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100/300 AREA UNIT MANAGERS MEETING
APPROVAL OF MEETING MINUTES

March 10, 2011

APPROVAL: _____ Date 3/10/2011
Mark French, DOE/RL (A3-04)
River Corridor Project Manager

APPROVAL: _____ Date 3/10/11
Briant Charboneau, DOE/RL (A6-33)
Groundwater Project Manager

APPROVAL: _____ Date 3/10/11
Nina Menard. Ecology (H0-57)
Environmental Restoration Project
Manager

APPROVAL: _____ Date 3/10/11
Laura Buelow, Rod Lobos, or Christopher
Guzzetti, EPA (B1-46)
100 Area Project Manager

APPROVAL: _____ Date 3-10-2011
Larry Gadbois, EPA
(B1-46)
300 Area Project Manager

Attachment A

100/300 AREA UNIT MANAGER MEETING
ATTENDANCE AND DISTRIBUTION
February 10, 2011

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Attachment B

Attachment C

100/300 Area UMM
Action List
January 13, 2011

Open (O)/ Closed (X)	Action No.	Co.	Actionee	Project	Action Description	Status
X	100-177	RL	J. Neath	100-D and 100-H	Based on the July 2009 100/300 Area Unit Manager Meeting, Agreement 1, DOE-RL will include notation flags in WIDS to identify which waste sites exceed WAC 173-340 (2007) cleanup levels where so evaluated by Ecology.	Open: 4/8/10; Action: 1/13/10 (will be incorporated into MP-14 which is being revised)
X	100-179	RL	J. Neath	All	DOE will develop in coordination with EPA and Ecology an agreed protocol for interim site closure for waste sites determined to be co-located with orchard affected land.	Open: 8/12/10; Action: 12/16/10 (TPA CN-401)

Attachment D

100 & 300 AREA UNIT MANAGER MEETING MINUTES

Groundwater and Source Operable Units; Facility Deactivation, Decontamination, Decommission, and Demolition (D4); Interim Safe Storage (ISS); and Mission Completion

February 10, 2011

ADMINISTRATIVE

- Next Unit Manager Meeting (UMM) – The next meeting will be held March 10, 2011, at the Washington Closure Hanford (WCH) Office Building, 2620 Fermi Avenue, Room C209.
- Attendees/Delegations – Attachment A is the list of attendees. Representatives from each agency were present to conduct the business of the UMM.
- Approval of Minutes – The January 13, 2011, meeting minutes were approved by the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and U.S. Department of Energy, Richland Operations Office (RL).
- Action Item Status – The status of action items was reviewed and updates were provided (see Attachment B).
- Agenda – Attachment C is the meeting agenda.

EXECUTIVE SESSION (Tri-Parties Only)

Executive Session: An Executive Session was not held by RL, EPA, and Ecology prior to the February 10, 2011, UMM.

INTEGRATED SCHEDULE FOR CROSS-CUTTING ISSUES AND DOCUMENTS

A new standing agenda item was included for discussion of cross-cutting issues and documents. Attachment 1 was handed out and presents information for the final Remedial Investigation/Feasibility Study preliminary remediation goals input/refinements.

100-F & 100-IU-2/100-IU-6 AREAS (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. Attachment 3 provides a schedule and map showing the status of remediation at 100-IU-2 and 100-IU-6. Attachment 4 provides a WHC Interoffice Memorandum of the 100-IU-2 and 100-IU-6 Recontour, Backfill, and Revegetation Recommendation. No issues were identified and no action items were documented.

Agreement 1: Attachment 5 documents an agreement between DOE/EPA on a chrome sampling strategy for 100-F-57.

100-D & 100-H AREAS (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. Attachment 6 provides aerial photographs of the progress on the new 100-DX and 100-HX pump and treat systems. No issues were identified and no action items were documented.

Agreement 1: Attachment 7 documents Ecology approval of the waste staging area for 116-H-5.

Agreement 2: Attachment 8 documents Ecology approval for additional excavation and sampling at the 116-H-5.

Agreement 3: Attachment 9 documents EPA approval for a non-contiguous onsite determination for spent nuclear fuel to be shipped from the 100-H Area to the 100-D area for consolidation and ultimate shipment to the 100-K West fuel storage basin and subsequently to the 200 Area Container Storage Building.

100-N AREA (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. Attachment 10 provides 2 aerial photographs of the 100-N rivershore and various groundwater remediation details. Attachment 11 provides status and information for D4/ISS at 100-N. No issues were identified and no agreements or action items were documented.

100-K AREA (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. No issues were identified and no agreements or action items were documented.

100-B/C AREA (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. Attachment 12 provides a schedule and map showing the status of remediation at 100-C-7. Attachment 13 provided aerial photographs of the 100-C-7. No issues were identified and no action items were documented.

Agreement 1: Attachment 14 documents EPA and DOE approval to send non-contaminated inert debris from 100-C-7 to U Canyon.

300 AREA – 618-10/11 (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. No issues were identified and no action items were documented.

Agreement 1: Attachment 15 provides the EPA and DOE approved air monitoring plan for 618-10. Attachment 16 provides the Total Effective Dose Equivalent calculation used to support preparation of the 618-10 air monitoring plan.

300 AREA - GENERAL (GROUNDWATER, SOILS, D4/ISS)

Attachment 2 provides status and information for groundwater. Attachment 17 provides status and information for field remediation activities. No issues were identified and no agreements or action items were documented.

REGULATORY CLOSEOUT DOCUMENTS OVERALL SCHEDULE

No issues were identified and no agreements or action items were documented.

MISSION COMPLETION PROJECT

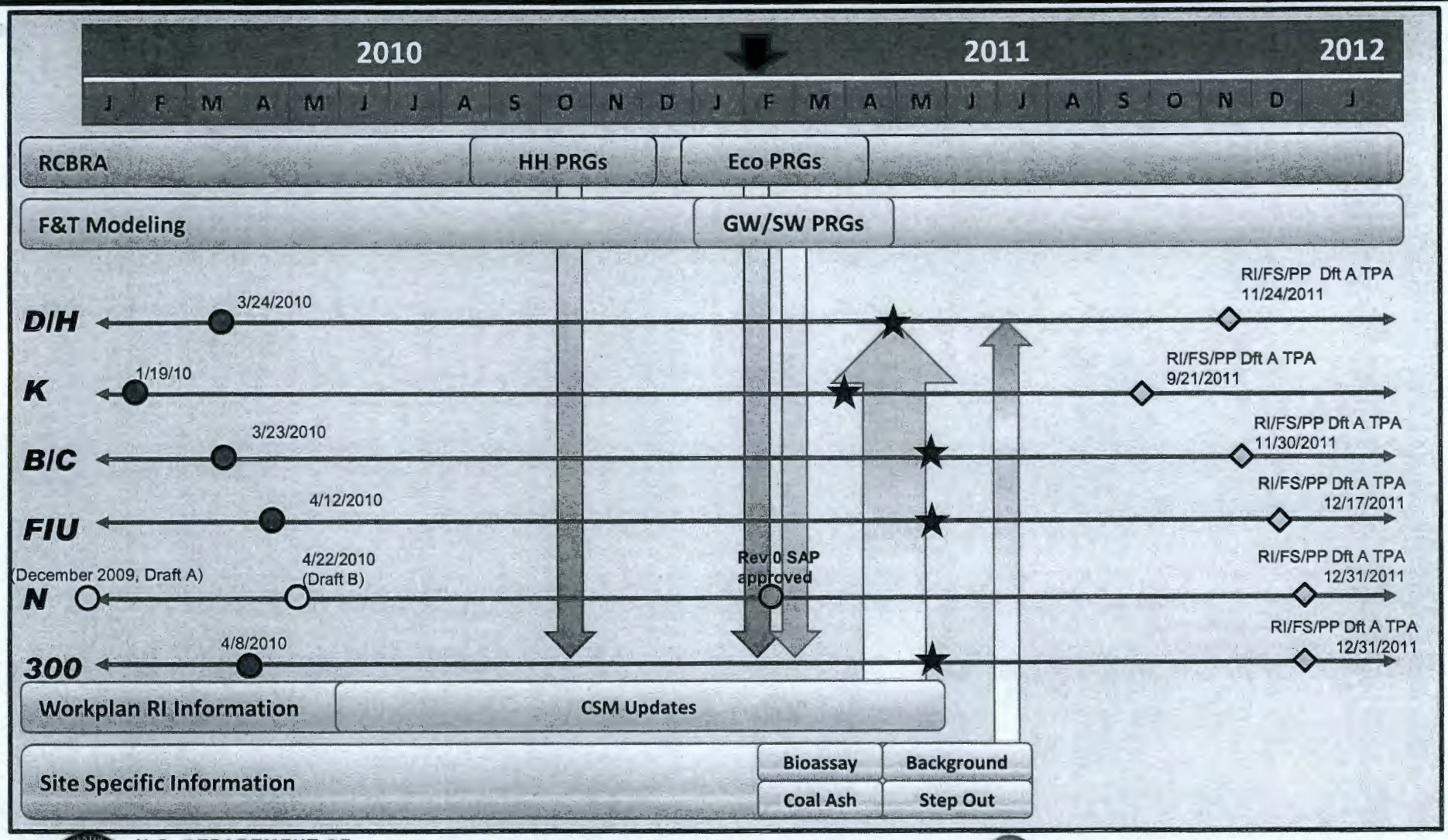
Attachment 18 provides status or information regarding the Orphan Sites Evaluations, Long-Term Stewardship, River Corridor Baseline Risk Assessment, the Remedial Investigation of Hanford Releases to the Columbia River, and a Document Review Look-Ahead. No issues were identified and no agreements or action items were documented.

5-YEAR RECORD OF DECISION ACTION ITEM UPDATE

Attachment 19 provides the latest status of the CERCLA Five-Year Review action Items. No issues were identified and no agreements or action items were documented.

Attachment 1

RI/FS PRG Inputs/Refinement



U.S. DEPARTMENT OF ENERGY

WP Draft	WP Rev 0	WP Data in HEIS	TPA Target Date
○	●	★	◇

CH2MHILL
Plateau Remediation Company

River Corridor Characterization Activity Summary

Field Activities

	Boreholes		RI/FS Wells		Test Pits		Aquifer Tubes	
	Required	Complete	Required	Complete	Required	Complete	Required	Complete
D/H	10	9	15	10	5	4	6	6
K	2	2	13	12	N/A	N/A	3	3
BC	8	8	10	8	3	3	9	9
FIU	3	0	3	3	N/A	N/A	N/A	N/A
N	N/A	N/A	8	0	N/A	N/A	12	12
FF-5	3	0	16	10	N/A	N/A	N/A	N/A
Total	*26*	*19*	*65*	*53*	*8*	*7*	*30*	*30*

N/A - no samples required

Activity Summary 2/3/11

U.S. DEPARTMENT OF ENERGY

CH2MHILL Plateau Remediation Company

River Corridor Characterization Activity Summary

Number of Samples Required By SAP*

	Boreholes		RI/FS Wells		Test Pits		Aquifer Tubes	
	Required	Complete	Required	Complete	Required	Complete	Required	Complete
D/H	208	145	368	255	27	9	6	6
K	83	73	686	593	N/A	N/A	3	3
BC	239	206	508	427	7	0	9	9
FIU	36	0	79	75	N/A	N/A	N/A	N/A
N	N/A	N/A	224	0	N/A	N/A	12	12
FF-5	75	0	440	372	N/A	N/A	N/A	N/A
Total	*639*	*424*	*2305*	*1722*	*34*	*9*	*30*	*30*

*Sample number required is based on SAP and adjustments in the field

N/A = no samples required

Activity Summary 2/3/11

U.S. DEPARTMENT OF ENERGY

CH2MHILL Plateau Remediation Company

River Corridor Characterization Activity Summary (cont'd)

Number of Samples Required By SAP

	DURA Sampling		Upwelling		% Total Samples Collected	% Total Data in HEIS
	Required	Complete	Required	Complete		
D/H	156	156	N/A	N/A	75%	94%
K	54	54	N/A	N/A	88%	87%
BC	54	54	12	14	86%	91%
FIU	165	165	23	0	79%	94%
N	85	84	15	15	39%	92%
FF-5	96	96	N/A	N/A	77%	92%
Total	*610*	*609*	*50*	*29*	*77%*	

*Sample number required is based on SAP and adjustments in the field
N/A = no samples required

Activity Summary 2/3/11

U.S. DEPARTMENT OF ENERGY

CH2MHILL
Plateau Remediation Company

River Corridor Characterization Activity Summary

Additional Samples (Covering all OUs)

Bioassay Sampling				
Type of Sampling	Planned	Complete	% Total Samples Collected	% Total Data in HEIS
Chemical Analysis	110	0	0%	0%
Bioassay	70	0	0%	0%

Background Sampling*			
Required	Complete	% Total Samples Collected	% Total Data in HEIS
190	0	0	0

*Samples are being gathered from archive collections. Number may change based on sample condition/accessability.

Activity Summary 1/24/11

U.S. DEPARTMENT OF ENERGY

CH2MHILL
Plateau Remediation Company

Attachment 2

100/300 Areas Unit Managers Meeting
February 10, 2011

100-FR-3 Operable Unit—Nathan Bowles / Mary Hartman

(M-015-64-T01, 11/30/2011, Submit CERCLA RI/FS Report and Proposed Plan for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units for groundwater and soil.)
Schedule Status - On schedule to meet TPA milestone. Field investigations are underway.

The three new RI monitoring wells were sampled in mid-January (first samples from the completed wells). Hexavalent chromium data are all that have been received to date, and are consistent with results from characterization sampling: 199-F5-52 = 4.5 ug/L; 199-F5-53 (RUM) = 2.4 ug/L; 199-F5-54 = 4.6 ug/L.

RI/FS characterization boreholes remain to be drilled and sampled. The kickoff meeting for this work was held on February 3, 2011, and field work is expected to begin by February 9, 2011.

Collection of additional upwelling (river pore water) samples was initiated on February 7, 2011, to support the RI/FS report. This sampling is being conducted under TPA-CN-391 (adding scope to the 100-F and IU-2/6 RI/FS SAP) as approved by DOE/RL and EPA.

Temporary aquifer sampling tubes were installed at five locations in the base of the 600-127 waste-site excavation (under TPA-CN-400) and were sampled (for shallow groundwater from below the base of the excavation). The analytical results are now in. No TPH or vinyl chloride was detected in the groundwater samples. TCE was detected at low levels at 3 sites, with a maximum of 2.3 ug/L. All of the detected results were flagged "J," meaning they are estimates (close to the detection limit). One of the detections had a duplicate sample that was non-detect. The 600-127 site is near the known TCE groundwater plume, so it's not surprising to see TCE in these samples. A determination will be made by RL and EPA on the removal of the temporary tubes.

Work is continuing on the 2010 site-wide annual groundwater report.

100-HR-3 Groundwater OU – Fred Biebesheimer / John Smoot

(M-15-70-T01, 07/30/2011, Submit feasibility study report and proposed plan for the 100-HR-1, 100-HR-2, 100-HR-3, 100-DR-1 and 100-DR-2 operable units for groundwater and soil).
Schedule Status - On schedule to meet TPA milestone. Field investigations were initiated following approval of the Rev. 0 RI/FS work plan documents. Drilling and sampling continue and are anticipated to be completed at the end of February.

- HR-3 Treatment System
  - For the period January 1 through 31, 2011:
    - The system is pumping with four wells from the 100-D North plume (199-D8-53, 199-D8-54, 199-D8-68, and 199-D8-72), two RUM wells in 100 H Area (199-H3-2C & 199-H4-12C), and three wells in H Area along the river (unconfined; 199-H4-15A, 199-H4-3, and 199-H4-63)
    - Total average flow through the system was 194 gpm.
      Average influent hexavalent chromium concentration for H Area was 34 ug/L
      Average influent hexavalent chromium concentration for D Area was 131 ug/L
- DR-5 Treatment System
  - For the period January 1 through 31, 2011:
    - The DR-5 is running with two wells downgradient of the North plume (199-D5-20 and 199-D5-92) and two wells slightly downgradient of the "hot spot" in the South plume (199-D5-39 and 199-D5-104). The system is in the process of being transitioned to DX.

  - Total average flow through the system was 27 gpm
  - The average influent hexavalent chromium concentration was 1021 ug/L.

- DX Pump and Treat system
  - For the period January 1 through 31, 2011:
    - The DX pump and treat system was turned over to operations on 12/16/2010, and the system is beginning to enter the Operations Test Procedure.
    - Total average flow through the system is 500 gpm.
    - The average influent hexavalent chromium concentration was 317 ug/L.

- ISRM Pond Sealing.
  - Waiting for ISRM pond liquids to finish evaporation.
  - CHPRC is evaluating decommissioning path forward, upon completion of the evaluation, a meeting will be held to present recommendations.

- Planned treatment capacity at the 100-HX facility is 800 gpm. The formal HX design is being issued. Construction is underway on road maintenance, HDPE pipe runs (215,025 of 318,000), and 24 of 27 road crossings have been completed. Process building construction is complete, and the site is being prepared for process equipment installation. Major process building efforts include wiring inside lighting and running conduit. Transfer building construction is almost complete.

- In situ Bioremediation Treatability Test
  - Formal comment resolution on the document is on-going, and has been delayed due to staff support of the RI/FS process.

- EM-22 Technology Projects
  - Investigation for mending ISRM Barrier: Laboratory studies into alternative ZVI amendments and dispersants were completed, and the results are being documented, a report is expected to be issued in March 2011.

- RI/FS Activities
  - All three spatial and temporal uncertainty groundwater sampling events have been conducted. Data are still being received from the laboratories.
  - RI/FS aquifer tube installation and three sampling rounds are completed.
  - Drilling and installation has been completed at wells 199-H6-4, 199-H3-6, 199-H6-3, 199-H1-7, 199-H3-7, 199-D5-132, 199-D5-133, 199-D6-3, 199-D5-140 and 199-D3-5. Wells 199-D5-134 and 199-H3-9 are underway.
  - Installation and sampling of boreholes C7855, C7862, C7857, C7851, C7850, C7852, C7863, C7861, have been completed. C7864 is underway. Boreholes C7852, C7857, and C7863 were converted into monitoring wells.
  - Test pits have been installed at 1607-H4, 116-H2, 100-D-4, and 116-D-4. Test pit 100-D-12 is on hold pending overhead power issue resolution.

<u>100-NR-2 Groundwater OU – Nathan Bowles / Deb Alexander</u>

(M-015-61, 12/31/2009, Submit RI/FS Work Plan for the 100-NR-1 and 100-NR-2 Operable Units.)

Schedule Status- TPA milestone met by DOE/RL submittal of Draft A document to Ecology on December 22, 2009. Ecology comments on the Draft B version of the document are being resolved and incorporated into a Rev. 0 document. Until the work plan is finalized and to expedite the well drilling work, the RI/FS SAP was finalized to a Rev. 0 to include 8 agreed-upon wells prior to final

approval of the work plan addendum. This Rev. 0 SAP was approved by DOE/RL, Ecology, and EPA in January. The SAP will be revised to a Rev. 1 alongside the finalization of the Rev. 0 work plan addendum.

(M-015-60, six months after the ROD amendment [03/29/2011], if an amendment to the 100-NR-1/2 Record of Decision for Interim Action is issued, DOE shall submit an RD/RA Work Plan.)
Schedule Status - On schedule to meet TPA milestone. The revision to the NR-1/2 OU Interim Action Remedial Design/Remedial Action Work Plan has continued with an internal review complete and a decisional draft being prepared for DOE/RL review which is expected to begin during the second week of February (following technical editing). In order to meet this milestone, the draft revision is due to the regulators within six months of the IROD Amendment issue date, resulting in a March 29, 2011 due date.

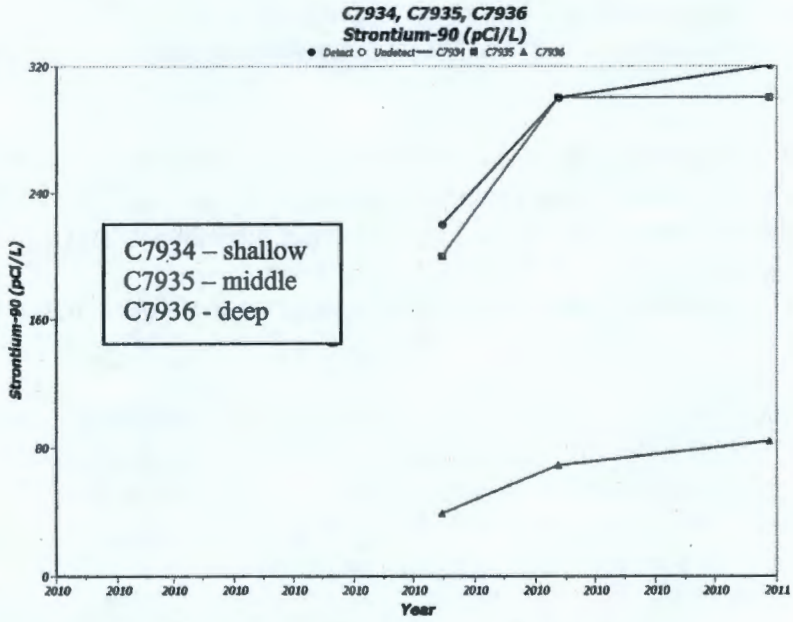
(M-015-62-T01, 12/31/2011, Submit a Feasibility Study [FS] Report and Proposed Plan [PP] for the 100-NR-1 and 100-NR-2 Operable Units including groundwater and soil. The FS Report and PP will evaluate the permeable reactive barrier technology and other alternatives and will identify a preferred alternative in accordance with CERCLA requirements.)
Schedule Status - Future schedule status will depend on approval of 100-N RI/FS work plan addendum.

- 100-N Integrated Groundwater Sampling and Analysis Plan – The Draft A document was submitted to Ecology by RL on June 2, 2010, and is still under Ecology review. Ecology review of this document is temporarily on hold to allow resources to focus on higher-priority documents agreed to by DOE/RL and Ecology. Based on recent work associated with the revision to the NR-2 RD/RA Work Plan, this SAP will likely need revision to a Draft B.

- RI/FS Activities
  - River pore water sampling: Sample collection for the upwelling (river pore water) from the bottom of the Columbia River adjacent to the 100-N shoreline as planned in the NR-2 river pore water SAP (DOE/RL-2010-69) was completed in December. Final data packages are in, and the results are being evaluated.
    - Fifteen sample sets were collected in two general areas as planned in the SAP.
    - The first three samples were collected around the location of previous chromium detection from a sample collected during the WCH pore water sampling activities. This location was revisited during the CHPRC sampling effort and samples were taken from three locations around the previous sample location (one of the three was essentially the same as the original WCH location). All three samples were non-detect for hexavalent chromium. As expected, Sr-90 was detected at all three of these locations, TPH-Diesel Range (TPH-D) was detected at only one of these locations, and tritium was detected at all three locations.
    - Ten other sample locations along a transect starting just above the N-outfall and continuing downstream for approximately 200 m were also sampled. The transect generally followed the 116 m river-bottom elevation, which is where the Ringold Fm. is believed to intersect the river bottom. The upriver portion of this transect was in this general area where Sr-90 was detected during the WCH pore water sampling activities. Sr-90 was only detected at two locations; one near the outfall and one ~22 m downstream from the outfall. The sampling point between these two detections was non-detect for Sr-90. No hexavalent chromium was detected along these ten transect sample points. TPH-

D was not detected in any of these samples. Tritium was detected at all but one sampling location.

A new set of aquifer tubes (C7934, 35, 36) near the outfall also has had detections for Sr-90. The figure below shows the trend plots from that set of aquifer tubes. The results from the aquifer tube and pore water sampling are being included and discussed in the 2010 annual groundwater report and will also be included in the 100-N RI/FS Report.



- Spatial-and-temporal groundwater well sampling: The third round of sampling was initiated in January, and as of February 9, 2011, 24 of the wells have been sampled. The one remaining well, 199-N-18, is located within the NR-2 TPH-diesel plume. Following sampling of this remaining well, all of the spatial-and-temporal groundwater sampling requirements of the Rev. 0 RI/FS SAP will be satisfied.
- Well drilling: Preparations are continuing for drilling and sampling of the eight proposed RI/FS wells. The drilling subcontract is expected to be awarded by mid February, and drilling is scheduled to be initiated by the end of February.

- Annual Reports
  - Work is continuing on the 2010 site-wide annual groundwater report and the 100 Areas pump-and-treat performance report.

- Phytoextraction
  - Ecology comments on the Draft A TTP for conducting a "hot" demonstration-scale treatability test of phytoextraction at the NR-2 site are being reviewed for response and incorporation into the document.

- Apatite PRB
  - Preparations for implementing the 600-foot Barrier Expansion Design Optimization Study (DOS) in the saturated zone are being resumed. Initiation of the injections is now planned for

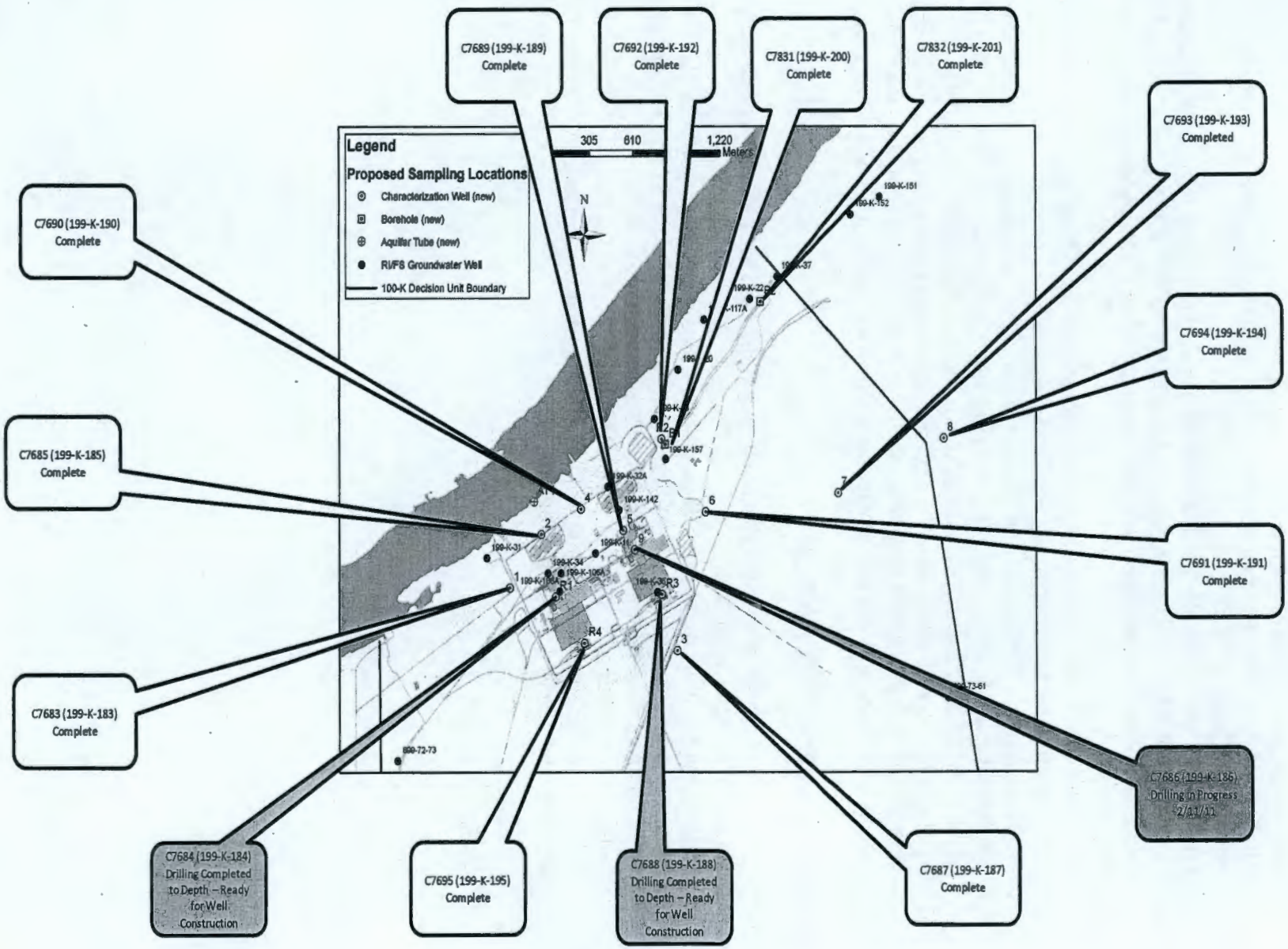
March. Currently all equipment is being checked and sampling paperwork reviewed in preparation for the start of the injections later this spring.

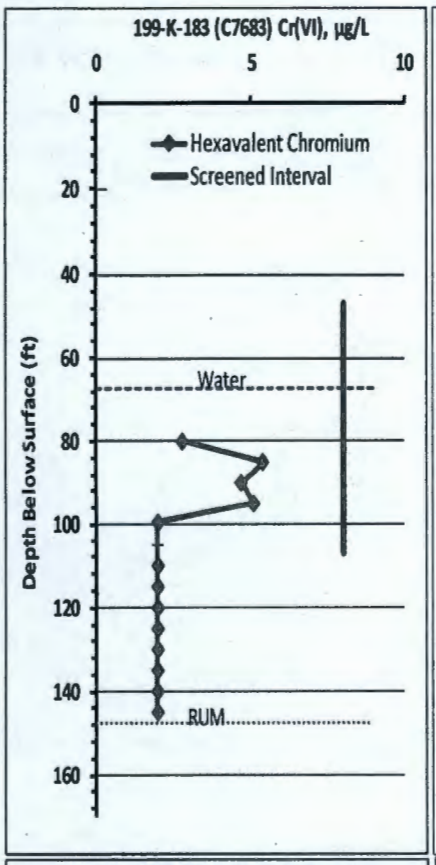
- The Jet Injection DOS was approved in January. Planning activities are continuing for implementing this study.
- Field pilot testing of the NR-2 infiltration gallery was performed in September through November of 2010. This pilot testing was conducted by PNNL using water with a bromide tracer. The draft final report on this test was prepared by PNNL, and is currently being reviewed internally.
- Data packages for the 171 new well installations are all in and are still being evaluated. A final report on all these wells and the data is in preparation.
- The final quarterly performance monitoring required for the original apatite barrier injections (performed in 2006, 2007, and 2008) was performed in August, 2010. Monitoring of this portion of the PRB will be biannually for the next two years, with samples scheduled to be collected in April and October of each year. The next sampling event will be later this spring or early summer and is dependent on the Columbia River stage; samples are going to be collected at the highest river stage possible to allow for sampling of the Hanford fm. monitoring wells.

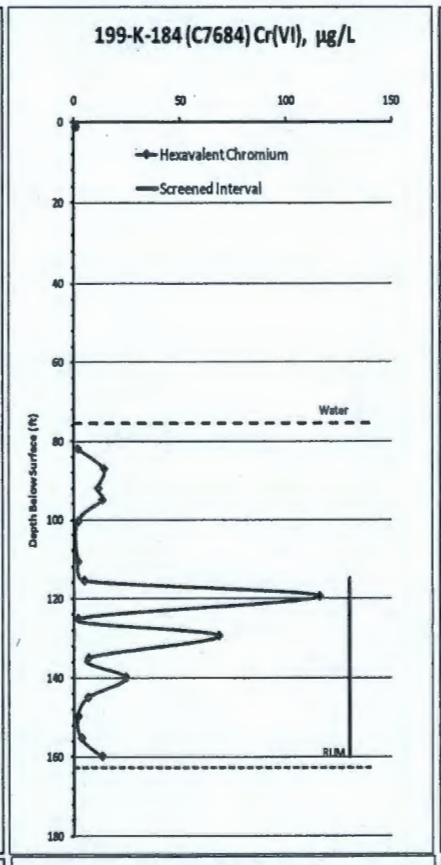
100-KR-4 Groundwater OU – Art Lee

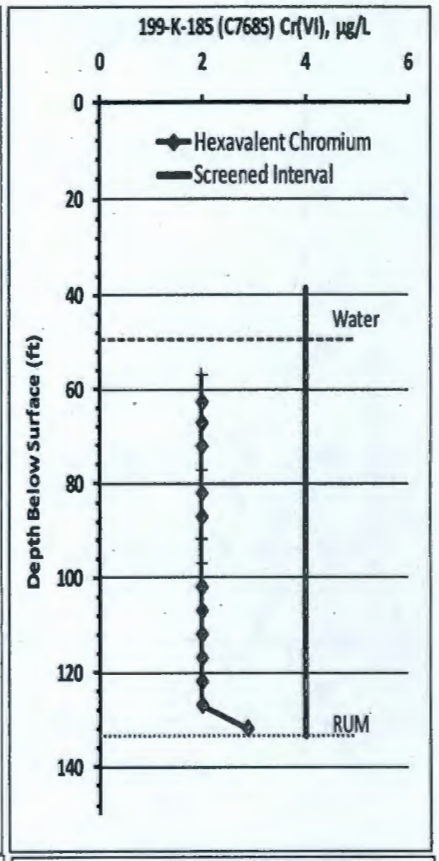
- RI/FS Activities:
  - All rounds of spatial temporal well sampling complete and groundwater risk assessment completed to identify COPCs
  - Drilling and sampling of 2 boreholes completed – completed as temporary wells. Groundwater samples were collected at the end of January with results showing 31 and 107 ppb hexavalent chromium contamination in C7831 and C7832, respectively.
  - Drilling and sampling for 12 of 13 wells completed
  - Drilling and sampling of remaining well (C7686) currently in progress
  - Development of RI/FS report in progress

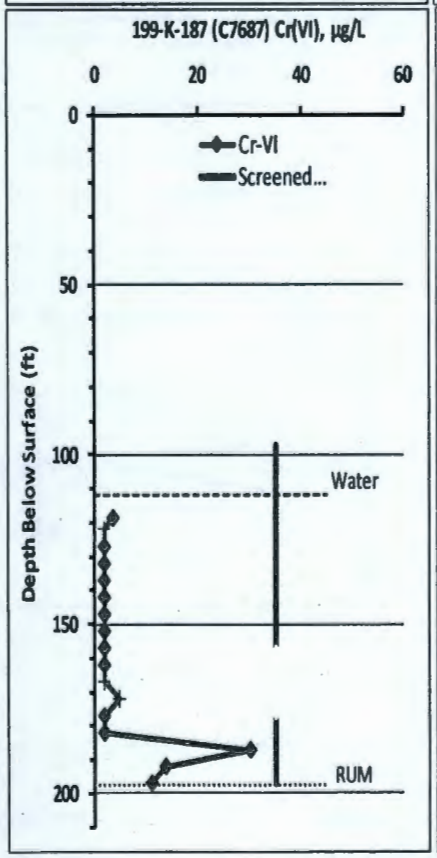
100/300 Areas Unit Managers Meeting
February 10, 2011

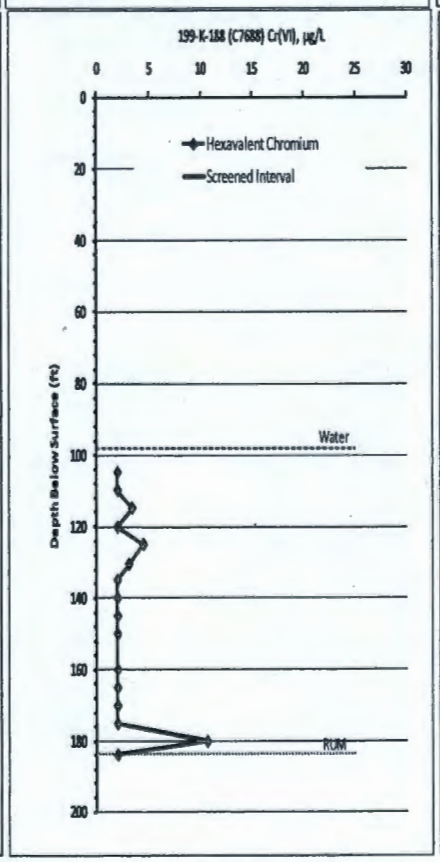


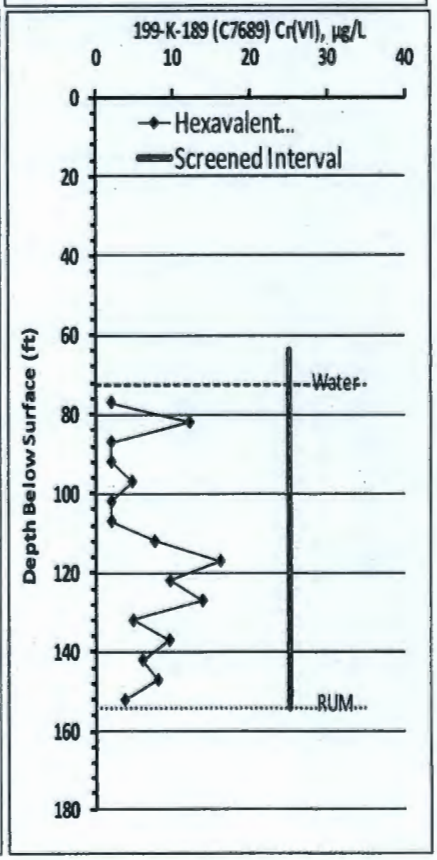

199-K-183 (C7683) Cr(VI), µg/L
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)

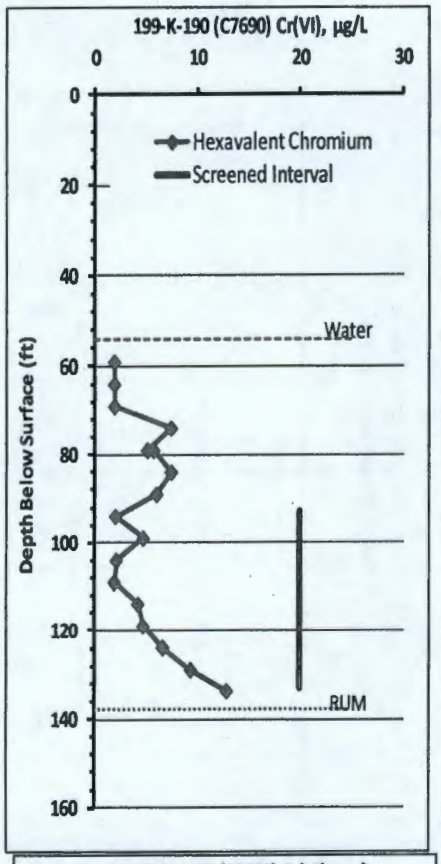

199-K-184 (C7684) Cr(VI), µg/L
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)

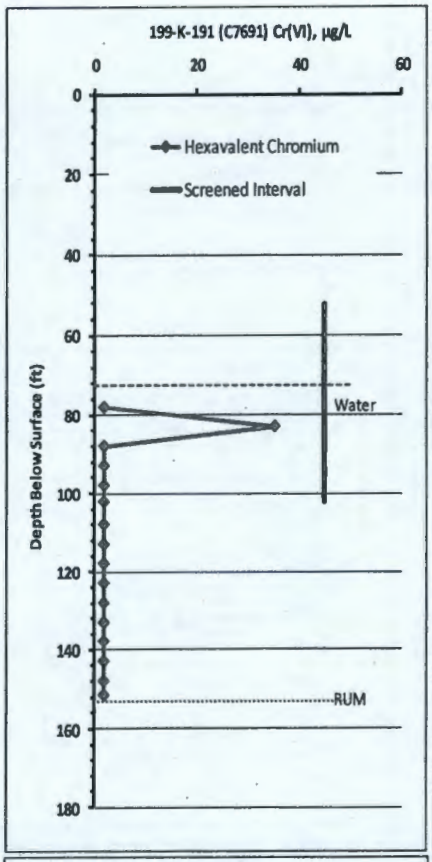

199-K-185 (C7685) Cr(VI), µg/L
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)


199-K-187 (C7687) Cr(VI), µg/L
Cr-VI
Screened...
Water
RUM
Depth Below Surface (ft)


199-K-188 (C7688) Cr(VI), µg/L
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)


199-K-189 (C7689) Cr(VI), µg/L
Hexavalent...
Screened Interval
Water
RUM
Depth Below Surface (ft)


199-K-190 (C7690) Cr(VI), µg/L
0
10
20
30
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
20
40
60
80
100
120
140
160


199-K-191 (C7691) Cr(VI), µg/L
0
20
40
60
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
20
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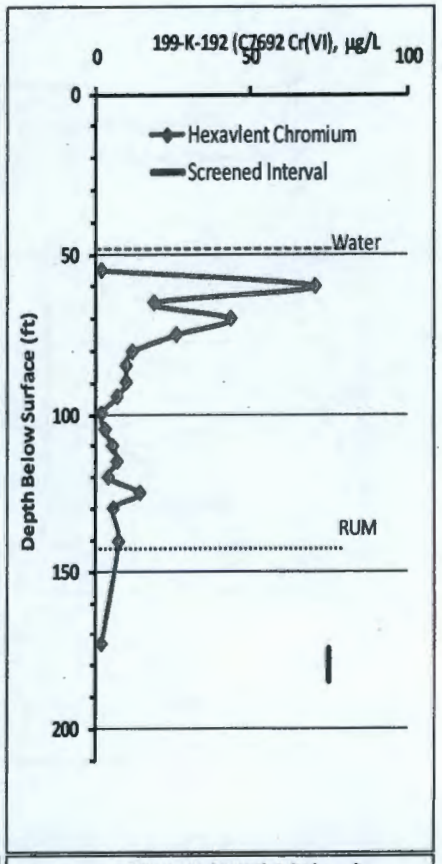
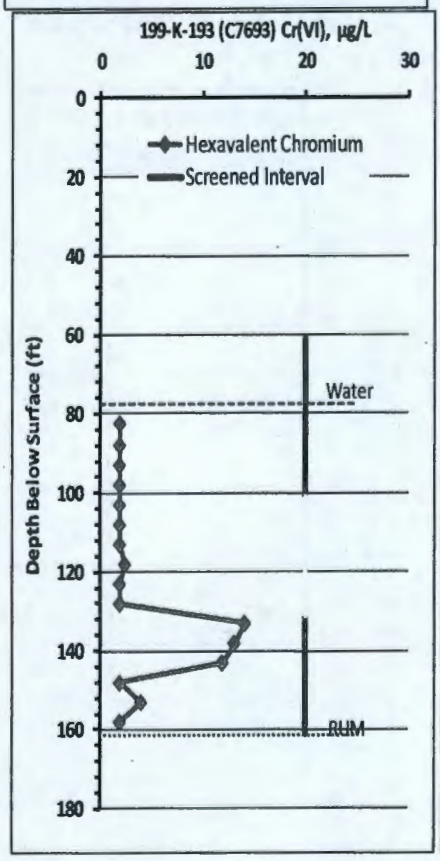
60
80
100
120
140
160
180


199-K-192 (C7692 Cr(VI), µg/L
0
50
100
Hexavlent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
50
100
150
200


199-K-193 (C7693) Cr(VI), µg/L
0
10
20
30
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
20
40
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80
100
120
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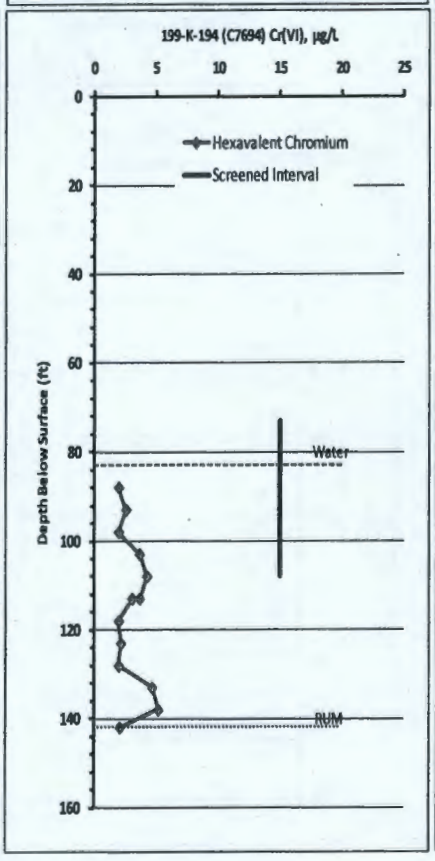
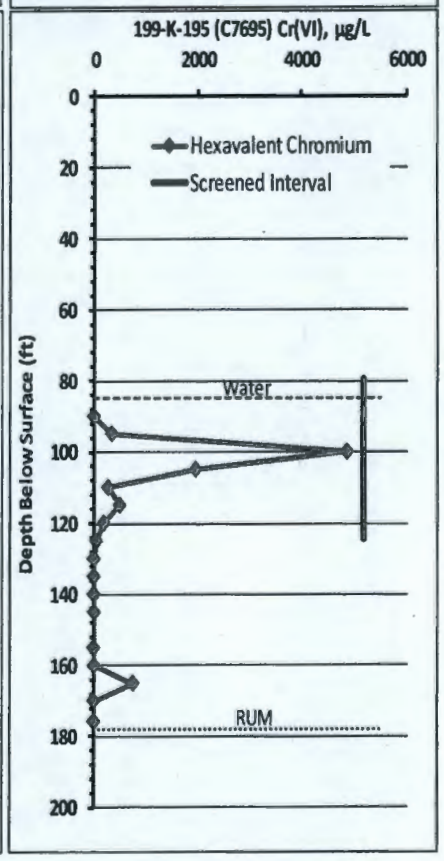
160
180


199-K-194 (C7694) Cr(VI), µg/L
0
5
10
15
20
25
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
20
40
60
80
100
120
140
160


199-K-195 (C7695) Cr(VI), µg/L
0
2000
4000
6000
Hexavalent Chromium
Screened Interval
Water
RUM
Depth Below Surface (ft)
0
20
40
60
80
100
120
140
160
180
200

100/300 Areas Unit Managers Meeting
February 10, 2011

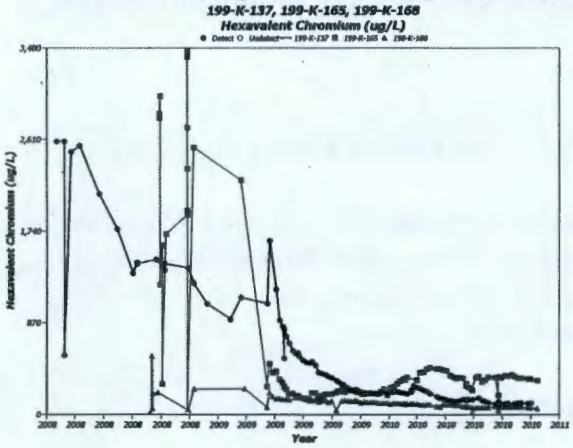
- Pump and Treat Systems Expansions and Modifications:
  - Phase 3 Realignment is in progress to add 1 new extraction well to KW, 2 new extractions wells to KR-4, and 6 spare lines to KX P&T systems
    - Well drilling ready to start when drill rig is available from RI drilling
    - Completed construction walk down of KR-4 transfer building #1 modifications for Phase 3 realignment to add two new future extraction wells (to be drilled) to the KR-4 P&T system
    - Initiated staging for Phase 3 modification work at the KW pump and treat facility
  - The KR-4 pump and treat system was restarted on January 14, 2011 following PLC upgrades and well head modifications. Unattended operations to continue running the system overnight established on January 17, 2011. Completion of acceptance testing of upgrades in progress.
  - Conversion of 2 monitoring wells at KX (199-K-152 and 199-K-182) and 1 monitoring well at KW (199-K-173) to extractions wells is in progress to treat areas with higher hexavalent chromium contamination. Two extraction wells at KX are being converted to monitoring wells (199-K-149 and 199-K-150) as hexavalent chromium contamination at the wells is <10 ppb.
  - Planning is underway for implementing RPO recommendations for additional wells to support 2020 groundwater cleanup target.
  - Process Test Plan for Implementation of ResinTech SIR-700 in the KW pump and Treat Facility has been prepared. ResinTech staff visited the site on January 19, 2011 to tour and discuss SIR-700 resin performance at DX and plans for process test at KW. ResinTech staff will provide more information and suggestions for the test.

- Pump and Treat Operations:
  - Work is continuing on the 2010 Annual Pump-and-Treat Performance Report for RL review in April.
  - The KR-4 Pump and Treat system has been restarted following the PLC upgrades. Several extraction wells have hexavalent chromium contamination levels below 10 ppb and the extraction wells are running at reduced flow rate to maintain resin performance
  - KX and KW pump and treat systems are operating normally.
    - Average Flow Rates in January:
      - KX - 479 gpm with 199-K-149 and 150 shut off
      - KW - 198 gpm (99% capacity)
      - KR4 - 99 gpm with reduced flow at <10 ppb wells
    - Cr(VI) Removed in January:
      - KX - 6.8 pounds (avg influent 39.6 ppb)
      - KW - 7.2 pounds (avg influent 101.4 ppb)
      - KR4 - 0.7 pounds (avg influent 18.8 ppb)
  - Resin Authorized Limit Application has been revised to add C-14 as a COC so that totes containing KW resin can be sent offsite for regeneration. The revised ALA has been approved internally by CHPRC and transmitted to RL on January 13, 2011 for approval.

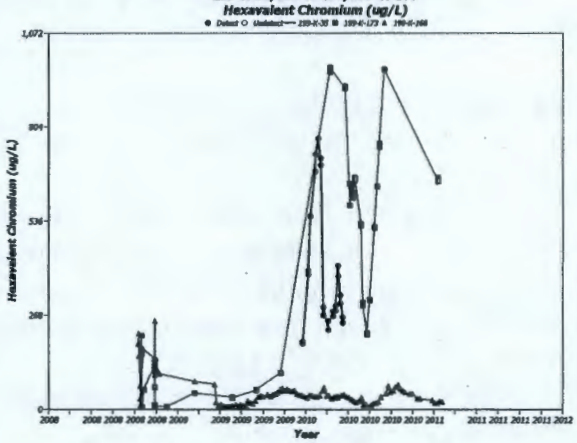
- Monitoring Activities:
  - Monthly Cultural Monitoring: The monitoring was conducted on January 21, 2011. No problems were observed.
  - Routine Monitoring:
    - Average monthly values from KW extraction wells were at or above the 20 µg/L aquatic standard in November and December, except for 199-K-132 which was at 18.5 ug/L.
    - Well 199-K-173 is being converted to an extraction well to the KW P&T to address high Cr6+ detected at the monitoring well (968 ug/L in August and 659 µg/L in Jan 2011).

- Wells 199-K-149 and 199-K-150 in the KX Northern plume are below 10 ppb and are being converted to monitoring wells. Wells 199-K-152 and 199-K-182 will serve as replacement extraction wells.
- Long-term decreases in overall Cr6+ levels observed at KX extraction wells at Northeast end of the K-2 Trench. Only well 199-K-22 and new shallow RI/FS well 199-K-201 at 116-K-2 trench show continuing high values above 100 µg/L.
- Wells 199-K-29 and K-30 located within excavation zone of buildings 115-KE and 117-KE are being decommissioned in support of subsurface remediation. The wells were geophysically logged and water samples collected prior to decommissioning.
- Well 199-K-18, which has shown an increasing Cr6+ concentration trend since December 1996, now has two quarters of results with decreasing Cr6+ concentrations. After peaking at 190-200 µg/L in Spring 2010, concentrations have declined to 173 and 131 µg/L in August 2010 and January 2011. Hexavalent chromium concentrations at the downgradient extraction wells 199-K-162 and K-120A declined or remained below 10 µg/L for January. Extraction well 199-K-145 declined from 62 to 46 µg/L between early October 2010 to 46 µg/L in January 2011.

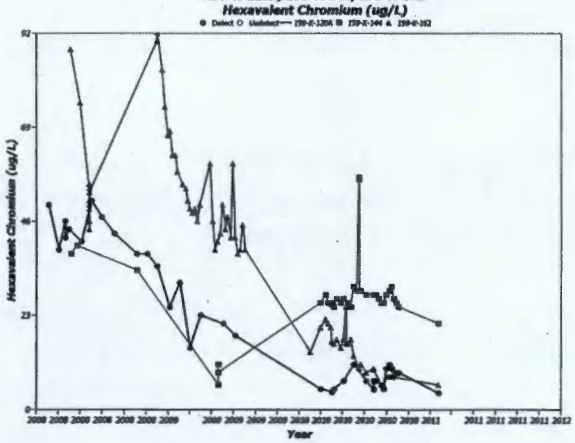
Extraction Wells, High Cr6+ Plume Segment, KW P&T



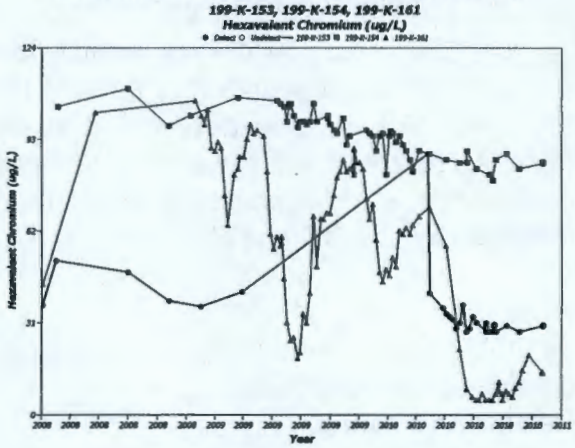
Monitoring Wells KW P&T

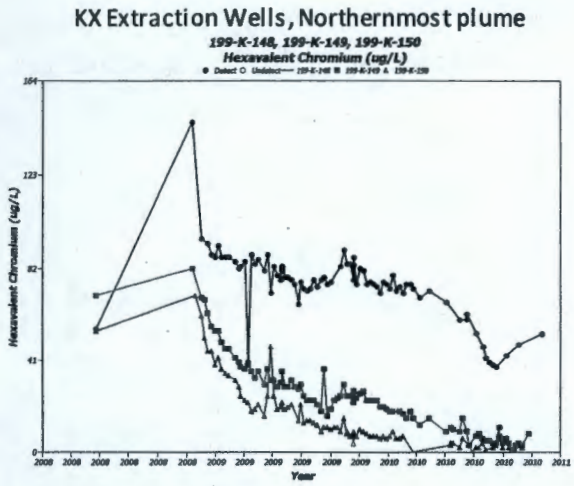


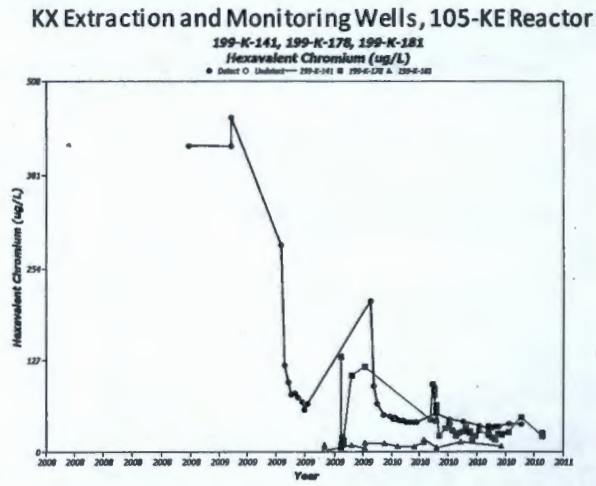
KR-4 SW Extraction Wells 116-K-2 Trench



KX Plume, Northeast End of 116-K-2 Trench







<u>100-BC-5 Operable Units—Nathan Bowles / Mary Hartman</u>

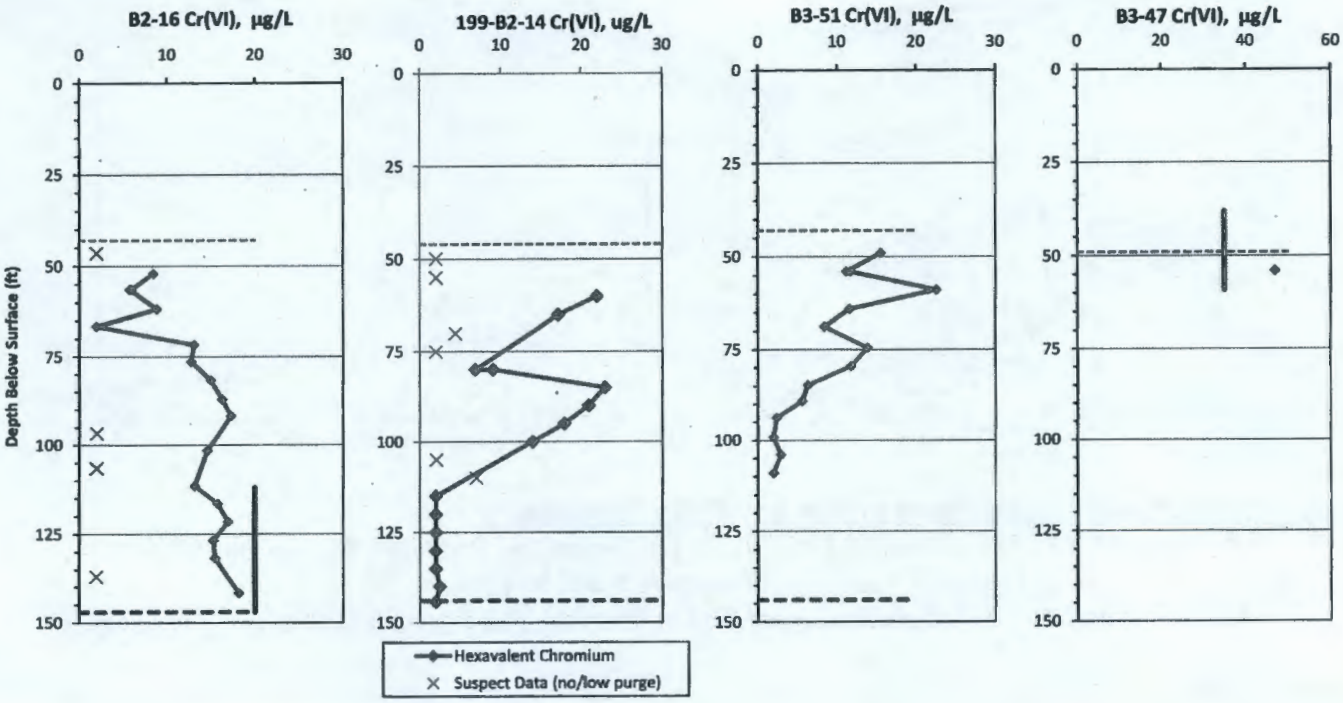
(M-015-68-T01, 11/30/2011, Submit CERCLA RI/FS Report and Proposed Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units for groundwater and soil.)

Schedule Status - On Schedule to meet TPA milestone. Field investigations are underway.

Status of RI well drilling:

C7508	199-B8-9	Sample ready
C7783	199-B2-15	Finished; awaiting final walk-down
C7784	199-B2-16	Finished; awaiting final walk-down
C7785	199-B3-51	Being drilled
C7786	199-B4-14	Sample ready
~~C7787~~	~~199-B5-7~~	Hit boulder. Moved 3 ft; see C8244
C8244	199-B5-8	Replacement for C7787. Being drilled

Well C7785 (199-B3-51) is located adjacent to older monitoring wells 199-B3-47 (water table) and 199-B2-12 (RUM). The plan is to screen 199-B3-51 at the base of the unconfined aquifer, unless chromium concentrations are high at another depth. So far the chromium concentrations have generally declined with depth. The graphs below show chromium profiles in the three new wells located near the river, plus an older well (B3-47). Well B2-16, located farthest west, has a different profile from B2-14 and B3-51. Note that concentrations in the upper part of the aquifer at B3-51 (in characterization samples) are lower than in adjacent monitoring well 199-B3-47. Dissolved oxygen of water samples from B3-51 has typically been >7 mg/L so the samples are believed to be representative.



Well C8244 (199-B5-8) is being drilled southeast of 100-B/C Area. As of 2/2/2011, the borehole was at approximately 170 ft depth (expected depth is 255 ft). Hexavalent chromium concentrations have ranged from <2 to 4.7 ug/L. Unless we find unexpected contamination the well will be screened at the water table.

The vadose borings have all been completed. Five were previously decommissioned after obtaining a water sample; two were completed as PVC wells and were sampled for groundwater during the first week of February.

The 100-BC test pits were completed and sampled in January.

Routine sampling of 100-BC Area wells began in January. This includes the four new wells installed last year and two of the newest RI wells.

Work is continuing on the 2010 site-wide annual groundwater report.

300-FF-5 Operable Unit—Mark Kemner/Bob Peterson

- (M-015-72-T01, 11/30/2011, Submit CERCLA RI/FS Report and Proposed Plan for the FF-5 Operable Units for groundwater and soil *Schedule Status - On Schedule to meet TPA milestone. Field investigations are underway.* The first 11 monitoring wells in the RI/FS work plan are complete. The remaining five temporary wells will be installed immediately after completion of C7662.
- All three rounds of RI/FS spatial and temporal groundwater sampling for 300-FF-5 have been completed. Replanned infiltration testing of tracer and polyphosphate is underway, with candidate sites in cultural and ecological review.

- Alternative emplacement testing field scale work is underway, with a candidate site identified and in cultural and ecological review.

- 300-FF-5 Operations and Maintenance Plan Activities (DOE/RL-95-73, Rev. 1, 2002)
  - *300 Area Subregion:*
    - The December semi-annual sampling event got underway in late January; some sampling associated with monthly requirements did occur during January. Plume maps and trend charts are being updated for 2010 in preparation for the annual groundwater report.
    - 324 Building hot cell issue: 300 Area RI/FS characterization borehole C7662 (#5, 399-4-15) was started in late January and drilled to total depth by February 4. No significant radiological contamination was encountered during drilling. Current plans are to complete the borehole as a water table monitoring well.
    - VOCs encountered during drilling: Trichloroethene and tetrachloroethene were detected in groundwater samples collected during drilling at C7661 (#4alt, 399-6-5, inland boundary of uranium plume) at concentrations well above the drinking water standard. The water sample was collected from Ringold sediment just below the saturated Hanford gravels, which contain uranium contamination. Peak concentration for trichloroethene was 200 ug/L and confirmed with a duplicate analysis. This detection, along with detections at C7659 (#3, 399-1-59, south end of 618-1 burial ground) and at C7656 (#6, 399-1-57, near the river), provide new information on the nature and extent of VOC contamination in finer-grained Ringold sediment within the unconfined aquifer.
    - Special sampling downgradient of the 618-7 Burial Ground remediation site: The most recent sampling of wells that monitor the plume created at this remediation site was conducted in late January. Concentrations nearest the burial ground are gradually declining from a peak of 225 µg/L. Weak evidence suggests that the plume has possible moved downgradient to well 399-3-6, where uranium concentrations are gradually increasing. Two new monitoring wells (399-6-3 and 399-6-5) have been completed along the downgradient migration pathway and will be available for sampling once final acceptance of the wells is completed.
    - Special sampling near the 618-1 Burial Ground/Acid Neutralization Pit remediation site: The most recent sampling occurred in mid-January, with results not yet available. The two wells sampled (399-1-2 and 399-1-21A) reveal concentration trends suggestive of uranium contamination mobilized by periodic high water table conditions.
  - *618-11 Burial Ground Subregion:* The most recent results are for samples collected in December 2010. Tritium values have remained relatively constant at the well closest to the likely area of release in the burial ground. Dispersion and radioactive decay have caused concentrations to gradually decrease in other portions of the plume.
  - *618-10 Burial Ground/316-4 Cribs Subregion:* Tributyl phosphate was detected in a December sample from 699-S6-E4A, which monitors groundwater beneath the former 316-4 cribs remediation site. While not detected during the previous several years, the recent detection is at a concentration consistent with earlier detections.

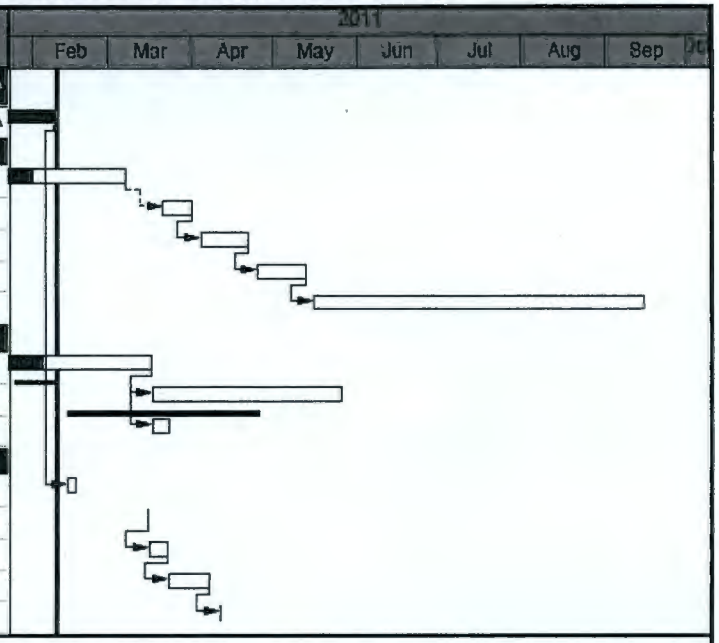
Att 2

Attachment 3

Field Remediation
IU-2/6
TPA Milestone M-16-56 (02-28-12)

Milestone Description: Complete Interim Remedial Actions for 100-IU-2 & 100-IU-6 Waste Sites

Activity ID	Activity Name	% Comp.	Rem Dur	Start	Finish
IU 2 & 6 Load-out			0.0	16-Dec-10 A	09-Feb-11 A
R003LE	600-3 ERDF Can Load-out	100%	0.0	16-Dec-10 A	09-Feb-11 A
IU 2 & 6 Backfill			121.0	29-Nov-10 A	15-Sep-11
IUBFILL001	IU 2 & 6 Close-out Procedure	65%	13.0	29-Nov-10 A	07-Mar-11
IUBFILL010	Award Contract	0%	8.0	21-Mar-11	31-Mar-11
IUBFILL020	Submittals	0%	12.0	04-Apr-11	21-Apr-11
IUBFILL030	PSR	0%	12.0	25-Apr-11	12-May-11
IUBFILL100	IU 2 & 6 Backfill	0%	69.0	16-May-11	15-Sep-11
600-149:1- Small Arms, Rifle & Pistol Range			59.0	03-Jan-11 A	25-May-11
6149R100	Coordinate and Remove UXO (High Density)	45%	19.0	03-Jan-11 A	16-Mar-11
6149C100	Prepare Final and Closure Reports	0%	40.0	17-Mar-11	25-May-11
6149R110	Disposal of UXOs (Army)	0%	4.0	17-Mar-11	23-Mar-11
600-186 - Construction Camp Septic System			32.0	14-Feb-11	11-Apr-11
6186PHASE12	Collection of 6/7 Samples	0%	4.0	14-Feb-11*	17-Feb-11
6186DP10	Cultural Release of Test Pit #4	0%	1.0	15-Mar-11*	15-Mar-11
6186PHASE2	Collection of Phase II Samples (Test Pit #4)	0%	4.0	16-Mar-11*	22-Mar-11
6186SR	Sample Results	0%	10.0	23-Mar-11	07-Apr-11
6186DP	Decision Point	0%	1.0	11-Apr-11*	11-Apr-11



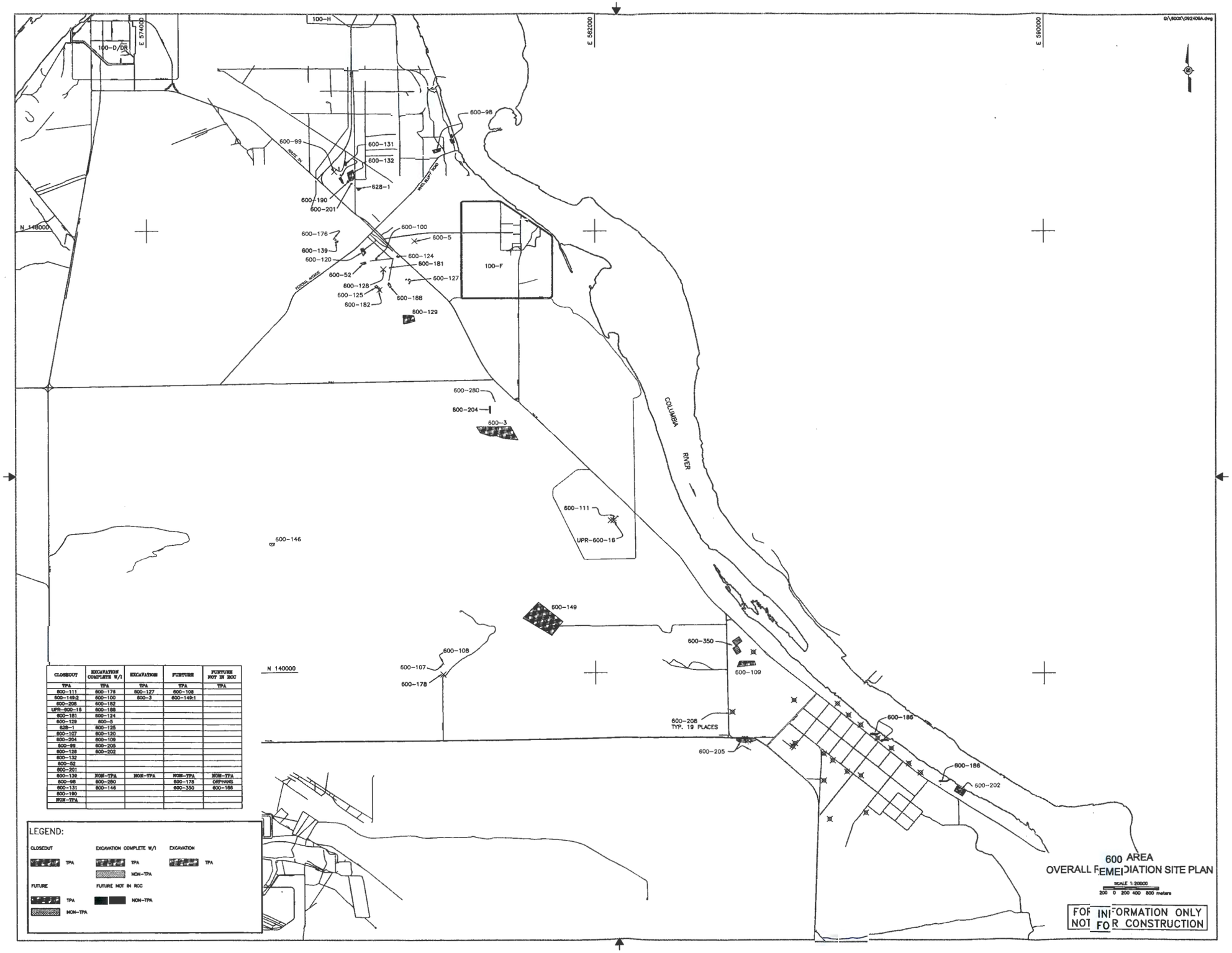
Activity /Actions Supporting Schedule

ISSUE / CONCERNS

- Expect cultural release concurrence for 600-186 #4 pit by mid-March.
- Sample result at 600-202 will impact site closure.

Milestones	Due Date	Status
TPA M-16-56	2/28/2012	2/28/12 F
PM - 26	3/31/2012	3/31/12 F

Att ~~A~~ 3



CLOSEOUT	EXCAVATION COMPLETE W/I	EXCAVATION	FUTURE	FUTURE NOT IN ROC
TPA	TPA	TPA	TPA	TPA
600-111	600-176	600-127	600-108	
600-149:2	600-100	600-3	600-149:1	
600-206	600-182			
UPR-600-16	600-188			
600-181	600-124			
600-129	600-5			
628-1	600-125			
600-107	600-120			
600-204	600-109			
600-99	600-205			
600-128	600-202			
600-132				
600-52				
600-201				
600-139	NON-TPA	NON-TPA	NON-TPA	NON-TPA
600-98	600-280		600-178	ORPHANS
600-131	600-146		600-350	600-186
600-190				
NON-TPA				

LEGEND:

CLOSEOUT: TPA

EXCAVATION COMPLETE W/I: TPA; NON-TPA

EXCAVATION: TPA

FUTURE: TPA; NON-TPA

FUTURE NOT IN ROC: NON-TPA

Att #3

Attachment 4

WCH Washington Closure Hanford

Interoffice Memorandum

156257

TO: D. N. Strom, X3-40

DATE: February 3, 2011

COPIES: D. E. Faulk, N2-01
Records and Document Control H4-11

FROM: A. L. Johnson ALJohnson 2-3-11
Environmental Services
H4-26/554-2264

SUBJECT: **100-IU-2 and 100-IU-6 RECONTOUR, BACKFILL, AND REVEGETATION RECOMMENDATION MEMORANDUM** - SUPERSEDES CCN 155669

Natural Resources Staff have evaluated the site specific conditions at the 100-IU-2 and 100-IU-6 waste sites, most of which are included in the Tri-Party Agreement (TPA) Milestone 16-56. The 100-IU-2 and 100-IU-6 waste sites are located outside the industrial areas associated with the 100 Area reactors. This evaluation was conducted in preparation for development of a restoration plan for the waste sites within the 100-IU-2 and 100-IU-6 Operable Units. A majority of the sites are generally small, less than 3 acres in size and surrounded by quality habitat including native sagebrush (*Artemisia tridentata*), gray rabbitbrush (*Chrysothamnus nauseous*), bunchgrasses, and forbs. The sites were surveyed for excavation size and depth, adjacent topography, species composition of the adjacent vegetation community, and soil type to determine the best methods are deployed to ensure successful restoration making the sites naturally blend with the surrounding habitats.

Thirty seven sites were evaluated (Table 1), most of which are included in the TPA Milestone 16-56 for completion by February 28, 2012 within the 100-IU-2 and 100-IU-6 units. The 600-111 site was remediated, backfilled, and revegetated in 2008. Ten other sites; 600-52, 600-98, 600-99, 600-107, 600-110, 600-129, UPR-600-16, 600-191, 600-201, and 600-208 were No Action sites or interim closed after surface debris were picked up, therefore, no backfill, recontouring, or revegetation is needed at these sites. Six other sites; 600-3, 600-120, 600-127, 600-176, 600-202, and 600-205 required more extensive excavation and waste removal that will require the sites to be backfilled to preremediation elevations with imported material. These sites will be seeded with native grass and forb seeds and planted with sagebrush, hopsage (*Grayia spinosa*), and bitterbrush (*Purshia tridentata*) seedlings. Seven other sites; 600-128, 600-131, 600-132, 600-181, 600-190, 600-204, and 628-1, required only minor isolated excavations that are small in size and less than 2 ft deep. The small isolated excavations were completed in 2003 and 2004, are surrounded by recovering native vegetation, do not have established roads, and are recommended not to be backfilled or recontoured as the disturbance footprints are not easily distinguishable from the surrounding area. These sites will have sagebrush seedlings planted between the established shrubs throughout the entire waste site boundaries. Thirteen additional sites; 600-5, 600-100, 600-108, 600-109, 600-124, 600-125, 600-139, 600-146, 600-149:1, 600-178, 600-182, 600-188, and 600-280 are recommended to be recontoured with adjacent soils to blend with the surrounding terrain without importing fill material. Long-term visual impacts will be minimized with careful recontouring and successful restoration with native plant species when the native soils used to recontour the sites are revegetated. Restoring waste sites to pre-disturbance conditions is more successful when the surface soils of the site posses the characteristics of

the adjacent native soils and habitats. The fine grained soils remaining at most of the 100-IU-2 and 100-IU-6 sites have a higher moisture holding capacity which will promote and support vegetation communities similar to the adjacent habitats. The recontoured sites will be seeded with a mixture of mycorrhizal inoculant, native grass and forb seeds and planted with shrub seedlings. Each site is described below with recommendations to either recontour the existing soils or import fill material.

600-3 Hanford Townsite Excess Material Storage Yard is a large site with varying depths of excavation ranging from 1ft to 5ft. During remediation of the site, a snake den was identified but was not able to be saved due to it's locate to the waste. The den can be constructed by filling the deepest excavations with boulders from a nearby borrow pit. A portion of the boulder area should be covered by smaller material, to reduce the amount of airflow and make the habitat more suitable for snake denning. One end of the boulder pile should be left open, to allow access to the void spaces created by the boulders. In addition to providing a potential snake den, the habitat would likely be used by cotton tail rabbits, porcupines, bushy tail wood rats, and many other native species. This project not only creates valuable wildlife habitat. All berms within the waste site or soil staging areas should be leveled, compacted soils ripped and smoothed, and salvaged topsoil distributed across areas of exposed cobble. The entire area disturbed by remediation activities will be broadcast seeded with native grass and forb seeds and planted with shrub seedlings.

600-5 White Bluffs Waste Oil Dump includes a shallow excavation, stockpile area, and constructed access road. This site should be recontoured, blending the excavation edge, ripping the compacted soils surrounding the excavation, soil staging area, and access road to a depth of one foot then smoothed to eliminate rip lines. This site will be broadcast seeded native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-52 White Bluffs Surface Basin was walked down in 2003 by project staff and the lead regulatory agency. During the walk down, no areas on f debris or anomalies requiring removal were located. The site was reclassified as "no action".

600-98 East White Bluffs Landfill, is actually two dumping areas near the White Bluffs Ferry Landing. Historic knowledge supports that this is a pre-Hanford dumping area used to dispose of debris and domestic waste common to the time it was in use. The small amount of scattered surface debris, including pots, bowls, glass, metal, wood, cable, and plywood, would not be hazardous or present a risk to human health or the environment. The no action decision for the 600-98 site is supported based on evaluation of the historical use of the site, field observations, and geophysical surveys.

600-99 site is the location of the J. A. Jones 2 burial ground, which was exhumed in 1971 and the debris removed. In 2003, a ground-penetrating radar survey showed three anomalies of scattered and concentrated debris in the vicinity of the site. Test pits at these locations showed that two areas were unbroken caliche at a depth of 1.2 m (4 ft), and the third area was part of a concrete foundation at a depth of 7.6 cm (3 in.). No debris was found, and no sampling was required. The site and test pits have been backfilled and the site was reclassified as "no action".

600-100 White Bluffs Landfill is an area where approximately 18 inches of the top surface was

removed. This site should be recontoured, the edges of the excavation should be smoothed with project personnel directed to limit any ground disturbances outside of the current excavation boundary to only the immediate area needed to smooth the excavation edges, as this site is surround by native shrubs and grasses. The 600-100 site will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-107 site includes the 213 J and K Cribs located on the southeast and southwest corners of the storage vault facilities. A focused sampling design was developed based on historical data, geophysical surveys, and information gathered from a site walkdown to further characterize the sites. The focused sample design consisted of digging test pits and sampling the soil and pipe at the two crib locations. Results from the sampling event were used to support the reclassification of the site as "no action".

600-108 (213 J & K Storage Facility) and 600-178 (213 J & K Guard House Toilet pit) sites are anticipated to have very little waste exported for disposal. The 250 bcm of imported crushed rock that is being used as a base for the temporary ERDF container area south of the perimeter fence can be used to fill the deepest portions of the 600-108 and 600-178 excavations. The remaining native soil adjacent to the 600-108 facility that was stockpiled during the original construction of the facility should be used to fill the remaining portions of the excavations and be recontoured to blend with the adjacent terrain as much as possible while limiting disturbance to only the areas approved by the Ecological and Cultural Resources Reviews. These two sites will be seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-109 Hanford Trailer Camp Landfill is located within the former Borrow Pit 15 boundary. Only the deepest excavations shall need to be backfilled with imported fill, which is estimated to be 30,000 bcm. During the excavation of the 600-109 site, large boulders were encountered. These boulders were segregated from the debris and set aside. The boulders can be used to create wildlife and snake habitat if placed in the deepest excavations. A portion of the boulder area should then be covered by smaller material, to reduce the amount of airflow and make the habitat more suitable for snake denning. One end of the boulder pile should be left open, to allow access to the void spaces created by the boulders. This project not only creates valuable wildlife habitat, but avoids the need to relocate the large pile of boulders. The remainder of the waste site should be sloped to ensure slope stability while varying slope steepness (to no steeper than 2:1 when possible), create a sinuous appearance, and eliminate large rectilinear topographic elements as much as possible. The soil staging area located west of the waste site and any additional compacted areas within the waste site boundary must be ripped to a depth of at least one foot and smoothed to eliminate the liner lines. The stockpiled topsoil salvaged from the soil staging area prior to staging waste should be redistributed across the soil staging area to the greatest extent possible. The site will be broadcast seeded with native grasses and forbs and planted with sagebrush seedlings.

600-110 known as the Hanford Townsite Landfill Site was walked down in February 2004 by contractor project staff and again in April 2004 with the U.S. Environmental Protection Agency Project Manager. The walk down did not identify the presence of hazardous debris or impacted soils associated with the 600-110 site. This was confirmed in April 2004 by performing a confirmatory

field investigation that did not find any hazardous debris or indications of contaminated soil at the site which supported the reclassification of "no action".

600-111 known as the P-11 Critical Mass Laboratory Crib and UPR-600-16 is known as the P-11 Fire and Contamination Spread. The P-11 Critical Mass Laboratory and Crib included the 120 Experimental Building, 123 Control Building (including septic system), and P-11 Crib, and is collectively listed in the Waste Information Data System (WIDS) as the 600-111 waste site. The UPR-600-16 waste site (WIDS) was an unplanned release of contamination associated with a fire at the 120 Building (600-111) and spread of contamination by water used to extinguish the fire. Characterization of the site started with review of the historical information, construction drawings, and geophysical survey data was used to determine the locations for collection of confirmatory samples. The confirmatory sampling results indicated that the septic system, including the septic tank and the septic drain field associated with the 123 Building, required removal. Laboratory analysis of confirmatory samples collected within the building footprint of the former 123 Control Building, the removed P-11 Crib, and the building footprint of the former 120 Experimental Building met the remedial action goals, and, therefore, no additional remedial action in these areas was necessary. Remedial action of the septic system tank and drain field located at the 600-111 waste site was performed between February 25, 2008 and March 25, 2008. Verification soil samples for the septic system remediation were collected on April 21, 2008. The results of the confirmatory sampling and the verification sampling are used to make reclassification decisions for the 600-111 and UPR-600-16 waste sites as interim closed. The excavation was backfilled in December 2008 and seeded with native grasses and planted with sagebrush seedlings.

600-120 White Bluffs Spare Parts Burn Pit should have the deepest portions of the excavation backfilled with imported fill then top dressed with the stockpiled topsoil. All compacted areas must be ripped and smoothed prior to revegetation. This site will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-124 White Bluffs Burn Site and Paint Disposal Area includes a soil stockpile area and excavation with varying depths from approximately 1 foot to 2 feet. The edges of the excavation should be blended with the appearance of linear lines reduced to the greatest extent practical. The site will be broadcast seeded with native grasses and forbs and planted with sagebrush seedlings.

600-125 White Bluffs Waste Disposal Trench 1 is within a sand dune that has been naturally stabilized with native bunchgrasses. The cleanup activities disturbed a very small area within the center of the sand dune which appears to have recontoured itself. No additional mechanical work is needed on this site prior to revegetation. The site will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-127 White Bluffs Loading Docks and Fuel Storage Area must be backfilled with imported fill and top dressed with the stockpiled top soils. All areas with compacted soil and roads constructed in support of the remediation work must be ripped to a depth of at least one foot and smoothed to eliminate the linear lines. The site will be seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-128 White Bluffs Oil and Oil Filter Dump Site was interim closed in 2003. No additional earthwork recommended at this site. The site is dominated with small stature rabbitbrush and native bunchgrasses, sagebrush seedlings will be planted amongst the established vegetation.

600-129 White Bluffs Pre-MED Community Dump Site 1 was interim closed in 2004 after surface debris was picked up. No additional earthwork recommended at this site. The site is dominated with small stature rabbitbrush and native bunchgrasses. he established vegetation.

600-131 White Bluffs Water Station and Special Fabrication Shops and Warehouse were interim closed in 2003. No additional earthwork needed at this site. The site has an established community of small stature rabbitbrush and native bunchgrasses, sagebrush seedlings will be planted amongst the established vegetation.

600-132 White Bluffs Construction Contractor Shop Landfill was interim closed in 2003. No additional earthwork needed at this site. The site has an established community of small stature rabbitbrush and native bunchgrasses, sagebrush and hopsage seedlings will be planted amongst the established vegetation.

600-139 White Bluffs Automotive Repair Shop was interim closed in 2003. The vegetation community on this site was disturbed during remediation of the adjacent 600-176 waste site. The 600-139 site will be revegetated at the same time as the 600-176 site.

600-146 Steel Structure on Northwest Side of Gable Mountain and Miscellaneous Debris pickup. Remediation of this site did not include excavation to remove the waste. All ground disturbances were associated with the equipment size reducing the steel structure and minor pickup of debris. The area used to size reduce the structure was smoothed prior to the demobilization from the site; therefore, no additional mechanical work is needed prior to revegetation of this site. This site will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-149:1 Small Arms Range, Rifle, and Pistol Range. The waste site boundary encompasses 51 acres, however, only a portion of the site will be remediated. The remediated portion, anticipated to be less than 15 acres will have the top 18 inches of debris and soil removed. The edges of the excavation should be blended with the appearance of linear lines reduced to the greatest extent practical. Should areas within the site require deeper excavations, imported fill may be required prior to recontouring and revegetation. Post excavation conditions will be evaluated by Natural Resources staff to determine if imported fill is required. All areas with compacted soil and roads constructed in support of the remediation work must be ripped to a depth of at least one foot and smoothed to eliminate the linear lines. The site will be broadcast seeded with native grasses and forbs and planted with shrub seedlings.

600-176 White Bluffs Paint Disposal Area includes an excavation approximately 3 feet deep that is surrounded to the south and west by an asphalt road, a soil staging area to the east, and an unremeditated waste site to the north of the waste site. The excavation edge adjacent to the asphalt road on the south and west should be backfilled to reduce the slope steepness and eliminate the linear

appearance of the excavation edge. The soils within the staging area to the east can be used to contour the excavated waste site and blend the steep linear edges and cover the exposed cobble in the bottom of the excavation. The gravel imported by the remediation contractor for use around the mobile trailer located southwest of the waste site must be removed and maybe used as backfill provided the crushed gravel is covered with native soils from the area. All compacted soils must be loosened to approximately 1 foot in depth and smoothed to eliminate the appearance of linear rows. Because this site is surrounded by rabbitbrush and sanddrop seed grass, the recontour activities should not extend beyond the current disturbance boundary. This site will be broadcast seeded with native grass and forbs and planted with sagebrush seedlings.

600-181 White Bluffs Oil Dump was cleanup in 2003. No additional earthwork in recommended at this site. This site has some small stature green and gray rabbitbrush and native grasses present. The site will be planted with sagebrush and hopsage seedlings.

600-182 White Bluffs Asbestos Pipe Lagging and Excess Piping site includes shallow excavation, a stockpile area, and constructed access road. Recontouring of this site shall include blending the excavation edge, ripping any compacted areas, and removal of the access road. Because the excavation is less than 1 foot deep, the topsoil salvaged from the stockpile area can be used to cover the exposed cobble at the 600-188 site. The 600-182 site will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-188 White Bluffs Waste Disposal Trench 2 remediation area included mechanical removal of surface debris from a depression and a waste staging area north of the waste site. The ground surface where the waste was removed is mostly rocky cobble. This cobble should be covered and contoured with fine grained soil salvaged from the 600-188 and 600-182 staging areas. The access road around the top of the excavation along with all other compacted areas must be ripped to a depth of at least one foot, smoothed, and covered with topsoil. This site is surrounded by a mature sagebrush community to the south and east that shall not be impacted by recontouring activities. The disturbed area will be broadcast seeded with native grasses and forbs and planted with sagebrush and hopsage seedlings.

600-190 White Bluffs Warehouse Tar and/or Paint Disposal Area was cleaned up in 2003. No additional earth work is recommended at this site. This site is dominated by gray rabbitbrush and grasses. Sagebrush seedlings will be planted amongst the established rabbitbrush community.

600-191 White Bluffs Pre-MED Community Dump Site 2 was interim closed in 2004 after surface debris was picked up. No additional earthwork recommended at this site. The site is dominated with small stature rabbitbrush and native bunchgrasses.

600-201 White Bluffs Paint and Solid Waste Disposal Site. The site was evaluated with ground penetrating radar and a test pit to confirm that it did not require remediation. Results of the test pit evaluations for the 600-201 site demonstrate that all remedial action objectives and remedial action goals for direct exposure, protection of groundwater, and protection of the Columbia River have been met. The site met cleanup standards and has been reclassified as "no action".

600-202 Hanford Townsite Burn and Burial Pits remediation included excavation of waste up to 15 ft deep with excavated soils stockpiled west of the waste site within an area covered with imported crushed rock. Crushed rock was also laid on top to the native sandy soils south and east of the excavation areas and used as access around the site. The excavated trenches should be backfilled to approximately pre-excavation elevation with imported material and finished with a soil type that will blend with the surrounding undisturbed soils. This may be accomplished by filling the bottom of the excavation with pit run material that often consists of rocky cobble then finished with no less than 1 foot of sand, perhaps from the ERDF cell construction. In addition, the soil staging area west of the waste site and the access road on the south and east sides of the waste site that were covered with imported crushed must also be covered with sand material. The entire disturbed area will be broadcast seeded with native grasses and forbs and planted with shrub seedlings.

600-204 Hanford Townsite Burn and Burial Trench was interim closed in 2003. No additional earthwork is recommended for this site. The site is dominated by gray rabbitbrush and native grasses. Sagebrush and hopsage seedlings will be planted between the established shrubs.

600-205 Hanford Townsite Landfill 2 includes a small excavation and waste staging area. The excavation should be backfilled with fill material then covered with surrounding topsoil to blend with the adjacent area. The area surrounding this site was burned in a wild land fire in 2009 which eliminated all shrubs in the area. The site is however surrounded by native bunchgrasses that should be preserved as much as possible. The area disturbed by remediation activities will be broadcast seeded with native grass and forb seed and planted with sagebrush seedlings.

600-208 Hanford Construction Camp Boiler House Ponds. There were eighteen 600-208 steam boiler sites. Each individual pond site was associated with a steam boiler location. Historical knowledge indicated that no hazardous chemicals were used in the process, and the boiler water discharge would not be hazardous or present a risk to human health or the environment. The no action decision for the 600-208 site is supported, based on reviews of the processes associated with steam boilers, site history, field observations, and geophysical surveys.

600-280 Hardened Tar Site includes a small area that was mechanically scrapped to remove less than 1 foot of material from the site surface. The remaining ground surface is a mostly cobble. The area used to access the site from the east should be bladed to cover the exposed cobble. This site is surrounded to the south, west, and north by rabbitbrush and native forbs that should be avoided to the greatest extent possible. The small area disturbed will be broadcast seeded with native grass and forb seeds and planted with shrub seedlings.

628-1 White Bluffs Burn Pit was interim closed in 2003. No additional earthwork is recommended at this site. This site is dominated by small stature rabbitbrush and grasses. Sagebrush seedlings will be planted between the existing shrubs.

Recontouring and backfilling the above identified sites as prescribed will maximize the use of previously disturbed areas adjacent to the excavated sites while maintaining the native soil to facilitate successful restoration. The recontouring activities must include covering any exposed cobble with fine

grained soil at least 2 inches in depth, berms around excavations and soil staging areas must be smoothed, excavation edges must be blended and linear lines minimized, all imported crushed rock must be removed or buried, and all compacted soils and access roads constructed in support of the remediation effort shall be ripped to a depth of at least one foot and smoothed to eliminate the visual appearance of human impact. Any access roads that were not constructed in support of the remediation activities are not required to be removed.

If any of the sites are backfilled and topped with the stockpiled fine grained soil more than 3 months prior to seeding, which normally begins in mid November, the redistributed fine grained soils must be treated with a soil fixative to prevent wind erosion. If any sites are backfilled more than 6 months prior to seeding, natural resources staff must evaluate the need for herbicide applications prior to revegetation efforts.

If there are any questions concerning this recommendation or if you would like to walk down the sites and discuss the recontour expectations please call April Johnson 509/554-2264.

Table 1. 100-IU-2/6 Site Table

Site	Backfill	Imported Fill Quantity (BCM)	Recontour	Reveg	Comments
600-3	x	500	x	x	Import fill, boulder habitat & reveg FY12
600-5		0	x	x	Rip, smooth and reveg FY11
600-52		0			No Action site
600-98		0			No Action site
600-99		0			No Action site
600-100		0	x	x	Rip, smooth and reveg FY11
600-107		0			No Action site
600-108	x	250	x	x	Use imported CTA gravel, contour existing material and reveg FY12
600-109	x	30,000	x	x	Imported fill, boulder habitat & reveg FY12
600-110		0			No Action site
600-111		0			Complete - interim closed, waste excavated, and revegetated in FY 09.
600-120	x	2,960	x	x	Import fill, rip, smooth and reveg FY12
600-124		0	x	x	Rip, smooth and reveg FY12
600-125		0		x	Reveg site FY11, reveg access road in FY12
600-127	x	21,500	x	x	Import fill, rip, smooth and reveg FY12
600-128		0		x	Shrubs only FY11
600-129		0			Complete- Interim closed, debris pickup, no reveg req'd
600-131		0		x	Shrubs only FY11
600-132		0		x	Shrubs only FY11
600-139		0		x	Adjacent to 600-176 reveg FY12
600-146		0			Reveg FY11
600-149:1		0	x	x	Evaluate if imported fill is needed after excavation is complete and reveg FY12
600-176	x	1,000	x	x	Import fill, rip, smooth and reveg FY12
600-178	x	520	x	x	Import fill, contour, and reveg FY12
600-181		0		x	Shrubs only FY11
600-182		0	x	x	Rip, smooth and reveg FY12
600-188		0	x	x	Topsoil from 600-182 SSA, rip, smooth and reveg FY12
600-190		0		x	Shrubs only FY11
600-191		0			Complete- Interim closed, debris pickup, no reveg req'd
600-201		0			No Action site
600-202	x	15,000		x	Import fill & reveg FY12
600-204		0		x	Shrubs only FY11
600-205	x	50		x	Import fill, reveg FY12
600-208		0			No Action site
600-280		0	x	x	Contour and reveg FY12
628-1		0		x	Shrubs only FY11
UPR-600-16		0			Complete - Interim closed with confirmatory sampling

~~Att 6~~

Att 4

Attachment 5

From: Saueressig, Daniel G
Sent: Tuesday, January 18, 2011 11:31 AM
To: ^WCH Document Control
Subject: FW: 100-F-57 CHROME SAMPLING STRATEGY

Attachments: 100-F-57 Cr sampling strategy.doc; 2620_B244jeffg_20110112063943.PDF

100-F-57 Cr sampling strategy.... 2620_B244jeffg_20110112063943....

Please provide a chron number (and include the attachments). This email documents a regulatory agreement.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

-----Original Message-----
From: Guzzetti.Christopher@epamail.epa.gov [mailto:Guzzetti.Christopher@epamail.epa.gov]
Sent: Thursday, January 13, 2011 12:56 PM
To: Post, Thomas C
Cc: Saueressig, Daniel G; Fancher, Jonathan D (Jon); Landon, Roger J; Wilkinson, Stephen G
Subject: RE: 100-F-57 CHROME SAMPLING STRATEGY

Dan,

I also concur with the attached characterization strategy.

Thanks,

Christopher J. Guzzetti
U.S. EPA Region 10
Hanford Project Office
Phone: (509) 376-9529
Fax: (509) 376-2396
Email: guzzetti.christopher@epa.gov

From: "Post, Thomas" <Thomas.Post@rl.doe.gov>
To: "Saueressig, Daniel G" <dgsauere@wch-rcc.com>, Christopher Guzzetti/R10/USEPA/US@EPA
Cc: "Fancher, Jonathan D (Jon)" <jdfanche@wch-rcc.com>, "Wilkinson, Stephen G" <sgwilkin@wch-rcc.com>, "Landon, Roger J" <rjlandon@wch-rcc.com>
Date: 01/13/2011 12:47 PM
Subject: RE: 100-F-57 CHROME SAMPLING STRATEGY

Dan,

I concur based on the attached and our meeting yesterday.

155785

Thanks a lot.

Tom

From: Saueressig, Daniel G [mailto:dgsauere@wch-rcc.com]
Sent: Thursday, January 13, 2011 12:38 PM
To: Guzzetti, Christopher; Post, Thomas
Cc: Fancher, Jonathan D (Jon); Wilkinson, Stephen G; Landon, Roger J
Subject: 100-F-57 CHROME SAMPLING STRATEGY

Chris/Tom, per our meeting yesterday, attached is a strategy (and drawing showing sample locations) we would like to propose related to determining the extent of the chrome contamination at 100-F-57. If you're in agreement with this strategy, we'll move forward and implement it and document this agreement at the next UMM.

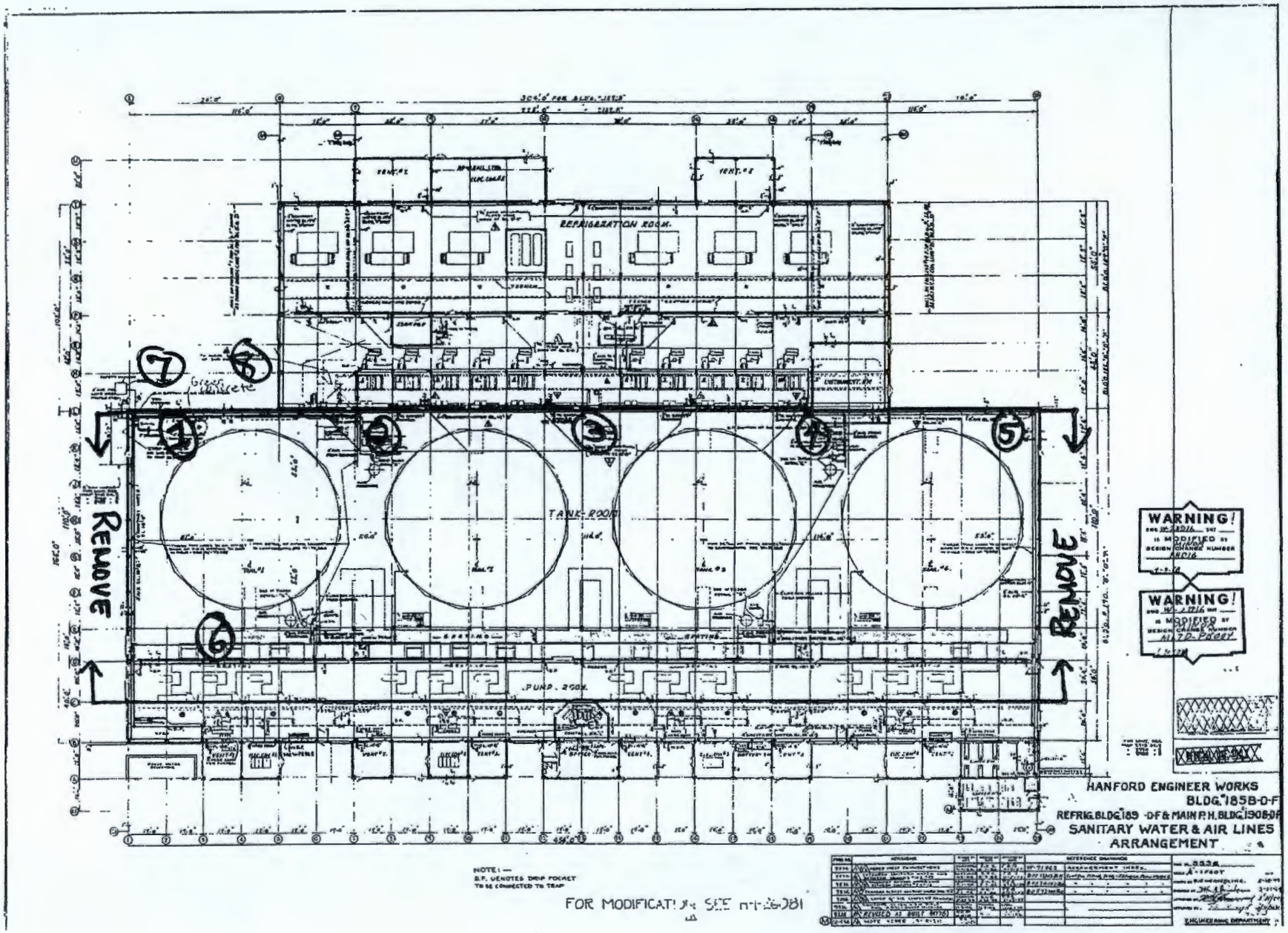
Thanks and give me a call if you have any questions

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

<< File: 100-F-57 Cr sampling strategy.doc >> << File: 2620_B244jeffg_20110112063943.PDF >>

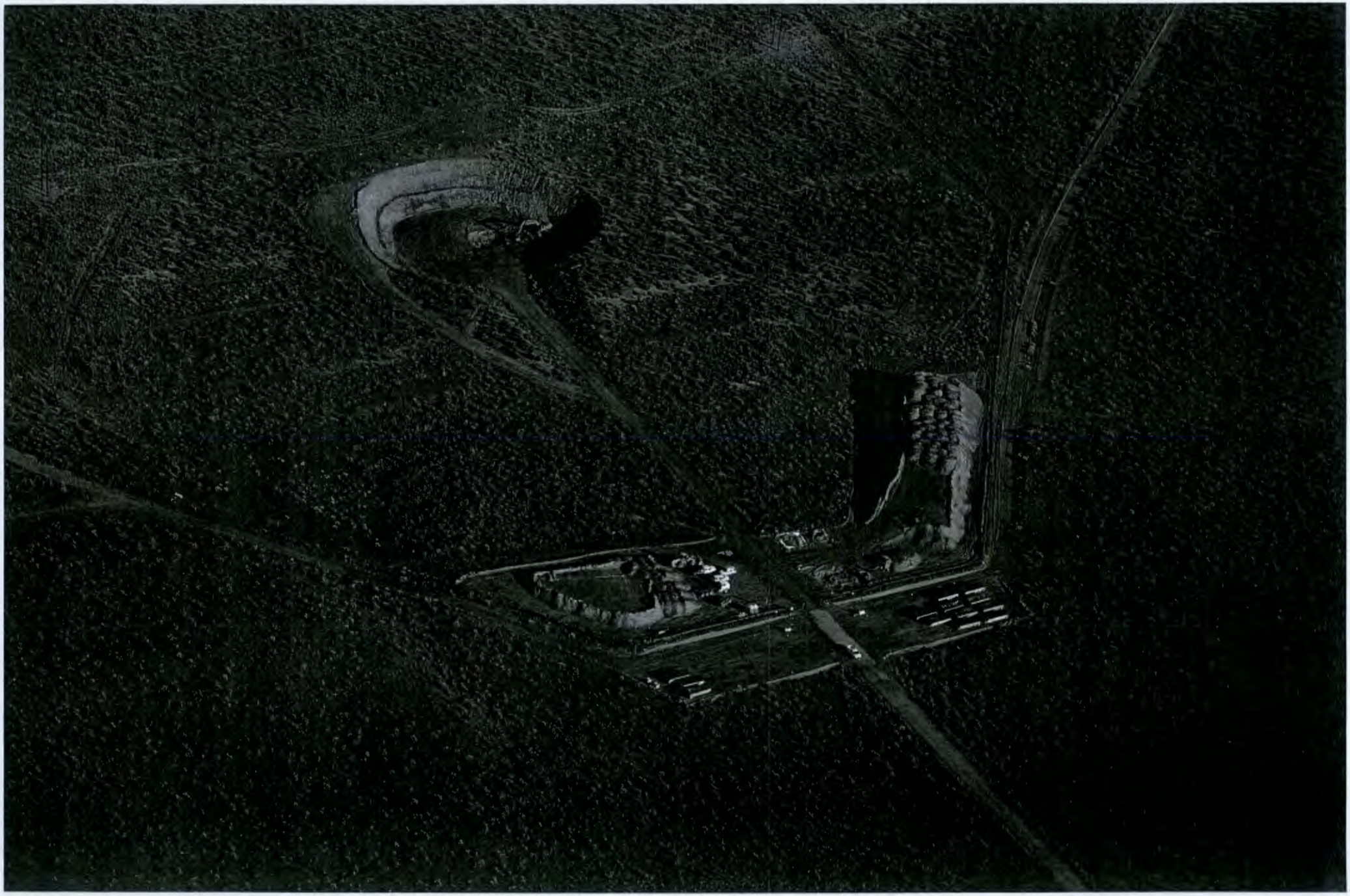
100-F-57 Cr characterization strategy

1. Excavate test pits at 8 locations in/around 100-F-57.
2. Approximate excavation locations are noted on the figure.
3. Excavate to the maximum depth of excavator reach without benching.
4. Minimize the use of dust suppression water.
5. Where concrete needs to be removed to access deeper soil sample the concrete.
6. Collect sample of the soil immediately under the concrete (all pot holes).
7. Continue excavating while maintaining slopes 1.5:1 to avoid raveling.
8. Collect samples every 1m in depth until final depth is reached.
9. If available, use the XRF to locate the hottest spot in the excavator bucket and collect the sample from that area.
10. Sample analysis:
    a. Cr^{+6}
    b. Total Chromium (via ICP metals)
    c. Collect sample for TCLP metals analysis, leach upon receipt at lab and hold leachate at lab pending further direction from the project.
    d. Where Total Cr is <100 mg/kg request lab to dispose of leachate
    e. Analyze leachate of the highest total Cr analysis.
    f. Based on the TCLP of the highest Cr sample the designators will determine if additional leachate analysis is needed.
11. If there are field indications of Cr^{+6} (Visual or XRF) additional test pits may be installed.
12. Excavated soil will be placed on plastic
13. Excavated soil will be placed in piles that can be traced to its pot hole including specific depth range.
14. Pot holes may remain open pending receipt of lab data.
    a. Pot hole soil may be replaced in the pot hole if Cr^{+6} is less than detectable and total Cr is less than Hanford background.
    b. Consultations with DOE & EPA are required prior to disposition of pot hole material with higher concentrations of Cr or Cr^{+6}


REFRIGERATION ROOM.
TANK ROOM
PUMP ROOM
REMOVE
REMOVE
Green Concrete
WARNING!
WARNING!
HANFORD ENGINEER WORKS
BLDG. 185B-D-F
REFRIG. BLDG. 189 -D-F & MAIN P.H. BLDG. 190B-D-F
SANITARY WATER & AIR LINES
ARRANGEMENT
NOTE:—
D.F. DENOTES DRIP POCKET
TO BE CONNECTED TO TRAP
FOR MODIFICATION SEE H-1-26081
ENGINEERING DEPARTMENT

Att ~~$~~ ~~4~~
5

Attachment 6



Att #6

Attachment 7

156349

^WCH Document Control

From: Saueressig, Daniel G
Sent: Thursday, February 10, 2011 10:20 AM
To: ^WCH Document Control
Subject: FW: REQUEST FOR WASTE STAGING AREA FOR 116-H-5

Attachments: MO229000.PDF

Please provide a chron number. This email documents a regulatory approval.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

MO229000.PDF
(166 KB)

From: Jones, Mandy (ECY) [mailto:mjon461@ECY.WA.GOV]
Sent: Monday, January 31, 2011 1:15 PM
To: Saueressig, Daniel G
Cc: Chance, Joanne C; Menard, Nina
Subject: RE: REQUEST FOR WASTE STAGING AREA FOR 116-H-5

Dan, thank you for the update on the status of the overburden pile.

Ecology approves the request for establishment of the staging pile at 116-H-5.

Please ensure that the staging pile is managed in accordance with the 100 Area RDR/RAWP and all of the associated COPCs for the 116-H-5 waste site are sampled for when the staging pile area is closed out.

When documenting this agreement in the UMM please include the design drawing that details the location of the staging pile.

Thank you,
Mandy

From: Saueressig, Daniel G [mailto:dgsauere@wch-rcc.com]
Sent: Thursday, January 27, 2011 3:30 PM
To: Jones, Mandy (ECY)
Cc: Chance, Joanne C
Subject: REQUEST FOR WASTE STAGING AREA FOR 116-H-5

Hi Mandy, I'd like to request your approval to set up a waste staging area for staging material from the additional excavation planned at 116-H-5 (see attached drawing). The staging pile will be operated in accordance with Section 4.5.2 of the 100 Area RDR/RAWP (DOE/RL-96-17, Rev. 6). In addition, this area is not over any existing waste sites. This location was previously used for overburden from 116-H-5 during the initial remediation effort, and unfortunately, some of the overburden material was above the RAGs when verification sampling was performed. When load out of this material occurs, an additional foot of soil will be removed and disposed at ERDF, consistent with current practices. This

area will also be included in the closure verification work instructions for the 116-H-5.

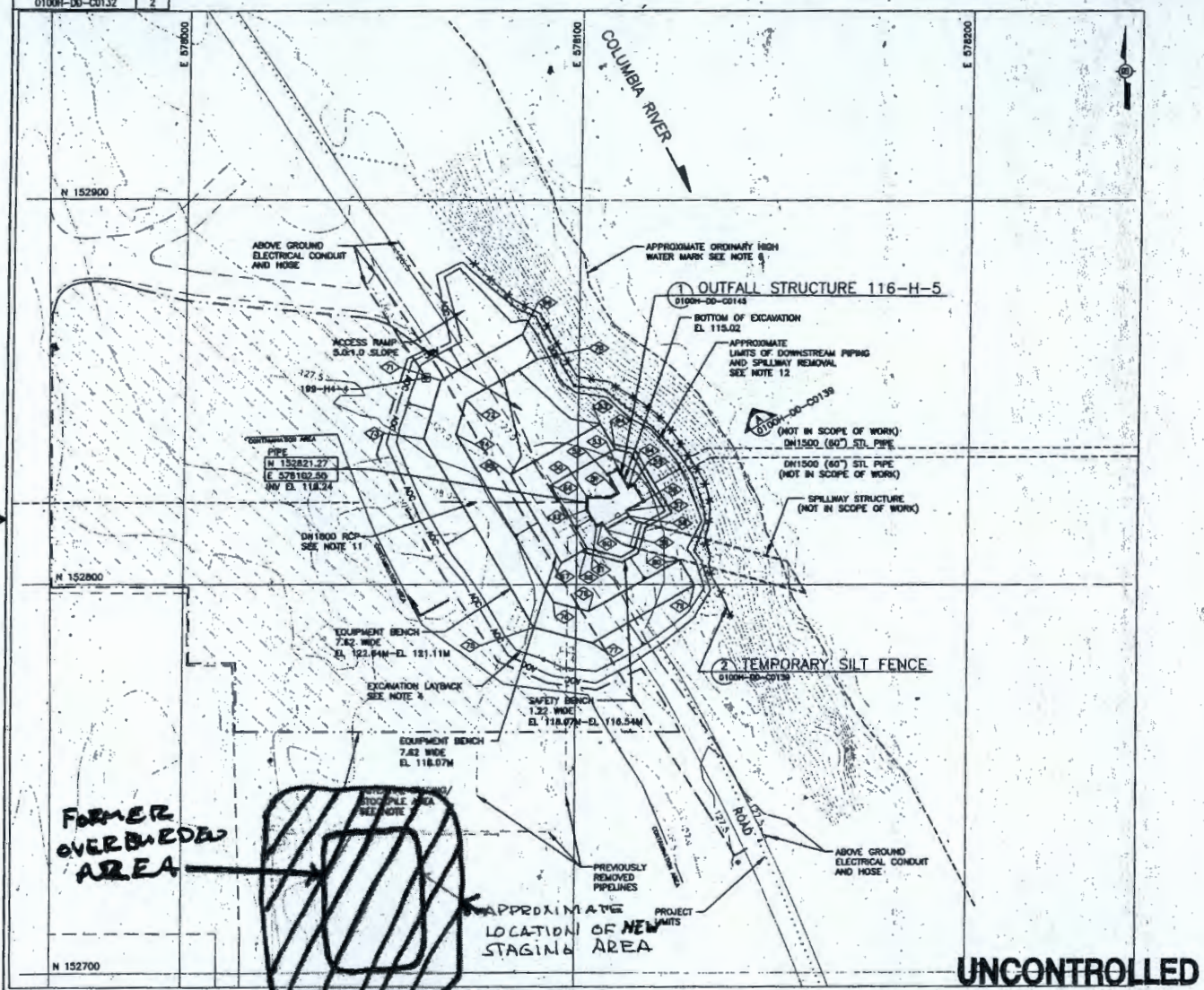
Let me know if you concur with using this area for staging waste from 116-H-5, unfortunately, operations would like to start using this area next week.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

<< File: MO229000.PDF >>

DRAWING NO.	REV. NO.
0100H-DD-C0132	2



UNCONTROLLED

NOTES CONT. 12. DEMOLISH AND REMOVE DOWNSTREAM PIPING, AND SPILLWAY TO THE LIMITS OF EXCAVATION. DOWNSTREAM PIPELINES TO BE PLUGGED WITH CONCRETE IN ACCORDANCE WITH THE SUBCONTRACT DOCUMENTS. INSTALL LOCATOR TAPE AT MOUTH OF SPILLWAY PRIOR TO BACKFILLING.

Dedicated WCH Excellence

SCALE 1:500

5 0 5 10 20 meters

RECORD INFORMATION		
RECORD NO.	BLDG NO.	INDEX NO.
H-1-89028 SHT 01	100H	0110

NOTES

1. SEE DRAWING 0100H-DD-G0009 FOR GENERAL ABBREVIATIONS AND SYMBOLS LIST.
2. LOCATION, GROUND SURFACE AND DIMENSIONS PROVIDED WERE TAKEN FROM HANFORD SITE RECORDS AND DRAWINGS:
   P-1009 SHT 8 OF 18, REV 9, AS-BUILT, 12-29-49 100-H AREA PLOT PLAN VICINITY 107-H
   P-2096 SHT 1 OF 1, REV 4, AS-BUILT, 10-24-49 DISCHARGE STRUCTURE PLAN AND SECTIONS
   P-2097 SHT 1 OF 1, REV 4, AS-BUILT, 10-24-49 DISCHARGE STRUCTURE SPILLWAY AND DETAILS
   P-4319 SHT 1 OF 1, REV 4, AS-BUILT, 11-15-51 1904-H DISCHARGE STRUCTURE PLAN, PROFILE AND DETAILS
   ACTUAL LOCATIONS AND DIMENSIONS SHALL BE VERIFIED BY THE SUBCONTRACTOR. AS-BUILT CONSTRUCTION MAY VARY FROM NEAT-LINES SHOWN ON DRAWINGS.
3. ALL ELEVATIONS AND DIMENSIONS ARE IN METERS EXCEPT AS SPECIFICALLY SHOWN.
4. LIMITS OF EXCAVATION ARE SHOWN ASSUMING A 1.5 H:1.0 V CUT SLOPE. ACTUAL EXCAVATION LIMITS SHALL BE THE RESPONSIBILITY OF THE SUBCONTRACTOR. EXCAVATIONS SHALL COMPLY WITH ALL REQUIREMENTS OF 0100H-SP-C0005 CIVIL SPECIFICATION.
5. EXCAVATION OF OUTFALL STRUCTURE SHALL REQUIRE USE OF A TEMPORARY SILT FENCE BETWEEN EXCAVATION AND RIVER TO PREVENT SOIL AND DEBRIS FROM REACHING THE SHORELINE. LOCATION AND EXTENT SHALL BE COORDINATED WITH CONTRACTOR.
6. CONSTRUCTION ACTIVITIES ON THE SHORELINE SHALL BE PROHIBITED BELOW THE ORDINARY HIGH WATER MARK.
7. CONTOUR INTERVAL IS 0.5 METERS.
8. STAGING OF MATERIAL SHALL OCCUR WITHIN THE AOC/WASTE SITE BOUNDARY UNLESS DIRECTED BY THE CONTRACTOR. STAGING OF MATERIAL OUTSIDE OF THE AOC/WASTE SITE BOUNDARY, SHALL HAVE PRIOR APPROVAL IN WRITING BY THE CONTRACTOR.
9. SEE DRAWING NO. 0100H-DD-C0147 FOR BURIAL GROUNDS AND REMAINING SITES SURVEY CONTROL DESIGN COORDINATE TABLE.
10. SUBCONTRACTOR SHALL CONSTRUCT ALL EXCAVATIONS THAT EXCEED 6.10M (20'-0") IN DEPTH FROM GROUND SURFACE IN ACCORDANCE WITH THE SUBCONTRACT DOCUMENTS.
11. SUBCONTRACTOR SHALL REMOVE DN1800 (72" DIA) REINFORCED CONCRETE PIPE TO EXTENT OF EXCAVATION.

DOCUMENT CONTROL date: 1/13/09

REV.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY	DSIGN BY	DSIGN CHK'D	APP'D BY	APP'D BY
2	1/9/09	ISSUED FOR CONSTRUCTION	JMF	CHB	TMB	JRL	HA	RLC
1	08/11/07	ISSUED FOR IFD TO ADD NEW SITES	JMF	CHB	TMB	JRL	HA	RLC
0	03/06/07	ISSUED FOR IFD	JMF	CHB	TMB	RMC	HA	JRD

SCALE AS SHOWN

U.S. DEPARTMENT OF ENERGY
DOE RICHLAND OPERATIONS OFFICE
RIVER CORRIDOR CLOSURE CONTRACT

WASHINGTON CLOSURE HANFORD LLC.
RICHLAND, WASHINGTON

100 H AREA
100 H BURIAL GROUNDS AND REMAINING SITES
116-H-5 OUTFALL STRUCTURE CIVIL PLOT PLAN

WCH JOB NO.	DOE CONTRACT NO.	CADD FILENAME
14655	DE-AC06-05RL-14655	1HDC0132.DWG

TASK	DRAWING NO.	REV. NO.
100H	0100H-DD-C0132	2

Att ~~8~~
7

Attachment 8

156155

^WCH Document Control

From: Saueressig, Daniel G
Sent: Wednesday, January 26, 2011 10:51 AM
To: ^WCH Document Control
Cc: Proctor, Megan L
Subject: FW: 100-H Area sites recommended for additional remediation and resampling
Attachments: Revised Remediation and Sampling Strategy for 116-H-5 Final.doc; deep zone exceeding RAGs.xls

Please provide a chron number (and include the attachments). This email documents a regulatory approval.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

From: Jones, Mandy (ECY) [mailto:mjon461@ECY.WA.GOV]
Sent: Wednesday, January 26, 2011 7:46 AM
To: Proctor, Megan L
Cc: Saueressig, Daniel G; Hanson, James P; Chance, Joanne C; Menard, Nina; Huckaby, Alisa D; Biebesheimer, Fred H; Nielson, Renee J; Curcio, Joseph P; Harrison, Robert P; James.Hanson@doe.rl.gov
Subject: RE: 100-H Area sites recommended for additional remediation and resampling

Megan, thank you for the update. Ecology supports the additional remediation and resampling for 116-H-5, as described in the attached write-up.

Please keep Ecology and the Groundwater Project updated on progress of this remediation, especially if groundwater is encountered.

Thank you,
Mandy

From: Proctor, Megan L [mailto:mlprocto@wch-rcc.com]
Sent: Tue 1/25/2011 1:50 PM
To: Jones, Mandy (ECY)
Cc: Saueressig, Daniel G; Hanson, James P; Chance, Joanne C; Menard, Nina (ECY); Huckaby, Alisa (ECY); Biebesheimer, Fred H; Nielson, Renee J; Curcio, Joseph P; Harrison, Robert P
Subject: RE: 100-H Area sites recommended for additional remediation and resampling

Hi Mandy.

To answer your question, the project is scheduled to resample this site 2/7/11.

156155

On another note, upon further review of the verification data, many of the samples collected from within the deep zone and overburden decision units also exceeded RAGs for protection of ground water and the Columbia River. That being said the project would actually like to dig more than previously indicated. I've attached a supplemental write-up, along with a spreadsheet, to explain the path forward. Please note due to the COPC list being rather extensive we have revised the proposed COPC list for your consideration.

Please let me know if you have any questions.

Thank you.
Megan

From: Jones, Mandy (ECY) [mailto:mjon461@ECY.WA.GOV]
Sent: Wednesday, January 19, 2011 7:51 AM
To: Proctor, Megan L
Cc: Saueressig, Daniel G; Hanson, James P; Chance, Joanne C; Menard, Nina; Huckaby, Alisa D; Biebesheimer, Fred H; Nielson, Renee J; Curcio, Joseph P; Harrison, Robert P
Subject: RE: 100-H Area sites recommended for additional remediation and resampling

That is good news. Thanks for the update. Do you have an anticipated date when the project will sample this site?

Thanks,
Mandy

From: Proctor, Megan L [mailto:mlprocto@wch-rcc.com]
Sent: Wed 1/19/2011 7:40 AM
To: Jones, Mandy (ECY)
Cc: Saueressig, Daniel G; Hanson, James P; Chance, Joanne C; Menard, Nina (ECY); Huckaby, Alisa (ECY); Biebesheimer, Fred H; Nielson, Renee J; Curcio, Joseph P; Harrison, Robert P
Subject: RE: 100-H Area sites recommended for additional remediation and resampling

Mandy,

Renee walked the site down with the project yesterday. Currently there is no water in the bottom of the excavation, so the two points in the deep zone that were previously underwater should be able to be remediated and sampled. Should this condition change prior to sample collection and water is encountered we will contact the Groundwater Project for coordination.

Please let me know if you have any additional questions.

Thanks.
Megan

From: Jones, Mandy (ECY) [mailto:mjon461@ECY.WA.GOV]
Sent: Thursday, January 13, 2011 12:24 PM
To: Nielson, Renee J; Curcio, Joseph P
Cc: Saueressig, Daniel G; Hanson, James P; Chance, Joanne C; Proctor, Megan L; Menard, Nina; Huckaby, Alisa D; Biebesheimer, Fred H

156155

Subject: RE: 100-H Area sites recommended for additional remediation and resampling
Importance: High

Renee, as we discussed on Monday, Ecology has a few concerns about the path forward provided for additional remediation at the 116-H-5 waste site. We have provided our recommendations for additional remediation and some information about the most recent sample data from monitoring wells in the area.

Overburden Soil Stockpile: Ecology agrees with the additional remediation as detailed in Figure 1, and the replacement of OB-8 sample point.

Staging Pile Area: Ecology agrees with the path forward as described in Figure 2 and discussed on January 10th.

Area 1: an additional 3.3 ft will be removed and the remediation area will be widened (as shown in Figure 2, provided 1/5/11)

Area 3 and Area 4: an additional 3.3 ft of material will be remediated
Area 2: requires no additional remediation.
A new set of 12 samples will be applied and taken over Area 1, 3 and 4

Shallow Zone and Deep Zone: Perform remediation as drawn on the attached file. As described in the attachment provide by the project on 1/5/11, please remove 3.3 ft of soil and perform replacement sampling for the following sample points SZ-9, SZ-11, DZ-5, DZ-6, DZ-7 and DZ-12.

It is understood that at one point in time DZ-6 and DZ-7 were under water. If they are currently underwater, WCH should work closely with the Groundwater Project to determine how to move forward with this contaminated area of the waste site. Please notify Ecology if additional remediation and replacement sampling cannot be performed at DZ-6 and DZ-7.

<< File: 116-H-5 additional remediation.pdf >>
In addition to the vadose zone issues discussed above please consider the following groundwater observations/conclusions.

- Aquifer tubes AT-H-3-D and AT-H-3-S are the closest down gradient wells to the 116-H-5 waste site. There are 2 wells in this "cluster" (i.e., located very close together). Concentration observations include:

- Hexavalent chromium is elevated at this location. Although the chromium gw restoration goal is currently 22 ppb, considering surface water dilution, there are several results above 11 µg/L. Hexavalent chromium measurements included: 19.5 µg/L (H-3-D on 3-11-2004), 14 µg/L (H-3-D on 11/17/2004), 15 µg/L (H-3-D on 11/06/2005), 12 µg/L (H-3-S on 11/06/2005), 17 µg/L (H-3-D on 02/06/2007), and 16 µg/L (H-3-S on 11/12/2007).

1 Strontium-90 was detected at this cluster: 2.35 pCi/L (H-3-D on 3/11/2004 and specific conductivity measured 233 µs/cm), 2.34 pCi/L (H-3-D on 11/13/2007 and specific conductivity measured 255 µs/cm), 3.35 pCi/L (H-3-S on 11/06/2005 and specific conductivity measured 257

µs/cm), and 2.42 pCi/L (H-3-S on 11/12/2007 and specific conductivity measured 255 µs/cm). All detected concentrations were below 8 pCi/L.

2 Technetium-99 was detected at this cluster: 35.4 pCi/L (H-3-S on 11/06/2005 and specific conductivity measured 257 µs/cm) and 5.4 pCi/L (H-3-S on 02/06/2007 and specific conductivity measured 240 µs/cm).

3 Dissolved oxygen is low at this cluster. As dissolved oxygen levels in water drop below 5.0 mg/l, aquatic life is put under stress. Also, background groundwater measurements for dissolved oxygen are 13,877. DO measurements below 5,000 µg/L include: 4,800 µg/L on 11/06/2005 at H-3-S and 4,030 µg/L on 12/08/2008 at H-3-S. Of the 8 DO measurements at this aquifer tube cluster, only 1 measurement was 10,000 µg/L – all others were below.

4 Nitrite was measured high at this cluster on 11/03/2009 at H-3-D.

Conclusion: Groundwater quality at aquifer tubes AT-H-3-D and AT-H-3-S has been negatively affected. Although the source of the contamination is not definitive, the closest waste site is the 116-H-5. Also note that many of the COPCs included for 116-H-5 have not been sampled at the AT-H-3-D/S aquifer tubes.

Thank you, Please let me know if you have questions or concerns.

Mandy

From: Nielson, Renee J [mailto:RJNIELSO@wch-rcc.com]
Sent: Wednesday, January 05, 2011 3:52 PM
To: Jones, Mandy (ECY)
Subject: 100-H Area sites recommended for additional remediation and resampling

Hi Mandy,

I am working with the 100-H and 100-D Areas to help facilitate closure of the waste sites. You may have already been made aware of the 116-H-5 site requiring additional remediation and resampling; however, I do not have an email that indicates Ecology has concurred with the proposed path forward. Please review the attached information for additional material removal and resampling at 116-H-5 and provide comments/concurrence. Please let me know if you have any questions.

Thank you,

Renée Nielson
372-9051 or 430-5466
<< File: Summary of 116-H-5 sample locations that exceed direct exposure rev 1.doc >>

Revised Remediation and Sampling Strategy for 116-H-5

After further review of the verification sampling results, it was noted that in addition to exceeding remedial action goals (RAGs) for direct exposure, many of the samples collected from within the deep zone and overburden decision units also exceed RAGs for protection of groundwater and the Columbia River. There is insufficient vadose zone thickness to demonstrate protection of groundwater via modeling, therefore, additional remediation of the deep zone decision unit is required beyond the originally agreed DZ-5, DZ-6, DZ-7, and DZ-12 locations. Based on the attached spreadsheet, all deep zone locations, except location DZ-2, exceed groundwater and river protection RAGs for metals, PAHs, and/or SVOA and require remediation. It is therefore recommended that all deep zone locations be remediated 1.0 m (3.3 ft) except for the bottom of the excavation, which will be remediated approximately 0.3 m (1.0 ft) due to the close proximity to groundwater. The remediated deep zone will then be re-sampled for the exceeded COPCs (metals, PAH, and SVOC) using the existing sample design. All other decision units are to be remediated and re-sampled based on the earlier agreement with Ecology.

Due to sample results exceeding cleanup criteria for protection of groundwater and the river, the use of overburden for backfill will be restricted to the upper portion of the excavation, at a depth supported by modeling. It is estimated that a minimum 2-meter thick layer of clean borrow material will be placed into the excavation prior to use of overburden soil for backfill.

LOCATION						DZ-1	DZ-1 Dup	DZ-3	DZ-4	DZ-5	DZ-6	DZ-7	DZ-8	DZ-9	DZ-10	DZ-11	DZ-12	
LOCATION	CLASS	DE	GW	R	Units	J19YD1	J19YF3	J19YD3	J19YD4	J19YD5	J19YD6	J19YD7	J19YD8	J19YD9	J19YF0	J19YF1	J19YF2	Units
Chromium	Metals	80,000	18.5	18.5	mg/kg							19.9						mg/kg
Lead	Metals	353	10.2	10.2	mg/kg	12.5	14.3		13.1	58.2	15.5	22.8		14.4	12.7	15.8	14.7	mg/kg
Zinc	Metals	24,000	480	67.8	mg/kg							70.2						mg/kg
Benzo(a)anthracene	PAH	1.37	0.015	0.015	mg/kg		18.3	21.2			69.1	592	22.3	16.7		48.7	94	ug/kg
Benzo(a)pyrene	PAH	0.137	0.015	0.015	mg/kg		15.2	17.8	15.7		61.7	533	22.5			68.9	142	ug/kg
Benzo(b)fluoranthene	PAH	1.37	0.015	0.015	mg/kg			33.7	25.8		88.4	974	32.4	19	19.6	69.1	107	ug/kg
Benzo(k)fluoranthene	PAH	1.37	0.015	0.015	mg/kg						33.2	350				27.4	57.2	ug/kg
Chrysene	PAH	13.7	0.12	0.1	mg/kg							602						ug/kg
Dibenz[a,h]anthracene	PAH	1.37	0.03	0.03	mg/kg							86.3						ug/kg
Indeno(1,2,3-cd)pyrene	PAH	1.37	0.33	0.33	mg/kg							460						
Benzo(a)anthracene	SVOA	1.37	0.015	0.015	mg/kg						212	682						ug/kg
Benzo(a)pyrene	SVOA	0.137	0.015	0.015	mg/kg						164	515						ug/kg
Benzo(b)fluoranthene	SVOA	1.37	0.015	0.015	mg/kg						152	666						ug/kg
Benzo(k)fluoranthene	SVOA	1.37	0.015	0.015	mg/kg						158	566					55.4	ug/kg
Chrysene	SVOA	13.7	0.12	0.1	mg/kg						219	724	611				441	ug/kg
Dibenz[a,h]anthracene	SVOA	1.37	0.03	0.03	mg/kg								138				96.2	
Indeno(1,2,3-cd)pyrene	SVOA	1.37	0.33	0.33	mg/kg							397	376					ug/kg

Att 8

8

Attachment 9

156164

^WCH Document Control

From: Saueressig, Daniel G
Sent: Wednesday, January 26, 2011 4:22 PM
To: ^WCH Document Control
Subject: FW: REQUEST OF OFFSITE DETERMINATION FOR SPENT NUCLEAR FUEL

Please provide a chron number. This email documents a regulatory approval.

Thanks,

Dan

-----Original Message-----
From: Buelow.Laura@epamail.epa.gov [mailto:Buelow.Laura@epamail.epa.gov]
Sent: Wednesday, January 26, 2011 2:52 PM
To: Saueressig, Daniel G
Cc: Einan.David@epamail.epa.gov; Chance, Joanne C; Jones, Mandy; Post, Thomas C
Subject: RE: REQUEST OF OFFSITE DETERMINATION FOR SPENT NUCLEAR FUEL

Dan,

EPA concurs with this path forward.

Laura Buelow, Environmental Scientist
U.S. Environmental Protection Agency
Hanford Project Office
309 Bradley Blvd, Suite 115
Richland, WA 99352
Phone: 509 376-5466
Fax: 509 376-2396
E-mail: buelow.laura@epa.gov

From: "Saueressig, Daniel G" <dgsauere@wch-rcc.com>
To: David Einan/R10/USEPA/US@EPA, Laura Buelow/R10/USEPA/US@EPA
Cc: "Chance, Joanne C" <joanne.chance@rl.doe.gov>, "Post, Thomas C" <thomas.post@rl.doe.gov>, "Jones, Mandy" <MJON461@ECY.WA.GOV>
Date: 01/18/2011 01:08 PM
Subject: RE: REQUEST OF OFFSITE DETERMINATION FOR SPENT NUCLEAR FUEL

Dave/Laura, thanks for your concurrence. I'd like to request a non-contiguous onsite approval to send the 3 pieces of SNF (approximately 14 inches) currently stored at 100-H to 100-D for consolidation prior to shipping to K Basins. CHPRC procedures require the use of a PAS-1 cask for shipping fuel to their facility and there are other compliant mechanism's to move the fuel, therefore, we'd like to move the remaining fuel at 100-H to 100-D and then ship it all to K Basins.

All movement of the SNF will be made in compliance with Department of Transportation requirements.

Let me know if you concur with allowing this non-contiguous onsite approval.

Thanks and give me a call if you have any questions.

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

156164

-----Original Message-----
From: Einan.David@epamail.epa.gov [mailto:Einan.David@epamail.epa.gov]
Sent: Wednesday, December 15, 2010 12:18 PM
To: Saueressig, Daniel G
Cc: Chance, Joanne C; Buelow.Laura@epamail.epa.gov; Post, Thomas C
Subject: Re: REQUEST OF OFFSITE DETERMINATION FOR SPENT NUCLEAR FUEL

Dan--

The EPA grants an offsite determination for Spent Nuclear Fuel from the 100 D and H Areas for shipment to the 100 K West fuel storage basin and subsequently to the 200 Area Canister Storage Building. The offsite determination for the K West basin is good through September 30, 2011 and the Canister Storage Building including the fuel storage pad outside the CSB is good through Dec 31, 2012. This approval does not address fuel acceptance requirements of the Spent Fuel Project.

Dave Einan
EPA Region 10
Hanford/INL Project Office
309 Bradley Blvd, Ste 115
Richland, WA 99352
509-376-3883

From: "Saueressig, Daniel G" <dgsauere@wch-rcc.com>
To: David Einan/R10/USEPA/US@EPA, Laura Buelow/R10/USEPA/US@EPA
Cc: "Chance, Joanne C" <joanne.chance@rl.doe.gov>, "Post, Thomas C" <thomas.post@rl.doe.gov>
Date: 12/06/2010 06:54 AM
Subject: REQUEST OF OFFSITE DETERMINATION FOR SPENT NUCLEAR FUEL

Dave/Laura, we need to move some spent nuclear fuel from both the 100-D and 100-H areas to K Basins and then ultimately the Canister Storage Building (CSB) for storage. I'd like to request your approval in accordance with 40 CFR 300.440 and section 4.3.3 of the RDR (DOE/RL-96-17, Rev. 6) to send this material to K Basins and ultimately the CSB. Shipment of the fuel is scheduled for the late January/February timeframe.

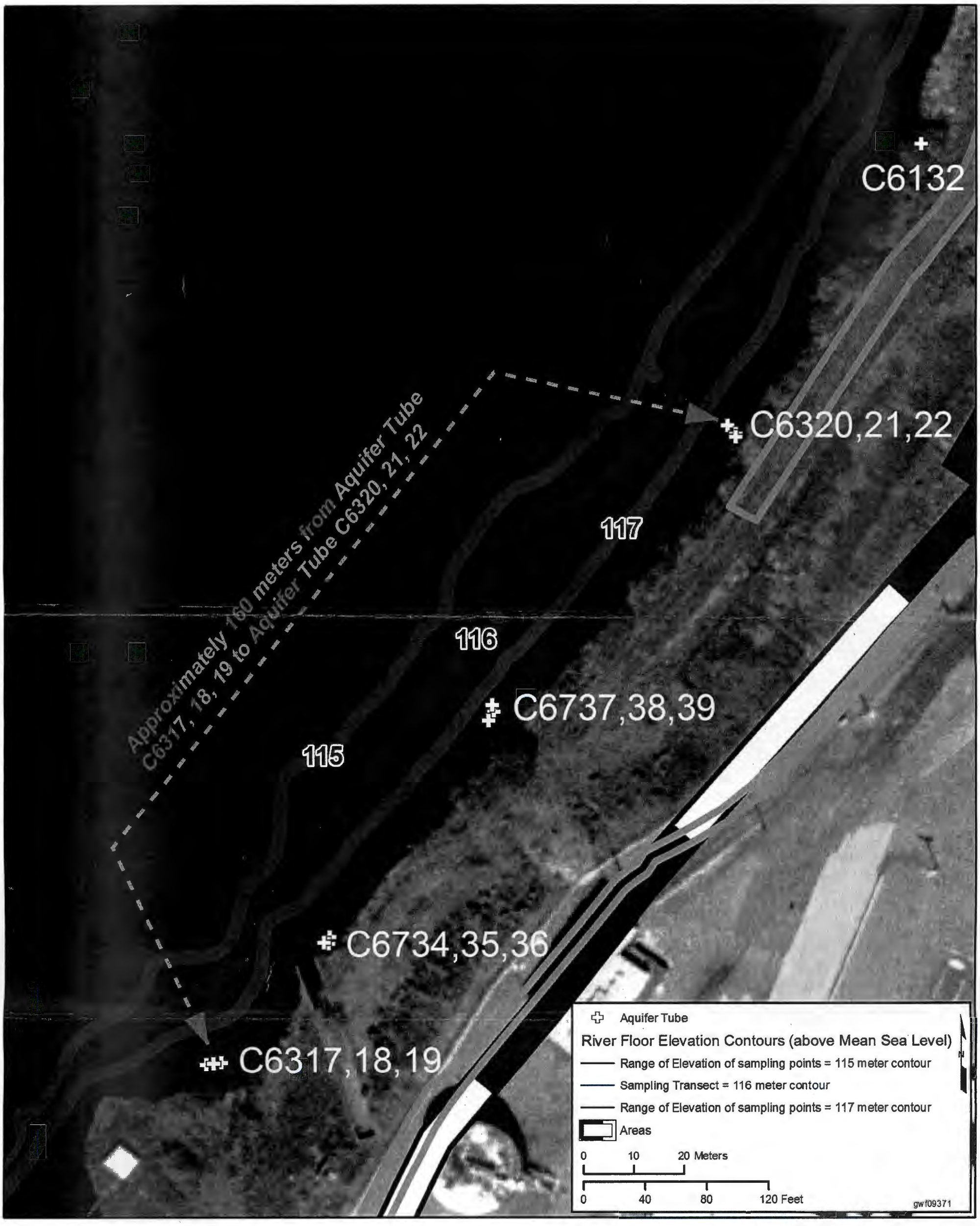
Let me know if you concur.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

Att ~~10~~
9

Attachment 10


C6132
C6320,21,22
117
116
C6737,38,39
115
C6734,35,36
C6317,18,19
Approximately 160 meters from Aquifer Tube C6317, 18, 19 to Aquifer Tube C6320, 21, 22
Aquifer Tube
River Floor Elevation Contours (above Mean Sea Level)
Range of Elevation of sampling points = 115 meter contour
Sampling Transect = 116 meter contour
Range of Elevation of sampling points = 117 meter contour
Areas
0 10 20 Meters
0 40 80 120 Feet
gwf09371

Att XI
10

Downstream location near PRB where Cr(VI) was detected during phase III
Aquifer Tube
Existing Apatite PRB
River Floor Elevation Contours (above Mean Sea Level)
Range of Elevation of sampling points = 115 meter contour
Sampling Transect = 116 meter contour
Range of Elevation of sampling points = 117 meter contour
Areas
0 50 100 Meters
0 100 200 300 Feet
CHSGW1008-08
100-N-65
116-N-1
116-N-3
100-N-14
116-N-2
118-N-1
120-N-4
124-N-4
100-N-66

Att 19
10

Attachment 11

100 Area D4/ISS Status
February 10, 2011

D4 (WCH)

100-N River Structures (181-N, 181-NE, 1908-NE): Continuing with removal of equipment from intake structures and characterization sampling. Successfully broke free stubborn traveling screens at 181-NE using hydraulic jacks. Removal of all screens expected to be complete by COB today. Removal of pumps from 181-NE expected to begin next week. Installation of stop logs complete at 181-N and almost complete at 181-NE. D4 has also relocated various pieces of equipment away from 181-N to provide FR with better access to the 1304-N Dump Basin.

Bench installation still on hold pending agency consultations. NMFS is working on a Biological Opinion (formal consultation), and is currently evaluating mitigation options. USFWS has until 2/18 to respond to a request from DOE to reinitiate consultation for a newly designated critical bull trout habitat that includes the Hanford Reach. Cultural resource review is complete for the structure demolition. Draft DQO/SAP is actively being reviewed by Ecology. Another meeting to discuss issues is scheduled for this afternoon.

182-N High Lift Pumphouse: Scaffold erection complete. Full time asbestos abatement activities expected to resume next week.

105-N Fuel Storage Basin (FSB): Demolition of Transfer Bay complete. Further D4 activities at the FSB have been placed on hold until FR activities at the adjacent 1304-N Dump Basin have progressed enough to allow D4, FR, and ISS to safely conduct simultaneous operations. Above grade demolition expected to start later this month or early March.

116-N Air Exhaust Stack (Substructure): D4 activities complete pending visual examination, radiological survey, and sampling as necessary. D4 is now focusing on the exhaust air tunnels that connected this structure to the 117-N.

117-N Exhaust Air Filter House: Demolition expected to begin next month.

Other Temporary Structures: D4 is working with ISS to demobilize and relocate their mobile offices, equipment, and storage area from south side of the 109-N to make the area available for FR to begin remediation of below grade pipelines as needed.

ISS/SSE (Intermech):

105-N Reactor Building: Pour back wall for below grade SSE on west side complete. ISS completion of below grade work (additional pour backs) on the west side pending D4 completion of FSB. Anchor bolt installation for roof of pressurizer recently began.

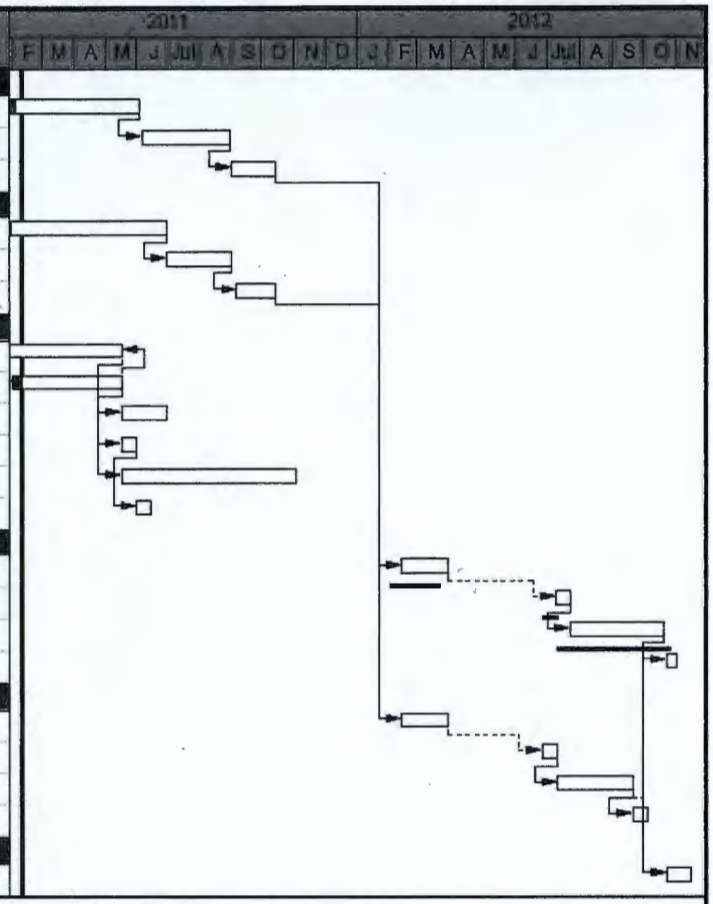
109-N Heat Exchanger Building: Completion of roof expected by end of this month.

Att ~~12~~ 11
~~10~~

Attachment 12

Field Remediation
100-C-7

Activity ID	Activity Name	% Comp.	Rem. Dur.	Start	Finish
100-C-7 Excavation			137.0	27-Jan-11 A	13-Oct-11
BCEXC100	Excavation 0-35 ft- 170,000 BCMS	7%	63.0	27-Jan-11 A	02-Jun-11
BCEXC110	Excavation 36-50 ft 7,700 BCMS	0%	50.0	06-Jun-11	31-Aug-11
BCEXC120	Excavation 51-85 ft 4,300 BCMS	0%	24.0	01-Sep-11	13-Oct-11
100-C-7:1 Excavation			137.0	27-Jan-11 A	13-Oct-11
BCEXC130	Excavation 0-50 ft 140,000 BCMS	2%	78.0	27-Jan-11 A	29-Jun-11
BCEXC140	Excavation 51-67 ft 40,000 BCMS	0%	36.0	30-Jun-11	01-Sep-11
BCEXC150	Excavation 68-85 ft 30,000 BCMS	0%	23.0	06-Sep-11	13-Oct-11
100-C-7 & 100-C-7:1 Load-Out			149.0	27-Dec-10 A	03-Nov-11
BCLO130	Scrap Metal 3255 Tons	20%	10.0	27-Dec-10 A	16-May-11
BCLO100	Concrete Demo Waste 140,000 Tons	8%	53.0	01-Feb-11 A	16-May-11
BCLO120	Power Poles 50 Tons	0%	25.0	17-May-11*	29-Jun-11
BCLO140	Potential Asbestos Contaminated Mat.1000 ...	0%	8.0	17-May-11*	31-May-11
BCLO150	ACL 265,000 Tons T&P	0%	96.0	17-May-11	03-Nov-11
BCLO110	LDR 100 Tons	0%	8.0	01-Jun-11	14-Jun-11
100-C-7 Sampling, Backfill and Reveg			147.0	14-Feb-12	01-Nov-12
BC502D4	Closure Sampling & Analysis for 100-C-7	0%	26.0	14-Feb-12	29-Mar-12
BC502D61	RL/Reg Approve Backfill Concurrence for 10...	0%	8.0	10-Jul-12	23-Jul-12
BC502C1	100-C-7 Backfill (250,000 BCMs)	0%	50.0	24-Jul-12	18-Oct-12
BC502E2	100-C-7 Perform Revegetation	0%	8.0	22-Oct-12	01-Nov-12
100-C-7:1 Sampling, Backfill and Reveg			130.0	14-Feb-12	03-Oct-12
BC50210	Closure Sampling & Analysis for 100-C-7:1	0%	26.0	14-Feb-12	29-Mar-12
BC50220	RL/Reg Approve Backfill Concurrence 100-C...	0%	8.0	27-Jun-12*	11-Jul-12
BC50230	100-C-7:1 Backfill (195,000 BCMs)	0%	39.0	12-Jul-12	19-Sep-12
BC50240	100-C-7:1 Perform Revegetation	0%	8.0	20-Sep-12	03-Oct-12
Pit 24 Re-Contouring			16.0	22-Oct-12	15-Nov-12
BC50250	Pit 24 Re-Contouring	0%	16.0	22-Oct-12	15-Nov-12



ACTIVITIES / ACTIONS SUPPORTING SCHEDULE

- Continue to transport 100-C-7 concrete demo material to U-Canyon.

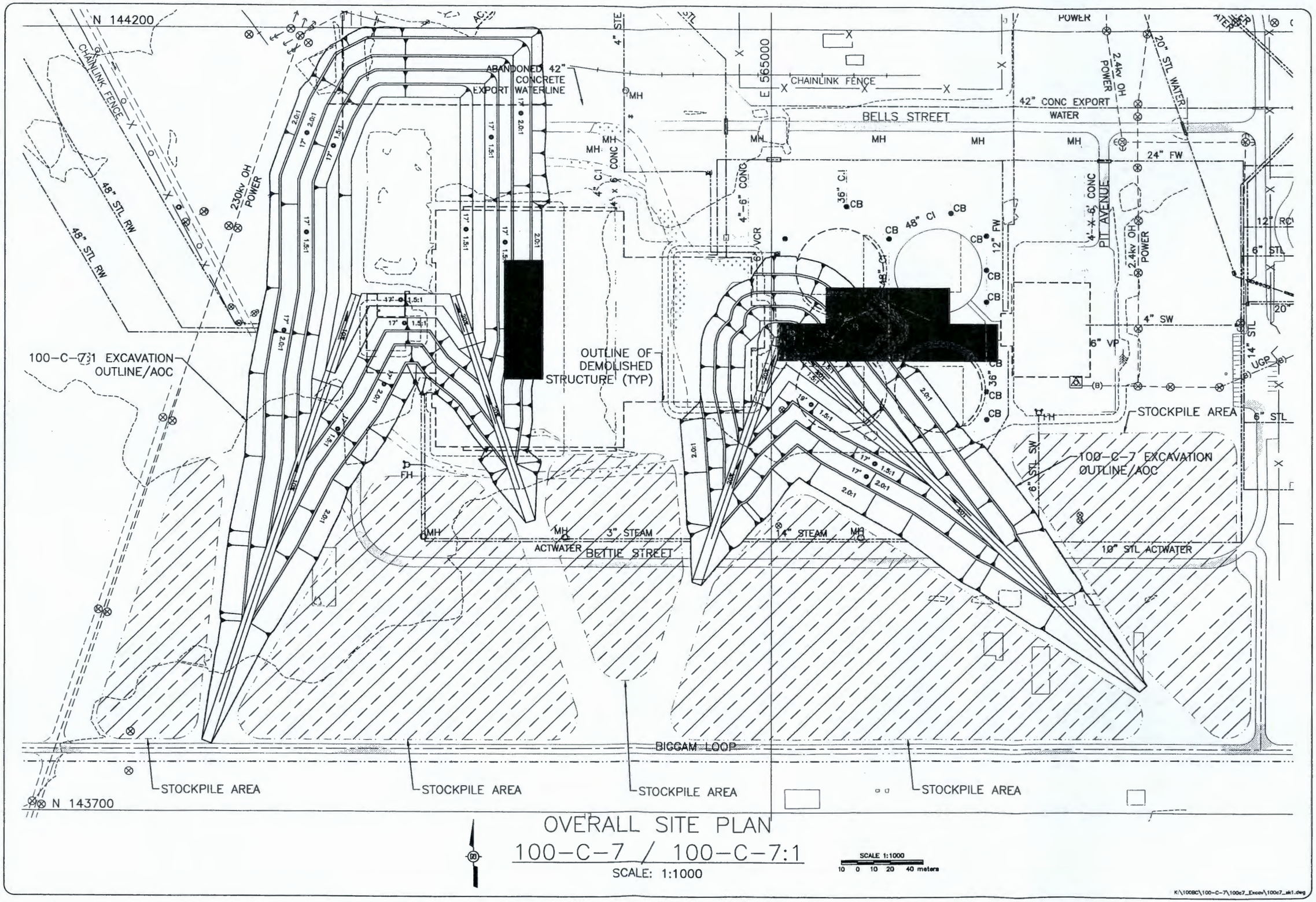
ISSUE / CONCERNS

Milestones	Due Date	Status
PM - 31	6/30/2013	6/30/2013 F

Att ~~A3~~
12

Attachment 13

Att ~~15~~
13



OVERALL SITE PLAN

100-C-7 / 100-C-7:1

SCALE: 1:1000

K:\100BC\100-C-7\100c7_Excav\100c7_sk1.dwg

Att ~~14~~
13

Attachment 14

156169

^WCH Document Control

From: Saueressig, Daniel G
Sent: Thursday, January 27, 2011 8:03 AM
To: ^WCH Document Control
Subject: FW: DOE Direction to transport the 100-C-7 demo material to U-Canyon

Please provide a chron number. This email documents a regulatory approval.

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

-----Original Message-----
From: Post, Thomas [mailto:Thomas.Post@rl.doe.gov]
Sent: Thursday, January 27, 2011 8:02 AM
To: Buelow.Laura@epamail.epa.gov; Saueressig, Daniel G
Cc: Cameron.Craig@epamail.epa.gov; Smith, Chris
Subject: RE: DOE Direction to transport the 100-C-7 demo material to U-Canyon

Dan,

DOE is onboard with this as well. Chris Smith (AMRC) confirmed with Al Farabee (AMCP) yesterday that this is 'a go'.

Thanks for putting this together.

Tom

-----Original Message-----
From: Buelow.Laura@epamail.epa.gov [mailto:Buelow.Laura@epamail.epa.gov]
Sent: Thursday, January 27, 2011 7:57 AM
To: Saueressig, Daniel G
Cc: Post, Thomas; Cameron.Craig@epamail.epa.gov
Subject: RE: DOE Direction to transport the 100-C-7 demo material to U-Canyon

I have talked with Craig several times (as recently as yesterday) and he is in favor of sending the material to U-Canyon.

Laura Buelow, Environmental Scientist
U.S. Environmental Protection Agency
Hanford Project Office
309 Bradley Blvd, Suite 115
Richland, WA 99352
Phone: 509 376-5466
Fax: 509 376-2396
E-mail: buelow.laura@epa.gov

From: "Saueressig, Daniel G" <dgsauere@wch-rcc.com>
To: Laura Buelow/R10/USEPA/US@EPA, "Post, Thomas C" <thomas.post@rl.doe.gov>
Date: 01/26/2011 04:30 PM
Subject: RE: DOE Direction to transport the 100-C-7 demo material to U-Canyon

Laura/Tom, I was hoping you could run our request by your counterparts at U canyon (Craig Cameron and Wade Woolery, I believe?) to ensure they are both on board and concur with our path forward.

Thanks and hope to hear back from you by tomorrow.

Dan

From: Saueressig, Daniel G
Sent: Wednesday, January 26, 2011 9:39 AM
To: 'Buelow.Laura@epamail.epa.gov'; Post, Thomas C
Cc: Strom, Dean N; Smith, Chris; Woolery, Wade C; Landon, Roger J; Wilkinson, Stephen G
Subject: FW: DOE Direction to transport the 100-C-7 demo material to U-Canyon

Laura/Tom, as you are aware, WCH is planning to start moving some inert demolition debris (concrete rubble) from 100-C-7 to U Canyon for use as fill material. Can you reply to this email that you are okay with the path forward for this material and then I can document your approval at the next UMM?

Thanks,

Dan Saueressig
FR Environmental Project Lead
Washington Closure Hanford
521-5326

From: Strom, Dean N
Sent: Tuesday, January 25, 2011 9:06 AM
To: Saueressig, Daniel G; Buelow.Laura@epamail.epa.gov; Post, Thomas C; Smith, Chris; Woolery, Wade C
Cc: Armatrout, Jeffrey F; Cantwell, Robert D; Foster, Thomas A; Everano, Jonetta J; Lipinski, Richard S; Bassel Younes; Robert Gunter

Subject: DOE Direction to transport the 100-C-7 demo material to U-Canyon

All,

As a reminder.

We are scheduling 24 trucks to start hauling the 100-C-7 demo material next Monday, 1-31-11. We will have 1 excavator to start the campaign on Monday, and another excavator will be secured soon. The two excavators should support 150+ cycles (trucks only) per day. Assuming 15 tons per truck, estimated volume equates to 2,250 tons/day. The total estimated volume is 140,000 tons for a duration of 4 months.

The 24 truck fleet is currently finishing at 100-N (today/tomorrow).

Thursday, (1-27-11) we will walk-down the site and routes with the crew. 156169

Still needed:

- DOE direction to transport the material to U-Canyon and a crew walk-down to determine the placement of the material.

- Shipper support if the material is transported to ERDF.

Thanks

Att ~~16~~

14

Attachment 15

AIR MONITORING PLAN FOR THE REMEDIATION OF THE 618-10 BURIAL GROUND TRENCHES
February 2011

1.0 INTRODUCTION

The remediation of the 618-10 Burial Ground trenches has the potential-to-emit (PTE) radionuclides. This activity is being conducted under a *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) Record of Decision (ROD) (EPA 2001), in accordance with the *Remedial Design Report/Remedial Action Work Plan for the 300 Area* (DOE/RL 2009). Quantification of radioactive emissions, implementing best available radionuclide control technology (BARCT), and air monitoring have been identified as substantive requirements (i.e., applicable or relevant and appropriate requirements) for this remedial action. A BARCT compliance demonstration is determined by the regulatory agency on a case-by-case basis. These substantive requirements are according to *Washington Administrative Code* (WAC) 246-247-040. This plan presents compliance with those requirements.

The 618-10 Burial Ground consists of 12 trenches and 94 vertical pipe units (VPUs). The trenches range in size from 320 ft (97 m) long by 70 ft (21 m) wide to 50 ft(15 m) long by 40 ft (12m) wide . The VPUs are 22-in. (65-cm) diameter, 15-ft (4.6-m) long waste receptacles constructed by welding five 55-gallon bottomless drums together end-to-end and burying them vertically. The 618-10 burial ground was covered in soil when it was closed. The work scope includes remediation of the 618-10 Burial Ground disposal trenches. Work involving the Vertical Pipe Units is not within the scope of this Air Monitoring Plan.

1.1 PLANNED ACTIVITIES

General remedial action operations include excavating, sampling, sorting, size reducing, stockpiling, treating (if necessary) containerizing, loading, backfilling, and transport of materials from the trenches. Materials may include a wide range of chemically and/or radiologically contaminated soil, miscellaneous debris, buried equipment, and structural materials. In addition, this work scope includes performance of all operations and incidentals for the handling, processing, and staging of buried drums or other anomalous materials that may be encountered. Also included are test pitting, trenching, and other activities that may be performed during remediation to further characterize the buried waste and/or determine the limits of the waste sites. .

Excavated material will be sent primarily to the Environmental Restoration Disposal Facility (ERDF) for disposal. On a case-by-case basis, other EPA approved disposal facilities may be used based on the specific waste stream designation.

Soil and Miscellaneous Debris Excavation

Scattered debris within some of the trenches will be picked up by hand; however, standard construction equipment will be used for excavation, loading, and hauling. The loading of

contaminated material into waste containers may result in soil spilled on the waste containers and/or haul trucks. Haul trucks with loaded containers will enter a survey area where they will be screened to detect exterior contamination. A decontamination station will be established to decontaminate containers and haul trucks, as required. Waste containers and/or haul trucks will be decontaminated by conventional means such as brushing or wipingDecontaminated trucks and containers will then proceed to the container transfer area where the transportation subcontractor will pick up the containers for transport to the ERDF.

Stockpiling and leaving open face excavations overnight will be minimized.

Anomaly Processing

Most anomalies (including drums and containers) will be overpacked at the excavation site and then characterized for disposal. Anomalies that contain significant quantities of Plutonium or other radionuclides that present an airborne risk will be opened in a HEPA filtered enclosure. .

Drum Handling

Drummed waste will be encountered in the 618-10 Burial Ground trenches. The exact quantity of drums and the types of waste material contained in the drums is not known at this time. Extensive records searches indicate that low-activity wastes were primarily disposed of in the trenches, but some of the moderate- to high-activity wastes were also disposed of in the trenches inside concrete/lead-shielded drums. Wastes included radiological contaminated laboratory instruments, bottles, boxes, filters, aluminum cuttings, metal cuttings, irradiated fuel element samples, metallurgical samples, electrical equipment, lighting fixtures, barrels, laboratory equipment and hoods/gloveboxes, and low and high activity liquid waste sealed in containers. To address the potential emission contributions from drummed waste handling a database was created based upon information gathered from a review of historical documentation related to the 618-10 Burial Ground. This database was queried to develop a worksheet that indentified the population of waste drums and associated inventory that was used for the emission calculation.

Drums will be placed in a salvage container (salvage drum, B-12 box, etc.) at the dig face and then moved through non-destructive assay stations. To support physical characterization and sampling of the contents, waste drum lids may be pierced under negative pressure and drum contents sampled in the HEPA ventilated drum punch facility. The HEPA ventilated drum punch unit is a fully enclosed, remotely operated structure designed to safely handle unvented drums. The drummed waste will subsequently be moved to a control area within the burial ground Area of Contamination (AOC) or other regulatory approved locations, loaded onto flatbed trailers, and transported to the ERDF or other regulatory approved locations for interim staging or disposal. Retrieved drums containing Zircaloy-2 chips and oil or black uranium oxide will be put into larger steel salvage containers (Nucfil™ vented or equivalent). Clean mineral oil or water will be added to these drums and salvage containers as needed to ensure chips are immersed.

During the overpacking, a Nucfil™ vent or equivalent may be inserted into the salvage container. The potential emissions from this activity are negligible compared with potential emissions from sampling and containerizing drums. This activity (venting drums) assumes a release fraction of 2E-09 (A. W. Conklin 1999) resulting in a calculated potential-to-emit several orders of magnitude below that associated with sampling and containerizing the drums. Therefore,

potential to emit during the sampling and containerizing of drums accounts for the activity of venting of drums.

If any of the drums are corroded to the point that they cannot be overpacked, the potential emissions will be part of soil excavation and will result in lower emissions from the drum handling activities.

2.0 AIRBORNE SOURCE INFORMATION

There is a potential for radioactive airborne emissions resulting from the characterization. The primary radiological constituents of concern at the waste sites include plutonium, americium, strontium, yttrium, cesium, and barium. Other isotopes will be encountered during characterization, however, it is expected that dose estimated provided below are conservative and represent the upper bound of what will actually be found during characterization.

2.1 INVENTORY

The radionuclide annual possession quantities and subsequent potential emission calculations for the 618-10 Burial Ground are summarized in Attachments 1 through 4. The inventory was developed from the previously described record review.

For the purpose of this calculation, as shown in Table 1 below, inventory is divided into two categories which are 1) emitted as a point source through the DPF, and 2) emitted as a fugitive emission during remediation of the burial ground trenches. The point source emission category was formed by assembling all unshielded drums in the 618-10 trenches. The fugitive emissions category encompasses all remaining waste items, including shielded drums and 10% of the unshielded drums that will be processed through the drum punch facility (to account for degraded drums). Waste items in the 618-10 VPUs are excluded. The item count associated with each category and container size is shown in the table below.

Table 1. 618-10 Burial Ground Item Type and Count

Category				Total
Point Source (Drum Punch Facility)	Unshielded Drums			1283
Fugitive Emissions	Remaining waste items (3451)	Shielded Drums (972)	Degraded unshielded Drums (128 estimated)	4551
Total				5834

An additional source of inventory must also be considered. Well water is planned to be used as a dust suppressant to control potentially airborne contaminants during the remediation activities. Two water supply wells (200-PO-1 Operable Unit Groundwater) have been constructed approximately 1000 feet northwest of the 618-10 Burial Ground boundary for this purpose. Groundwater samples have been collected from monitoring wells at the Hanford Site for nearly

40 years and analytical results compiled into the Hanford Environmental Information System (HEIS) database. A search of the HEIS database for all analytical data from existing wells in the vicinity of the 618-10 site provided over 14,000 entries for non-radiological and radiological hazardous materials. The information provided from the database search will serve as the basis for determining an inventory of isotopes for the dust suppression water. This inventory will be counted in the fugitive emission inventory.

Drum characterization may consist of placing drums into the drum punch facility and obtaining a sample of up to 2L from each drum sampled. Although only 2L is disturbed and available to potentially emit, conservatively, the entire inventory of unshielded drums is assumed to be emitted through the point source for purposes of the dose calculation. Shielded drums will not be processed through the drum punch facility.
There are three general types of drums:

1. Drums containing miscellaneous waste including metal turnings (such as uranium and Zircaloy), oxides and powders (including uranium oxide, and thorium oxide), and miscellaneous trash (contaminated objects, paper, plastic, cloth).

2. Drums containing detectable levels of plutonium (using a combination of gamma spectroscopy and neutron counting)

3. Drums in which the contents have been concreted.

Type 1 drums will be punched in the DPF with about a 6 inch hole, sampled (by removing approximately 2 liters of material) and overpacked for shipment to off site treatment, or returned to the excavation to be broken up and mixed with the soil, and loaded out for disposal at ERDF.

Type 2 drums will be punched in the DPF with a minimal size hole (no larger than about 1/2 inch) to vent gasses potentially generated through alpha radiolysis. These drums will not be sampled, but will be overpacked with a lid fitted with a NucFil (or equivalent) filter.

Type 3 drums will not be punched, but instead will be non-destructively assayed and non-destructively examined and overpacked for shipment to off site treatment, or returned to the excavation if assayed non-TRU, to be broken up and mixed with the soil, and loaded out for disposal at ERDF.

Consistent with WAC 246-247, a release fraction 1E-03 was applied to the inventory assuming all of the material disposed of is in the form of particulate. An exception is H-3 and Kr-85 which are multiplied by 1. The use of these release fractions is considered conservative because it will be used on waste forms including bulk soil, neutron irradiated items, fixed contamination, and volumetrically contaminated items. It is assumed that all trench remediation activities will occur over one year.

The CAP88-PC model was used to determine the total effective dose equivalent, or annual unabated offsite dose for trench remediation. The potential-to-emit (curies per year) were the input for the computer model, and the model generated the annual unabated dose. The CAP88-PC model summary and synopsis are presented in calculation 0600X-CA-V0087 (WCH 2011). The total effective dose equivalent (TEDE) to the hypothetical maximally exposed offsite individual (MEI) for trench remediation is 1.96E-01 mrem/yr. The TEDE to the MEI for drum

characterization is 2.64E-02 mrem/yr. The MEI for both activities was located at Energy Northwest, which is located 4,265m to the North.

3.0 BEST AVAILABLE RADIONUCLIDE CONTROL TECHNOLOGY (BARCT)

The following is the BARCT to be implemented during the 618-10 trench remedial action

3.1 DRUM VENTING FILTERS

The venting filters inserted in drums, if used, will be Nucfil™ filters or equivalent that are considered BARCT for radioactive emissions at the Hanford Site.

3.2 SAMPLING AND OVERPACKING – HEPA FILTRATION

The sampling activities will be conducted utilizing as low as reasonably achievable (ALARA) practices during the sampling/containerization campaign. These practices include isolating each drum prior to sampling, ensuring each drum is stabilized as appropriate, and utilizing safety precautions such as grounding equipment and non-sparking tools. If physical characterization is needed, the lids of intact waste drums will be pierced and drum contents sampled in the HEPA ventilated drum punch. The HEPA ventilated drum punch unit is a fully enclosed, remotely operated structure designed to safely handle unvented drums.

The use of HEPA filters has been generally accepted as BARCT and their use is encouraged whenever practical during remediation activities. HEPA filters shall have efficiency testing performed upon installation and on an annual basis thereafter and must be demonstrated to 99.95% removal efficiency.

3.3 APPLICATION OF DUST SUPPRESSANTS

The following describes the controls to be implemented during the excavation, sorting, size reduction, stockpiling, and bulk material loading:

- Water will be applied during excavation, sorting, size reduction, container loading, stockpiling, and backfilling processes to minimize airborne releases. Only the amount necessary to control airborne releases will be used so as to minimize the potential for downward migration of mobile contaminants.

- Soil fixatives will be applied to any contaminated soils and debris that will be inactive for more than 24 hours.

- Fixatives will be applied to contaminated soils and debris (including stockpiles) that will be inactive less than 24 hours at the end of work operations, if the sustained windspeed is predicted overnight to be greater than 32.2 kph (20 mph) based on the Hanford Meteorological Station morning forecast. This will allow the project enough time, if necessary, to prepare for the application of dust control measures. If a soil fixative has already been applied and the soil will remain undisturbed, further use of fixatives will not be

needed. The fixatives or other controls will not be applied when the contaminated soils are frozen, or if it is raining, snowing, or other freezing precipitation is falling at the end of work operations.

- An entry will be made in the project logbook or equivalent when the forecast predicts, sustained wind speeds of greater than 32.2 kph (20 mph) and dust control is to be applied at the end of the work shift.

- Additional measures for controlling small debris in waste piles may be prudent based on waste site conditions as determined by project personnel. Some additional measures that may be used are: 1) apply a thin layer of other contaminated soil from the same waste site that is free of debris on the surface and follow normal fixative application, 2) apply a thin layer of uncontaminated soil that is free of debris on the surface and follow normal fixative application, 3) apply a bonded fiber fixative, 4) cover the area containing small debris that is easily re-suspended with a tarp or other appropriate material.

- Other dust suppression methods, such as processing magnesium chloride into the soil matrix, may be utilized.

4.0 MONITORING

During remediation of the 618-10 Burial Ground, monitoring activities will consist of four previously established air monitoring stations (Figure 1). These air monitors will be located upwind and downwind of the burial ground. In addition, four thermoluminescent dosimeters (TLDs) will be used to supplement the air monitoring data. The TLDs will be co-located with the air monitors (Figure 1).

These air monitors/TLDs are the means/methods to measure emissions. The operation of these monitors/TLDs will follow the protocol established for these programs. The data from these monitors/TLDs will be included in the annual reports prepared for the Hanford Site. Air samples are collected every two weeks and analyzed for total alpha and total beta. These samples are composited semi-annually and analyzed for isotopic uranium, isotopic plutonium, Am-241, Sr-90, and gamma emitting radionuclides (gamma energy analysis). Soil deposition samples will also be collected before, during, and after remediation. The samples will be obtained near the air monitor locations and will be analyzed for isotopic uranium, isotopic plutonium, Am-241, Sr-90, and gamma emitting radionuclides (gamma energy analysis).

The TLDs are collected and read quarterly.

Air monitors are run continuously during remediation activities and air monitor downtime will be minimized. If any one of the near facility air monitor stations is out of operation for more than 48 hours during normal work operations (excluding weekends and holidays), the regulatory agency will be notified. At least 3 air monitors must be operating for normal work operations, excavation and sampling activities to continue at the site.

Exhaust points from HEPA filters (and any ductwork, seams, or other potential release locations from enclosures) will be monitored on a routine basis for potential radionuclide releases and

results recorded (e.g., post survey results negative). Any positive survey results will require appropriate maintenance on the facility to ensure that continued releases do not occur. In the event of positive survey results, work will stop and the cause investigated. The results of this investigation will be discussed with EPA before operations continue. Records of routine monitoring and necessary maintenance will be provided to regulatory staff upon request.

As part of the site-wide evaluation of near-facility monitoring (NFM) data, the electronic release summary database compares NFM composite air sample results to 10% of the Table 2 values, Appendix E, 40 CFR 61. The database identifies results that exceed these values. Results from the air monitors identified in this plan that are above these values will be investigated and the adequacy of the controls evaluated as appropriate.

Note: ™ Nucfil is a registered trademark of Nuclear Filter Technology Incorporated, 5161 Ward Rd., Wheat Ridge, CO 80033.

5.0 REFERENCES

DOE/RL, 2009, *Remedial Design Report/Remedial Action work Plan for the 300 Area*, DOE/RL-2001-47, Revision 3, December 2009, U.S. Dept. of Energy-Richland Operation Office, Richland, Washington

EPA, 2001, *Interim Action Record of Decision for the 300-FF-2 Operable Unit,* April 2001, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

WAC 246-247-030, "Radiation Protection-Air Emissions," *Washington Administrative Code,* as amended.

WAC 246-247-040, "Radiation Protection-Air Emissions," *Washington Administrative Code,* as amended.

Washington Department of Health, Letter AIR 99-1006, from A. W. Conklin to J. E. Rasmussen, October 18,1999.

WCH, 2008, *618-10 and 618-11 Waste Burial Grounds Basis for Interim Operation,* WCH-183, Revision 0, Washington Closure Hanford, Richland, Washington.

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Attachment 1

Trench Item Potential to Emit (Fugitive)

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Ac-225	1.32E-15		1.32E-15
Ac-227	3.60E-08		3.60E-08
Ac-228	7.18E-05		7.18E-05
Am-241	2.79E-03		2.79E-03
Am-242	4.00E-07		4.00E-07
Am-242m	4.02E-07		4.02E-07
Am-243	2.26E-07		2.26E-07
At-217	1.32E-15		1.32E-15
Ba-137m	6.79E-02	1.35E-06	6.79E-02
Be-10	2.22E-10		2.22E-10
Be-7		8.79E-06	8.79E-06
Bi-210	2.07E-09		2.07E-09
Bi-211	3.60E-08		3.60E-08
Bi-212	7.16E-05		7.16E-05
Bi-213	1.32E-15		1.32E-15
Bi-214	5.52E-09		5.52E-09
C-14	5.24E-04	3.92E-07	5.25E-04
Ca-41	1.98E-05		1.98E-05
Ce-144		2.47E-06	2.47E-06
Cl-36	4.37E-06		4.37E-06
Cm-242	3.31E-07		3.31E-07
Cm-243	3.77E-08		3.77E-08
Cm-244	5.65E-07		5.65E-07
Cm-245	7.64E-11		7.64E-11
Cm-246	2.11E-12		2.11E-12
Co-58		2.52E-07	2.52E-07
Co-60	4.50E-06	1.50E-06	6.00E-06
Cs-134	1.46E-09	4.79E-07	4.80E-07
Cs-135	8.77E-07		8.77E-07
Cs-137	7.18E-02	1.42E-06	7.18E-02
Eu-152	2.31E-06	5.53E-07	2.86E-06
Eu-154	4.43E-05	7.56E-07	4.50E-05
Eu-155		1.30E-06	1.30E-06
Fe-59		7.73E-07	7.73E-07
Fr-221	1.32E-15		1.32E-15
Fr-223	4.97E-10		4.97E-10
H-3	5.40E-01	5.30E+00	5.84E+00
I-129	6.71E-08	3.99E-08	1.07E-07
K-40		1.30E-05	1.30E-05
Kr-85	9.19E-01		9.19E-01
Mo-93	7.08E-09		7.08E-09
Nb-93m	4.99E-06		4.99E-06
Nb-94	7.27E-08		7.27E-08
Ni-59	3.68E-06		3.68E-06
Ni-63	3.21E-04		3.21E-04
Np-237	5.70E-07		5.70E-07
Np-238	2.01E-09		2.01E-09
Np-239	2.26E-07		2.26E-07
Np-240m	2.22E-19		2.22E-19
Pa-231	7.05E-08		7.05E-08
Pa-233	5.70E-07		5.70E-07
Pa-234	4.00E-06		4.00E-06
Pa-234m	3.07E-03		3.07E-03
Pb-209	1.32E-15		1.32E-15
Pb-210	2.07E-09		2.07E-09
Pb-211	3.60E-08		3.60E-08
Pb-212	7.16E-05		7.16E-05
Pb-214	5.52E-09		5.52E-09
Pd-107	1.32E-07		1.32E-07
Po-210	2.07E-09		2.07E-09
Po-211	1.01E-10		1.01E-10

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Po-212	4.59E-05		4.59E-05
Po-213	1.29E-15		1.29E-15
Po-214	5.52E-09		5.52E-09
Po-215	3.60E-08		3.60E-08
Po-216	7.16E-05		7.16E-05
Po-218	5.52E-09		5.52E-09
Pu-238	4.70E-04	7.04E-09	4.70E-04
Pu-239	3.41E-03	1.11E-09	3.41E-03
Pu-240	1.10E-03		1.10E-03
Pu-241	7.95E-03		7.95E-03
Pu-242	1.79E-07		1.79E-07
Ra-223	3.60E-08		3.60E-08
Ra-224	7.16E-05		7.16E-05
Ra-225	1.32E-15		1.32E-15
Ra-226	5.52E-09		5.52E-09
Ra-228	7.18E-05		7.18E-05
Re-187	4.45E-13		4.45E-13
Rn-219	3.60E-08		3.60E-08
Rn-220	7.16E-05		7.16E-05
Rn-222	5.52E-09		5.52E-09
Ru-106		1.20E-05	1.20E-05
Sb-125		2.13E-06	2.13E-06
Sb-126	2.27E-07		2.27E-07
Sb-126m	1.62E-06		1.62E-06
Se-79	9.85E-07		9.85E-07
Sm-151	2.38E-03		2.38E-03
Sn-121m	2.97E-06		2.97E-06
Sn-126	1.62E-06		1.62E-06
Sr-90	6.97E-02	4.13E-08	6.97E-02
Tc-99	3.28E-05	9.25E-06	4.20E-05
Th-227	3.55E-08		3.55E-08
Th-228	7.16E-05		7.16E-05
Th-229	1.32E-15		1.32E-15
Th-230	4.96E-07		4.96E-07
Th-231	6.43E-05		6.43E-05
Th-232	7.20E-05		7.20E-05
Th-234	3.07E-03		3.07E-03
Tl-207	3.59E-08		3.59E-08
Tl-208	2.58E-05		2.58E-05
U-232	5.64E-09		5.64E-09
U-233	1.55E-10	7.05E-07	7.06E-07
U-234	1.06E-03	3.51E-06	1.07E-03
U-235	6.43E-05	1.88E-07	6.45E-05
U-236	2.00E-06		2.00E-06
U-237	1.95E-07		1.95E-07
U-238	3.07E-03	5.40E-06	3.08E-03
U-240	2.22E-19		2.22E-19
Y-90	6.97E-02	4.13E-08	6.97E-02
Zn-65		6.18E-07	6.18E-07
Zr-93	5.65E-06		5.65E-06
Zr-95		1.85E-05	1.85E-05

Notes:
Radionuclide potential to emit values are presented in Calculation 0600X-CA-V0087, *Total Effective Dose Emission Calculation for Remediation of the 618-10 Burial Ground,* rev. 0.
(1) Release Fraction of 1 consistent with gaseous material form.

Attachment 2

Well Water Inventory and Potential to Emit (Fugitive)

A	B	C	D	E	F
Well Name	Nuclide	Concentration (pCi/L)	Concentration (Ci/L)	Activity (Ci)	PTE (Ci/year)
699-S6-E4D	Be-7	6.98E+01	6.98E-11	8.79E-03	8.79E-06
699-S6-E4A	C-14	3.11E+00	3.11E-12	3.92E-04	3.92E-07
699-S6-E4D	Ce/Pr-144 (1)	1.96E+01	1.96E-11	2.47E-03	2.47E-06
699-S6-E4A	Co-58	2.00E+00	2.00E-12	2.52E-04	2.52E-07
699-S6-E4B	Co-60	1.19E+01	1.19E-11	1.50E-03	1.50E-06
699-S6-E4A	Cs-134	3.80E+00	3.80E-12	4.79E-04	4.79E-07
699-S6-E4D	Cs-137	1.13E+01	1.13E-11	1.42E-03	1.42E-06
	Ba-137m (6)			1.35E-03	1.35E-06
699-S6-E4K	Eu-152	4.39E+00	4.39E-12	5.53E-04	5.53E-07
699-S6-E4D	Eu-154	6.00E+00	6.00E-12	7.56E-04	7.56E-07
699-S6-E4A	Eu-155	1.03E+01	1.03E-11	1.30E-03	1.30E-06
699-S6-E4A	Fe-59	6.14E+00	6.14E-12	7.73E-04	7.73E-07
699-S6-E4D	H-3 (5)	4.21E+04	4.21E-08	5.30E+00	5.30E+00
699-S6-E4D	I-129	3.17E-01	3.17E-13	3.99E-05	3.99E-08
699-S6-E4D	K-40	1.03E+02	1.03E-10	1.30E-02	1.30E-05
699-S6-E4A	Pu-238	5.59E-02	5.59E-14	7.04E-06	7.04E-09
699-S6-E4B	Pu-239/240 (2)	8.83E-03	8.83E-15	1.11E-06	1.11E-09
699-S6-E4D	Ru-106	9.54E+01	9.54E-11	1.20E-02	1.20E-05
699-S6-E4D	Sb-125	1.69E+01	1.69E-11	2.13E-03	2.13E-06
699-S6-E4A	Sr-90	3.28E-01	3.28E-13	4.13E-05	4.13E-08
	Y-90 (7)			4.13E-05	4.13E-08
699-S6-E4D	Tc-99	7.34E+01	7.34E-11	9.25E-03	9.25E-06
699-S6-E4L	U-233/234 (3)	5.60E+00	5.60E-12	7.05E-04	7.05E-07
699-S6-E4A	U-234	2.79E+01	2.79E-11	3.51E-03	3.51E-06
699-S6-E4A	U-235	1.49E+00	1.49E-12	1.88E-04	1.88E-07
699-S6-E4A	U-238	4.29E+01	4.29E-11	5.40E-03	5.40E-06
699-S6-E4D	Zn-65	4.91E+00	4.91E-12	6.18E-04	6.18E-07
699-S6-E4D	Zr/Nb-95 (4)	1.47E+02	1.47E-10	1.85E-02	1.85E-05

Notes:

(1) Assumed to be all Ce-144

(2) Assumed to be all Pu-239

(3) Assumed to be all U-233

(4) Assumed to be all Zr-95

(5) Release Fraction of 1 consistent with gaseous material form.

(6) Ba-137m, a daughter product of Cs-137, is assumed to be 0.946 of Cs-137 activity.

(7) Y-90, a daughter product of Sr-90, is assumed to be in equal proportion to Sr-90.

(8) Radionuclide potential to emit values are presented in Calculation 0600X-CA-V0087, *Total Effective Dose Emission Calculation for Remediation of the 618-10 Burial Ground*, rev. 0.

Attachment 3

Fugitive and Well Water Combined Potential to Emit And Total Effective Dose Equivalent

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Ac-225	1.32E-15		1.32E-15
Ac-227	3.60E-08		3.60E-08
Ac-228	7.18E-05		7.18E-05
Am-241	2.79E-03		2.79E-03
Am-242	4.00E-07		4.00E-07
Am-242m	4.02E-07		4.02E-07
Am-243	2.26E-07		2.26E-07
At-217	1.32E-15		1.32E-15
Ba-137m	6.79E-02	1.35E-06	6.79E-02
Be-10	2.22E-10		2.22E-10
Be-7		8.79E-06	8.79E-06
Bi-210	2.07E-09		2.07E-09
Bi-211	3.60E-08		3.60E-08
Bi-212	7.16E-05		7.16E-05
Bi-213	1.32E-15		1.32E-15
Bi-214	5.52E-09		5.52E-09
C-14	5.24E-04	3.92E-07	5.25E-04
Ca-41	1.98E-05		1.98E-05
Ce-144		2.47E-06	2.47E-06
Cl-36	4.37E-06		4.37E-06
Cm-242	3.31E-07		3.31E-07
Cm-243	3.77E-08		3.77E-08
Cm-244	5.65E-07		5.65E-07
Cm-245	7.64E-11		7.64E-11
Cm-246	2.11E-12		2.11E-12
Co-58		2.52E-07	2.52E-07
Co-60	4.50E-06	1.50E-06	6.00E-06
Cs-134	1.46E-09	4.79E-07	4.80E-07
Cs-135	8.77E-07		8.77E-07
Cs-137	7.18E-02	1.42E-06	7.18E-02
Eu-152	2.31E-06	5.53E-07	2.86E-06
Eu-154	4.43E-05	7.56E-07	4.50E-05
Eu-155		1.30E-06	1.30E-06
Fe-59		7.73E-07	7.73E-07
Fr-221	1.32E-15		1.32E-15
Fr-223	4.97E-10		4.97E-10
H-3	5.40E-01	5.30E+00	5.84E+00
I-129	6.71E-08	3.99E-08	1.07E-07
K-40		1.30E-05	1.30E-05
Kr-85	9.19E-01		9.19E-01
Mo-93	7.08E-09		7.08E-09
Nb-93m	4.99E-06		4.99E-06
Nb-94	7.27E-08		7.27E-08
Ni-59	3.68E-06		3.68E-06
Ni-63	3.21E-04		3.21E-04
Np-237	5.70E-07		5.70E-07
Np-238	2.01E-09		2.01E-09
Np-239	2.26E-07		2.26E-07
Np-240m	2.22E-19		2.22E-19
Pa-231	7.05E-08		7.05E-08
Pa-233	5.70E-07		5.70E-07
Pa-234	4.00E-06		4.00E-06
Pa-234m	3.07E-03		3.07E-03
Pb-209	1.32E-15		1.32E-15
Pb-210	2.07E-09		2.07E-09
Pb-211	3.60E-08		3.60E-08
Pb-212	7.16E-05		7.16E-05
Pb-214	5.52E-09		5.52E-09
Pd-107	1.32E-07		1.32E-07
Po-210	2.07E-09		2.07E-09
Po-211	1.01E-10		1.01E-10

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Po-212	4.59E-05		4.59E-05
Po-213	1.29E-15		1.29E-15
Po-214	5.52E-09		5.52E-09
Po-215	3.60E-08		3.60E-08
Po-216	7.16E-05		7.16E-05
Po-218	5.52E-09		5.52E-09
Pu-238	4.70E-04	7.04E-09	4.70E-04
Pu-239	3.41E-03	1.11E-09	3.41E-03
Pu-240	1.10E-03		1.10E-03
Pu-241	7.95E-03		7.95E-03
Pu-242	1.79E-07		1.79E-07
Ra-223	3.60E-08		3.60E-08
Ra-224	7.16E-05		7.16E-05
Ra-225	1.32E-15		1.32E-15
Ra-226	5.52E-09		5.52E-09
Ra-228	7.18E-05		7.18E-05
Re-187	4.45E-13		4.45E-13
Rn-219	3.60E-08		3.60E-08
Rn-220	7.16E-05		7.16E-05
Rn-222	5.52E-09		5.52E-09
Ru-106		1.20E-05	1.20E-05
Sb-125		2.13E-06	2.13E-06
Sb-126	2.27E-07		2.27E-07
Sb-126m	1.62E-06		1.62E-06
Se-79	9.85E-07		9.85E-07
Sm-151	2.38E-03		2.38E-03
Sn-121m	2.97E-06		2.97E-06
Sn-126	1.62E-06		1.62E-06
Sr-90	6.97E-02	4.13E-08	6.97E-02
Tc-99	3.28E-05	9.25E-06	4.20E-05
Th-227	3.55E-08		3.55E-08
Th-228	7.16E-05		7.16E-05
Th-229	1.32E-15		1.32E-15
Th-230	4.96E-07		4.96E-07
Th-231	6.43E-05		6.43E-05
Th-232	7.20E-05		7.20E-05
Th-234	3.07E-03		3.07E-03
Tl-207	3.59E-08		3.59E-08
Tl-208	2.58E-05		2.58E-05
U-232	5.64E-09		5.64E-09
U-233	1.55E-10	7.05E-07	7.06E-07
U-234	1.06E-03	3.51E-06	1.07E-03
U-235	6.43E-05	1.88E-07	6.45E-05
U-236	2.00E-06		2.00E-06
U-237	1.95E-07		1.95E-07
U-238	3.07E-03	5.40E-06	3.08E-03
U-240	2.22E-19		2.22E-19
Y-90	6.97E-02	4.13E-08	6.97E-02
Zn-65		6.18E-07	6.18E-07
Zr-93	5.65E-06		5.65E-06
Zr-95		1.85E-05	1.85E-05

Fugitive Category Total Effective Dose Equivalent

Nuclide	TEDE (mrem/y)
Am-242m	4.77E-06
Am-242	2.29E-09
Cm-242	5.47E-07
Pu-238	6.97E-03
U-234	1.25E-03
Th-230	2.31E-06
Ra-226	6.02E-09
Rn-222	1.52E-16
Po-218	2.87E-18
Pb-214	2.37E-11
Bi-214	2.58E-11
Po-214	2.60E-17
Pb-210	7.20E-10
Bi-210	6.07E-11
Po-210	2.13E-09
At-218	0.00E+00
Pu-242	2.73E-06
U-238	2.96E-03
Th-234	1.38E-05
Pa-234m	5.61E-06
Pa-234	1.88E-07
Np-238	1.42E-12
Be-10	0.00E+00
Be-7	2.97E-09
C-14	1.66E-06
Ca-41	9.05E-08
Ce-144	4.02E-08
Pr-144m	2.89E-12
Pr-144	3.93E-11
Cl-36	8.24E-06
Cm-243	3.76E-07
Am-243	2.99E-06
Np-239	8.79E-11
Pu-239	5.49E-02
U-235	6.70E-05
Th-231	2.38E-08
Pa-231	2.13E-06
Ac-227	8.27E-07
Th-227	1.16E-07
Ra-223	8.44E-08
Rn-219	1.37E-13
Po-215	3.47E-16
Pb-211	1.26E-10
Bi-211	9.08E-14
Tl-207	2.01E-14
Po-211	0.00E+00
Fr-223	0.00E+00
Cm-244	4.82E-06
Pu-240	1.77E-02
U-236	2.15E-06
Th-232	5.82E-04
Ra-228	2.01E-04
Ac-228	1.41E-06

Th-228	9.01E-04
Ra-224	6.76E-05
Rn-220	1.91E-12
Po-216	1.78E-11
Pb-212	4.02E-06
Bi-212	9.45E-07
Po-212	0.00E+00
Tl-208	1.18E-06
Cm-245	0.00E+00
Pu-241	2.30E-03
Am-241	3.74E-02
Np-237	4.19E-06
Pa-233	2.80E-09
U-233	8.40E-07
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
U-237	5.25E-10
Co-58	2.76E-09
Co-60	6.42E-07
Cs-134	2.25E-07
Cs-135	4.76E-08
Cs-137	2.61E-02
Ba-137m	6.61E-04
Eu-152	9.46E-08
Gd-152	0.00E+00
Eu-154	1.76E-06
Eu-155	4.57E-09
Fe-59	6.58E-09
I-129	1.48E-07
K-40	2.65E-06
Kr-85	3.41E-07
Mo-93	1.32E-12
Nb-93m	1.75E-09
Nb-94	2.27E-09
Ni-59	3.04E-09
Ni-63	6.54E-07
Pd-107	2.46E-11
Ru-106	2.61E-07
Rh-106	5.83E-08
Sb-125	2.05E-08
Te-125m	1.17E-09
Se-79	7.90E-08
Sm-151	3.32E-06
Sn-121m	2.01E-08
Sn-121	1.24E-11
Sn-126	1.24E-07
Sb-126m	4.23E-08
Sb-126	1.09E-08
Sr-90	4.35E-02
Y-90	1.61E-04
Tc-99	4.58E-06
U-232	1.39E-08

Zn-65	7.88E-08
Zr-93	2.56E-08
Zr-95	1.31E-07
Nb-95m	4.63E-11
Nb-95	4.14E-10
H-3	4.27E-04
Cm-246	0.00E+00
TOTAL	1.96E-01

Notes:
The annual unabated dose was determined using the CAP88-PC, Version 2 Model. The PTE was the input for the model, and the model generated the annual unabated dose. The CAP88-PC model summary and synopsis is presented in 0600X-CA-V0087, *Total Effective Dose Emission Calculation for Remediation of the 618-10 Burial Ground*, rev. 0.

Attachment 4

Drum Punch Facility Inventory, Potential to Emit and Total Effective Dose Equivalent

Nuclide	Activity (Ci)	PTE (Ci/year)
Ac-225	1.499E-15	1.50E-18
Ac-227	1.350E-04	1.35E-07
Ac-228	1.196E-01	1.20E-04
Am-241	4.108E-02	4.11E-05
Am-242	8.350E-06	8.35E-09
Am-242m	8.391E-06	8.39E-09
Am-243	4.848E-06	4.85E-09
At-217	1.499E-15	1.50E-18
Ba-137m	6.652E-01	6.65E-04
Be-10	3.246E-10	3.25E-13
Bi-210	4.738E-06	4.74E-09
Bi-211	1.351E-04	1.35E-07
Bi-212	1.194E-01	1.19E-04
Bi-213	1.499E-15	1.50E-18
Bi-214	1.262E-05	1.26E-08
C-14	8.407E-05	8.41E-08
Cm-242	6.906E-06	6.91E-09
Cm-243	8.330E-07	8.33E-10
Cm-244	1.253E-05	1.25E-08
Cm-245	1.715E-09	1.71E-12
Cm-246	4.773E-11	4.77E-14
Co-60	5.918E-06	5.92E-09
Cs-134	2.061E-08	2.06E-11
Cs-135	8.572E-06	8.57E-09
Cs-137	7.033E-01	7.03E-04
Eu-152	1.644E-05	1.64E-08
Eu-154	6.262E-04	6.26E-07
Fr-221	1.499E-15	1.50E-18
Fr-223	1.862E-06	1.86E-09
H-3	6.688E-04	6.69E-04
I-129	6.785E-07	6.78E-10
Kr-85	8.702E-03	8.70E-03
Mo-93	1.035E-08	1.03E-11
Nb-93m	4.006E-05	4.01E-08
Nb-94	2.111E-09	2.11E-12
Ni-59	5.026E-06	5.03E-09
Ni-63	4.319E-04	4.32E-07
Np-237	6.686E-06	6.69E-09
Np-238	4.197E-08	4.20E-11
Np-239	4.848E-06	4.85E-09
Np-240m	4.264E-18	4.26E-21
Pa-231	2.644E-04	2.64E-07
Pa-233	6.686E-06	6.69E-09
Pa-234	2.465E-02	2.47E-05
Pa-234m	1.896E+01	1.90E-02
Pb-209	1.499E-15	1.50E-18
Pb-210	4.737E-06	4.74E-09
Pb-211	1.351E-04	1.35E-07
Pb-212	1.194E-01	1.19E-04
Pb-214	1.262E-05	1.26E-08
Pd-107	1.518E-06	1.52E-09
Po-210	4.738E-06	4.74E-09
Po-211	3.782E-07	3.78E-10
Po-212	7.652E-02	7.65E-05
Po-213	1.467E-15	1.47E-18
Po-214	1.262E-05	1.26E-08
Po-215	1.351E-04	1.35E-07
Po-216	1.194E-01	1.19E-04
Po-218	1.262E-05	1.26E-08
Pu-238	6.591E-03	6.59E-06
Pu-239	3.142E-02	3.14E-05
Pu-240	1.322E-02	1.32E-05

Nuclide	Activity (Ci)	PTE (Ci/year)
Pu-241	1.164E-01	1.16E-04
Pu-242	3.134E-06	3.13E-09
Ra-223	1.351E-04	1.35E-07
Ra-224	1.194E-01	1.19E-04
Ra-225	1.499E-15	1.50E-18
Ra-226	1.262E-05	1.26E-08
Ra-228	1.196E-01	1.20E-04
Re-187	6.381E-13	6.38E-16
Rn-219	1.351E-04	1.35E-07
Rn-220	1.194E-01	1.19E-04
Rn-222	1.262E-05	1.26E-08
Sb-126	2.306E-06	2.31E-09
Sb-126m	1.647E-05	1.65E-08
Se-79	9.586E-06	9.59E-09
Sm-151	1.941E-02	1.94E-05
Sn-121m	5.826E-06	5.83E-09
Sn-126	1.647E-05	1.65E-08
Sr-90	5.510E-01	5.51E-04
Tc-99	3.198E-04	3.20E-07
Th-227	1.333E-04	1.33E-07
Th-228	1.194E-01	1.19E-04
Th-229	1.499E-15	1.50E-18
Th-230	1.133E-03	1.13E-06
Th-231	2.413E-01	2.41E-04
Th-232	1.200E-01	1.20E-04
Th-234	1.896E+01	1.90E-02
Tl-207	1.347E-04	1.35E-07
Tl-208	4.292E-02	4.29E-05
U-232	7.835E-08	7.83E-11
U-233	1.778E-09	1.78E-12
U-234	2.432E+00	2.43E-03
U-235	2.413E-01	2.41E-04
U-236	1.812E-05	1.81E-08
U-237	2.857E-06	2.86E-09
U-238	1.896E+01	1.90E-02
U-240	4.264E-18	4.26E-21
Y-90	5.512E-01	5.51E-04
Zr-93	4.535E-05	4.54E-08

Notes:

Radionuclide potential to emit and total effective dose equivalent values are presented in Calculation 0600X-CA-V0087, *Total Effective Dose Emission Calculation for Remediation of the 618-10 Burial Ground,* rev. 0.

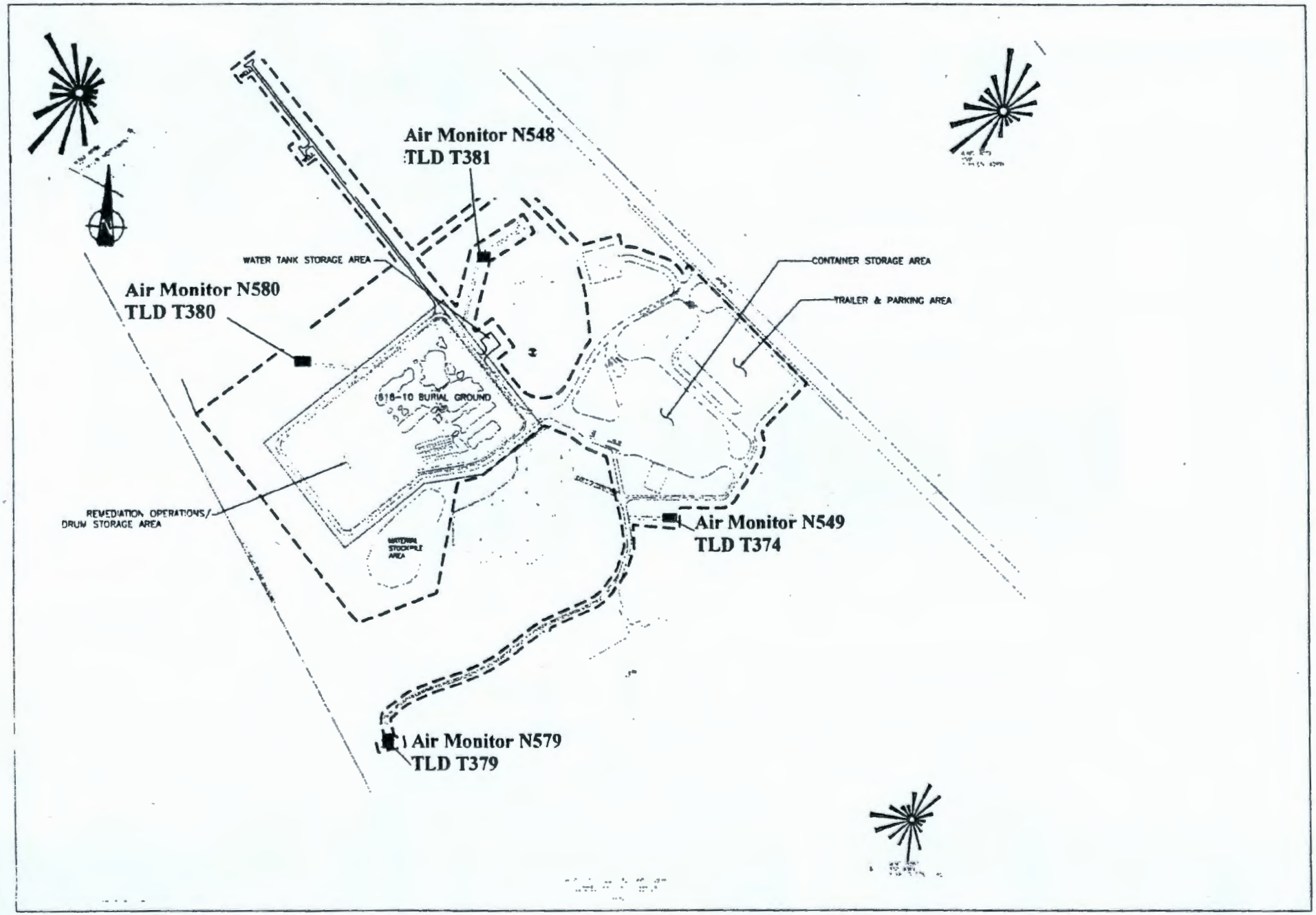
(1) Release Fraction of 1 consistent with gaseous material form.

Point Source Category Total Effective Dose Equivalent

Nuclide	TEDE mrem/y)
Am-242m	9.76E-08
Am-242	4.55E-11
Cm-242	1.01E-08
Pu-238	9.76E-05
U-234	2.82E-03
Th-230	5.26E-06
Ra-226	1.37E-08
Rn-222	3.47E-16
Po-218	6.55E-18
Pb-214	5.40E-11
Bi-214	5.89E-11
Po-214	5.93E-17
Pb-210	1.65E-09
Bi-210	1.39E-10
Po-210	4.88E-09
At-218	0.00E+00
Pu-242	4.69E-08
U-238	1.82E-02
Th-234	8.51E-05
Pa-234m	3.46E-05
Pa-234	1.16E-06
Np-238	0.00E+00
C-14	2.66E-10
Cm-243	0.00E+00
Am-243	6.29E-08
Np-239	1.46E-12
Pu-239	5.05E-04
U-235	2.50E-04
Th-231	8.89E-08
Pa-231	7.95E-06
Ac-227	3.15E-06
Th-227	4.35E-07
Ra-223	3.28E-07
Rn-219	5.13E-13
Po-215	3.81E-13
Pb-211	6.85E-10
Bi-211	9.98E-11
Tl-207	1.25E-10
Po-211	0.00E+00
Fr-223	6.11E-12
Cm-244	1.05E-07
Pu-240	2.12E-04
U-236	1.83E-08
Th-232	9.69E-04
Ra-228	3.35E-04
Ac-228	2.36E-06
Th-228	1.50E-03
Ra-224	1.12E-04
Rn-220	3.16E-12
Po-216	2.95E-11
Pb-212	6.68E-06
Bi-212	1.57E-06
Po-212	0.00E+00

Tl-208	1.96E-06
Cm-245	0.00E+00
Pu-241	3.35E-05
Am-241	5.50E-04
Np-237	4.78E-08
Pa-233	7.09E-12
U-233	0.00E+00
Th-229	0.00E+00
Ra-225	0.00E+00
Ac-225	0.00E+00
Fr-221	0.00E+00
At-217	0.00E+00
Bi-213	0.00E+00
Po-213	0.00E+00
Pb-209	0.00E+00
Tl-209	0.00E+00
U-237	1.51E-12
Co-60	1.99E-11
Cs-134	0.00E+00
Cs-135	1.86E-12
Cs-137	2.56E-04
Ba-137m	6.47E-06
Eu-152	2.18E-10
Gd-152	0.00E+00
Eu-154	2.44E-08
H-3	4.89E-08
I-129	0.00E+00
Kr-85	3.23E-09
Mo-93	0.00E+00
Nb-93m	1.27E-11
Nb-94	0.00E+00
Ni-59	2.09E-13
Ni-63	8.80E-10
Pd-107	4.07E-14
Se-79	3.43E-12
Sm-151	2.70E-08
Sn-121m	8.17E-12
Sn-121	0.00E+00
Sn-126	1.47E-10
Sb-126m	1.53E-12
Sb-126	2.45E-12
Sr-90	3.43E-04
Y-90	1.27E-06
Tc-99	3.48E-08
U-232	0.00E+00
Zr-93	2.05E-10
TOTAL	2.64E-02

Figure 1 618-10 Near Facility Air Monitor and TLD Locations


Air Monitor N548
TLD T381
WATER TANK STORAGE AREA
Air Monitor N580
TLD T380
CONTAINER STORAGE AREA
TRAILER & PARKING AREA
818-10 BURIAL GROUND
REMEDIATION OPERATIONS/
DRUM STORAGE AREA
Air Monitor N549
TLD T374
Air Monitor N579
TLD T379

APPROVAL PAGE

Title: Air Monitoring Plan for the Remediation of the 618-10 Burial Ground Trenches, February 2011

Approval:

J Zeisloft
U.S. Department of Energy
Richland Operations Office

Signature

2/10/11
Date

LE Gadbois
U.S. Environmental Protection Agency

Larry Gadbois
Signature

Feb 10, 2011
Date

Att ~~17~~
15

Attachment 16

CALCULATION COVER SHEET

Project Title: Field Remediation **Job No. 14655**

Area: 618-10 Burial Ground

Discipline: Environmental Engineering *Calculation No: 0600X-CA-V0087

Subject: Total Effective Dose Equivalent Calculation for Remediation of the 618-10 Burial Ground

Computer Program: CAP88-PC Program No: Revision 3

The attached calculations have been generated for a specific purpose and task. Use of the calculations by persons who do not have access to all pertinent facts may lead to incorrect conclusions and/or results. Before applying these calculations to your work, the underlying basis, rationale, and other pertinent information relevant to these calculations must be thoroughly reviewed with appropriate Washington Closure Hanford LLC (WCH) officials or other authorized personnel. WCH is not responsible for the use of a calculation not under its direct control.

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Total Pages = 60 pages	Beverly Skwarek	Tom Rodovsky	Darrin Faulk	John Ludowise	2/2/2011
1	Total Pages = 62	Beverly Skwarek	Tom Rodovsky	Darrin Faulk	John Ludowise	
	Cover (1), Calc Body (18)	Beverly Skwarek	Tom Rodovsky	Darrin Faulk	[illegible]	2-10-11
	Att. A (2), Att. B (2)	2/9/2011	2/9/2011	2/10/2011		
	Att. C (19), Att. D (20)					

SUMMARY OF REVISION

1	Revision 0 assumed only the sampled portion (2L) from each drum in the Drum Punch Facility, plus the entire contents of the "worst-case" drum, would have the potential to emit. Revision 1 changes this assumption to conservatively assume that the entire contents/inventory of each drum to be placed into the Drum Punch Facility would have the potential to emit.

Total Effective Dose Equivalent Calculation for Remediation of the 618-10 Burial Ground

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Attachments

A. 400 Area Weather Station Wind File
B. Map Showing Distance to the Maximally Exposed Individual from the 618-10 Burial Ground
C. CAP88-PC Synopsis and Summary Reports for Drum Punch Facility
D. CAP88-PC Synopsis and Summary Reports Trench Remediation and Dust Suppression Activity

1.0 Purpose

The purpose of this calculation is to determine the unabated total effective dose equivalent (TEDE) (in mrem/year) to the maximally exposed individual (MEI) from potential radionuclide emissions to the air during the remediation of the 618-10 Burial Ground. The burial ground is located approximately 4 miles northwest of the Hanford Site 300 Area. The burial ground contains both burial trenches and vertical pipe unit (VPU) waste receptacles. This calculation does not include the remediation of the VPUs.

Remediation of the 618-10 Burial Ground considered in this calculation will consist of three primary activities:

- Excavation of drums/containers and other material from the burial trenches
- Dust suppression using groundwater from two, newly installed water supply wells
- Withdrawal of samples from waste drums utilizing the Drum Punch Facility (DPF)

2.0 Methodology

Two separate TEDEs will be calculated: one for the activities performed at the DPF, and one for the remediation of the burial site, including a dust suppression activity. The DPF is located immediately adjacent to the burial ground, but for the purposes of this calculation, will be treated separately.

The methodology used to determine the TEDEs included in this calculation is:

1. Identify the radionuclide inventory for the emission unit,
2. Determine Release Fractions (RFs) for each inventory nuclide based on material form,
3. Calculate the potential to emit (PTE) for each material form and nuclide using the determined RFs and,
4. Using CAP88-PC program, calculate the TEDE using the total PTE for each nuclide in the inventory.

This calculation estimates the TEDE to the MEI in accordance with 40 CFR 61.93 (a) and WAC 246-247-110 (15).

3.0 Inventory Determination

The 618-10 Burial Ground received low- to high-activity waste (e.g., fission products, waste from nuclear fuel metallurgical examinations and some plutonium-contaminated waste) from March 1954 until September 1963. Most of the waste received at the site was from the 300 Area laboratory and fuel development facilities.

The 618-10 Burial Ground has been surface stabilized with at least 2 ft of topsoil and vegetated with crested wheatgrass. It is inside a chain-link fence and is posted with signs warning of underground radioactive material. The latest geophysical surveys and intrusive characterization data indicate that there are most likely 12 trenches at the site. Records indicate that low-activity wastes were primarily disposed of in the trenches, but some of the moderate- to high-activity wastes were also disposed of in the trenches

inside concrete/lead-shielded drums. Wastes included radiologically contaminated laboratory instruments, bottles, boxes, filters, aluminum cuttings, metal cuttings, irradiated fuel element samples, metallurgical samples, electrical equipment, lighting fixtures, barrels, laboratory equipment and hoods/gloveboxes, and low- and high-activity liquid waste sealed in containers. Unfortunately, the 618-10 disposal records did not include a radiological inventory of the waste content.

An ACCESS database was created based upon information gathered from a review of historical documentation related to the 618-10 Burial Ground. This database was queried (1/18/2011 1:09PM) to develop an EXCEL worksheet which identified the inventory used in this calculation. The database and inventory values were validated in WCH calculation 0600X-CA-N0060, Revision 1 (WCH, 2011).

For the purpose of this calculation, the inventory is divided into two categories: 1) a point source emission category associated with the drum punch and sampling activity and 2) a fugitive emission category associated with remediation of the burial ground trenches. The point source category in the ACCESS database was formed by assembling all unshielded drums in the 618-10 trenches (1283 drums). The fugitive category encompassed all remaining waste items (3451 items) plus all shielded drums (972 drums). Waste items in the 618-10 VPUs are excluded.

An additional source of inventory will also be considered. Well water is planned to be used as a dust suppressant to control potentially airborne contaminants during the remediation activities. Two water supply wells (300-FF-5 Operable Unit Groundwater) are to be installed approximately 1000 feet northwest of the 618-10 Burial Ground boundary for this purpose. Groundwater samples have been collected from monitoring wells at the Hanford Site for nearly 40 years and analytical results compiled into the Hanford Environmental Information System (HEIS) database. A search of the HEIS database for all analytical data from existing wells in the vicinity of the 618-10 site provided over 14,000 entries for non-radiological and radiological hazardous materials. The information provided from the database search will serve as the basis for determining an inventory of isotopes for the dust suppression water. This inventory will contribute to the total fugitive emission category.

3.1 Drum Punch Facility (Point Source Emission) Inventory

The DPF, pictured in Figure 1, and its support facilities are currently located immediately adjacent to the 618-10 Burial Ground. This facility provides for remote monitoring of radiation, industrial hygiene, and temperature; video monitoring and recording capability; remote operation of the drum penetrating equipment; and the ability to add stabilizing fluids (water or mineral oil) to the drum contents to render the contents safe for personnel to approach and sample. The DPF is also equipped with a hopper filled with sand that can be released remotely in the event of a fire during drum penetration. The DPF enclosure is a commercially available hazardous material storage unit that has been modified for the specific purpose of housing the drum penetration equipment. The enclosure is ventilated by a high efficiency particulate air (HEPA) filtered exhauster, and therefore, will be treated as a point source. The actual sampling of the drum content may take place outside of the DPF enclosure and utilization of more than one DPF is currently planned, but will have no impact on the assumptions made in this calculation.

As drums are unearthed and removed from the remediation area, they will be characterized by weight and

radiation screening. The drums will then pass through a non-destructive assay (NDA) process before being transferred the DPF. Drums found to contain alpha nuclides or containing free liquids or gases will be segregated and not sampled at the drum punch facility. Since the number of drums that will be sampled at the DPF is unknown, it is conservatively assumed that all the unshielded drums will be sampled.

Table 1 lists the inventory determined to be contained in the drums planned to be transferred to the DPF (the addition of the inventory of 30 and 55 gallon drums in Table 16 of WCH, 2011). Although only a fraction of that inventory will be disturbed and have a potential to emit during the drum punch and sampling process, this calculation conservatively assumes that each drum will have 100% of its content available for emission.

3.2 Trench (Fugitive Emission) Inventory

The activities (Ci) contributing toward fugitive emissions were obtained from Table 16 of WCH, 2011 and are shown in Table 2.

Based upon field experience gained during remediation of the 618-7 burial ground, it is expected, that in addition to the above mentioned inventory, some waste drums found in the trenches that were planned for the DPF have failed (crumbled), or will fail during the removal process, due to corrosion/deterioration of the drums. Their content will therefore remain in the trench. Based upon discussions with site field engineers, this calculation conservatively assumes that 10% of the total activity determined for the DPF drums (the sum of columns B and D of Table 1) will account for this drum failure in the trenches. This quantity will be added to the fugitive category (burial ground trenches) to contribute toward its total activity (Table 2). Note that for conservatism, the 10% inventory is not "removed" from the total DPF point-source inventory.

3.3 Well Water (Fugitive Emission) Inventory

A search of the HEIS database for all analytical data from existing wells in the vicinity of the 618-10 site was used to determine an inventory of isotopes entering the excavation area via pumped well water over the course of the remediation activity, which is assumed to be one year.

All the radionuclides that had been measured from the surrounding wells over the years were extracted from the database resulting in a subset of over 1,200 measurements. From that subset of data, the highest concentration for each isotope present was selected. This created an inventory of 26 radionuclides that most conservatively represent the potential radiolonuclides that will be emitted by the application of dust suppression water. Nuclide activities were not decayed to present time to add further conservatism.

The set of nuclides and analytical results (pCi/L), representing measurements from four different wells sampled between 1987 and 2010, is shown in Table 3, columns A, B, and C. Table 3, column D, converts the units to Ci/L by multiplying by 1E-12. To calculate an activity in curies (Ci), it was conservatively assumed that an average of 160,000 gallons (605,600 liters) of well water would be used per day, 4 days per week, 52 weeks per year, for 1 year. This totaled 1.26E+08 liters. The calculated nuclide activity for each isotope is shown in Table 3, column E.

4.0 Release Fraction Methodology

WAC 246-247-30 defines a radionuclide's release fraction based on its physical state: (i) 1 for gases; (ii) 10^{-3} for liquids or particulate solids; and (iii) 10^{-6} for solids.

Tritium and krypton-85 will be assigned a release fraction of 1 consistent with a gaseous material form. Although some of the inventory defined in this calculation may exist in solid form, it is conservatively assumed that the entire remaining inventory (i.e., excluding H-3 and Kr-85) is in the form of liquid or particulate, and will be assigned a release fraction of 1E-03.

5.0 Calculation of Potential to Emit

"Potential-to-emit" (PTE) means the rate of release of radionuclides from an emission unit based on the actual or potential discharge of the effluent stream that would result if all abatement control equipment did not exist, but operations were otherwise normal (WAC 246-247-30). The potential to emit (PTE) is calculated by multiplying each nuclide activity by its determined release fraction, as defined in Section 4.0, then dividing by the length of time in years it will take to perform the work:

PTE = (Nuclide Activity, Ci) (RF) / (Work Period, yr)

It is conservatively assumed that the remediation activity of the burial ground will be completed in 1 year.

5.1 Point Source Emission Category PTE

The point source emission category inventory is shown in Table 1.

As an example, the PTE for Ac-227 is calculated below:

PTE = (Nuclide Total Activity, Ci) (RF) / (Work Period, yr)
PTE = (1.350E-04 Ci) (1E-03) / (1 yr) = 1.35E-07 Ci/yr

The results of the point source emission PTE calculation are shown in Table 1.

5.2 Fugitive Emission Category PTE

Table 4 combines the trench PTE and well water PTE to determine the fugitive emission category PTE.

5.2.1 Trench PTE

Using the same formula cited above in Section 5.0, the trench PTE was calculated.

An example for Ac-227 (Table 2) is as follows:

PTE = (Nuclide Total Activity, Ci) (RF) / (Work Period, yr)
PTE = (3.598E-05 Ci) (1E-03) / (1 yr) = 3.60E-08 Ci/yr

The results of the PTE calculation are shown in column E of Table 2.

5.2.2 Well Water PTE

Using the same formula cited above in Section 5.0, the well water PTE was calculated.

An example for Be-7 (Table 3) is as follows:

PTE = (Nuclide Activity, Ci) (RF) / (Work Period, yr)
PTE = (8.79E-03 Ci) (1E-03) / (1 yr) = 8.79E-06 Ci/yr

The results of the PTE calculation are shown in column F of Table 3.

Table 1. Drum Punch Facility Inventory and Point Source PTE

Nuclide	Activity (Ci)	PTE (Ci/year)
Ac-225	1.499E-15	1.50E-18
Ac-227	1.350E-04	1.35E-07
Ac-228	1.196E-01	1.20E-04
Am-241	4.108E-02	4.11E-05
Am-242	8.350E-06	8.35E-09
Am-242m	8.391E-06	8.39E-09
Am-243	4.848E-06	4.85E-09
At-217	1.499E-15	1.50E-18
Ba-137m	6.652E-01	6.65E-04
Be-10	3.246E-10	3.25E-13
Bi-210	4.738E-06	4.74E-09
Bi-211	1.351E-04	1.35E-07
Bi-212	1.194E-01	1.19E-04
Bi-213	1.499E-15	1.50E-18
Bi-214	1.262E-05	1.26E-08
C-14	8.407E-05	8.41E-08
Cm-242	6.906E-06	6.91E-09
Cm-243	8.330E-07	8.33E-10
Cm-244	1.253E-05	1.25E-08
Cm-245	1.715E-09	1.71E-12
Cm-246	4.773E-11	4.77E-14
Co-60	5.918E-06	5.92E-09
Cs-134	2.061E-08	2.06E-11
Cs-135	8.572E-06	8.57E-09
Cs-137	7.033E-01	7.03E-04
Eu-152	1.644E-05	1.64E-08
Eu-154	6.262E-04	6.26E-07
Fr-221	1.499E-15	1.50E-18
Fr-223	1.862E-06	1.86E-09
H-3[1]	6.688E-04	6.69E-04
I-129	6.785E-07	6.78E-10
Kr-85[1]	8.702E-03	8.70E-03
Mo-93	1.035E-08	1.03E-11
Nb-93m	4.006E-05	4.01E-08
Nb-94	2.111E-09	2.11E-12
Ni-59	5.026E-06	5.03E-09
Ni-63	4.319E-04	4.32E-07
Np-237	6.686E-06	6.69E-09
Np-238	4.197E-08	4.20E-11
Np-239	4.848E-06	4.85E-09
Np-240m	4.264E-18	4.26E-21
Pa-231	2.644E-04	2.64E-07
Pa-233	6.686E-06	6.69E-09
Pa-234	2.465E-02	2.47E-05
Pa-234m	1.896E+01	1.90E-02
Pb-209	1.499E-15	1.50E-18
Pb-210	4.737E-06	4.74E-09
Pb-211	1.351E-04	1.35E-07
Pb-212	1.194E-01	1.19E-04
Pb-214	1.262E-05	1.26E-08
Pd-107	1.518E-06	1.52E-09

Nuclide	Activity (Ci)	PTE (Ci/year)
Po-210	4.738E-06	4.74E-09
Po-211	3.782E-07	3.78E-10
Po-212	7.652E-02	7.65E-05
Po-213	1.467E-15	1.47E-18
Po-214	1.262E-05	1.26E-08
Po-215	1.351E-04	1.35E-07
Po-216	1.194E-01	1.19E-04
Po-218	1.262E-05	1.26E-08
Pu-238	6.591E-03	6.59E-06
Pu-239	3.142E-02	3.14E-05
Pu-240	1.322E-02	1.32E-05
Pu-241	1.164E-01	1.16E-04
Pu-242	3.134E-06	3.13E-09
Ra-223	1.351E-04	1.35E-07
Ra-224	1.194E-01	1.19E-04
Ra-225	1.499E-15	1.50E-18
Ra-226	1.262E-05	1.26E-08
Ra-228	1.196E-01	1.20E-04
Re-187	6.381E-13	6.38E-16
Rn-219	1.351E-04	1.35E-07
Rn-220	1.194E-01	1.19E-04
Rn-222	1.262E-05	1.26E-08
Sb-126	2.306E-06	2.31E-09
Sb-126m	1.647E-05	1.65E-08
Se-79	9.586E-06	9.59E-09
Sm-151	1.941E-02	1.94E-05
Sn-121m	5.826E-06	5.83E-09
Sn-126	1.647E-05	1.65E-08
Sr-90	5.510E-01	5.51E-04
Tc-99	3.198E-04	3.20E-07
Th-227	1.333E-04	1.33E-07
Th-228	1.194E-01	1.19E-04
Th-229	1.499E-15	1.50E-18
Th-230	1.133E-03	1.13E-06
Th-231	2.413E-01	2.41E-04
Th-232	1.200E-01	1.20E-04
Th-234	1.896E+01	1.90E-02
Tl-207	1.347E-04	1.35E-07
Tl-208	4.292E-02	4.29E-05
U-232	7.835E-08	7.83E-11
U-233	1.778E-09	1.78E-12
U-234	2.432E+00	2.43E-03
U-235	2.413E-01	2.41E-04
U-236	1.812E-05	1.81E-08
U-237	2.857E-06	2.86E-09
U-238	1.896E+01	1.90E-02
U-240	4.264E-18	4.26E-21
Y-90	5.512E-01	5.51E-04
Zr-93	4.535E-05	4.54E-08

Note: (1) Release Fraction of 1 consistent with gaseous material form.

Table 2. 618-10 Trench Inventory and PTE

A	B	C	D	E
Nuclide	Activity (Ci)	10% of DPF Activity (Ci)	Total Activity (Ci)	PTE (Ci/year)
Ac-225	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Ac-227	2.248E-05	1.350E-05	3.598E-05	3.60E-08
Ac-228	5.980E-02	1.196E-02	7.176E-02	7.18E-05
Am-241	2.786E+00	4.108E-03	2.790E+00	2.79E-03
Am-242	3.993E-04	8.350E-07	4.002E-04	4.00E-07
Am-242m	4.013E-04	8.391E-07	4.021E-04	4.02E-07
Am-243	2.258E-04	4.848E-07	2.263E-04	2.26E-07
At-217	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Ba-137m	6.785E+01	6.652E-02	6.792E+01	6.79E-02
Be-10	2.223E-07	3.246E-11	2.224E-07	2.22E-10
Bi-210	1.600E-06	4.738E-07	2.073E-06	2.07E-09
Bi-211	2.250E-05	1.351E-05	3.601E-05	3.60E-08
Bi-212	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Bi-213	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Bi-214	4.259E-06	1.262E-06	5.521E-06	5.52E-09
C-14	5.242E-01	8.407E-06	5.242E-01	5.24E-04
Ca-41	1.976E-02	0.000E+00	1.976E-02	1.98E-05
Cl-36	4.370E-03	0.000E+00	4.370E-03	4.37E-06
Cm-242	3.302E-04	6.906E-07	3.309E-04	3.31E-07
Cm-243	3.757E-05	8.330E-08	3.765E-05	3.77E-08
Cm-244	5.640E-04	1.253E-06	5.652E-04	5.65E-07
Cm-245	7.621E-08	1.715E-10	7.638E-08	7.64E-11
Cm-246	2.104E-09	4.773E-12	2.109E-09	2.11E-12
Co-60	4.501E-03	5.918E-07	4.502E-03	4.50E-06
Cs-134	1.457E-06	2.061E-09	1.459E-06	1.46E-09
Cs-135	8.761E-04	8.572E-07	8.769E-04	8.77E-07
Cs-137	7.174E+01	7.033E-02	7.181E+01	7.18E-02
Eu-152	2.304E-03	1.644E-06	2.306E-03	2.31E-06
Eu-154	4.420E-02	6.262E-05	4.426E-02	4.43E-05
Fr-221	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Fr-223	3.103E-07	1.862E-07	4.966E-07	4.97E-10
H-3(1)	5.402E-01	6.688E-05	5.403E-01	5.40E-01
I-129	6.707E-05	6.785E-08	6.714E-05	6.71E-08
Kr-85(1)	9.179E-01	8.702E-04	9.188E-01	9.19E-01
Mo-93	7.075E-06	1.035E-09	7.076E-06	7.08E-09
Nb-93m	4.982E-03	4.006E-06	4.986E-03	4.99E-06
Nb-94	7.268E-05	2.111E-10	7.268E-05	7.27E-08
Ni-59	3.683E-03	5.026E-07	3.684E-03	3.68E-06
Ni-63	3.208E-01	4.319E-05	3.209E-01	3.21E-04
Np-237	5.689E-04	6.686E-07	5.695E-04	5.70E-07
Np-238	2.007E-06	4.197E-09	2.011E-06	2.01E-09
Np-239	2.258E-04	4.848E-07	2.263E-04	2.26E-07
Np-240m	2.218E-16	4.264E-19	2.222E-16	2.22E-19
Pa-231	4.404E-05	2.644E-05	7.049E-05	7.05E-08
Pa-233	5.689E-04	6.686E-07	5.695E-04	5.70E-07
Pa-234	1.531E-03	2.465E-03	3.996E-03	4.00E-06
Pa-234m	1.178E+00	1.896E+00	3.074E+00	3.07E-03
Pb-209	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Pb-210	1.599E-06	4.737E-07	2.073E-06	2.07E-09
Pb-211	2.250E-05	1.351E-05	3.601E-05	3.60E-08

Washington Closure
Hanford LLC

CALCULATION SHEET

Originator Beverly Skwarek **Date** 2/9/2011 **Calc. No.** 0600X-CA-V0087 **Rev. No.** 1

Project Field Remediation **Job No.** 14655 **Checked** Tom Rodovsky **Date** 2/9/2011

Subject Total Effective Dose Equivalent Calculation for Remediation of the 618-10 Burial Ground **Sheet No.** 10 of 18

A	B	C	D	E
Nuclide	Activity (Ci)	10% of DPF Activity (Ci)	Total Activity (Ci)	PTE (Ci/year)
Pb-212	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Pb-214	4.259E-06	1.262E-06	5.521E-06	5.52E-09
Pd-107	1.315E-04	1.518E-07	1.317E-04	1.32E-07
Po-210	1.600E-06	4.738E-07	2.073E-06	2.07E-09
Po-211	6.279E-08	3.782E-08	1.006E-07	1.01E-10
Po-212	3.826E-02	7.652E-03	4.592E-02	4.59E-05
Po-213	1.287E-12	1.467E-16	1.287E-12	1.29E-15
Po-214	4.259E-06	1.262E-06	5.521E-06	5.52E-09
Po-215	2.250E-05	1.351E-05	3.601E-05	3.60E-08
Po-216	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Po-218	4.259E-06	1.262E-06	5.521E-06	5.52E-09
Pu-238	4.694E-01	6.591E-04	4.701E-01	4.70E-04
Pu-239	3.410E+00	3.142E-03	3.413E+00	3.41E-03
Pu-240	1.095E+00	1.322E-03	1.096E+00	1.10E-03
Pu-241	7.938E+00	1.164E-02	7.949E+00	7.95E-03
Pu-242	1.788E-04	3.134E-07	1.791E-04	1.79E-07
Ra-223	2.250E-05	1.351E-05	3.601E-05	3.60E-08
Ra-224	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Ra-225	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Ra-226	4.259E-06	1.262E-06	5.521E-06	5.52E-09
Ra-228	5.980E-02	1.196E-02	7.176E-02	7.18E-05
Re-187	4.452E-10	6.381E-14	4.453E-10	4.45E-13
Rn-219	2.250E-05	1.351E-05	3.601E-05	3.60E-08
Rn-220	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Rn-222	4.259E-06	1.262E-06	5.521E-06	5.52E-09
Sb-126	2.264E-04	2.306E-07	2.266E-04	2.27E-07
Sb-126m	1.617E-03	1.647E-06	1.619E-03	1.62E-06
Se-79	9.842E-04	9.586E-07	9.852E-04	9.85E-07
Sm-151	2.376E+00	1.941E-03	2.378E+00	2.38E-03
Sn-121m	2.972E-03	5.826E-07	2.973E-03	2.97E-06
Sn-126	1.617E-03	1.647E-06	1.619E-03	1.62E-06
Sr-90	6.965E+01	5.510E-02	6.970E+01	6.97E-02
Tc-99	3.276E-02	3.198E-05	3.279E-02	3.28E-05
Th-227	2.219E-05	1.333E-05	3.552E-05	3.55E-08
Th-228	5.970E-02	1.194E-02	7.164E-02	7.16E-05
Th-229	1.315E-12	1.499E-16	1.315E-12	1.32E-15
Th-230	3.824E-04	1.133E-04	4.957E-04	4.96E-07
Th-231	4.016E-02	2.413E-02	6.429E-02	6.43E-05
Th-232	6.002E-02	1.200E-02	7.202E-02	7.20E-05
Th-234	1.178E+00	1.896E+00	3.074E+00	3.07E-03
Tl-207	2.244E-05	1.347E-05	3.591E-05	3.59E-08
Tl-208	2.146E-02	4.292E-03	2.575E-02	2.58E-05
U-232	5.632E-06	7.835E-09	5.640E-06	5.64E-09
U-233	1.544E-07	1.778E-10	1.545E-07	1.55E-10
U-234	8.202E-01	2.432E-01	1.063E+00	1.06E-03
U-235	4.016E-02	2.413E-02	6.429E-02	6.43E-05
U-236	1.998E-03	1.812E-06	1.999E-03	2.00E-06
U-237	1.948E-04	2.857E-07	1.950E-04	1.95E-07
U-238	1.178E+00	1.896E+00	3.074E+00	3.07E-03
U-240	2.218E-16	4.264E-19	2.222E-16	2.22E-19
Y-90	6.967E+01	5.512E-02	6.972E+01	6.97E-02
Zr-93	5.642E-03	4.535E-06	5.646E-03	5.65E-06

1 Note: (1) Release Fraction of 1 consistent with gaseous material form.

Table 3. Well Water Inventory and PTE

A	B	C	D	E	F
Well Name	Nuclide	Concentration (pCi/L)	Concentration (Ci/L)	Activity (Ci)	PTE (Ci/year)
699-S6-E4D	Be-7	6.98E+01	6.98E-11	8.79E-03	8.79E-06
699-S6-E4A	C-14	3.11E+00	3.11E-12	3.92E-04	3.92E-07
699-S6-E4D	Ce/Pr-144 (1)	1.96E+01	1.96E-11	2.47E-03	2.47E-06
699-S6-E4A	Co-58	2.00E+00	2.00E-12	2.52E-04	2.52E-07
699-S6-E4B	Co-60	1.19E+01	1.19E-11	1.50E-03	1.50E-06
699-S6-E4A	Cs-134	3.80E+00	3.80E-12	4.79E-04	4.79E-07
699-S6-E4D	Cs-137	1.13E+01	1.13E-11	1.42E-03	1.42E-06
	Ba-137m (6)			1.35E-03	1.35E-06
699-S6-E4K	Eu-152	4.39E+00	4.39E-12	5.53E-04	5.53E-07
699-S6-E4D	Eu-154	6.00E+00	6.00E-12	7.56E-04	7.56E-07
699-S6-E4A	Eu-155	1.03E+01	1.03E-11	1.30E-03	1.30E-06
699-S6-E4A	Fe-59	6.14E+00	6.14E-12	7.73E-04	7.73E-07
699-S6-E4D	H-3 (5)	4.21E+04	4.21E-08	5.30E+00	5.30E+00
699-S6-E4D	I-129	3.17E-01	3.17E-13	3.99E-05	3.99E-08
699-S6-E4D	K-40	1.03E+02	1.03E-10	1.30E-02	1.30E-05
699-S6-E4A	Pu-238	5.59E-02	5.59E-14	7.04E-06	7.04E-09
699-S6-E4B	Pu-239/240 (2)	8.83E-03	8.83E-15	1.11E-06	1.11E-09
699-S6-E4D	Ru-106	9.54E+01	9.54E-11	1.20E-02	1.20E-05
699-S6-E4D	Sb-125	1.69E+01	1.69E-11	2.13E-03	2.13E-06
699-S6-E4A	Sr-90	3.28E-01	3.28E-13	4.13E-05	4.13E-08
	Y-90 (7)			4.13E-05	4.13E-08
699-S6-E4D	Tc-99	7.34E+01	7.34E-11	9.25E-03	9.25E-06
699-S6-E4L	U-233/234 (3)	5.60E+00	5.60E-12	7.05E-04	7.05E-07
699-S6-E4A	U-234	2.79E+01	2.79E-11	3.51E-03	3.51E-06
699-S6-E4A	U-235	1.49E+00	1.49E-12	1.88E-04	1.88E-07
699-S6-E4A	U-238	4.29E+01	4.29E-11	5.40E-03	5.40E-06
699-S6-E4D	Zn-65	4.91E+00	4.91E-12	6.18E-04	6.18E-07
699-S6-E4D	Zr/Nb-95 (4)	1.47E+02	1.47E-10	1.85E-02	1.85E-05

Notes: (1) Assumed to be all Ce-144
(2) Assumed to be all Pu-239
(3) Assumed to be all U-233
(4) Assumed to be all Zr-95
(5) Release Fraction of 1 consistent with gaseous material form.
(6) Ba-137m, a daughter product of Cs-137, is assumed to be 0.946 of Cs-137 activity.
(7) Y-90, a daughter product of Sr-90, is assumed to be in equal proportion to Sr-90.

Table 4. Total Fugitive Category PTE

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Ac-225	1.32E-15		1.32E-15
Ac-227	3.60E-08		3.60E-08
Ac-228	7.18E-05		7.18E-05
Am-241	2.79E-03		2.79E-03
Am-242	4.00E-07		4.00E-07
Am-242m	4.02E-07		4.02E-07
Am-243	2.26E-07		2.26E-07
At-217	1.32E-15		1.32E-15
Ba-137m	6.79E-02	1.35E-06	6.79E-02
Be-10	2.22E-10		2.22E-10
Be-7		8.79E-06	8.79E-06
Bi-210	2.07E-09		2.07E-09
Bi-211	3.60E-08		3.60E-08
Bi-212	7.16E-05		7.16E-05
Bi-213	1.32E-15		1.32E-15
Bi-214	5.52E-09		5.52E-09
C-14	5.24E-04	3.92E-07	5.25E-04
Ca-41	1.98E-05		1.98E-05
Ce-144		2.47E-06	2.47E-06
Cl-36	4.37E-06		4.37E-06
Cm-242	3.31E-07		3.31E-07
Cm-243	3.77E-08		3.77E-08
Cm-244	5.65E-07		5.65E-07
Cm-245	7.64E-11		7.64E-11
Cm-246	2.11E-12		2.11E-12
Co-58		2.52E-07	2.52E-07
Co-60	4.50E-06	1.50E-06	6.00E-06
Cs-134	1.46E-09	4.79E-07	4.80E-07
Cs-135	8.77E-07		8.77E-07
Cs-137	7.18E-02	1.42E-06	7.18E-02
Eu-152	2.31E-06	5.53E-07	2.86E-06
Eu-154	4.43E-05	7.56E-07	4.50E-05
Eu-155		1.30E-06	1.30E-06
Fe-59		7.73E-07	7.73E-07
Fr-221	1.32E-15		1.32E-15
Fr-223	4.97E-10		4.97E-10
H-3	5.40E-01	5.30E+00	5.84E+00
I-129	6.71E-08	3.99E-08	1.07E-07
K-40		1.30E-05	1.30E-05
Kr-85	9.19E-01		9.19E-01
Mo-93	7.08E-09		7.08E-09
Nb-93m	4.99E-06		4.99E-06
Nb-94	7.27E-08		7.27E-08
Ni-59	3.68E-06		3.68E-06
Ni-63	3.21E-04		3.21E-04
Np-237	5.70E-07		5.70E-07
Np-238	2.01E-09		2.01E-09
Np-239	2.26E-07		2.26E-07
Np-240m	2.22E-19		2.22E-19
Pa-231	7.05E-08		7.05E-08

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
Pa-233	5.70E-07		5.70E-07
Pa-234	4.00E-06		4.00E-06
Pa-234m	3.07E-03		3.07E-03
Pb-209	1.32E-15		1.32E-15
Pb-210	2.07E-09		2.07E-09
Pb-211	3.60E-08		3.60E-08
Pb-212	7.16E-05		7.16E-05
Pb-214	5.52E-09		5.52E-09
Pd-107	1.32E-07		1.32E-07
Po-210	2.07E-09		2.07E-09
Po-211	1.01E-10		1.01E-10
Po-212	4.59E-05		4.59E-05
Po-213	1.29E-15		1.29E-15
Po-214	5.52E-09		5.52E-09
Po-215	3.60E-08		3.60E-08
Po-216	7.16E-05		7.16E-05
Po-218	5.52E-09		5.52E-09
Pu-238	4.70E-04	7.04E-09	4.70E-04
Pu-239	3.41E-03	1.11E-09	3.41E-03
Pu-240	1.10E-03		1.10E-03
Pu-241	7.95E-03		7.95E-03
Pu-242	1.79E-07		1.79E-07
Ra-223	3.60E-08		3.60E-08
Ra-224	7.16E-05		7.16E-05
Ra-225	1.32E-15		1.32E-15
Ra-226	5.52E-09		5.52E-09
Ra-228	7.18E-05		7.18E-05
Re-187	4.45E-13		4.45E-13
Rn-219	3.60E-08		3.60E-08
Rn-220	7.16E-05		7.16E-05
Rn-222	5.52E-09		5.52E-09
Ru-106		1.20E-05	1.20E-05
Sb-125		2.13E-06	2.13E-06
Sb-126	2.27E-07		2.27E-07
Sb-126m	1.62E-06		1.62E-06
Se-79	9.85E-07		9.85E-07
Sm-151	2.38E-03		2.38E-03
Sn-121m	2.97E-06		2.97E-06
Sn-126	1.62E-06		1.62E-06
Sr-90	6.97E-02	4.13E-08	6.97E-02
Tc-99	3.28E-05	9.25E-06	4.20E-05
Th-227	3.55E-08		3.55E-08
Th-228	7.16E-05		7.16E-05
Th-229	1.32E-15		1.32E-15
Th-230	4.96E-07		4.96E-07
Th-231	6.43E-05		6.43E-05
Th-232	7.20E-05		7.20E-05
Th-234	3.07E-03		3.07E-03
Tl-207	3.59E-08		3.59E-08
Tl-208	2.58E-05		2.58E-05
U-232	5.64E-09		5.64E-09
U-233	1.55E-10	7.05E-07	7.06E-07
U-234	1.06E-03	3.51E-06	1.07E-03

Nuclide	Trench PTE (Ci/year)	Well Water PTE (Ci/year)	Total Fugitive PTE (Ci/year)
U-235	6.43E-05	1.88E-07	6.45E-05
U-236	2.00E-06		2.00E-06
U-237	1.95E-07		1.95E-07
U-238	3.07E-03	5.40E-06	3.08E-03
U-240	2.22E-19		2.22E-19
Y-90	6.97E-02	4.13E-08	6.97E-02
Zn-65		6.18E-07	6.18E-07
Zr-93	5.65E-06		5.65E-06
Zr-95		1.85E-05	1.85E-05

6.0 Calculation of Total Effective Dose Equivalent

Two separate TEDEs will be calculated. The TEDE to the MEI will be calculated for the point source emission category (waste drum sampling activity) using the PTE calculated in Table 1. The TEDE to the MEI will be calculated for the fugitive emission category (trench remediation and dust suppression activities) using the PTEs summed in Table 4. Note that for the CAP88-PC model runs, nuclides from Table 1 and Table 4 with PTE values of 1E-12 Ci/yr or lower were omitted.

CAP88-PC, Version 3.0 is used to calculate the dose to the MEI using the PTE value for each radionuclide as input into the CAP88-PC model run. In accordance with the requirements of the WCH procedure for project calculations (ENG-1-4.5), a data set test problem, titled "Modtest" supplied by the software author, was run as the validation test of the CAP88-PC program. Results were in agreement with the results documented in the CAP88-PC Version 3.0 User's Manual (TEA, 2007).

Because of its close proximity to 618-10 Burial Ground, the Hanford site-specific wind file for the 400 Area (a06400.WND) was used in the CAP88-PC model run and is shown in Attachment A. The wind file is based on average data collected in the 400 Area between 1983 and 2006 at the 10-meter level.

The distances to the site boundary that are used in the CAP88-PC model run are shown in Attachment B. By regulation [WAC 246-247-030 (15)], the MEI is any member of the public (real or hypothetical) who abides or resides in an unrestricted area, and may receive the highest TEDE from the emission unit(s) under remediation, taking into account all exposure pathways by the radioactive emissions. For the purposes of this calculation, and for each source term being considered, the MEI was assumed to be located at the Hanford site boundary at a compass bearing from the source that yielded the highest dose from all air pathways, as computed by the CAP88-PC program. However, as directed by Washington Department of Health, the Laser Interferometer Gravitational-Wave Observatory (LIGO) and the Energy Northwest Columbia Generating Station are considered "off-site" for the purpose of determining the location of the MEI. Distances to the site boundary were computed using the Hanford Geographic Information System (HGIS).

Distances to the site boundary in 16 compass directions plus the distances to other potential "off-site" non-DOE related business locations (i.e., LIGO and the Energy Northwest Columbia Generating Station) are input into the CAP88-PC model to show the dose at the site boundary in all directions and for potential

"off-site" receptor locations. However, CAP88-PC automatically calculates the "individual effective dose equivalent" for each distance in all directions (See attached CAP88-PC model runs in Attachment C and D).

By default, CAP88-PC will take the maximum "individual effective dose equivalent" regardless of direction or distance and use it as the basis for the dose to the maximally exposed individual and report it as the "effective dose equivalent" in the nuclide specific dose equivalent summary. The result is that the maximum "individual effective dose equivalent" selected from the matrix of individual effective dose equivalents is at a location that is not on the site boundary or other "off-site" non-DOE related business location. To determine the maximum effective dose equivalent at the site boundary or non-DOE related business location, a review of the Summary Report (Attachments C and D) is conducted to determine which of the 16 compass directions at the site boundary or "off-site" non-DOE related business location distance inputs result in the maximum "individual effective dose equivalent". The "ILOC" parameter specifies the direction and indexes the 16 sectors of the compass, where 1 corresponds to the North, 2 to the North Northwest, 3 to the Northwest, up to 16 for North Northeast. The "JLOC" parameter is an index into the distance, where 1 is the shortest distance, 2 is the second shortest distance, and so on for all 18 hypothetical MEIs. The ILOC and JLOC parameters are therefore set so that the "effective dose equivalent" and the nuclide specific dose equivalent summary are reported based on the maximum "individual effective dose equivalent" at a location that is at the site boundary (or other "off-site" non-DOE related business location).

The following assumptions were made for the CAP88-PC model run:

- The height of lid (1000 m) is the rounded average of winter and summer mean afternoon mixing heights (500 and 2000 m respectively) for southeastern Washington, as shown on pages 32 and 34 of Holzworth, 1972. The lid is the inner layer of the atmosphere, within which there is normally a steady decrease of temperature with increasing altitude. Nearly all clouds form and weather conditions manifest themselves within this region. Its thermal structure is caused primarily by the heating of the earth's surface by solar radiation, followed by heat transfer through turbulent mixing and convection.
- Annual Precipitation (17.7 cm) is the normal annual precipitation for the Hanford Site as reported in Section 8.16.1 of PNNL, 2010.
- Annual ambient temperature (12° C) is the normal mean annual temperature for the Hanford Site as reported on Preface/Summary Page "xxii" of PNNL, 2010.
- The default value for humidity of 8 g/m^3 was used. This value was compared to Hanford-specific historical data and was determined to compare well with this value.
- "Time Step Days" was set to a value of 10, given the nuclides present and their respective half-lives.
- Decay chains were limited to 5 (CAP88-PC default).
- Build-up time in years was set to 50 years consistent with Attachment 9, Exhibit 1, of DOE/RL, 2008.
- The Drum Punch Facility was modeled as a point/stack source emission in CAP88-PC with a stack height of 1m and diameter of 1m. No plume rise was assumed.

- A source height of 0m was conservatively used for the fugitive emission CAP88-PC run.
- For the trench remediation area, a source area of 27,870.91 m^2 (300,000 ft^2) was assumed which was obtained from Figure 1-2 of WCH-390, Rev. 1, (WCH, 2010) where the outside dimensions are shown to be 500 feet by 600 feet. As discussed in the CAP88-PC User's Guide (TEA, 2007), the ratio of distance to the receptor/source diameter is greater than 2.5; therefore, CAP88-PC automatically models the area source as a point source. CAP88-PC automatically assumes the source is a circular area and calculates a source diameter as follows:
    - $27{,}870.91\ m^2 = (\text{Diameter}/2)^2\ (\pi)$

  The source diameter is calculated as 188.4m, which is far less than the distance to the MEI at Energy Northwest which is 4,265 meters away. Therefore, the CAP88-PC code assumes the source to be a point source.
- Characterization activities are conservatively assumed to occur within one year.

7.0 Results

Two CAP88-PC models were generated to determine the TEDEs for 618-10 Waste Burial Ground remediation activities. Synopsis and Summary reports for the waste drum punch/sampling activity (Point Source Emission) are shown in Attachment C. Synopsis and Summary reports for the trench remediation/dust suppression activities (Fugitive Emission) are shown in Attachment D.

The TEDE to the MEI resulting from the drum punch/sampling activity has an annual dose of 2.64E-02 mrem/yr. The TEDE to the MEI resulting from the trench remediation/dust suppression activities has an annual dose of 1.96E-01 mrem/yr. The MEI for both activities was located at Energy Northwest, which is located 4,265 meters in the North direction.

8.0 References

40 CFR 61, *National Emission Standards for Hazardous Air Pollutants (NESHAPS),* United States Code of Federal Regulations.

DOE/RL, 2008, *Methods for Calculating Doses to Demonstrate Compliance with Air Pathway Radiation Dose Standards at the Hanford Site*, DOE/RL-2007-53, Revision 0, May 2008, United States Department of Energy, Richland, Washington.

ENG-1, *Engineering & Design*, ENG-1-4.5 "Project Calculations", Washington Closure Hanford, Richland, Washington.

TEA, 2007, *CAP88-PC Version 3.0 User's Guide*, December 09, 2007, Trinity Engineering Associates, Inc. for the U.S. Environmental Protection Agency, Washington, D.C.

Holzworth, G. C., 1972, *Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States, Office of Air Programs*, AP-101, (NTIS Accession No. PB 207103), U. S. Environmental Protection Agency, Research Triangle Park, North Carolina.

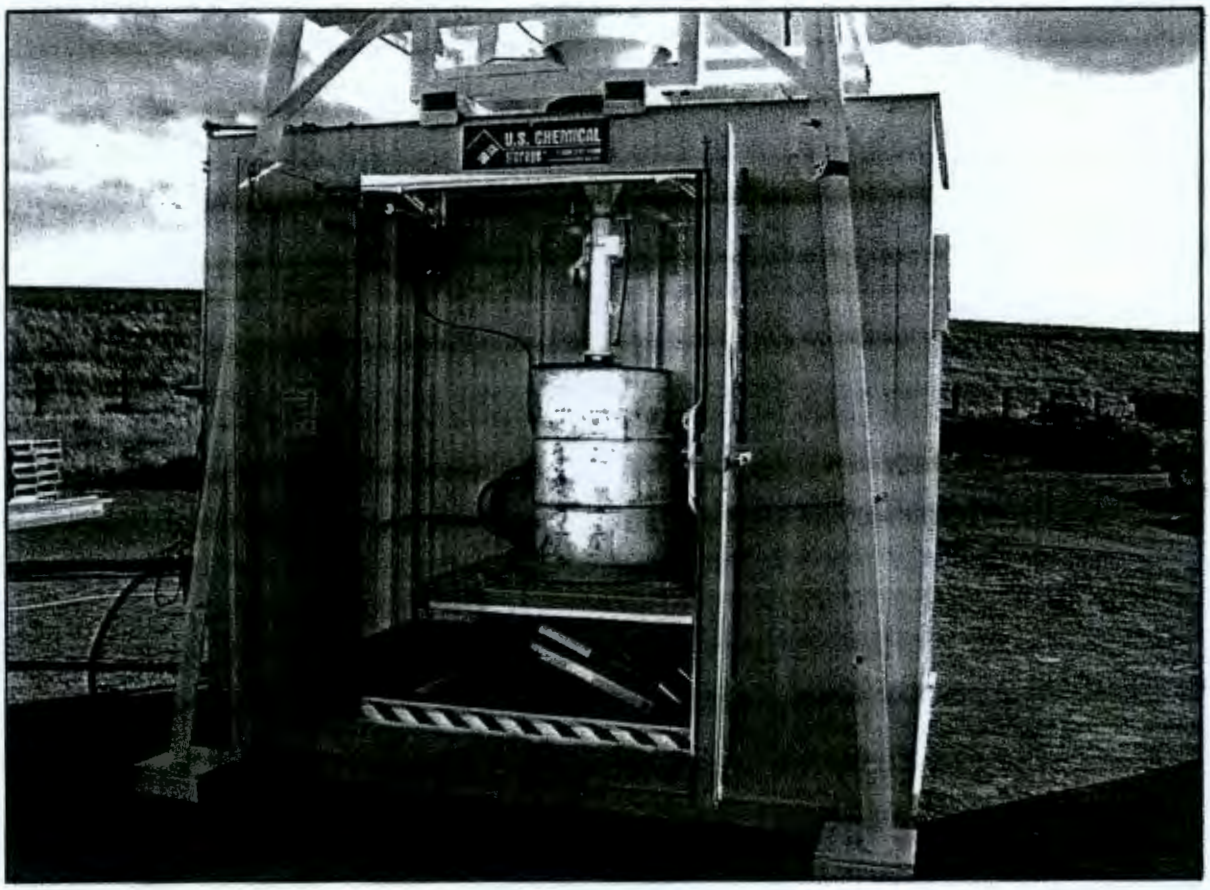
PNNL, 2010, Hanford Site Environmental Report for Calendar Year 2009, PNNL-19455, Pacific Northwest National Laboratory, September 2010, Richland, Washington.

WAC 246-247, "Radiation Protection - Air Emissions," Washington Administrative Code, as amended

WCH, 2010, *Hazard Categorization for the 618-10 Burial Ground Intrusive Characterization*, WCH-390, Revision 1, Washington Closure Hanford, Richland, Washington.

WCH, 2011, *Radiological Inventory in the 618-10 Burial Ground Trenches,* Calculation, 0600X-CA-N0060, Revision 1.

Figure 1. Drum Punch Facility



Attachment A

400 Area Weather Station Wind File

```
 0.00000
.105 .085 .052 .027 .022 .023 .038 .055 .057 .079 .109 .056 .039 .043 .079 .128
3.03 2.38 2.22 1.90 1.93 1.94 2.44 2.70 2.67 2.58 3.27 2.95 3.24 3.71 3.93 3.86
2.79 2.23 1.97 1.68 1.73 1.66 1.86 2.48 2.58 2.46 2.90 2.41 2.52 3.47 3.38 3.68
2.76 2.23 1.94 1.69 1.58 1.53 1.98 2.23 2.38 2.32 2.77 2.30 2.38 3.26 3.59 3.54
2.63 2.25 1.94 1.52 1.48 1.59 1.83 2.02 2.06 2.42 3.00 2.54 2.24 2.48 3.15 3.32
2.55 2.53 2.06 1.45 1.33 1.42 1.83 2.01 1.93 2.36 2.92 2.47 1.94 2.08 2.74 2.97
2.46 2.73 2.04 1.36 1.21 1.34 1.70 1.89 1.80 2.27 2.32 1.62 1.39 1.50 1.97 2.54
2.45 2.84 2.03 1.36 1.14 1.27 1.69 1.92 1.88 2.25 2.34 1.53 1.25 1.41 1.94 2.38
4.01 3.08 2.91 2.57 2.56 2.74 3.44 3.84 3.73 3.86 5.09 4.68 5.23 6.04 6.05 5.20
3.86 3.04 2.79 2.31 2.37 2.34 2.74 3.63 3.44 3.58 4.83 4.12 4.57 5.58 5.62 5.07
3.74 3.04 2.73 2.36 2.17 2.13 2.93 3.16 3.31 3.45 4.76 3.74 4.33 5.68 6.24 5.04
3.79 3.15 2.79 2.22 2.09 2.40 2.81 3.14 3.08 3.53 4.74 4.26 4.14 4.93 5.98 5.07
3.61 3.42 2.92 2.01 1.85 2.00 2.94 3.11 2.77 3.41 4.30 3.90 3.17 3.71 4.96 4.53
3.40 3.60 2.88 1.86 1.59 1.84 2.42 2.62 2.54 3.21 3.29 2.43 2.08 2.27 3.20 3.72
3.44 3.82 3.03 1.94 1.48 1.69 2.29 2.58 2.55 3.15 3.28 2.18 1.74 2.16 3.32 3.77
   .1450   .0468   .0382   .2242   .2624   .2099   .0735
   .0947   .0363   .0292   .2152   .2725   .2444   .1076
   .1552   .0594   .0498   .2644   .2375   .1686   .0651
   .2537   .0699   .0588   .2721   .1875   .1140   .0441
   .2455   .0773   .0636   .2727   .1864   .1136   .0409
   .2335   .0661   .0573   .2863   .1850   .1233   .0485
   .2141   .0679   .0548   .2611   .1932   .1488   .0601
   .2061   .0633   .0506   .2405   .1881   .1718   .0796
   .1672   .0627   .0488   .2526   .2021   .1812   .0854
   .0894   .0428   .0365   .2758   .2720   .1965   .0869
   .0698   .0294   .0266   .3021   .3434   .1598   .0689
   .0929   .0286   .0268   .2946   .3750   .1321   .0500
   .1572   .0412   .0361   .2500   .3273   .1392   .0490
   .1710   .0539   .0398   .2506   .3021   .1382   .0445
   .1542   .0506   .0392   .2604   .3059   .1429   .0468
   .1519   .0553   .0436   .2492   .2812   .1651   .0537

400 AREA FFTF (Station 9) - 10 M - Pasquill A - G (1983-2006)
Formatted 1/16/08 KR, NEPA JFDs 2006 (PNNL-6415, Rev. 18)
Windspeed Classes (m/s): .89  2.65  4.7  7.15  9.8  12.7  15.6  19.0
```

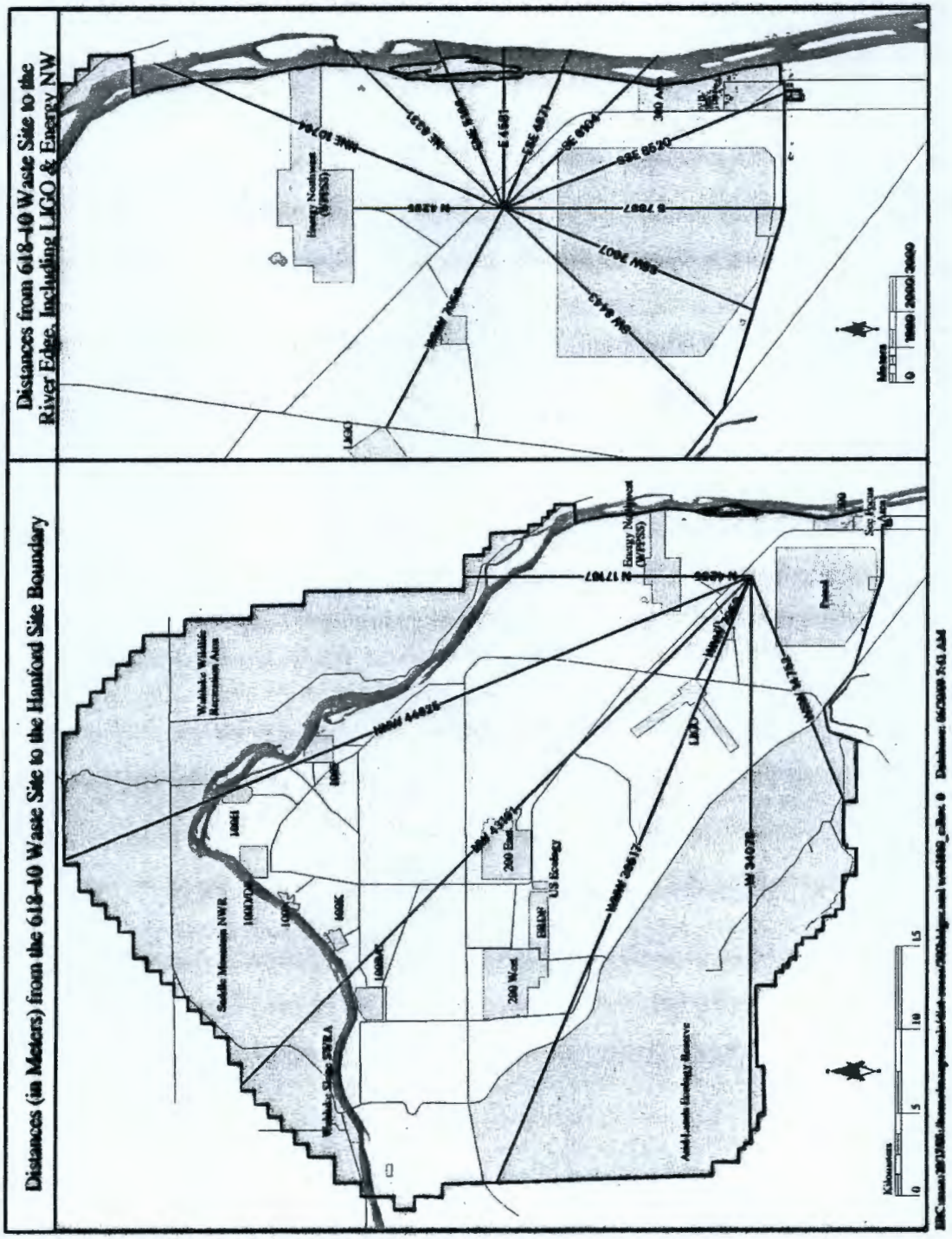
Attachment B

Map Showing Distance to the Maximally Exposed Individual From the 618-10 Burial Ground

Washington Closure
Hanford LLC

CALCULATION SHEET

Originator	Beverly Skwarek	**Date**	2/9/2011	**Calc. No.**	0600X-CA-V0087	**Rev. No.**	1
Project	Field Remediation	**Job No.**	14655	**Checked**	Tom Rodovsky	**Date**	2/9/2011
Subject	Total Effective Dose Equivalent Calculation for Remediation of the 618-10 Burial Ground					**Sheet No.**	B-2 of B-2



Attachment C

CAP88-PC Synopsis and Summary Reports For Drum Punch Facility

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Radon Individual Assessment
Jan 13, 2011 09:25 am

Facility: 618-10 Burial Ground Remediation
Address: Hanford Site
City: Richland
State: WA Zip: 99354

Source Category:
Source Type: Stack
Emission Year: 2011

Comments: 618-10 DPF
Total Drum Content

Effective Dose Equivalent
(mrem/year)

2.64E-02

At This Location: 4265 Meters North

Dataset Name: 618-10 Total DPF
Dataset Date: 1/5/2011 11:42:00 AM
Wind File: C:\Program Files\CAP88-PC30\WindLib\a06400.w

```
Jan  13, 2011  09:25 am                                    SYNOPSIS
                                                           Page  1


                    MAXIMALLY EXPOSED INDIVIDUAL


          Location Of The Individual:   4265 Meters North
          Lifetime Fatal Cancer Risk:          1.97E-08
```

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SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2011

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Ac-227	M	1	1.3E-07	1.3E-07
Ac-228	M	1	1.2E-04	1.2E-04
Am-241	M	1	4.1E-05	4.1E-05
Am-242	M	1	8.3E-09	8.3E-09
Am-242m	M	1	8.4E-09	8.4E-09
Am-243	M	1	4.8E-09	4.8E-09
Ba-137m	M	1	6.6E-04	6.6E-04
Bi-210	M	1	4.7E-09	4.7E-09
Bi-211	M	1	1.3E-07	1.3E-07
Bi-212	M	1	1.2E-04	1.2E-04
Bi-214	M	1	1.3E-08	1.3E-08
C-14	M	1	8.4E-08	8.4E-08
Cm-242	M	1	6.2E-09	6.2E-09
Cm-243	M	1	8.3E-10	8.3E-10
Cm-244	M	1	1.3E-08	1.3E-08
Cm-245	M	1	1.7E-12	1.7E-12
Co-60	M	1	5.9E-09	5.9E-09
Cs-134	F	1	2.1E-11	2.1E-11
Cs-135	F	1	8.6E-09	8.6E-09
Cs-137	F	1	7.0E-04	7.0E-04
Eu-152	M	1	1.6E-08	1.6E-08
Eu-154	M	1	6.3E-07	6.3E-07
Fr-223	M	1	1.9E-09	1.9E-09
H-3	V	0	6.7E-04	6.7E-04
I-129	F	1	6.8E-10	6.8E-10
Kr-85	G	0	8.7E-03	8.7E-03
Mo-93	M	1	1.0E-11	1.0E-11
Nb-93m	M	1	4.0E-08	4.0E-08
Nb-94	M	1	2.1E-12	2.1E-12
Ni-59	M	1	5.0E-09	5.0E-09
Ni-63	M	1	4.3E-07	4.3E-07
Np-237	M	1	6.7E-09	6.7E-09
Np-238	M	1	4.2E-11	4.2E-11
Np-239	M	1	4.8E-09	4.8E-09
Pa-231	M	1	2.6E-07	2.6E-07
Pa-233	M	1	6.7E-09	6.7E-09
Pa-234	M	1	2.5E-05	2.5E-05
Pa-234m	M	1	1.9E-02	1.9E-02
Pb-210	M	1	4.7E-09	4.7E-09
Pb-211	M	1	1.3E-07	1.3E-07
Pb-212	M	1	1.2E-04	1.2E-04
Pb-214	M	1	1.3E-08	1.3E-08
Pd-107	M	1	1.5E-09	1.5E-09

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Po-210     M   1   4.7E-09 4.7E-09
Po-211     M   1   3.8E-10 3.8E-10
Po-212     M   1   7.7E-05 7.7E-05
Po-214     M   1   1.3E-08 1.3E-08
Po-215     M   1   1.3E-07 1.3E-07
Po-216     M   1   1.2E-04 1.2E-04
Po-218     M   1   1.3E-08 1.3E-08
Pu-238     M   1   6.6E-06 6.6E-06
Pu-239     M   1   3.1E-05 3.1E-05
Pu-240     M   1   1.3E-05 1.3E-05
Pu-241     M   1   1.2E-04 1.2E-04
Pu-242     M   1   3.1E-09 3.1E-09
Ra-223     M   1   1.3E-07 1.3E-07
Ra-224     M   1   1.2E-04 1.2E-04
Ra-226     M   1   1.3E-08 1.3E-08
Ra-228     M   1   1.2E-04 1.2E-04
Rn-219     G   0   1.3E-07 1.3E-07
Rn-220     G   0   1.2E-04 1.2E-04
Rn-222     G   0   1.3E-08 1.3E-08
Sb-126     M   1   2.3E-09 2.3E-09
Sb-126m    M   1   1.6E-08 1.6E-08
Se-79      F   1   9.6E-09 9.6E-09
Sm-151     M   1   1.9E-05 1.9E-05
Sn-121m    M   1   5.8E-09 5.8E-09
Sn-126     M   1   1.6E-08 1.6E-08
Sr-90      M   1   5.5E-04 5.5E-04
Tc-99      M   1   3.2E-07 3.2E-07
Th-227     S   1   1.3E-07 1.3E-07
Th-228     S   1   1.2E-04 1.2E-04
Th-230     S   1   1.1E-06 1.1E-06
Th-231     S   1   2.4E-04 2.4E-04
Th-232     S   1   1.2E-04 1.2E-04
Th-234     S   1   1.9E-02 1.9E-02
Tl-207     M   1   1.3E-07 1.3E-07
Tl-208     M   1   4.3E-05 4.3E-05
U-232      M   1   7.8E-11 7.8E-11
U-233      M   1   1.8E-12 1.8E-12
U-234      M   1   2.4E-03 2.4E-03
U-235      M   1   2.4E-04 2.4E-04
U-236      M   1   1.8E-08 1.8E-08
U-237      M   1   2.9E-09 2.9E-09
U-238      M   1   1.9E-02 1.9E-02
Y-90       M   1   5.5E-04 5.5E-04
Zr-93      M   1   4.5E-08 4.5E-08

                   SITE INFORMATION

                       Temperature:     12 degrees C
                     Precipitation:     18 cm/y
                     Humidity:           8 g/cu m
                     Mixing Height:   1000 m

                     User specified location of max exposed individual.
                     (ILOC, JLOC):   1,  1
```

Jan 13, 2011 09:25 am

SYNOPSIS
Page 3

SOURCE INFORMATION

Source Number: 1

Stack Height (m): 1.00
Diameter (m): 1.00

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

4265	4581	4871	5166	6104	6331	7059
7607	7887	8443	8520	10764	14752	17167
34078	39517	43191	44625			

```
                    C A P 8 8 - P C

                    Version 3.0


          Clean Air Act Assessment Package - 1988


D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

              Non-Radon Individual Assessment
                   Jan  13, 2011  09:25 am



     Facility:  618-10 Burial Ground Remediation
      Address:  Hanford Site
         City:  Richland
        State:  WA          Zip:    99354


     Source Category:
         Source Type:  Stack
       Emission Year:  2011


     Comments:  618-10 DPF
                Total Drum Content


        Dataset Name:  618-10 Total DPF
        Dataset Date:  1/5/2011 11:42:00 AM
           Wind File:  .   C:\Program Files\CAP88-PC30\WindLib\a06400.wnd
```

Jan 13, 2011 09:25 am

SUMMARY
Page 1

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	2.26E-03
INHALATION	2.41E-02
AIR IMMERSION	8.40E-08
GROUND SURFACE	5.10E-05
INTERNAL	2.63E-02
EXTERNAL	5.11E-05
TOTAL	2.64E-02

Jan 13, 2011 09:25 am

SUMMARY
Page 2

NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
Am-242m	9.76E-08
Am-242	4.55E-11
Cm-242	1.01E-08
Pu-238	9.76E-05
U-234	2.82E-03
Th-230	5.26E-06
Ra-226	1.37E-08
Rn-222	3.47E-16
Po-218	6.55E-18
Pb-214	5.40E-11
Bi-214	5.89E-11
Po-214	5.93E-17
Pb-210	1.65E-09
Bi-210	1.39E-10
Po-210	4.88E-09
At-218	0.00E+00
Pu-242	4.69E-08
U-238	1.82E-02
Th-234	8.51E-05
Pa-234m	3.46E-05
Pa-234	1.16E-06
Np-238	0.00E+00
C-14	2.66E-10
Cm-243	0.00E+00
Am-243	6.29E-08
Np-239	1.46E-12
Pu-239	5.05E-04
U-235	2.50E-04
Th-231	8.89E-08
Pa-231	7.95E-06
Ac-227	3.15E-06
Th-227	4.35E-07
Ra-223	3.28E-07
Rn-219	5.13E-13
Po-215	3.81E-13
Pb-211	6.86E-10
Bi-211	9.98E-11
Tl-207	1.25E-10
Po-211	0.00E+00
Fr-223	6.11E-12
Cm-244	1.05E-07

1	Pu-240	2.12E-04
2	U-236	1.83E-08
3	Th-232	9.69E-04
4	Ra-228	3.35E-04
5	Ac-228	2.36E-06
6	Th-228	1.50E-03
7	Ra-224	1.12E-04
8	Rn-220	3.16E-12
9	Po-216	2.95E-11
10	Pb-212	6.68E-06
11	Bi-212	1.57E-06
12	Po-212	0.00E+00
13	Tl-208	1.96E-06
14	Cm-245	0.00E+00
15	Pu-241	3.35E-05
16	Am-241	5.50E-04
17	Np-237	4.78E-08
18	Pa-233	7.09E-12
19	U-233	0.00E+00
20	Th-229	0.00E+00
21	Ra-225	0.00E+00
22	Ac-225	0.00E+00
23	Fr-221	0.00E+00
24	At-217	0.00E+00
25	Bi-213	0.00E+00
26	Po-213	0.00E+00
27	Pb-209	0.00E+00
28	Tl-209	0.00E+00
29	U-237	1.51E-12
30	Co-60	1.99E-11
31	Cs-134	0.00E+00
32	Cs-135	1.86E-12
33	Cs-137	2.56E-04
34	Ba-137m	6.47E-06
35	Eu-152	2.18E-10
36	Gd-152	0.00E+00
37	Eu-154	2.44E-08
38	H-3	4.89E-08
39	I-129	0.00E+00
40	Kr-85	3.23E-09
41	Mo-93	0.00E+00
42	Nb-93m	1.27E-11
43	Nb-94	0.00E+00
44	Ni-59	2.09E-13
45	Ni-63	8.80E-10
46	Pd-107	4.07E-14
47	Se-79	3.43E-12
48	Sm-151	2.70E-08
49	Sn-121m	8.17E-12
50	Sn-121	0.00E+00
51	Sn-126	1.47E-10
52	Sb-126m	1.53E-12
53	Sb-126	2.45E-12
54	Sr-90	3.43E-04

Y-90	1.27E-06
Tc-99	3.48E-08
U-232	0.00E+00
Zr-93	2.05E-10
TOTAL	2.64E-02

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SUMMARY
Page 3

CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	1.64E-11
Stomach	4.80E-11
Colon	3.59E-10
Liver	1.67E-10
LUNG	1.84E-08
Bone	1.17E-10
Skin	4.32E-12
Breast	2.88E-11
Ovary	2.74E-11
Bladder	3.99E-11
Kidneys	9.67E-11
Thyroid	3.48E-12
Leukemia	2.09E-10
Residual	1.62E-10
Total	1.97E-08
TOTAL	3.94E-08

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	9.35E-10
INHALATION	1.88E-08
AIR IMMERSION	3.89E-14
GROUND SURFACE	1.38E-11
INTERNAL	1.97E-08
EXTERNAL	1.39E-11
TOTAL	1.97E-08

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SUMMARY
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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Am-242m	9.01E-15
Am-242	3.37E-17
Cm-242	7.48E-15
Pu-238	1.70E-11
U-234	2.27E-09
Th-230	2.60E-12
Ra-226	1.16E-14
Rn-222	1.88E-22
Po-218	3.58E-24
Pb-214	3.70E-17
Bi-214	3.02E-17
Po-214	3.25E-23
Pb-210	1.02E-15
Bi-210	1.21E-16
Po-210	4.12E-15
At-218	0.00E+00
Pu-242	7.35E-15
U-238	1.46E-08
Th-234	9.84E-11
Pa-234m	5.55E-12
Pa-234	6.33E-13
Np-238	0.00E+00
C-14	1.81E-16
Cm-243	0.00E+00
Am-243	9.67E-15
Np-239	1.36E-18
Pu-239	7.98E-11
U-235	2.01E-10
Th-231	5.33E-14
Pa-231	7.51E-13
Ac-227	8.25E-13
Th-227	3.78E-13
Ra-223	2.79E-13
Rn-219	2.77E-19
Po-215	2.09E-19
Pb-211	4.76E-16
Bi-211	5.46E-17
Tl-207	1.60E-17
Po-211	0.00E+00
Fr-223	5.16E-18
Cm-244	2.40E-14

1	Pu-240	3.36E-11
2	U-236	1.53E-14
3	Th-232	4.19E-10
4	Ra-228	1.40E-10
5	Ac-228	1.30E-12
6	Th-228	1.28E-09
7	Ra-224	9.64E-11
8	Rn-220	1.73E-18
9	Po-216	1.62E-17
10	Pb-212	5.68E-12
11	Bi-212	9.31E-13
12	Po-212	0.00E+00
13	Tl-208	1.07E-12
14	Cm-245	0.00E+00
15	Pu-241	2.87E-12
16	Am-241	8.65E-11
17	Np-237	8.81E-15
18	Pa-233	6.19E-18
19	U-233	0.00E+00
20	Th-229	0.00E+00
21	Ra-225	0.00E+00
22	Ac-225	0.00E+00
23	Fr-221	0.00E+00
24	At-217	0.00E+00
25	Bi-213	0.00E+00
26	Po-213	0.00E+00
27	Pb-209	0.00E+00
28	Tl-209	0.00E+00
29	U-237	1.36E-18
30	Co-60	1.54E-17
31	Cs-134	0.00E+00
32	Cs-135	9.18E-19
33	Cs-137	1.30E-10
34	Ba-137m	3.49E-12
35	Eu-152	1.05E-16
36	Gd-152	0.00E+00
37	Eu-154	1.38E-14
38	H-3	3.02E-14
39	I-129	0.00E+00
40	Kr-85	9.72E-16
41	Mo-93	0.00E+00
42	Nb-93m	1.42E-17
43	Nb-94	0.00E+00
44	Ni-59	1.54E-19
45	Ni-63	8.71E-16
46	Pd-107	4.10E-20
47	Se-79	1.90E-18
48	Sm-151	1.10E-14
49	Sn-121m	6.99E-18
50	Sn-121	0.00E+00
51	Sn-126	1.22E-16
52	Sb-126m	8.15E-19
53	Sb-126	2.03E-18
54	Sr-90	2.02E-10

Y-90	3.96E-13
Tc-99	3.35E-14
U-232	0.00E+00
Zr-93	4.08E-17
TOTAL	1.97E-08

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SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	4265	4581	4871	5166	6104	6331	7059
N	2.6E-02	2.4E-02	2.2E-02	2.0E-02	1.5E-02	1.5E-02	1.2E-02
NNW	2.4E-02	2.2E-02	2.0E-02	1.8E-02	1.4E-02	1.3E-02	1.1E-02
NW	1.4E-02	1.3E-02	1.2E-02	1.1E-02	8.2E-03	7.8E-03	6.5E-03
WNW	7.4E-03	6.6E-03	6.0E-03	5.5E-03	4.2E-03	4.0E-03	3.3E-03
W	6.2E-03	5.6E-03	5.1E-03	4.6E-03	3.6E-03	3.3E-03	2.8E-03
WSW	6.6E-03	5.9E-03	5.4E-03	4.9E-03	3.8E-03	3.5E-03	2.9E-03
SW	1.0E-02	9.2E-03	8.4E-03	7.7E-03	5.9E-03	5.6E-03	4.6E-03
SSW	1.5E-02	1.4E-02	1.2E-02	1.1E-02	8.8E-03	8.3E-03	6.9E-03
S	1.7E-02	1.5E-02	1.4E-02	1.3E-02	9.8E-03	9.2E-03	7.6E-03
SSE	2.2E-02	2.0E-02	1.8E-02	1.7E-02	1.3E-02	1.2E-02	1.0E-02
SE	2.7E-02	2.4E-02	2.2E-02	2.0E-02	1.6E-02	1.5E-02	1.2E-02
ESE	1.5E-02	1.3E-02	1.2E-02	1.1E-02	8.7E-03	8.2E-03	6.8E-03
E	1.1E-02	1.0E-02	9.2E-03	8.4E-03	6.5E-03	6.1E-03	5.1E-03
ENE	1.1E-02	1.0E-02	9.2E-03	8.4E-03	6.5E-03	6.1E-03	5.1E-03
NE	1.7E-02	1.6E-02	1.4E-02	1.3E-02	1.0E-02	9.6E-03	8.1E-03
NNE	2.6E-02	2.4E-02	2.2E-02	2.0E-02	1.6E-02	1.5E-02	1.2E-02

	Distance (m)						
Direction	7607	7887	8443	8520	10764	14752	17167
N	1.1E-02	1.0E-02	9.4E-03	9.2E-03	6.5E-03	4.4E-03	3.7E-03
NNW	1.0E-02	9.6E-03	8.6E-03	8.5E-03	6.0E-03	4.1E-03	3.4E-03
NW	5.8E-03	5.5E-03	4.9E-03	4.9E-03	3.4E-03	2.3E-03	1.9E-03
WNW	3.0E-03	2.8E-03	2.5E-03	2.5E-03	1.7E-03	1.1E-03	9.2E-04
W	2.5E-03	2.3E-03	2.1E-03	2.1E-03	1.4E-03	9.4E-04	7.6E-04
WSW	2.6E-03	2.5E-03	2.2E-03	2.2E-03	1.5E-03	1.0E-03	8.1E-04
SW	4.1E-03	3.9E-03	3.5E-03	3.5E-03	2.4E-03	1.6E-03	1.3E-03
SSW	6.1E-03	5.8E-03	5.2E-03	5.1E-03	3.6E-03	2.4E-03	2.0E-03
S	6.8E-03	6.4E-03	5.8E-03	5.7E-03	4.0E-03	2.7E-03	2.2E-03
SSE	9.2E-03	8.7E-03	7.9E-03	7.8E-03	5.5E-03	3.7E-03	3.0E-03
SE	1.1E-02	1.0E-02	9.4E-03	9.3E-03	6.6E-03	4.5E-03	3.7E-03
ESE	6.1E-03	5.8E-03	5.2E-03	5.1E-03	3.6E-03	2.4E-03	2.0E-03
E	4.5E-03	4.3E-03	3.8E-03	3.8E-03	2.6E-03	1.8E-03	1.4E-03
ENE	4.5E-03	4.3E-03	3.9E-03	3.8E-03	2.7E-03	1.8E-03	1.5E-03
NE	7.2E-03	6.8E-03	6.1E-03	6.1E-03	4.3E-03	2.9E-03	2.4E-03
NNE	1.1E-02	1.0E-02	9.4E-03	9.3E-03	6.6E-03	4.5E-03	3.7E-03

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SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	34078	39517	43191	44625
N	1.4E-03	1.1E-03	1.0E-03	9.5E-04
NNW	1.3E-03	1.0E-03	9.2E-04	8.8E-04
NW	6.7E-04	5.5E-04	4.9E-04	4.7E-04
WNW	3.1E-04	2.5E-04	2.2E-04	2.1E-04
W	2.5E-04	2.0E-04	1.8E-04	1.7E-04
WSW	2.7E-04	2.2E-04	1.9E-04	1.8E-04
SW	4.5E-04	3.7E-04	3.3E-04	3.1E-04
SSW	6.8E-04	5.6E-04	5.0E-04	4.7E-04
S	7.5E-04	6.1E-04	5.4E-04	5.2E-04
SSE	1.1E-03	9.0E-04	8.0E-04	7.6E-04
SE	1.4E-03	1.1E-03	9.9E-04	9.5E-04
ESE	7.0E-04	5.8E-04	5.1E-04	4.9E-04
E	4.9E-04	4.0E-04	3.6E-04	3.4E-04
ENE	5.1E-04	4.2E-04	3.7E-04	3.5E-04
NE	8.7E-04	7.2E-04	6.4E-04	6.1E-04
NNE	1.4E-03	1.1E-03	1.0E-03	9.8E-04

- Underlined numbers are MEI values at the Hanford Site boundary.
- Double underlined number is MEI value at the LIGO boundary.
- Wavy underlined number is MEI value at the Energy Northwest boundary.
- Shaded number is the overall maximum value to the MEI (at the Hanford Site Boundary, LIGO, or Energy Northwest)

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SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 4265	4581	4871	5166	6104	6331	7059
N	2.0E-08	1.8E-08	1.6E-08	1.5E-08	1.2E-08	1.1E-08	9.2E-09
NNW	1.8E-08	1.6E-08	1.5E-08	1.4E-08	1.1E-08	1.0E-08	8.4E-09
NW	1.1E-08	9.5E-09	8.7E-09	7.9E-09	6.1E-09	5.8E-09	4.8E-09
WNW	5.5E-09	4.9E-09	4.5E-09	4.1E-09	3.2E-09	3.0E-09	2.5E-09
W	4.6E-09	4.2E-09	3.8E-09	3.5E-09	2.7E-09	2.5E-09	2.1E-09
WSW	4.9E-09	4.4E-09	4.0E-09	3.7E-09	2.8E-09	2.6E-09	2.2E-09
SW	7.6E-09	6.9E-09	6.3E-09	5.7E-09	4.4E-09	4.2E-09	3.5E-09
SSW	1.1E-08	1.0E-08	9.2E-09	8.5E-09	6.5E-09	6.2E-09	5.1E-09
S	1.3E-08	1.1E-08	1.0E-08	9.4E-09	7.3E-09	6.9E-09	5.7E-09
SSE	1.7E-08	1.5E-08	1.4E-08	1.3E-08	9.8E-09	9.2E-09	7.7E-09
SE	2.0E-08	1.8E-08	1.6E-08	1.5E-08	1.2E-08	1.1E-08	9.2E-09
ESE	1.1E-08	1.0E-08	9.2E-09	8.4E-09	6.5E-09	6.1E-09	5.1E-09
E	8.4E-09	7.5E-09	6.9E-09	6.3E-09	4.8E-09	4.6E-09	3.8E-09
ENE	8.4E-09	7.5E-09	6.9E-09	6.3E-09	4.8E-09	4.6E-09	3.8E-09
NE	1.3E-08	1.2E-08	1.1E-08	9.8E-09	7.6E-09	7.2E-09	6.0E-09
NNE	2.0E-08	1.8E-08	1.6E-08	1.5E-08	1.2E-08	1.1E-08	9.2E-09

Direction	Distance (m) 7607	7887	8443	8520	10764	14752	17167
N	8.2E-09	7.8E-09	7.0E-09	6.9E-09	4.9E-09	3.3E-09	2.7E-09
NNW	7.5E-09	7.1E-09	6.4E-09	6.3E-09	4.5E-09	3.1E-09	2.5E-09
NW	4.3E-09	4.1E-09	3.7E-09	3.6E-09	2.6E-09	1.7E-09	1.4E-09
WNW	2.2E-09	2.1E-09	1.9E-09	1.8E-09	1.3E-09	8.5E-10	6.9E-10
W	1.8E-09	1.7E-09	1.6E-09	1.5E-09	1.1E-09	7.0E-10	5.7E-10
WSW	1.9E-09	1.8E-09	1.7E-09	1.6E-09	1.1E-09	7.5E-10	6.0E-10
SW	3.1E-09	2.9E-09	2.6E-09	2.6E-09	1.8E-09	1.2E-09	9.9E-10
SSW	4.6E-09	4.3E-09	3.9E-09	3.8E-09	2.7E-09	1.8E-09	1.5E-09
S	5.1E-09	4.8E-09	4.3E-09	4.3E-09	3.0E-09	2.0E-09	1.6E-09
SSE	6.9E-09	6.5E-09	5.9E-09	5.8E-09	4.1E-09	2.8E-09	2.3E-09
SE	8.3E-09	7.8E-09	7.1E-09	7.0E-09	4.9E-09	3.3E-09	2.7E-09
ESE	4.6E-09	4.3E-09	3.9E-09	3.8E-09	2.7E-09	1.8E-09	1.5E-09
E	3.4E-09	3.2E-09	2.9E-09	2.8E-09	2.0E-09	1.3E-09	1.1E-09
ENE	3.4E-09	3.2E-09	2.9E-09	2.8E-09	2.0E-09	1.3E-09	1.1E-09
NE	5.4E-09	5.1E-09	4.6E-09	4.5E-09	3.2E-09	2.2E-09	1.8E-09
NNE	8.2E-09	7.8E-09	7.0E-09	6.9E-09	4.9E-09	3.3E-09	2.8E-09

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SUMMARY
Page 8

INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	34078	39517	43191	44625
N	1.0E-09	8.3E-10	7.4E-10	7.1E-10
NNW	9.3E-10	7.7E-10	6.9E-10	6.6E-10
NW	5.0E-10	4.1E-10	3.6E-10	3.5E-10
WNW	2.3E-10	1.9E-10	1.7E-10	1.6E-10
W	1.9E-10	1.5E-10	1.3E-10	1.3E-10
WSW	2.0E-10	1.6E-10	1.4E-10	1.4E-10
SW	3.4E-10	2.8E-10	2.4E-10	2.3E-10
SSW	5.1E-10	4.2E-10	3.7E-10	3.5E-10
S	5.6E-10	4.6E-10	4.0E-10	3.9E-10
SSE	8.1E-10	6.7E-10	5.9E-10	5.7E-10
SE	1.0E-09	8.3E-10	7.4E-10	7.1E-10
ESE	5.2E-10	4.3E-10	3.8E-10	3.6E-10
E	3.7E-10	3.0E-10	2.7E-10	2.5E-10
ENE	3.8E-10	3.1E-10	2.7E-10	2.6E-10
NE	6.5E-10	5.3E-10	4.7E-10	4.5E-10
NNE	1.0E-09	8.5E-10	7.6E-10	7.3E-10

Attachment D

CAP88-PC Synopsis and Summary Reports For Trench Remediation and Dust Suppression Activity

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                    C A P 8 8 - P C

                    Version 3.0


          Clean Air Act Assessment Package - 1988



              S Y N O P S I S   R E P O R T

              Radon Individual Assessment
                 Jan  16, 2011  11:21 am



     Facility:  618-10 Burial Ground Remediation
      Address:  Hanford Site
         City:  Richland
        State:  WA          Zip:    99354


     Source Category:
         Source Type:  Area
       Emission Year:  2011


     Comments:  618-10 Remediation
                Fugitive and Well Water



                 Effective Dose Equivalent
                       (mrem/year)
                 ____________________

                       1.96E-01
                 ____________________


    At This Location:   4265 Meters North

        Dataset Name:  618-10 Other
        Dataset Date:  1/16/2011 11:14:00 AM
           Wind File:  C:\Program Files\CAP88-PC30\WindLib\a06400.w
```

Jan 16, 2011 11:21 am

SYNOPSIS
Page 1

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 4265 Meters North
Lifetime Fatal Cancer Risk: 6.29E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
Adrenals	2.93E-02
B Surfac	8.66E-01
Breasts	2.39E-02
St Wall	2.85E-02
ULI Wall	3.82E-02
Kidneys	2.90E-02
Lungs	3.75E-02
Ovaries	3.27E-02
R Marrow	3.13E-01
Spleen	2.83E-02
Thymus	2.75E-02
Uterus	3.01E-02
Bld Wall	3.14E-02
Brain	2.50E-02
Esophagu	2.90E-02
SI Wall	3.00E-02
LLI Wall	6.77E-02
Liver	5.95E-02
Muscle	2.65E-02
Pancreas	3.00E-02
Skin	3.75E-02
Testes	2.94E-02
Thyroid	2.75E-02
EFFEC	1.96E-01

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SYNOPSIS
Page 2

RADIONUCLIDE EMISSIONS DURING THE YEAR 2011

Nuclide	Type	Size	Source #1 Ci/y	TOTAL Ci/y
Ac-227	M	1	3.6E-08	3.6E-08
Ac-228	M	1	7.2E-05	7.2E-05
Am-241	M	1	2.8E-03	2.8E-03
Am-242	M	1	4.0E-07	4.0E-07
Am-242m	M	1	4.0E-07	4.0E-07
Am-243	M	1	2.3E-07	2.3E-07
Ba-137m	M	1	6.8E-02	6.8E-02
Be-10	M	1	2.2E-10	2.2E-10
Be-7	M	1	8.8E-06	8.8E-06
Bi-210	M	1	2.1E-09	2.1E-09
Bi-211	M	1	3.6E-08	3.6E-08
Bi-212	M	1	7.2E-05	7.2E-05
Bi-214	M	1	5.5E-09	5.5E-09
C-14	M	1	5.2E-04	5.2E-04
Ca-41	M	1	2.0E-05	2.0E-05
Ce-144	M	1	2.5E-06	2.5E-06
Cl-36	M	1	4.4E-06	4.4E-06
Cm-242	M	1	3.3E-07	3.3E-07
Cm-243	M	1	3.8E-08	3.8E-08
Cm-244	M	1	5.6E-07	5.6E-07
Cm-245	M	1	7.6E-11	7.6E-11
Co-58	M	1	2.5E-07	2.5E-07
Co-60	M	1	6.0E-06	6.0E-06
Cs-134	F	1	4.8E-07	4.8E-07
Cs-135	F	1	8.8E-07	8.8E-07
Cs-137	F	1	7.2E-02	7.2E-02
Eu-152	M	1	2.9E-06	2.9E-06
Eu-154	M	1	4.5E-05	4.5E-05
Eu-155	M	1	1.3E-06	1.3E-06
Fe-59	M	1	7.7E-07	7.7E-07
Fr-223	M	1	5.0E-10	5.0E-10
I-129	F	1	1.1E-07	1.1E-07
K-40	M	1	1.3E-05	1.3E-05
Kr-85	G	0	9.2E-01	9.2E-01
Mo-93	M	1	7.1E-09	7.1E-09
Nb-93m	M	1	5.0E-06	5.0E-06
Nb-94	M	1	7.3E-08	7.3E-08
Ni-59	M	1	3.7E-06	3.7E-06
Ni-63	M	1	3.2E-04	3.2E-04
Np-237	M	1	5.7E-07	5.7E-07
Np-238	M	1	2.0E-09	2.0E-09
Np-239	M	1	2.3E-07	2.3E-07

1	Pa-231	M	1	7.1E-08	7.1E-08
2	Pa-233	M	1	5.7E-07	5.7E-07
3	Pa-234	M	1	4.0E-06	4.0E-06
4	Pa-234m	M	1	3.1E-03	3.1E-03
5	Pb-210	M	1	2.1E-09	2.1E-09
6	Pb-211	M	1	3.6E-08	3.6E-08
7	Pb-212	M	1	7.2E-05	7.2E-05
8	Pb-214	M	1	5.5E-09	5.5E-09
9	Pd-107	M	1	1.3E-07	1.3E-07
10	Po-210	M	1	2.1E-09	2.1E-09
11	Po-211	M	1	1.0E-10	1.0E-10
12	Po-212	M	1	4.6E-05	4.6E-05
13	Po-214	M	1	5.5E-09	5.5E-09
14	Po-215	M	1	3.6E-08	3.6E-08
15	Po-216	M	1	7.2E-05	7.2E-05
16	Po-218	M	1	5.5E-09	5.5E-09
17	Pu-238	M	1	4.7E-04	4.7E-04
18	Pu-239	M	1	3.4E-03	3.4E-03
19	Pu-240	M	1	1.1E-03	1.1E-03
20	Pu-241	M	1	8.0E-03	8.0E-03
21	Pu-242	M	1	1.8E-07	1.8E-07
22	Ra-223	M	1	3.6E-08	3.6E-08
23	Ra-224	M	1	7.2E-05	7.2E-05
24	Ra-226	M	1	5.5E-09	5.5E-09
25	Ra-228	M	1	7.2E-05	7.2E-05
26	Ru-106	M	1	1.2E-05	1.2E-05
27	Sb-125	M	1	2.1E-06	2.1E-06
28	Sb-126	M	1	2.3E-07	2.3E-07
29	Sb-126m	M	1	1.6E-06	1.6E-06
30	Se-79	F	1	9.9E-07	9.9E-07
31	Sm-151	M	1	2.4E-03	2.4E-03
32	Sn-121m	M	1	3.0E-06	3.0E-06
33	Sn-126	M	1	1.6E-06	1.6E-06
34	Sr-90	M	1	7.0E-02	7.0E-02
35	Tc-99	M	1	4.2E-05	4.2E-05
36	Th-227	S	1	3.6E-08	3.6E-08
37	Th-228	S	1	7.2E-05	7.2E-05
38	Th-230	S	1	5.0E-07	5.0E-07
39	Th-231	S	1	6.4E-05	6.4E-05
40	Th-232	S	1	7.2E-05	7.2E-05
41	Th-234	S	1	3.1E-03	3.1E-03
42	Tl-207	M	1	3.6E-08	3.6E-08
43	Tl-208	M	1	2.6E-05	2.6E-05
44	U-232	M	1	5.6E-09	5.6E-09
45	U-233	M	1	7.1E-07	7.1E-07
46	U-234	M	1	1.1E-03	1.1E-03
47	U-235	M	1	6.4E-05	6.4E-05
48	U-236	M	1	2.0E-06	2.0E-06
49	U-237	M	1	1.9E-07	1.9E-07
50	U-238	M	1	3.1E-03	3.1E-03
51	Y-90	M	1	7.0E-02	7.0E-02
52	Zn-65	M	1	6.2E-07	6.2E-07
53	Zr-93	M	1	5.6E-06	5.6E-06
54	Zr-95	M	1	1.9E-05	1.9E-05

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Rn-219     G    0    3.6E-08 3.6E-08
Rn-220     G    0    7.2E-05 7.2E-05
Rn-222     G    0    5.5E-09 5.5E-09
H-3        V    0    5.8E+00 5.8E+00
Cm-246     M    1    2.1E-12 2.1E-12


                    SITE INFORMATION

                         Temperature:     12 degrees C
                       Precipitation:     18 cm/y
                       Humidity:           8 g/cu m
                       Mixing Height:   1000 m

                       User specified location of max exposed individual.
                       (ILOC, JLOC):   1,  1
```

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SYNOPSIS
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SOURCE INFORMATION

Source Number: 1

Source Height (m): 0.00
Area (sq m): 27870.91

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.00	0.00	0.00	0.00	0.00	0.00	0.00

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	1.000	1.000	1.000
Fraction From Assessment Area:	0.000	0.000	0.000
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

4265	4581	4871	5166	6104	6331	7059
7607	7887	8443	8520	10764	14752	17167
34078	39517	43191	44625			

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                    C A P 8 8 - P C

                    Version 3.0

          Clean Air Act Assessment Package - 1988

D O S E   A N D   R I S K   E Q U I V A L E N T   S U M M A R I E S

              Non-Radon Individual Assessment
                   Jan  16, 2011  11:21 am


      Facility:  618-10 Burial Ground Remediation
       Address:  Hanford Site
          City:  Richland
         State:  WA          Zip:    99354


    Source Category:
        Source Type:  Area
      Emission Year:  2011


    Comments:  618-10 Remediation
               Fugitive and Well Water


       Dataset Name:  618-10 Other
       Dataset Date:  1/16/2011 11:14:00 AM
          Wind File:  .   C:\Program Files\CAP88-PC30\WindLib\a06400.wnd
```

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SUMMARY
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ORGAN DOSE EQUIVALENT SUMMARY

Organ	Selected Individual (mrem/y)
Adrenals	2.93E-02
B Surfac	8.66E-01
Breasts	2.39E-02
St Wall	2.85E-02
ULI Wall	3.82E-02
Kidneys	2.90E-02
Lungs	3.75E-02
Ovaries	3.27E-02
R Marrow	3.13E-01
Spleen	2.83E-02
Thymus	2.75E-02
Uterus	3.01E-02
Bld Wall	3.14E-02
Brain	2.50E-02
Esophagu	2.90E-02
SI Wall	3.00E-02
LLI Wall	6.77E-02
Liver	5.95E-02
Muscle	2.65E-02
Pancreas	3.00E-02
Skin	3.75E-02
Testes	2.94E-02
Thyroid	2.75E-02
EFFEC	1.96E-01

PATHWAY EFFECTIVE DOSE EQUIVALENT SUMMARY

Pathway	Selected Individual (mrem/y)
INGESTION	7.17E-02
INHALATION	1.24E-01
AIR IMMERSION	2.71E-06
GROUND SURFACE	8.05E-04
INTERNAL	1.95E-01
EXTERNAL	8.08E-04
TOTAL	1.96E-01

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SUMMARY
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NUCLIDE EFFECTIVE DOSE EQUIVALENT SUMMARY

Nuclide	Selected Individual (mrem/y)
Am-242m	4.77E-06
Am-242	2.29E-09
Cm-242	5.47E-07
Pu-238	6.97E-03
U-234	1.25E-03
Th-230	2.31E-06
Ra-226	6.02E-09
Rn-222	1.52E-16
Po-218	2.87E-18
Pb-214	2.37E-11
Bi-214	2.58E-11
Po-214	2.60E-17
Pb-210	7.20E-10
Bi-210	6.07E-11
Po-210	2.13E-09
At-218	0.00E+00
Pu-242	2.73E-06
U-238	2.96E-03
Th-234	1.38E-05
Pa-234m	5.61E-06
Pa-234	1.88E-07
Np-238	1.42E-12
Be-10	0.00E+00
Be-7	2.97E-09
C-14	1.66E-06
Ca-41	9.05E-08
Ce-144	4.02E-08
Pr-144m	2.89E-12
Pr-144	3.93E-11
Cl-36	8.24E-06
Cm-243	3.76E-07
Am-243	2.99E-06
Np-239	8.79E-11
Pu-239	5.49E-02
U-235	6.70E-05
Th-231	2.38E-08
Pa-231	2.13E-06
Ac-227	8.27E-07
Th-227	1.16E-07
Ra-223	8.44E-08
Rn-219	1.37E-13
Po-215	3.47E-16
Pb-211	1.26E-10

1	Bi-211	9.08E-14
2	Tl-207	2.01E-14
3	Po-211	0.00E+00
4	Fr-223	0.00E+00
5	Cm-244	4.82E-06
6	Pu-240	1.77E-02
7	U-236	2.15E-06
8	Th-232	5.82E-04
9	Ra-228	2.01E-04
10	Ac-228	1.41E-06
11	Th-228	9.01E-04
12	Ra-224	6.76E-05
13	Rn-220	1.91E-12
14	Po-216	1.78E-11
15	Pb-212	4.02E-06
16	Bi-212	9.45E-07
17	Po-212	0.00E+00
18	Tl-208	1.18E-06
19	Cm-245	0.00E+00
20	Pu-241	2.30E-03
21	Am-241	3.74E-02
22	Np-237	4.19E-06
23	Pa-233	2.80E-09
24	U-233	8.40E-07
25	Th-229	0.00E+00
26	Ra-225	0.00E+00
27	Ac-225	0.00E+00
28	Fr-221	0.00E+00
29	At-217	0.00E+00
30	Bi-213	0.00E+00
31	Po-213	0.00E+00
32	Pb-209	0.00E+00
33	Tl-209	0.00E+00
34	U-237	5.25E-10
35	Co-58	2.76E-09
36	Co-60	6.42E-07
37	Cs-134	2.25E-07
38	Cs-135	4.76E-08
39	Cs-137	2.61E-02
40	Ba-137m	6.61E-04
41	Eu-152	9.46E-08
42	Gd-152	0.00E+00
43	Eu-154	1.76E-06
44	Eu-155	4.57E-09
45	Fe-59	6.58E-09
46	I-129	1.48E-07
47	K-40	2.65E-06
48	Kr-85	3.41E-07
49	Mo-93	1.32E-12
50	Nb-93m	1.75E-09
51	Nb-94	2.27E-09
52	Ni-59	3.04E-09
53	Ni-63	6.54E-07
54	Pd-107	2.46E-11

Ru-106	2.61E-07
Rh-106	5.83E-08
Sb-125	2.05E-08
Te-125m	1.17E-09
Se-79	7.90E-08
Sm-151	3.32E-06
Sn-121m	2.01E-08
Sn-121	1.24E-11
Sn-126	1.24E-07
Sb-126m	4.23E-08
Sb-126	1.09E-08
Sr-90	4.35E-02
Y-90	1.61E-04
Tc-99	4.58E-06
U-232	1.39E-08
Zn-65	7.88E-08
Zr-93	2.56E-08
Zr-95	1.31E-07
Nb-95m	4.63E-11
Nb-95	4.14E-10
H-3	4.27E-04
Cm-246	0.00E+00
TOTAL	1.96E-01

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SUMMARY
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CANCER RISK SUMMARY

Cancer	Selected Individual Total Lifetime Fatal Cancer Risk
Esophagu	3.51E-10
Stomach	1.23E-09
Colon	6.65E-09
Liver	6.42E-09
LUNG	1.58E-08
Bone	3.13E-09
Skin	3.96E-11
Breast	1.01E-09
Ovary	9.01E-10
Bladder	9.20E-10
Kidneys	2.46E-10
Thyroid	8.51E-11
Leukemia	2.18E-08
Residual	4.39E-09
Total	6.29E-08
TOTAL	1.26E-07

PATHWAY RISK SUMMARY

Pathway	Selected Individual Total Lifetime Fatal Cancer Risk
INGESTION	3.89E-08
INHALATION	2.36E-08
AIR IMMERSION	1.37E-12
GROUND SURFACE	3.76E-10
INTERNAL	6.25E-08
EXTERNAL	3.77E-10
TOTAL	6.29E-08

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NUCLIDE RISK SUMMARY

Nuclide	Selected Individual Total Lifetime Fatal Cancer Risk
Am-242m	4.41E-13
Am-242	1.66E-15
Cm-242	4.04E-13
Pu-238	1.21E-09
U-234	1.00E-09
Th-230	1.14E-12
Ra-226	5.10E-15
Rn-222	8.26E-23
Po-218	1.57E-24
Pb-214	1.62E-17
Bi-214	1.32E-17
Po-214	1.43E-23
Pb-210	4.46E-16
Bi-210	5.29E-17
Po-210	1.80E-15
At-218	0.00E+00
Pu-242	4.28E-13
U-238	2.37E-09
Th-234	1.59E-11
Pa-234m	9.00E-13
Pa-234	1.03E-13
Np-238	5.96E-19
Be-10	0.00E+00
Be-7	1.67E-15
C-14	1.13E-12
Ca-41	4.87E-14
Ce-144	3.80E-14
Pr-144m	1.31E-18
Pr-144	7.90E-18
Cl-36	7.04E-12
Cm-243	7.67E-14
Am-243	4.58E-13
Np-239	7.38E-17
Pu-239	8.68E-09
U-235	5.38E-11
Th-231	1.43E-14
Pa-231	2.01E-13
Ac-227	2.18E-13
Th-227	1.01E-13
Ra-223	7.29E-14
Rn-219	7.41E-20

1	Po-215	1.89E-22
2	Pb-211	1.08E-16
3	Bi-211	4.90E-20
4	Tl-207	4.93E-21
5	Po-211	0.00E+00
6	Fr-223	0.00E+00
7	Cm-244	1.10E-12
8	Pu-240	2.80E-09
9	U-236	1.73E-12
10	Th-232	2.52E-10
11	Ra-228	8.40E-11
12	Ac-228	7.80E-13
13	Th-228	7.69E-10
14	Ra-224	5.81E-11
15	Rn-220	1.04E-18
16	Po-216	9.75E-18
17	Pb-212	3.42E-12
18	Bi-212	5.61E-13
19	Po-212	0.00E+00
20	Tl-208	6.44E-13
21	Cm-245	0.00E+00
22	Pu-241	1.97E-10
23	Am-241	5.88E-09
24	Np-237	7.67E-13
25	Pa-233	2.06E-15
26	U-233	6.75E-13
27	Th-229	0.00E+00
28	Ra-225	0.00E+00
29	Ac-225	0.00E+00
30	Fr-221	0.00E+00
31	At-217	0.00E+00
32	Bi-213	0.00E+00
33	Po-213	0.00E+00
34	Pb-209	0.00E+00
35	Tl-209	0.00E+00
36	U-237	3.33E-16
37	Co-58	1.86E-15
38	Co-60	5.91E-13
39	Cs-134	1.12E-13
40	Cs-135	2.55E-14
41	Cs-137	1.33E-08
42	Ba-137m	3.57E-10
43	Eu-152	5.17E-14
44	Gd-152	0.00E+00
45	Eu-154	9.95E-13
46	Eu-155	2.81E-15
47	Fe-59	4.28E-15
48	I-129	7.48E-15
49	K-40	2.51E-12
50	Kr-85	1.03E-13
51	Mo-93	6.94E-19
52	Nb-93m	2.00E-15
53	Nb-94	1.39E-15
54	Ni-59	2.98E-15

Ni-63	6.47E-13
Pd-107	3.47E-17
Ru-106	2.99E-13
Rh-106	2.13E-14
Sb-125	1.33E-14
Te-125m	9.50E-16
Se-79	4.97E-14
Sm-151	1.35E-12
Sn-121m	2.50E-14
Sn-121	1.44E-17
Sn-126	1.41E-13
Sb-126m	2.24E-14
Sb-126	6.12E-15
Sr-90	2.56E-08
Y-90	5.02E-11
Tc-99	4.40E-12
U-232	8.64E-15
Zn-65	5.57E-14
Zr-93	5.09E-15
Zr-95	8.27E-14
Nb-95m	2.58E-17
Nb-95	2.34E-16
H-3	2.64E-10
Cm-246	0.00E+00
TOTAL	6.29E-08

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SUMMARY
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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)						
Direction	4265	4581	4871	5166	6104	6331	7059
N	2.0E-01	1.8E-01	1.6E-01	1.5E-01	1.2E-01	1.1E-01	9.2E-02
NNW	1.8E-01	1.6E-01	1.5E-01	1.4E-01	1.1E-01	1.0E-01	8.4E-02
NW	1.1E-01	9.5E-02	8.7E-02	7.9E-02	6.1E-02	5.8E-02	4.9E-02
WNW	5.5E-02	5.0E-02	4.5E-02	4.1E-02	3.2E-02	3.0E-02	2.5E-02
W	4.7E-02	4.2E-02	3.8E-02	3.5E-02	2.7E-02	2.5E-02	2.1E-02
WSW	4.9E-02	4.4E-02	4.0E-02	3.7E-02	2.8E-02	2.7E-02	2.2E-02
SW	7.6E-02	6.9E-02	6.3E-02	5.7E-02	4.4E-02	4.2E-02	3.5E-02
SSW	1.1E-01	1.0E-01	9.2E-02	8.5E-02	6.5E-02	6.2E-02	5.1E-02
S	1.3E-01	1.1E-01	1.0E-01	9.4E-02	7.3E-02	6.9E-02	5.7E-02
SSE	1.7E-01	1.5E-01	1.4E-01	1.3E-01	9.7E-02	9.2E-02	7.7E-02
SE	2.0E-01	1.8E-01	1.6E-01	1.5E-01	1.2E-01	1.1E-01	9.2E-02
ESE	1.1E-01	1.0E-01	9.2E-02	8.4E-02	6.5E-02	6.1E-02	5.1E-02
E	8.4E-02	7.5E-02	6.9E-02	6.3E-02	4.8E-02	4.6E-02	3.8E-02
ENE	8.3E-02	7.5E-02	6.8E-02	6.3E-02	4.8E-02	4.6E-02	3.8E-02
NE	1.3E-01	1.2E-01	1.1E-01	9.8E-02	7.6E-02	7.2E-02	6.0E-02
NNE	2.0E-01	1.8E-01	1.6E-01	1.5E-01	1.2E-01	1.1E-01	9.2E-02

	Distance (m)						
Direction	7607	7887	8443	8520	10764	14752	17167
N	8.2E-02	7.8E-02	7.0E-02	6.9E-02	4.9E-02	3.3E-02	2.8E-02
NNW	7.5E-02	7.1E-02	6.4E-02	6.3E-02	4.5E-02	3.1E-02	2.5E-02
NW	4.3E-02	4.1E-02	3.7E-02	3.7E-02	2.6E-02	1.7E-02	1.4E-02
WNW	2.2E-02	2.1E-02	1.9E-02	1.9E-02	1.3E-02	8.6E-03	7.0E-03
W	1.9E-02	1.8E-02	1.6E-02	1.6E-02	1.1E-02	7.1E-03	5.8E-03
WSW	2.0E-02	1.9E-02	1.7E-02	1.7E-02	1.1E-02	7.6E-03	6.2E-03
SW	3.1E-02	2.9E-02	2.7E-02	2.6E-02	1.8E-02	1.2E-02	1.0E-02
SSW	4.6E-02	4.3E-02	3.9E-02	3.9E-02	2.7E-02	1.8E-02	1.5E-02
S	5.1E-02	4.8E-02	4.3E-02	4.3E-02	3.0E-02	2.0E-02	1.7E-02
SSE	6.9E-02	6.5E-02	5.9E-02	5.8E-02	4.1E-02	2.8E-02	2.3E-02
SE	8.3E-02	7.8E-02	7.1E-02	7.0E-02	4.9E-02	3.3E-02	2.8E-02
ESE	4.6E-02	4.3E-02	3.9E-02	3.8E-02	2.7E-02	1.8E-02	1.5E-02
E	3.4E-02	3.2E-02	2.9E-02	2.8E-02	2.0E-02	1.3E-02	1.1E-02
ENE	3.4E-02	3.2E-02	2.9E-02	2.8E-02	2.0E-02	1.3E-02	1.1E-02
NE	5.4E-02	5.1E-02	4.6E-02	4.5E-02	3.2E-02	2.2E-02	1.8E-02
NNE	8.2E-02	7.8E-02	7.0E-02	7.0E-02	4.9E-02	3.4E-02	2.8E-02

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INDIVIDUAL EFFECTIVE DOSE EQUIVALENT RATE (mrem/y)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	34078	39517	43191	44625
N	1.0E-02	8.5E-03	7.5E-03	7.2E-03
NNW	9.4E-03	7.8E-03	7.0E-03	6.7E-03
NW	5.1E-03	4.2E-03	3.7E-03	3.6E-03
WNW	2.4E-03	2.0E-03	1.7E-03	1.6E-03
W	1.9E-03	1.6E-03	1.4E-03	1.3E-03
WSW	2.1E-03	1.7E-03	1.5E-03	1.4E-03
SW	3.5E-03	2.9E-03	2.5E-03	2.4E-03
SSW	5.2E-03	4.3E-03	3.8E-03	3.6E-03
S	5.7E-03	4.7E-03	4.1E-03	4.0E-03
SSE	8.2E-03	6.8E-03	6.0E-03	5.8E-03
SE	1.0E-02	8.4E-03	7.5E-03	7.2E-03
ESE	5.3E-03	4.4E-03	3.9E-03	3.7E-03
E	3.8E-03	3.1E-03	2.7E-03	2.6E-03
ENE	3.9E-03	3.2E-03	2.8E-03	2.7E-03
NE	6.6E-03	5.4E-03	4.8E-03	4.6E-03
NNE	1.0E-02	8.7E-03	7.7E-03	7.4E-03

- Underlined numbers are MEI values at the Hanford Site boundary.
- Double underlined number is MEI value at the LIGO boundary.
- Wavy underlined number is MEI value at the Energy Northwest boundary.
- Shaded number is the overall maximum value to the MEI (at the Hanford Site Boundary, LIGO, or Energy Northwest)

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SUMMARY
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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

Direction	Distance (m) 4265	4581	4871	5166	6104	6331	7059
N	6.3E-08	5.7E-08	5.2E-08	4.8E-08	3.7E-08	3.5E-08	2.9E-08
NNW	5.8E-08	5.2E-08	4.7E-08	4.4E-08	3.4E-08	3.2E-08	2.7E-08
NW	3.4E-08	3.0E-08	2.8E-08	2.6E-08	2.0E-08	1.9E-08	1.6E-08
WNW	1.8E-08	1.6E-08	1.5E-08	1.3E-08	1.0E-08	9.7E-09	8.1E-09
W	1.5E-08	1.4E-08	1.2E-08	1.1E-08	8.7E-09	8.2E-09	6.8E-09
WSW	1.6E-08	1.4E-08	1.3E-08	1.2E-08	9.2E-09	8.6E-09	7.2E-09
SW	2.5E-08	2.2E-08	2.0E-08	1.9E-08	1.4E-08	1.4E-08	1.1E-08
SSW	3.6E-08	3.2E-08	3.0E-08	2.7E-08	2.1E-08	2.0E-08	1.7E-08
S	4.0E-08	3.6E-08	3.3E-08	3.0E-08	2.3E-08	2.2E-08	1.8E-08
SSE	5.3E-08	4.8E-08	4.4E-08	4.0E-08	3.1E-08	3.0E-08	2.5E-08
SE	6.4E-08	5.7E-08	5.2E-08	4.8E-08	3.7E-08	3.5E-08	3.0E-08
ESE	3.6E-08	3.2E-08	2.9E-08	2.7E-08	2.1E-08	2.0E-08	1.6E-08
E	2.7E-08	2.4E-08	2.2E-08	2.0E-08	1.6E-08	1.5E-08	1.2E-08
ENE	2.7E-08	2.4E-08	2.2E-08	2.0E-08	1.6E-08	1.5E-08	1.2E-08
NE	4.2E-08	3.8E-08	3.4E-08	3.1E-08	2.4E-08	2.3E-08	1.9E-08
NNE	6.3E-08	5.7E-08	5.2E-08	4.8E-08	3.7E-08	3.5E-08	3.0E-08

Direction	Distance (m) 7607	7887	8443	8520	10764	14752	17167
N	2.6E-08	2.5E-08	2.3E-08	2.2E-08	1.6E-08	1.1E-08	8.9E-09
NNW	2.4E-08	2.3E-08	2.1E-08	2.0E-08	1.5E-08	9.9E-09	8.2E-09
NW	1.4E-08	1.3E-08	1.2E-08	1.2E-08	8.4E-09	5.6E-09	4.6E-09
WNW	7.2E-09	6.9E-09	6.2E-09	6.1E-09	4.3E-09	2.8E-09	2.3E-09
W	6.1E-09	5.7E-09	5.2E-09	5.1E-09	3.5E-09	2.3E-09	1.9E-09
WSW	6.4E-09	6.1E-09	5.5E-09	5.4E-09	3.8E-09	2.5E-09	2.0E-09
SW	1.0E-08	9.5E-09	8.6E-09	8.5E-09	6.0E-09	4.0E-09	3.3E-09
SSW	1.5E-08	1.4E-08	1.3E-08	1.2E-08	8.8E-09	5.9E-09	4.9E-09
S	1.6E-08	1.6E-08	1.4E-08	1.4E-08	9.7E-09	6.5E-09	5.4E-09
SSE	2.2E-08	2.1E-08	1.9E-08	1.9E-08	1.3E-08	8.9E-09	7.4E-09
SE	2.7E-08	2.5E-08	2.3E-08	2.2E-08	1.6E-08	1.1E-08	8.9E-09
ESE	1.5E-08	1.4E-08	1.3E-08	1.2E-08	8.7E-09	5.9E-09	4.8E-09
E	1.1E-08	1.0E-08	9.3E-09	9.1E-09	6.4E-09	4.3E-09	3.5E-09
ENE	1.1E-08	1.0E-08	9.3E-09	9.2E-09	6.5E-09	4.4E-09	3.6E-09
NE	1.7E-08	1.6E-08	1.5E-08	1.5E-08	1.0E-08	7.0E-09	5.8E-09
NNE	2.7E-08	2.5E-08	2.3E-08	2.2E-08	1.6E-08	1.1E-08	9.0E-09

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INDIVIDUAL LIFETIME RISK (deaths)
(All Radionuclides and Pathways)

	Distance (m)			
Direction	34078	39517	43191	44625
N	3.3E-09	2.8E-09	2.5E-09	2.4E-09
NNW	3.1E-09	2.5E-09	2.3E-09	2.2E-09
NW	1.7E-09	1.4E-09	1.2E-09	1.2E-09
WNW	8.0E-10	6.5E-10	5.8E-10	5.5E-10
W	6.5E-10	5.3E-10	4.7E-10	4.4E-10
WSW	6.9E-10	5.7E-10	5.0E-10	4.8E-10
SW	1.1E-09	9.4E-10	8.3E-10	8.0E-10
SSW	1.7E-09	1.4E-09	1.2E-09	1.2E-09
S	1.9E-09	1.5E-09	1.4E-09	1.3E-09
SSE	2.7E-09	2.2E-09	2.0E-09	1.9E-09
SE	3.3E-09	2.8E-09	2.4E-09	2.3E-09
ESE	1.7E-09	1.4E-09	1.3E-09	1.2E-09
E	1.2E-09	1.0E-09	8.9E-10	8.5E-10
ENE	1.3E-09	1.0E-09	9.2E-10	8.8E-10
NE	2.2E-09	1.8E-09	1.6E-09	1.5E-09
NNE	3.4E-09	2.8E-09	2.5E-09	2.4E-09

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Attachment 17

300 Area Field Remediation Status
February 10, 2011

Current activities and monthly look ahead

- Demo and excavation at 321 and 3706
- Load out of excavated and demo waste
- 300-15 (process sewer) camera inspections and sampling.

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Attachment 18

Environmental Protection Mission Completion Project
February 10, 2011

Orphan Sites Evaluations

- The 100-F/IU-2/IU-6 Area - Segment 3 Orphan Sites Evaluation Report, Rev. 0 was transmitted to RL on 1/24/11.
- Currently performing the gap analysis phase of the OSE process for 100-F/IU-2/IU-6 Area – Segment 4.
- The field investigation task for 100-F/IU-2/IU-6 – Segment 5 was initiated on 1/31/11.

Long-Term Stewardship

- Continued working with RL, MSA, and CHPRC regarding the Segment 1 turnover and transition package to support transition of interim surveillance and maintenance responsibilities between contractors.
- Continue with the development of the remedial action report for Segment 1.
- The development of the remedial action report for the 100-BC-1 OU will begin the week of 2/14/11.

River Corridor Baseline Risk Assessment

- The Draft C Ecological risk assessment report is being finalized reflect RL pre-concurrence review comments. Current focus is on updated Ecological PRGs.
- The Draft C Human Health risk assessment report was transmitted to EPA and Ecology for review in December 2010.

Remedial Investigation of Hanford Releases to Columbia River

- The data summary report was approved on 2/7/11 and is being duplicated for distribution.
- Development of the Decisional Draft Human Health and Ecological risk assessment reports is continuing.

Document Review Look-Ahead

Document	Regulator Review Start	Duration
River Corridor Baseline Risk Assessment - Human Health Report (DOE/RL-2007-21, Volume II)	January 3, 2011 (actual)	45 days
River Corridor Baseline Risk Assessment – Ecological Report (DOE/RL-2007-21, Volume I)	May 2011	45 days
SAP for Waste Site Transition Zone Sampling (DOE/RL-2010-115)	January 17, 2011 (actual)	45 days

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Attachment 19

CERCLA Five-Year Review Action Items

2/10/2011

Point of Contact	*Action No.*	*Deliverables*	*Due Date*	*Status*
100 Area				
WCH/RL	1-3	Reassess and resubmit to EPA the protectiveness determinations for operable units 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-HR-3, 100-IU-2, 100-IU-6, 100-KR-1, 100-KR-2, 100-KR-4, 100-NR-1, 300-FF-1 and 300-FR-2 using new information from the River Corridor Baseline Risk Assessment and submit to EPA an addendum with, as appropriated, updated Protectiveness Determinations, Issues, and Follow-Up Actions.	2/15/2008	This action was to be coordinated with the finalization of the Risk Assessment. A Draft B Risk Assessment is now projected to be submitted early 2010.
Bowles, Nathan	7-1	Perform additional data collection to support risk assessment, provide to Ecology previously collected data, and coordinate with River Corridor sampling efforts to collect additional pore water data from new and existing aquifer tubes along the 100-NR-2 shoreline in order to assess water quality impacts.	9/1/2008	(Partially completed August 2008) Samples were collected from aquifer tubes in FY07 and FY08. Section 2.4.1 of the Groundwater Annual report discusses significant results. PNNL placed additional aquifer tubes and collected samples to identify the dimensions of SR-90 and TPH contaminants along the shoreline at 100-NR-2 in 2007. The results are detailed in PNNL-16714. Additional tubes were installed in 2008. Previous sample results have been provided to Ecology. Ecology feels that the river pore data collections from seeps in the river described in the Remedial Investigation Work Plan for Hanford Site Releases to the Columbia River, DOE/RL-2008-11, Rev. 0 should be completed prior to closing out this action.
Biebesheimer, Fred (Note: this item was not part of the Executive Summary table in the CERCLA 5-year review but exists within the text in Section 1.4.6.4).	11-2	Expand groundwater pump-and-treat extraction within the 100-D Area by 378.5 liters (100 gallons) per minute to enhance remediation of the chromium plume.	Completed 12/17/2010	Completed - Pump-and-treat extraction in the 100-D Area was expanded by 600 gpm (DX Expansion project). System was operational by 12/17/2010 .
Biebesheimer, Fred	12-1	Perform additional characterization of the aquifer below the initial aquitard. [Note: this action is for H Area.]	9/30/2009	Additional characterization was conducted via an aquifer rebound test and pumping from the RUM unit to verify the conceptual site model in FY 2009. Data are being evaluated and a report is being prepared to support the RI/FS. Five wells will also be drilled into the RUM in support of the 100-D and H Area RI/FS in FY 2010.

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