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200 AREA GROUNDWATER AND SOURCE OPERABLE UNITS

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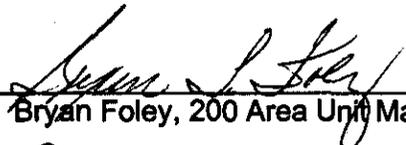
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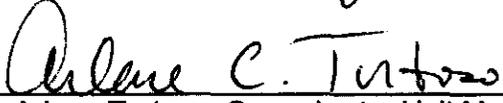
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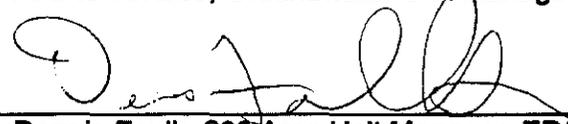
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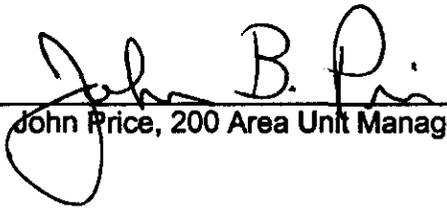
Meeting Minutes Transmittal/Approval
Unit Managers' Meeting
200 Area Groundwater and Source Operable Units
3350 George Washington Way, Richland, Washington
March 2001

095598

APPROVAL:  Date 11/3/01
Bryan Foley, 200 Area Unit Manager, DOE/RL (A5-13)

APPROVAL:  Date 11/29/01
Arlene Tortoso, Groundwater Unit Manager, DOE/RL (H0-12)

APPROVAL:  Date 12-20-01
Dennis Faulk, 200 Area Unit Manager, EPA (B5-01)

APPROVAL:  Date 4-JAN-02
John Price, 200 Area Unit Manager, Ecology (B5-18)

Meeting minutes are attached. Minutes are comprised of the following:

Attachment 1	--	Agenda
Attachment 2	--	Attendance Record
Attachment 3	--	200 Area Current Action Log
Attachment 4	--	200 Area UMM Minutes – March 2001
Attachment 5	--	Comparison of Maximum Carbon Tetrachloride Rebound Concentrations
Attachment 6	--	Carbon Tetrachloride Concentration (ppmv)
Attachment 7	--	Approval of the Carbon Tetrachloride Expedited Response Action (200-AP-2) Soil Vapor Extraction System Operating Plan for FY 2001
Attachment 8	--	Map Showing Proposed New Groundwater Monitoring Well Location
Attachment 9	--	Public Review Draft, USDOE Hanford Site First Five Year Review Report

Prepared by:



Alison Kent, BHI GW/VZ Integration Project (H0-21)

Date

10-25-01

Concurrence by:



Bruce Ford, BHI GW/VZ Integration Project (H0-19)

Date

10/30/01

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UNIT MANAGERS' MEETING AGENDA

3350 George Washington Way

March 22, 2001

9:00 a.m. – 11:00 a.m. 200 Area Room 2A01

200-PW-1 Plutonium/Organic-Rich Process Waste OU (Expedited Response Action) (10 minutes)

- Soil Vapor Extraction System Restart
 - Operations startup status
 - Operating plan approval
- Carbon Tetrachloride Vapor Monitoring
- Z-9 Well Deepening Status

200-ZP-1 (10 minutes)

- Treatment Operations Status
- PFP Well Installation
 - Schedule Status
 - Well Location

200-UP-1 (10 minutes)

- Operations Status
- Monitoring Well Installation Schedule Status
- FY02 Conversion of Old Injection Well to an Extraction Well Schedule Status

General (10 minutes)

- Outstanding Action Items (attached)
- Set up meeting to discuss 200 Area alternative baseline impacts to TPA

Groundwater Monitoring Plan Revisions (5 minutes)

- B Pond
- A-29 Ditch
- B-63 Trench

200-PW-1 Plutonium/Organic-Rich Process Waste OU (10 minutes)

- Work Plan Status
 - Status DQO process
 - Status Draft A Work Plan due to regulators 6/30/01

- 107-day Notice to Renegotiate Milestone M-13-26
- Set up meeting to discuss details associated with expanding the remedial investigation beyond the current focus on characterization at known waste disposal sites.

200-CW-1 Gable/B Pond and Ditches Cooling Water OU (5 minutes)

- Feasibility Study Status
 - Set up meeting to plan Land-Use Scenario Development Meeting
 - Status FS and TPA Change Package

200-CS-1 Chemical Sewer OU (5 minutes)

- Status request to cross 216-A-29 Ditch to support vit plant

200-TW-1 Scavenged and 200-TW-2 Tank Waste OUs (10 minutes)

- Work Plan Status
 - Work Plan transmitted to regulators 3/13/01; TPA Change Packages also transmitted
- Prejob Planning for Fieldwork
 - Waste control plan status
 - Drilling start date planned 4/23/01
 - Regulator approval of work plan to support scheduled start of field work

200-PW-2 Uranium-Rich Process Waste OU (5 minutes)

- Work Plan Status
 - Status Rev. 0 Work Plan preparation
 - Status DQO Summary Report
 - Status Regulator Review of Draft TPA Change Package

**200 Area Unit Managers' Meeting
OPEN ACTION ITEMS & TRACKING**

Item #	Description	Responsible Party	Contact	Due Date	Status	Comments	Priority	Other
15	200 Area Implementation Plan Ecology comment response letter	Bryan Foley, RL	John Price, Ecology	01/18/2000		TSD		

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**MEETING MINUTES
200 AREA GROUNDWATER AND SOURCE OPERABLE UNITS
UNIT MANAGERS' MEETING -- 200 AREA
March 22, 2001**

095598

Attendees: See Attachment #2

Agenda: See Attachment #1

Topics of Discussion:

General

1. Update of Five Year Review Report – Finalization of the Five Year Review Report was discussed. DOE will be providing comments to EPA. EPA stated that in order to meet the April 5, 2001, finalization date the comments would have to be in by the middle of the last week in March. No changes have been made to the document since the December 2000 version. One comment was received from the Nez Perce that affected the 200 Area.

Arlene Tortoso stated that she would like to meet to discuss the action items and what is required to satisfy the commitments, so everyone understands what is expected and all are on the right track. No meeting date was set.

2. Outstanding Action Items – One action item was discussed. DOE committed to providing a response letter to Ecology comments on the 200 Area Implementation Plan by April 12, 2001.
3. Set up meeting to discuss 200 Area alternative baseline impacts to TPA – DOE-RL requested that Ecology and EPA attend a meeting to discuss which 12 operable units are going to be characterized to represent the nine major waste groupings on the central plateau. This discussion is key to understanding proposed changes to M-13 and M-20 TPA Milestones. EPA stated that the 200 Area meetings would be supported because there are indications that DOE-RL is ready to talk about the 100 and 300 Area Milestones. EPA and Ecology agreed that the third week of April would be the best time for this meeting.

200-PW-1 Plutonium/Organic-Rich Process Waste OU (Expedited Response Action)

4. Soil Vapor Extraction System Restart
 - Operations startup status – The active soil vapor extraction is going to startup between April 2, 2001, and April 16, 2001.
 - Operating Plan approval – The Soil Vapor Extraction System Operating Plan for FY01 was approved during the meeting. The FY01 Soil Vapor Extraction System Operating Plan For the Carbon Tetrachloride Expedited Response Action (200-ZP-2 Operable Unit) includes the operating

schedule for SVE operations and soil vapor monitoring for Z-1A and Z-9 sites. EPA requested that the original Operating Plan be put in the Expedited Response Action File as well as a copy in the Administrative Record File.

5. Carbon Tetrachloride Vapor Monitoring – A hand-out of the rebound concentrations was distributed summarizing the monitoring results since July 1999. (Attached)
6. Z-9 Well Deepening – The date of completion in the contract is June 15, 2001. The contract does have a detailed schedule.

200-PW-1 Plutonium/Organic-Rich Process Waste OU

7. Work Plan Status
 - Status DQO process – The Draft DQO minutes have been received by DOE-RL.
 - Status Draft A Work Plan due to regulators 06/30/01 – A meeting with DOE-RL and EPA is planned for March 26, 2001, to discuss expanding the carbon tetrachloride vadose zone investigations approach and including it in the Work Plan. EPA stated that there is an action and expectation in the Five Year Plan that an integrated carbon tetrachloride strategy would be developed and issued by December 31, 2001. EPA stated that they want to know by the end of the year how the strategy was going to be implemented.
 - 107-day Notice to Renegotiate Milestone M-13-26 – DOE-RL noted that a TPA-required 107-day notice had been issued to reserve dispute resolution rights.

200-ZP-1

8. Treatment Operations Status – Extraction well number 2 went down. It was worked on and brought back up. There is an algae treatment coming up in April. It may be delayed if it is not needed.
9. PFP Well Installation – EPA approved the general location of the PFP well inside the fence near the Z-9 effluent lines. The location is just to the left of the hazardous waste pad looking east. It was decided to go forward with the plan, making sure there are no underground access problems. The PFP engineer can assist in a more specific location. EPA stated that an excavation permit (and GPR survey) should be done on both the north and south sides of the hazardous waste pad. EPA also stated that cone penetrometer investigations could be used to get a lot of cheaper data for locating an additional well. This one will be a data point. Arlene Tortoso will present cost estimates of drilling both inside and outside the fence to Dennis Faulk off-line.

200-UP-1

10. Operations Status – The well pump went down Saturday and it was brought back online Monday morning. We will monitor pump conditions to understand the problem.
11. Monitoring Well Installation Schedule Status – Mark Byrnes is overseeing the installation of a new monitoring well at 200-UP-1. A map was provided of the proposed drilling location. The new well is located cross-gradient to groundwater flow. The internal Draft of the Description of Work is out for review. The internal Draft of the Sampling Analysis Instruction will be out early next week. A location has been staked. The GPR survey will be completed shortly. Mobilization is scheduled to begin June 14, 2001. De-mobilization is set to begin August 22, 2001, but may be pushed out a month due to resources in the field.
- EPA stated that if more comes up on UP-1 and the December date in the Five Year Review doesn't look good, Ecology should be informed.
12. FY02 Conversion of Old Injection Well to an Extraction Well Schedule Status – BHI is working on the engineering design work this year and will hook up in FY02. Most of the planning work will be done in FY01.

Groundwater Monitoring Plan Revisions

13. B Pond – The Monitoring Plan has been prepared and needs to be presented to Ecology. There has been a change in flow directions with the decline of the groundwater mound. It is proposed that the set of wells in the monitoring network be adjusted and that an option to use an alternate statistical evaluation is provided. Use of this alternate statistical evaluation would require a variance from Ecology.
14. A-29 Ditch – We propose reducing the number of wells at these facilities.
15. B-63 – We are incorporating alternate statistical approaches and a change of methods.

200-CW-1 Gable/B Pond and Ditches Cooling Water OU

16. Feasibility Study Status
- Set up meeting to plan Land-Use Scenario Development Meeting – As discussed in a meeting held on March 15, 2001, DOE-RL will be scheduling a series of workshops with EPA and Ecology to define a set of scenarios to apply when assessing the potential impact of waste sites located outside of the 200 Area exclusive-use boundary.
 - Status FS and TPA Change Package – DOE-RL will provide a TPA Change Package containing a schedule with the new completion date for the Feasibility Study.

200-CS-1 Chemical Sewer OU

17. Status request to cross 216-A-29 Ditch to support vit plant – CH2M Hill Hanford Group, Inc., is evaluating an option to route waste transfer lines to cross the A-29 Ditch near the head end. By crossing the A-29, there will be significant savings. The 200 Area project is looking into it from a technical standpoint. The two projects are going to talk more on March 23, 2001. There will be involvement from the regulators. Bryan Foley stated that the key issue is to coordinate with the RCRA Treatment Storage Disposal and permitting associated with the vitrification plant and tank farms. There will be a meeting with Ecology. Ecology made the comment that Brenda Becker-Khaleel, Melinda Brown and Laura would need to be included in that meeting.

200-TW-1 Scavenged and 200-TW-2 Tank Waste OUs18. Work Plan Status

- Work Plan transmitted to regulators 3/13/01; TPA Change Packages also transmitted – The Rev. 0 Work Plan and TPA Change Package were transmitted to the regulators on March 13, 2001, for their final approval.

19. Prejob Planning for Fieldwork

- Waste control plan status – The Waste Control Plans were delivered to EPA and Ecology during the meeting for approval.
- Drilling start date planned 4/23/01 – The planned start date for initiating field work is April 23, 2001. The first activity will be a one-week mock-up training on the use of the glove bag. Due to subcontracting delays, there may be a slip of that date. The uncertainty is the availability of the drilling contractor, when they are available and how fast they can respond. We need to allow for additional time for bidders to evaluate our packages due to the anticipated level of radioactivity at the waste sites and the increased amount of drilling going on on the site as a whole.
- Regulator approval of work plan to support scheduled start of field work was requested.

200-PW-2 Uranium-Rich Process Waste OU20. Work Plan Status

- Status Rev. 0 Work Plan preparation – DOE-RL received Ecology's comments on the Draft A Work Plan on March 5, 2001.
- Status DQO Summary Report – DOE-RL is finalizing the DQO Summary Report used to develop the sampling program in the Work Plan. The Final DQO Report will be transmitted to regulators with the Rev. 0 Work Plan.

- **Status Regulator Review of Draft TPA Change Package – DOE-RL will be preparing a revised TPA Change Package associated with the Work Plan. Ecology asked if the Draft TPA Change Package went to Roger Stanley as well as John Price. DOE-RL replied that it only went to John Price and that DOE-RL had not received any comments. There was a discussion on the fact that the M-20 Milestone would be impacted with the current schedule. The Closure Plan Schedule and the over-all Operating Unit Schedule are not consistent. This will be discussed further at the meeting in the third week of April (see General).**

Comparison of Maximum Carbon Tetrachloride Rebound Concentrations
Monitored at 200-PW-1 (200-ZP-2) Soil Vapor Extraction Sites
FY 1997 - FY 2001

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200-PW-1 (200-ZP-2)		November 1996 - July 1997				October 1997 - September 1998		July 1998 - September 1999		July 1999 - January 2001	
Location (Well or Probe) /feet bgs	Site	Zone	Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	Maximum Rebound Carbon Tetrachloride (ppmv)	months* of rebound	
79-03/ 5 ft	Z-18	1	0	8	0	3	0	12			
79-06/ 5 ft	Z-1A	1	not measured		not measured		1.4	12			
79-11/ 5 ft	Z-1A	1	0	8	0	6	2.9	12			
86-05/ 5 ft	Z-9	1	not measured		not measured		0	3			
86-05-01/ 5 ft	Z-9	1	not measured		not measured		0	3			
86-06/ 5 ft	Z-9	1	1.3	8	0	9	1.9	6			
87-05/ 5 ft	Z-1A	1	not measured		not measured		1.0	12			
87-09/ 5 ft	Z-1A	1	not measured		1.5	3	2.6	12			
84-02/ 5 ft	Z-9	1	0	8	not measured		1.4	3			
95-11/ 5 ft	Z-9	1	0	8	2.1	9	2.5	6			
95-12/ 5 ft	Z-9	1	1.1	8	1.5	9	1.3	6			
95-14/ 5 ft	Z-9	1	not measured		not measured		0	3			
CPT-13A/ 9 ft	Z-1A	2	not measured		0	6	1.0	12			
CPT-16/ 10 ft	Z-9	2	not measured		0	9	1.5	6			
CPT-17/ 10 ft	Z-9	2	not measured		4.2	9	5.1	6		5.7 21	
CPT-18/ 15 ft	Z-9	2	not measured		6.5	9	5.0	6		5.2 21	
CPT-31/25 ft	Z-1A	2	not measured		0	6	0	12			
CPT-16/ 25 ft	Z-9	2	not measured		not measured		not measured			1.8 21	
CPT-32/ 25 ft	Z-1A	2	not measured		9.1	6	10	12		16.5 18	
CPT-30/ 28 ft	Z-18	2	not measured		not measured		3.2	12		1.4 18	
CPT-13A/ 30 ft	Z-1A	2	2.2	8	not measured		not measured			3.6 18	
CPT-7A/ 32 ft	Z-1A	2	not measured		2.3	6	5.4	12		6.2 18	
CPT-27/ 33 ft	Z-9	2	1.2	8	not measured		not measured			2.6 21	
CPT-1A/ 35 ft	Z-18	2	2.0	8	1.4	3	3.0	12		5.1 18	
CPT-33/ 40 ft	Z-1A	2	not measured		2.0	3	2.8	12			
CPT-34/ 40 ft	Z-18	2	2.3	8	not measured		1.7	12			
CPT-21A/ 45 ft	Z-9	2	65.6	8	52.7	9	57	3		122 21	
W15-220ST/ 52 ft	Z-9	2	2	8	not measured		1.6	3			
CPT-28/ 60 ft	Z-9	2	not measured		1.5	0	3.7	3			
CPT-9A/ 60 ft	Z-9	2	45.5	8	41.1	0	44	3		68 21	
CPT-30/ 68 ft	Z-18	2	1.7	8	not measured		3.0	12			
CPT-13A/ 70 ft	Z-1A	2	5.2	8	not measured		5.8	12			
CPT-24/70 ft	Z-9	2	not measured		3.2	9	3.6	3			
W15-219SST/ 70 ft	Z-9	2	14.8	8	not measured		7.6	3			
CPT-31/ 76 ft	Z-1A	2	4.0	8	not measured		4.2	12			
CPT-33/ 80 ft	Z-1A	2	5.8	8	not measured		9.2	12			
W15-82/ 82 ft	Z-9	2	28.9	8	5.5	9	46	6		51 21	
W15-95/ 82 ft	Z-9	2	not measured		15.3	9	39	6		43 21	
CPT-21A/ 86 ft	Z-9	2	221	8	206	9	148	6		195 21	
CPT-34/ 86 ft	Z-18	2	36.3	8	5.9	3	0	12			
W15-218SST/ 86 ft	Z-9	2	not measured		not measured		0	3			
CPT-28/ 87 ft	Z-9	2	280	8	230	9	203	6		214 21	
CPT-1A/ 91 ft	Z-18	2	3.9	8	not measured		4.2	12			
CPT-4A/ 91 ft	Z-1A	2	not measured		7.7	3	14	12			
CPT-9A/ 91 ft	Z-9	2	103	8	34.5	9	72	3			
W18-252SST/ 100 ft	Z-1A	2	38.2	8	17.8	3	24	12			
W18-152/ 113 ft	Z-12	2	46.8	8	11.1	3	33	12		25 18	
W15-217/ 115 ft	Z-9	3	797	8	630	9	561	6		442 21	
CPT-24/ 118 ft	Z-9	3	44.6	8	37.7	9	37	6			
W15-220SST/ 118 ft	Z-9	4	21.9	8	not measured		36	3			
W18-158L/ 123 ft	Z-1A	3	not measured		143	3	492	12		284 18	
W18-167/ 123 ft	Z-1A	3	323	8	79.7	3	228	12		248 18	
W15-219SST/ 130 ft	Z-9	4	298	8	not measured		47	3			
W18-249/ 134 ft	Z-18	3	208	8	20.4	3	215	12		176 18	
W18-248/ 136 ft	Z-1A	3	288	8	86.3	3	177	12		214 18	
W15-219SST/ 155 ft	Z-9	5	59.8	8	not measured		24	3			
W15-220SST/ 185 ft	Z-9	5	14.5	8	not measured		13	3			
W15-6L/ 189 ft	Z-9	6	22.6	8	17.8	9	1.3	6			
W15-9L/ 189 ft	Z-9	6	18.3	8	15.0	9	15	6		20 21	
W18-7/ 200 ft	Z-1A	6	28.5	8	17.3	3	29	12			
W18-6L/ 208 ft	Z-1A	6	36	8	31.3	6	15	12			
W18-12/ 210 ft	Z-18	6	not measured		3.8	3	19	12			

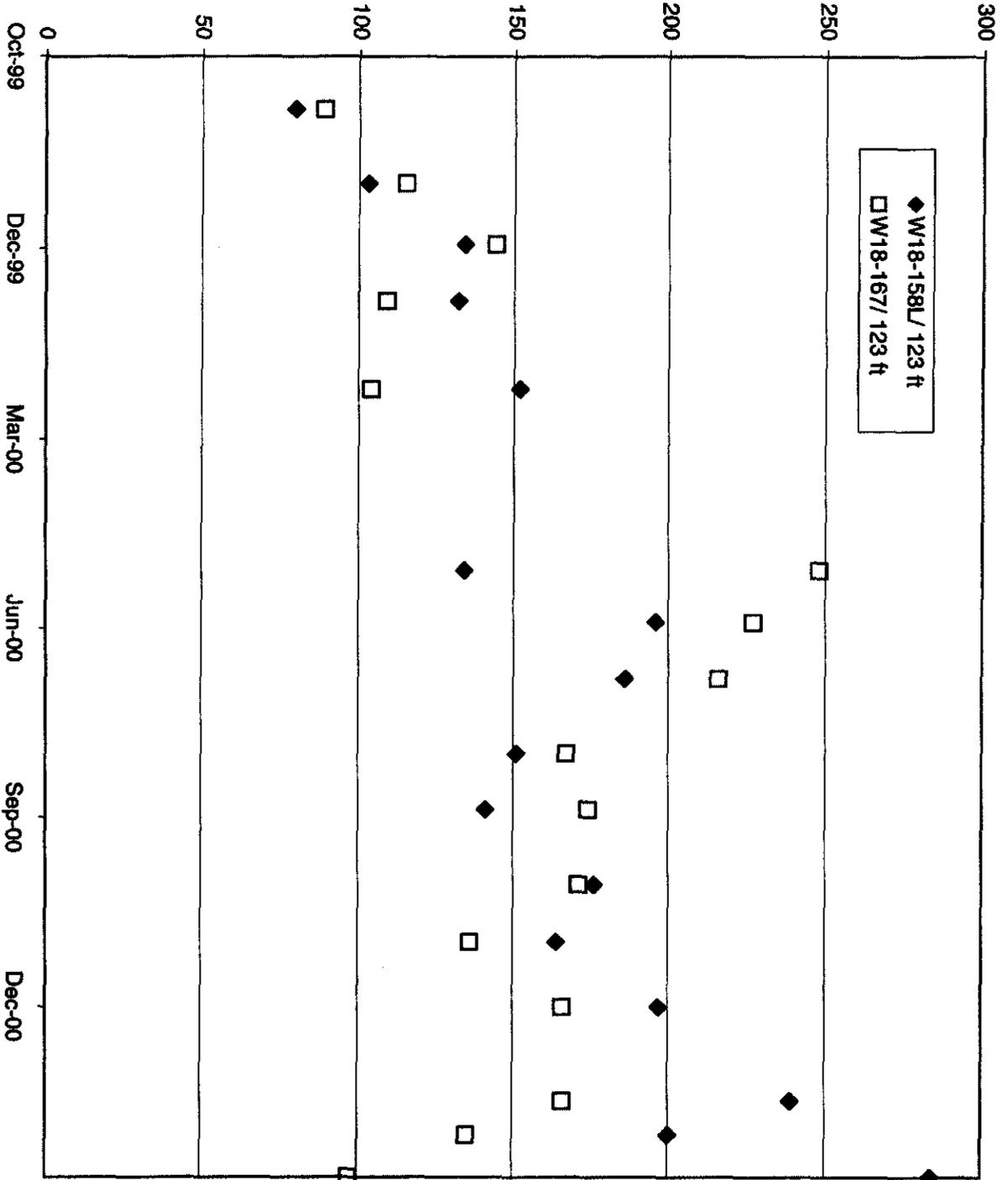
* - based on location (Z-1A/18/12 or Z-9) of monitoring point; specific points may be beyond SVE zone of influence during particular operating configurations

- Z-18 and Z-12 wells off-line Oct 96 - Apr 98

- CPT-1A, CPT-9A, and possibly CPT-7A appeared to be beyond SVE zone of influence in Oct 96 based on differential pressure (BHI-01105, p. 6-1)

- CPT-9A, CPT-21A, CPT-28 beyond SVE zone of influence in May 96 based on CCl4 concentrations and airflow modeling based on measured vacuums (BHI-01105, p. 6-1)

Carbon Tetrachloride Concentration (ppmv)



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**APPROVAL OF THE CARBON TETRACHLORIDE EXPEDITED RESPONSE ACTION
(200-ZP-2) SOIL VAPOR EXTRACTION SYSTEM OPERATING PLAN FOR FY 2001**

The Unit Managers for the Carbon Tetrachloride Expedited Response Action (200-ZP-2 Operable Unit) approve the attached FY 2001 Soil Vapor Extraction System Operating Plan.

A. C. Tortoso 3/22/01 D. A. Faulk 3-22-01

A. C. Tortoso
U.S. Department of Energy
Richland Operations Office

Date D. A. Faulk Date
U.S. Environmental Protection Agency
Region X, Hanford Office

**FY 2001 SOIL VAPOR EXTRACTION SYSTEM OPERATING PLAN FOR THE CARBON
TETRACHLORIDE EXPEDITED RESPONSE ACTION
(200-ZP-2 OPERABLE UNIT)**

Soil vapor extraction will be used at the 200-ZP-2 Operable Unit during FY 2001 to remove carbon tetrachloride from the vadose zone. The primary objectives for this remediation are protection of the groundwater and mass removal. Only the 14.2 m³/min soil vapor extraction (SVE) system will be operated. Two sites will be remediated using SVE: the 216-Z-9 (Z-9) site and the 216-Z-1A/Z-18/Z-12 (Z-1A) site. Specific on-line wells have been selected prior to start-up at each site based on vapor monitoring, previous concentration trends, and location. These site-specific plans are included in this operating plan for approval by the Unit Managers prior to implementation. Based on characterization data collected at on-line wells during operation, the mix of on-line wells may be reconfigured during operations to optimize removal. These adjustments to the mix of on-line wells will not be submitted to the Unit Managers for approval prior to implementation but will be reported at Unit Manager Meetings. Ongoing passive soil vapor extraction will be maintained at Z-1A wells.

Soil vapor monitoring will be conducted at vadose zone locations near the groundwater, the Plio-Pleistocene layer, and the ground surface at the Z-1A and Z-9 sites while they are not being actively remediated using SVE. The soil vapor monitoring plan for both sites from April 2001 through September 2001 is included with this operating plan for approval prior to implementation. Monitoring results will be reported at the Unit Manager Meetings. If carbon tetrachloride vapor concentrations increase such that the carbon tetrachloride contamination may impact human health or the environment (including groundwater), the Unit Managers will decide on the appropriate response to mitigate the problem (e.g., relocating the vapor extraction system to address the problem).

Two wells at the Z-9 site will be deepened during May and June 2001 to provide additional access to the vadose zone below the Plio-Pleistocene layer. The SVE system will be operated at the Z-1A site during this time to avoid interfering with the characterization sampling to be conducted during the well deepening.

The schedule for SVE operations and soil vapor monitoring is:

- | | |
|--|--|
| April 2001 through June 2001: | Operate the SVE system at the Z-1A site
Monitor soil vapor concentrations at the Z-9 site |
| July 2001 through September 2001: | Operate the SVE system at the Z-9 site
Monitor soil vapor concentrations at the Z-1A site |

**SOIL VAPOR EXTRACTION OPERATING PLAN AT THE
216-Z-1A, 216-Z-18, AND 216-Z-12 SITE
April 2001 – June 2001**

Twenty-three wells at the 216-Z-1A, 216-Z-18, and 216-Z-12 site (Z-1A site) are identified for potential soil vapor extraction (Table 1). All of these wells will be prepared for potential hook-up to the soil vapor extraction system in April-June 2001.

The March 2001 non-operational soil vapor monitoring was conducted on 3/20/01. On 3/21/01, the sampling tubes were removed from wells 299-W18-152, 299-W18-158L, 299-W18-167, 299-W18-249, and 299-W18-248. The current wellhead assemblies (configured for non-operational soil vapor monitoring) will not be disturbed until after 3/21/01, i.e., after the monitoring has been completed and the tubing removed.

Passive soil vapor extraction is being conducted at the following Z-1A wells with lower intervals open between the Plio-Pleistocene layer and groundwater: 299-W18-6L, 299-W18-7, 299-W18-10L, 299-W18-11L, 299-W18-12, 299-W18-246L, 299-W18-247L, 299-W18-252L (Table 2). Pressure and temperature monitoring is also being conducted at 299-W18-9, 299-W18-6U, 299-W18-247U, and 299-W18-252U. An additional objective during SVE operations at Z-1A in FY 2001 is to evaluate the effectiveness of the Plio-Pleistocene layer as a barrier to vertical air flow in this area. The evaluation will be based on comparison of the pressure responses above and below the Plio-Pleistocene layer to the vacuum applied by the SVE system above the Plio-Pleistocene layer.

For initial start-up operations at Z-1A, extraction will be implemented at six intervals in the Z-1A tile field: 299-W18-158L, 299-W18-165, 299-W18-166, 299-W18-167, 299-W18-168, and 299-W18-174 (Figure 1). During non-operational monitoring at Z-1A since October 1999, the highest carbon tetrachloride concentrations (maximum 248 ppmv) have been observed at wells in the tile field.

These six intervals will be characterized on the first day of operations. During continued operations, all on-line wells will be characterized each week and all off-line wells, if requested, will be characterized during the 2nd, 4th, 6th, 8th, 10th, and final weeks, according to the attached sampling and analysis plan (Table 3). As before, the mix of on-line wells will be periodically changed during operations, based on changing concentrations, extraction interval locations, and operating experience. In general, the initial extraction wells will be nearer the primary carbon tetrachloride source (Z-1A Tile Field) and wells added later will expand operations away from this source.

The ERC technical lead organizes and maintains spreadsheets of the characterization data on a desktop computer. The characterization data are included in the annual performance evaluation report.

**SOIL VAPOR EXTRACTION OPERATING PLAN AT THE
216-Z-9 SITE
July 2001 – September 2001**

Twenty-one wells at the 216-Z-9 site (Z-9 site) are identified for potential vapor extraction (Table 4). All of these wells will be prepared for potential hook-up to the soil vapor extraction system in July-September 2001.

Deepening of two existing soil vapor extraction wells, 299-W15-84 and 299-W15-95, will begin in May 2001. The sampling tube in well 299-W15-95 will be removed prior to that time. Soil vapor extraction operations will not begin at Z-9 until the well deepening activities have concluded in approximately mid-June 2001.

The last non-operational soil vapor monitoring at Z-9 prior to SVE restart will take place in mid to late June 2001. At that time, any sampling tubes will be removed from potential on-line wells. With the exception of the wells being deepened, the current wellhead assemblies (configured for non-operational soil vapor monitoring) will not be disturbed until the monitoring has been completed and the tubing removed.

Passive soil vapor extraction is being conducted at the following Z-1A wells with lower intervals open between the Plio-Pleistocene layer and groundwater: 299-W18-6L, 299-W18-7, 299-W18-10L, 299-W18-11L, 299-W18-12, 299-W18-246L, 299-W18-247L, 299-W18-252L (Table 2). Pressure and temperature monitoring is also being conducted at 299-W18-9, 299-W18-6U, 299-W18-247U, and 299-W18-252U.

The first task at Z-9 will be to conduct two 3-hour SVE tests, one at each of the two newly deepened wells, to observe initial carbon tetrachloride concentrations at these new extraction intervals (Table 4, initial wells labeled "1"). In addition, soil vapor samples collected using the SVE system will be compared to those collected using a sample pump during well deepening. During each test, only the one test well will be placed on-line to the SVE system. A minimum volume of air will be extracted initially to obtain a representative sample of the concentration adjacent to the well ("puffer test"). Soil vapor extraction will then be continued to determine the carbon tetrachloride concentration at progressive distances from the well. (Note: The term "puffer test" was coined by ERA project staff during the 1991 SVE pilot testing to describe collection of an initial, representative soil vapor sample using a minimal amount of vapor extraction to minimize potential redistribution of the soil vapor concentrations that might be produced by prolonged pumping [DOE-RL 1991, Appendix F.]

For initial full-scale start-up operations at Z-9, extraction will be implemented at four intervals: 299-W15-217, 299-W15-82, 299-W15-9U, and 299-W15-9L (Table 4, initial wells labeled "2") (Figure 1). During non-operational monitoring at Z-9 since July 1999, the highest carbon tetrachloride concentrations (maximum 442 ppmv) have been observed at well 299-W15-217. Start-up operations in FY98 and FY99 were also initiated using these four extraction intervals. Selecting the same set of initial wells will allow comparison of the rebound in FY98 after 9 months to that in FY99 after 6 months to that in FY01 after 24 months.

Based on past operating experience, it is anticipated that extraction will be continued on these four intervals for two to three weeks before additional wells are placed on-line. Preference will then be given to extended extraction from the new extraction intervals, 299-W15-84L and 299-W15-95L.

These four intervals will be characterized on the first day they are placed into operation. During continued operations, all on-line wells will be characterized each week and all off-line wells, if requested, will be characterized during the 2nd, 4th, 6th, 8th, 10th, and final weeks, according to the attached sampling and analysis plan (Table 3). As with Z-1A operations, the mix of on-line wells will be periodically changed during operations, based on changing concentrations, extraction interval locations, and operating experience. In general, the initial extraction wells will be nearer the carbon tetrachloride source (Z-9 Trench) and wells added later will expand operations away from this source.

The ERC technical lead organizes and maintains spreadsheets of the characterization data on a desktop computer. The characterization data are included in the annual performance evaluation report.

Reference:

DOE-RL, 1991, Expedited Response Action Proposal (EE/CA & EA) for 200 West Area Carbon Tetrachloride Plume, DOE/RL-91-32, Draft B.

VADOSE ZONE MONITORING PLAN FOR SOIL VAPOR EXTRACTION SITES
April 2001 – September 2001

Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring

This plan describes the non-operational monitoring and passive soil vapor extraction monitoring to be conducted during April through September 2001 for the 200 West Area Carbon Tetrachloride Expedited Response Action (200-ZP-2 Operable Unit). Non-operational monitoring will be conducted at the 216-Z-9 (Z-9) site during April through June 2001 while the soil vapor extraction (SVE) system is operating at the 216-Z-1A/Z-18/Z-12 (Z-1A) site. Non-operational monitoring will be conducted at the Z-1A site during July through September 2001 while the SVE system is operating at the Z-9 site. Passive soil vapor extraction monitoring will be conducted at the Z-1A site from April 2001 through September 2001.

Scope: Monitor carbon tetrachloride soil vapor concentrations at selected probes and wells during non-operation of the soil vapor extraction (SVE) system (Tables 5 and 6). At any particular time, all of the probes and some of the wells will be "non-operational," i.e., they will not be connected to the SVE system. Eight of the non-operational wells have a passive soil vapor extraction system installed at the wellhead.

Passive soil vapor extraction is a remediation technology that uses naturally induced pressure gradients between the subsurface and the surface to drive soil vapor to the surface. In general, falling atmospheric pressure causes subsurface vapor to move to the atmosphere through wells, while rising atmospheric pressure causes atmospheric air to move into the subsurface. The passive soil vapor extraction systems will be used to remove carbon tetrachloride from the vadose zone.

All of the passive extraction wells will vent through aboveground canisters containing Granular Activated Carbon (GAC). Each system also has an in-line, replaceable cartridge of GAC for sampling upstream of the canister of GAC. The GAC cartridges will be sampled and analyzed periodically to provide a passive, time-integrated measure of the amount of mass removed through the well. Three of the passive systems are also instrumented to measure and record the flow rate and carbon tetrachloride vapor concentration on an hourly basis; these data can be used to calculate an hourly estimate of the amount of mass removed (Table 7).

For monitoring the non-operational probes and wells, the components of this scope are:

- Collect soil vapor samples using the rebound study sampling method and sampling pump (Rohay 1997)
- Analyze soil vapor samples for carbon tetrachloride using B&K at field screening level QC-1 (BHI-QA-03)
- Evaluate concentration trends for ERC
- Report results to 200-ZP-2 Unit Managers
- Include results in annual reports

For monitoring the 8 passive soil vapor extraction system wells, the components of this scope are:

- Change out the used, in-line GAC sample cartridges and replace with clean GAC sample cartridges
- Sample the GAC and send the GAC samples to an off-site laboratory for analysis of carbon tetrachloride (Sampling Authorization Form B99-093)
- Download the dataloggers (4) and B&K instruments (3)
- Evaluate concentration trends for ERC
- Report results to 200-ZP-2 Unit Managers
- Include results in annual reports

Purpose and Objectives: The purpose of non-operational monitoring is to measure carbon tetrachloride concentrations in the vadose zone during the shutdown of the SVE system.

The objectives of monitoring the non-operational wells and probes are (1) to be cognizant of carbon tetrachloride concentrations and trends near the vadose-atmosphere and vadose-groundwater interfaces to ensure that non-operation of the SVE system is not negatively impacting atmosphere or groundwater; and (2) to be cognizant of carbon tetrachloride concentrations and trends near the lower permeability Plio-Pleistocene layer to provide an indication of concentrations that can be expected during restart of SVE operations and to support selection of on-line wells.

The objectives of monitoring the passive soil vapor extraction system wells, which are all open near the vadose-groundwater interface, are: (1) to protect groundwater by removing carbon tetrachloride from the vadose zone; (2) to be cognizant of the carbon tetrachloride concentrations and trends near the vadose-groundwater interface; and (3) to quantify the mass of carbon tetrachloride removed using this technology. The instrumented systems will be operated to provide a long-term record of passive extraction data, particularly contaminant concentrations in the extracted vapor and mass removal rates.

Duration: Non-operational monitoring and passive soil vapor extraction monitoring will be conducted from April 2001 through September 2001 during FY 2001. It is anticipated that non-operational and passive extraction monitoring will be continued in FY 2002.

Monitoring Frequency: Monitoring will be conducted monthly. It is assumed that (1) the ERC sampler(s)/geologist will spend approximately 2 days/month collecting and analyzing samples, shipping passive GAC samples to offsite laboratories, and downloading data; and (2) the ERC technical lead will spend approximately 1 day/month analyzing and reporting the results.

Monitoring Locations: Locations were selected to focus carbon tetrachloride monitoring near the vadose-atmosphere and vadose-groundwater interfaces and near the Plio-Pleistocene layer (Table 5). At the recommendation of the ERC technical lead, and with approval from the ERC task lead, these monitoring locations could be revised based on developing trends, accessibility, and/or recommendations of the sampler. The 200-ZP-2 Unit Managers will be advised of any changes to the monitoring locations. Monitoring locations are shown on Figures 2 and 3.

Note: During FY97, FY98, and FY99, carbon tetrachloride concentrations and trends were also monitored at shallow soil vapor probes (1.5 m deep). In light of the sporadic and low concentrations detected at these shallow soil vapor probes, shallow monitoring was not conducted during FY00 and will not be conducted during FY01.

Data Management: The field screening data obtained from non-operational wells and probes are entered into a controlled field logbook, which is maintained by ERC Document & Information Services. The ERC technical lead organizes and maintains spreadsheets of the field screening data on a desktop computer. The field screening data are included in the annual performance evaluation report.

The laboratory data obtained from the GAC samples on the 8 passive extraction wells are entered into HEIS. A hardcopy of the data and associated paperwork is maintained by ERC until transmitted to Hanford records holding. The data collected from the dataloggers and B&Ks are stored on ERC network drives that are backed up daily. The ERC technical lead organizes and maintains spreadsheets of all the passive extraction data on a desktop computer. The passive extraction data will be included in the annual performance evaluation report.

References:

**BHI-QA-03, ERC Quality Assurance Program Plans, Procedure 5.2, Onsite Measurements
Quality Assurance Program Plan**

Rohay, V.J., 1997, Rebound Study Report for the Carbon Tetrachloride Soil Vapor Extraction Site, Fiscal Year 1997, BHI-01105, Rev. 0

Table 1. Wells Available for Soil Vapor Extraction System Operations at the 216-Z-1A/Z-18/Z-12 Site, April through June 2001

Potential On-Line Wells	Reason	Initial Wells
299-W18-89	Mass removal	
299-W18-93	Mass removal	
299-W18-94	Mass removal	
299-W18-96	Mass removal	
299-W18-97	Mass removal	
299-W18-98	Mass removal	
299-W18-99	Mass removal	
299-W18-152	Mass removal	
299-W18-153	Mass removal	
299-W18-157	Mass removal	
299-W18-158L	Mass removal	
299-W18-159	Mass removal	
299-W18-163L	Mass removal	
299-W18-165	Mass removal	1
299-W18-166	Mass removal	1
299-W18-167	Mass removal	
299-W18-168	Mass removal	1
299-W18-169	Mass removal	
299-W18-171L	Mass removal	
299-W18-174	Mass removal	1
299-W18-246U	Mass removal	
299-W18-248	Mass removal	
299-W18-249	Mass removal	

Table 2. Passive Soil Vapor Extraction Wells at the 216-Z-1A/Z-18/Z-12 Site, FY 2001

Passive Soil Vapor Extraction Wells	Reason
299-W18-6L	Groundwater Protection
299-W18-7	Groundwater Protection
299-W18-10L	Groundwater Protection
299-W18-11L	Groundwater Protection
299-W18-12	Groundwater Protection
299-W18-246L	Groundwater Protection
299-W18-247L	Groundwater Protection
299-W18-252L	Groundwater Protection
299-W18-9	Monitoring
299-W18-6U	Monitoring
299-W18-247U	Monitoring
299-W18-252U	Monitoring

Table 3. Sampling and Analysis Plan for Soil Vapor Extraction System Operations, April Through September 2001

When to Monitor	on-line wells	off-line wells	vacuum		flow	CCl4	CHCl3	CH2Cl2	MEK
			wellhead	system		carbon tetrachloride	chloroform	methylene chloride	MEK
first day of operations	X		X	X	X	X	X	X	X
beginning of 2nd week	X	X	X	X	X	X	X	X	X
beginning of 3rd week	X		X	X	X	X	X	X	X
beginning of 4th week	X	X	X	X	X	X	X	X	X
beginning of 5th week	X		X	X	X	X	X	X	X
beginning of 6th week	X	X	X	X	X	X	X	X	X
beginning of 7th week	X		X	X	X	X	X	X	X
beginning of 8th week	X	X	X	X	X	X	X	X	X
beginning of 9th week	X		X	X	X	X	X	X	X
beginning of 10th week	X	X	X	X	X	X	X	X	X
beginning of 11th week	X		X	X	X	X	X	X	X
beginning of 12th week	X		X	X	X	X	X	X	X
last day of operations	X	X	X	X	X	X	X	X	X
Fax copy of monitoring records to ERC Technical Lead (Virginia Rohay at 372-9447) by close of day following monitoring.									

Table 4. Wells Available for Soil Vapor Extraction System Operations at the 216-Z-9 Site, July through September 2001

Potential On-Line Wells	Reason	Initial Wells
299-W15-6U	Mass removal	
299-W15-6L	Groundwater Protection	
299-W15-9U	Mass removal	
299-W15-9L	Groundwater Protection	2
299-W15-82	Mass removal	2
299-W15-84U	Mass removal	2
299-W15-84L	Mass removal	1
299-W15-85	Mass removal	
299-W15-86	Mass removal	
299-W15-95U	Mass removal	
299-W15-95L	Mass removal	1
299-W15-216U	Mass removal	
299-W15-216L	Groundwater Protection	
299-W15-217	Mass removal	2
299-W15-218U	Mass removal	
299-W15-218L	Groundwater Protection	
299-W15-219U	Mass removal	
299-W15-219L	Groundwater Protection	
299-W15-220U	Mass removal	
299-W15-220L	Groundwater Protection	
299-W15-223	Mass removal	

Table 5a. Distribution of Selected Monitoring Locations During Soil Vapor Extraction System Operations at the 216-Z-1A/Z-18/Z-12 Site, April through June 2001

Target Zone	Number of Monitoring Locations		
	Z-1A	Z-9	Total
Near-surface (3-25 m below ground surface)	5	9	14
Plio-Pleistocene (25-45 m below ground surface)	0	8	8
Groundwater (50-65 m below ground surface)	8 ^a	3	11
Total	13	20	33

^a Eight available monitoring locations near the vadose/groundwater interface in the Z-1A area are being monitored as part of the passive soil vapor extraction system network. The passive network also includes an additional 12 wells and probes that are monitored only for pressures (Table 7).

Table 5b. Distribution of Selected Monitoring Locations During Soil Vapor Extraction System Operations at the 216-Z-9 Site, July through September 2001

Target Zone	Number of Monitoring Locations		
	Z-1A	Z-9	Total
Near-surface (3-25 m below ground surface)	9	3	12
Plio-Pleistocene (25-45 m below ground surface)	7	3	10
Groundwater (50-65 m below ground surface)	8 ^a	0	8
Total	24	6	30

^a Eight available monitoring locations near the vadose/groundwater interface in the Z-1A area are being monitored as part of the passive soil vapor extraction system network. The passive network also includes an additional 12 wells and probes that are monitored only for pressures (Table 7).

Table 6a. Non-Operational Wells and Probes Selected for Monitoring During Soil Vapor Extraction System Operations at the 216-Z-1A/Z-18/Z-12 Site, April through June 2001

Target Zone	Z-9	Depth (m)	Comment	Z-1A	Depth (m)	Comment
Near-surface	CPT-17 10 ft (blue)	3	southwest of Z-9	CPT-4A 25 ft (white)	8	north central in Z-1A/Z-18/Z-12 field
Near-surface	CPT-18 15 ft (white)	5	northwest of Z-9	CPT-13A 30 ft (blue)	10	southeast of Z-1A
Near-surface	CPT-16 25 ft (blue)	8	east of Z-9	CPT-7A 32 ft (yellow)	10	farfield northeast of Z-1A
Near-surface	CPT-27 33 ft (red)	10	southeast of Z-9	CPT-1A 35 ft (black)	11	west of Z-12
Near-surface	CPT-21A 45 ft (green)	14	south of Z-9	CPT-34 40 ft (green)	12	west of Z-18
Near-surface	299-W15-220 SST/52 ft (blue)	16	east of Z-9			
Near-surface	CPT-9A 60 ft (blue)	18	farfield north of Z-9			
Near-surface	299-W15-219 SST/70 ft (yellow)	21	northwest of Z-9			
Near-surface	CPT-18 75 ft (red)	23	near 299-W15-84U and 299-W15-95U			
Plio-Pleisto	299-W15-82	25	east side of Z-9			
Plio-Pleisto	CPT-21A 86 ft (red)	26	south of Z-9			
Plio-Pleisto	CPT-28 87 ft (red)	27	farfield south of Z-9			
Plio-Pleisto	299-W15-85	28	near 299-W15-84U and 299-W15-95U			
Plio-Pleisto	299-W15-217	35	southwest corner of Z-9			
Plio-Pleisto	CPT-24 118 ft (red)	36	north of Z-9			
Plio-Pleisto	299-W15-220 SST/118 ft (red)	36	east of Z-9			
Plio-Pleisto	299-W15-219 SST/130 ft (blue)	40	northwest of Z-9			
Gw	299-W15-219 SST/155 ft (red)	47	northwest of Z-9	299-W18-247L*	51	southeast of Z-18
Gw	299-W15-220 SST/185 ft (yellow)	56	east of Z-9	299-W18-246L*	52	west of Z-1A
Gw	299-W15-9L	57	11 m from 299-W15-32 extraction well	299-W18-252L*	53	middle of Z-1A/Z-18/Z-12 field
Gw				299-W18-10L*	55	east side of Z-18
Gw				299-W18-7*	57	east side of Z-1A
Gw				299-W18-6L*	60	west side of Z-1A
Gw				299-W18-11L*	60	Z-18
Gw				299-W18-12*	60	Z-18

* Passive soil vapor extraction wells (Table 7)

Note: Colors refer to the color coding on the soil vapor probe tubing.

Table 6b. Non-Operational Wells and Probes Selected for Monitoring During Soil Vapor Extraction System Operations at the 216-Z-9 Site, July through September 2001

Target Zone	Z-9	Depth (m)	Comment	Z-1A	Depth (m)	Comment
Near-surface	CPT-28 40 ft (green)	12	farfield south of Z-9	CPT-32 25 ft (green)	8	west of Z-1A
Near-surface	CPT-21A 45 ft (green)	14	south of Z-9	CPT-4A 25 ft (white)	8	north central in Z-1A/Z-18/Z-12 field
Near-surface	CPT-9A 60 ft (blue)	18	farfield north of Z-9	CPT-30 28 ft (green)	9	north of Z-18 (middle of Z-1A/Z-18/Z-12 field)
Near-surface				CPT-13A 30 ft (blue)	10	southeast of Z-1A
Near-surface				CPT-7A 32 ft (yellow)	10	farfield northeast of Z-1A
Near-surface				CPT-1A 35 ft (black)	11	west of Z-12
Near-surface				CPT-33 40 ft (green)	12	between Z-18 and Z-12
Near-surface				CPT-34 40 ft (green)	12	west of Z-18
Near-surface				CPT-32 70 ft (red)	21	west of Z-1A
Plio-Pleisto	CPT-21A 86 ft (red)	26	south of Z-9	CPT-4A 91 ft (red)	28	north central in Z-1A/Z-18/Z-12 field
Plio-Pleisto	CPT-28 87 ft (red)	27	farfield south of Z-9	CPT-1A 91 ft (red)	28	west of Z-12
Plio-Pleisto	CPT-9A 91 ft (red)	28	farfield north of Z-9	299-W18-152	34	northwest corner of Z-12
Plio-Pleisto				299-W18-158L	37	within Z-1A
Plio-Pleisto				299-W18-167	37	within Z-1A
Plio-Pleisto				299-W18-249	41	northeast corner of Z-18
Plio-Pleisto				299-W18-248	41	east side of Z-1A
Gw				299-W18-247L*	51	southeast of Z-18
Gw				299-W18-246L*	52	west of Z-1A
Gw				299-W18-252L*	53	middle of Z-1A/Z-18/Z-12 field
Gw				299-W18-10L*	55	east side of Z-18
Gw				299-W18-7*	57	east side of Z-1A
Gw				299-W18-6L*	60	west side of Z-1A
Gw				299-W18-11L*	60	Z-18
Gw				299-W18-12*	60	Z-18

* Passive soil vapor extraction wells (Table 7)

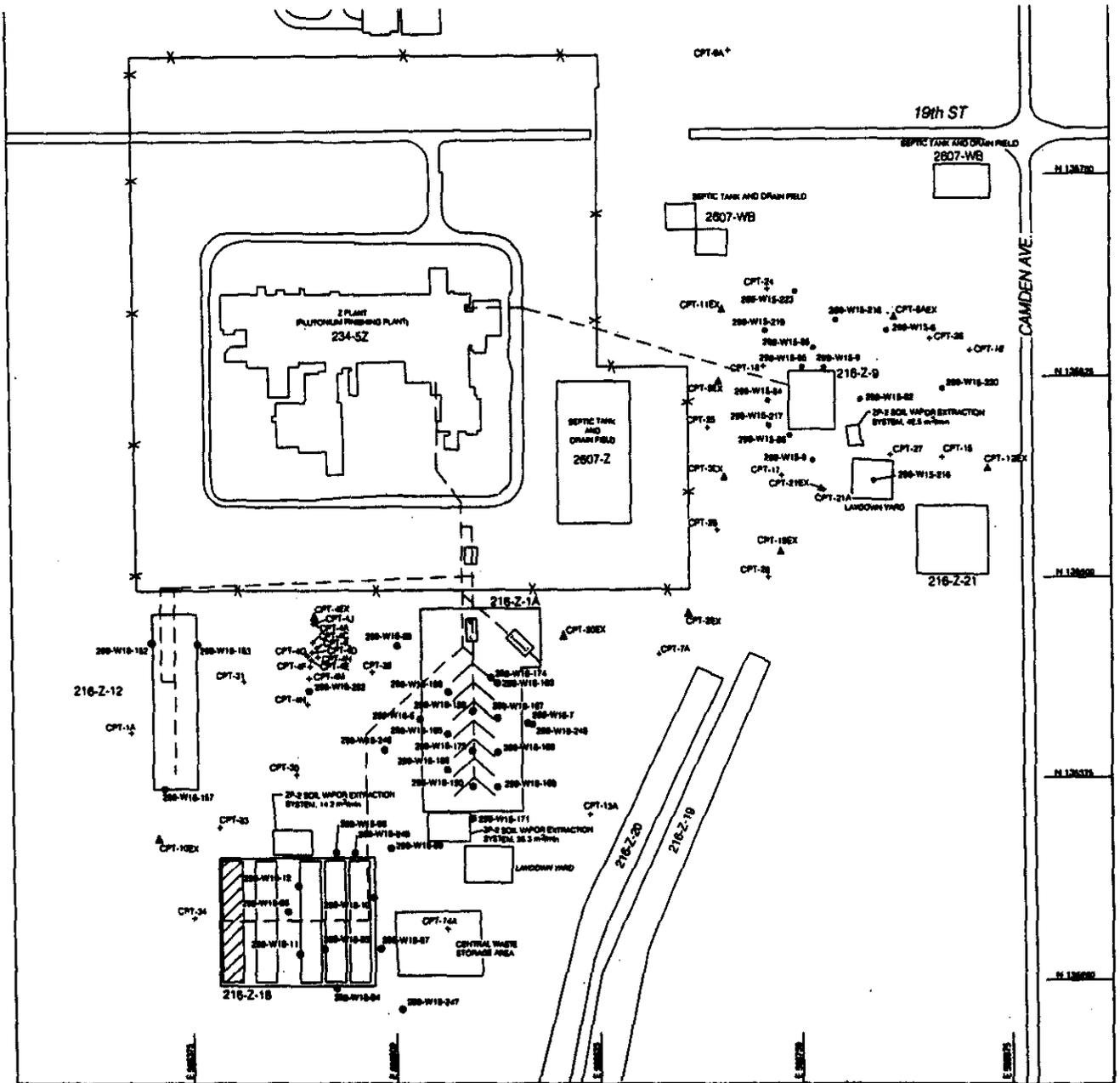
Note: Colors refer to the color coding on the soil vapor probe tubing.

Table 7. Passive Soil Vapor Extraction Well Network

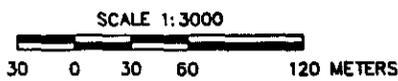
Well/Probe	Purpose	Instrumentation	Comment	Open Interval (m bgs)
		Parameter		
299-W18-7	Extraction	Carbon Tetrachloride (GAC)		51 – 62
299-W18-6U	Monitoring	Differential Pressure	Sealed well	29 – 38
299-W18-6L	Extraction	Differential Pressure	two 60-m lengths of sample tubing dropped in well	58 – 61
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
299-W18-9	Monitoring	Differential pressure	Sealed well	55 – 64
		Temperatures at 3 m, 60 m below top of well		
299-W18-10L	Extraction	Carbon Tetrachloride (GAC)		45 – 64
299-W18-11L	Extraction	Carbon Tetrachloride (GAC)		55 – 65
299-W18-12	Extraction	Carbon Tetrachloride (GAC)		54 – 65
299-W18-246L	Extraction	Carbon Tetrachloride (GAC)		50 – 53
299-W18-247L	Extraction	Differential pressure	Well with long passive extraction record	49 – 52
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
299-W18-247U	Monitoring	Differential pressure	Sealed well	36 – 39
299-W18-252L	Extraction	Differential pressure		50 – 56
		Airflow		
		Temperatures at 3 m, 60 m below top of well		
		Carbon Tetrachloride (B&K)		
		Carbon Tetrachloride (GAC)		
		Barometric pressure		
299-W18-252U	Monitoring	Differential pressure	Sealed well	34 – 41
299-W18-252/SST100 (red)	Monitoring	Differential pressure	Stainless steel tubes strapped to outside of casing	30
299-W18-252/SST145 (blue)	Monitoring	Differential pressure		44
299-W18-252/SST210 (yellow)	Monitoring	Differential pressure		64
CPT-4F/10 (black)	Monitoring	Differential pressure	Soil probes emplaced using cone penetrometer	3
CPT-4F/25 (white)	Monitoring	Differential pressure		8
CPT-4F/50 (blue)	Monitoring	Differential pressure		15
CPT-4F/75 (yellow)	Monitoring	Differential pressure		23
CPT-4F/109 (red)	Monitoring	Differential pressure		33

Note: Colors refer to the color coding on the soil vapor probe tubing.

Figure 1. Location of Extraction and Monitoring Wells and Probes at the 216-Z-1A/Z-18/Z-12 and 216-Z-9 Sites



G:\POLYMER\ROOM\11188701.DWG



LEGEND

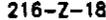
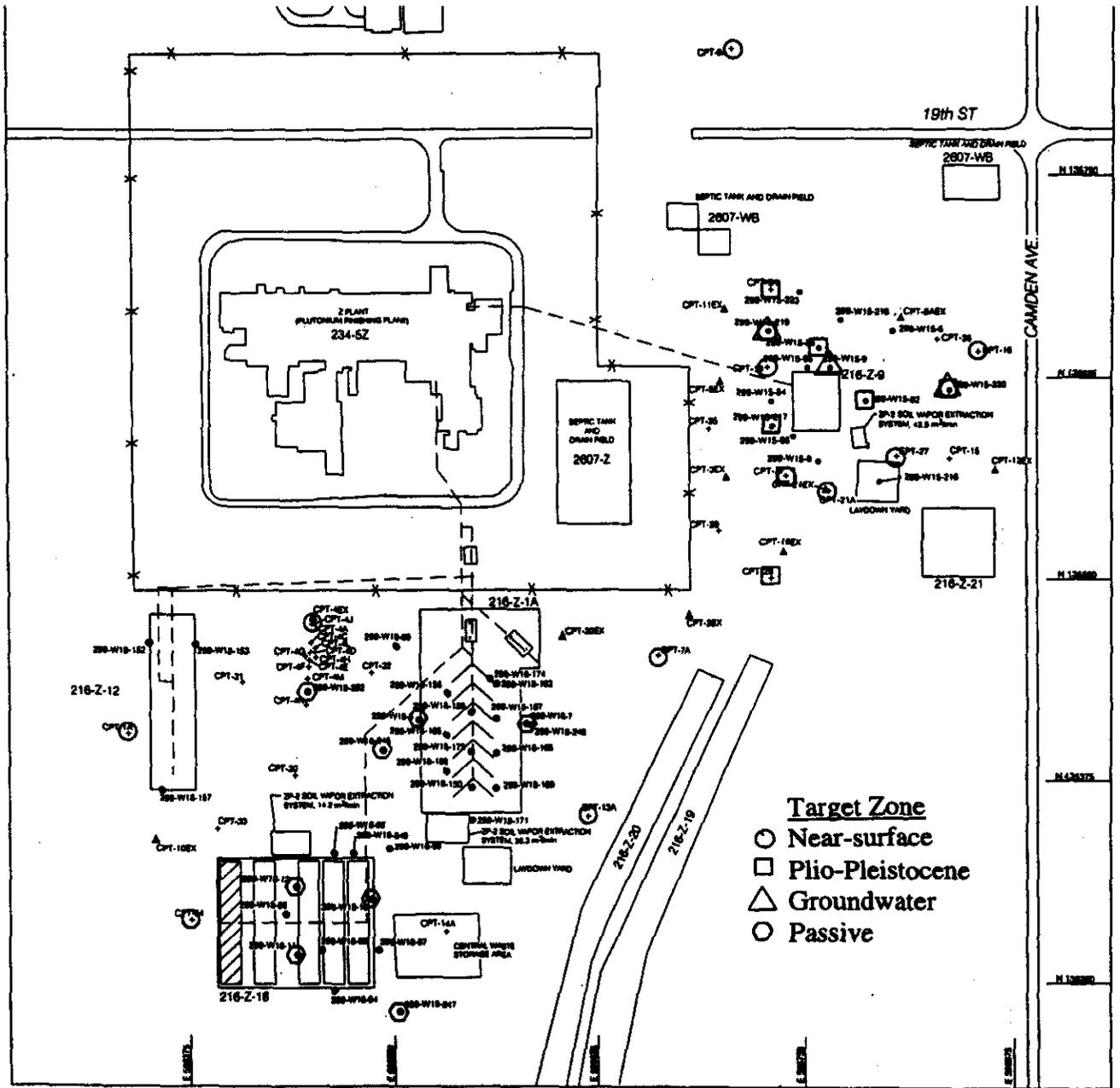
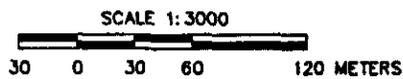
-  CPT-01 CONE PENETROMETER DEEP SOIL VAPOR PROBE (>2 m DEPTH) LOCATION AND NUMBER DESIGNATION
-  CPT-02 CONE PENETROMETER SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER DESIGNATION
-  200-W18-01 200-ZP-2 SOIL VAPOR EXTRACTION/MONITORING WELL LOCATION AND NUMBER DESIGNATION
-  216-Z-18 LIQUID WASTE DISPOSAL SITE

Figure 2. Location of Wells and Probes Selected for Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring, April through June 2001



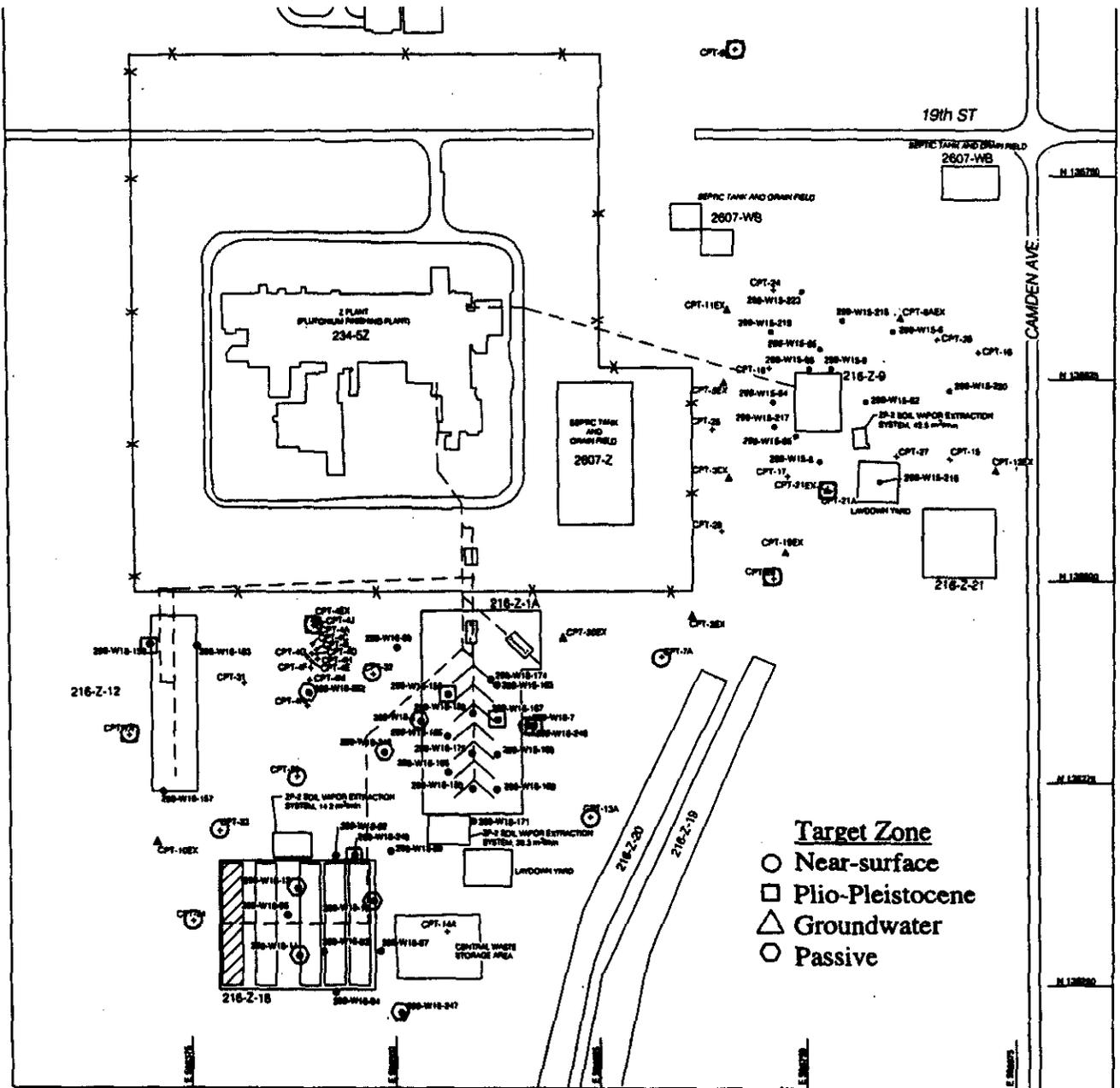
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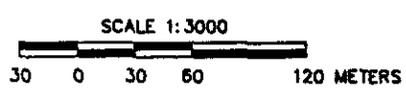
LEGEND

- + CPT-30 CONE PENETROMETER DEEP SOIL VAPOR PROBE (>2 m DEPTH) LOCATION AND NUMBER DESIGNATION
- ▲ CPT-6EX CONE PENETROMETER SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER DESIGNATION
- 200-W15-02 200-ZP-2 SOIL VAPOR EXTRACTION MONITORING WELL LOCATION AND NUMBER DESIGNATION
- 216-Z-18 LIQUID WASTE DISPOSAL SITE

Figure 3. Location of Wells and Probes Selected for Non-Operational Monitoring and Passive Soil Vapor Extraction Monitoring, July through September 2001

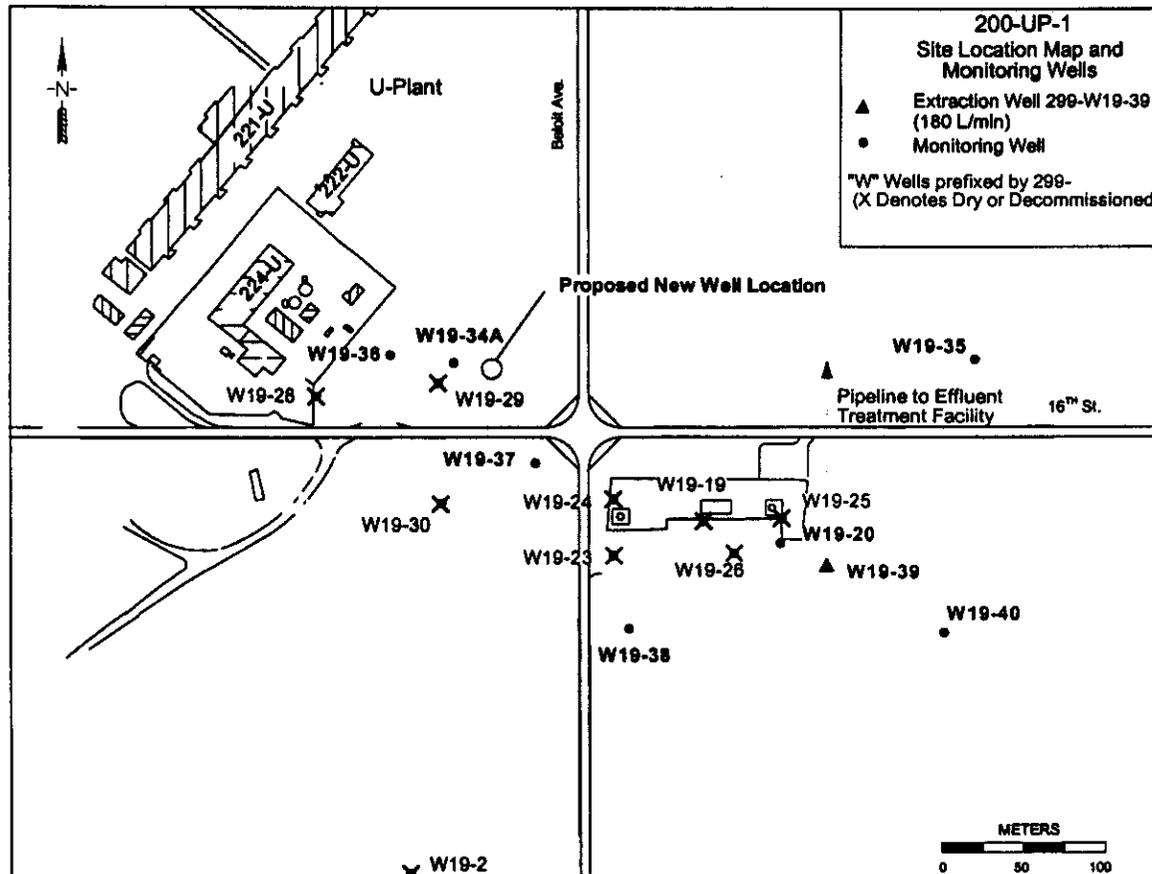


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LEGEND

- + CPT-00 CONE PENETROMETER DEEP SOIL VAPOR PROBE (>2 m DEPTH) LOCATION AND NUMBER DESIGNATION
- ▲ CPT-01 CONE PENETROMETER SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER DESIGNATION
- 200-W15-02 200-ZP-2 SOIL VAPOR EXTRACTION MONITORING WELL LOCATION AND NUMBER DESIGNATION
- 216-Z-18 LIQUID WASTE DISPOSAL SITE

Figure 1. Map Showing Proposed New Groundwater Monitoring Well Location.

The total depth of the borehole should not exceed 300 ft, and the borehole shall be drilled in a manner to support the installation of a 4-in. diameter well casing and screen (see Section 3.5) and to accommodate downhole geophysical logging (see Section 3.4). The minimum diameter of the borehole shall not be less than 8 in. If a large-diameter (12-in.) temporary conductor casing is required to meet drilling objectives, this temporary casing shall not be installed any deeper than 50 ft below ground surface (bgs).

3.2 MAINTENANCE SUPPORT EQUIPMENT SOIL SAMPLING

While soil sampling is not required to resolve decisions related to well installation, the soil sampling proposed in this section is being conducted to assist MSE in performing studies for a separate task. Soil samples will be collected using a 5-in.-outside-diameter split-spoon sampler (2 ft in length) from the intervals described below. Stainless-steel liners will be used inside the split-spoon sampler to contain the sample material. The sampler will be driven into the soil after the borehole has been cleaned out and any loose material has been removed from the bottom of the borehole. Blow count data are not required for this study. The split-spoons shall not be driven more than 2 ft below the starting depth for the sample interval.

095598

Public Review Draft

**USDOE Hanford Site
First Five Year Review Report**

Prepared by:
The U.S. Environmental Protection Agency
Region 10, Hanford Project Office

Public Review Draft

January 25, 2001

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Foreword

General

The U.S. Department of Energy's (DOE's) Hanford Site, which was established to produce nuclear materials for national defense, covers approximately 586 square miles adjacent to the City of Richland in Benton County of Washington State. When the Hanford Site was placed on the National Priorities List (NPL) in 1989, it was divided into four NPL sites: the USDOE Hanford 100 Area, 200 Area, 300 Area, and 1100 Area. Each NPL site was further divided into operable units to simplify the response. An operable unit is a grouping of individual sites based primarily on geographic area or common waste sources; soil and groundwater contamination are usually in separate operable units. In anticipation of the NPL listing, DOE entered into the *Hanford Federal Facility Agreement and Consent Order* (also known as the Tri-Party Agreement or TPA) with the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology). The TPA established the legal framework and schedule for the cleanup at Hanford. For each operable unit, the TPA designates either EPA or Ecology as the lead regulatory agency.

EPA Region 10 has conducted the first five-year reviews of the remedial actions implemented at the four NPL sites at the Hanford Site. The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of those five-year reviews are documented in this five-year review report. This five-year review report also identifies deficiencies found during the review, if any, and identifies recommendations to address them.

These reviews of the Hanford Site are required by statute. EPA must implement five-year reviews in a manner consistent with the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) and the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP). CERCLA §121(c), as amended, states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This report documents the results of the five-year reviews that were conducted from February 2000 through September 2000. The four NPL sites are discussed in separate sections. The scope of the TPA is broader than this five-year review because the TPA addresses regulated *Resource Conservation and Recovery Act* (RCRA) units, as well as the cleanup of past practice

units required under RCRA and/or CERCLA. Only operable units listed as past-practice units in the TPA are covered in this five-year review report. Removal of radiologically-contaminated structures, if conducted pursuant to the 1995 *Policy on Decommissioning Department of Energy Facilities Under CERCLA*, is also included. Active treatment, storage, or disposal units, such as the Hanford tank farms, are not part of this review.

100 Area

The 100 Area consists of six nuclear reactor areas that are principally contaminated with radionuclides and metals and, to a lesser extent, with other contaminants such as organic chemicals and asbestos. In addition to the reactor areas, there are outlying waste sites whose principal contaminants are metals and organic chemicals. The 100 Area five-year review covers eleven decision documents that have resulted, or will result, in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure. The primary cleanup actions that will be performed in the 100 Area are removal of contaminated soil, decontamination and/or demolition of contaminated buildings, removal of underground contaminated pipes and other engineered structures, capture and treatment of contaminated groundwater that would otherwise flow into the Columbia River, and removal of spent nuclear fuel and associated waste from water-filled basins that have a history of leaks. Institutional controls are an additional component of the selected remedies.

Several of the cleanup actions that were reviewed (namely removal of contaminated soil, decontamination and/or demolition of buildings, removal of underground pipes and other structures, and clean-out of the spent nuclear fuel basins) have achieved or are on track to achieve the "protection of human health and the environment" criteria that was set forth in the decision documents. Several minor recommendations for those cleanup actions are provided in this review. The principal deficiency is that the pump-and-treat remedial action for capturing and treating several chromium-contaminated groundwater plumes has not achieved the required protectiveness criteria because of insufficient capture of the plume. The five-year review recommends optimizing and running the extraction/treatment system more reliably.

200 Area

The 200 Area of the Hanford Site was used for chemical processing and for waste management. These activities generated radioactive, hazardous, and mixed wastes that were disposed of into the soil column and resulted in large amounts of contaminated soil and groundwater in the 200 Area. This five-year review is focused on the inactive soil disposal area, inactive facilities, contaminated groundwater, and the Environmental Restoration Disposal Facility (ERDF). Ongoing waste management activities, active treatment, storage, or disposal facilities and tank farm operations are not included in this review.

The 200 Area is divided into 23 soil operable units. These units contain approximately 700 soil waste sites and associated structures, as well as numerous facilities requiring decontamination and decommissioning. In addition to the 23 soil operable units, the 200 Area

NPL site contains four groundwater operable units, two of which (200-ZP-1 and 200-UP-1) are in 200 West Area and two of which (200-BP-5 and 200-PO-1) are in 200 East Area.

The 23 soil operable units are in various stages of the remedial investigation/feasibility study process and are currently on schedule for the completion of all required investigations by 2008. Only two soil operable units have had a remedy selected. One of these, the Environmental Restoration Disposal Facility (ERDF), has also been constructed. The review of ERDF indicated that the facility is operating in an environmentally protective manner and no change to current operations is needed. There are no issues associated with the cleanup of the 233-S Plutonium Concentration Facility.

Review of the 200-ZP-1/200-ZP-2 carbon tetrachloride project revealed several areas of concern that will need to be addressed to ensure protection of human health and the environment. Soil vapor extraction has been used to remove carbon tetrachloride from the soil for the past 8 years. Vapor extraction was highly successful during the first several years of the project, removing more than 150,000 pounds of carbon tetrachloride. However, during the past 3 years, removal efficiency has dropped significantly and little carbon tetrachloride has been removed. DOE and EPA are currently reviewing applicable technologies that will enhance removal of carbon tetrachloride from both soil and groundwater.

A review of the 200-UP-1 Pump-and-Treat System for removing uranium and Technetium-99 from 200 West Area groundwater revealed that the system has been partially successful in removing the technetium but has had little effect on uranium concentrations. DOE and Ecology need to develop a strategy to enhance removal of uranium from the 200 Area groundwater in order to ensure protection of human health and the environment.

300 Area

The 300 Area consists of three operable units. The 300-FF-1 and 300-FF-2 Operable Units address contamination at soil waste sites and burial grounds associated with operations in the 300 Area. The primary cleanup actions involve the removal of contaminated soils and debris; treating the material, as appropriate; and disposing of the material in an appropriate facility. Institutional controls are an additional component of the selected remedies. The 300-FF-5 Operable Unit addresses groundwater contamination beneath the soil waste sites and burial grounds. The current decision for contaminated groundwater in the 300 Area is to monitor the groundwater plumes to ensure that they are attenuating to acceptable concentrations through natural processes. Part of the cleanup includes controlling use of the cleanup areas and the groundwater.

In general, the 300 Area cleanups are proceeding in a protective and effective manner. EPA still considers the cleanup goals and remedy selection decisions appropriate at the time of this review. However, the review outlines a number of action items that DOE must perform in order to ensure that (1) the remedy remains protective, and (2) appropriate information is being gathered to document that the remedy is achieving the goals established in the Record of Decision. For example, an active and enforceable institutional controls plan is required. In

addition, DOE must demonstrate that soil cleanup levels are protective of groundwater, that biological resources are not being adversely impacted, and that contaminated groundwater plumes are attenuating to acceptable concentrations through natural processes in a reasonable length of time.

1100 Area

The 1100 Area was divided into four operable units. All of the remedies have been completed, and the 1100 Area has been deleted from the NPL. The remedies at three of the operable units (1100-EM-2, 1100-EM-3, and 1100-IU-1) allow for unrestricted use and unlimited exposure. Hazardous substances remain in one operable unit (1100-EM-1) at levels that do not allow for unlimited use and unrestricted exposure. The Horn Rapids Landfill was used for asbestos disposal and was closed in accordance with asbestos regulations. Also, the groundwater in the vicinity of the Horn Rapids Landfill is contaminated with trichloroethene; the remedy was to allow the contamination to attenuate. Institutional controls are a component of the selected remedies, specifically to maintain the landfill fence and cap and to prevent use of the contaminated groundwater. The only deficiency found during the review was that the fence around the landfill needs some repair.

Action Items

The following table is a summary of the action items to address deficiencies identified during the reviews. The first action item, SW-1, is a site-wide issue that crosscuts each all of the NPL sites. Each section contains a complete list of the action items and additional recommendations for an NPL site. Some of the action items may represent new work, as defined by the TPA, and therefore the due date and the subsequent schedule to implement those requirements will be subject to negotiation.

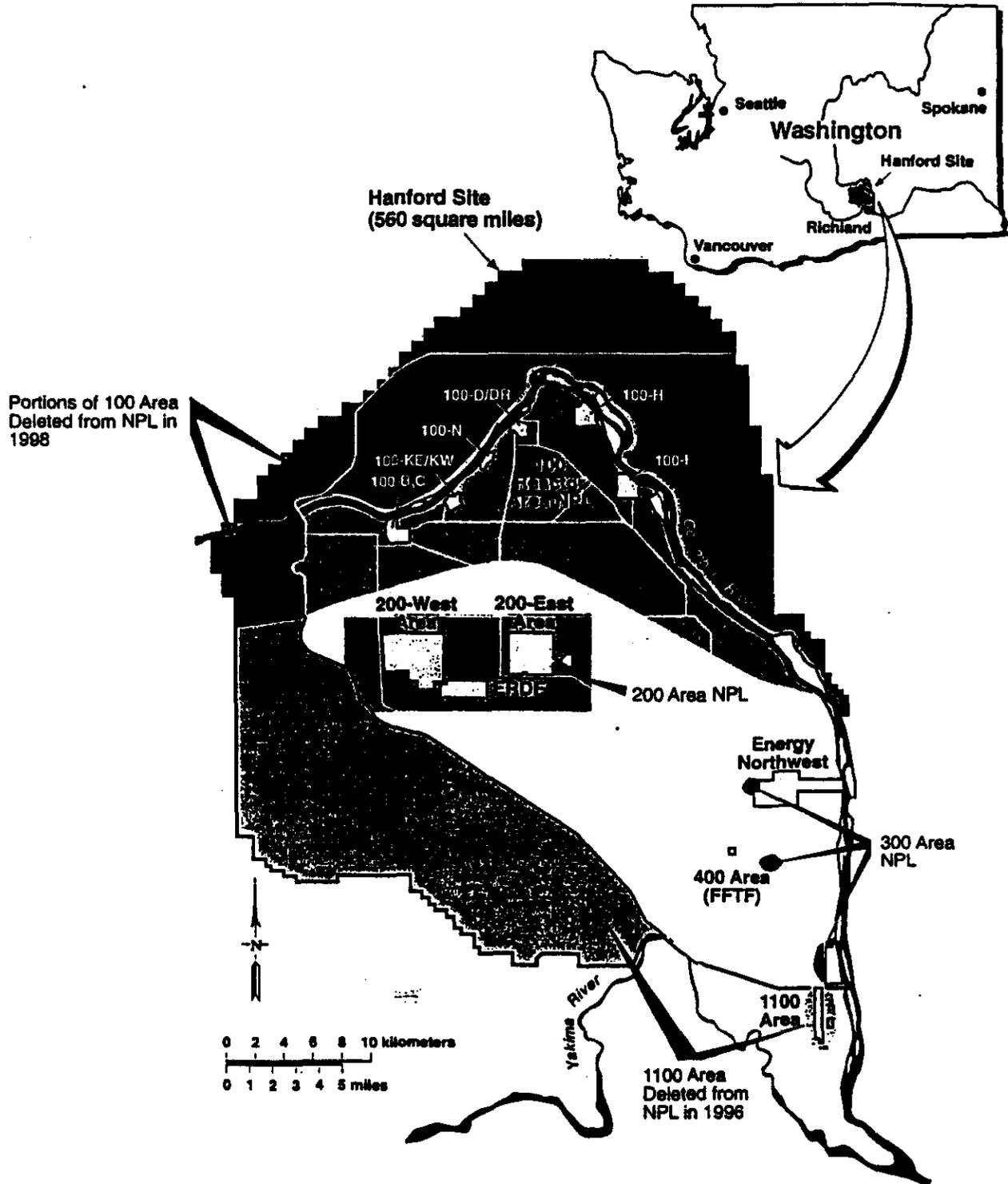
Action Item	Description	Due Date
SW-1	DOE shall develop a site-wide institutional controls plan for the Hanford Site. EPA will initiate modifications to appropriate remedy selection decision documents to incorporate the requirements.	July 2001
100-1	<p>DOE shall optimize and complete system enhancements to the 100-HR-3 and 100-KR-4 groundwater pump-and-treat systems for chromium to run more reliably and achieve the required cleanup levels.</p> <ul style="list-style-type: none"> • The overall system up-time must improve. • The downtime for individual wells must be dramatically improved. • A much higher percentage of the targeted plume must be captured. 	January 2002

Action Item	Description	Due Date
100-2	DOE shall investigate alternative remedial action technologies for the removal, mass reduction, and/or attenuation of Strontium-90 from the aquifer sediments in 100-NR-2 and to further reduce the net flux of Strontium-90 to the river. This investigation will be documented in a feasibility study to support a ROD amendment.	December 2001
200-1	DOE shall evaluate enhancements to the 200-PW-1 soil vapor extraction system in order to remove carbon tetrachloride from the vadose zone, and shall provide this information to EPA.	December 2001
200-2	The Tri-Parties should continue to investigate applicable dense non aqueous phase liquid (DNAPL) detection technologies and enhancements to the current pump-and-treat system.	December 2001
200-3	DOE shall install at least one monitoring/production well within the high-concentration area of the carbon tetrachloride plume near PFP. This well shall be installed by DOE in FY 2001 to support characterization needs, enhancement to pump-and-treat and/or vapor extraction system operations, and DNAPL investigations.	September 2001
200-4	The Tri-Parties shall develop a comprehensive monitoring network for the entire 200-ZP-1 Operable Unit. Currently, the monitoring network for the 200-ZP-1 Operable Unit only focuses on the area affected by the pump-and-treat operations. The monitoring network will be documented in a sampling and analysis plan that will be submitted to EPA, the lead regulatory agency for 200-ZP-1, for approval.	December 2001
200-5	DOE should evaluate approaches for meeting RAOs for the Technetium-99 and uranium plumes in 200-UP-1. Data indicates that more inventories of uranium are present in the groundwater than what DOE predicted. A higher rate of extraction, or other enhancements to pump-and-treat, may be required to meet the RAOs. Because of the drop in the water table and higher concentrations, new monitoring wells and extraction wells are needed to evaluate performance and allow for increased pumping capacity. Future efforts should include a new modeling study with additional characterization to determine the required rate of pumping to meet the RAOs. In addition, DOE will also make parallel effort to look at alternative technology for the uranium removal.	December 2001

Action Item	Description	Due Date
200-6	The Tri-Parties shall develop a comprehensive monitoring network for the entire 200-UP-1 Operable Unit. Currently, the monitoring network for the 200-UP-1 Operable Unit only focuses on the area affected by the pump-and-treat operations. The monitoring network will be documented in a sampling and analysis plan that will be submitted to Ecology, the lead regulatory agency for 200-UP-1, for approval.	December 2001
200-7	The Tri-Parties shall develop a comprehensive monitoring well network for the 200-PO-1 Operable Unit. The monitoring network will be documented in a sampling and analysis plan that will be submitted to Ecology, the lead regulatory agency for 200-PO-1, for approval.	December 2002
200-8	The Tri-Parties shall develop a comprehensive monitoring well network for the 200-BP-5 Operable Unit. The monitoring network will be documented in a sampling and analysis plan that will be submitted to EPA, the lead regulatory agency for 200-BP-5, for approval.	December 2002
200-9	DOE shall complete the Phase III Feasibility Study for the Canyon Disposition Initiative to support the development of a ROD by September 2002.	September 2001
300-1	DOE shall update the structure and content of 300 Area cleanup verification packages (CVPs). The 300-FF-1 Remedial Design/Remedial Action work plan may need to be updated to reflect new requirements. Supplemental information may have to be documented in the file for completed CVPs as well.	March 2001
300-2	DOE will submit a path forward for the 618-4 burial ground to EPA. The path forward will address: (1) options for treatment and disposal of excavated drums, (2) options for continued storage of drums if treatment is not imminent, and (3) plans for completing the excavation of the burial ground.	March 2001
300-3	DOE shall submit options to EPA for expedited response actions to address current contaminant releases from the 618-11 Burial Ground.	March 2001

Action Item	Description	Due Date
300-4	DOE shall update and expand the operations and maintenance (O&M) plan for the 300-FF-5 Operable Unit. The revised O&M plan shall be submitted to EPA for approval and shall address: 1) requirements for monitoring groundwater and river springs in the 300-FF-5 operable unit; 2) requirements for monitoring any impacts that may be associated with contaminated groundwater and river spring discharges; 3) requirements for evaluation of groundwater data including an assessment of the effectiveness of the natural attenuation remedy; and 4) regulatory reporting requirements. DOE shall submit a revised O&M plan by March 2001. DOE shall implement the revised O&M plan as approved by EPA.	March 2001
1100-1	DOE shall replace the loose fenceposts around the Horn Rapids Landfill.	March 2001
1100-2	DOE shall replace missing asbestos warning signs around the Horn Rapids Landfill.	March 2001

Hanford Site National Priority List Designations



E0101027

List of Acronyms

ARAR	applicable or relevant and appropriate requirement
BEHP	bis(2-ethylhexyl)phthalate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CVP	cleanup verification package
DCG	derived concentration guide
D&D	decontamination and decommissioning
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense, non aqueous phase liquid
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ESD	explanation of significant difference
FY	fiscal year
HASP	health and safety plan
HRL	Horn Rapids Landfill
IC	institutional control
ISRM	in-situ redox manipulation
IU	isolated unit
MCL	maximum contaminant level
MEI	maximally exposed individual
MTCA	Model Toxics Control Act
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPL	National Priorities List
O&M	operation and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
ppm	parts per million
RA	remedial action
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RTD	remove, treat, dispose
TCE	trichloroethene
TPH	total petroleum hydrocarbon
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
USDOE	U.S. Department of Energy
VOC	volatile organic compound
WAC	Washington Administrative Code
WDOH	Washington State Department of Health