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Meeting Minutes Transmittal/Approval
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
2440 Stevens Center Place, Room 1200, Richland, Washington
September, 1995

FROM/APPROVAL: Donna Wanek Date 10/19/95
Donna Wanek, 200 Aggregate Area Unit Manager, RL (H4-83)

APPROVAL: Paul Beaver Date 10/19/95
Paul R. Beaver, 200 Aggregate Area Unit Manager, EPA (B5-01)

APPROVAL: Dib Goswami Date 10/19/95
Dib Goswami, 200 Aggregate Area Unit Manager, WA Dept of Ecology

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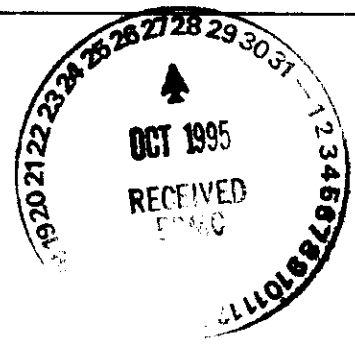
Meeting Minutes are attached. Minutes are comprised of the following:

Attachment #1 - Meeting Summary
Attachment #2 - Attendance Sheet
Attachment #3 - Agenda (part of Attachment #1)
Attachment #4 - Action Item Status List
Attachment #5 - 200-BP-5 TPA Change Request
Attachment #6 - 200-PO-1 Presentation
Attachment #7 - I-129 Presentation
Attachment #8 - 200-ZP-1 Presentation
Attachment #9 - Bioremediation Presentation
Attachment #10 - Carbon Tetrachloride process history
Attachment #11 - NPL Agreement for the ZP-1 Sample Analysis Plan
Attachment #12 - 200-ZP-2 Draft Schedule of FY 1996 Reports



Prepared by: Donna Wanek Date: 10/19/95

Concurrence by: Date: 10/19/95
George Hencket, BHI Project Manager - 200 Areas, (H6-07)

Attachment # 1
Unit Manager's Meeting: 200 Aggregate/200 Area Operable Units
September, 1995

Meeting and Summary of Commitments and Agreements

1. 7:45 - 8:00, 200-BP-5 - D. Erb:

   * Tri-Party Agreement Change Request

2. 8:00 - 8:15, 200-PO-1 - M. Todd:

   * General Status

3. 8:15 - 8:30, I-129 Report - G. Kasza:

   * Status of M-15-81B

4. 8:30 - 8:45, 200-ZP-1 - J. Freeman-Pollard:

   * General status
   * Approval of NPL Agreement for the Sample Analysis Plan

5. 8:45 - 9:30, CCl_4 - D. Wanek:

   * General status

6. 9:30 - 10:00, 200-ZP-2 - R. Tranbarger:

   * General Status

200-BP-5 Tri-Party Agreement Change Request

The parties reviewed the draft change request provided by Mr. Erb. RL will provide an electronic version of the change request to EPA and Ecology; comments will be provided to Ms. Wanek by COB Monday, September 25, 1995. The change request will be presented to the Hanford Project Managers September 27, 1995.

The 200-BP-5 Sample and Analysis Plan (SAP) will be available for review by the three parties by December 31, 1995 the 200-BP-5 Operable Unit. Prior to preparation of the plan, a list of the wells and analytes, currently sampled in the sitewide monitoring program will be provided, to EPA and Ecology, for the area encompassed within 200-BP-5. Groundwater monitoring established within the SAP will supplement monitoring needs not currently provided by the Sitewide program.

Status 200-PO-1 Operable Unit

The status of the RCRA Field Investigation report was provided. Screening of contaminants is continuing. ERC believes that arsenic levels identified, might be background at the site. EPA recommended that documentation be provided to the regulators to justify the background assumption. The documentation would require regulatory approval to maintain the background concentration theory

The three parties discussed the focus sheet for the operable unit; and agreed that the focus sheet would not be issued until a determination was made as to how the public involvement opportunity would be provided. Additionally, the notice that was prepared for the Hanford Highlights should be cancelled. Ecology has the action to cancel that notice.

Status M-15-81B

A status of the Iodine-129 Report was provided. The report uses the current MCL of 1 pCi/L, however the proposed National Primary Drinking Water Regulation (56 FR 33050) would set the I-129 MCL at 21 pCi/L.

Conclusions of the report indicate that there is no commercial experience in removing I-129 from groundwater.

Status 200-ZP-1 Operable Unit

A status of the pilot scale operations was provided, along with a status of the IRM implementation. EPA requested a graph of well performance showing the influent concentrations being observed at the pilot scale system. The mass of CCl_4 will be provided to EPA and Ecology by September 22, 1995, at EPA's request. EPA recommended that a meeting be scheduled to present the 90% design of the treatment system. This will support an expedited regulatory review/approval of the treatment design. Formal responses to the regulatory comments on the Conceptual Design will be provided prior to the meeting, and will be addressed during the 90% design presentation.

The September groundwater monitoring will be completed on time. EPA requested field screening results from the sampling activities; the summary reports received from the laboratory; and well plots similar to those provided by the 100-BC-5 operable unit.

EPA and RL approved the NPL Agreement form for semiannual groundwater monitoring. Ecology Unit Manager was not available.

IRM well drilling for FY 1996 was addressed. The Description of Work will be submitted to the three parties on September 22, 1995. EPA requested regulatory review of the Statement of Work prior to issuance of the drilling contract. RL reported that Technology Demonstration is proposing a strategy to evaluate the geologic affects of sonic drilling. EPA and Ecology requested review of the plan prior to drilling of any wells.

Status of CCL_4 Listing

Status of information gathered to support delisting of the CCl_4 was provided to EPA and Ecology.

EPA and Ecology were requested to continue researching avenues for delisting, or obtaining waivers, for the CCl_4. RL is continuing to prepare waste volumes generated from the affected projects, and recommendations for regulatory relief.

Status of 200-ZP-2 Operable Unit, ERA Activity

ERC reviewed their plans for future operations of the VES. EPA and Ecology requested copies of all reports prepared in support of the ERA. There was a discussion as to how ERC determines when to switch wells. The on-line wells are characterized monthly; all wells are characterized quarterly.

EPA has reviewed the Action Memorandum and feels that it does not need to be modified at this time.

Status of 200-UP-1 Operable Unit

No Unit Manager's Meeting for 200-UP-1 Operable Unit.

Attachment #2

Attendee List
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
September, 1995

Anderson, Ted	ERC	372-9133
Beaver, Paul	EPA	376-8665
Buckmaster, Mark	ERC	372-9272
Dahl, Suzanne	Ecology	736-5705
Faulk, Dennis	EPA	376-8631
Henckel, George	ERC	372-9381
Kramer, Chris	ERC	372-9360
Myers, Dave	ERC	372-9337
Porter, Ken	ERC	372-9277
Staats, Phil	Ecology	736-3029
Todd, Mary	ERC	372-9678
Tranbarger, Rhett	ERC	372-8346
Truex, Mike	PNL	372-1220
Rohay, Virginia	ERC	372-9312
Wanek, Donna	RL	376-5778
Wooley, Ted	Ecology	736-3012
Young, Jennifer	RL-PRD	376-7044

Attachment #4

Action Item Status List
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
September, 1995

ACTION NUMBER	ACTION	DUE DATE	STATUS
BP5-1	Provide comments on TPA change request to Donna Wanek	9/25/95	
BP5-2	Provide three parties with list of wells and analytes sampled by Sitewide monitoring program	10/19/95	
ZP1-1	ERC to provide graph of concentrations observed at influent well	10/19/95	
ZP1-2	ERC to provide mass of CCl_4 removed	9/22/95	
ZP1-3	ERC to schedule presentation of IRM treatment design	10/26/95	
ZP1-4	Provide formal responses to regulatory comments of the ZP-1 CDR	10/01/95	
ZP1-5	Provide regulators with field screening results, summary reports, and well plots for groundwater sampling		
ZP1-6	Provide opportunity for regulatory review of drilling SOW prior to issuance of the contract		
CCl-1	EPA and Ecology review of alternatives for delisting of CCl_4	10/19/95	
RA-1	RL took an action to set up a presentation of the Risk Based Decision Analysis for the regulators	10/19/95	

Change Number	Federal Facility Agreement and Consent Order Change Control Form Do not use blue ink. Type or print using black ink.	Date 09/21/95

Originator: Donna Wanek
Phone: (509) 376-5778

Class of Change
[ ] I - Signatories [x] II - Project Manager [ ] III - Unit Manager

Change Title: Delete M-15-21 milestone for preparing the IRM Proposed Plan for the 200-BP-5 Operable Unit, currently due on October 31, 1995.

Description/Justification of Change

The three parties agree that an IRM Proposed Plan is not required for the 200-BP-5 Operable Unit at this time. The treatability tests performed at the 200-BP-5 Operable Unit have indicated that, using current technologies, interim remedial measures (IRM) at 200-BP-5 would not be efficient or cost effective for remediation of contaminants in the groundwater. In accordance with decisional criteria identified in the Tri-Party Agreement, preparing an IRM Proposed Plan and conducting follow-on interim remedial measures is determined to not be effective use of resources, and therefore not appropriate at this time. Results from geohydrological data and risk analyses do not support continued treatment of the BY-Crib and B-5 Reverse Well contaminants. Therefore, DOE requests that the interim Milestone (M-15-21) for submittal of an IRM Proposed Plan be deleted and contaminants at 200-BP-5 be addressed at a later time, either when new cleanup technologies are developed or during the final remedial action process for the operable unit.

Impact of Change (See attachment)

Affected Documents
Hanford Federal Facility Agreement and Consent Order Action Plan
IRM Proposed Plan for 200-BP-5 Operable Unit (No longer required)

Approvals

_____ _____ ___ Approved ___ Disapproved
DOE Date

_____ _____ ___ Approved ___ Disapproved
EPA Date

_____ _____ ___ Approved ___ Disapproved
Ecology Date

Impact of Change:

The risk-based decision analysis indicates that there is no significant risk to human health associated with the contaminants of concern (Sr-90, Cs-137, and Pu-239/240) at the 216-B-5 Reverse Well. The treatability test indicated that while Strontium, Cesium and Plutonium can be removed from the extracted water by the treatment technology, treatment of Strontium to levels below the MCL may not be cost effective.

Treatability tests at the BY-Cribs indicated that, while removal of the primary contaminants of concern (Tc-99, Co-60) from the extracted water through the treatment techniques is effective, the very thin aquifer encountered at extraction well 699-50-53A does not allow meaningful extraction or treatment rates to be achieved. During the treatability test, the extraction flow from the well averaged approximately 3 gpm. These findings are documented in the 200-BP-5 Treatability Test Report.

Approving the change request will ~~delete preparing an unnecessary document. This change request will effectively end any further~~ accelerated actions asociated with the IRM pathway for groundwater cleanup. Further characterization/treatment activities will be delayed until restarted along either a Limited Field Investigation or Final Remedy Selection pathway.

200-PO-1 Operable Unit
Unit Managers Meeting
September 21, 1995

Prepared by:
Mary E. Todd, ERC
Operable Unit Team Lead

RCRA Field Investigation Report Status

- Task 1 - Plume Evaluation
  - Completed Well Identification
  - Completed Data Collection and Screening (see handout)
- Task 2 - TSD Evaluation
  - Completed TSD Identification
  - Completed Data Collection and Screening

RCRA Field Investigation Report Status (continued)

- Task 3 - Trend Analysis
  - Completed By-Well Concentration Versus Time Curves
  - Beginning Historical Plume Maps
- Task 4 - Monitoring Evaluation
  - Completed Current Monitoring Program Status Evaluation
- Task 5 - Document Preparation
  - Completed Major Portions of Section 1 Through 4

200-PO-1 Data Screening Summary

Data from 1984 to present from all the wells included in the 200-PO-1 operable unit were electronically screened against the MCL and MTCA-B values. Constituents with detections greater than either the MCL or MTCA-B cutoffs were evaluated individually to determine whether or not the detections indicated a potential contaminant. The following is a summary of evaluations for the individual constituents which were removed from consideration as a potential contaminant of concern:

1,1,2,2-Tetrachloroethane: 2 detections above MTCA-B value of 0.219 ppb; Reasons for removing from potential contaminant list - single detection in a well.

1,2-Dichloroethane: 2 detections above MTCA-B value of 0.481 ppb; Reasons for removing from potential contaminant list - single detection in well.

2,4-Dinitrophenol: 2 detections above MTCA-B value of 32 ppb; Reasons for removing from potential contaminant list - single detection in well.

4,4'-DDT: 5 detections above MTCA-B value of 0.257 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Aldrin: 5 detections above MTCA-B value of 0.00515 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Alpha-BHC: 1 detection above MTCA-B value of 0.0139 ppb; Reasons for removing from potential contaminant list - single detection in well.

Antimony: 18 detections above MTCA-B value of 6.4 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Bromodichloromethane: 1 detection above MTCA-B value of 0.706 ppb; Reasons for removing from potential contaminant list - single detection in well.

Barium: 2 detections above MTCA-B value of 1120 ppb; Reasons for removing from potential contaminant list - value not consistent with trend in well, value from old sample, recent samples show no problem.

Benzene: 2 detections above MTCA-B value of 1.5 ppb; Reasons for removing from potential contaminant list - single detection in well.

Bis(2-ethylhexyl) phthalate: 13 detections above MTCA-B value of 6.25 ppb; Reasons for removing from potential contaminant list - single detection in well, laboratory

contamination problems, value not consistent with trend in well.

Cadmium: 12 detections above MTCA-B value of 8 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well, value from old sample, recent samples show no problem.

Cerium/Praseodymium-144: 6 detections above MCL value of 24 pCi/L; Reasons for removing from potential contaminant list - value from old sample, recent samples show no problem, value not consistent with trend in well.

Chloroform: 2 detections above MTCA-B value of 7.17 ppb; Reasons for removing from potential contaminant list - single detection in well, value from old sample, recent samples show no problem.

Copper: 2 detections above MTCA-B value of 592 ppb; Reasons for removing from potential contaminant list - value not consistent with trend in well.

Dibromochloromethane: 1 detection above MTCA-B value of 0.521 ppb; Reasons for removing from potential contaminant list - single detection in well.

Dieldrin: 5 detections above MTCA-B value of 0.00547 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Dimethoate: 4 detections above MTCA-B value of 3.2 ppb; Reasons for removing from potential contaminant list - single detection in well, value from old sample, recent samples show no problem.

Endrin: 5 detections above MCL value of 2 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Gamma-BHC (Lindane): 6 detections above MTCA-B value of 0.0673 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Gross alpha: 27 detections above MCL value of 15 pCi/L; Reasons for removing from potential contaminant list - value from old sample, recent samples show no problem.

Heptachlor: 8 detections above MTCA-B value of 0.0194 ppb; Reasons for removing from potential contaminant list - single detection in well, only sampling event with detection in well.

Lead: 5 detections above MCL value of 50 ppb; Reasons for removing from potential contaminant list - value from old sample, recent sampling shows no problem, single

detection in well.

Mercury: 1 detection above MTCA-B value of 4.8 ppb; Reasons for removing from potential contaminant list - single detection in well.

Methylenechloride: 24 detections above MTCA-B value of 5.83 ppb; Reasons for removing from potential contaminant list - single detection in well, value not consistent with trend in well, only sampling event with detection in well.

Nickel: 15 detections above MTCA-B value of 320 ppb; Reasons for removing from potential contaminant list - value from old sample, recent sampling shows no problem, single detection in well.

Pentachlorophenol: 7 detections above MTCA-B value of 0.729 ppb; Reasons for removing from potential contaminant list - single detection in well, value from old sample, recent sampling shows no problem.

Polychlorodibenzodioxin: 1 detection above MTCA-B value of 0.0114 ppb; Reasons for removing from potential contaminant list - single detection in well.

Styrene: 4 detections above MTCA-B value of 1.46 ppb; Reasons for removing from potential contaminant list - value from old sample, recent sampling shows no problem.

Technetium-99: 1 detection above MCL value of 727 ppb; Reasons for removing from potential contaminant list - single detection in well.

Tetrachloroethene:212 detections above MTCA-B values of 0.858 ppb; Reasons for removing from potential contaminant list - value from old sample, recent sampling shows no problem.

Trichloroethene: 39 detections above MTCA-B value of 3.98 ppb; Reasons for removing from potential contaminant list - single detection in well, value from old sample, recent sampling shows no problem.

Uranium: 8 detections above MCL value of 20 pCi/L; Reasons for removing from potential contaminant list - value not consistent with trend in well, value from old sample, recent sampling shows no problem.

Zirconium/Niobium-95: 3 detections above MCL value of 145 pCi/L; Reasons for removing from potential contaminant list - single detection in well, value not consistent with trend in well.

The following is a summary of evaluations of potential contaminants which are recommended to be removed from consideration as a potential contaminant of concern:

Hydrazine: 27 detections above MTCA-B value of 0.0292 ppb; Reasons for removing detections from consideration - single detection in well. Remainder of detections from the same rounds reported as detections only after lab changed its reporting methods. What used to be reported as a undetect is now reported as a value with a "L" qualifier indicating the detection was below the contract required detection limit but detectable by their instruments....only a problem if treat "L" qualified data as a detection.

Ruthenium-106: 334 detections above MCL value of 24 pCi/L; Reasons for removing detections from consideration - value from old sample, recent sampling shows no problem, single detection in well. Remainder of detections from sampling one year old or older if decay to present concentration is not a problem.

Beryllium: 122 detections above MTCA-B value of 0.0203 ppb; Reasons for removing detections from consideration - single detection in well, value from old sample, recent sampling shows no problem, only sampling event with detection in well, other sample from same sampling event showed no detection. Unfiltered sample showed problem, filtered sample from same sampling event showed undetect (no turbidity data available). Remainder of detections reported with "L" and/or "B" qualifier indicating the detection was below the contract required detection limit but detectable by the labs instruments....only a problem if treat "L" or "B" qualified data as a detection.

Arsenic: 1296 detections above MTCA-B value of 0.05 ppb; Reasons for removing detections from consideration - other sample from same sampling event showed no detection, value at or below background, value from old sample, recent sampling showed no problem. Remainder of detections from wells where most recent values are just above background and are one to two years old.

The following is a summary of evaluations of potential contaminants for which problem detections are centered around a specific TSD:

Carbon tetrachloride: 54 detections above MTCA-B value of 0.337 ppb; Reasons for removing detections from consideration - single detection, value from old sample, recent sampling showed no problem. Remainder of detections reported with "L" qualifier indicating the detection was below the contract required detection limit but detectable by the labs instruments....all of these detections are centered around NRDWL and if used should be addressed in the associated TSD discussion.

Chromium: 354 detections above MTCA-B value of 80 ppb; Reasons for removing detections from consideration - single problem detection, value from old sample, recent sampling showed no problem, problem detections in unfiltered samples only, filtered samples from the same well do not show detections. Remainder of detections indicate a problem in both the unfiltered and filtered samples from one well associated with the single-shelled tanks - area A-AX and if used should be addressed in the associated TSD discussion.

Manganese: 157 detections above MTCA-B value of 80 ppb; Reasons for removing detections from consideration - value from old sample, recent sampling showed no problem, problem detections in unfiltered samples only filtered samples from the same well do not indicate a problem turbidity data (when available) show elevated levels of particulates in the well. Remainder of detections indicate a problem in both the unfiltered and filtered samples from wells associated with the 216-B-3 Pond and should be addressed in the associated TSD discussion.

Strontium-90: 49 detections above MTCA-B value of 8 pCi/L; Reasons for removing detections from consideration - Single problem detection, value from old sample, recent sampling showed no problem, value not consistent with trend in well. Remainder of detections indicate a problem in two wells associated with the 216-A-36-B Crib and if used should be addressed in the associated TSD discussion.

Vanadium: 30 detections above MTCA-B value of 112 ppb; Reasons for removing detections from consideration - single problem detection, value from old sample, recent sampling showed no problem, problem detections in unfiltered samples only filtered samples from the same well do not indicate a problem turbidity data (when available) show elevated levels of particulates in the well. Remainder of detections indicate a problem in both the unfiltered and filtered samples from one well located near wells associated with the 216-A-29 Ditch and if used should be addressed in the associated TSD discussion.

The following is a list of constituents which are potential contaminants of concern:

Iodine-129: 50 detections above MCL value of 0.48 pCi/L.

Tritium: 3007 detections above MCL value of 20000 pCi/L.

DOE/RL 95-69
Internal Review

Iodine-129 Contamination: Nature, Extent, and Management Options

Date Published
September 1995

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

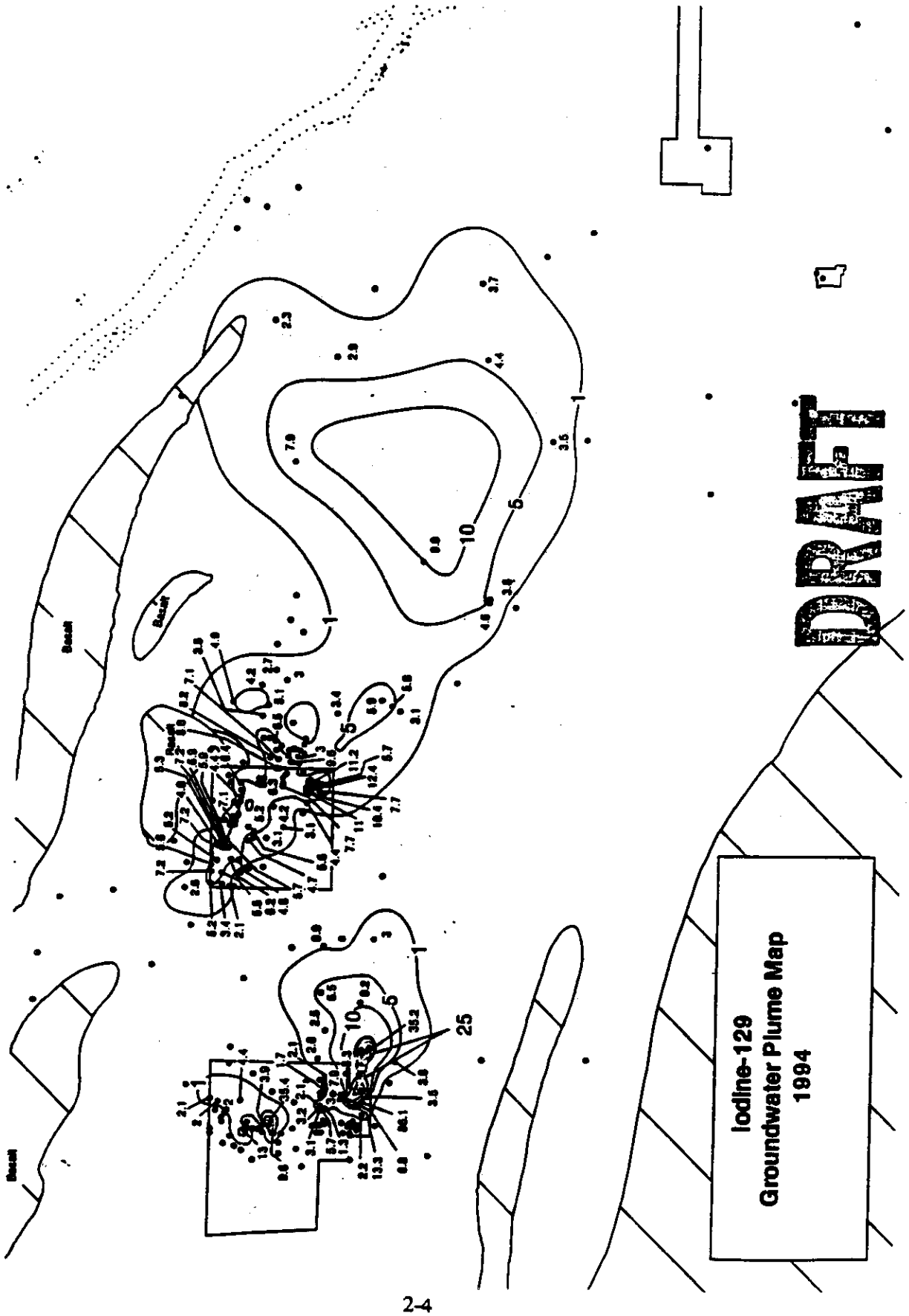
Report Status

- Internal ERC Review - completed
- Final Draft to Tech Editor - 9/25
- To DOE for Concurrent Regulator Review - 9/29
- TPA Milestone - 4/30/96

TPA Milestone M-15-81B

"Submit to EPA and Ecology, a document to support future Feasibility Studies describing: the known nature and extent of Iodine-129 contamination in the 200 Area Plateau (soil and groundwater); potential Applicable or Relevant and Appropriate Requirements (ARARs); and available treatment methods; including costs and efficiencies."

Figure 2-2. Iodine-129 Groundwater Plume Map, 1994.



Draft Conclusions

- I-129 is a long-lived and extremely mobile potential carcinogen
- I-129 contamination has reached Columbia River as determined by differences in river water I-129 concentrations measured at Priest Rapids and Richland
- I-129 groundwater plume is large and low concentration. Highest groundwater concentrations are:
  - 86.1 pCi/L in 200 West
  - 12.4 pCi/L in 200 East

Draft Conclusions (continued)

- One I-129 Vadose Zone soils sample above detection limit:

  1.6 pCi/g at U1/2 crib investigation.

  – more hits will be encountered as more source operable unit investigations occur

- Literature search and vendor contacts indicate no commercial experience in removing I-129 from groundwater

  – experience in removing I-129 from nuclear reactor and process effluents

Draft Conclusions (continued)

- Proposed National Primary Drinking Water Regulation (56 FR 33050) would set I-129 MCL at 21 pCi/L. This would greatly reduce ~~extent~~ AREA of 1-129 groundwater contamination PLUME TO BE REMEDIATED

Unit Manager's Meeting: 200-ZP-1 Operable Unit
September 21, 1995

1. PILOT SCALE TREATABILITY TEST

- Status - Extracted 4,031,731 gallons
  Treated 4,030,044 gallons
  Injected 4,021,984 gallons

  200-ZP-2 Condensate 8,075 gallons (FY 95)

2. IRM IMPLEMENTATION - PHASE II

- Status - John Olson

3. TECHNOLOGY DEMONSTRATION - BIOREMEDIATION

Goal - to completely degrade CCl_4

- Status - Chris Kramer

4. GROUNDWATER MONITORING

- Status - Sampling will completed on September 22, 1995.

Results File

5. OTHER ACTIVITIES

- DNAPL Report

  The 200-ZP-1 DNAPL report (BHI-00431) will be submitted to DOE/EPA/Ecology on September 27, 1995.

- Risk Based Decision Analysis Report

  The 200-ZP-1 Risk Based Decision Analysis report (BHI-00427) is being revised to be consistent with the 200-BP-5 subject document.

- 200-ZP-1 NPL Agreement Form - Semiannual Groundwater Monitoring

- 200-ZP-1 IRM Well Drilling - FY 96 Wells

  A description of work (DOW) will be submitted to DOE/EPA/Ecology on September 22, 1995. Comments are due back by October 6, 1995. Drilling of the first extraction well is scheduled to commence in October 1995.

200-ZP-1 PHASE 2 IRM DESIGN
STATUS OF PURCHASING DOCUMENTS

Document Number	Issue	Award	Description	Status
0200W-MR-G0006 Rev. 1	8/15/95A	9/20/95F	MR: Treatment System (air stripper, GAC system, and PLC)	Technical evaluation complete: two bids acceptable (Letter documenting results sent from John Olson to Floyd Willis). Life Cycle Costs reviewed and approved (verbally) by Design Team. Award delayed until 9/20/95 to verify differences between BHI estimate and bids.
0200W-MR-G0009 Rev. 0 Rev.1	8/10/95A 9/7/95A	9/22/95F	MR: Metal buildings and associated equipment (HVAC and electrical)	New revision (Rev. 1) processed through document control and to Floyd on 9/7/95. potential delays
0200W-MR-G0008 Rev. 1	8/31/95A	9/22/95F	MR: Dual containment pipe and leak detection system	Scope of work modified to remove extraction system.
0200X-FM-G0114	8/31/95A	9/22/95F	Job Order: Civil site work (trenching and buried electrical)	Scope of work and drawings modified to remove extraction system. Will be released with Power to Site Package
0200X-FM-G0115	8/31/95A	9/22/95F	Job Order: Power to site.	Scope of work and drawings modified to remove extraction system. Will be released with Civil Site Work Package
0200X-FM-G0122	8/4/95A	8/15/95A	FMR: Transformer delivery 10/27	OK - On track. Awarded 8/15/95, Tentative delivery date 10/27/95. WHC Utilities changed requirements for fuses. Vendor will not supply - WHC Utilities will supply.
0200X-FM-G0132	8/31/95A	9/5/95A	FMR: Meter and Cabinet	4-6 week lead time when order placed. Vendor questions identified a problem with the cabinet Site Utilities required. Received correct cabinet requirements and transmitted to procurement on 9/1/95. Delivery anticipated 10/27/95

A = Actual, F = Forecast

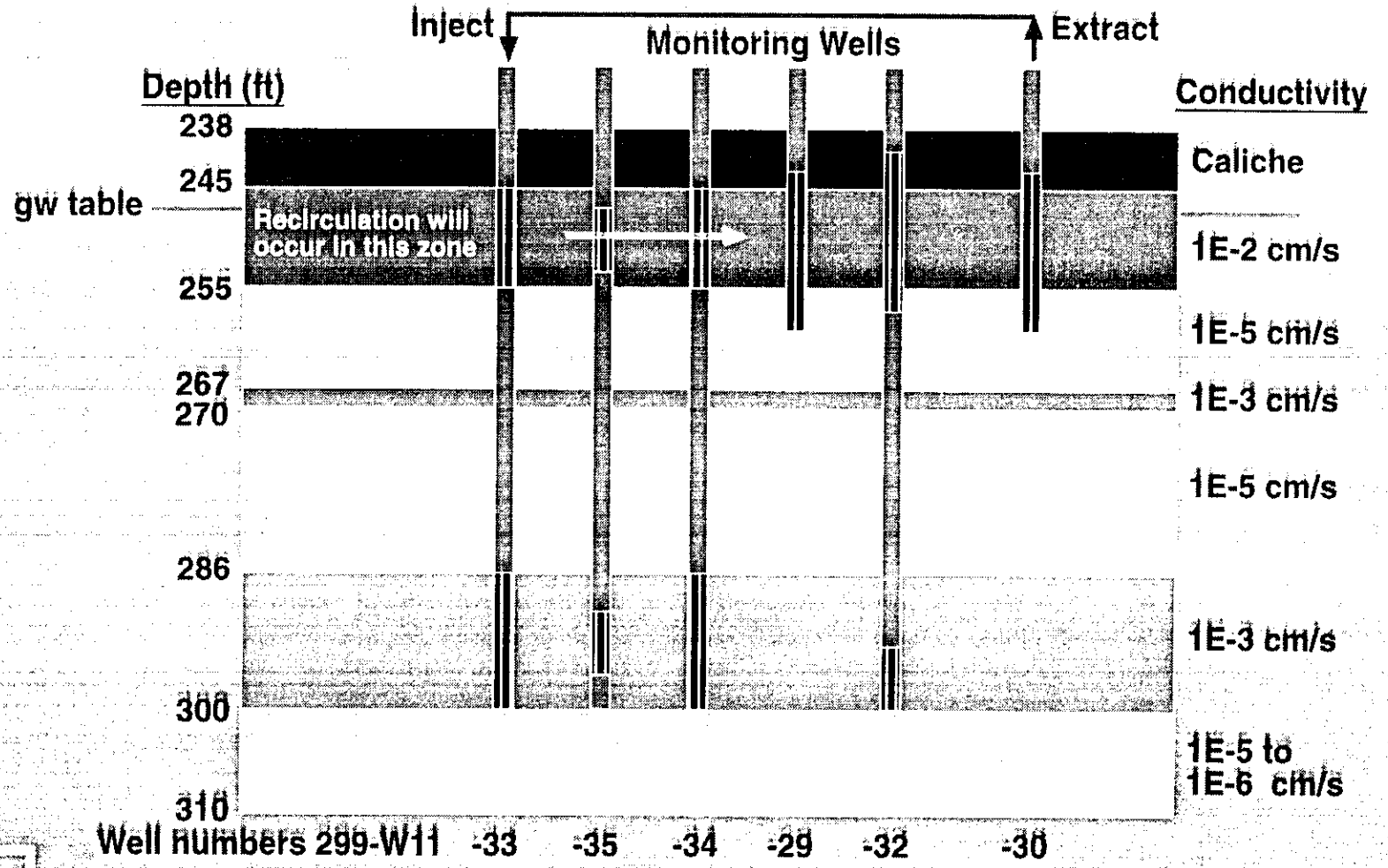
These will be awarded this FY.

200-ZP-1 Phase 2 IRM Treatment System

Task	Tenative Date
Treatment Equipment (Air Stripper)	
Award Contract	20 Sep 95
ERC/DOE/EPA/Ecology Review of 90% Design →	26 Oct 95 - 01 Nov 95
Treatment System Delivery to Hanford	1 Dec 95
Civil Trenching and Underground Conduit/Power to Site	
Award Contract	22 Sep 95
Field Activities Begin	09 Oct 95
Contract Complete	17 Nov 95
Dual Containment Pipe/Leak Detection System	
Award Contract	22 Sep 95
Field Activities Begin	09 Oct 95
Contract Complete	17 Nov 95
Metal Buildings and Associated Electrical/HVAC	
Award Contract	22 Sep 95
Field Activities Begin	20 Nov 95
Contract Complete	19 Dec 95

Pre-Demonstration Conceptual Model

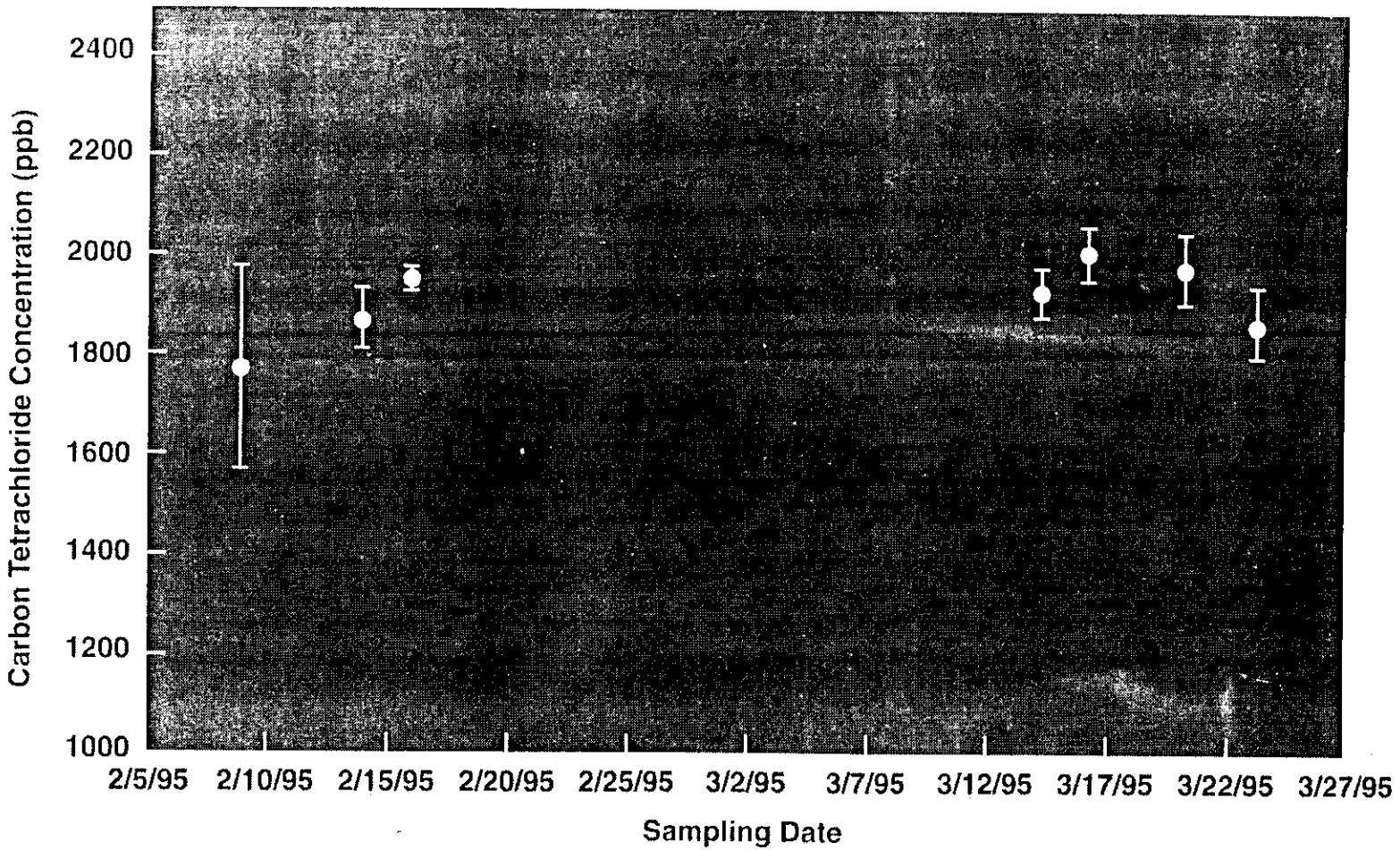
Surface recirculation with sample ports and in-line filters for entrained sediment



Note: All wells are on a common centerline.

E9509040.2

Aqueous Carbon Tetrachloride Concentrations During Phase 1

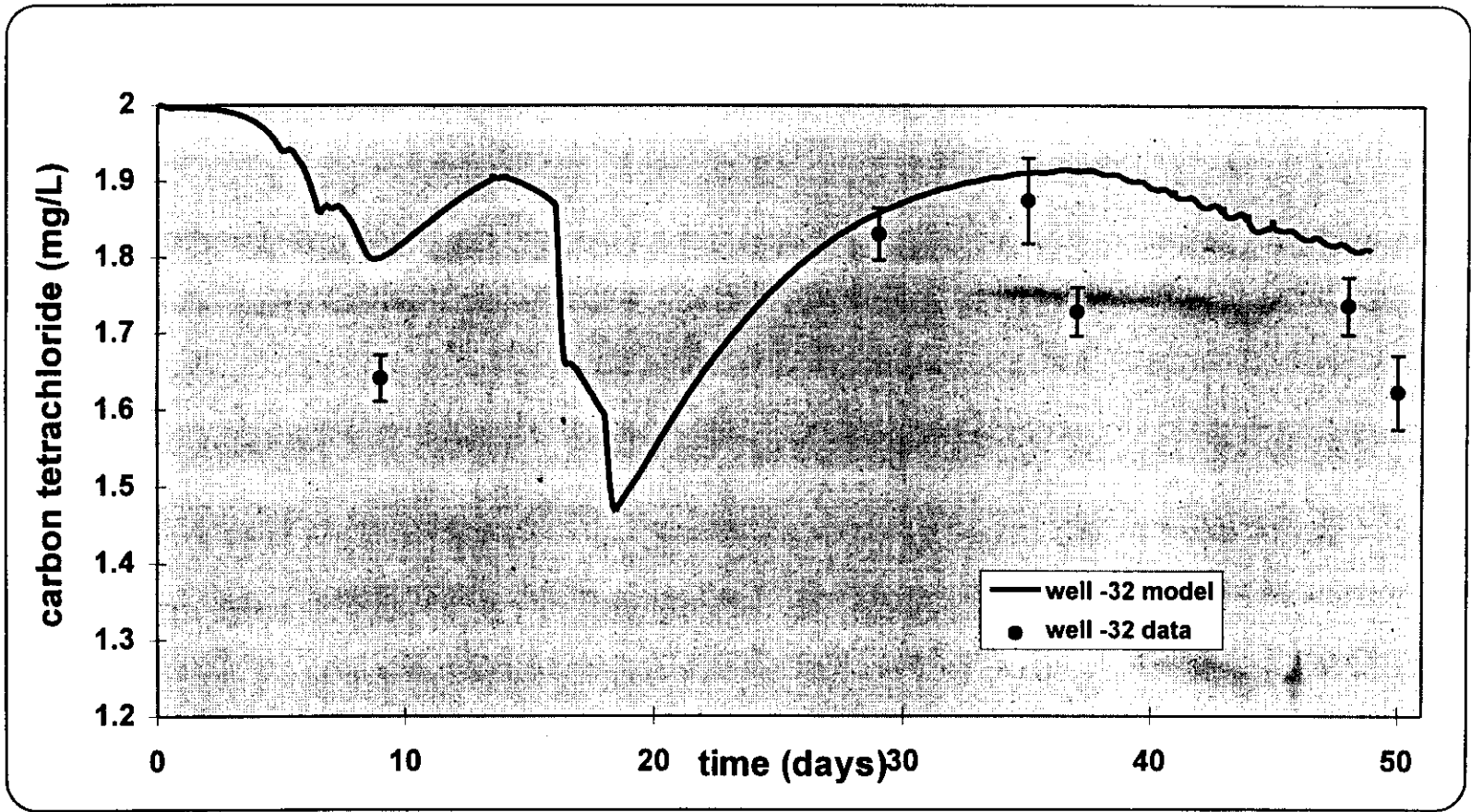


E9509040.5

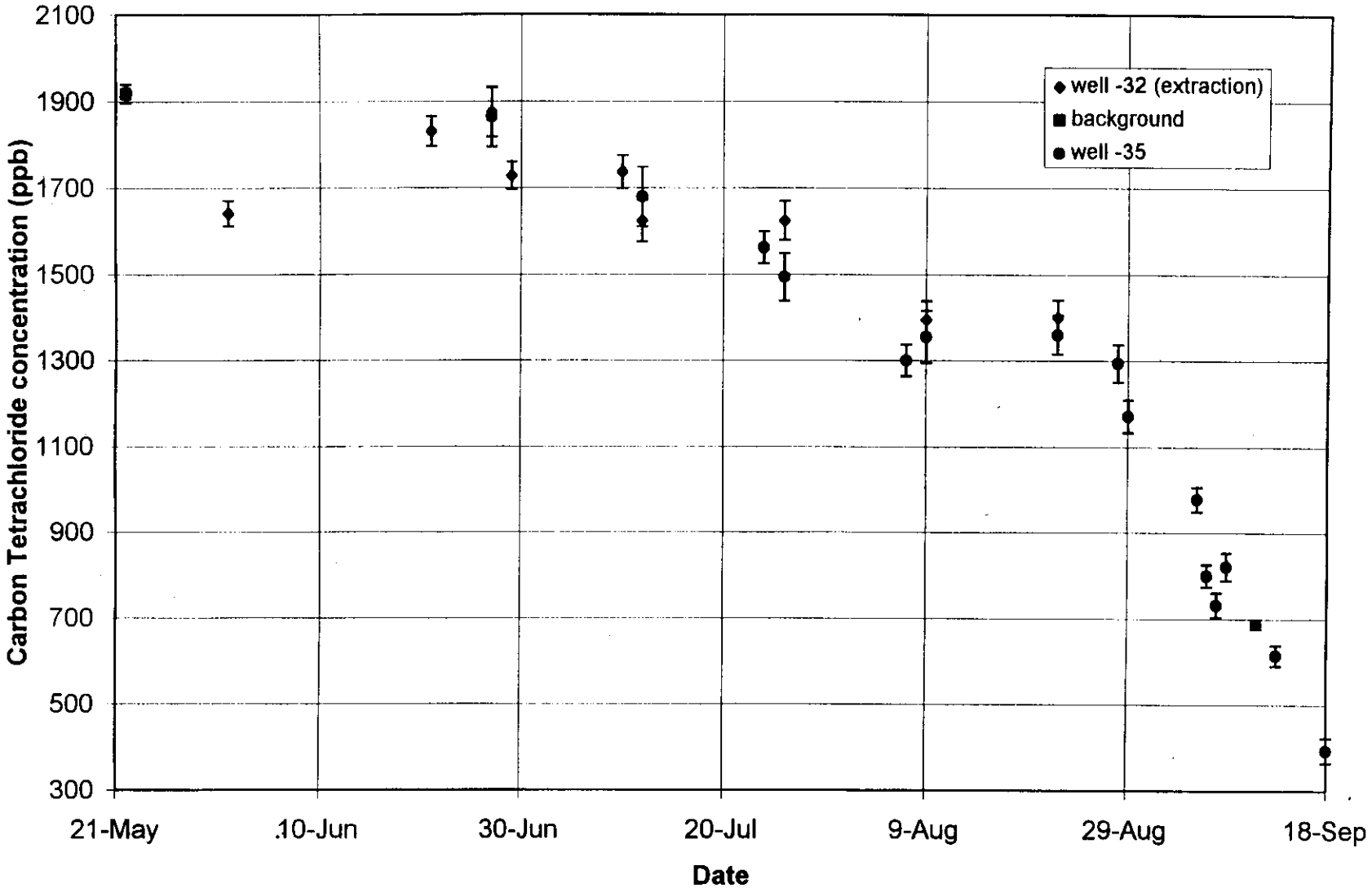
Phase II Operation

- System Baseline revalidated without nutrient supplements
  - Carbon tetrachloride at 2 mg/L
  - Nitrate at 250 mg/L
- Build Biomass
  - Acetate pulsing initiated promoting rapid denitrification (Day 0-5)
  - Biomass development promoted through sequential acetate/nitrate pulsing (Day 6-7)
- Problem solution period
  - Extraction well fouling due to acetate breakthrough (Day 7)
  - Pumping continued without nutrient addition to clear well (Day 7-13)
  - Cycled pumping to clear excess nitrite and allow development of nitrite-reducing population (Day 13-26)
- Steady state operation
  -Acetate/nitrate pulsing maintained (Day 26-90+)
- Chloroform testing
  - Show CF production conditions

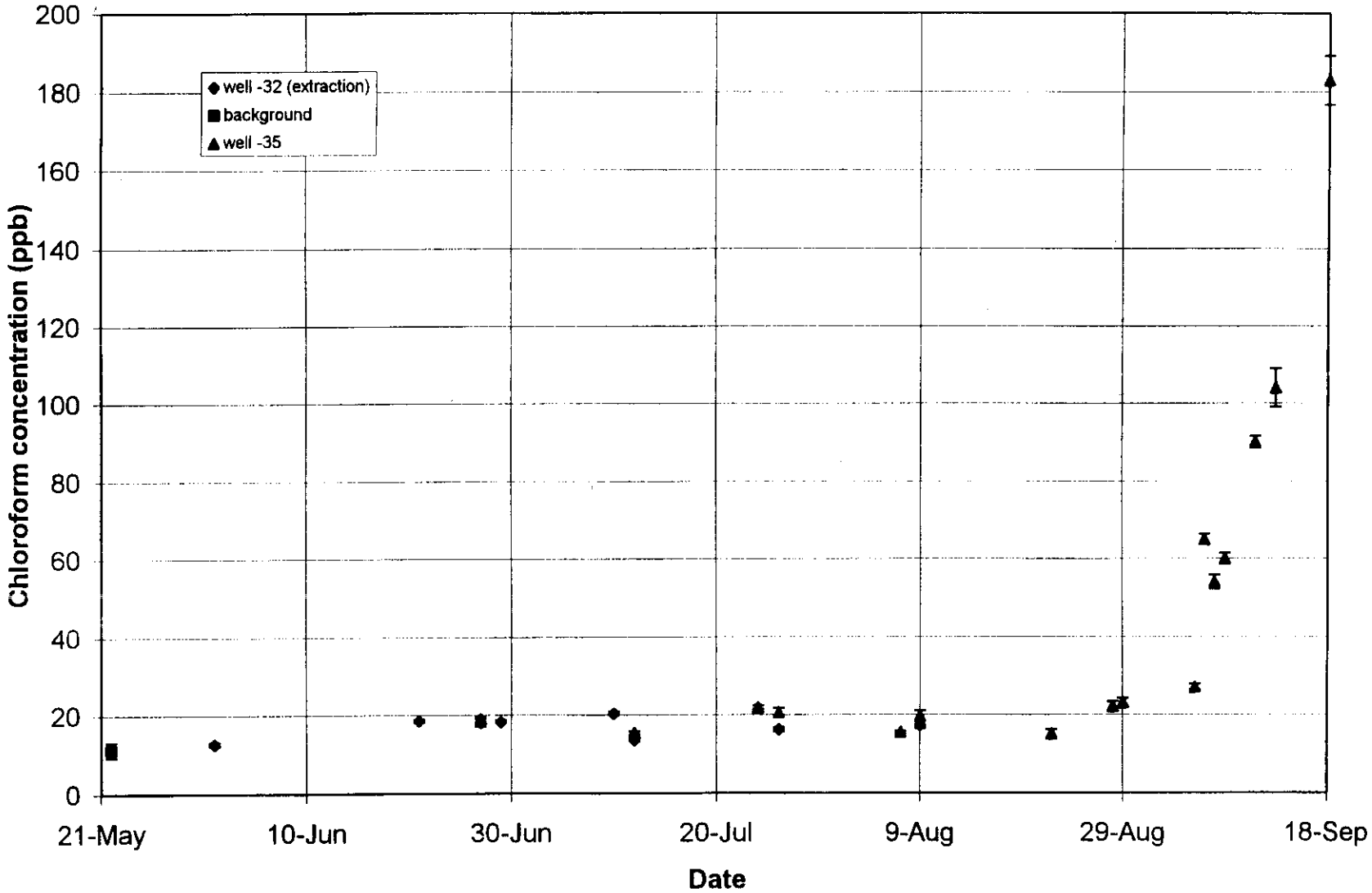
Carbon Tetrachloride Concentration During Active Bioremediation



Phase II Carbon Tetrachloride Average Concentrations at the Extraction Well and Well -35 Compared to Phase I Data



Phase II Chloroform Average Concentrations at the Extraction Well and Well -35 Compared to Phase I Data



Summary of Phase II Results

- Demonstrated indigenous, subsurface microbes can degrade carbon tetrachloride and nitrate *in situ*
- Operated the *in situ* bioremediation system longer than any similar known system without plugging
- Demonstrated bioremedial process design and control
  - No CF production
  - Validated CF production conditions
- Enhanced both development and field validation of bioremediation simulation tools
- Physical constraints inhibited process effectiveness for volumetric treatment

Phase III

- Eliminate constraints so we can use different operating strategies
  - Better hydraulic control (increased flow rates)
  - Use of skewed pulses
    - Better CT destruction rates
    - Better biomass distribution control
- Work with industrial partners
- Understand full scale implications

INFORMATION USED TO DETERMINE LISTING

- INTERVIEWS WITH PFP OPERATORS WERE USED TO CONFIRM THAT THE CCL_4 WAS USED AS A DEGREASER
  (DSI's DATED APRIL 11 AND 27, 1994 ARE ATTACHED)

- FRANK WALTERS SAID THAT CCL_4 WAS USED IN THE FABRICATION LINE TO DEGREASE PLUTONIUM SHAPES AND THEIR SHAVINGS.

- GREG BERGQUIST NOTED THAT CCL_4 WAS USED IN THE FOLLOWING METAL OPERATIONS: BUTTON CLEANING, AS A COOLANT DURING MACHINING, DEGREASING, AND FINAL SHAPE CLEANING.

- JOE ROEMER SAID THEY USED LARD AND CCL_4 TOGETHER TO DO THE MACHINING AND THAT IT WAS VERY LIKELY THAT THEY USED IT TO DEGREASE THE SHAPES SINCE THEY WERE THEN TRANSFERRED TO A DENSITY BALANCE THAT USED PCE TO MEASURE THEIR WEIGHT.

PROCESS HISTORY

- PFP IS A CHEMICAL PROCESSING FACILITY DESIGNED TO PROCESS HANFORD GENERATED PLUTONIUM TO A FINAL PRODUCT FORM
- THE FACILITY BEGAN OPERATION IN 1949
- RECUPLEX AND PRF WERE ESTABLISHED TO RECOVER PLUTONIUM FROM THE PROCESS STREAMS AND ARE THE PRIMARY CONTRIBUTORS OF CCL_4 TO THE PFP SOILS
- TOTAL QUANTITY OF CCL_4 DEPOSITED TO SOIL FROM ALL PFP ACTIVITIES OVER THE OPERATIONAL HISTORY OF RECUPLEX AND PRF RANGE FROM 370,000 LITERS TO 620,000 LITERS

PRF	280,000 TO 310,000 LITERS
MACHINE OIL	11,000 11,000 LITERS
RECUPLEX	83,000 TO 300,000 LITERS
TOTAL	370,000 TO 620,000 LITERS

CCL_4 USES AT PFP

- TWO SOLVENTS WERE USED FOR THE ENTIRE PERIOD OF PLANT OPERATION.
  - AN 85:15 RATIO (BY VOLUME) OF CCL_4 TO TBP WAS USED IN THE EXTRACTION AND STRIPPING COLUMNS FOR THE BULK OF THE SEPARATIONS.
  - A 50:50 RATIO OF CCL_4 TO DBBP WAS USED FOR BATCH REWORK OF PROCESS RAFFINATE THAT DID NOT MEET DISCHARGE SPECIFICATIONS BECAUSE OF PLUTONIUM CONCENTRATION.
- 75% TO 85% CCL_4 IN COMBINATION WITH TBP, DBBP, AND TRACE MONOBUTYL PHOSPHATE WAS DISCHARGED TO THE Z-9 CRIB
- AN 80:20 MIXTURE OF CCL_4 AND LARD OIL WAS USED AS A LUBRICANT ON PFP PLUTONIUM CUTTING AND MILLING TOOLS

INFORMATION USED TO DETERMINE LISTING

- INTERVIEWS WITH PFP OPERATORS WERE USED TO CONFIRM THAT THE CCL_4 WAS USED AS A DEGREASER (DSI's DATED APRIL 11 AND 27, 1994 ARE ATTACHED)

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ACTIONS TO BE COMPLETED

- ESTIMATED VOLUMES GENERATED FROM THE PROJECTS
- PROPOSED REGULATORY DETERMINATIONS
- OTHER STRATEGIES IMPLEMENTED AT HANFORD

RECOMMENDED ACTION

- SINCE THERE IS SOME QUESTION AS TO HOW THE CCL_4 WAS USED AND WHERE IT WAS DISCHARGED, RL RECOMMENDS THAT A RCRA EXPERT (SUCH AS BARRY VEDDER) WALK THROUGH THE PROCESS WITH ONE OF THE OPERATORS TO GAIN A CLEAR UNDERSTANDING OF HOW THE CCL_4 WAS USED AND DISCHARGED

CARBON TETRACHLORIDE DISCHARGED TO SOIL AT Z PLANT, 200 WEST AREA, HANFORD SITE

1.0 PURPOSE AND SCOPE

This paper is an account of operations at the Plutonium Finishing Plant (PFP) (originally called Z plant) from 1955 to 1973 as it pertains to the non-malicious environmental discharge of carbon tetrachloride. The account is compiled from eye-witness descriptions, existing documentation, and includes a recent study performed by D. H. DeFord. The report by DeFord has been interpreted with the aid of seven years engineering experience at the PFP.

The report by D. H. DeFord of the Technical Baseline Section, Environmental Engineering Group, Westinghouse Hanford Company (WHC) was performed at the request of the Geology Section, Geosciences Group, WHC, in support of the 200 West Area Carbon Tetrachloride Expedited Response Action. Its purpose was to identify and document historical evidences of the nature and quantity of carbon tetrachloride (CCl_4) deposited to the soil column in the area of the Z Plant, 200 West Area, Hanford Site, Washington.

This report was performed by the PFP Process Engineering section of the PFP Engineering Group, WHC, also at the request of the Geology Section, Geosciences Group, WHC.

2.0 EXECUTIVE SUMMARY

CCl_4 disposed of in soil at Z Plant came primarily from two sources; the Recuplex Plant and the Plutonium Reclamation Facility (PRF).

The volume thought to have been disposed of by Recuplex to the 216-Z-9 Crib ranges between 83,000 and 300,000 liters.

A minor amount of CCl_4 was discharged from the PRF ancillary waste treatment facility, Reclamation-Waste Treatment Facility (RWTF), located in 242-Z. However, this facility was operated concurrently with PRF and was not considered as a separate operation.

The volume of CCl_4 thought to have been disposed of by PRF to the 216-Z-1 Crib Complex (216-Z-1 and -2 Cribs and 216-Z-1A Tile Field) and to the 216-Z-18 Crib ranges between 280,000 and 310,000 liters.

About 11,000 liters of CCl_4 is thought to have been discharged from Z Plant as a component of cutting oil, a lubricant for the machining of metal parts.

The total quantity of CCl_4 deposited to soil from all Z Plant facilities over the operational history of Recuplexand PRF may therefore be represented as a range of 370,000 to 620,000 liters.

*	PRF	280,000	to	310,000 liters
	Machine oil	11,000		11,000 liters
	Recuplex	83,000	to	300,000 liters
	TOTAL	370,000	to	620,000 liters

3.0 BACKGROUND

Z Plant (currently called the PFP) is a complex of chemical processing facilities designed to process Hanford generated plutonium to a final product form as dictated by US government demand. Uranium bearing fuel rods were irradiated in one of the several Hanford production reactors; a process which creates plutonium from uranium. The irradiated rods were processed through one of Hanford's chemical separation facilities where the plutonium was extracted and transferred as plutonium nitrate to Z Plant.

Z Plant then processed the plutonium nitrate to a final form on one of three process lines; RG-RB from 1949 to 1953, the RMA Line from 1953 to 1979, and the RMC Line from 1960 to present. Each of these process lines generated side streams which contained recoverable plutonium.

Recuplex and PRF were established to recover plutonium from these streams and are the primary contributors of CCl_4 to Z Plant soils. (Ballinger and Hall 1989, Bramson 1989, Venetz, 1991)

3.1 RECUPLEX OPERATIONS

Recuplex operated from 1955 to 1962, utilizing solvent extraction column technology to recover plutonium from various Z Plant streams. Carbon tetrachloride was used extensively in the solvents used in this facility.

There were two major paths for the release of CCl_4 to the environment during operation of Recuplex. One was the direct discharge of solvents; the other was evaporative losses. Carbon tetrachloride is a volatile liquid at room temperature. Anywhere the solvent contacted air, evaporation would occur. A large fraction of the CCl_4 brought into the plant was undoubtedly lost through evaporation caused by tank level instrumentation and spills/leakage to the secondary containment. It is not clear if more CCl_4 was lost through evaporation , but, it is conceivable that less than half of the * CCl_4 consumed by Recuplex was discharged as liquid. Because of this, records of plant consumption of CCl_4 would not be of any use.

Two solvents were used for the entire period of plant operation. An 85:15 ratio (by volume) of CCl_4 to TBP was used in the extraction and stripping columns for the bulk of the separations. A 50:50 ratio of CCl_4 to dibutylbutyl phosphonate (DBBP) was used for batch rework of process raffinate that did not meet discharge specifications because of plutonium concentration.

Other ratios of CCl_4 to TBP were tested during the semi-works (pilot) period of operation and used during plant operation, but 85:15 gives the most conservative estimate and is used for all Recuplex waste volume calculations in this report.

With exposure to ionizing radiation and nitrous acid, the TBP within the solvent would gradually degrade to dibutylphosphate (DBP). Dibutylphosphate has a much greater affinity for plutonium than TBP and would not work in the process. The degraded solvent was periodically discharged batch-wise and replaced with fresh solvent. Each batch of TBP-based solvent was approximately 200 liters. All solvent discharges were received by the 216-Z-9 Crib, a facility designed to distribute liquids in soil.

On occasion, through a process upset, aqueous raffinate from the primary extraction (CA) column would exceed the maximum allowable plutonium concentration. At some point in the operation of Recuplex, a flowsheet was developed to economically reclaim plutonium from this, often extremely dilute, stream.

To reclaim plutonium from the CA column raffinate, a batch of raffinate was mixed with DBBP solution. The DBBP, like DBP, has a high affinity for plutonium. The organic would extract most of the plutonium leaving an aqueous phase which usually met the waste discharge concentration specification. The aqueous was discharged and the DBBP solution was stripped, providing for the recycle of plutonium to the Recuplex feed. The DBBP solution was then discharged to the 216-Z-9 Crib. Each batch of DBBP-based solvent was approximately 100 liters.

The DBBP solution was not retained because of the danger of mixing it with the TBP-based solvent. It had to be kept completely separate from the TBP based solvent because the two would ruin each other's properties if mixed.

Carbon tetrachloride was also used in the '50s and '60s mixed with lard to make cutting oil for the machining of warhead parts. There are many records of cutting oil discharged to soil.

3.2 PRF OPERATIONS

Recuplex operation was discontinued after a criticality incident on April 7, 1962 and it was replaced in 1964 by PRF which operated until 1979; and again from 1984 to 1987. (Ballinger and Hall, 1989 and Venetz, 1991) The facility is scheduled to resume operation in late 1991.

PRF had essentially the same mission as Recuplex and utilized similar but superior solvent extraction column technology with CCl_4/TBP as the extractant. Sloat, 1967, reports that a 80:20 ratio (by volume) was used; this ratio has remained the same to this date.

Solvent degradation continued to be a problem and degraded solvent was again disposed of to the soil column, this time through the 216-Z-1A and 216-Z-18 Cribs. The 216-Z-1 and -2 Cribs received PRF solvent wastes for about one month from May until June, 1966 and again in October 1967. (HISS Data Base) No solvent was sent to cribs after May 1973. (Nelson-Olson Memo)

An americium separation facility, the RWTF, was added on to PRF and also began operation in 1964. This facility used a 70:30 ratio (by volume) of CCl_4 to DBBP.

No other Z Plant facilities discharged significant quantities of CCl_4 to the soil column. No other Z Plant waste disposal sites are recognized to have received significant amounts of CCl_4. This report quantifies the volume of solvent discharged to the soil column at the 216-Z-9, 216-Z-1 Complex, and 216-Z-18 Cribs.

4.0 WASTES DEPOSITED TO SOIL FROM RECUPLEX

The 216-Z-9 Crib received all solvent and aqueous wastes discharged to soil by the Recuplex facility. No other cribs were used for this purpose. 216-Z-9 received wastes from no other facility.

216-Z-9 is an enclosed trench located about 700 feet east of the 234-5Z Building and about 500 feet south of 19th Street. It is a 60 X 30 X 21 foot deep trench with a concrete cover. Waste was transferred by gravity through two 1.5 inch stainless steel lines which entered the crib about 17 feet above its bottom. (WIDS)

The total volume of all types of liquid waste discharged to 216-Z-9 is reported by English-Mercer, 1984, as 4,090,000 liters of "aqueous and organic waste from 234-5." This figure is confirmed by Law, 1991 and by Ludowise, 1978.

Data on the quantity of CCl_4 discharged to 216-Z-9 comes from several sources.

WIDS	Reports the presence of organic and aqueous wastes but fails to quantify it. It does quantify numerous inorganic components.
Interviews	Five interviews were conducted with past or present Z Plant personnel which provided information on quantities of organic compounds discharged to the 216-Z-9 Crib from Recuplex operations.

Shift Log

Two Recuplex Shift Logs (Operators Logs) exist and were reviewed for this report. These are Logs numbered 21 and 22 which cover a period from January 29, 1962 to April 7, 1962. All other logs appear to have been destroyed in accordance with applicable records control schedules. Information recorded in the logs was used only to jog memories concerning operating practices.

Name	Quantity Reported
Gil Wagenaar	2 batches/shift maximum 1 batch/9 shifts minimum
Frank Walters	5 batches/14 shifts
Donald Schmale	4 drums of CCl_4/28 shifts
Donald Nelson	1 batch/14 shifts
Joseph Teal	1 batch/14 shifts

* In each case except Schmale, interviewees recall solvent discharge in terms of batches discharged per shift or per week. Don Schmale recalls solvent consumption in terms of drums consumed per week.

These interviews appear to provide a very wide range of volume estimates. Upon closer examination, it appears that the estimates do not conflict. The following observations are useful for judicious interpretation of the interview data.

Mr. Wagenaar was a Recuplex Chemical Technician who routinely accomplished the transfer of waste treatment solvents to the 216-Z-9 Crib. He also appears to enjoy a good memory and is clearly a qualified observer. Mr Wagenaar provided the highest estimates of organic discharge frequency. It should be observed, however, that Mr. Wagenaar was referring to DBBP-based rather than TBP-based solvent.

Mr. Walters's estimate of the DBBP-based solvent discharge frequency was close to the middle of the range provided by Mr. Wagenaar.

The estimate of CCl_4 consumption provided by Mr. Schmale is rejected as an estimate of the CCl_4 discharged to the soil for reasons previously mentioned.

Messrs. Teal and Nelson provide equal estimates of the frequency of TBP-based solvent discharge. Mr. Nelson worked at Recuplex from 1955 until 1961 and was directly involved in Recuplex operation. He is a qualified observer and seems to enjoy good memory. Mr. Teal was a Recuplex manager who was less directly involved in Recuplex operation than Nelson or Wagenaar, but feels that his knowledge of its activities is adequate for his estimate. His memory also appears to be good.

In telephone interviews with Messrs. Dave Underwood, Recuplex shift manager - retired and Martin Curtis, Recuplex shift engineer - retired, both indicated the average discharge frequency for TBP-based solvent was much lower than once per shift, but neither were able to recall clearly enough to quantify. When a frequency of one batch per week was suggested, both individuals indicated that was a reasonable frequency.

In a telephone interview with Bob Van der Cook, process engineer, active, he indicated that TBP-based solvent was not discharged very often because of its value and scarcity (at that time). Mr. Van der Cook explained that efforts to reduce loss of solvent led to new techniques such as addition of iron to feeds to remove DBP in the extraction column through the raffinate.

Classified, compiled weekly operating reports for CY1961 remark that the loss of TBP solvent to the crib had been cut in half due to washing of this solvent with sodium carbonate. Meekly reports for CY1962 remarked several times that the process had been shut down to accommodate washing of the solvent, a process that would not be necessary if the solvent was to be sent to the crib. The time and effort expended to wash the solvent support the comments of Mr. Van der Cook.

From these interviews, it is possible to estimate the average quantity of CCl4 discharged to the environment per shift. The estimates follow.

Solvent Base	batch size (liters)	Composition (% CCl_4)	Frequency ($shift^{-1}$)	Mean Discharge Rate (liters/shift)
DBBP	100	50	1	50
TBP	200	85*	0.0714	12

* conservative

The average total CCl_4 discharged per shift is estimated at 62 liters. The number of shifts operated per year was limited by equipment failures, process upsets, labor disputes, support services failures, etc.. The amount of operating time per year for a few years follows.

Period	Scheduled Operating Hours	Days per Week	On-Line % Efficiency	Source
1955	2,200	5	30	Judson, 1956
1958	8,160*	7*	65.1**	HW-54307 (confidential)
1959	8,160*	7*	69.6**	HW-58705 RD (confidential)
1960	8,160*	7*	70.4**	HW-63362 RD (confidential)
1961-1962	11,040	7	67.9**	HW-67999 RD (secret); HW-72224 RD (secret)

* estimated
** estimated from average daily flows with 2230 liters = 100%

Recuplex flowsheets varied, so the 100% basis used was 100% in January of 1960. Usually, if the feed stream flow rate was modified, most other streams were modified correspondingly.

From the average On-Line Efficiency for 1958 through 1962, the On-Line Efficiency for 1956 and 1957 is estimated as 68.2%. It is estimated that Recuplex operated on the same schedule from start-up under the Manufacturing Department on January 1, 1956 to the criticality incident on April 7, 1962.

The number of January, 1960 based shifts of time operating and the resulting CCl_4 discharge in each year is computed to be:

Period	Possible Operating Shifts	Equivalent Shifts Operated	Liters CCl_4 Discharged
1955	275	83	5,120
1956	1,095	748	46,400
1957	1,095	748	46,400
1958	1,095	713	44,200
1959	1,095	762	47,300
1960	1,095	771	47,800
1961-1962	1,380	937	58,100

Total CCl_4 discharged as liquid: 300,000 liters

Reports

Bruns, 1973, reports the following quantities of CCl_4 deposited to the 216-Z-9 Crib:

- 75-85% CCl_4 in combination with TBP, DBBP and trace monobutyl phosphate (MBP).
  - 102 metric ton CCl_4
- Cutting oil: 50% CCl_4 in combination with Lard Oil
  - 30 metric ton CCl_4

Combined, these represent approximately 83,000 liters of CCl_4 deposited to the 216-Z-9 Crib.

This estimate was made by L. E. Bruns, a very objective and very knowledgeable individual, and is therefore very credible. This low estimate also agrees with the few remarks in early operating reports that indicated great reluctance to discharge solvent. Most of these remarks were made prior to 1960.

In summary, the following volumes of CCl_4 have been reported to have been discharged from Recuplex to the 216-Z-9 Crib:

Reconstruction of events	300,000 liters
Bruns, 1973	83,000 liters

5.0 WASTES DEPOSITED TO SOIL FROM PRF

Solvent and plutonium bearing aqueous wastes from PRF were deposited to soil primarily through the 216-Z-1A Tile Field and the 216-Z-18 Crib. The 216-Z-1 and -2 Cribs received PRF wastes for two short periods of time. No other waste sites are known to have received PRF solvent wastes. The following history describes the use of the 216-Z Crib Complex associated with PRF (Owens, 1981).

SERVICE DATES FROM	TO	FUNCTION
6/49	6/52	216-Z-1 and -2 Cribs and the Z-1A Tile Field received process, analytical and development lab wastes from 234-5Z Bldg. via the 241-Z-361 Settling Tank.
6/52	3/59	216-Z-1 & 2 were bypassed. 216-Z-1A Tile Field received the above wastes via overflow from 216-Z-3 Crib.
3/59	5/64	All portions of this site were inactive.
5/64	8/64	216-Z-1 & 2 were still inactive. 216-Z-1A received aqueous and organic waste from PRF (236-Z and 242-Z Bldgs).

8/64 5/66	Same as above plus 242-Z Waste Treatment and Americium Recovery Bldg waste.
5/66 6/66	216-Z-1 & 2 received 236-Z Bldg aqueous and organic waste and 242-Z Bldg waste: the distribution point in 216-Z-1A Tile Field was moved from the A section 100 ft down the main trunk to the B section.
6/66 10/67	216-Z-1 & 2 were inactive; section B of the 216-Z-1A Tile Field received aqueous and organic waste from 236-Z Bldg and from the 242-Z Building.
10/67 10/67	216-Z-1 & 2 received 236-Z and 242-Z Bldg wastes while the discharge point was moved 75 feet further down the main trunk from the B section to the C section.
10/67 3/68	216-Z-1 & 2 were inactive; 216-Z-1A Tile Field received 236-Z and 242-Z Bldg wastes.
3/68 4/69	216-Z-1A Tile Field continued to receive the above wastes; 216-Z-1 & 2 received uranium wastes from 236-Z and 242-Z Bldgs.
4/69 -	All portions of the 216-Z 1, 2, and 3 Cribs and 216-Z-1A Tile Field were retired.
4/69 5/73	216-Z-18 Crib received waste from 236-Z and 242-Z Bldgs.
5/73 -	216-Z-18 retired.

The 216-Z-1 Crib Complex is located about 500 feet south of the 234-5Z Building.

The 216-Z-1 and -2 Cribs consist of two wooden box structures arranged in a north-south line. Each is 12 X 12 X 14 feet high and is constructed of 6 X 6 inch timbers and has an open bottom. Each stands in a 14 foot square by 21 foot deep, back-filled excavation. 216-Z-2 Crib overflowed into 216-Z-1 Crib which overflowed to the 216-Z-1A Tile Field. These cribs received PRF wastes for one month in 1966 and another month in 1967 while modifications were being made to the 216-Z-1A Tile Field.

The 216-Z-1A Tile Field is immediately south of the 216-Z-1 Crib and consists of a 260 foot long north-south running trunk with seven pairs of 70 foot laterals, all at an average depth of 19 feet below grade. All tile field piping is 8 inch perforated vitrified clay pipe. The tile field was divided into three operational sections to preclude waste build-up at the upper (northern) end of the field.

The 216-Z-18 Crib is a drain field type crib located southwest of the 216-Z-1A Tile Field and about 1,000 feet south of the 234-5Z Building. It consists of five parallel, north-south oriented, excavations, each 207 X 10 X 18 feet deep. A 300 foot long, 3 inch diameter steel pipe runs east and west, bisecting the length of each excavation. Two 100 foot long, 3 inch diameter perforated, fiberglass reinforced, epoxy pipes exit each side of the steel pipe in each excavation (two lines north and two lines south). These distribution lines are one foot above the crib bottom in a 2 foot thick bed of gravel. The excavation is back-filled to grade. (WIDS)

Each of these waste sites received CCl_4 but most references do not specify into which specific waste site(s) the CCl_4 was deposited. However, although not attempted here, it should be possible to determine distribution of the CCl_4 by correlating operating history of each facility with historical crib activity.

The total volume of all types of liquid waste deposited to PRF waste sites is reported by Brown et al 1990, and confirmed by Law 1991, as follows:

216-Z-1 & 2 Cribs	33,700,000 liters
216-Z-1A Tile Field	6,210,000 liters
216-Z-3 Crib*	178,000,000 liters
216-Z-18 Crib	3.860,000 liters
Total	221,770,000 liters

* 216-Z-3 is included here even though it preceded PRF operations because it overflowed into the 216-Z-1A Tile Field and contributed to its total volume.

Data on the quantity of CCl_4 discharged to soil from PRF comes primarily from the following two sources. Three other sources have been identified by DeFord, however, these sources are incomplete. These are the WIDS, the Essential Materials Log, and some work by Sloat prior to 1973. These data sets are known to offer incomplete data. The two that contain complete data sets provide estimates of 280,000 and 310,000 liters of CCl_4 deposited to soil by PRF.

English-Mercer 1984, reports $4.97X10^5$ kg (310,000 liters) of CCl_4 deposited to PRF waste sites. It also reports quantities of TBP and DBBP.

	216-Z-1A	216-Z-18	TOTAL
CCl_4	$2.37X10^5$ kg	$2.6X10^5$ kg	$4.97X10^5$ kg
TBP	$3.0\ X10^4$ kg	$2.2X10^4$ kg	$5.2\ X10^4$ kg
DBBP	$2.03X10^4$ kg	$1.5X10^4$ kg	$3.53X10^4$ kg

It should be noted that process solvents are kept at specified compositions by a process known as "butting." Normally, the process solvent is routinely sampled and analyzed for specific gravity. Composition is inferred from this analysis result. Commonly, the specific gravity is found to be lower than a target value (because of evaporation) characteristic of a 80:20 CCl_4 to TBP ratio. When this occurs, CCl_4 is added to the process solvent (the solvent is butted with CCl_4) to correct the solvent composition.

Both TBP and DBBP are very insoluble in water, and both have very low vapor pressures. Because of this and that at all times during operation the composition of the solvent is well controlled, consumption of TBP and DBBP should provide keys to an excellent estimate of the CCl_4 discharged in liquid form from PRF. This estimate comes to 300,000 liters, which corroborates the above estimate of CCl_4 discharge.

9113186.2543

The Crawley-Olson Memo 1974, provides a May 15, 1973 date for discontinuance of waste solvent discharges to soil and provides limited data on CCl_4 evaporation. It also reports CCl_4, TBP and DBBP consumption at PRF as follows:

1,838 drums (380,000 liters) CCl_4 less 61 drums not dumped after May 1973
71,144 pounds DBBP
106,080 pounds TBP

Of course, the above estimate of CCl_4 consumption cannot be used to estimate discharge to ground because of the effects of evaporation. An estimate of the liquid CCl_4 discharged can be made from the consumption estimates for TBP and DBBP as previously described. This estimate is

280,000 liters CCl_4.

This estimate can be used to estimate the amount of CCl_4 discharged to the atmosphere. This estimate is

175 tons (short) CCl_4.

This estimate is quite reasonable because discharge of CCl_4 to the atmosphere in the 1984-85 time frame was close to 20 tons per year according to records of consumption. Dividing the 175 tons between the nine years from 1964 to 1973 gives nearly 20 tons per year.

This memo reports CCl_4 consumption by year and closely approximates data in the Essential Materials Log, adding validity to both documents. Crawley also reports data for 1964-1967, years of PRF operation omitted by the Essential Materials Log. These data may be the most reliable available to estimate CCl_4 consumption at PRF and provides the lower limit of the range of quantities disposed of to soil by PRF.

From the previous estimate, about 26% of the CCl_4 consumed was lost to evaporation. Crawley suggests that 37% of CCl_4 was lost to evaporation prior to batch make-up. An additional quantity was lost to evaporation during extraction column operation. The estimate by Crawley is discounted in favor of the agreement between the overall evaporation derived from the data set and recent operating experience.

R.J. Sloat, 1967, provides information on quantities of CCl_4 introduced to the 216-Z-1A Tile Field from 1964 to 1967. As such, it is incomplete for the purpose of this report and is not used.

The Essential Materials Log is a record of essential materials consumed by Hanford operational facilities. It provides 'supply-side data' which derives from physical inventories conducted monthly by materials management personnel. This source reports 1,238 drums (260,000 liters) of CCl_4 charged to the PRF chemical inventory during 1967-1973. It provides no data for years prior to 1967 and is therefore incomplete for the purpose of this report and is not used.

The WIDS data base reports 163,000 liters of CCl_4 deposited to soil by PRF but reports only that portion deposited to the 216-Z-18 Crib between 1969 and 1973, failing to report quantities deposited to other cribs for the years between 1964 and 1969. It is therefore incomplete for the purpose of this report and is not used.

Interviews were conducted with the same operations personnel named in section 4.0 for Recuplex operations. These tended to verify data provided by Crawley-Olson and English-Mercer. They also verified that most CCl_4 delivered to PRF was used in the solvent extraction process and, when degraded through repeated use, the solvent was disposed of to soil through the subject waste sites until these discharges were discontinued in 1973.

In summary, the following volumes of CCl_4 are reported to have been deposited to soil by PRF:

English-Mercer, 1984	310,000 liters.
Crawley-Olson Memo, 1974	280,000 liters.

6.0 OTHER SOURCES OF CCl_4 WASTES

Another source of CCl_4 discharged to soil at Z Plant was cutting oil, or fabrication oil; a 80:20 mixture of CCl_4 and lard oil used as a lubricant on Z Plant plutonium cutting and milling tools. CCl_4 was used further to clean the cutting oil from the millings and work surfaces, and some of the oil/CCl_4 waste was disposed of to the same cribs used for solvent extraction column liquid waste disposal. Sloat, 1967, estimates that about 6,000 gallons (22,000 liters) of this solution was accumulated and "washed in 10M HNO_3 to remove the plutonium. After washing, the fabrication oil is routed to the Z-1A tile field." According to Owens, 1981, by this time the solution had reduced through evaporation to 50:50 CCl_4 and lard oil.

This gives an estimated total liquid CCl_4 discharge in combination with lard oil of 11,000 liters.

7.0 LOSSES DUE TO EVAPORATION

It is clear from interviews with past and present employees that significant amounts of CCl_4 were lost to evaporation at Recuplex and PRF. The amounts of loss are unclear. Interviewees agree that Recuplex lost far more than did PRF, and that the amounts lost were significant. When asked how much was lost, terms such as "lots" and "large amounts" are used, but most could not quantify the amounts. When asked if the amount was "more like 3% or 30%?", David Crawley answered, "it was more like 30%."

All interviewees report that evaporation made it necessary to frequently add "large amounts" of CCl_4 to extraction column solvent batches to return specific gravity to the desired level, suggesting that the rate of evaporation was indeed considerable.

As previously mentioned, the Crawley-Olson memo indicates that 26% of the CCl_4 consumed was lost to evaporation.

8.0 SUMMARY

This report presents widely ranging quantitative data which do not lend themselves to finite quantities of CCl_4 deposited to soil from Recuplex or PRF. Rather, all values are necessarily presented as ranges.

Recuplex operations reportedly deposited from 83,000 to 300,000 liters of CCl_4 to soil. This range is based on estimates provided by past Recuplex employees and is supported by additional data sources which fall within the range.

Accepting the Crawley-Olson Memo as a lower limit and the English-Mercer Memo as the upper, a range of 280,000 to 310,000 liters is suggested for PRF generated CCl_4 deposited to soil.

The following range is thereby suggested for CCl_4 deposited to soil from the two Z Plant facilities.

Recuplex	83,000	to	300,000 liters	
Machine oil	11,000		11,000 liters	
PRF	280,000	to	310,000 liters	
TOTAL	370,000	to	620,000 liters	CCl_4

9.0 BIBLIOGRAPHY

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9.1 INTERVIEWS

Interviews or telephone conversations were conducted with the following current or past Hanford employees as follows:

NAME	DATE INTERVIEWED	JOB TITLE AND DATES WORKED
Glen Chronister	February 15, 1991	Operations Manager, PRF
David Crawley	March 22, 1991	Chemical Engineer, Recuplex and PRF, 1961-1986
David Dodd	April 1, 1991	Chemist, Recuplex and PRF 1962 to present
Jack Hogan	February 13, 1991	Essential Materials Manager
Maria McDonald-McNamar	May 2, 1991	Chemical Engineer, PFP 1990-1991
Ernie Mincie	February 15, 1991	Recuplex Technician
Donald Nelson	February 20, 1991	Chemical Technician, Recuplex, 1955-1961

Donald Schmale	February 13, 1991	Chemical Technician, Recuplex, 1955-1961
Les Swanson	February 20, 1991	Recuplex Technician, 1955-1962
Joseph Teal	February 11, 1991	Recuplex Supervisor
Ted Venetz	April 15, 1991	PRF Cognizant Engineer
Gil Wagenaar	February 5, 1991	Chemical Technician, Recuplex and PRF, et al, 1950-1988
Frank Walters	February 13, 1991	Recuplex and Z Plant Technician.

9.2 DRAWINGS

The following Hanford Drawings describe Z Plant Waste Sites:

Z-Plant Area Plan	H-2-44511 Series
216-Z-1A Tile Field	H-2-16459
216-Z-9 Crib	H-2-15491 H-2-15492 H-2-26532
216-Z-18 Crib	SK-2-21808 H-2-26093 H-2-26094

Waste Designation Telecon Record (Jean Dunkirk, March 15, 1994)

On March 8, I spoke with Don McBride (the current ECO at PFP) regarding the potential that carbon tet may have been used historically at PFP for degreasing. He referred me to Craig Barrington and Rick Laws. Craig Barrington referred me to Joe Teal (376-9586) and Ron Walser (373-3522). Rick Laws informed me that he believed that machined parts may have been submersed into carbon tet for cleaning, and referred me for more information to Frank Walters (373-2417), Andy Anderson (373-5377), Mel Swett (373-3674), Tom Keefe (943-1407) Paul Magula, Duncan Sinclair, George Wilbur (of Yakima) George Sell (376-3591), Jim Fitzpatrick, and Bob Vandercook (373-9137).

Tom Keefe informed me that carbon tet was used at PFP for degreasing in two manners. At first, there was a vat of carbon tet, parts were placed in the vat and ultrasonic was used to clean the parts. When that practice was discovered to present a criticality hazard, a tank of carbon tet was placed on the floor above the cleaning area, and carbon tet was sprayed onto the parts to be cleaned. He had no knowledge of what happened to the spent carbon tet after the cleaning process.

Andy Anderson stated that he had no personal knowledge of carbon tet use for degreasing or disposal, but that Mel Swett would have personal knowledge.

Mel Swett informed me that carbon tet was used for degreasing in PFP. In a glove box was a well that contained heated carbon tet into which baskets of plutonium turning would be dipped for cleaning. Originally the intent was to use the carbon tet vapors for vapor degreasing, but it was found to be more efficient to dip the baskets into the well of carbon tet. The spent carbon tet would be drained to another hood, and then disposed to the Z9 crib. Mr. Swett started working the carbon tet degreasing operation in 1961. He does not know how long before that time it had been in use. In 1962, the method of disposal of the spent carbon tet was changed. After that time, the spent carbon tet was collected into five gallon cans with sorbent and was stored in that form for many years in the basement of the 2345 building, referred to as the tunnels. Eventually, these cans were removed and disposed of in over-packed barrels in on-site burial grounds. Mr Swett thought that there were probably other carbon tet degreasing operations at PFP, but this was the operation of which he had personal knowledge.

Bob Vandercook was a supervisor at PFP. He informed me that carbon tet was used in degreasing at PFP. He thought that most of the carbon tet evaporated, and that in later years, the carbon tet/lard oil mixture was placed in cans in the tunnels. I then related to him what Mr. Swett had told me, and asked him whether that was consistent with his recollection. He told me that I should believe what Mel Swett told me, that Mel had worked hands on with the carbon tet degreasing operation and that he should know what had happened. He also referred me to Joe Teal and Frank Walters for additional information.

I spoke to all of these persons on March 3, 1994. I was not able to reach Joe Teal, Frank Walters or the other persons referred by Rick Laws.

I have related the above information to Rick Pierce, Mike Romsos, and George Henckel, and suggested that they may wish to further research the carbon tet issues.

On March 10, I received from Virginia Rohay a copy of excerpts of the soil sample results for the areas being remediated by the SVE. These results show concentrations of PCE and TCE in the soil in this area, and state that it appears that the SVE is extracting the PCE from the subsurface. This information creates a need to perform a "reasonable inquiry" to determine whether the source of the PCE and TCE is an F001 or F002 waste. I requested Jon Fancher to investigate whether the canisters had been analyzed for PCE and TCE, and if so, whether any detectible levels had been found. I related this information to Mike Romsos and asked him to add the PCE and TCE issues to the waste designation efforts.

DON'T SAY IT --- *Write It!*

DATE: April 11, 1994

TO: G. C. Henckel H6-04

FROM: Sean A. Driggers H6-04

Telephone: 2-3493

cc: CCl4 ERA Project File

SUBJECT: CARBON TET USED AS A DEGREASER

I contacted Frank Walters today and asked him questions about whether CCl_4 was used as a degreaser. He said that Z Plant operated a fabrication line from 1949 until 1963-64 when it was removed and the scope of work was given to Rocky Flats. CCl_4 was used in the fabrication line to degrease Plutonium shapes and their shavings. He said the waste CCl_4 mixed with lard oil was stored in 5 gal. lard cans in the tunnels of PFP until a later time when they were treated. In the treatment process the mixture was contacted with nitric to extract the Pu and the liquid waste was sent to PRF where it was disposed of to the cribs (may have been Z-1A or Z-9 at the time). Some of the waste was incinerated at the 232-Z facility. Frank referred me to Greg Bergquist.

I contacted Greg Bergquist of PFP who examined a classified process flowsheet document looking for the uses of CCl_4 in the fabrication process. He noted that CCl_4 was used in the following metal operations: button cleaning, as a coolant during machining, degreasing, and final shape cleaning. He said the primary disposal method for the CCl_4 was to let it evaporate and go up the stack. There was no mention in the document for liquid disposal of the CCl_4. He also noted that there was no mention of TCE or PCE in the flowsheet document.

I also contacted Joe Roemer who used to work in the laboratories back when the fabrication process was operating. He said they used lard and CCl_4 together to do the machining and that it was very likely that they used CCl_4 to degrease the shapes since they were then transferred to a density balance that used PCE to measure their weight. These balances were used on the two metal lines as well as in the fabrication process. He believed that the waste CCl_4 was probably directly dumped to the cribs before they began collecting it in the 5 gal. lard cans. The lard cans were then processed in the late seventies to clean out the Pu so that the waste could then be disposed to the cribs.

Finally, I contacted Joe Teal who had been referred to me by everyone that I had talked with previously. He said he worked primarily on the metal lines until 1973 and had little to do with the fabrication process. He knew that they used lard oil to machine the parts and used CCl_4 to clean the shavings which were then incinerated. He said that the liquid waste was collected in the 5 gal. lard cans that were stored in the tunnels. The waste in the lard cans was treated in Glovebox HC-10 with a nitric acid solution, according to Ted Venetz, where the liquid solvent solution was disposed of to the 216-Z-1A crib, and the nitric was sent to a column in PRF for reprocessing. When asked about the use of PCE in the density balances he said that bromo-benzene, not PCE, was used. He gave me the name of George Wilbur, of Yakima, as the supervisor of the fabrication line to contact for more information.

DON'T SAY IT --- *Write It!* DATE: April 27, 1994

TO: G. C. Henckel H6-04 FROM: Sean A. Driggers SAD H6-04

Telephone: 2-3493

CC: CCl4 Project File

SUBJECT: AMOUNT OF CCL_4 USED IN PFP DEGREASING OPERATIONS

A calculation of the amount of CCl_4 that was used in degreasing operations at the Plutonium Finishing Plant was made based on the research conducted during the development of the Expedited Response Action Proposal (EE/CA & EA) for 200 West Area Carbon Tetrachloride Plume (DOE/RL-91-32). The proposal reports the following quantities of CCl_4 associated with fabrication processes that the plant operated between 1949 and 1963.

60 tons (44,000 L) of cutting oil: 50% volume CCl_4 in combination with lard oil was disposed to the 216-Z-9 Trench.

An additional 22,000 L of fabrication oil was accumulated in 5 gal. containers that was later processed for plutonium recovery and then discharged to the 216-Z-1A Tile Field. The composition of this waste was 50% volume CCl_4 combined with lard oil.

Approximately 15% of the fabrication oil is considered to be used in the degreasing portion of the fabrication process based on conversations with past plant personnel (Frank Walters) who worked at the facility when the process was operated.

The amount of CCl_4 used as a degreaser is calculated as follows:

Total amount of fabrication process waste disposed: 44,000 L + 22,000 L = 66,000 L.

Amount of CCl_4 in fabrication process waste: 66,000 L x 0.50 = 33,000 L

Amount of CCl_4 used as a degreaser: 33,000 L x 0.15 = 4,950 L

An estimated 363,000 L to 580,000 L of CCl_4 was disposed to the soil. Based on this estimate approximately 1.36% to 0.85% of the total amount of CCl_4 disposed to the soil is estimated to have been derived from past degreasing operations at the Plutonium Finishing Plant.

Control Number:	**200 NPL Agreement/Change Control Form** __ Change _X Agreement __ Information Operable Unit: 200-ZP-1 Groundwater	Date Submitted: September 20, 1995 Date Approved:

Document Number/Title: 200-ZP-1 Groundwater Sampling and Analysis Plan, Revision 2	Date Document Last Issued:
Originator: J. Freeman-Pollard	Phone: 372-9347

Summary Description:

Ecology, EPA, and DOE Unit Managers agree that the *200-ZP-1 Groundwater Sampling and Analysis Plan*, Revision 2, will be implemented for the 200-ZP-1 Operable Unit.

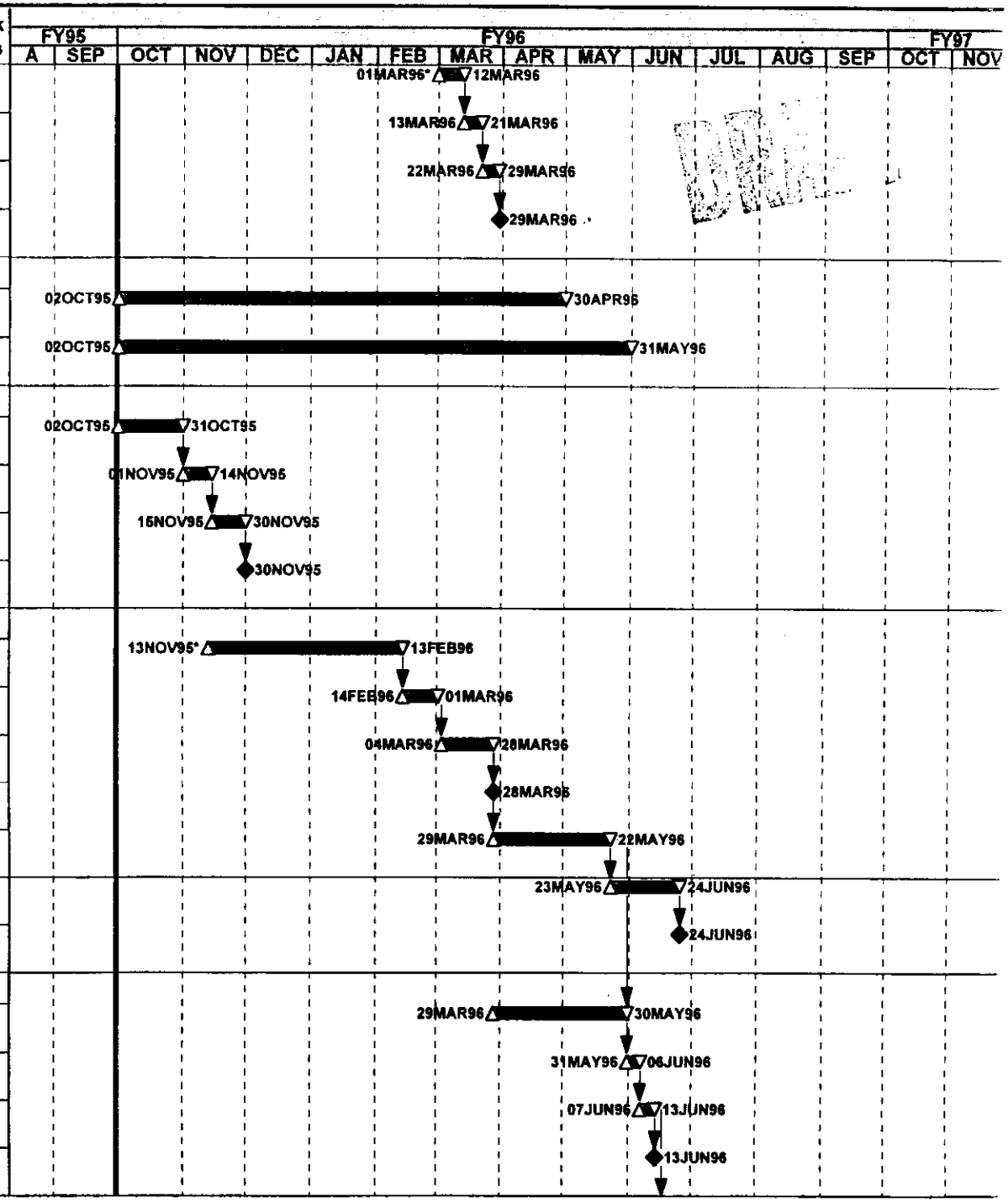
Justification and Impact of Change:

The *200-ZP-1 Groundwater Sampling and Analysis Plan*, Revision 2, incorporates changes as agreed per 200 NPL Agreement/Change Control Form Number BHI-00190. The monitoring network specified in the *200-ZP-1 Groundwater Sampling and Analysis/Quality Assurance Plan*, Revision 2, addresses the scope of the IRM as specified in DOE/RL-93-68, Rev. 3, and in the 200-ZP-1 Interim Action Record of Decision.

ERC Project Manager	Date
DOE Unit Manager	Date
Ecology Unit Manager	Date
Env. Protection Agency Unit Manager	Date

Per Action Plan for Implementation of the Hanford Consent Order and Compliance Agreement Section 9.3.

Activity ID	Activity Description	Work Days
X3PU235	PREPARE DRAFT SOIL-PARTITIONING REPORT	8
XBPU236	INTERNAL ERC REVIEW	7
XBPU237	PREPARE REV. 0 OF SOIL-PARTITIONING REPORT	6
XBPU237A	SUBMIT TO DOE	0
NUMERICAL MODELING		
XBPU238	WELLFIED CHARACT FOR NUMERICAL MODELING	146
XBPU239	REFINE NUMERICAL MODEL	168
PERFORMANCE EVALUATION REPORT (1991- JUNE 1995)		
XBPU240	PREPARE DRAFT PERFORMANCE EVALUATION REPORT	22*
XBPU241	INTERNAL ERC REVIEW	10
XBPU242	PREPARE REV. 0 OF PERFORMANCE EVALUATION REPORT	10
XBPU242A	SUBMIT TO DOE	0
FUTURE OPERATIONS STRATEGY		
XBPU243	PREPARE DRAFT FUTURE OPERATIONS STRATEGY	62
XBPU244	ERC REVIEW OF DRAFT FUTURE OPERATIONS STRATEGY	12
XBPU245	PREPARE FINAL FUTURE OPERATIONS STRATEGY	19
XBPU245A	SUBMIT FINAL TO DOE	0
XBPU245B	CONCURRENT REVIEW W/DOE & REGULATORS	39
XBPU246	PREPARE REV. 0 OF FUTURE OPERATIONS STRATEGY	22
XBPU246A	SUBMIT TO DOE	0
DOW PREPARATION FOR FY96 WELL DRILLING		
XBPU247	PREPARE DOWS FOR ALL WELLS	44
XBPU248	INTERNAL ERC REVIEW	5
XBPU249	DISPOSITION/INCORPORATE COMMENTS	5
XBPU249A	SUBMIT TO DOE	0



Project Start	28AUG95
Project Finish	30SEP96
Data Date	01OCT95
Plot Date	21SEP95

Early Bar
Progress Bar
Critical Activity

SCS5:ZP02

FY96 PLANNING
200-ZP-2
TARGET SCHEDULE

PRINTED 9/21/95

Date	Revision	Checked	Approved

Figure 3-9. Areas of Influence in Wells with Open Intervals Below Caliche–Modified Configuration (Continuous Operation).

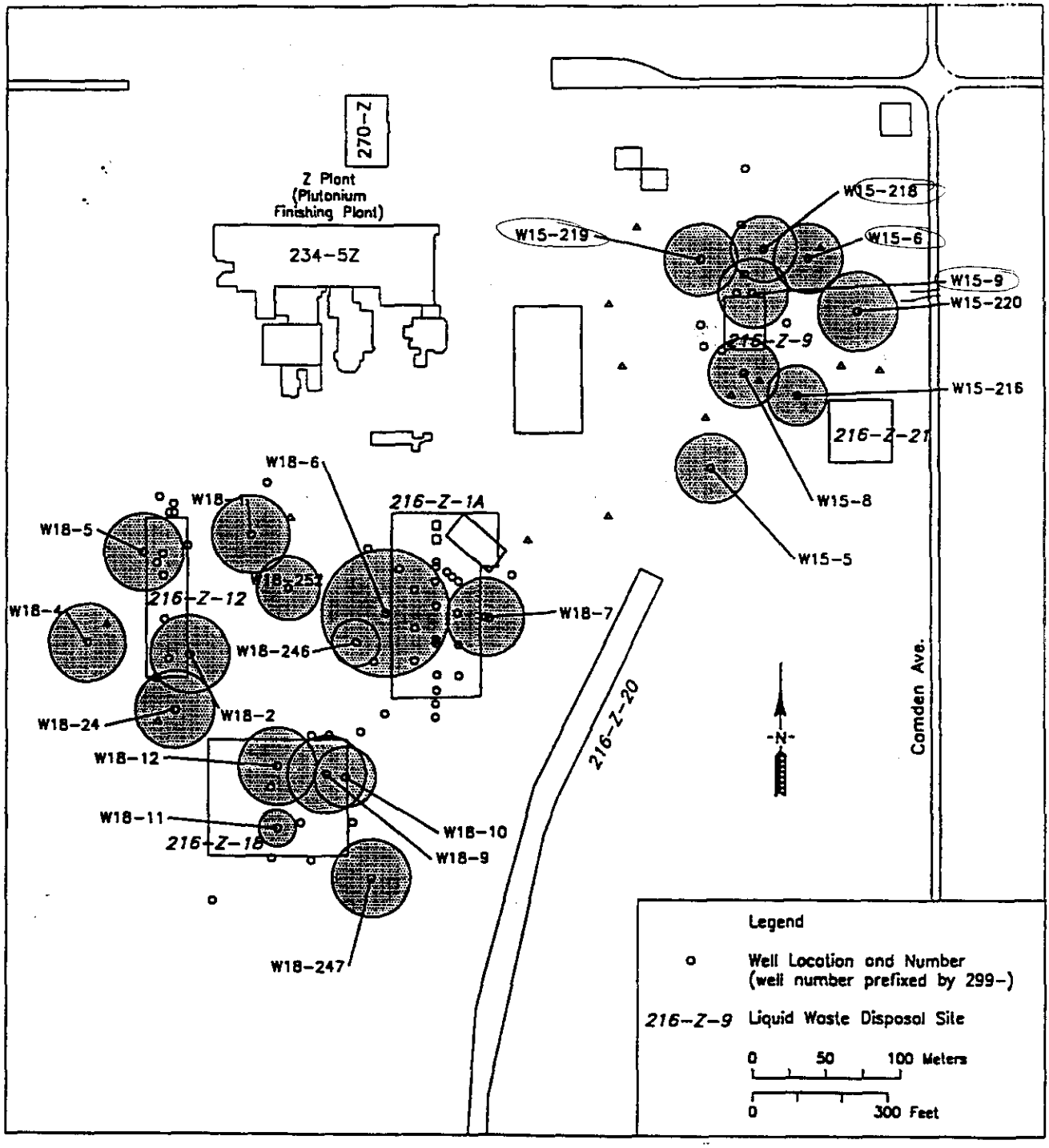
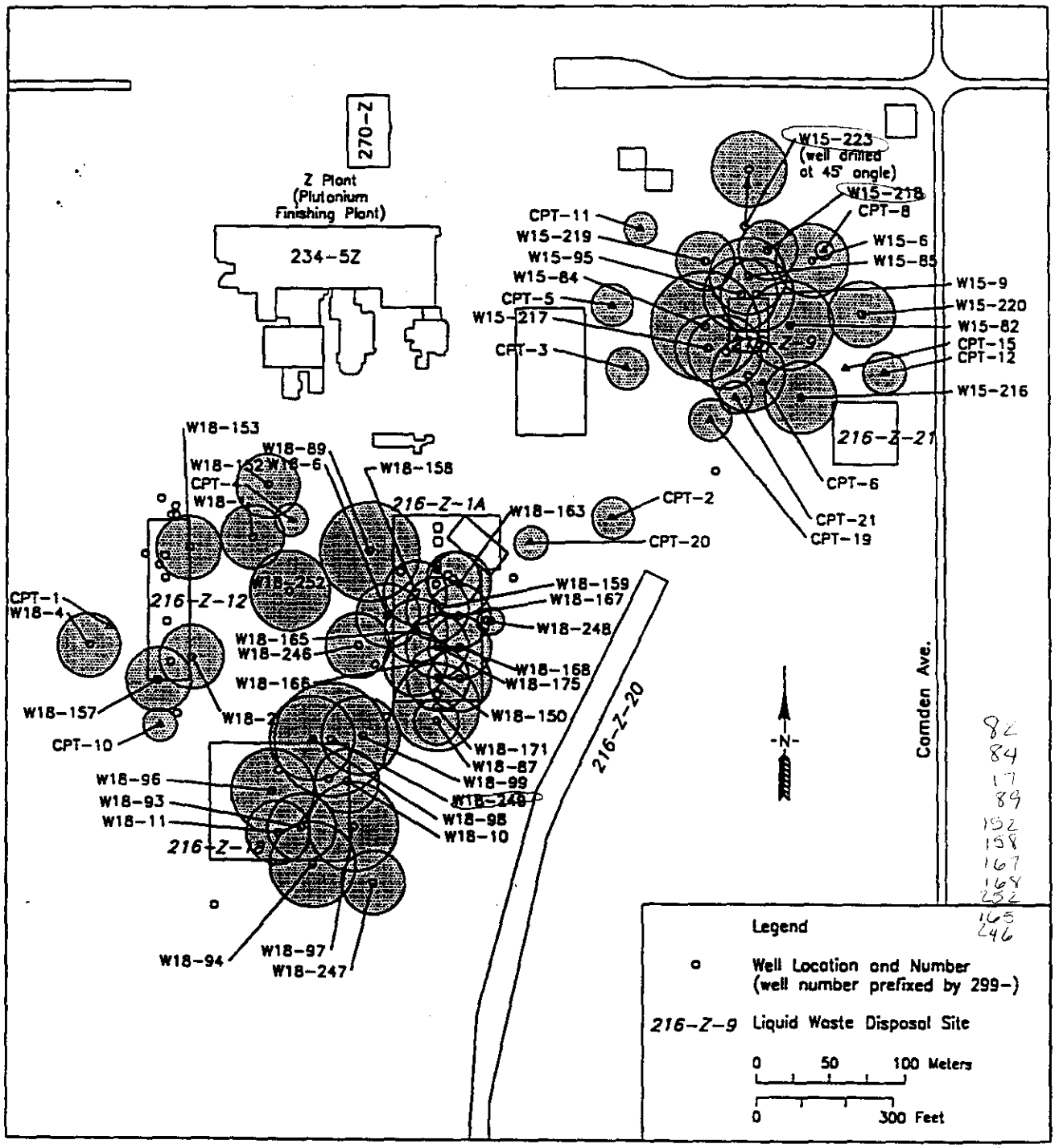


Figure 3-7. Areas of Influence in Wells with Open Intervals Above Caliche--Modified Configuration (Continuous Operation).



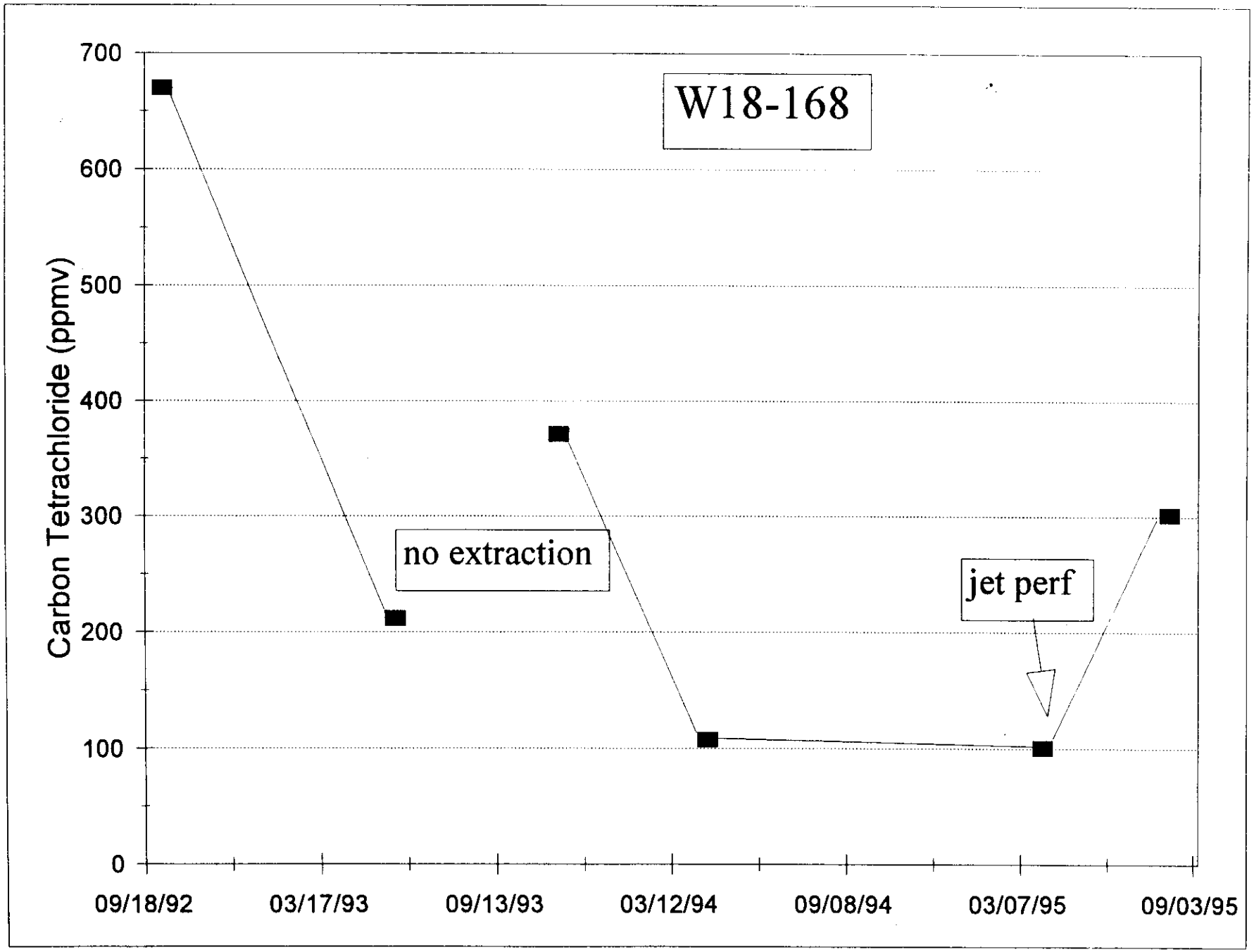
Date	Well & Interval	Vacuum (in H2O)	Flow (scfm)	CCl4 (ppmv)	CCl4 Flux (lb/hr)	Status
	216-Z-9 WELLS					
	1500 cfm VES					
08/22/95	299-W15-6L	85	123	80	0.25	+
08/22/95	299-W15-6U	80	151	15	0.06	
	299-W15-8	alpha contamination				
07/10/95	299-W15-9L	55	51	63	0.08	
08/02/95	299-W15-9U	72	79	97.2	0.20	+
08/01/95	299-W15-82	80	172	94.5	0.42	+
08/02/95	299-W15-84	60	420	54.7	0.59	+
08/02/95	299-W15-85	72	166	18	0.08	
08/22/95	299-W15-86	75	305	215	1.68	+
02/10/95	299-W15-95	118	56	211	0.30	
07/10/95	299-W15-216L	85	27	78	0.05	
07/10/95	299-W15-216U	80	285	24	0.18	
08/02/95	299-W15-217	62	67	63	0.11	+
08/02/95	299-W15-218L	75	95	42.5	0.10	+
08/02/95	299-W15-218U	70	175	56.8	0.26	+
08/02/95	299-W15-219L	90	71	26.3	0.05	+
08/02/95	299-W15-219U	90	83	21	0.04	+
08/21/95	299-W15-220L	60	95	75	0.18	
08/21/95	299-W15-220U	80	158	108	0.44	
09/19/95	299-W15-223		167	62	0.27	+

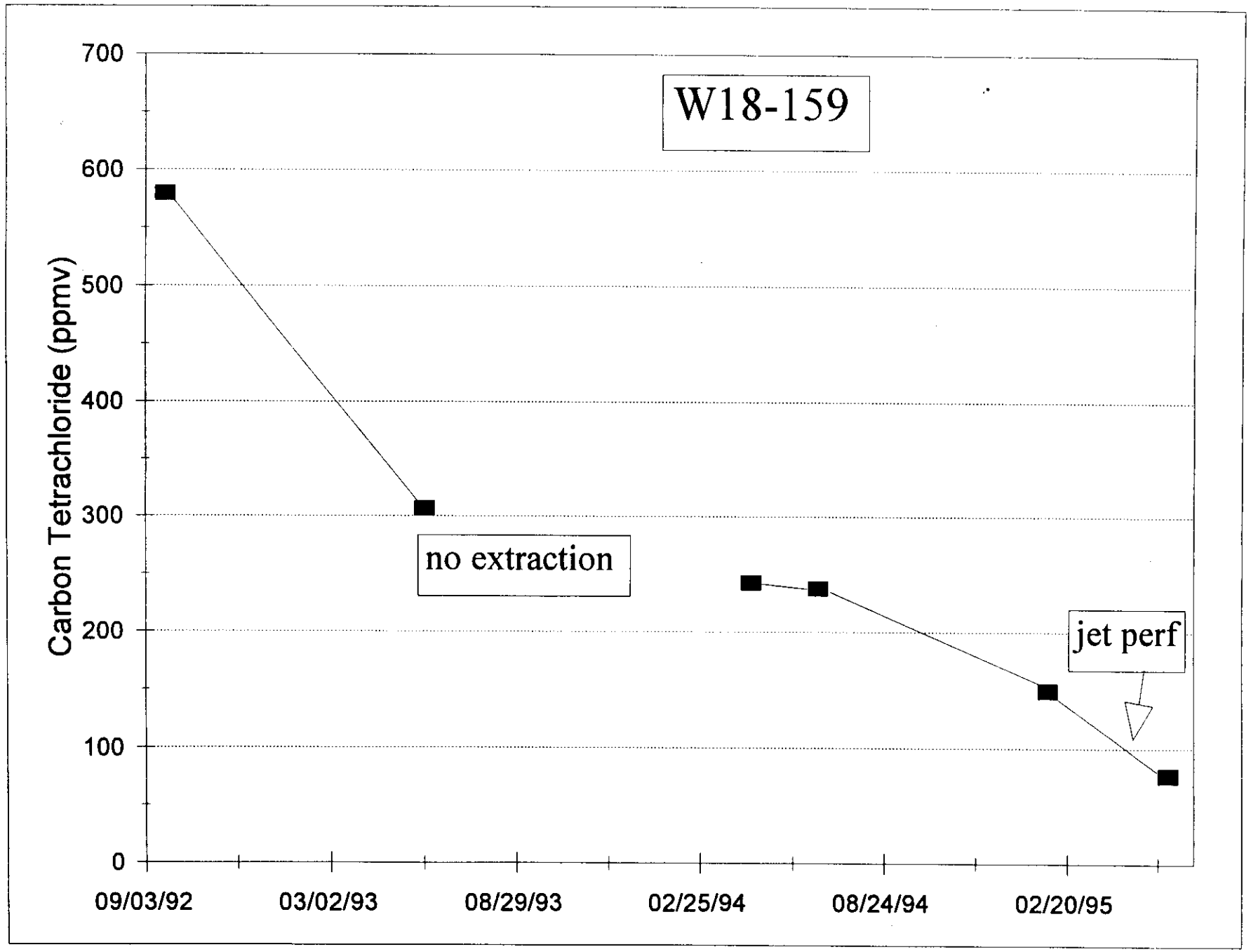
Date	Well & Interval	Vacuum (in H2O)	Flow (scfm)	CCl4 (ppmv)	CCl4 Flux (lb/hr)	Status
	216-Z-1A WELLS					
	1000 cfm VES					
09/06/95	299-W18-6L	23	42	74	0.08	
09/06/95	299-W18-6U	18	83	10	0.02	
08/04/95	299-W18-7	20	252	76	0.49	+
08/04/95	299-W18-89	15	259	92	0.61	+
	299-W18-150	alpha contamination				
08/08/95	299-W18-158L	40	0			
08/08/95	299-W18-158U	30	63	248	0.40	+
05/31/95	299-W18-159	100	392	77	0.78	
08/08/95	299-W18-163L	30	63	81	0.13	
08/08/95	299-W18-163U	25	143	72	0.26	
08/07/95	299-W18-165	60	219	92	0.52	+
08/07/95	299-W18-166	65	202	67	0.35	
08/08/95	299-W18-167	10	227	208	1.21	+
08/09/95	299-W18-168	25	79	302	0.61	(+)
09/06/95	299-W18-169	15	132	16	0.05	
08/16/95	299-W18-171L	36	142	7	0.03	
08/16/95	299-W18-171U	30	199	1	0.00	
08/07/95	299-W18-174	30	39	81	0.08	(-)
	299-W18-175	alpha contamination				
08/04/95	299-W18-248	0	4			-

currently being operated

recently took off line

Date	Well & Interval	Vacuum (in H2O)	Flow (scfm)	CCl4 (ppmv)	CCl4 Flux (lb/hr)	Status
	216-Z-18 WELLS					
	500 cfm VES					
05/10/95	299-W18-10L	98	53	18	0.02	-
06/07/95	299-W18-11L	99	29	27	0.02	-
08/03/95	299-W18-12	99	194	23	0.11	-
07/14/94	299-W18-93	100	170	26	0.11	
07/25/94	299-W18-94	102	272	22	0.15	
08/03/95	299-W18-96	99	256	13	0.09	-
07/26/94	299-W18-97	102	297	12	0.09	
07/12/94	299-W18-98	101	265	39	0.27	
03/28/95	299-W18-99	98	275	9	0.06	
07/12/95	299-W18-152	100	234	362	2.18	+
07/12/95	299-W18-153	100	354	52	0.47	
07/12/95	299-W18-157	100	356	20	0.18	
08/03/95	299-W18-246L	99	182	49	0.23	+
08/03/95	299-W18-246U	101	190	48	0.23	
03/28/95	299-W18-249	70	500	32	0.41	
08/03/95	299-W18-252L	103	107	97	0.27	+
08/03/95	299-W18-252U	100	229	53	0.31	


W18-168
Carbon Tetrachloride (ppmv)
700
600
500
400
300
200
100
0
no extraction
jet perf
09/18/92
03/17/93
09/13/93
03/12/94
09/08/94
03/07/95
09/03/95


W18-159
Carbon Tetrachloride (ppmv)
700
600
500
400
300
200
100
0
09/03/92
03/02/93
08/29/93
02/25/94
08/24/94
02/20/95
no extraction
jet perf

Distribution

Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Unit
September, 1995

Donna Wanek . . . . . DOE-RL, PRD (H4-83)
Mary Harmon . . . . . DOE-HQ (EM-442)
Richard Person . . . . . DOE-HQ (EM-442)

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Lynn Albin . . . . . Washington Dept. of Health

Curt Wittreich . . . . . BHI (H6-02)
George Henckel . . . . . BHI (H7-04)
Alvina Goforth . . . . . BHI (H6-08)
R. Scott Hajner . . . . . BHI (H4-79)
Tom Page (Please route to:) . . . . . PNL (K1-31)

Cheryl Thornhill	PNL (K1-19)	Steve Slate . . .	PNL (K1-19)
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