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Final

Meeting Minutes Transmittal/Approval
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
2440 Stevens Center, Room 2200/2425 Stevens Center, Sagebrush Room, Richland, Washington
February 23 & 24, 1994

FROM/APPROVAL: _____ Date 3/31/94
Paul M. Pak, 200 Aggregate Area Unit Manager, RL (A5-19)

APPROVAL: _____ Date 3/31/94
Paul R. Beaver, 200 Aggregate Area Unit Manager, EPA (B5-01)

APPROVAL: _____ Date 3/31/94
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
Attachment #4	-	Action Item Status List
Attachment #5	-	200-UP-1 Groundwater Operable Unit
Attachment #6	-	200-ZP-1 Strategy
Attachment #7	-	Wells to be Sampled Specifically for the 200-ZP-1 Operable Unit
Attachment #8	-	200 Area Biota Sampling
Attachment #9	-	1000 CFM VES Daily Operating Efficiency (Carbon Tetrachloride)
Attachment #10	-	Groundwater Monitoring for 200-BP-5 OU
Attachment #11	-	200-BP-5 Pilot Scale Treatability Test

Prepared by: Kay Kimmel Date: 3/31/94
Kay Kimmel, Jim Consort GSSC (B1-42)

Concurrence by: for _____ Date: 3/31/94
Curt Wittreich, WHC Coordinator (H6-03)

Attachment #1
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
February 23 & 24, 1994

Meeting and Summary of Commitments and Agreements

1. SIGNING OF THE NOVEMBER 200 AREA UNIT MANAGER'S MEETING MINUTES:

Meeting minutes were reviewed and approved with no changes. Unit Managers had agreed to postpone the December 1993 and January 1994 meetings due to scheduling conflicts.

2. ACTION ITEM UPDATE. See Attachment 4 for status:

2AAMS.9 No additional information.

3. NEW ACTION ITEMS (INITIATED February 23 & 24, 1994):

2AAMS.10 Present to EPA and Ecology the groundwater sampling strategy, and the hydrogeological implications of pump and treat operations at the 200-ZP-1 Operable Unit next Wednesday, March 2, 1994. Action: Dan Parker.

2AAMS.11 Provide a schedule for the issuance of an Interim Record of Decision for 200-ZP-1. Action: Dennis Faulk.

2AAMS.12 Within two weeks of receipt, evaluate RL's proposed overall strategy for the 200-ZP-1 Operable Unit, if not acceptable, write a letter with EPA's strategy, indicating all changes EPA will require. Action: Dennis Faulk.

4. INFORMATION ITEMS:
February 23, 1994

- Status 200-UP-1 Operable Unit - Curt Wittreich provided the status of activities at this operable unit (see Attachment #5).

  * **LFI Groundwater Monitoring Strategy** - C. Wittreich provided the strategy for monitoring groundwater. He indicated five wells are scheduled to be installed this year. Ecology requested advance notification of drilling in order to take groundwater and soil samples.

  * **Treatability Study Overall Strategy and Plan Presentation** - C. Wittreich provided the overall strategy then reviewed the Treatability Test Plan Table of Contents. The schedule is to submit the test plan to the regulators on March 2, and finalize it by March 31, 1994. The waste control plan is discussed in Treatability Test Plan but will require separate sign-off before work begins. WHC indicated they are considering drying the ion exchange columns and disposing of the spent resin with no regeneration step. Wells that appear suitable for the test have been selected; final well selection is requested by the end of this week (February 25, 1994). Wells 2-W19-24 and 2-W19-25 were chosen for this pump and treat process because they locally have the highest production rates and contaminant concentrations. Extraction will be from Well 2-W19-24 and reinjection will be into well 2-W19-25, with a

treatment train in between. A two dimensional groundwater model, pumping at 17 gpm, illustrated that there is little chance of establishing a recirculation cell even after 150 days, indicating the sphere of influence is small. Nonetheless, a bromine tracer will be added to detect when a recirculation cell has been set up.

- Status of 200-ZP-1 - Dan Parker updated the status for activities at the 200-ZP-1 Operable Unit (see Attachments #6 and #7). He indicated that before the pilot scale pump and treat treatability test can begin, a selected set of wells needs to be sampled to provide a current picture of the contaminant concentrations within and near the plume boundary. The regulators requested the groundwater sampling strategy, and an indication of the hydrogeological implications of pump and treat operations at the 200-ZP-1 Operable Unit (see Action Item 2AAMS.10). The regulators requested WHC provide a map indicating all RCRA and CERCLA wells for this operable unit. Dennis Faulk indicated he would provide a schedule for the issuance of an Interim Record of Decision for 200-ZP-1 (see Action Item 2AAMS.11).

  * **Metal-Enhanced Abiotic Degradation of Chlorinated Organic Compounds** - Cecil Kindle presented a summary of work performed by EnviroMetal Technologies using iron filings for groundwater remediation in a passive destruction process. Hanford groundwater was spiked with TCE, Chloroform, and carbon tetrachloride, as contaminants, processed, then tested for degree of contaminant removal. The test results were positive and further scale up is planned. This technique is useable both *in situ* and *ex situ*. [Related applications: after two years in an in situ "permeable iron wall" application, no plugging had been detected when the application was core sampled. Although the initial Hanford application may be for chlorinated organic cleanup, results show that inorganics such as chromium and uranium (and possibly technetium) are removed.] This process seems a good match to Hanford groundwater contaminants.

  * **TS Overall Strategy** - Dan Parker provided a short overview of the current strategy for performing an IRM at the 200-ZP-1 Operable Unit. He then presented the proposed revised strategy for this operable unit. The proposed strategy resembles the strategy for the 200-UP-1 Operable Unit, and would use the results of limited field investigation activities, a qualitative risk assessment, and treatability testing to develop a revised IRM proposed plan (Revision 1) by February 1995.

    D. Parker indicated that Revision 0 of the IRM proposed plan has been issued to the regulators. The public comment period has been delayed due to regulator concerns with the proposed plan. Dennis Faulk took an action to review the proposed strategy with Doug Sherwood. If not acceptable, EPA will write a letter to RL outlining their strategy and providing comments identifying all changes to the IRM proposed plan EPA will require (see Action Item 2AAMS.12).

February 24, 1994

- 200 Area Biota Sampling - Ron Mitchell provided the status of biota sampling performed for the 200 Area (see Attachment #8).

- ERA Activity - George Henckel provided the status of the carbon tetrachloride extraction activities (see Attachment #9). He indicated that the efficiency dropped a bit during February, and he noted condensate is being handled as purgewater.

- Status 200-BP-5 Operable Unit - Dave Erb provided the history and status of the 200-BP-5 OU.

  * **TS Overall Strategy** - Dave Erb presented the overall strategy (see Attachment #10). He anticipates the following questions will be answered by the treatability study: can the primary contaminants be removed with ion exchange ~~along with cobalt~~; will a cyanide destruction be necessary; can other contaminants be removed? On presentation of the logic diagram, Paul Pak requested that this strategy be modified to match 200-BP-1 more closely. He also requested clarification from the regulators that, once this treatability test is proven and goes to a proposed plan, the work does not stop for a public review cycle. General discussions regarding the depth of the aquifer in relation to pump and treat activities ensued. Doug Hildebrand indicated he had tasked a team to assess the influence of ceasing discharges to B-Pond. It is expected that water levels in several wells will decline and affect the ability of the pump and treat system.

  * **Groundwater Monitoring Strategy** - Dave Erb provided the groundwater monitoring strategy for 200-BP-5 (see Attachment #11). Currently, 27 wells are being sampled within the fence line, with an anticipated reduction to about 10. Paul Beaver indicated EPA is confident of certain wells which can be deleted, however he would like to review the other wells to make a final determination. D. Erb indicated a need for some agreements on sampling frequency and analytes list, as well as which wells to continue monitoring.

5. AGREEMENTS:

a. Unit managers agreed that field activities such as fitness-for-use assessments, pump tests and groundwater sampling should be conducted for the wells at the 216-BY Cribs Plume and 216-B-5 Reverse Well Plume.

200-BP-5 Operable Unit Manager's Meeting
Official Attendance Record
February 24, 1994

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
Paul M. Pak	DOE-RL	200 Area	376-4798
Stuart P. Luttrell	PNL	None / GW Surv-Project	376-6023
R Douglas Hildebrand	DOE-RL	Ground Water Support	376-~~7287~~
James Consort	Dames & Moore/GSSC	RL Support	946 3694
William E Lum II	USGS	EPA Support	206 593 6510
Paul Beaver	EPA	Unit Mgr.	376-8665
Ted Wooley	Ecology	UM	736-5012
Jeff Ross	EPA Support ← →	PRC EMI	206/624.2692
M.A. Buckmaster	WHC	200 Area	376-1792
Dave Erb	WHC	200-BP-5 Coord. O.U.	372-1402
GEORGE C. HENAGER III	WHC	OBSERVER	376-1994
GREG KASZA	WHC	200 BP-5 Groups	376-0763
KAY KIMMEL	MACTEC/D&M	RL SUPPORT	946-3692
Hal Downey	WHC	ER-Program	376-0568

94-4295-0989

200-ZP-1 Operable Unit Manager's Meeting
Official Attendance Record
February 23, 1994

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PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
D.L. Parker	WHC	PROJ MNGR	372-1031
Paul Beaver	EPA	Unit Mgr	376-8665
Diana Sickle	WHC	ER Support	372-3141
Paul Pak	RL	RL OU Mgr	376-4798
Richard Carlson	WHC	200 Area mgr.	376-9027
James Conser+	Dames & Moore/GSSC	RL Support	946 3694
Dennis Faulk	EPA	ZP-1 OU Manager	376-8631
Dibakar Goswami	Ecology	Unit Mgr	376-736-3015
MA Frank	WHC	Mgr Eng. for Treat. Test	376-2731
Norm Hepner	Ecology	ERDF	736-3048
Jeff Ross	PRC EMI	EPA Support	206/624-2692
KAY KIMMEL	MACTEC/D&M	RL SUPPORT	946-3692
Brian Drost	USGS	EPA Support	206-593-6510
David Holland	Ecology	UM/Suppt	736-3027
Evan Dresel	PNL	Gw Surveillance	376-8341
Donna Wanek	RL	Anal Services	376-5778

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200-UP-1 Operable Unit Manager's Meeting
Official Attendance Record
February 24, 1994
3

Please print clearly and use black ink

PRINTED NAME	ORGANIZATION	O.U. ROLE	TELEPHONE
Dave Einan	~~EPA~~	Unit Mgr	509·376·3883
Dib Goswami	Ecology	Unit Mgr.	509-736-3015
DENNIS FALK	EPA		376-8631
James Consort	Numanit Mgmt/SSC	RL Support	9463694
Richard Carlson	WHC	Mgr. 200 Area	~~3~~ 376-9027
Hal Needy	WHC	ER Programs	376-0548
Diana Sickle	WHC	ER Support	372-3141
Evan Diesel	PNL	GW Surveillance	376-8341
Donna Wanek	DOE	RL Analytical Serv	376-5778
David Holland	Ecology	Unit Mgr/Suppt.	736-3027
Brian Drost	USGS	EPA Support	206-593-6510
Jim Green	WHC	Treatment systems	(509)376-5155
Bruce Ford	WHC	Geosciences Support	(509)376-6465
CORT WITTREICH	WHC	OU coordin.	3761862
KAY KIMMEL	MACTEC/D&M	RL SUPPORT	946-3692

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Attachment #3
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
February 23 & 24, 1994

Agenda

200 Area Activities

February 23, 1994

- **Status 200-UP-1** - Curt Wittreich
  - *LFI Characterization Status - B. Innis/C. Wittreich
  - *LFI GW Monitoring Strategy - B. Innis/C. Wittreich
  - *TS Overall Strategy - C. Wittreich
  - *TS Plan Presentation - C. Wittreich
  - *Treatment Train Presentation - J. Green

- **Status 200-ZP-1** - Dan Parker
  - *TS Overall Strategy
  - *TS Characterization and Monitoring, Sampling Strategy
  - *Metal-Enhanced Abiotic Degradation of Chlorinated Organic Compounds - Cecil Kindle

February 24, 1994

- **200 Area Biota** - Ron Mitchell

- **ERA Activities** - George Henckel

- **Status 200-BP-5** - Dave Erb
  - *TS Overall Strategy
  - *Groundwater Monitoring Strategy.

Attachment #4

Action Item Status List
Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
February 23 & 24, 1994

Item No.	Action/Source of Action	Status
2AAMS.9	Provide to Bill Lum any data to compare these slug tests to other tests. Action: Craig Swanson	Opened 11/17/93.
2AAMS.10	Present to EPA and Ecology the groundwater sampling strategy, and the hydrogeological implications of pump and treat operations at the 200-ZP-1 Operable Unit next Wednesday, March 2, 1994. Action: Dan Parker.	Opened 02/23/94.
2AAMS.11	Provide a schedule for the issuance of an Interim Record of Decision for 200-ZP-1. Action: Dennis Faulk.	Opened 02/23/94.
2AAMS.12	Within two weeks of receipt, evaluate RL's proposed overall strategy for the 200-ZP-1 Operable Unit, if not acceptable, write a letter with EPA's strategy, indicating all changes EPA will require. Action: Dennis Faulk.	Opened 02/23/94.

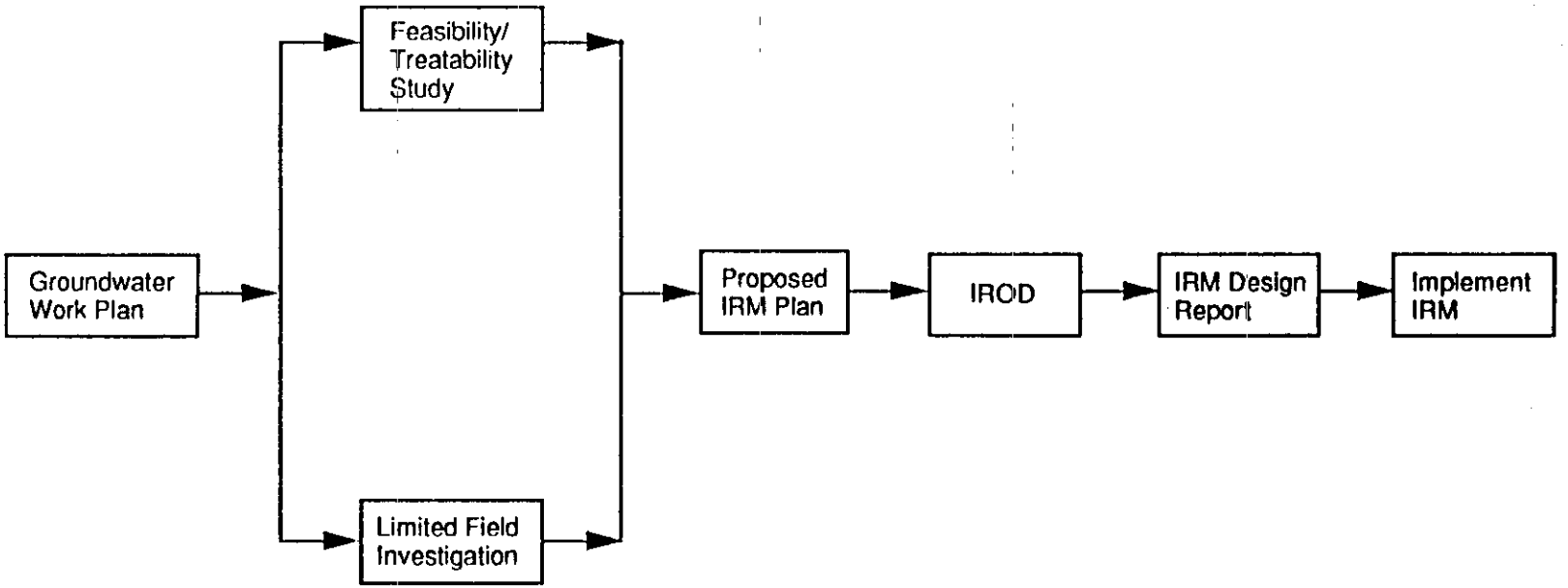
200-UP-1 GROUNDWATER OPERABLE UNIT

CURT WITTREICH
BRUCE FORD
GEORGE KELTY
JIM GREEN

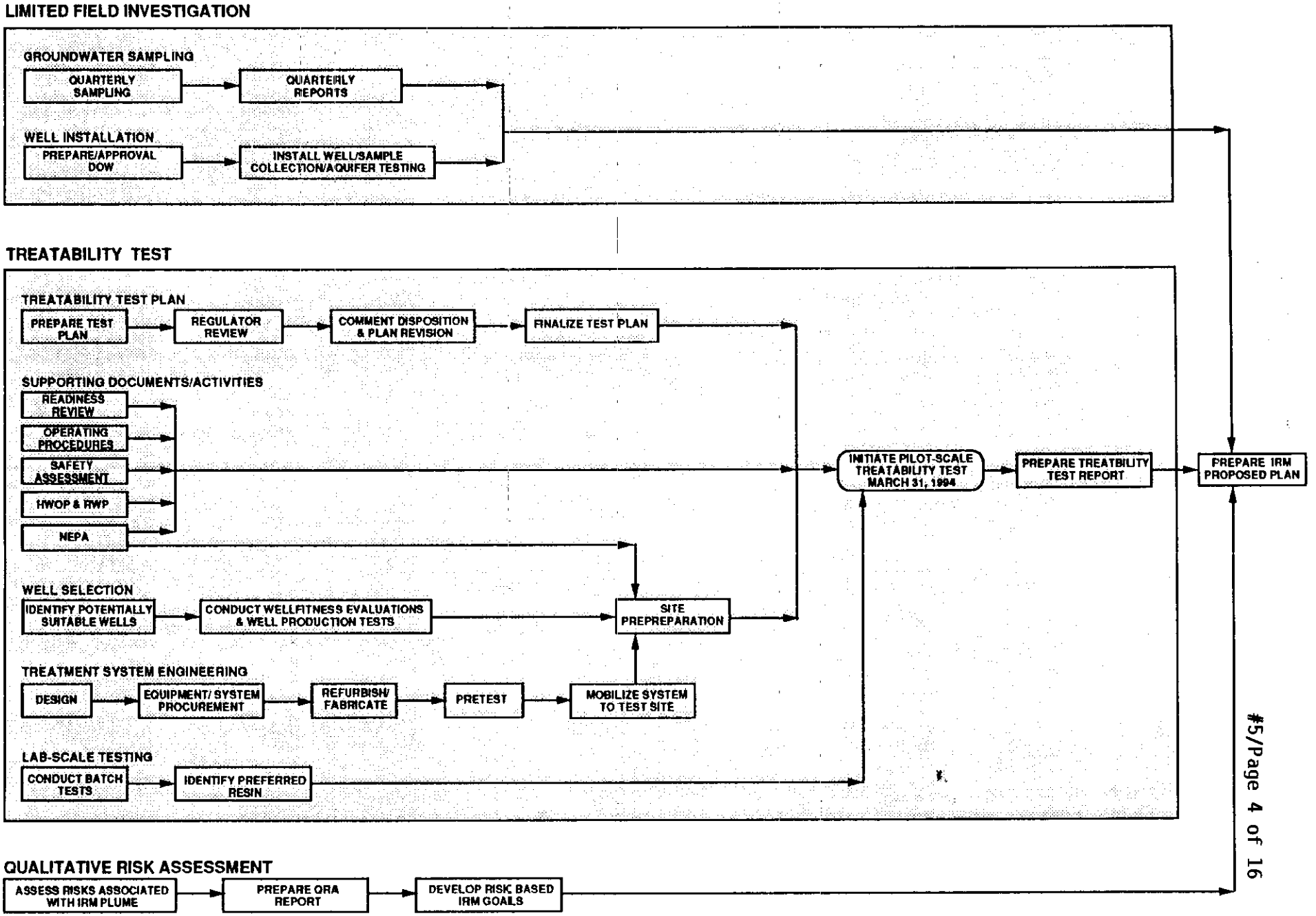
FEBRUARY 24, 1994

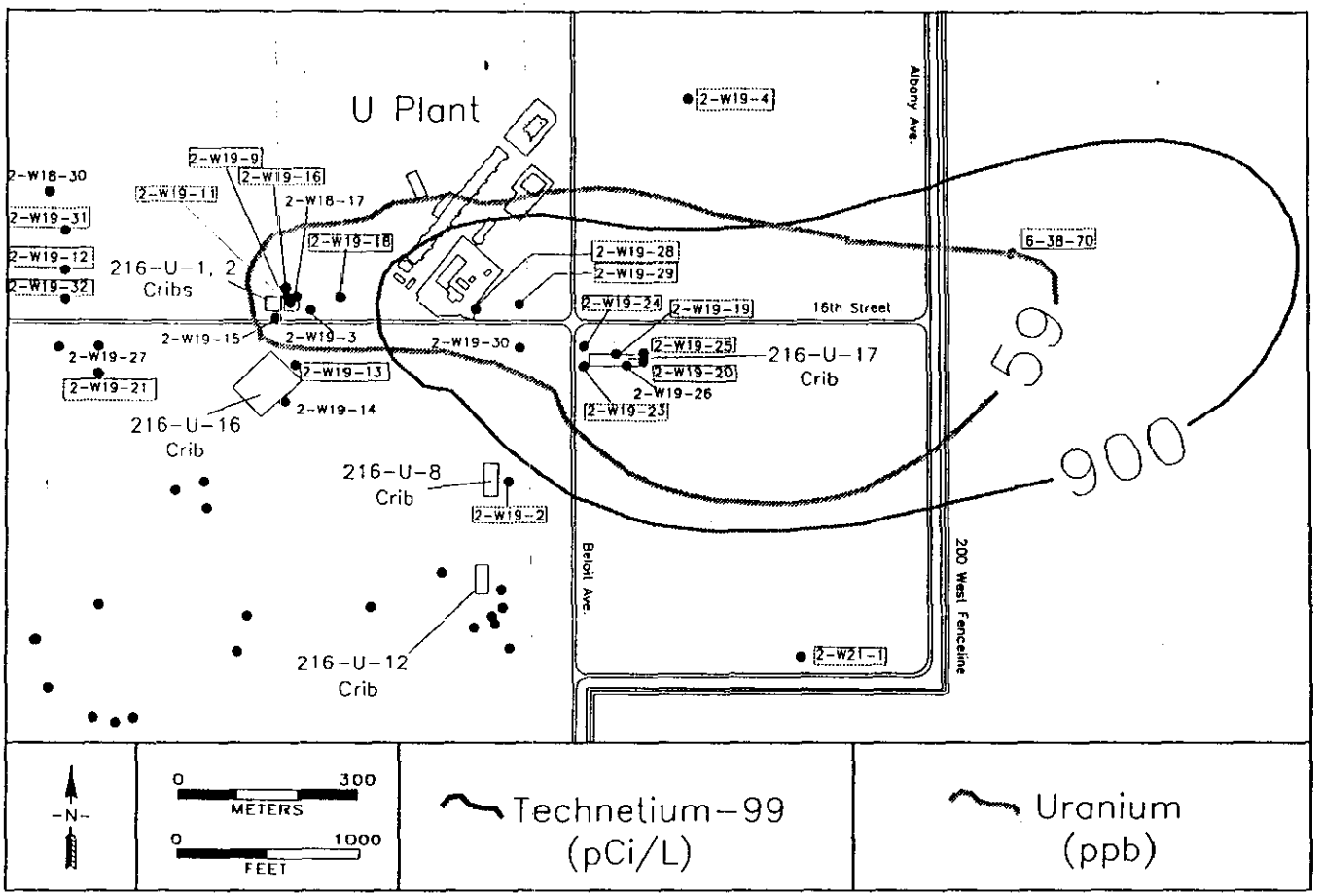
AGENDA

- OVERALL OPERABLE UNIT STRATEGY
- LFI SCOPE AND STATUS
  - GROUNDWATER MONITORING
  - WELL INSTALLATION
- TREATABILITY TEST SCOPE AND STATUS
  - OVERALL STRATEGY
  - TEST SITE
  - TEST PLAN
  - WELL SELECTION
  - ION-EXCHANGE TREATMENT SYSTEM


Groundwater Work Plan
Feasibility/ Treatability Study
Limited Field Investigation
Proposed IRM Plan
IROD
IRM Design Report
Implement IRM

OPERABLE UNIT 200-UP-1 ACTIVITY LOGIC





WHC GEOHYDRO 021794

Quarterly Groundwater Monitoring Analytes for 200-UP-1

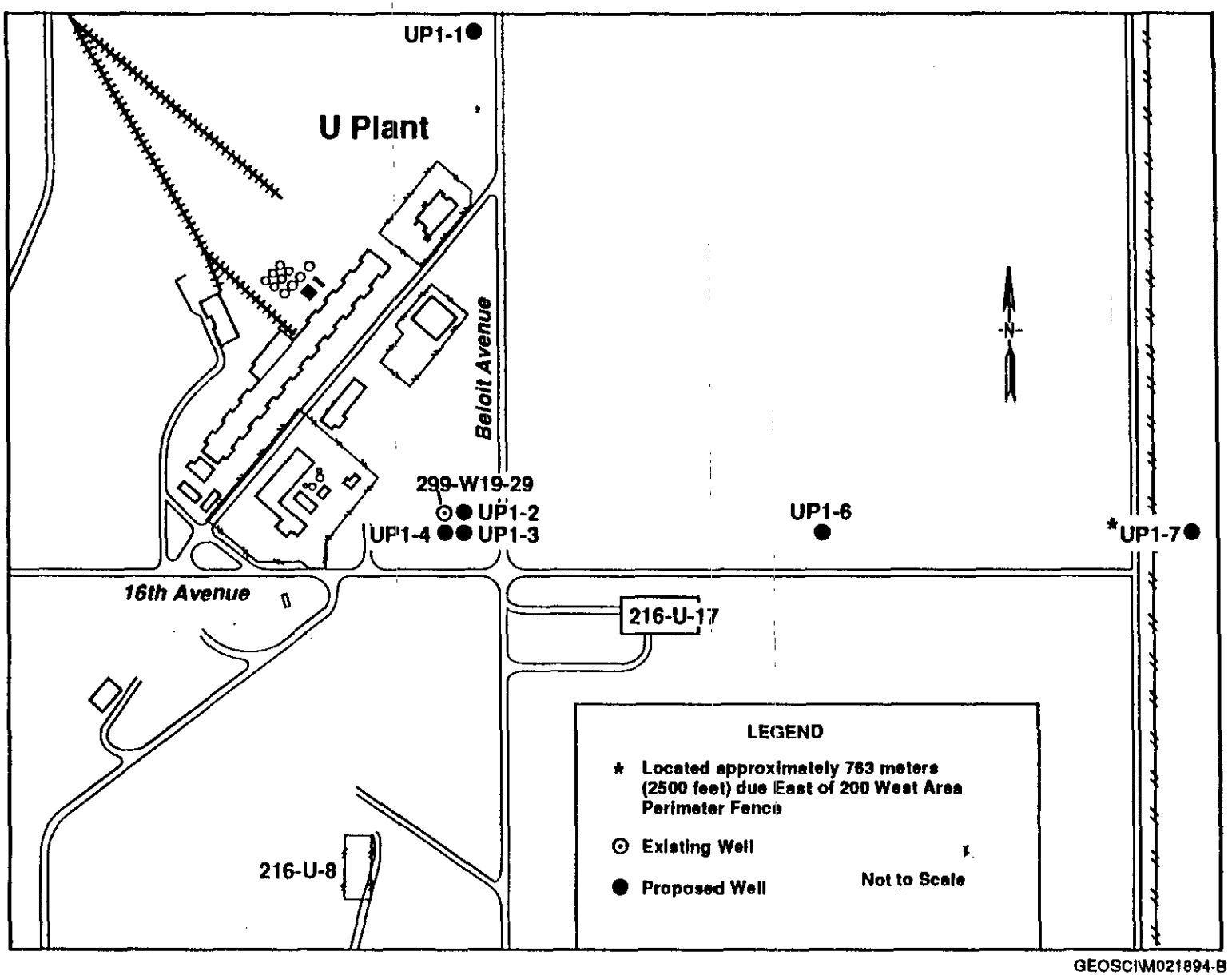
Well	VOA	Semi-VOA	Pest/PCB	Total U	Isot. U	Tc-99	NO3	Gross A/B	I129	Gamma scan	Sr-90	metals Unfilt. and Filt.
299-W19-9				X		X	X					
299-W19-11				X		X	X					
299-W19-16				X		X	X					
299-W19-19	X			X		X	X					
299-W19-23	X			X		X	X					
299-W19-20	X			X		X	X					
299-W19-2				X		X	X				X	
299-W19-24	X			X		X	X				X	
299-W21-1				X		X	X				X	
299-W19-28	X			X		X	X					
299-W19-29	X			X	X	X	X					
299-W19-12				X		X	X			X		ICP ONLY
299-W19-32				X		X	X			X		ICP ONLY
299-W19-21				X		X	X			X		GFAA ONLY
299-W19-4	X			X		X	X	X	X			
299-W19-18	X		X	X		X	X	X			X	
299-W19-25	X			X		X	X	X				
299-W19-13				X		X	X					
299-W19-31				X		X	X					ICP ONLY
699-38-70	X			X		X	X				X	

QC Sample specifications:
1 full set of QC samples (field blank, equipment blank, duplicate, and split samples) will be required during the first quarter to satisfy the 1 in 20 requirements per applicable regulations. The duplicate and split for the first quarter should be taken at well 299-W19-18 and also prepare the equipment blank on the same day for the full list of analytes required for that well. This should provide the most complete QC by performing the

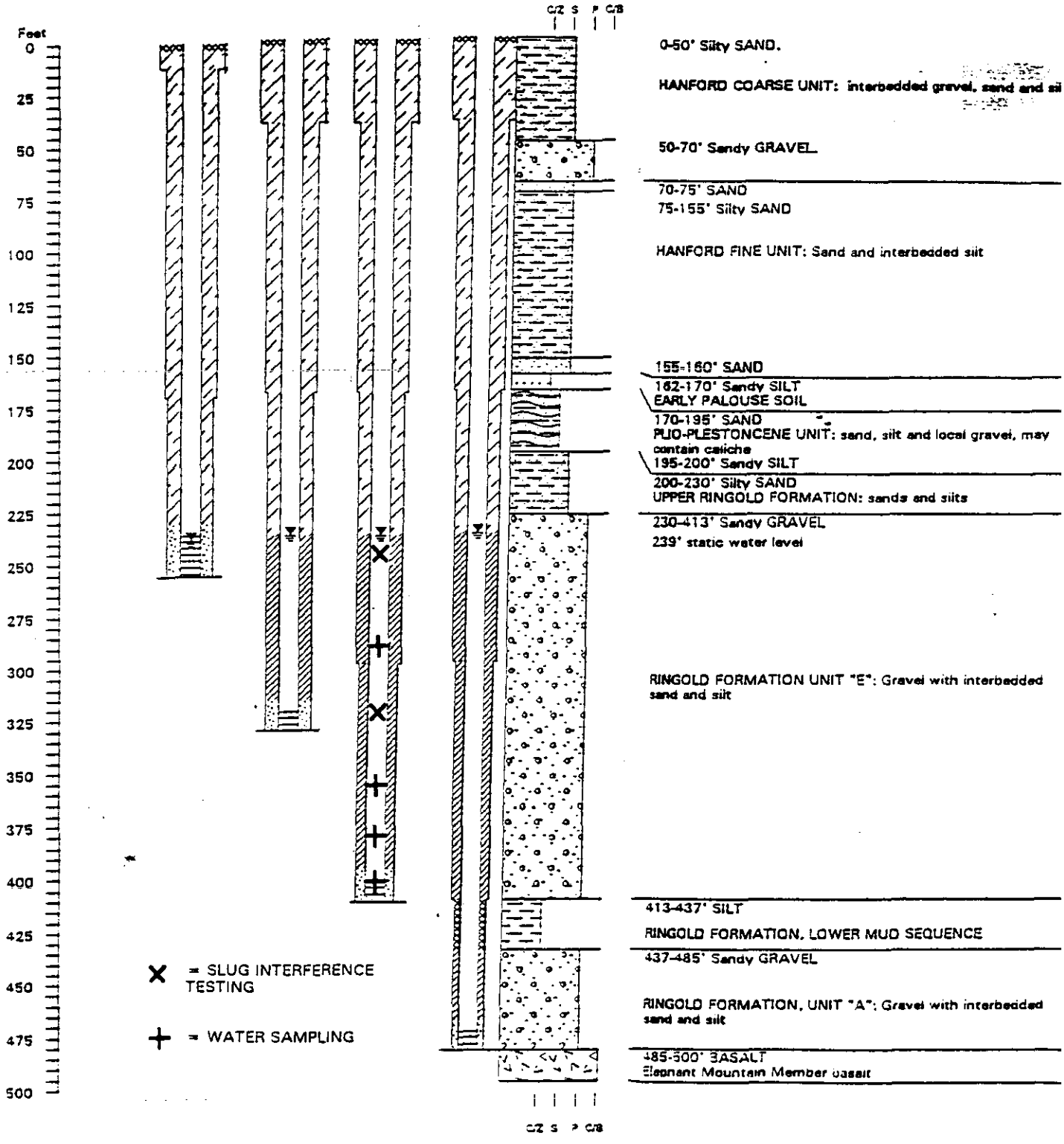
checks on the sample with the most analytes. The field blank may be obtained at any of the wells that are sampled for VOA at the discretion of the sampling team.

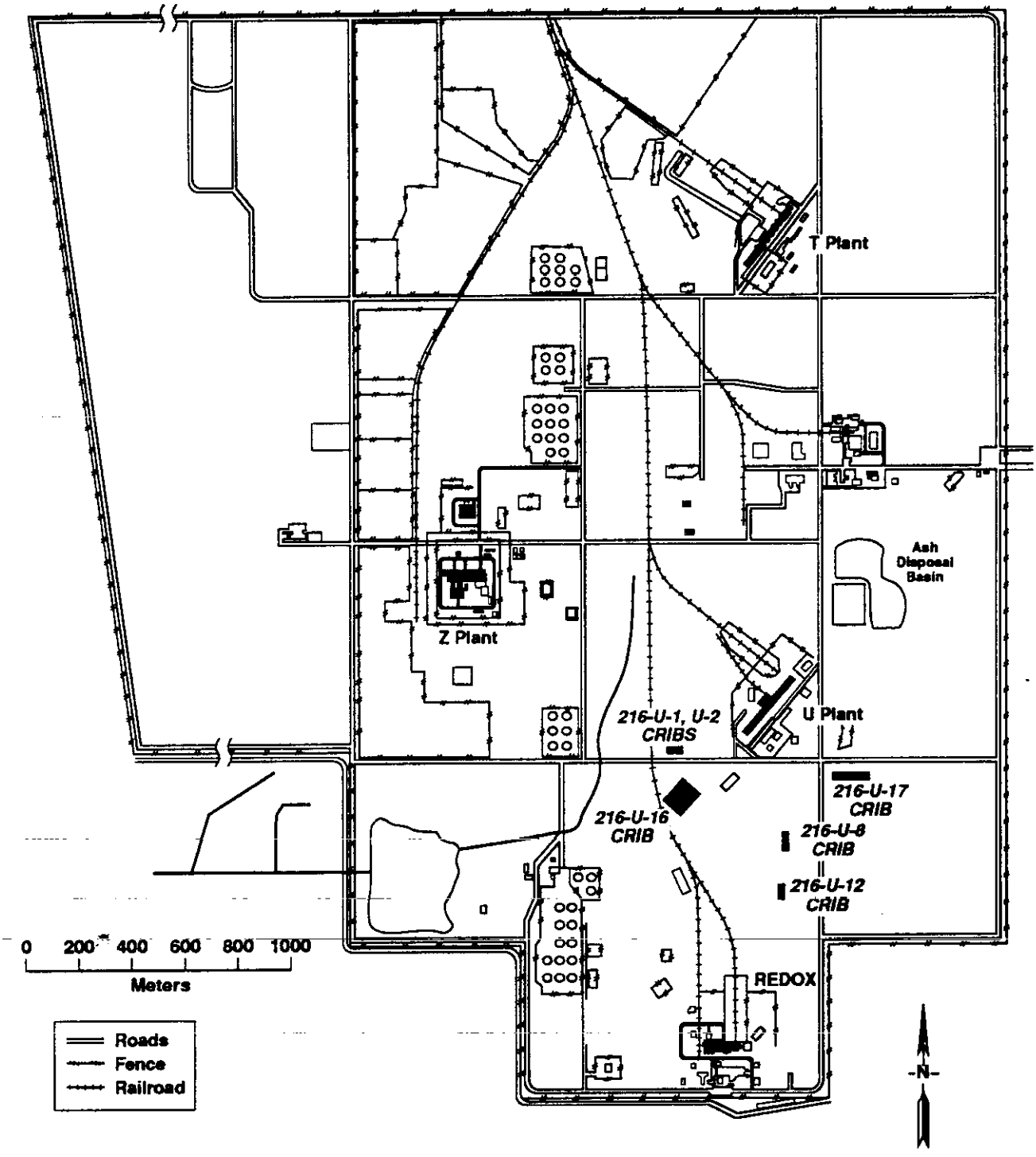
5 new monitoring wells will be constructed for the O.U. by the end of July 1994, and will need to be integrated into this sampling schedule and analyzed for constituents according to the table on the following page:

New Well#	VOA	Total U	Tc-99	NO3	Gross A/B
UP1-2	X	X	X	X	X
UP1-3	X	X	X	X	X
UP1-4	X	X	X	X	X
UP1-6	X	X	X	X	
UP1-7		X	X	X	


UP1-1
U Plant
Beloit Avenue
299-W19-29
UP1-2
UP1-4
UP1-3
UP1-6
*UP1-7
16th Avenue
216-U-17
216-U-8
LEGEND
* Located approximately 763 meters (2500 feet) due East of 200 West Area Perimeter Fence
Existing Well
Proposed Well
Not to Scale
N
GEOSCI\M021894-B

Slug interference and water sampling intervals.





200 WEST AREA

CONTENTS

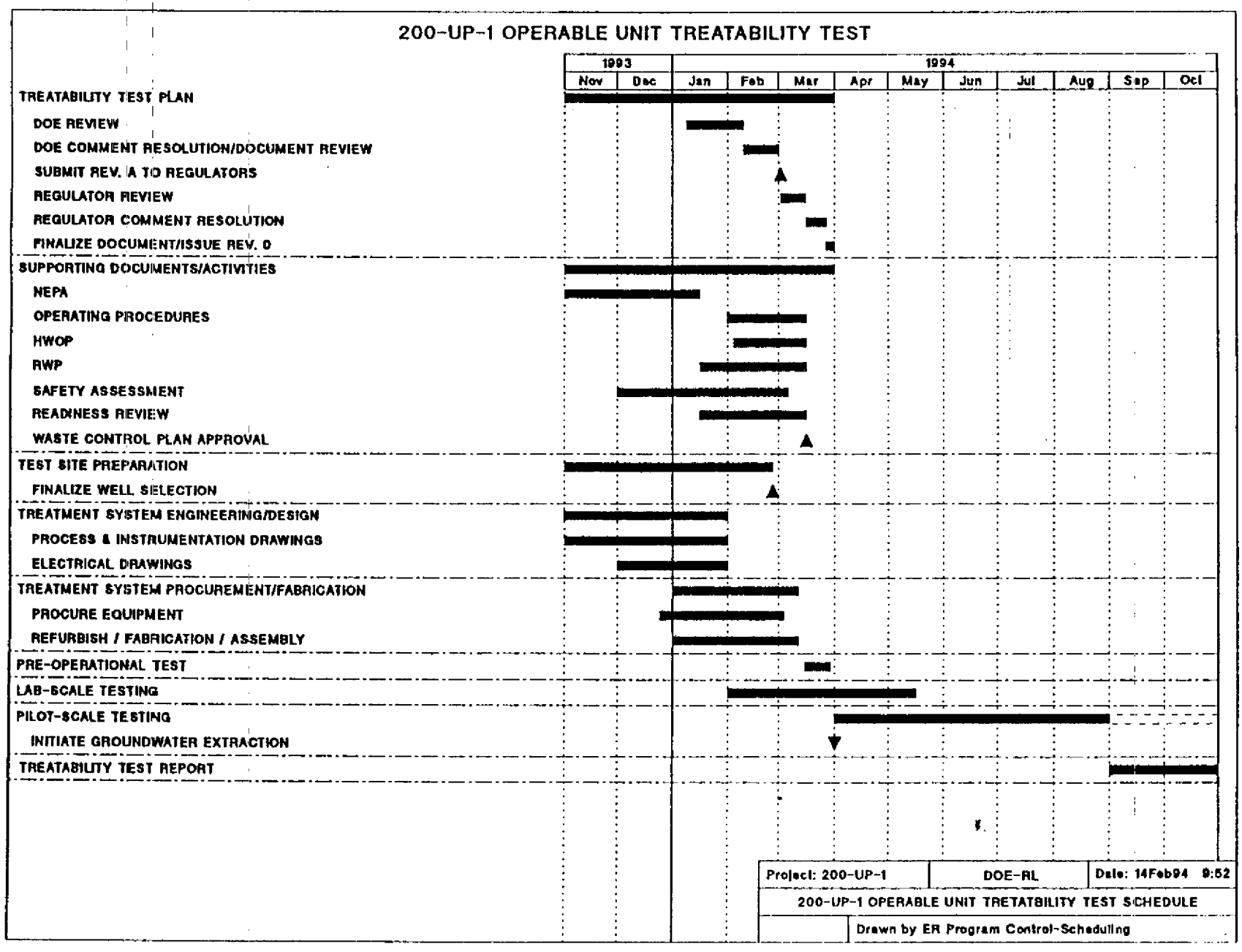


Figure 7-1. Treatability Test Schedule.

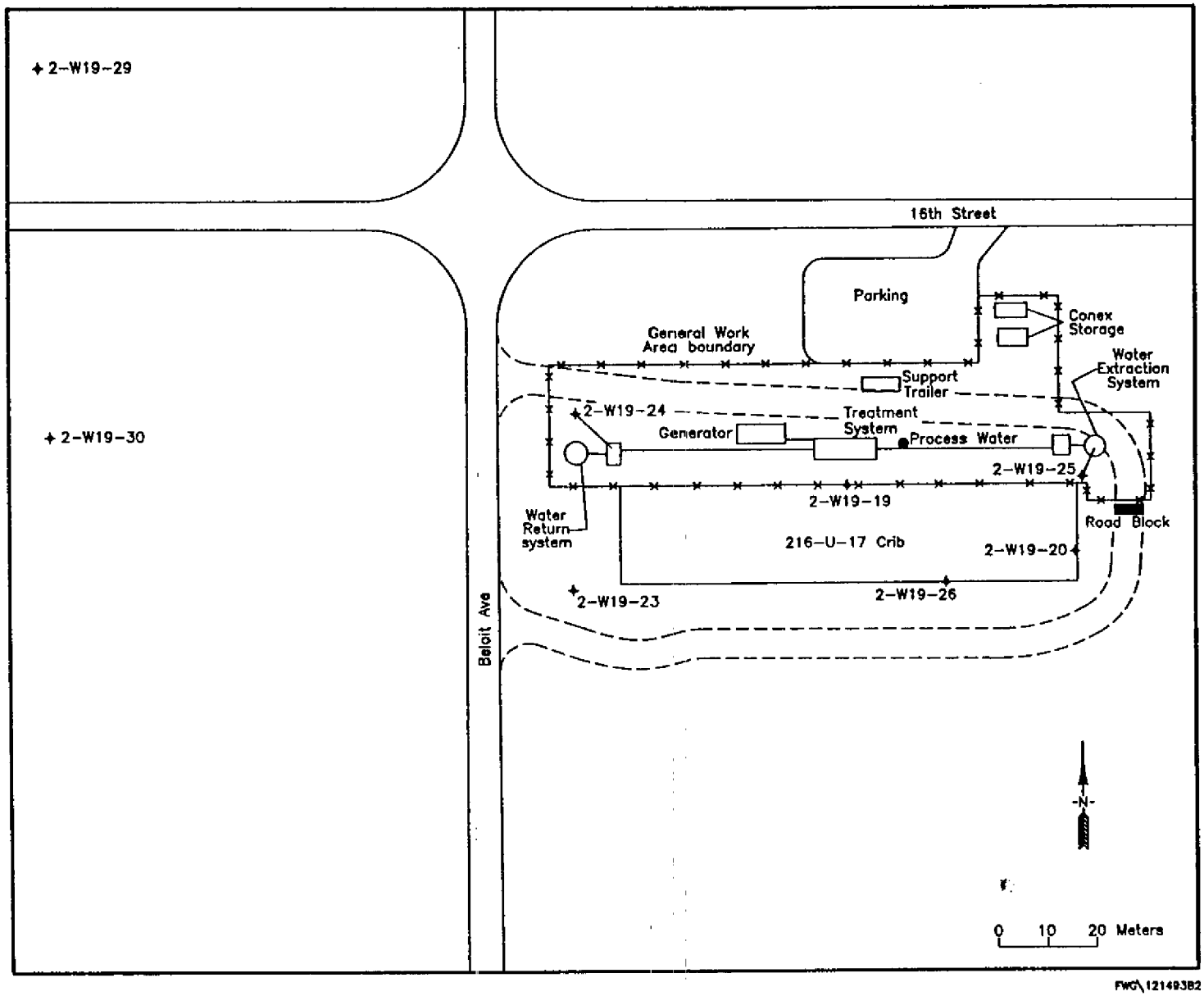
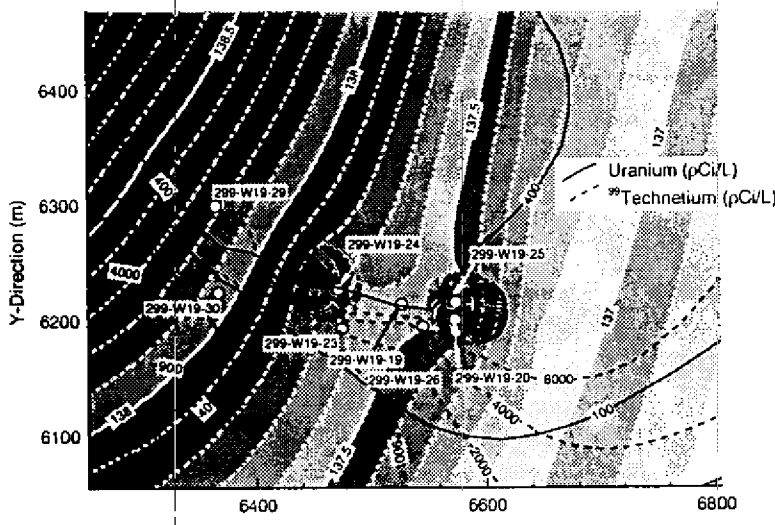


Table 4-1. Estimated Groundwater Production for the 200-UP-1 Well Useability Tests.[a]

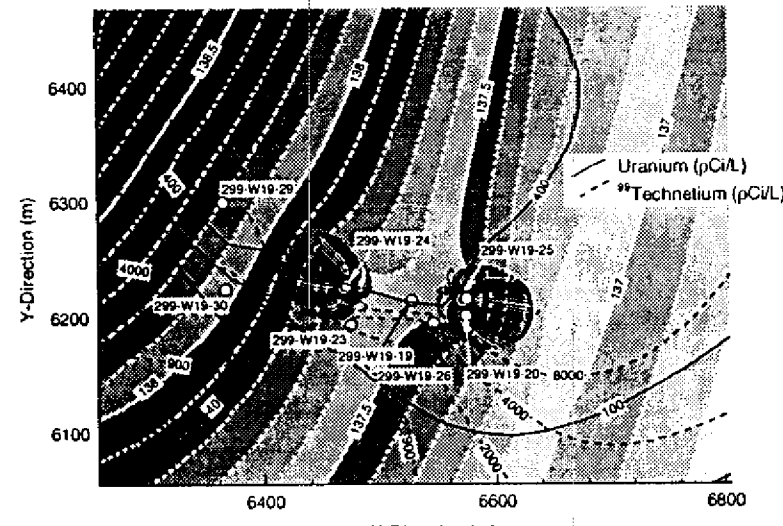
Well	Total Drawdown (ft)	Discharge Rate (gal/min)	Specific Capacity	50% of Screen (ft)	Estimated Production (gal/min)[b]
299-W19-23	2.6	6.25	2.4	6.5	12.5
299-W19-24	1.74	6.25	3.6	5.82	16.8
299-W19-25	2.5	7.05	2.8	7.0	15.8
299-W19-29	2.2	6.65	3.0	5.5	13.3
299-W19-30	2.5	4.25	1.7	5.3	7.2

a/ Useability tests were performed from December 2, 1993 to January 7, 1994.

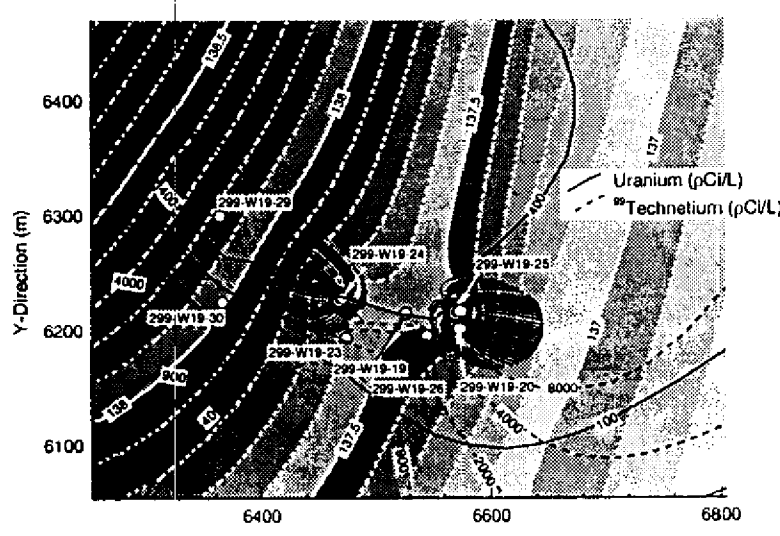
b/ Estimated well production is 80% of the specific capacity. This conservative factor was added because of the short duration of the well production tests.



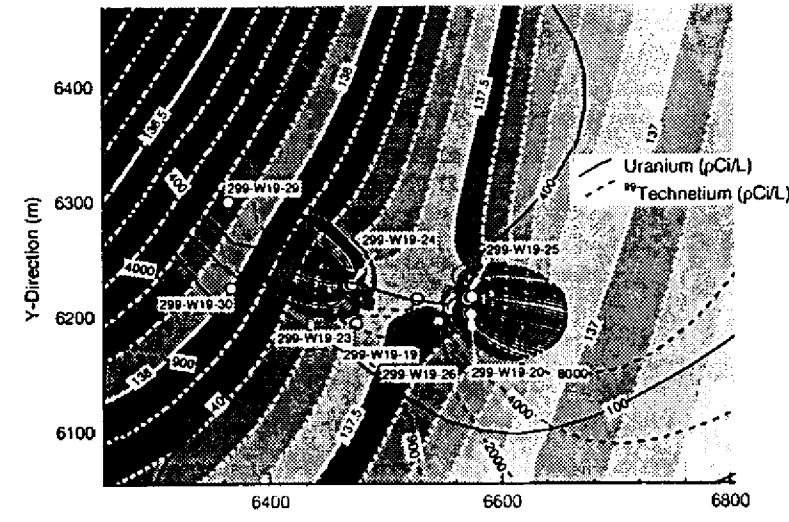
Capture and Injection Zones at 60 Days



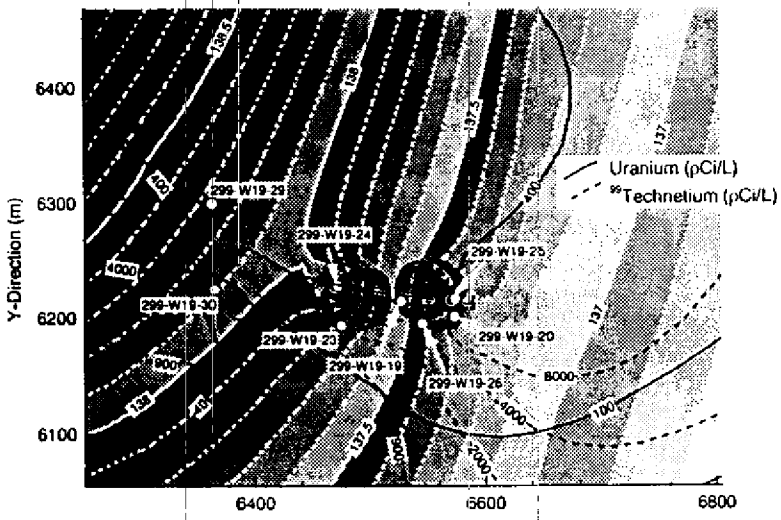
Capture and Injection Zones at 90 Days



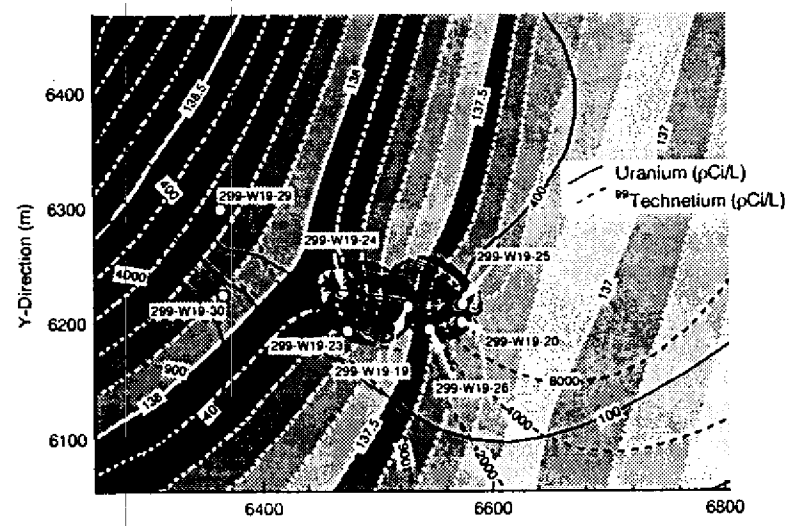
Capture and Injection Zones at 120 Days



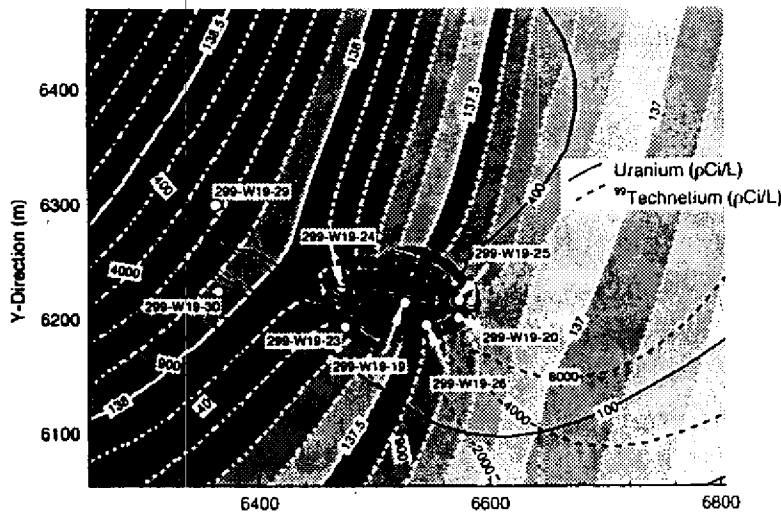
Capture and Injection Zones at 150 Days



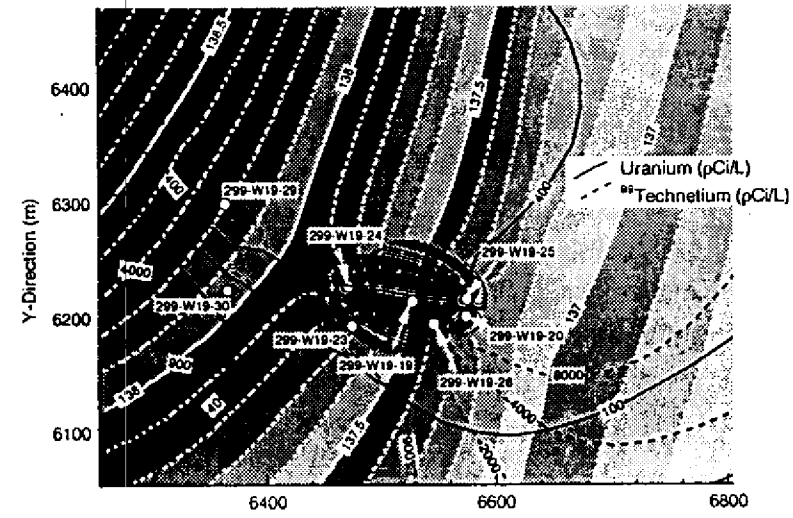
Capture and Injection Zones at 60 Days



Capture and Injection Zones at 90 Days



Capture and Injection Zones at 120 Days



Capture and Injection Zones at 150 Days

1

200-ZP-1 STRATEGY

FEBRUARY 23, 1994

D. L. Parker

2

200-ZP-1 STRATEGY

CURRENT STRATEGY:

- o IRM PROPOSED PLAN
- o INTERIM ACTION ROD
- o BEGIN TREATABILITY TEST 30 DAYS AFTER THE INTERIM ACTION ROD IS ISSUED.
- o THREE ELEMENTS
  - TREATABILITY TEST
  - LIMITED FIELD INVESTIGATION
  - REMEDIATION

3

200-ZP-1 STRATEGY

PROPOSED STRATEGY:

- o PERFORM RI/FS ACTIVITIES
  - TREATABILITY TESTING
  - LIMITED FIELD INVESTIGATION
  - QUALITATIVE RISK ASSESSMENT

- o REVISE AND RE-ISSUE IRM PROPOSED PLAN
  - INCORPORATES RESULTS OF THE RI/FS ACTIVITIES
  - IDENTIFIES PREFERRED ALTERNATIVE
  - ESTABLISHES IRM GOALS

- o RECEIVE INTERIM ACTION ROD

- o INITIATE REMEDIAL DESIGN
  - CONDUCT ADDITIONAL LFI AND TREATABILITY TESTING, IF NEEDED

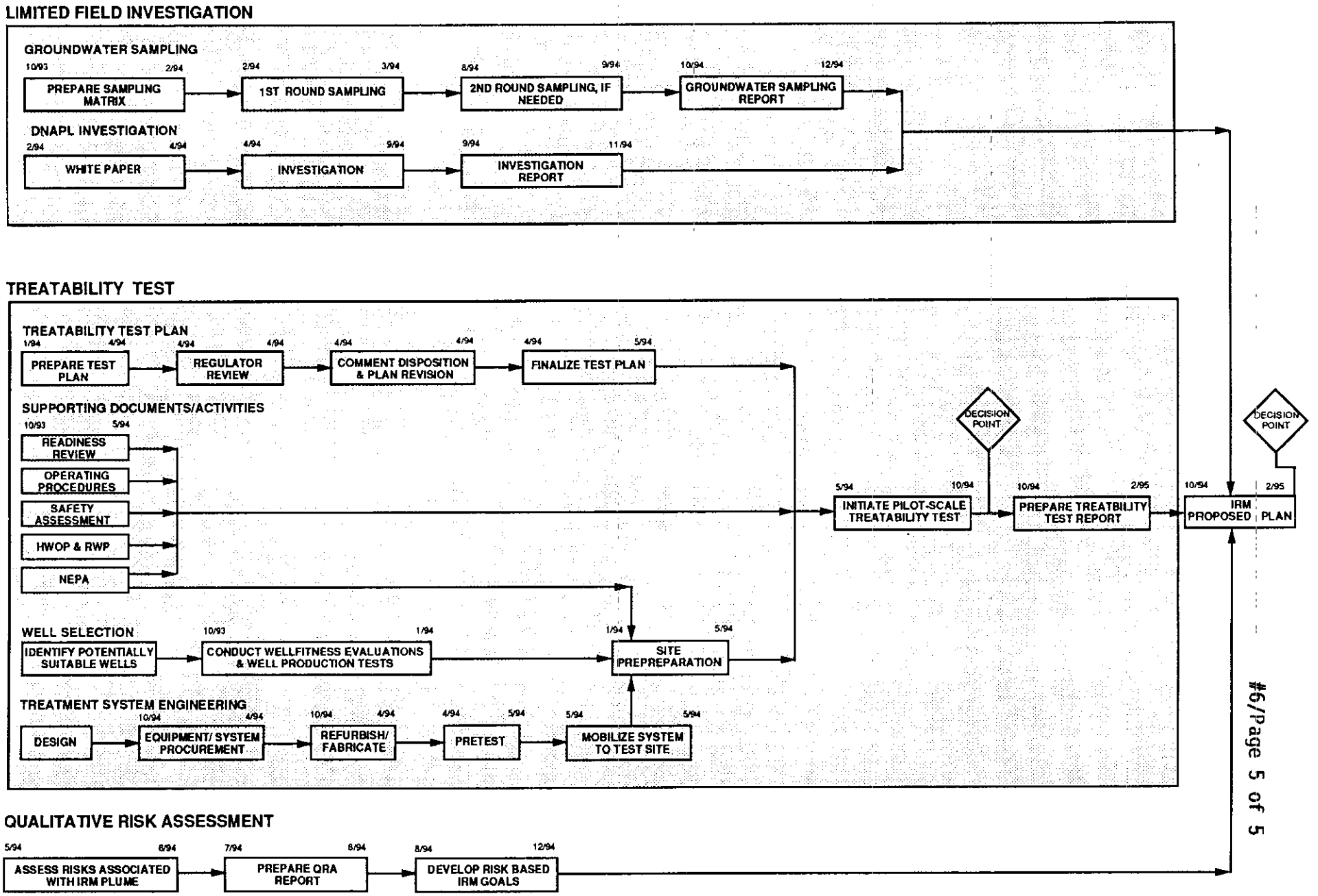
- o INITIATE THE IRM
  - PHASED/OBSERVATIONAL APPROACH

4

200-ZP-1 STRATEGY

- THREE MAIN ACTIVITIES
  - o CHARACTERIZATION
  - o TREATABILITY TESTING
  - o QUALITATIVE RISK ASSESSMENT

DRAFT 200-ZP-1 ACTIVITY LOGIC



WELLS TO BE SAMPLED SPECIFICALLY FOR THE 200-ZP-1 OPERABLE UNIT

WELL	WELL
2-W10-4	2-W15-20
2-W10-5	2-W15-23
2-W11-12	2-W15-24
2-W11-13	2-W15-4
2-W11-14	2-W18-1
2-W11-3	2-W18-2
2-W11-6	2-W18-26
2-W11-7	2-W18-3
2-W14-5	2-W18-4
2-W14-9	2-W18-5
2-W15-11	699-39-79
2-W15-12	
2-W15-13	
2-W15-16	
2-W15-17	
2-W15-18	
2-W15-19	
2-W15-2	

WELLS WITHIN 200-ZP-1 TO BE SAMPLED BY OTHER PROJECTS

WELL
2-W10-13
2-W10-14
2-W10-19
2-W10-20
2-W10-21
2-W11-31
2-W10-15*
2-W10-16*
2-W11-27*
2-W11-28*
2-W10-17*
2-W10-18*
2-W14-12*
2-W15-22*
2-W15-8
2-W18-17
2-W18-20
2-W18-29

* Volatiles analysis added to regular RCRA sampling

GROUNDWATER SAMPLES TAKEN FOR 200-ZP-1 WILL BE ANALYZED FOR:

VOLATILES	SW846 METHOD 8240
TOTAL ORGANIC CARBON	METHOD 9060
TOTAL SUSPENDID SOLIDS	METHOD EPA 160.2
pH	METHOD 9040
GROSS ALPHA	ITAS-RD-3214
GROSS BETA	ITAS-RD-3214
TOTAL ACTIVITY	222S LABS

I.T. WILL BE THE PRIMARY LABORATORY FOR THIS SAMPLING.
TMA WILL BE THE SECONDARY LABORATORY, FOR SPLIT SAMPLES.

Proposed outline:

OBJECTIVE

Provide an estimation of actual contaminant concentration values in 200 area biota associated with waste sites. These values are intended for comparisons with calculated values derived from risk assessments.

METHODS

Four sites, two each terrestrial and two riparian, two in 200 East and two in 200 West. See Table (sampling summary)

RESULTS

Discuss Sr-90, Cs-137, copper, zinc

OTHER PROJECTS

Stegen, J. A. 1994. Vegetation Communities Associated with the 100-Area and 200-Area Facilities on the Hanford Site, WHC-SD-EN-TI-216, Westinghouse Hanford Company (Show typical map)

Downs, J.L., W.H. Rickard, C.A. Brandt, L.L. Cadwell, C. E. Cushing, D.R. Geist, R.M. Mazaika, D.A. Neitzel, L.E. Rogers, M. R. Sackschewsky, and J.J. Nugent, 1994, *Habitat Types on the Hanford Site: Wildlife and Plant Species of Concern*, PNL-8942, Pacific Northwest Laboratory, Richland, Washington.

Driver, C. J. (in clearance) Ecotoxicology Literature Review, PNL-XXX, (Summarizes literature on toxicology of most historically biotically significant contaminants)

Johnson, et al. (in preparation) A summary of historical trends on biota contamination in relation to 200 area waste sites

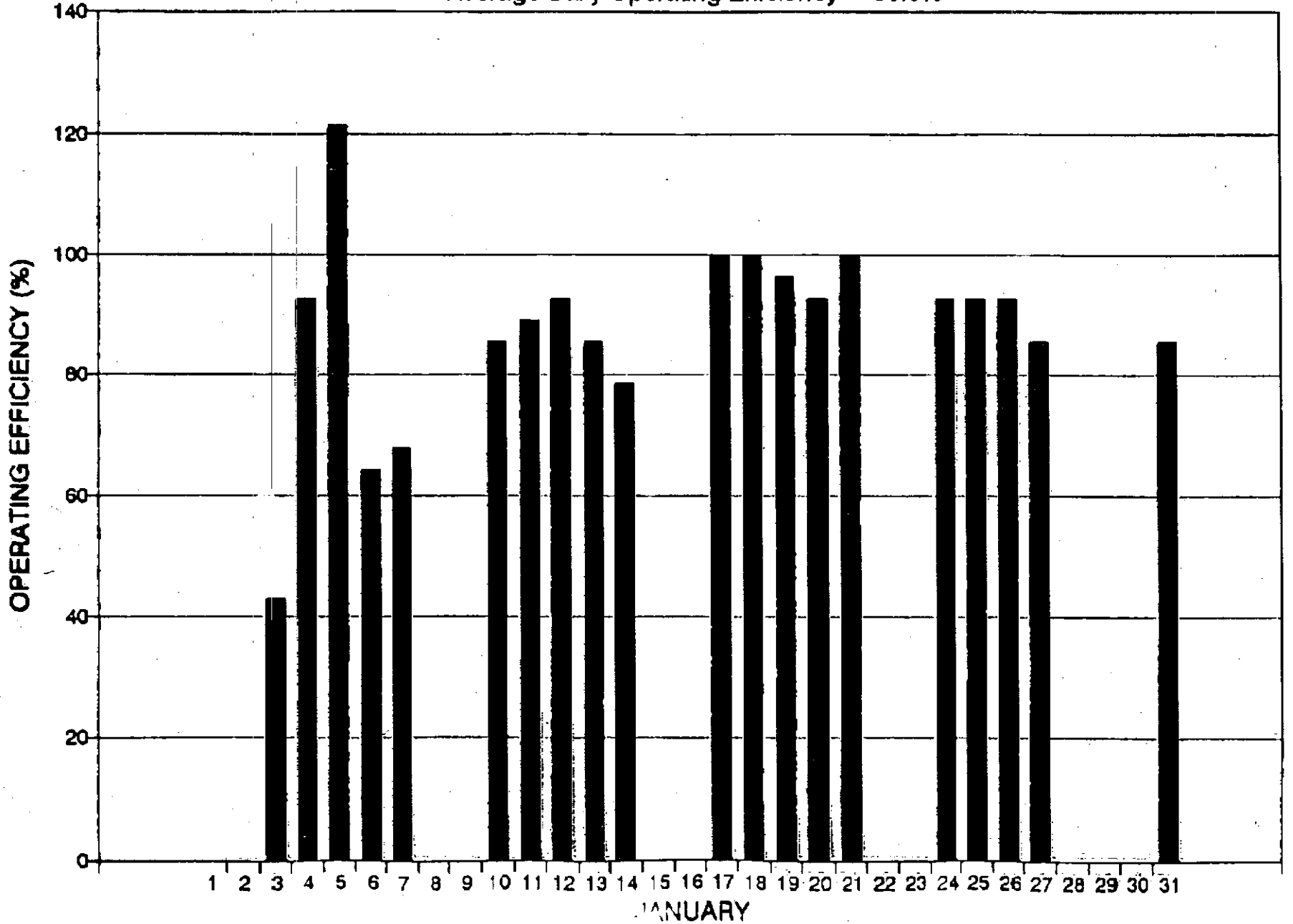
PNL's Site-Wide monitoring program; tasks to sample deer, pigeons, and raptor pellets from in and around the 200 Areas

Table 1. Sampling Summary.

Site	Number of samples			
	Soil	Vegetation	Mice	Insects
216-B-3 (riparian)	4	2 cattail 1 bulrush 1 willow	4 deer mice 2 pocket mice	1 (composite)
216-T-4 (riparian)	4	2 cattail 1 bulrush 1 willow	4 deer mice 2 pocket mice	1 (composite)
216-A-24 (terrestrial)	4	2 Russian thistle 1 cheatgrass 1 cheatgrass/ wheatgrass	4 pocket mice	1 (composite)
216-U-11 (terrestrial)	4	2 Russian thistle 2 cheatgrass	4 pocket mice	1 (composite)
Control site (Saddle Mountain Pond)	2	1 bulrush 1 cattail 1 willow 1 Russian thistle 1 cheatgrass	2 pocket mice 2 deer mice	1 (composite)

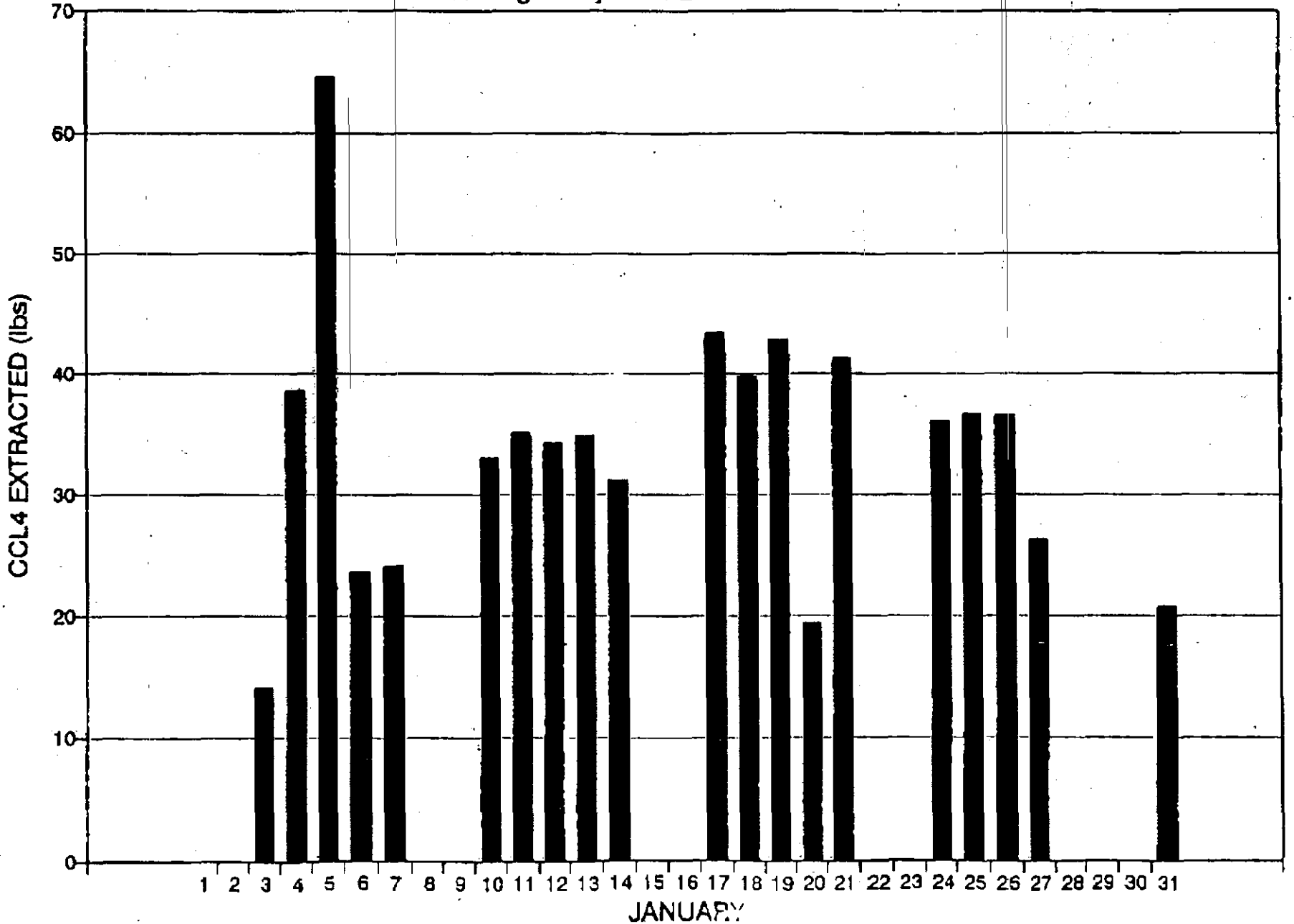
03/03/94 08:01 ☎509 376 8476 740 STEVENS 1219

1000 CFM VES
DAILY OPERATING EFFICIENCY
Average Daily Operating Efficiency = 83.9%



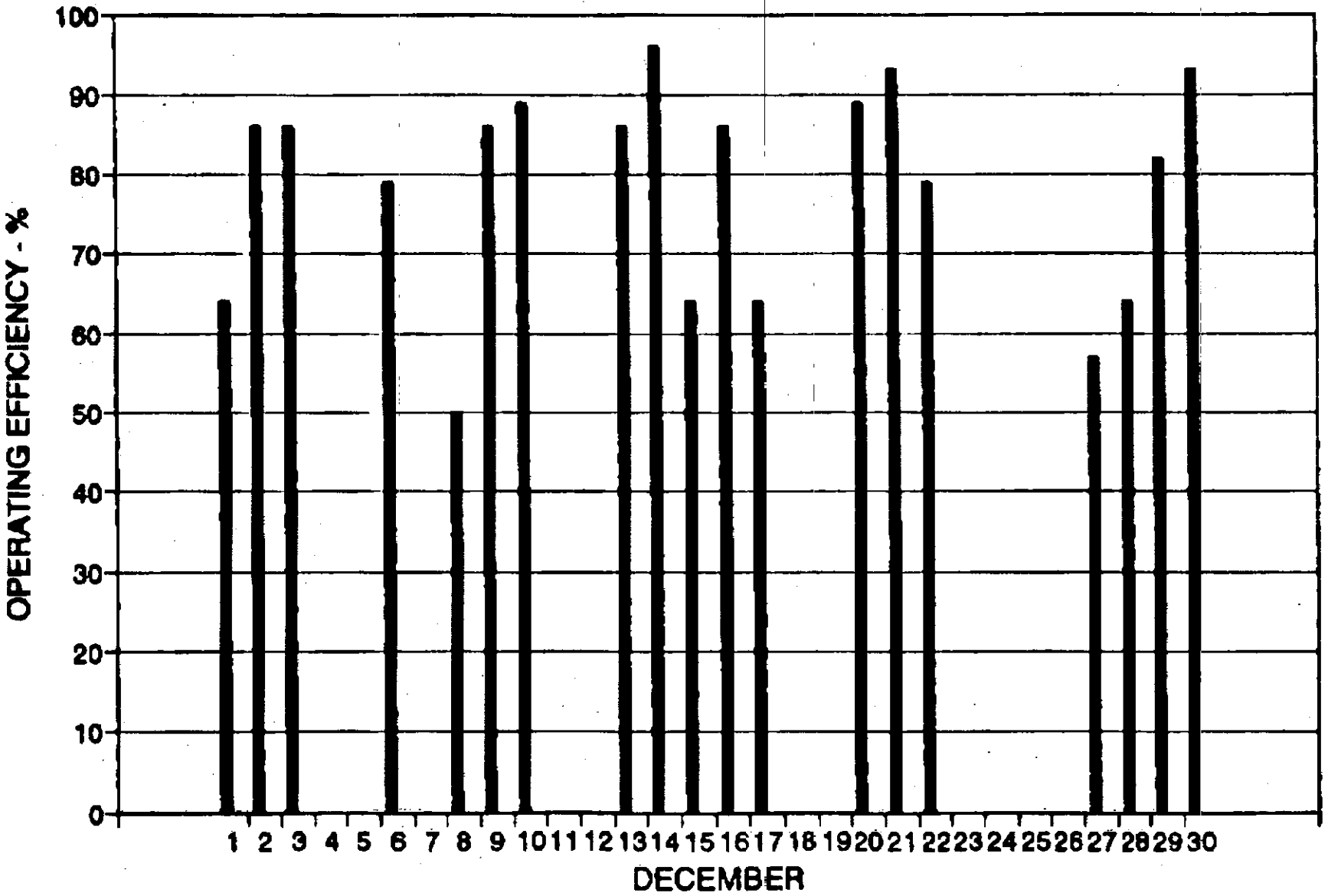
1000 CFM VES
DAILY CCL4 EXTRACTION TOTALS

Average Daily CCl4 Extraction = 33.8 lbs



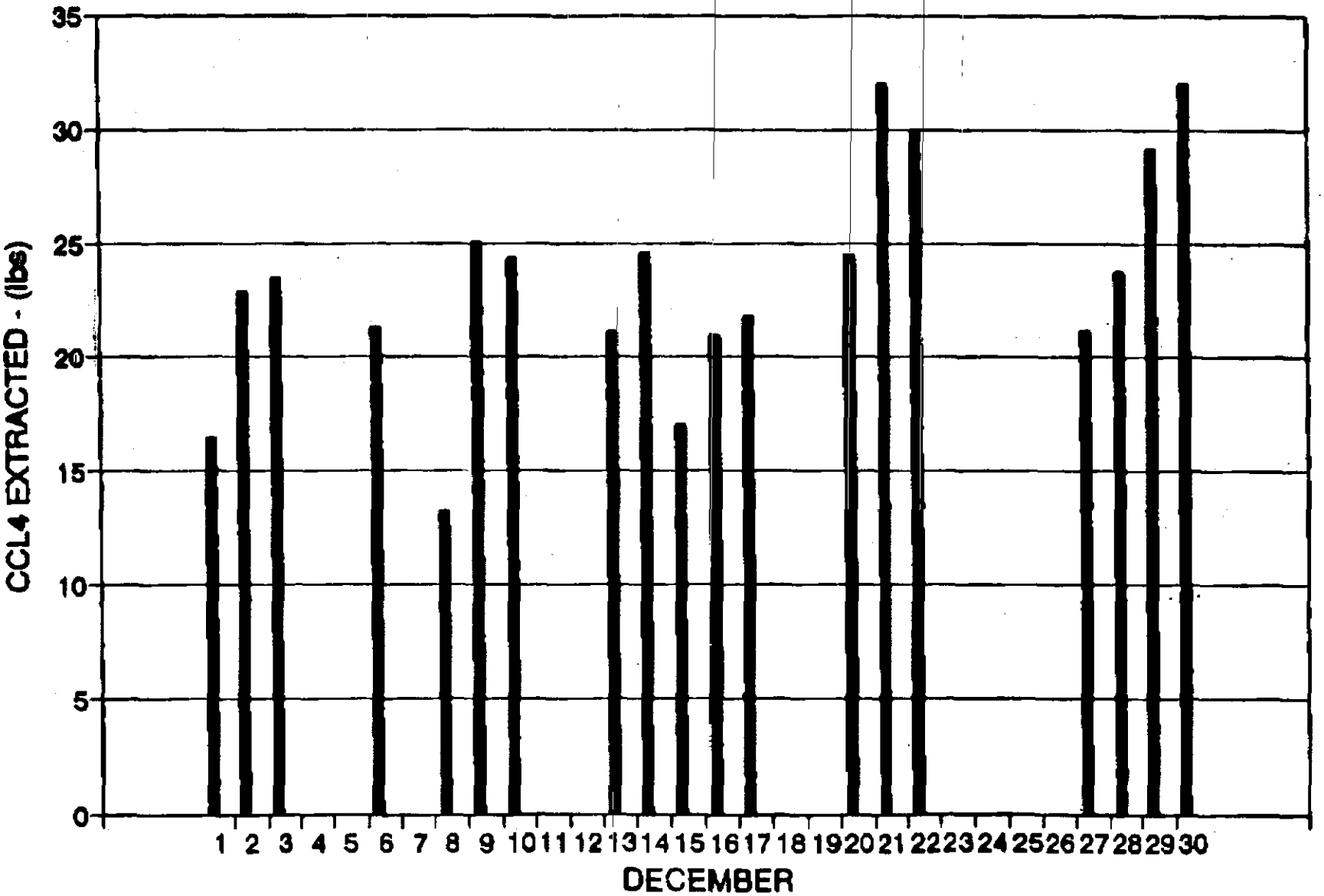
1000 CFM VES
DAILY OPERATING EFFICIENCY

Average Daily Operating Efficiency = 78.6%



1000 CFM VES
DAILY CCL4 EXTRACTION TOTALS

Average Daily Extraction = 23.4 lbs.



GROUNDWATER MONITORING FOR 200-BP-5 OU

UNIT MANAGERS MEETING

FEBRUARY 24, 1994

DAVE ERB

GROUNDWATER MONITORING FOR 200-BP-5 OU

TWO MAJOR AREAS OF ACTION

* Groundwater monitoring in support of 216-BY Cribs Plume in 600 Areas.

  - Short time-frame (5-8 years)
  - Monitor spreading of existing plumes

* Groundwater monitoring around the 216-BY cribs for future releases from crib.

  - Long time-frame (5-30 years)
  - Monitor releases from crib area itself
  - Not related to 200-BP-1 crib cover performance evaluation

GROUNDWATER MONITORING FOR 200-BP-5 OU

* Groundwater Sampling & Analysis for 200-BP-1 required under Task 7, RI/FS Work Plan, DOE/RL-88-32, Rev 1, March 1990.

* Task 7 required quarterly sampling for first year and semi-annual sampling through the end of the Feasability Study phase.

* First quarter sample analyses for Radionuclides, Metals and Cyanide, Groundwater Chemistry (Anions, pH, Specific Conductivity, etc), Volatile Organics, Semi-volatile Organics, Pesticides & PCBs.

* First 5 rounds of sampling targeted 44 wells.

* Volatile Organics, Semi-volatile Organics, Pesticides and PCBs dropped after no detects in first sample round.

* Four wells added in Summer, 1991 near Gable Gap to track plume.

* Results from first 5 rounds of sampling reported in 200-BP-1 Phase 1 RI Report (DOE/RL-92-70, 1993).

GROUNDWATER MONITORING FOR 200-BP-5 OU

* TPA Change Request M-93-06 divides 200 East groundwater into 2 OUs -
  200-BP-5 for north half of 200 East/600 Area
  200-PO-1 for south half of 200 East/600 Area.

* 200-BP-5 OU addresses Treatability Testing and continuation of Groundwater sampling for BP-1.

* EPA requests DOE/WHC consider dropping wells from 200-BP-1 GW monitoring activities.

* Reduce number of wells from 48 to 31.
  - Retain all wells in confined aquifer
  - Retain all 600 Area wells
  - Delete wells sampled by RCRA GW assessment or nearby
  - Delete 4 of 6 wells around BY cribs
  - Delete decommissioned well

* Reduce list of analytes by deleting ICP Metals and Groundwater Anions. Add Co-60, Tc-99 and Cyanide to RCRA sampling for Low Level Burial Grounds (218-E-10 and 218-E-12B) Groundwater Assessments.

* Monitoring to continue for duration of Treatability Testing/Interim Remedial Measures/ Record of Decision.

GROUNDWATER MONITORING FOR 200-BP-5 OU

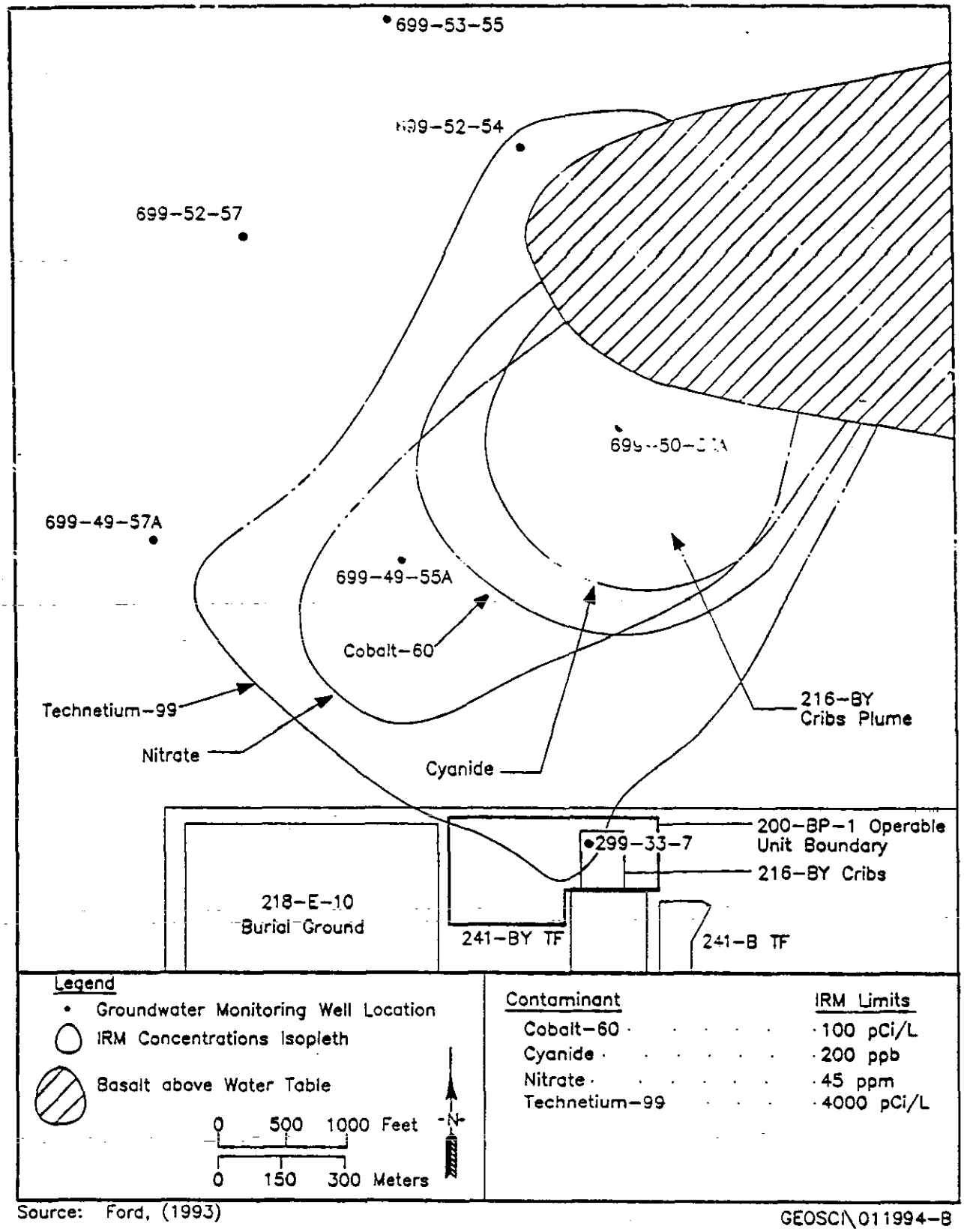
* Long-term monitoring for 200-BP-1 will be necessary to detect "leakage" from crib.

* Gradient flow directions may change with time and require new wells.

* Further study is necessary to assess efficiency of existing wells at detecting new groundwater contamination.

* Need to assess sampling frequency and analytes list.

Figure 1-3. 216-BY Cribs IRM Plume.



Source: Ford, (1993)

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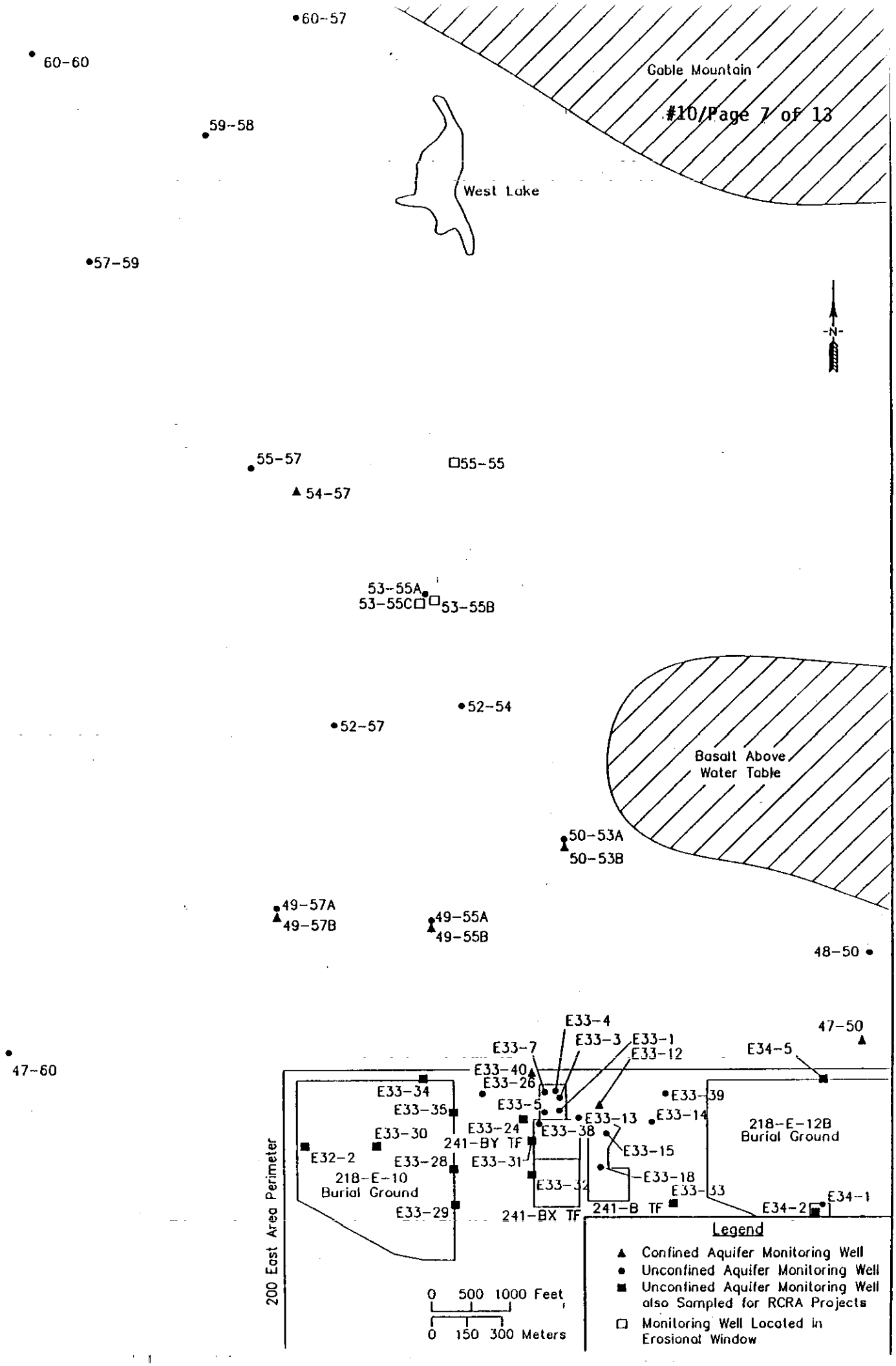
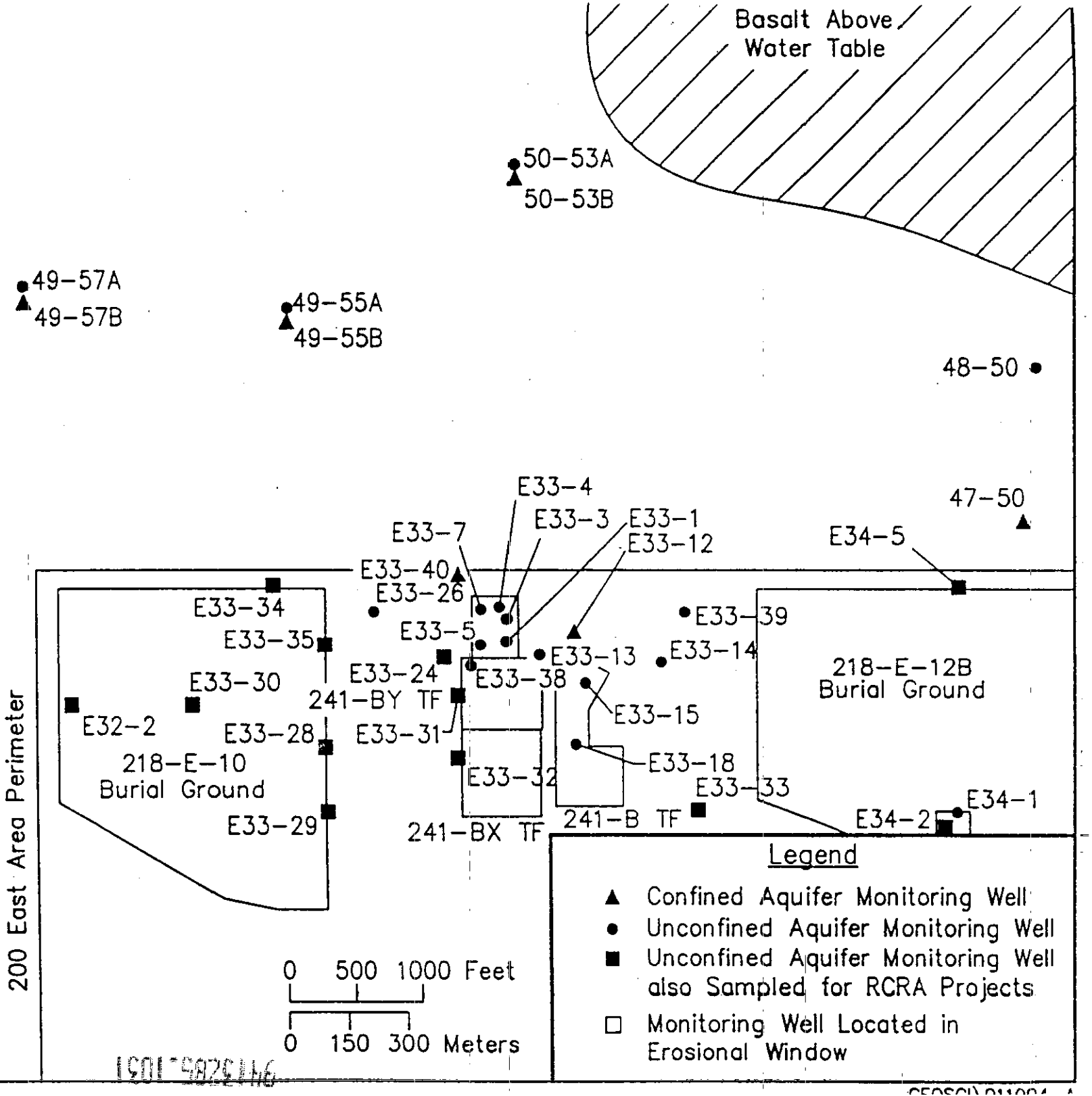
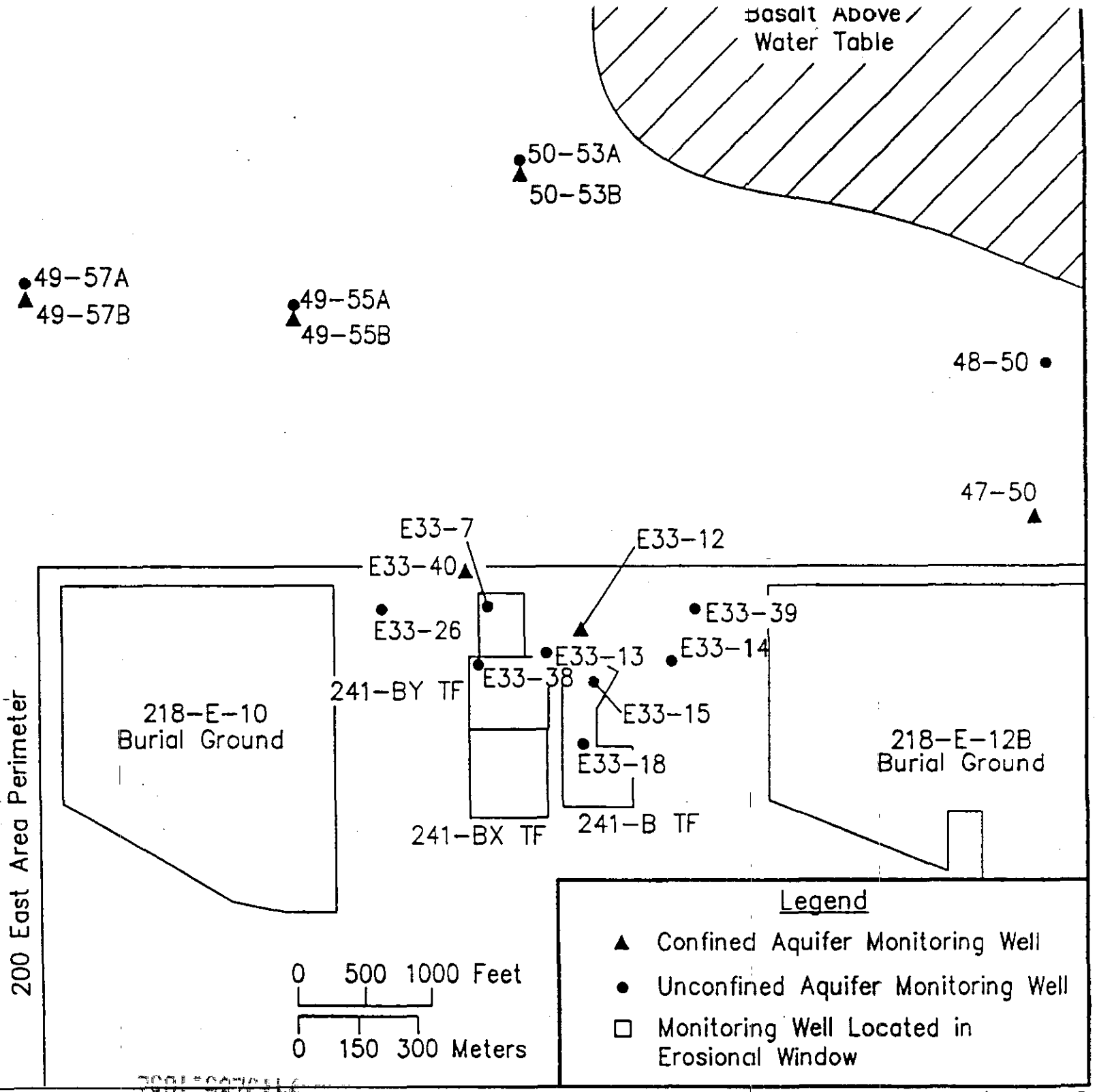



Basalt Above Water Table
50-53A
50-53B
49-57A
49-57B
49-55A
49-55B
48-50
47-50
E33-4
E33-3
E33-1
E33-12
E33-7
E34-5
E33-40
E33-26
E33-34
E33-39
E33-5
E33-35
E33-13
E33-14
E33-24
E33-38
218-E-12B Burial Ground
E33-30
241-BY TF
E33-15
E32-2
E33-28
E33-31
E33-18
218-E-10 Burial Ground
E33-32
E33-33
E34-1
E33-29
241-BX TF
241-B TF
E34-2
200 East Area Perimeter
0 500 1000 Feet
0 150 300 Meters
Legend
Confined Aquifer Monitoring Well
Unconfined Aquifer Monitoring Well
Unconfined Aquifer Monitoring Well also Sampled for RCRA Projects
Monitoring Well Located in Erosional Window



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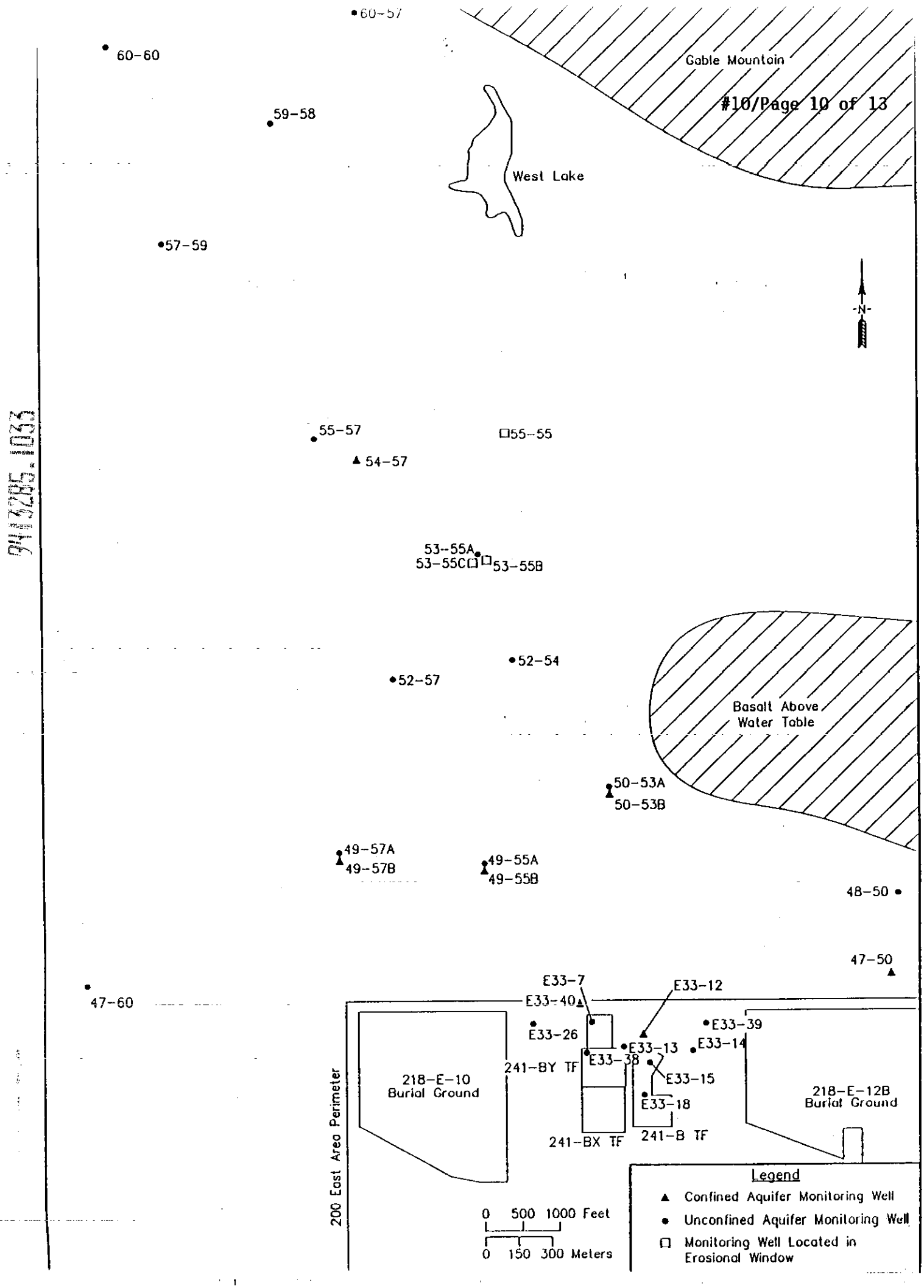


COMPARISON OF CERCLA vs RCRA ANALYSES

ANALYTES	CERCLA 200-BP-5	RCRA WMA-B-BX-BY TANK FARMS	RCRA LLWM-1 (218-E-10)	RCRA LLWMA-2 (218-E-12B)
METALS	Ca, Mg, Na, K, Fe, Mn, Si, Al, Bi, Se	Ca, Mg, Na, K, Fe, Mn, Sb, Ba, Be, Cd, Cr, Co, Cu, Ni, Ag, Sn, V, Zn	Same RCRA + Se	Same RCRA
ANIONS	F, Cl, SO_4, NO_3, PO_4	F, Cl, SO_4, NO_2, PO_4, NO_3, Br	Same RCRA	Same RCRA
RADIONUCLIDES	Gross Alpha Gross Beta Gamma Spectral Cs^{137}, Co^{60} Ru^{106}, Pu^{238}, $Pu^{239/240}$, Sr^{90}, Total U, H^3, Tc^{99}, Total Activity	Gross Alpha, Gross Beta, Gamma Scan, Pu Isotopic, Sr^{90}, U, Tc^{99}, I^{129}, Co^{60}	Gross Alpha, Gross Beta, U, H^3, Radium **Propose to Co-sample for Co^{60} & Tc^{99}**	Gross Alpha, Gross Beta, U, H^3, Radium **Propose to Co-sample for Co^{60} & Tc^{99}**
ORGANICS		Phenol, TOX, TOC, Turbidity	Phenol, TOX, TOC, Herbicides, Pesticides,	Phenol, TOX, TOC, PCB
SITE SPECIFIC CONSTITUENTS	NO_2, Alkalinity, TDS, pH, Specific conductivity, Sulfates, Cyanide	pH, Specific Conductivity, Turbidity Cyanide	pH, Pb, Hg, PCB, Ammonium, As, Cyanide, Turbidity, Coliform	pH, Pb, Hg, P, Specific Conductivity Cyanide, Turbidity
SAMPLE FREQUENCY	Semi-Annually	Metals and Anions- Annually, Others Semi-Annually	Quarterly. To be changed to Semi-Annually when removed from Assessment Monitoring	Semi-Annually

200-BP-5 WELLS-SELECTION AND CHARACTERISTICS

WELL	AQFR	SHARED USAGE	SAMPLE FREQUENCY	SCREEN DIA---INTERVAL	RECOMMENDED CHANGE
2-E32-2	UN	RCRA-L#1	SEMI	4 253 - 273	RCRA SAMPLE
2-E33-1	UN			8 215 - 233	STOP
2-E33-3	UN			8 219 - 231	STOP
2-E33-4	UN			8 215 - 231	STOP
2-E33-5	UN			8 218 - 236	STOP
2-E33-7	UN			8 215 - 231	
2-E33-12	CONF			4 305 - 385	
2-E33-13	UN			8 210 - 235	
2-E33-14	UN			8 212 - 227	
2-E33-15	UN			8 222 - 237	
2-E33-18	UN			8 240 - 260	
2-E33-24	--	------	DECOMMISSIONED	----------	---DROP---
2-E33-26	UN			6 199 - 220	
2-E33-28	UN	RCRA-L#1	SEMI	4 255 - 275	RCRA SAMPLE
2-E33-29	UN	RCRA-L#1	SEMI	4 262 - 282	RCRA SAMPLE
2-E33-30	UN	RCRA-L#1	SEMI	4 255 - 275	RCRA SAMPLE
2-E33-31	UN	RCRA-BT	SEMI	4 235 - 256	RCRA SAMPLE
2-E33-32	UN	RCRA-BT	SEMI	4 246 - 267	RCRA SAMPLE
2-E33-33	UN	RCRA-BT	SEMI	4 222 - 247	RCRA SAMPLE
2-E33-34	UN	RCRA-L#1	SEMI	4 219 - 239	RCRA SAMPLE
2-E33-35	UN	RCRA-L#1	SEMI	4 228 - 248	RCRA SAMPLE
2-E33-38	UN			4 218 - 239	
2-E33-39	UN			4 208 - 229	
2-E33-40	CONF			4 293 - 304	
2-E34-1	UN			8 215 - 230	STOP
2-E34-2	UN	RCRA-L#2	SEMI	4 220 - 240	RCRA SAMPLE
2-E34-5	UN	RCRA-L#2	SEMI	4 170 - 190	RCRA SAMPLE

WELL	AQFR	SHARED USAGE	SAMPLE FREQUENCY	SCREEN DIA---INTERVAL	RECOMMENDED CHANGE
6-47-50	CONF			6 260 - 295	
6-47-60	UN			8 235 - 277	
6-48-50	UN			4 159 - 179	
6-49-55A	UN			6 124 - 139	
6-49-55B	CONF			6 175 - 226	
6-49-57A	UN			8 144 - 161	
6-49-57B	CONF			4 219 - 230	
6-50-53A	UN			8 142 - 156	
6-50-53B	CONF			4 214 - 224	
6-52-54	UN			4 156 - 166	
6-52-57	UN			4 149 - 159	
6-53-55A	UN			8 165 - 270 2 330 - 335	
6-53-55B	UN			8 232 - 255	
6-53-55C	UN			10 197 - 220	
6-54-57	CONF			6 236 - 320	
6-55-55	UN			4 148 - 169	
6-55-57	UN			6 139 - 169	
6-57-59	UN			4 165 - 186	
6-59-58	UN??			6 85 - 105	
6-60-57	UN??			6 60 - 70	
6-60-60	UN??			8 100 - 127	

200-BP-5 PILOT SCALE TREATABILITY TEST

DAVE ERB

UNIT MANAGERS MEETING

FEBRUARY 24, 1994

PRESENTATION CONTENTS:

* 200-BP-5 TREATABILITY TEST STRATEGY

* GROUNDWATER MONITORING FOR 200-BP-5

* AT CONCLUSION OF PRESENTATION, REACH AN AGREEMENT-IN-PRINCIPLE FOR PURSUING LEAD-IN ACTIVITIES FOR TREATABILITY TEST

  &

  AGREE TO PROPOSED WELL AND ANALYTE REDUCTIONS FOR CONTINUING 200-BP-1 GROUNDWATER MONITORING

200-BP-5 OU TREATABILITY TEST - ORIGINS

* 200-BP-5 Treatability Testing derived from the 200 East Groundwater Aggregate Area Management Study Report (GWAAMSR).

* 200 East GWAAMSR identified a number of wells with contaminant concentrations above Drinking Water Standards or Derived Concentration Guidelines.

* Thirteen constituents were found over broader areas that correlated well with historical releases to the ground.

* Hazardous material plumes included Arsenic, Chromium, Nitrate and Cyanide.

* Radionuclide plumes included H-3, Co-60, Sr-90, Tc-99, I-129, Cs-137, Pu-239/240, Gross Alpha & Gross Beta.

* AAMSR evaluated the plumes according to relative risk and provided recommendations on potential cleanup strategies.

* Sr-90 plume rated as an candidate for Expedited Response Actions.

* Co-60, Tc-99, Cs-137 and Pu-239/240, along with Uranium, Nitrate and Cyanide rated as candidates for Interim Remedial Measures.

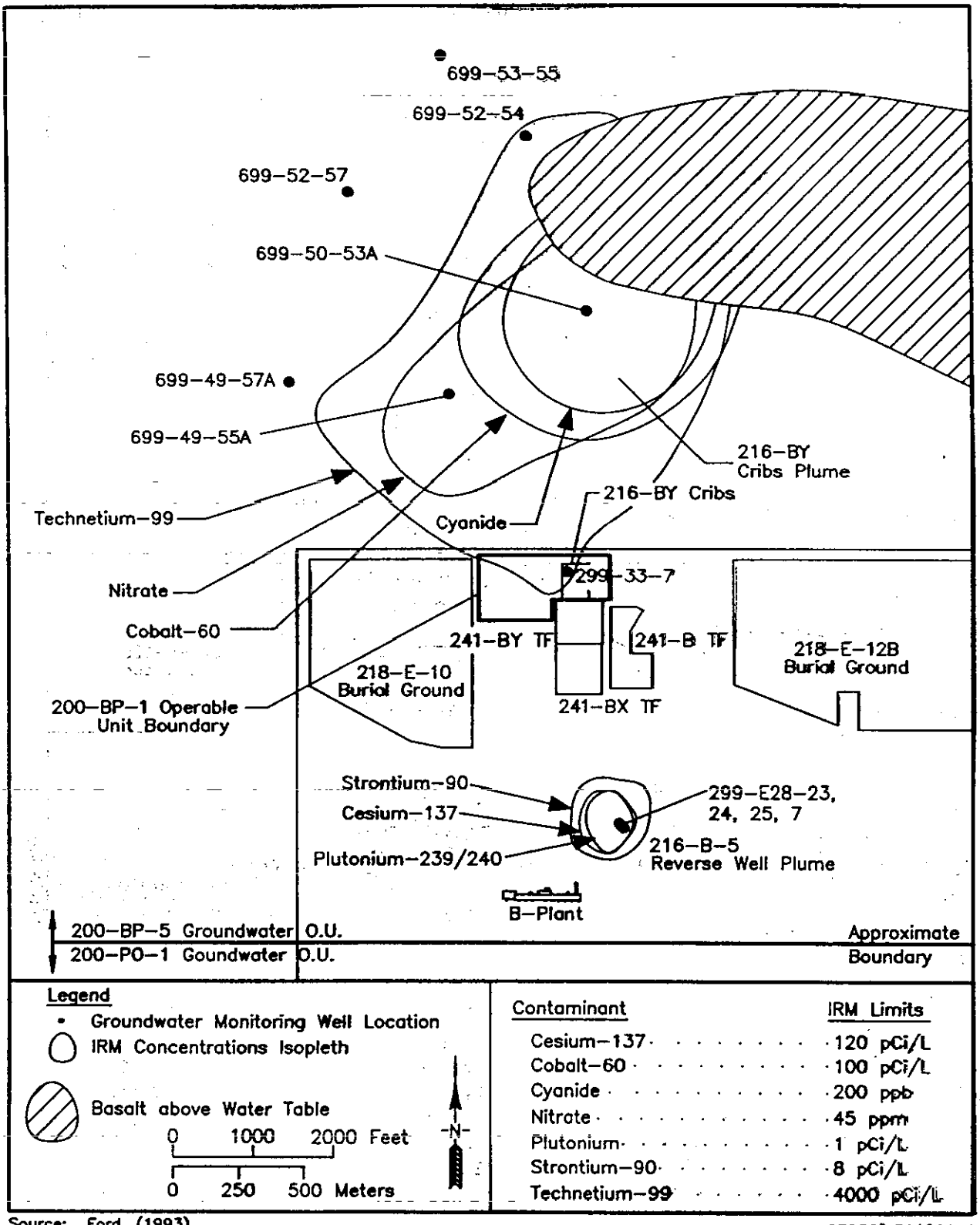
200-BP-5 OU TREATABILITY TEST - TPA CHANGES

* Operable Units redefined by TPA Change Request M-93-06 which created 2 Groundwater Operable Units in 200-East Area.

* 200-BP-5 extends over north half of 200 East area and into 600 Area up to Gable Gap.

* 200-PO-1 covers south half of 200 East and contiguous parts of 600 Area to south and east.

* Source Waste Management Units transferred to 200-BP-6 and 200-PO-2 OUs, respectively.



Source: Ford, (1993)

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200-BP-5 OU TREATABILITY TEST

TRI PARTY AGREEMENT CHANGES

* TPA Change Request M-13-93-02 approved changing 200-BP-5 LFI Work Plan to a Pilot-Scale Treatability Test Plan, due Januay 31, 1994, in expectation of initiating groundwater remediation.

* TPA Change Request M-13-93-03 developed during Summer 1993 TPA renegotiations to expedite GW cleanup in 200 Areas.

* M-13-93-03 specified accelerating start of pilot-scale Pump and Treat projects at the 216-BY Cribs plume for Co^{60} and Tc^{99}, and at the 216-B-5 Reverse Well for Sr^{90}, Cs^{137}, and $Pu^{239/240}$.

* TPA Milestone M-13-06A modified to initiate Treatability Testing no earlier than August 31, 1994 at both sites.

* Modifications/expansions to Treatment System is expected to optimize the cleanup activities. Use of existing wells and equipment is expected where possible.

* Following completion of Treatability Test, and IRM Proposed Plan and Interim Record of Decision will be prepared.

* Sr^{90} treated as an IRM level constituent.

200-BP-5 OU TREATABILITY TEST

SITE CONCEPTUAL MODEL - 216-BY CRIBS PLUME

* 9 Cribs in 200-BP-1 OU received 4.7 x 10E7 gals of waste from 1954-1974.

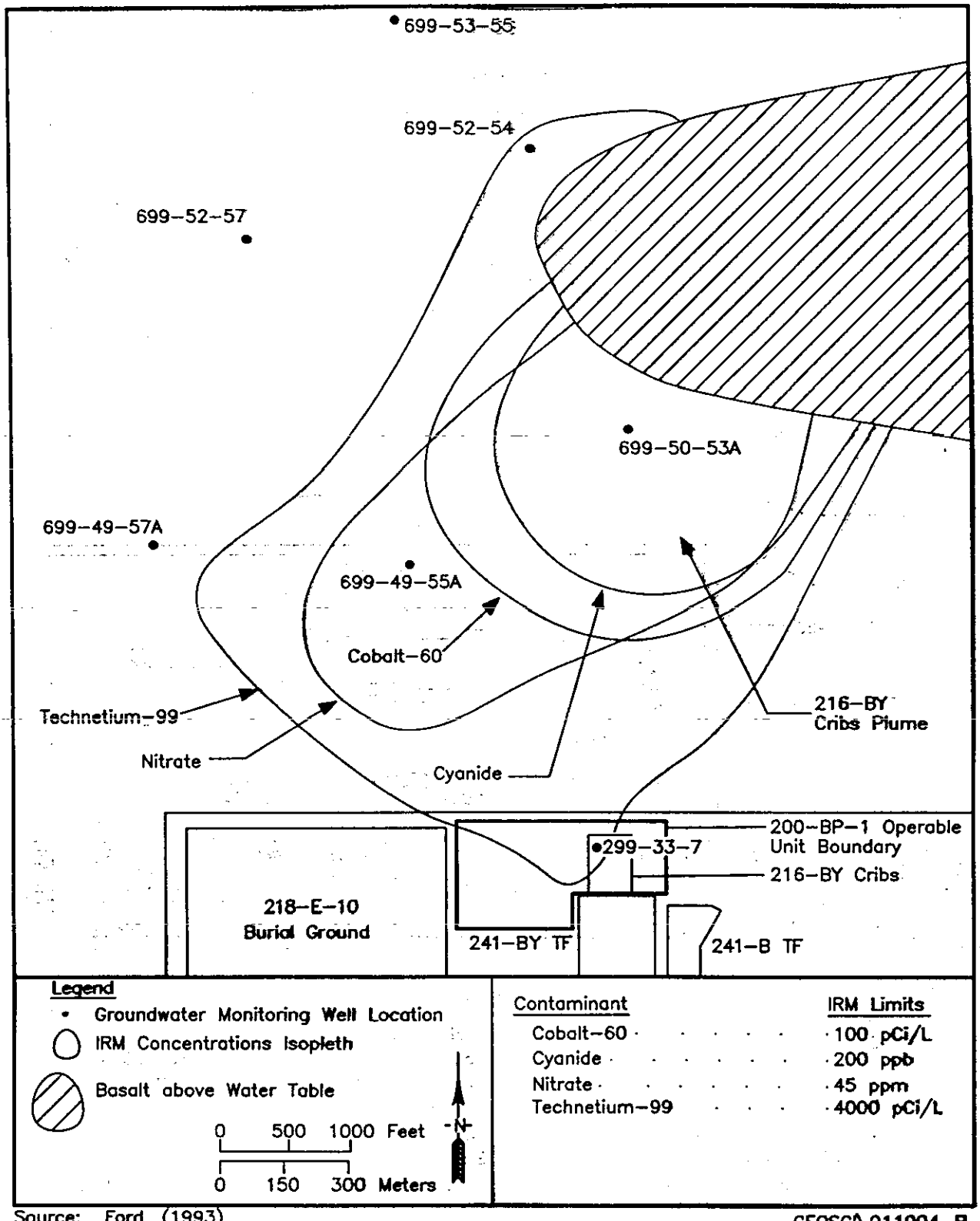
* Waste derived from 2 programs - Uranium Recovery Program generated ferrocyanide scavanging waste (1954-57) & In Tank Solidification generated process condensate wastes (1964-1974).

* Total extimates wastes discharged to soil included 5.6 x 10E6 kg of nitrates, 13,900 kg of cyanide, 0.45 Ci of Co^{60} and 21.5 Ci of Tc^{99}.

* Wastes believed to have migrated to NW-N due, primarily, to changing gradients from B-Pond.

* Wells north of 200-East fenceline have exhibited increasing and decreasing concentrations of contaminants over time.

* Tc^{99}, cyanide and nitrates are mobile in groundwater. Co^{60} typically binds to soil, however, analyses show it to be very mobile. Complexing with cyanide is the most likely answer.



Source: Ford, (1993)

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200-BP-5 OU TREATABILITY TEST

SITE CONCEPTUAL MODEL - 216-BY CRIBS PLUME

* Tc^{99} plume geometry defined by 4 wells where above-MCL concentrations are found. Plume is centered around the 699-50-53A well.

* Co^{60} and Cyanide plumes defined only by above MCL concentrations of contaminants in the 50-53A well.

* Aquifer is thin over the northern part of the OU. Well 699-52-54 has dried up and GW in well 699-50-53A has dropped by ~3.5 ft, to less than a 1 ft thickness.

* Water level is dropping due to reduced discharges to B-Pond. Water level declines will continue as B-Pond Main Lobe is shut down and as W-049 Project ponds are sited farther east.

* No major problems expected in treating contaminants pumped from the aquifer. Returning GW to subsurface will require new wells. Shallow thickenss of aquifer may pose problems for continuous pumping.

* Will not be able to treat part of plume with greatest contaminant concentrations.

* Treatment of Co^{60}

200-BP-5 OU TREATABILITY TEST

SITE CONCEPTUAL MODEL - 216-B-5 REVERSE WELL PLUMES

* Reverse well drilled to 302 ft depth in 1944.

* Reverse well used between April, 1945 and September 19, 1947. Facility use halted when groundwater sample from 241-B TF well was contaminated.

* Reverse well was not the source, but water level measurements revealed that the water table had risen into the casing.

* Reverse well received 8.1 x 10E6 gal of waste from 221-B and 224-B facilities, including 4300 gm of $Pu^{239/240}$, 76 Ci of Sr^{90} and 81 Ci of Cs^{137}. By 1994, about 65% of Sr^{90} & Cs^{137} have decayed.

* Study by Brown and Rupert (1950) reported on a 3 year investigation of groundwater contaminantion. Study drilled 11 wells about 216-B-5. Wells spaced 65-6000 ft from well.

* Broad plume of short-lived Beta Emitters detected 2000 ft SE of the reverse well but decayed to a much smaller size by end of study.

200-BP-5 OU TREATABILITY TEST

* $Pu^{239/240}$ not detected at nearest well 65 ft away.

* Study by Smith (1980) characterized soil and groundwater much closer to reverse well. Both groundwater and sediment samples showed significant concentrations of Pu, Sr and Cs around the reverse well. Most contaminantion seemed to be within 10-15 ft of the reverse well.

* Smith also estimated that ~ 2400 gms of Pu retained in the 241-B-361 Settling Tank.

* Reverse well was perforated into coarse-grained Lower Ringold sediments. Minor amounts of fine-grained materials throughout the sediments and in localized lenses.

* GWT is about 46 ft thick here at present. No obvious gradient due to competing influences of B-Pond and 200 West groundwater mounds.

* Behavior of Pu, Sr and Cs in soil are well known through laboratory testing and field work. Pu readily sorbs onto fine-grained soils and is not released over pH range found in GW. Cs and Sr are less tightly held and tend to migrate more.

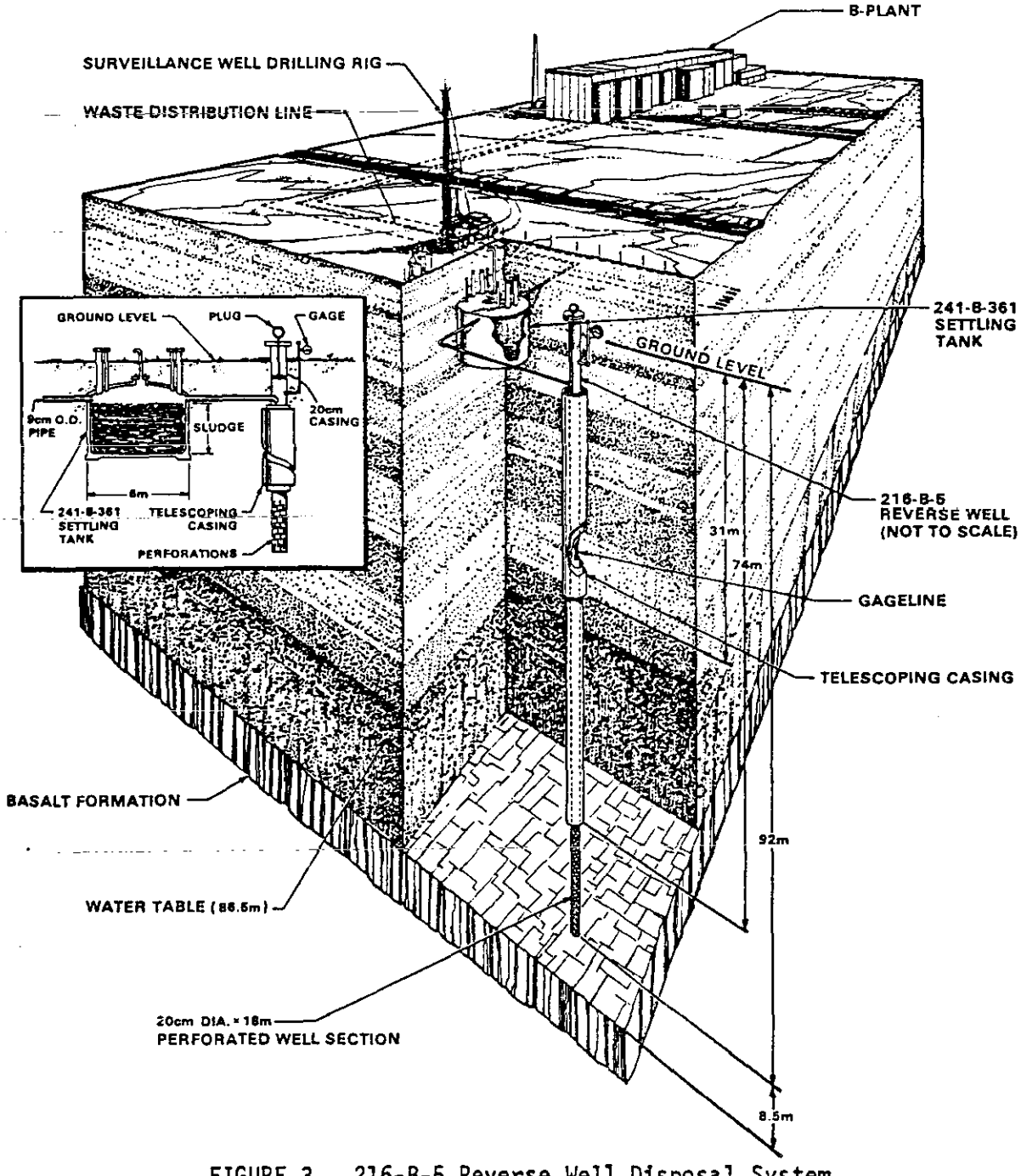


FIGURE 3. 216-B-5 Reverse Well Disposal System.

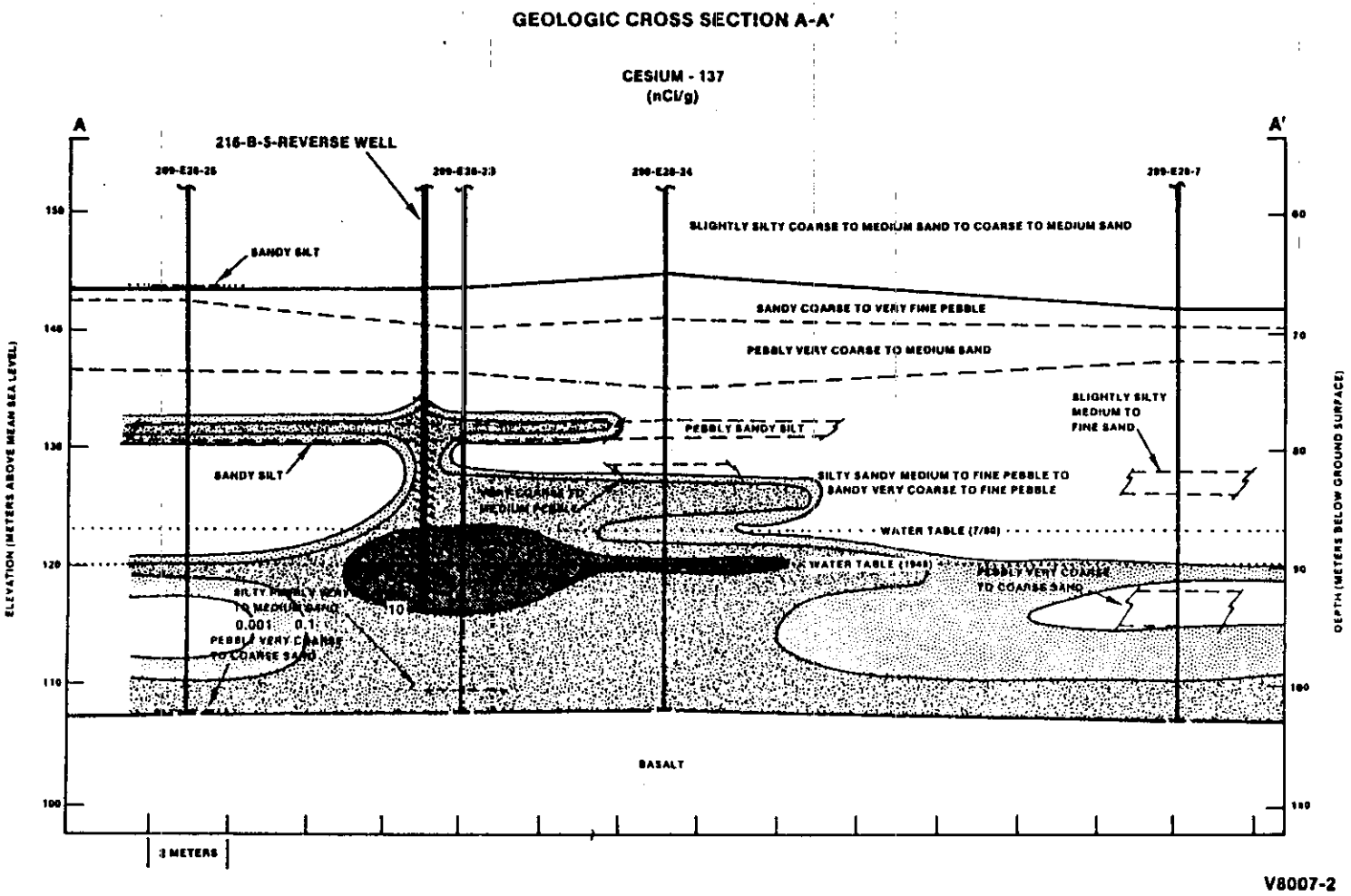


FIGURE 21. ^{137}Cs Distribution.

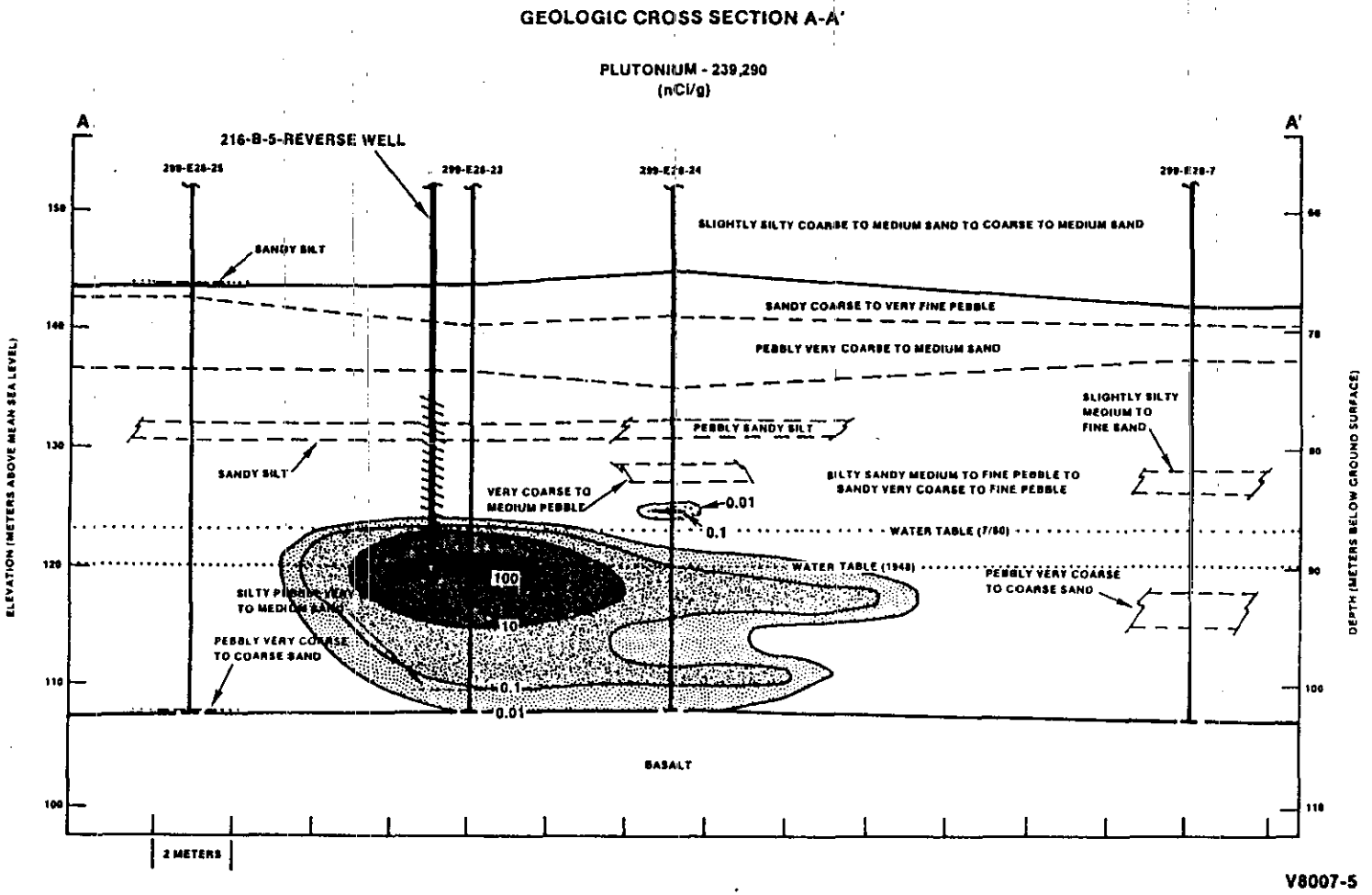


FIGURE 22. $^{239-240}$Pu Distribution.

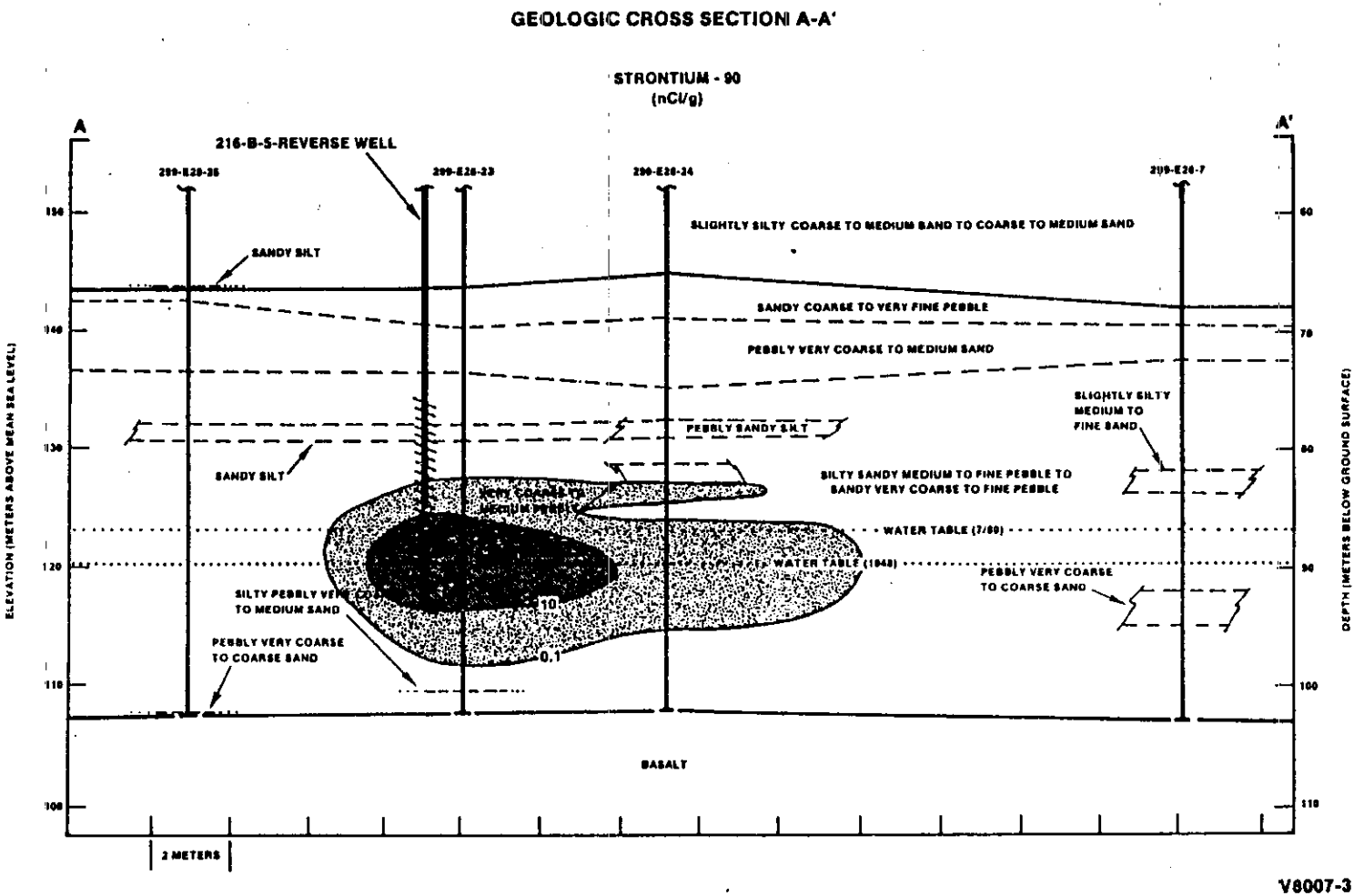


FIGURE 23. ^{90}Sr Distribution.

200-BP-5 OU TREATABILITY TEST

* Recent yearly groundwater analyses from nearby wells at 216-B-5 indicate high concentrations of the three contaminants. Contaminants may dissociate off soil particles but do not move far before being recaptured.

* General Conclusion for site plumes are that primary contaminants may not be easily removed from the aquifer.

200-BP-5 OU TREATABILITY TEST

TREATABILITY TEST OBJECTIVES

* Two major concerns -

  - At both sites, can primary contaminants be removed from pumped groundwater?
    - Can Co^{60} be removed from groundwater without Cyanide Destruction?

  - At 216-B-5 Reverse Well site, can groundwater pumping effectively remove Sr, Cs and Pu from the aquifer?

200-BP-5 OU TREATABILITY TEST

TEST PERFORMANCE OBJECTIVES

* Determine removal efficiency of the two Ion Exchange systems on Co^{60}, Tc^{99}, Sr^{90}, Cs^{137} and $Pu^{239/240}$. Also included are factors important to scaling-up the test equipment.

* Three subcategories of parameters to be addressed
  - Effectiveness of the Treatment Systems.
  - Assess parameters/factors affecting operations
  - Determine resource needs.

* Effectiveness
  - Effectiveness of the IX System.
  - Identify optimum/preferred resin(s).
  - Determine Co^{60}'s response to IX. Determine alkaline chlorination's effectiveness on Co-60/Cyanide complex destruction.
  - Assess design/operating parameters of cyanide destruction.

* Operating Parameters
  - Refine operation configurations, requirements & procedures.
  - Assess GW constituents' impacts on operational efficiency.
  - Assess operating parameters (e.g. flow rates, residence times, pH, Eh, etc) on treatment efficiency.
  - Demonstrate system reliability and safety.

200-BP-5 OU TREATABILITY TEST

* **Resource Requirements**

  - **Develop estimates of significant cost components including:**
    - **Equipment and materials**
    - **Resin/ resin capacity**
    - **Other chemical costs**
    - **Power and Utility Costs**
    - **Process Residue/Secondary Waste Costs**
    - **Maintenance costs/factors**
    - **Operator and Personnel requirements**

  - **Refine health and safety requirements**

200-BP-5 OU TREATABILITY TEST

CONTAMINANT EXTRACTION OBJECTIVES

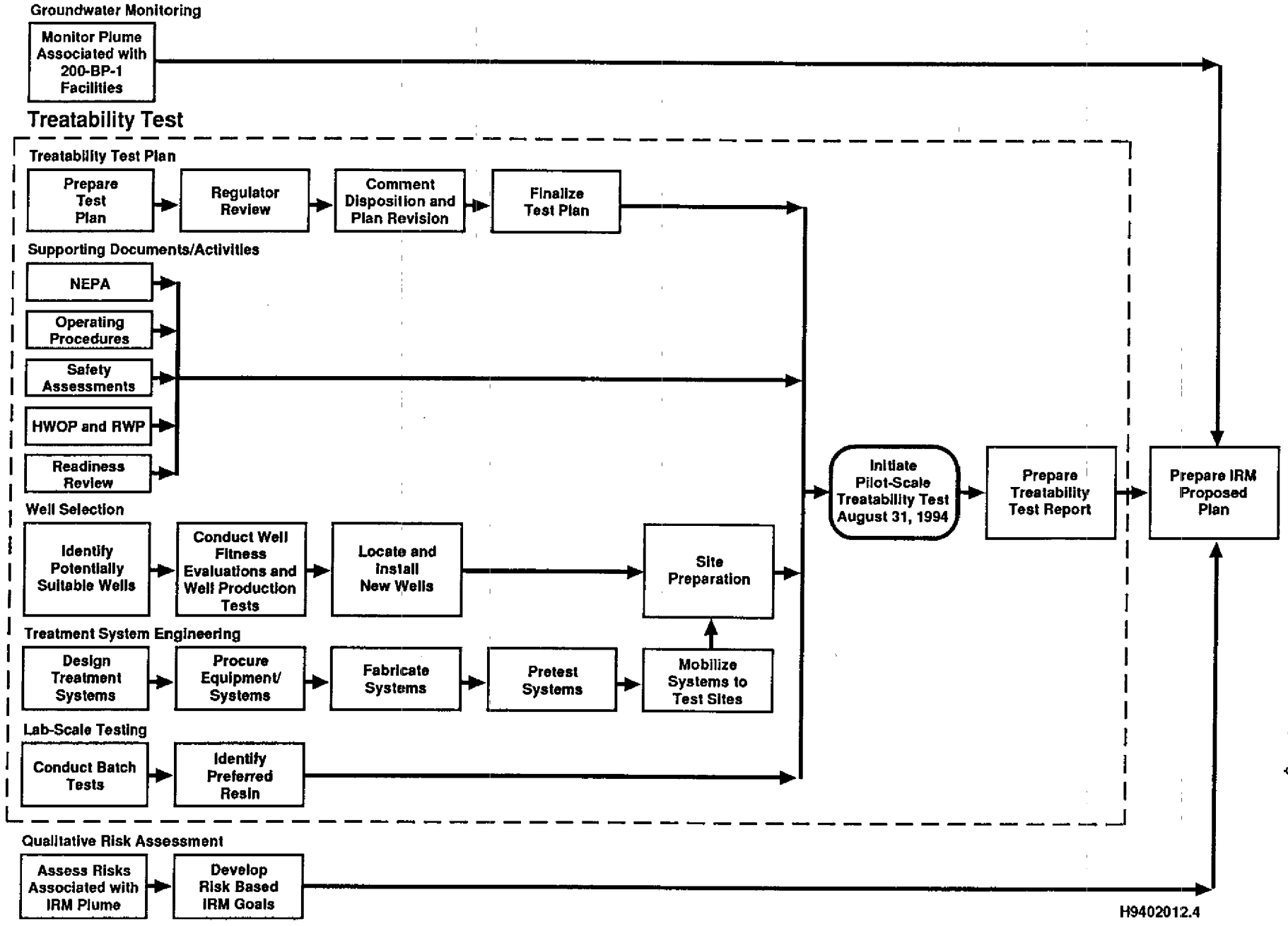
Overall Goal - Assess the potential for recovering contaminants from the aquifer at 216-B-5 REVERSE WELL site.

* Effectiveness
  - Determine effectiveness of contaminant recovery for primary contaminants from the aquifer.

* System Optimization Parameters
  - Refine aquifer hydrologic properties, primary contaminant distribution, estimates of total contaminant quantities, for predicting long term effectiveness
  - Optimize pump cycling (rates of pumping, aquifer re-equilibration times and moving pumps among available wells) for maximal recovery
  - Develop computer model of local GW flow and primary contaminant phase transformation and transport to estimate aquifer and geochemical parameters needed to predict system performance

* Resource Requirements
  - Estimates of cost contributors (pumping costs, extra well installation costs, analytical and interpretations costs)

200-BP-5 Logic



200-BP-5 OU TREATABILITY TEST

WELL SELECTION FOR EXTRACTION AND RETURN OF GROUNDWATER

* CRITERIA FOR SELECTION

  - Access to Groundwater Contamination
  - Aquifer Characteristics and Well Construction
  - Proximity of return wells to treatment system and extraction wells

* DESIGN SPECIFICATIONS

  - 10-20 gpm continuous pumping rate
  - Both wells should be within 500 ft of treatment system

200-BP-5 OU TREATABILITY TEST

WELL SELECTION AT 216-B-5 REVERSE WELL PLUME SITE

GENERALLY GOOD WELL COVERAGE FOR BOTH PURPOSES

- 4 candidate extraction Wells + Reverse Well at 216-B-5 Site within 85 ft of one another.
- 4 candidate return wells within ~ 500 ft of the plume site; three require pipeline/road crossing.
- Wells' fitness-for-use are unknown, have not been inspected.
- Preferred extraction well is 299-E28-23, has highest Sr levels and high Cs and Pu levels.
- 299-E-28-24 and -25 are adequate backup sites, B-5 Reverse Well may also be useful.
- Preferred return well is 299-E28-1, located upgradient to the plume.

200-BP-5 OU TREATABILITY TEST

WELL SELECTION AT 216-BY CRIBS PLUME

LIMITED WELL COVERAGE FOR PLUMES IN 600 AREAS

- Wells defining plumes are spaced ~2000 ft or greater apart.
- One well, 699-50-53A, defines the cyanide and Co^{60} plumes with concentrations above MCLs. Four wells define the MCL plume for Tc^{99}.
- Aquifer continues to decline. Well 699-50-53A has less than 1 ft of GW & wells 699-49-55A and 49-57A have 9-10 ft of GW.
- Preferred well for extraction is 49-55A.
- No wells available for reinjection - new wells needed. Well siting must balance location within plume with aquifer thickness.
- New wells may become better extraction than return sites, depending on site conditions.
- Existing well can be deepened to provide a deeper "sump" for the pumps.
- Existing wells have been evaluated for fitness-for-use in 1990-91 by 200-BP-1.

200-BP-5 OU TREATABILITY TEST

FIELD ACTIVITIES

* WELL FITNESS-FOR-USE ASSESSMENTS

- Examine casing w/ TV Camera.
- Remediate well if needed.
- Conduct pump tests at well (measure aquifer response, take water samples during pumping and analyze for primary contaminants).
- Deepen borehole if needed.
- Evaluate data and assess ability of well to properly supply or return GW.

- Inspect 3-4 wells at 216-BY Cribs Plume
- Inspect 6-7 wells at 216-B-5 Reverse Well Plume

* DRILL NEW WELLS

- 1-2 new wells expected for 216-BY Cribs plume for returning treated GW.
- New well design should include options to extract from and return water to aquifer.
- Limited geological characterization for new wells, but will include Geophysical logging.
- Groundwater samples will be taken for full suite of analyses.
- Drill wells in May and June, 1994

200-BP-5 OU TREATABILITY TEST

TREATABILITY TEST SYSTEM DEVELOPMENT REQUIREMENT FOR BOTH PLUME SITES

* Test System Design scheduled for 12/1/93-4/13/94.
* Resin Selection process
  - Acquire samples during Groundwater Monitoring
  - Conduct lab tests on multiple resins
  - Evaluate Co^{60} removal by resins
  - If UNSAT, lab test cyanide destruction and subsequent Co^{60} removal
  - If cyanide destruction is successful, include as pretreatment step for 216-BY Cribs plume system.
* Procurement of components and fabrication of system from 12/1/93-7/29/94.
* Field test the system and mobilize to site during August, 1994.
* Prepare supporting documentation (HWOP, NEPA, QAPjP/SAP, RWP, Safety Assessment, Waste Control Plan, Operating Procedures, etc.) between 12/1/93-8/25/94.
* Conduct Readiness Review for Treatability Test
* Start testing of both test systems on August 31, 1994 and operate for 6 months.
* Evaluate test data and prepare report 3/1-5/31/95.
* Interim Remedial Measures-Proposed Plan 5/1/95-10/30/95 - Primary Document
* Interim Action Record of Decision prepared by EPA starting 11/1/95.

200-BP-5 OU TREATABILITY TEST

EXTRACTION TESTING AT 216-B-5 REVERSE WELL PLUME SITE

* Determine changes in primary contaminants' concentrations from start of test over time.
* When concentrations reach a static level, stop test and allow aquifer to re-equilibrate for some period of time.
* Restart test and repeat cycles as needed, varying re-equilibration times allowed//wells used//pumping rates//etc., based on prior test observations.
* Better define local aquifer and geochemical properties.
* Numerical modeling to characterize local groundwater flow, contaminant phase transformation and transport.
* Calculate expected recovery during a full-scale Interim Remedial Measure response

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Unit Manager's Meeting: 200 Aggregate Area/200 Area Operable Units
February 23 & 24, 1994

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Diane Clark . . . . . DOE-RL, TSD/SSB (A5-55)
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