



Department of Energy

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MAY 10 2000

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DOE-0659-00

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Ms. Val Orr
Division of Drinking and Ground Waters - UIC Unit
Ohio Environmental Protection Agency
P.O. Box 1049
1800 Watermark Drive
Columbus, Ohio 45316-1049

Dear Mr. Saric, Mr. Schneider, and Ms. Orr:

DECEMBER 1999 OPERATING REPORT FOR THE RE-INJECTION DEMONSTRATION

This correspondence submits the Re-Injection Demonstration Operation Report for the month of December 1999.

As specified in the Re-Injection Demonstration Test Plan, monthly operating reports for the re-injection demonstration are to be prepared and submitted to the U.S. Environmental Protection Agency (U.S. EPA), Ohio Environmental Protection Agency (O EPA) Office of Federal Facilities Oversight, and the OEPA Division of Drinking and Ground Waters - UIC Unit.

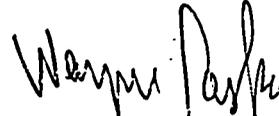
Mr. James A. Saric
Mr. Tom Schneider
Ms. Val Orr

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If you have any questions regarding this submittal, please contact Robert Janke at (513) 648-3124.

Sincerely,



Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:R.J. Janke

Enclosure

cc w/enclosure:

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F. Hodge, Tetra Tech
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W. Hertel, Fluor Fernald, Inc./52-5
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**MONTHLY OPERATING REPORT
RE-INJECTION DEMONSTRATION
DECEMBER 1999**

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OVERVIEW

On September 2, 1999, DOE completed one year of active groundwater re-injection as part of a one-year groundwater re-injection demonstration. DOE is currently in the process of preparing a final report.

Although the data are still being analyzed, operational experience gained over the last year indicates that DOE can effectively operate the re-injection wells. A cursory review of the data collected from the aquifer over the past year indicates that groundwater re-injection has not had any adverse effects on the aquifer. DOE is therefore continuing with the use of re-injection pending the issuance of the final report on June 30, 2000. DOE will continue producing monthly re-injection operating reports during this interim time period.

These monthly reports will be submitted to the U.S. EPA, Ohio EPA Office of Federal Facilities Oversight, and the Division of Ohio EPA Drinking and Ground Waters - UIC Unit, and will include the following information:

- I. Analysis of the injectate
- II. The volume and rate of re-injection
- III. A description of any well maintenance and rehabilitation procedures which were conducted
- IV. Results of groundwater monitoring at the re-injection test site conducted above and beyond the IEMP.

This report covers re-injection operations from December 1, 1999 to January 1, 2000.

ANALYSIS OF THE INJECTATE

Groundwater extracted from the Great Miami Aquifer is treated for uranium removal and is then re-injected back into the Great Miami Aquifer. The groundwater is treated in the FEMP Advanced Waste Water Treatment (AWWT) Expansion Facility. The effluent from the AWWT Expansion Facility is sampled monthly for the parameters listed in Table 2.1 of the Re-Injection Demonstration Test Plan, Rev. 0. Monthly injectate grab sampling focuses on the final remediation level (FRL) constituents that have had an exceedance of their FRL in the area of the aquifer from which the groundwater is being pumped. The monthly injectate grab samples are sent to an off-site laboratory for analysis.

Results from the monthly injectate grab sample collected in December are provided in Table 1. These results indicate that all the constituent concentrations are below their respective FRLs.

Figure 1 shows the composite daily uranium results from the AWWT Expansion Facility effluent. These results are derived from the 24-hour composite sampler, which samples the combined effluent from the active treatment trains comprising the facility. The results are used by plant management as process control; they provide a daily evaluation of the quality of the water that is re-injected back into the aquifer. These data also indicate that the uranium concentration of the treated groundwater, which was re-injected back into the aquifer in December was below 20µg/L.

VOLUME AND RATE OF RE-INJECTION

Treated groundwater is being re-injected into the Great Miami Aquifer in five re-injection wells at a rate of 200 gallons per minute per well. Figure 2 illustrates the location of the five re-injection wells. Re-Injection Well 8 is 8 inches in diameter. Re-Injection Well 9 is 12 inches in diameter. The other re-injection wells are all 16 inches in diameter. The combined design re-injection rate for all five wells is 1000 gallons per minute. Operational data specific to each re-injection well are provided in Tables 2 through 6.

Figure 3 illustrates the water level rise in each of the five re-injection wells from December 1, 1999 to January 1, 2000, as measured by the operators at the AWWT Expansion Facility Distributed Control System (DCS). Water levels are recorded three times per day. Water levels inside the re-injection wells are monitored as an indicator of plugging within the wells. Given a constant re-injection rate, as a well screen becomes plugged, the water level in the well rises to compensate for the greater pressure needed to move the same volume of water through a smaller opening.

While it is not the intent of this report to discuss operational efficiency issues, the following information is provided to aid in the interpretation of Figure 3. From December 1, 1999 to December 4, 1999 (readings 1367 to 1376) the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South field Area. From December 14, 1999 to December 28, 1999 (readings 1407 to 1447) Re-Injection Well 9 underwent a treatment to address well plugging. From December 28, 1999 to the end of the month the communication system was down so no readings were recorded. Communication with Re-Injection Well 8 was down all month due to a problem with the fiber optic cable. Despite this,

water levels were collected manually. Between December 6, 1999 and December 27, 1999 the water level in Re-Injection Well 8 rose 2.3 feet (from 9.4 feet below top of well "btow" to 7.1 feet btow).

WELL MAINTENANCE AND REHABILITATION

During December, Re-Injection Well 9 was treated for plugging. As illustrated in Figure 3, the water level in Re-Injection Well 9 had risen approximately 49 feet since the start of re-injection on September 2, 1998. This is the first time since the start of re-injection that this well had undergone a treatment for plugging. Re-injection was stopped on December 14, 1999 because the water level rise had reached the designated cut-off point. Actual treatment work ran from December 16, 1999 to December 28, 1999. Upon return to service on December 28, 1999 communication with the DCS was down so an initial water level is not recorded. On January 11, 2000 the reported water level rise in the well was 15.43 feet. The initial water level rise in the well when re-injection began on September 2, 1998 was 3.67 feet.

The well was treated using approximately 5 gallons of sodium hypochlorite with a concentration of 12.5 percent chlorine. The well screen was swabbed and surged. Approximately 14,600 gallons of water were pumped from the well during rehabilitation.

GROUNDWATER MONITORING RESULTS

As explained in the overview section of this report, the one-year groundwater Re-Injection Demonstration officially ended on September 2, 1999. No water quality sampling, other than IEMP sampling, is planned at this time. Results from the demonstration will be presented in a report, which will be issued in June of 2000. The final report will make recommendations concerning additional monitoring if it is determined that additional monitoring is warranted.

TABLE 1
ANALYSIS OF INJECTATE
Sample Collected December 15, 1999

Constituents ^a	Result ^b	Groundwater FRL ^c	Detection Limit	Constituent Type ^e	Basis for FRL ^f
General Chemistry		mg/L			
Nitrate	0.381	11.0		MP	B
Inorganics		mg/L			
Antimony	U	0.006	0.00052	N	A
Arsenic	0.00085 B	0.05		N	A
Barium	0.0531	2.0		N	A
Beryllium	U	0.004	0.00002	N	A
Cadmium	U	0.014	0.00010	N	B
Total Chromium	0.00026 B	0.022 ^d		MP	R
Cobalt	U	0.17	0.00018	N	R
Lead	U	0.015	0.00052	N	A
Manganese	0.0012 B	0.9		N	B
Mercury	U	0.002	0.0001	MP	A
Nickel	0.0013 B	0.1		N	A
Selenium	U	0.05	0.001	N	A
Silver	U	0.05	0.0002	N	R
Vanadium	U	0.038	0.00015	N	R
Zinc	U	0.021	0.00012	N	B
Radionuclides		pCi/L			
Neptunium-237	U	1.0	0.059	MP	R*
Radium-226	U	20.0	0.10	N	A
Strontium-90	U	8.0	0.50	MP	A
Thorium-228	0.207	4.0		N	R*
Thorium-232	U	1.2	0.031	N	R*
Total Uranium	1.15	20.0		MP	A
Organics		µg/L			
Bis(2-ethylhexyl)phthalate	U	6.0	5	N	A
Carbon disulfide	U	5.5	1	N	A
1, 1-Dichloroethene	U	7.0	1	N	A
1, 2-Dichloroethane	U	5.0	1	MP	A
Trichloroethene	U	5.0	1	N	A

^aConstituents taken from Table 2-1 of Re-Injection Demonstration Test Plan. Constituents are those previously detected in aquifer zones 2 and 4 at concentrations above their FRL.

^bIf a duplicate sample was analyzed the highest concentration between the regular sample and duplicate sample is reported.
 U = Nondetect

B = Lab qualifier (inorganic). Reported value was obtained from a reading that was less than the contract required detection limit but greater than or equal to the instrument detection limit.

^cFrom Table 9-4 in OUS ROD.

^dFRL is for hexavalent chromium.

^eConstituent types from Appendix A of IEMP. MP indicates that the constituent has been identified as being able to migrate to the aquifer. N indicates that the constituent has been identified as not being able to migrate to the aquifer.

^fA - Applicable or relevant and appropriate requirement based (MCL, PMCL, etc.).

B - Based on 95th percentile background concentrations.

R - Risk-based

R* - Risk-based radionuclide cleanup levels include constituent specific 95th percentile background concentration.

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TABLE 2

RE-INJECTION WELL 22107 (IW-8)
OPERATIONAL SUMMARY SHEET
DECEMBER 1999

Reference Elevation (feet AMSL) - 539.92 (top of casing)
Northing Coordinate ('83) - 476196.22
Easting Coordinate ('83) - 1347978.25

Hours in reporting period^a = 752.35 Target Injection Rate = 200 gpm
Hours not injecting^b = 72.00
Hours injecting^c = 680.35
Operational percent^d = 90.4

Monthly Measurements		
Month	Million Gallons Injected ^e	Average Operating Injection Rate (gpm) ^f
9/98	8.16	206
10/98	5.78	203
11/98	8.47	196
12/98	5.76	222
1/99	5.35	227
2/99	7.06	196
3/99	7.34	205
4/99	7.75	197
5/99	7.46	216
6/99	8.42	197
7/99	8.93	201
8/99	8.64	199
9/99	3.92	181
10/99	7.86	199
11/99	6.54	196
12/99	7.28	178

^aFirst operational shift reading on 12/1/99 to first operational shift reading on 01/1/00
^bDowntime. From December 1, 1999 to December 4, 1999 the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field area.
^cHours in reporting period - Hours not injecting
^d(Hours injecting/Hours in reporting period) x 100
^eSummation of daily totalizer differences
^fMillion Gallons Injected/(Hours Injecting x 60)

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TABLE 3

RE-INJECTION WELL 22108 (IW-9)
OPERATIONAL SUMMARY SHEET
DECEMBER 1999

Reference Elevation (feet AMSL) - 578.025 (top of casing)
Northing Coordinate ('83) - 476255.74
Easting Coordinate ('83) - 1348384.49

Hours in reporting period^a = 751.95

Target Injection Rate = 200 gpm

Hours not injecting^b = 480.28

Hours injecting^c = 271.67

Operational percent^d = 36.1

Monthly Measurements		
Month	Million Gallons Injected ^e	Average Operating Injection Rate (gpm) ^f
9/98	8.17	206
10/98	8.30	201
11/98	8.53	197
12/98	5.66	214
1/99	4.33	181
2/99	6.07	156 ^g
3/99	5.93	178 ^h
4/99	6.66	184
5/99	7.83	200
6/99	8.41	197
7/99	8.79	198
8/99	8.63	198
9/99	5.68	187
10/99	7.80	198
11/99	6.54	185
12/99	3.08	189

^aFirst operational shift reading on 12/1/99 to first operational shift reading on 01/1/00

^bDowntime. From December 1, 1999 to December 4, 1999 the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field area. Re-injection well 9 was down from December 14, 1999 to December 28, 1999 to undergo a treatment for plugging.

^cHours in reporting period - Hours not injecting

^d(Hours injecting/Hours in reporting period) x 100

^eSummation of daily totalizer differences

^fMillion Gallons Injected/(Hours Injecting x 60)

^gInjection out of smaller downcomer in February. Target Injection rate of smaller downcomer is 150 gpm.

^hInjection out of smaller downcomer up until March 8. Large downcomer was used from March 11 to April 1, 1999.

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TABLE 4

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RE-INJECTION WELL 22109 (IW-10)
OPERATIONAL SUMMARY SHEET
DECEMBER 1999

Reference Elevation (feet AMSL) - 576.92 (top of casing)
Northing Coordinate ('83) - 476175.65
Easting Coordinate ('83) - 1348860.53

Hours in reporting period^a = 750.50 Target Injection Rate = 200 gpm
Hours not injecting^b = 72.00
Hours injecting^c = 678.50
Operational percent^d = 90.4

Monthly Measurements		
Month	Million Gallons Injected ^e	Average Operating Injection Rate (gpm) ^f
9/98	8.13	205
10/98	8.28	200
11/98	8.50	196
12/98	5.72	217
1/99	5.48	229
2/99	8.09	208
3/99	8.13	204
4/99	5.35	190
5/99	8.25	197
6/99	8.36	196
7/99	8.81	199
8/99	8.52	196
9/99	1.97	169
10/99	7.79	198
11/99	6.47	183
12/99	7.58	186

^aFirst operational shift reading on 12/1/99 to first operational shift reading on 01/1/00.

^bDowntime. From December 1, 1999 to December 4, 1999 the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field area.

^cHours in reporting period - Hours not injecting

^d(Hours injecting/Hours in reporting period) x 100

^eSummation of daily totalizer differences

^fMillion Gallons Injected/(Hours Injecting x 60)

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TABLE 5

RE-INJECTION WELL 22240 (IW-11)
OPERATIONAL SUMMARY SHEET
DECEMBER 1999

Reference Elevation (feet AMSL) - 577.14 (top of casing)
Northing Coordinate ('83) - 476422.82
Easting Coordinate ('83) - 1349386.92

Hours in reporting period^a = 750.45
Hours not injecting^b = 72.00
Hours injecting^c = 678.45
Operational percent^d = 90.4

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected ^e	Average Operating Injection Rate (gpm) ^f
9/98	8.39	211
10/98	8.29	199
11/98	8.50	197
12/98	5.68	216
1/99	5.53	230
2/99	8.06	208
3/99	8.04	204
4/99	7.56	192
5/99	8.34	199
6/99	8.42	197
7/99	8.85	199
8/99	8.65	199
9/99	5.64	186
10/99	7.91	200
11/99	6.67	189
12/99	7.62	187

^aFirst operational shift reading on 12/1/99 to first operational shift reading on 01/1/00

^bDowntime. From December 1, 1999 to December 4, 1999 the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field area.

^cHours in reporting period - Hours not injecting

^d(Hours injecting/Hours in reporting period) x 100

^eSummation of daily totalizer differences

^fMillion Gallons Injected/(Hours Injecting x 60)

TABLE 6

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RE-INJECTION WELL 22111 (IW-12)
OPERATIONAL SUMMARY SHEET
DECEMBER 1999

Reference Elevation (feet AMSL) - 583.01 (top of casing)
Northing Coordinate ('83) - 476518.64
Easting Coordinate ('83) - 1350105.39

Hours in reporting period^a = 750.48
Hours not injecting^b = 128.02
Hours injecting^c = 622.47
Operational percent^d = 82.9

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected ^e	Average Operating Injection Rate (gpm) ^f
9/98	8.12	205
10/98	8.27	201
11/98	8.53	197
12/98	5.61	219
1/99	5.08	212
2/99	8.06	208
3/99	8.13	203
4/99	7.65	195
5/99	8.27	197
6/99	8.42	197
7/99	8.80	198
8/99	8.67	199
9/99	5.66	187
10/99	7.82	198
11/99	6.65	188
12/99	7.41	198

^aFirst operational shift reading on 12/1/99 to first operational shift reading on 01/1/00

^bDowntime. From December 1, 1999 to December 4, 1999 the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field area.

^cHours in reporting period - Hours not injecting

^d(Hours injecting/Hours in reporting period) x 100

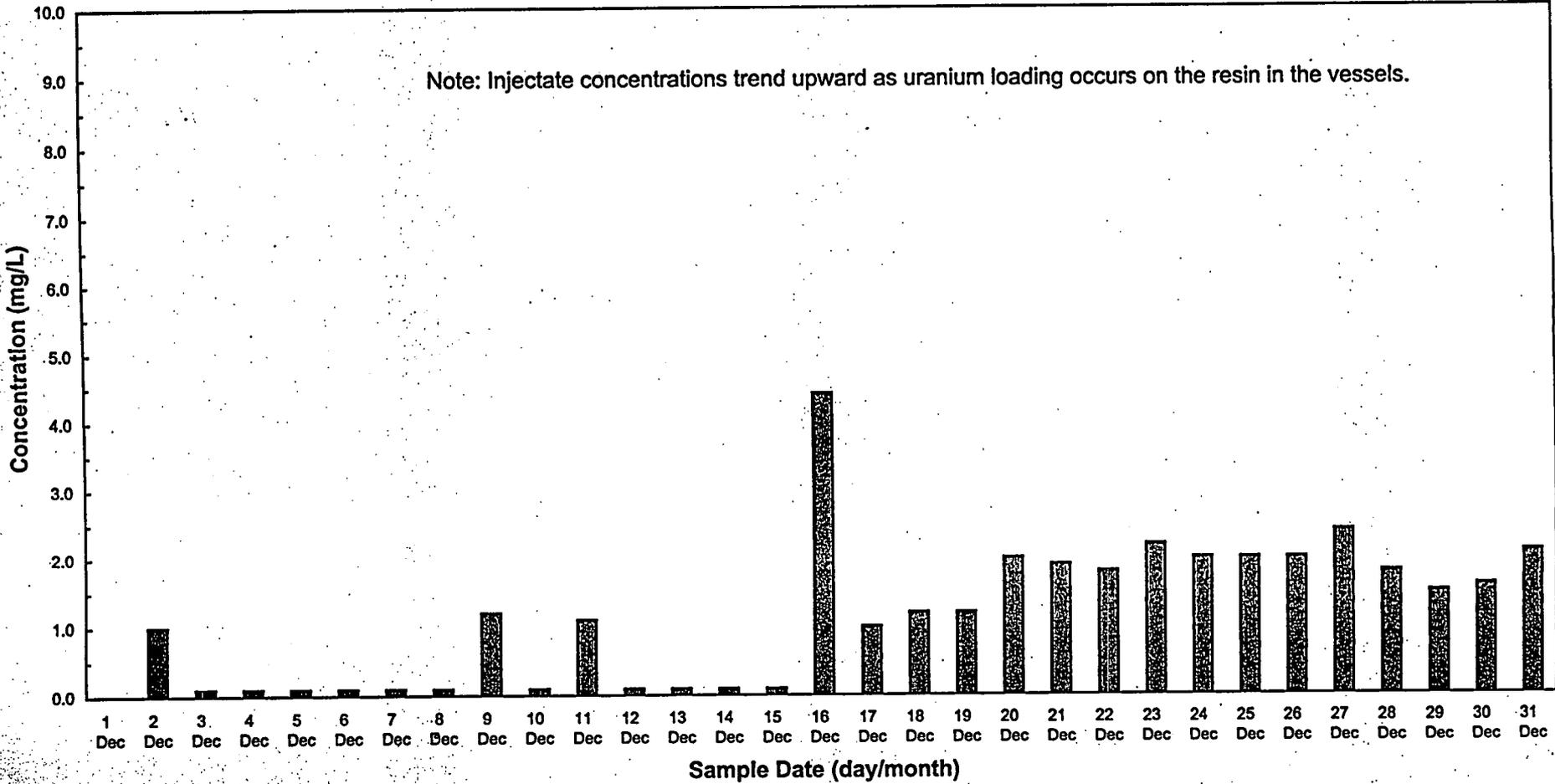
^eSummation of daily totalizer differences

^fMillion Gallons Injected/(Hours Injecting x 60)

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FIGURE 1

URANIUM CONCENTRATION OF AWWT EXPANSION EFFLUENT*
DECEMBER 1999



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* Samples derived from combined plant effluent via 24-hour Composite Sampler.

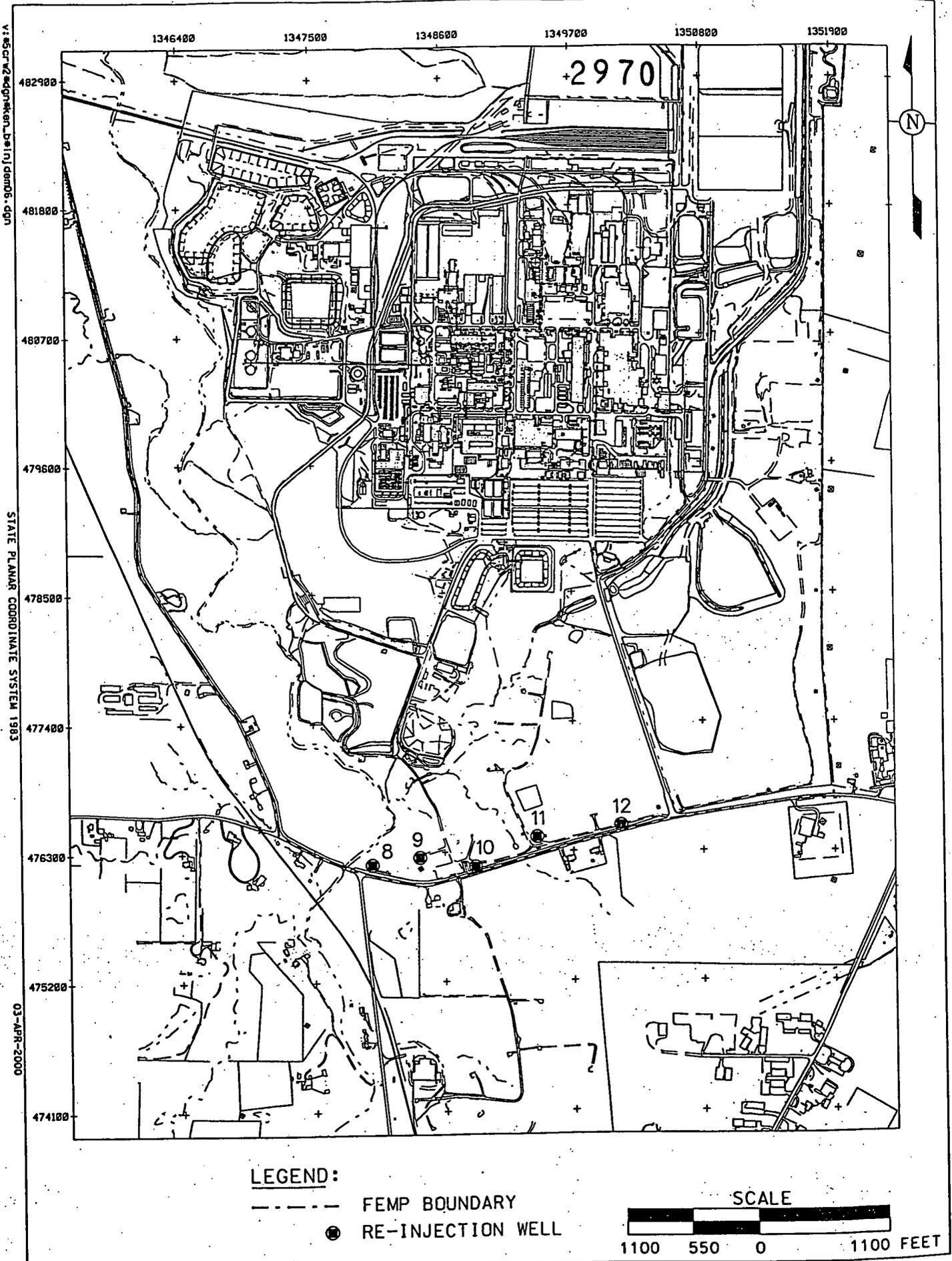


FIGURE 2. LOCATION OF RE-INJECTION WELLS.

Figure 3.
Re-Injection Wells, Water Level Rise
December 1, 1999 to January 1, 2000

