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2404

JUL 21 1999

Mr. James A. Saric, Remedial Project Manager
U.S. Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0949-99

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 43216-1049

Mr. Val Orr
Division of Drinking and Ground Waters – UIC Unit
P.O. Box 1049
1800 Watermark Drive
Columbus, Ohio 43216-1049

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

APRIL 1999 OPERATING REPORT FOR THE RE-INJECTION DEMONSTRATION

This correspondence submits the Re-Injection Demonstration Operation Report for the month of April 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 (OEPA) Office of Federal Facilities Oversight, and the OEPA Division of Drinking and Ground Waters-UIC Unit.

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If you have any questions regarding this submittal, please contact John Kappa at (513) 648-3149.

Sincerely,

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Kappa

Enclosure

cc w/enclosure:
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MONTHLY OPERATING REPORT
RE-INJECTION DEMONSTRATION
APRIL 1999

OVERVIEW

The FEMP Re-Injection Demonstration began on September 2, 1998. The controlling document for the Re-Injection Demonstration is the Re-Injection Demonstration Test Plan, Rev. 0. A requirement of Section 6 of the test plan is that monthly operating reports 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. The monthly operating reports are to 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.

This report serves to fulfill this commitment for the month of April 1999. It covers operation of the Re-Injection Demonstration from April 1, 1999 through May 1, 1999.

ANALYSIS OF THE INJECTATE

Groundwater which is being extracted from the Great Miami Aquifer is being treated for uranium and re-injected back into the Great Miami Aquifer. The groundwater is being treated in the FEMP Advanced Waste Water Treatment (AWWT) Expansion Facility. The effluent from the AWWT Expansion Facility is being sampled monthly for the parameters listed in Table 2.1 of the Re-Injection Demonstration Test Plan, Rev. 0. Monthly injectate sampling is focusing 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 samples are being sent to an off-site laboratory for analysis.

Preliminary results from the injectate sample collected in April are provided in Table 1. A review of the preliminary data from April indicates that all of the constituent concentrations except lead are below their respective FRLs. Lead is four thousandths of a mg/L over the FRL for lead. Lab personnel have confirmed that the value has been reported correctly. The value is an order of magnitude above values reported for any sample colleted since the start of the demonstration.

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Therefore this value is considered suspect. DOE anticipates that the lead concentration in the May sample will be back down below the FRL.

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 1 illustrates the location of the five re-injection wells. Re-Injection Well 8 is an 8 inch diameter well. Re-Injection Well 9 is a 12 inch diameter well. 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 2 illustrates the water level rise in each of the five re-injection wells from April 1, 1999 through May 1, 1999, 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. As a well screen becomes plugged, the water level in the well rises to compensate for the greater pressure needed to maintain a constant re-injection rate.

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 2. Operators missed recording a water level for each re-injection well during the second shift of May 7 (Sample Point 654). IW-10 was not operating from April 12 to April 20 (Sample Points 669 to 692) to facilitate rehabilitation of the well screen. As can be seen in Figure 2, following rehabilitation the water level rise in IW-10 was only 8.54 feet versus 51.79 feet prior to rehabilitation. IW-9 lost communication with the DCS from April 17 to April 19 (Sample Points 684 to 689). All of the re-injection wells were shut down from April 27 to April 30 (Sample Points 715 to 722) to facilitate maintenance of the water treatment system. IW-9 lost communication with the DCS when the wells were restarted on April 30, 1999.

WELL MAINTENANCE AND REHABILITATION

During April, Re-Injection Well 10 was rehabilitated. Water level rise within the re-injection wells is monitored as an indirect measure of plugging within or in the vicinity of the well. As illustrated in Figure 2, the water level in Re-Injection Well 10 had risen approximately 51.79 feet since the start of

re-injection on September 2, 1998. Re-Injection Well 10 is a 16-inch diameter well. Rehabilitation of the well lasted from April 12, 1999 to April 20, 1999. Upon return to service on April 20, 1999 the water level rise in the well was approximately 8.54 feet.

The well was rehabilitated using approximately 6 gallons of sodium hypochlorite with a concentration of 12.5 percent chlorine. The well screen was swabbed and surged. Approximately 9950 gallons of water were pumped form the well during rehabilitation. The baseline chlorine level measured in the well prior to the start of rehabilitation was 0.05 ppm to 0.07 ppm. After pumping 6000 gallons of water from the well the chlorine level measured 0.09 ppm. The chlorine concentration of the water pumped from the well at the end of the rehabilitation was 0.00 mg/L.

GROUNDWATER MONITORING RESULTS

Water quality samples for the Re-Injection demonstration are collected quarterly and analyzed for major anions, cations, and total uranium. The first round of water quality data was collected in August 1998, prior to the start of re-injection. Results of the August sampling event were reported in the September monthly report. The second round of water quality samples was collected in December 1998. Results of the December sampling event were reported in the January monthly report. The next scheduled collection of water quality samples for the re-injection demonstration took place in March 1999. March results are reported in Table 7. At the end of the one year Re-Injection Demonstration, the water quality data collected quarterly during the demonstration will be used to illustrate water quality conditions over the course of the demonstration.

TABLE 1

ANALYSIS OF INJECTATE PRELIMINARY RESULTS
Sample Collected April 8, 1999

Constituents[a]	Result[b]	Groundwater FRL[c]	Detection Limit	Constituent Type[e]	Basis for FRL[f]
General Chemistry		mg/L			
Nitrate	2.38	11.0		MP	B
Inorganics		mg/L			
Antimony	0.00053 B	0.006		N	A
Arsenic	0.0042 B	0.05		N	A
Barium	0.0535	2.0		N	A
Beryllium	0.0017 B	0.004		N	A
Cadmium	U	0.014	0.00031	N	B
Total Chromium	U	0.022[d]	0.00014	MP	R
Cobalt	U	0.17	0.00001	N	R
Lead[g]	**0.0191**	**0.015**		N	A
Manganese	0.0061 B	0.9		N	B
Mercury	U	0.002	0.00012	MP	A
Nickel	0.00081 B	0.1		N	A
Selenium	0.0025 B	0.05		N	A
Silver	0.00037 B	0.05		N	A
Vanadium	U	0.038	0.00073	N	R
Zinc	0.0124 B	0.021		N	B
Radionuclides		pCi/L			
Neptunium-237	U	1.0	0.0722	MP	R*
Radium-226	0.458	20.0		N	A
Strontium-90	1.10	8.0		MP	A
Thorium-228	U	4.0	0.193	N	R*
Thorium-232	U	1.2	0.095	N	R*
		µg/L			
Total Uranium	4.69	20.0		MP	A
Organics		µg/L			
Bis(2-ethylhexyl)phthalate	U	6.0	5	N	A
Carbon disulfide	U	5.5	5	N	A
1,1-Dichloroethene	U	7.0	5	N	A
1,2-Dichloroethane	U	5.0	1	MP	A
Trichloroethene	U	5.0	3	N	A

[a]Constituents 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.
[b]If a duplicate sample was analyzed the highest concentration between the regular sample and duplicate sample is reported.
B = Lab qualifier. 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.
J = Lab qualifier, data are estimated.
U = Nondetect
[c]From Table 9-4 in OU5 ROD.
[d]FRL is for hexavalent chromium.
[e]Constituent 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.
[f]A - 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.
[g]The lead result has been reported in bold type to indicate that the value exceeds the lead FRL.

TABLE 2

RE-INJECTION WELL 22107 (IW-8)
OPERATIONAL SUMMARY SHEET
APRIL 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] = 721.75
Hours not injecting[b] = 66.58
Hours injecting[c] = 655.17
Operational percent[d] = 90.8

Target Injection Rate = 200 gpm

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

[a]First operational shift reading on 04/01/99 to first operational shift reading on 05/01/99
[b]Downtime. System down to facilitate maintenance on the water treatment system.
[c]Hours in reporting period - Hours not injecting
[d](Hours injecting/Hours in reporting period) x 100
[e]Summation of daily totalizer differences
[f]Million Gallons Injected/(Hours Injecting x 60)

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TABLE 3

RE-INJECTION WELL 22108 (IW-9)
OPERATIONAL SUMMARY SHEET
APRIL 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] = 720.17
Hours not injecting[b] = 115.22
Hours injecting[c] = 604.95
Operational percent[d] = 84.0

Target Injection Rate = 150 gpm[g]
200 gpm

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
01/99	4.33	181
02/99	6.07	156[g]
03/99	5.93	178[h]
04/99	6.66	184

[a]First operational shift reading on 04/01/99 to first operational shift reading on 05/01/99
[b]Downtime. System down to facilitate maintenance on the water treatment system.
[c]Hours in reporting period - Hours not injecting
[d](Hours injecting/Hours in reporting period) x 100
[e]Summation of daily totalizer differences
[f]Million Gallons Injected/(Hours Injecting x 60)
[g]Injection out of smaller downcomer. Target Injection rate of smaller downcomer is 150 gpm.
[h]Injection out of smaller downcomer up until March 8. Large downcomer was used from March 11 to April 1, 1999.

TABLE 4

RE-INJECTION WELL 22109 (IW-10)
OPERATIONAL SUMMARY SHEET
APRIL 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] = 721.80
Hours not injecting[b] = 251.55
Hours injecting[c] = 470.25
Operational percent[d] = 65.2

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected[e]	Average Operating Injection Rate (gpm)[f]
09/98	8.13	205
10/98	8.28	200
11/98	8.50	196
12/98	5.72	217
01/99	5.48	229
02/99	8.09	208
03/99	8.13	204
04/99	5.35	190

[a]First operational shift reading on 04/01/99 to first operational shift reading on 05/01/99
[b]Downtime. Well down during re-development. System down to facilitate maintenance on the water treatment system.
[c]Hours in reporting period - Hours not injecting
[d](Hours injecting/Hours in reporting period) x 100
[e]Summation of daily totalizer differences
[f]Million Gallons Injected/(Hours Injecting x 60)

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TABLE 5

RE-INJECTION WELL 22240 (IW-11)
OPERATIONAL SUMMARY SHEET
APRIL 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] = 722.63
Hours not injecting[b] = 66.97
Hours injecting[c] = 655.66
Operational percent[d] = 90.7

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected[e]	Average Operating Injection Rate (gpm)[f]
0/98	8.39	211
10/98	8.29	199
11/98	8.50	197
12/98	5.68	216
01/99	5.53	230
02/99	8.06	208
03/99	8.04	204
04/99	7.56	192

[a]First operational shift reading on 04/01/99 to first operational shift reading on 05/01/99
[b]Downtime. System down to facilitate maintenance on the water treatment system.
[c]Hours in reporting period - Hours not injecting
[d](Hours injecting/Hours in reporting period) x 100
[e]Summation of daily totalizer differences
[f]Million Gallons Injected/(Hours Injecting x 60)

TABLE 6

RE-INJECTION WELL 22111 (IW-12)
OPERATIONAL SUMMARY SHEET
APRIL 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] = 722.63
Hours not injecting[b] = 66.98
Hours injecting[c] = 655.65
Operational percent[d] = 90.7

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected[e]	Average Operating Injection Rate (gpm)[f]
09/98	8.12	205
10/98	8.27	201
11/98	8.53	197
12/98	5.61	219
01/99	5.08	212
02/99	8.06	208
03/99	8.13	203
04/99	7.65	195

[a]First operational shift reading on 04/01/99 to first operational shift reading on 05/01/99
[b]Downtime. System down to facilitate maintenance on the water treatment system.
[c]Hours in reporting period - Hours not injecting
[d](Hours injecting/Hours in reporting period) x 100
[e]Summation of daily totalizer differences
[f]Million Gallons Injected/(Hours Injecting x 60)

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TABLE 7

PRELIMINARY GROUNDWATER MONITORING RESULTS
SAMPLES COLLECTED IN MARCH 1999 FOR THE RE-INJECTION DEMONSTRATION

Constituent		Well 2015 03/23/99	Well 2017 03/24/99	Well 2060 03/25/99	Well 2070 03/22/99	Well 2106 03/22/99	Well 2166 03/22/99	Well 2398 03/23/99	Well 2434 03/22/99	Well 3015 03/23/99	Well 3015-D 03/23/99	Well 3069 03/22/99	Well 3106 03/22/99	Well 3070 03/22/99	Well 3398 03/23/99	Well 4398 03/23/99
aluminum	mg/L	0.0266U	0.0515	0.0266U	0.0453	0.0806	0.0418	0.0428	0.0736	0.0266U	0.0369	0.0456	0.048	0.0764	0.0754	0.0343
calcium	mg/L	83.6	150	87.7	101	78.1	124	89.2	76.2	93.6	93.2	96.0	89.6	84.2	92.8	110
iron	mg/L	0.0047	0.0024U	0.187	2.3	0.228	0.0024U	1.38	0.085	0.787	0.785	0.0226	0.0024U	2.9	0.693	0.969
magnesium	mg/L	21.1	33.8	21.8	33.5	25.9	34.9	25.4	25	22.2	22.3	27.6	26.3	24.2	23.3	27.8
manganese	mg/L	0.0007U	0.0007	0.0033	233	0.0014U	0.0007U	0.0492	0.0007	0.308	0.309	0.0007U	0.0007U	0.301	0.268	0.654
potassium	mg/L	3.07	2.460	3.14	3.54	2.967	3.59	3.16	2.9	3.07	3.2	3.24	3.22	2.6	2.73	1.03
silicon	mg/L	3.42	5.540	2.95	4.4	3.250	4.8	4.32	3.85	3.39	3.4	4.42	4.25	3.97	4.19	6.28
sodium	mg/L	13.7	12.1	14.4	15.2	16.830	16.3	36.7	15.8	14.2	14.2	15.5	16.2	9.71	10.6	6.66
ammonia	mg/L	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.11	0.10U	0.19
nitrate-nitrogen	mg/L	2.1	0.4	1.5	0.1U	0.8	1.5	0.8	0.8	0.1U	0.1U	2.0	0.8	0.1U	0.1U	0.1U
uranium	ug/L	123	5.41	121	0.8	50	79	26.1	1.5	1.5	1.5	386	1.0	0.2J	0.8	0.1J
alkalinity	mg/L	225	355	225	255	225	280	250	215	230	230	280	225	230	240	235
chloride	mg/L	30	30.0	30	66	38.0	38.0	68.0	38	32.0	32.0	38	38.0	30.0	34.0	22.0
fluoride	mg/L	0.37	0.15	0.33	0.11	0.27	0.14	0.12	0.22	0.12	0.12	0.18	0.12	0.13	0.12	0.12
sulfate	mg/L	45.3	149.0	47.9	88.6	63.8	97.6	14.6	54.2	103.0	102.3	17.3	34.7	106.6	75.2	94.3
TDS	mg/L	385	667	404	557	435	561	508	431	458	458	484	445	443	453	461
TSS	mg/L	2U	2U	1.8U	10.0	10.0	2U	7.2	2.0	6.4	6.8	2.0U	2U	7.0	2.8	4.4
phosphate(total)	mg/L	0.1U	0.1U	0.1U	0.1U	0.1	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
bicarbonate	mg/L	225	355	225	255	225	280	250	215	230	230	280	225	230	240	235
carbonate	mg/L	1.0U	1.0U	1.0U	1.0U	1.0U	1U	1.0U	1U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U

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Constituent		Well 22299 03/22/99	Well 22300 03/23/99	Well 22301 03/24/99	Well 22302 03/23/99	Well 22303 03/23/99	Well 22303-D 03/23/99	Well 32304 03/24/99	Well 32305 03/24/99	32306 03/24/99	Well 32307 03/23/99	FB 03/22/99	FB 03/23/99	Rinsate 03/23/99	FB 03/24/99	FB 03/25/99
aluminum	mg/L	19.78	2.580	0.958	25.7	1.59	1.12	0.0287	0.233	0.128	0.0472	0.0653	0.170	0.0266	0.0868	0.0266U
calcium	mg/L	172	175	90.2	167	124	115	105	92.4	101	97.8	2.57	0.177	0.0717	0.235	0.0349
iron	mg/L	32.9	11.9	3.34	40	4.43	3.67	0.103	0.0434	1.26	1.16	0.0091	0.0522	0.0548	0.0076	0.0268
magnesium	mg/L	94	50.2	24.3	42.4	33.6	30.9	23.9	22.3	23.9	24.4	0.807	0.0668	0.025	0.036	0.0217U
manganese	mg/L	0.304	0.298	0.0814	0.665	0.233	0.191	0.423	0.0011	0.320	0.377	0.0007U	0.0007U	0.0007U	0.0007U	0.0007U
potassium	mg/L	10.7	3.180	2.45	6.190	3.23	3.02	2.890	3.240	3.790	3.04	0.251	0.289U	0.289U	0.289U	0.289U
silicon	mg/L	50.7	6.760	4.49	31.3	5.79	5.16	4.260	3.830	3.880	3.63	0.236	0.336	0.0461	0.116	0.0339
sodium	mg/L	16.96	14.6	11.9	13.8	14.6	14.3	15.8	15.3	15.4	17	0.567	0.147U	0.147U	0.147U	0.147U
ammonia	mg/L	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U	0.10U
nitrate-nitrogen	mg/L	0.8	0.8	0.7	0.7	0.4	0.7	0.2	1.1	0.1U	0.1U	0.1U	0.10U	0.1U	0.10U	0.1U
uranium	ug/L	4.9	6.00	4.50	9.61	5.69	2.6	3.86	1U	2.39	14.9	0U	0U	0U	1U	1U
alkalinity	mg/L	230	240	230	240	210	230	255	230	230	230	1.0U	1.0U	1.0U	1.0U	0.1U
chloride	mg/L	44	36.0	34.0	36.0	40	38	36.0	36.0	40.0	40.0	1.0U	1.0U	1.0U	1.0U	1.0U
fluoride	mg/L	0.22	0.22	0.21	0.29	0.26	0.25	0.11	0.13	0.11	0.15	0.10U	0.10U	0.10U	0.10U	0.10U
sulfate	mg/L	66.3	63.6	64.5	96.8	55.2	55.0	114.2	51.5	92.4	116.8	1.0U	1.0U	1.0U	1.0U	1.0U
TDS	mg/L	441	459	439	514	457	458	464	418	462	501	10U	10U	10U	10U	10U
TSS	mg/L	76	649	225	1340	628	601	2.0U	2.0U	5.2	9.0	2U	2U	2.0U	2.0U	2.0U
phosphate(total)	mg/L	0.13	0.15	0.1U	0.15	0.13	0.13	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
bicarbonate	mg/L	230	240	230	240	210	230	255	230	230	230	1.0U	1.0U	1.0U	1.0U	1.0U
carbonate	mg/L	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U

FB = field blank

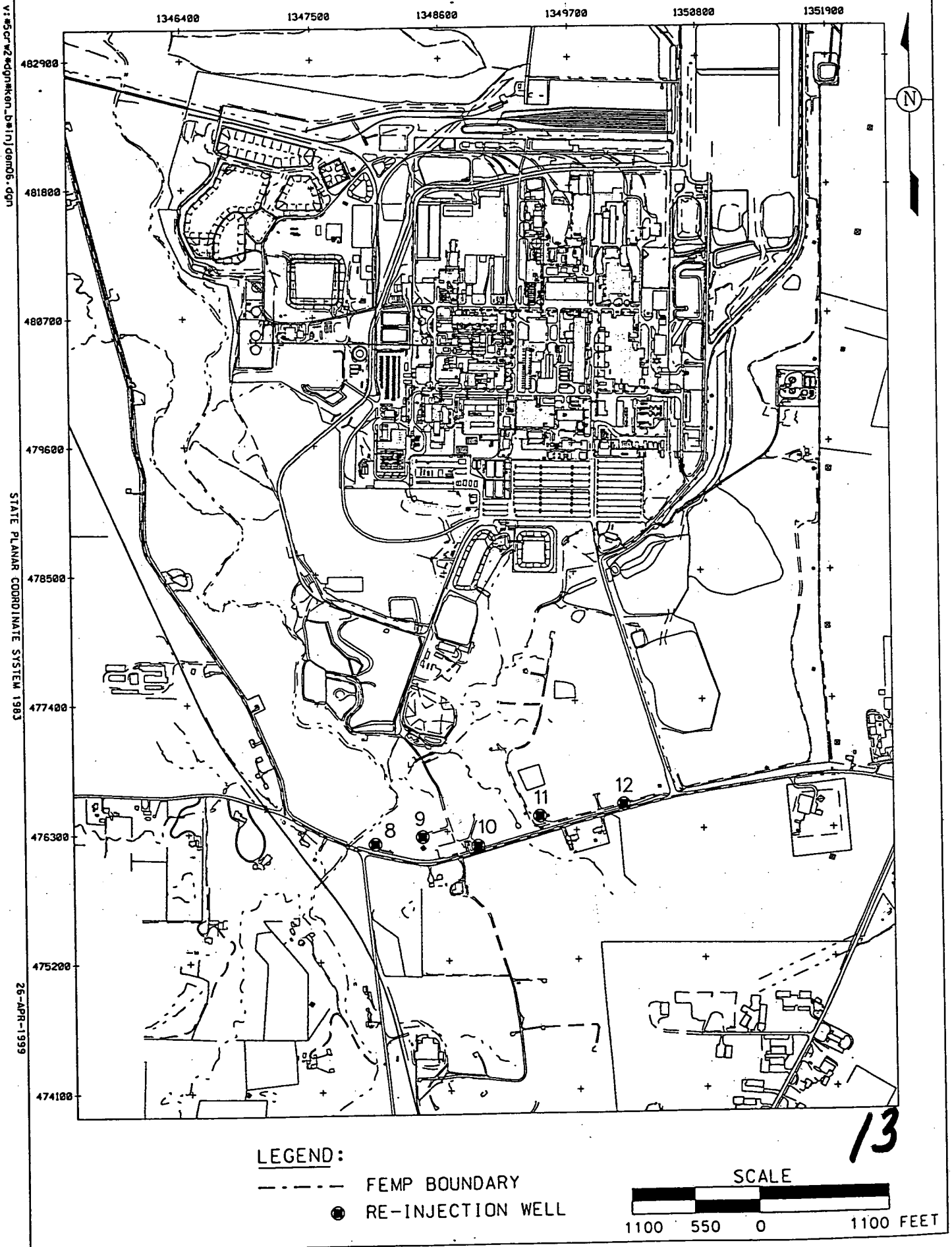

FIGURE 1. LOCATION OF RE-INJECTION WELLS

Re-Injection Wells, Water Level Rise
First Shift April 1, 1999 to May 1, 1999