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JUL 05 2000

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-0804-00

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

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

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

APRIL 2000 RE-INJECTION OPERATING REPORT

This correspondence submits the Re-Injection Operation Report for the month of April 2000.

As specified in the Re-Injection Demonstration Test Plan, monthly re-injection operating reports 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.

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

Sincerely,

Johnny Reising

FEMP:R.J. Janke

Johnny W. Reising
Fernald Remedial Action
Project Manager

Enclosure

cc w/enclosure:
R. J. Janke, OH/FEMP
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T. Schneider, OEPA-Dayton (three copies of enclosure)
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F. Hodge, Tetra Tech
M. Schupe, HSI GeoTrans
R. Vandegrift, ODH
D. Brettschneider, Fluor Fernald, Inc./52-5
K. Broberg, Fluor Fernald, Inc./52-5
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MONTHLY RE-INJECTION OPERATING REPORT APRIL 2000

OVERVIEW

On September 2, 1999, DOE completed one year of active groundwater re-injection as part of a one-year groundwater re-injection demonstration.

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 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 EPA and Ohio EPA approval of it's addition to aquifer restoration at the FEMP. DOE will continue to produce 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 – Underground Injection Control Unit, and will include the following information:

I. Analysis of the injectate
II. Volume and rate of re-injection
III. A description of any well maintenance and rehabilitation procedures 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 April 1, 2000 to May 1, 2000.

ANALYSIS OF THE INJECTATE

Groundwater extracted from the Great Miami Aquifer is treated for uranium removal and is then re-injected 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 region 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 April 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; the results 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 re-injected back into the aquifer in April 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.

Figure 3 illustrates the water level rise in each of the five re-injection wells from April 1, 2000 to May 1, 2000, as measured by the operators at the AWWT Expansion Facility Distributed Control System (DCS). Water levels are recorded three times each 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.

The design re-injection set point for each of the re-injection wells is 200 gpm. In February of 2000, a new injection rate strategy was initiated to help compensate for well downtimes due to maintenance, electrical outages, etc. Injection rate set points are temporarily increased to 220 gpm toward the end of a month and decreased to the 200 gpm rate at the start of a new month. The ability to increase re-injection rates is dependent upon the availability of higher than average groundwater treatment capacity and lower

than normal uranium concentrations in the site effluent. This strategy for adjusting re-injection rate set points may continue in future months depending on the available treatment capacity and uranium concentrations in the site effluent.

While it is not the intent of this report to discuss operational issues, the following information is provided to aid in the interpretation of Figure 3.

- On April 3, 2000 the injection rates for the wells were adjusted back to 200 gpm/well.
- From the second shift on April 7, 2000 to the first shift on April 8, 2000 (sample numbers 1753 and 1754) re-injection was not taking place. The system was not operating to facilitate maintenance in the treatment plant.
- From April 13, 2000 to April 17, 2000 (sample numbers 1769 to 1782) re-injection was not taking place. The system was not operating to facilitate re-start after regeneration of the treatment vessels. The uranium concentration of the treated water is usually a little high after regeneration has taken place. Re-Injection does not take place until the uranium concentration has decreased. This drop in uranium concentration can be seen in Figure 1.
- On April 20, 2000 injection rates were increased to 220 gpm/well. Also, on April 20, 2000 IW-8 was shut down to facilitate a treatment for plugging.
- On April 30, 2000 injection rates were adjusted back to 200 gpm/well.

WELL MAINTENANCE AND REHABILITATION

No maintenance was conducted on the re-injection wells in April. Re-injection Well 8 was shut down on April 20, 2000 because the water level rise in the well indicated that a treatment for plugging was needed. However, actual work did not begin until May.

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.

TABLE 1

ANALYSIS OF INJECTATE
Sample Collected April 3, 2000

Constituents[a]	Result[b]	Groundwater FRL[c]	Detection Limit	Constituent Type[e]	Basis for FRL[f]
General Chemistry		**mg/L**			
Nitrate	0.534 B	11.0		MP	B
Inorganics		**mg/L**			
Antimony	U	0.006	0.004	N	A
Arsenic	U	0.05	0.002	N	A
Barium	0.0524	2.0		N	A
Beryllium	U	0.004	0.0001	N	A
Cadmium	U	0.014	0.0003	N	B
Total Chromium	U	0.022[d]	0.001	MP	R
Cobalt	U	0.17	0.002	N	R
Lead	U	0.015	0.002	N	A
Manganese	U	0.9	0.001	N	B
Mercury	U	0.002	0.0001	MP	A
Nickel	U	0.1	0.001	N	A
Selenium	U	0.05	0.0029	N	A
Silver	U	0.05	0.001	N	R
Vanadium	U	0.038	0.001	N	R
Zinc	0.0024 B	0.021		N	B
Radionuclides		**pCi/L**			
Neptunium-237	0.0223	1.0		MP	R*
Radium-226	U	20.0	0.534	N	A
Strontium-90	U	8.0	0.425	MP	A
Thorium-228	U	4.0	0.0944	N	R*
Thorium-232	0.0183	1.2		N	R*
		µg/L			
Total Uranium	5.20	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.
U = Nondetect
B = Lab qualifier (inorganic). Reported result is greater than the instrument detection level but less than the contract required detection limit.
[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.

TABLE 2

RE-INJECTION WELL 22107 (IW-8)
OPERATIONAL SUMMARY SHEET
APRIL 2000

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

Hours in reporting period[a] = 718.10
Hours not injecting[b] = 360.18
Hours injecting[c] = 357.92
Operational percent[d] = 49.8

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
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
1/00	7.74	192
2/00	8.85	212
3/00	9.22	208
4/00	4.07	190

[a]First operational shift reading on 4/1/00 to first operational shift reading on 5/1/00
[b]Downtime. Well shut down on April 20, 2000 to facilitate treatment for plugging. All wells not operating for a period of time on April 7 and 8, 2000 and from April 13 to 17, 2000 to facilitate system maintenance.
[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 3

RE-INJECTION WELL 22108 (IW-9)
OPERATIONAL SUMMARY SHEET
APRIL 2000

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

Hours in reporting period[a] = 718.83
Hours not injecting[b] = 96.02
Hours injecting[c] = 622.82
Operational percent[d] = 86.6

Target Injection Rate = 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
1/99	4.33	181
2/99	6.07	156
3/99	5.93	178
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
1/00	6.12	212
2/00	8.78	218
3/00	9.22	206
4/00	7.54	202[g]

[a]First operational shift reading on 4/1/00 to first operational shift reading on 5/1/00
[b]Downtime. All wells not operating for a period of time on April 7 and 8, 2000 and from April 13 to 17, 2000 to facilitate system maintenance.
[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]From April 20, 2000 to April 30, 2000, wells were operated at a set point of 220 gpm/well.

TABLE 4

RE-INJECTION WELL 22109 (IW-10)
OPERATIONAL SUMMARY SHEET
APRIL 2000

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

Hours in reporting period[a] = 718.88
Hours not injecting[b] = 96.00
Hours injecting[c] = 622.88
Operational percent[d] = 86.7

Target injection Rate = 200 gpm

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
1/00	8.72	195
2/00	6.61	233
3/00	9.11	204
4/00	7.47	200[g]

[a]First operational shift reading on 4/1/00 to first operational shift reading on 5/1/00
[b]Downtime. All wells not operating for a period of time on April 7 and 8, 2000 and from April 13 to 17, 2000 to facilitate system maintenance.
[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]From April 20, 2000 to April 30, 2000, wells were operated at a set point of 220 gpm/well.

TABLE 5

RE-INJECTION WELL 22240 (IW-11)
OPERATIONAL SUMMARY SHEET
APRIL 2000

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

Hours in reporting period[a] = 718.80 Target Injection Rate = 200 gpm
Hours not injecting[b] = 96.02
Hours injecting[c] = 622.78
Operational percent[d] = 86.6

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
1/00	8.86	198
2/00	8.76	217
3/00	9.19	206
4/00	7.53	201[g]

[a]First operational shift reading on 4/1/00 to first operational shift reading on 5/1/00
[b]Downtime. All wells not operating for a period of time on April 7 and 8, 2000 and from April 13 to 17, 2000 to facilitate system maintenance.
[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]From April 20, 2000 to April 30, 2000, wells were operated at a set point of 220 gpm/well.

TABLE 6

RE-INJECTION WELL 22111 (IW-12)
OPERATIONAL SUMMARY SHEET
APRIL 2000

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

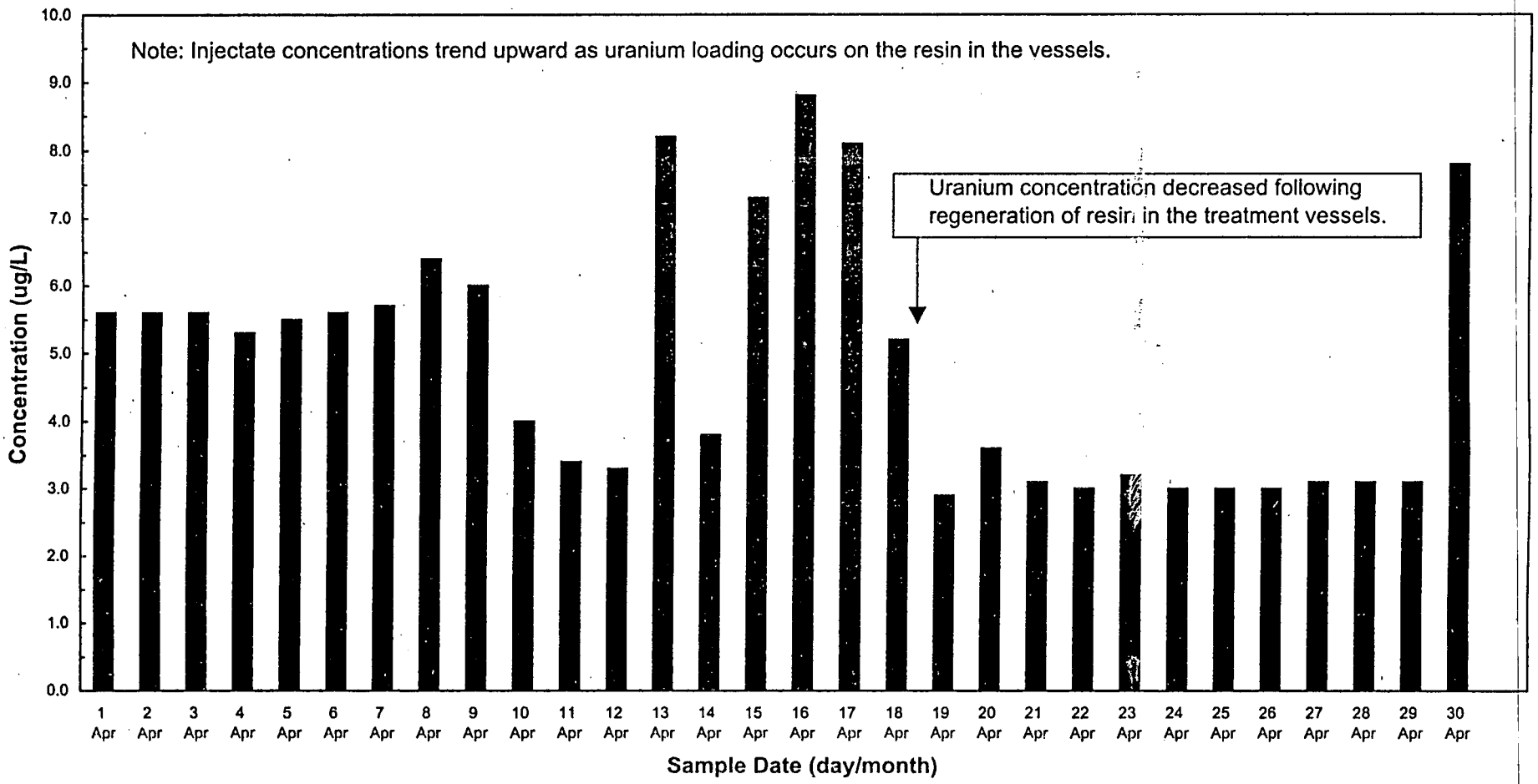
Hours in reporting period[a] = 718.80 Target Injection Rate = 200 gpm
Hours not injecting[b] = 96.02
Hours injecting[c] = 622.78
Operational percent[d] = 86.6

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
1/00	8.84	198
2/00	8.77	217
3/00	9.19	206
4/00	7.52	201[g]

[a]First operational shift reading on 4/1/00 to first operational shift reading on 5/1/00
[b]Downtime. All wells not operating for a period of time on April 7 and 8, 2000 and from April 13 to 17, 2000 to facilitate system maintenance.
[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]From April 20, 2000 to April 30, 2000, wells were operated at a set point of 220 gpm/well.

FIGURE 1

URANIUM CONCENTRATION OF AWWT EXPANSION EFFLUENT*
APRIL 2000



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

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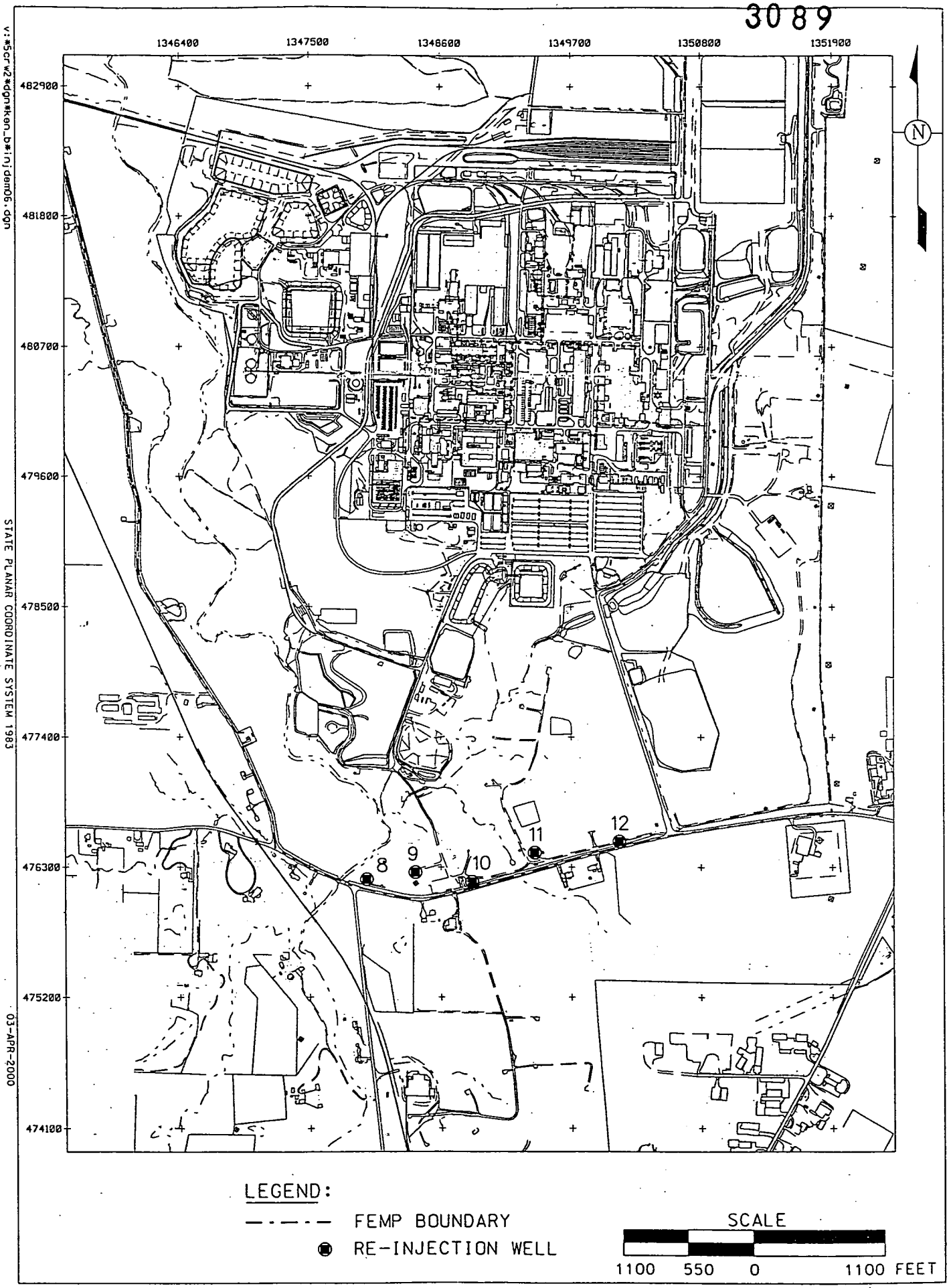
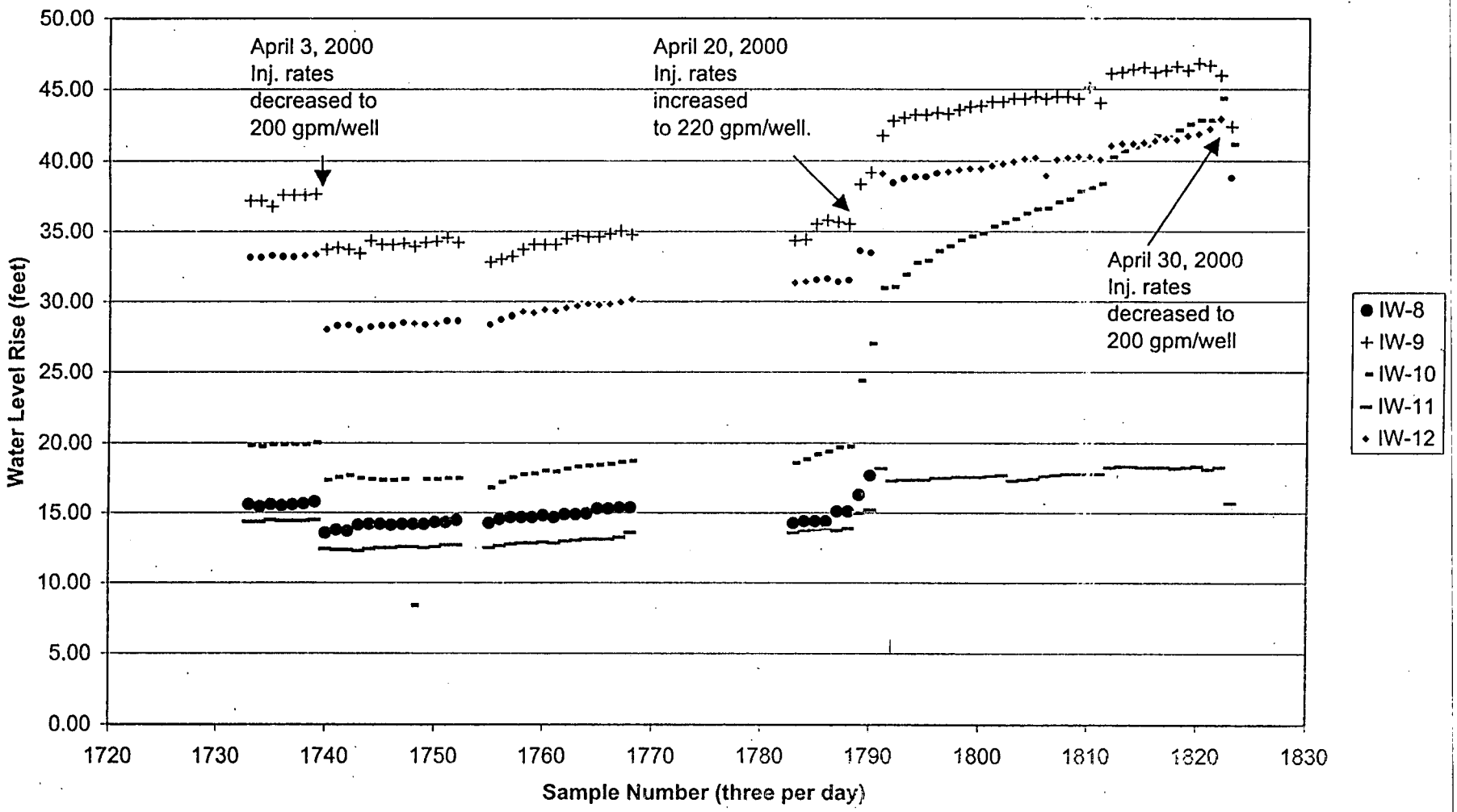


FIGURE 2. LOCATION OF RE-INJECTION WELLS

Figure 3
Re-Injection Wells, Water Level Rise
First Shift on April 1, 2000 to First Shift on May 1, 2000



H