



**Department of Energy**

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JUN 26 2000

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

DOE-0673-00

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  
Ohio Environmental Protection Agency  
P.O. Box 1049  
1800 Watermark Drive  
Columbus, Ohio 45316-1049

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

**FEBRUARY 2000 RE-INJECTION OPERATING REPORT**

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

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

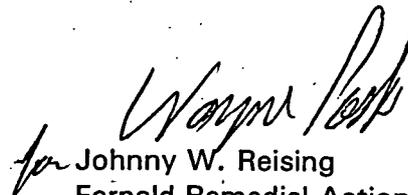
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JUN 26 2000

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

Sincerely,

FEMP:R.J. Janke

  
for Johnny W. Reising  
Fernald Remedial Action  
Project Manager

Enclosure

cc w/enclosure:

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G. Jablonowski, USEPA-V, SRF-5J  
T. Schneider, OEPA-Dayton (three copies of enclosure)  
F. Bell, ATSDR  
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  
W. Hertel, Fluor Fernald, Inc./52-5  
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J. Harmon, Fluor Fernald, Inc./90  
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**MONTHLY RE-INJECTION  
OPERATING REPORT  
FEBRUARY 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. 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 February 1, 2000 to March 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 February 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 February, was below  $20\mu\text{g/L}$ .

#### 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. To help compensate for well downtimes (due to maintenance, electrical outages etc.), re-injection rates of all five re-injection wells were increased from February 18, 2000 through the rest of the month by 10 percent. The opportunity to increase the re-injection rates was made available by higher than average groundwater treatment capacity and lower than normal uranium concentrations in the site effluent. The re-injection rate increases may continue in the latter portions of future months depending on the available treatment capacity and uranium concentrations in of the site effluent. 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 February 1, 2000 to March 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 issues, the following information is provided to aid in the interpretation of Figure 3. From February 8, 2000 to February 15, 2000 (readings 1575 to 1595) Re-Injection Well 10 underwent a treatment to address plugging.

#### WELL MAINTENANCE AND REHABILITATION

During February, Re-Injection Well 10 was treated for plugging. Re-Injection was stopped on February 8, 2000. Actual treatment work ran from February 8, 2000 to February 15, 2000. Upon return to service on February 15, 2000 the water level rise was measured at 6.53 feet.

The well was treated using approximately 5.0 gallons of sodium hypochlorite with a concentration of 12.5 percent chlorine. The well screen was swabbed and surged. Approximately 9,900 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 February 9, 2000**

Constituents <sup>a</sup>	Result <sup>b</sup>	Groundwater FRL <sup>c</sup>	Detection Limit	Constituent Type <sup>e</sup>	Basis for FRL <sup>f</sup>
<b>General Chemistry</b>		<b>mg/L</b>			
Nitrate	0.280	11.0		MP	B
<b>Inorganics</b>		<b>mg/L</b>			
Antimony	U	0.006	0.000683	N	A
Arsenic	0.00162 B	0.05		N	A
Barium	0.0513 E	2.0		N	A
Beryllium	U	0.004	0.00001	N	A
Cadmium	U	0.014	0.00013	N	B
Total Chromium	0.000683 B	0.022 <sup>d</sup>		MP	R
Cobalt	U	0.17	0.00001	N	R
Lead	U	0.015	0.00001	N	A
Manganese	0.00103 B	0.9		N	B
Mercury	U	0.002	0.00004	MP	A
Nickel	0.00122 B	0.1		N	A
Selenium	0.000465 B	0.05		N	A
Silver	U	0.05	0.000014	N	R
Vanadium	0.00153 B	0.038		N	R
Zinc	0.000681 B	0.021		N	B
<b>Radionuclides</b>		<b>pCi/L</b>			
Neptunium-237	U	1.0	0.0371	MP	R*
Radium-226	0.8931	20.0		N	A
Strontium-90	U	8.0	0.5534	MP	A
Thorium-228	U	4.0	0.0534	N	R*
Thorium-232	U	1.2	0.0114	N	R*
Total Uranium	1.99	<b>µg/L</b> 20.0		MP	A
<b>Organics</b>		<b>µg/L</b>			
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

<sup>a</sup>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.

<sup>b</sup>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 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.

E = Estimated because of suspected matrix interference.

<sup>c</sup>From Table 9-4 in OUS ROD.

<sup>d</sup>FRL is for hexavalent chromium.

<sup>e</sup>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.

<sup>f</sup>A - Applicable or relevant and appropriate requirement based (MCL, PMCL, etc.).

B - Based on 95<sup>th</sup> percentile background concentrations.

R - Risk-based

R\* - Risk-based radionuclide cleanup levels include constituent specific 95<sup>th</sup> percentile background concentration.



TABLE 3

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

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

Hours in reporting period<sup>a</sup> = 672.63

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 0.00

Hours injecting<sup>c</sup> = 672.63

Operational percent<sup>d</sup> = 100

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
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 <sup>g</sup>
3/99	5.93	178 <sup>h</sup>
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 <sup>g</sup>

<sup>a</sup>First operational shift reading on 2/1/00 to first operational shift reading on 3/1/00

<sup>b</sup>Downtime. No downtime in February 2000.

<sup>c</sup>Hours in reporting period - Hours not injecting

<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

<sup>e</sup>Summation of daily totalizer differences

<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

<sup>g</sup>Injection out of smaller downcomer in February. Target Injection rate of smaller downcomer is 150 gpm.

<sup>h</sup>Injection out of smaller downcomer up until March 8. Large downcomer was used from March 11 to April 1, 1999.

<sup>i</sup>From February 18, 2000 through the end of the month, well was operated at a set point of 220 gpm.

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TABLE 4

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

Reference Elevation (feet AMSL) - 576.92 (top of casing)

Northing Coordinate ('83) - 476175.65

Easting Coordinate ('83) - 1348860.53

Hours in reporting period<sup>a</sup> = 672.67

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 199.42

Hours injecting<sup>c</sup> = 473.25

Operational percent<sup>d</sup> = 70.4

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
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 <sup>g</sup>

<sup>a</sup>First operational shift reading on 2/1/00 to first operational shift reading on 3/1/00

<sup>b</sup>Downtime. No injection from February 8, 2000 to February 15, 2000 while well underwent a treatment for plugging.

<sup>c</sup>Hours in reporting period - Hours not injecting

<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

<sup>e</sup>Summation of daily totalizer differences

<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

<sup>g</sup>From February 18, 2000 through the end of the month, well was operated at a set point of 220 gpm.

TABLE 5

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

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

Hours in reporting period<sup>a</sup> = 672.78  
Hours not injecting<sup>b</sup> = 0.00  
Hours injecting<sup>c</sup> = 672.78  
Operational percent<sup>d</sup> = 100

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
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 <sup>g</sup>

<sup>a</sup>First operational shift reading on 2/1/00 to first operational shift reading on 3/1/00

<sup>b</sup>Downtime. No downtime in February 2000.

<sup>c</sup>Hours in reporting period - Hours not injecting

<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

<sup>e</sup>Summation of daily totalizer differences

<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

<sup>g</sup>From February 18, 2000 through the end of the month, well was operated at a set point of 220 gpm.

TABLE 6

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

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

Hours in reporting period<sup>a</sup> = 672.80

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 0.00

Hours injecting<sup>c</sup> = 672.80

Operational percent<sup>d</sup> = 100

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
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 <sup>g</sup>

<sup>a</sup>First operational shift reading on 2/1/00 to first operational shift reading on 3/1/00

<sup>b</sup>Downtime. No downtime in February 2000.

<sup>c</sup>Hours in reporting period - Hours not injecting

<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

<sup>e</sup>Summation of daily totalizer differences

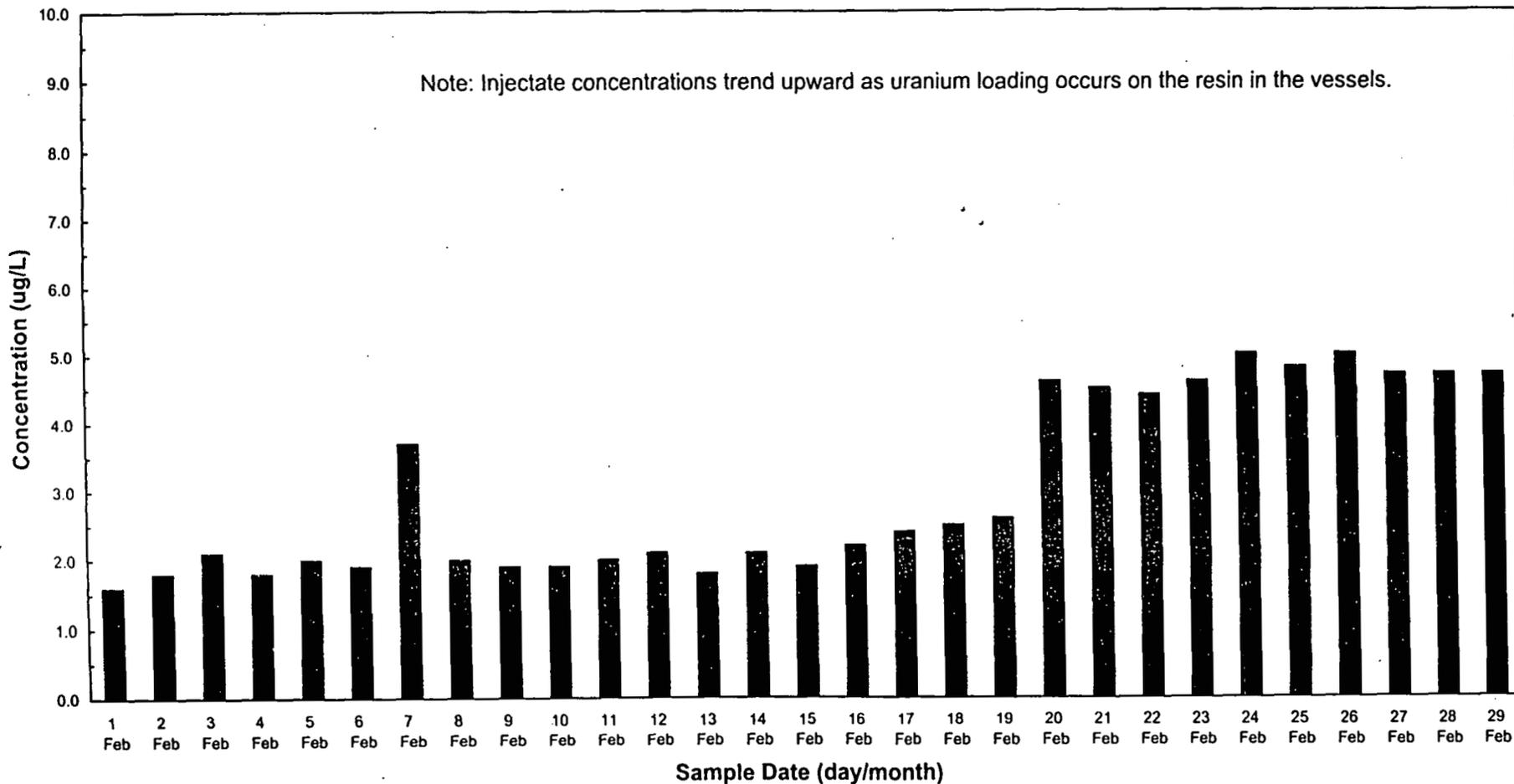
<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

<sup>g</sup>From February 18, 2000 through the end of the month, well was operated at a set point of 220 gpm.

FIGURE 1

URANIUM CONCENTRATION OF AWWT EXPANSION EFFLUENT\*  
FEBRUARY 2000

2000/2



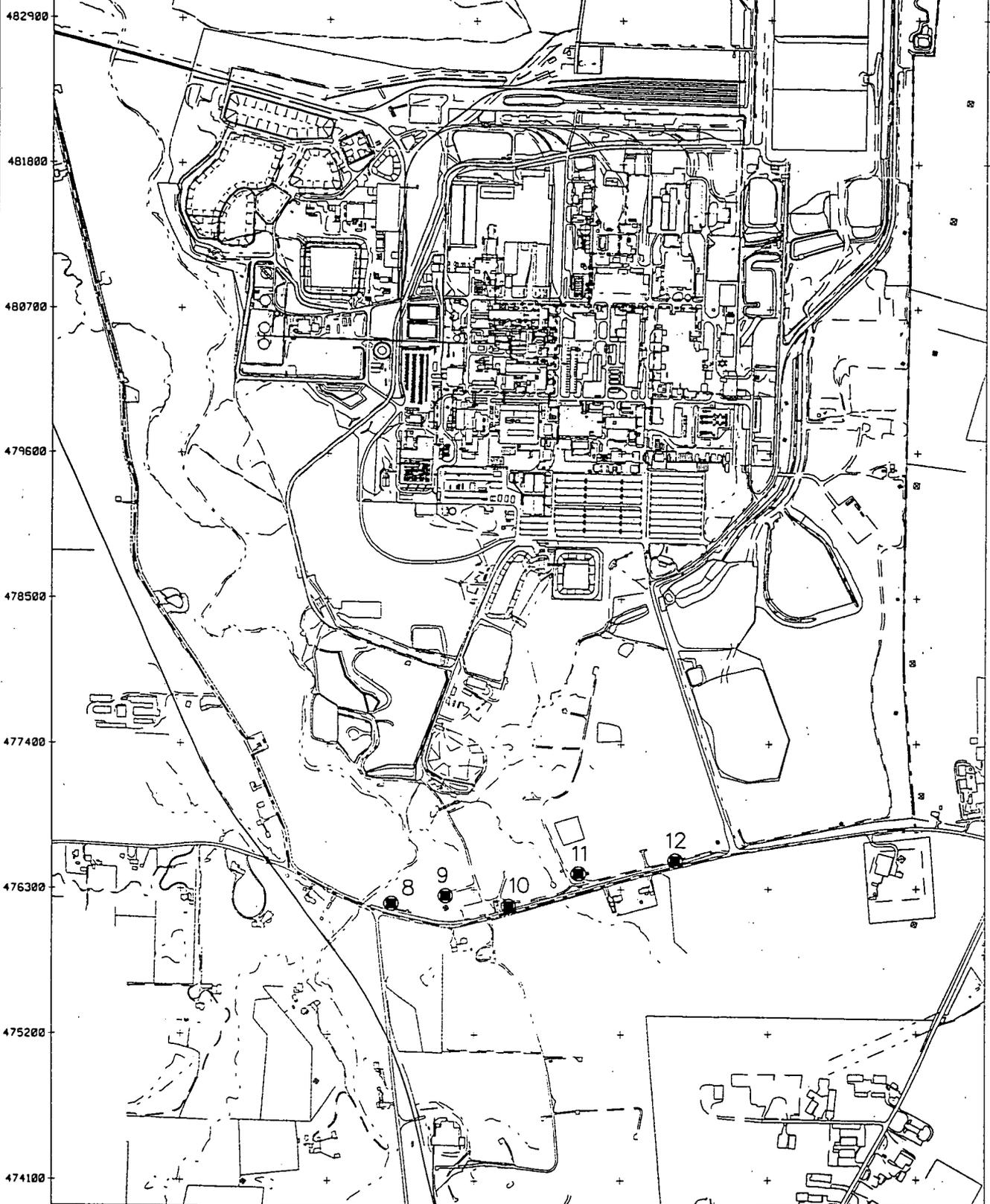
\* Samples derived from combined plant effluent via 24-hour Composite Sampler.

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STATE PLANNAR COORDINATE SYSTEM 1983

03-APR-2000

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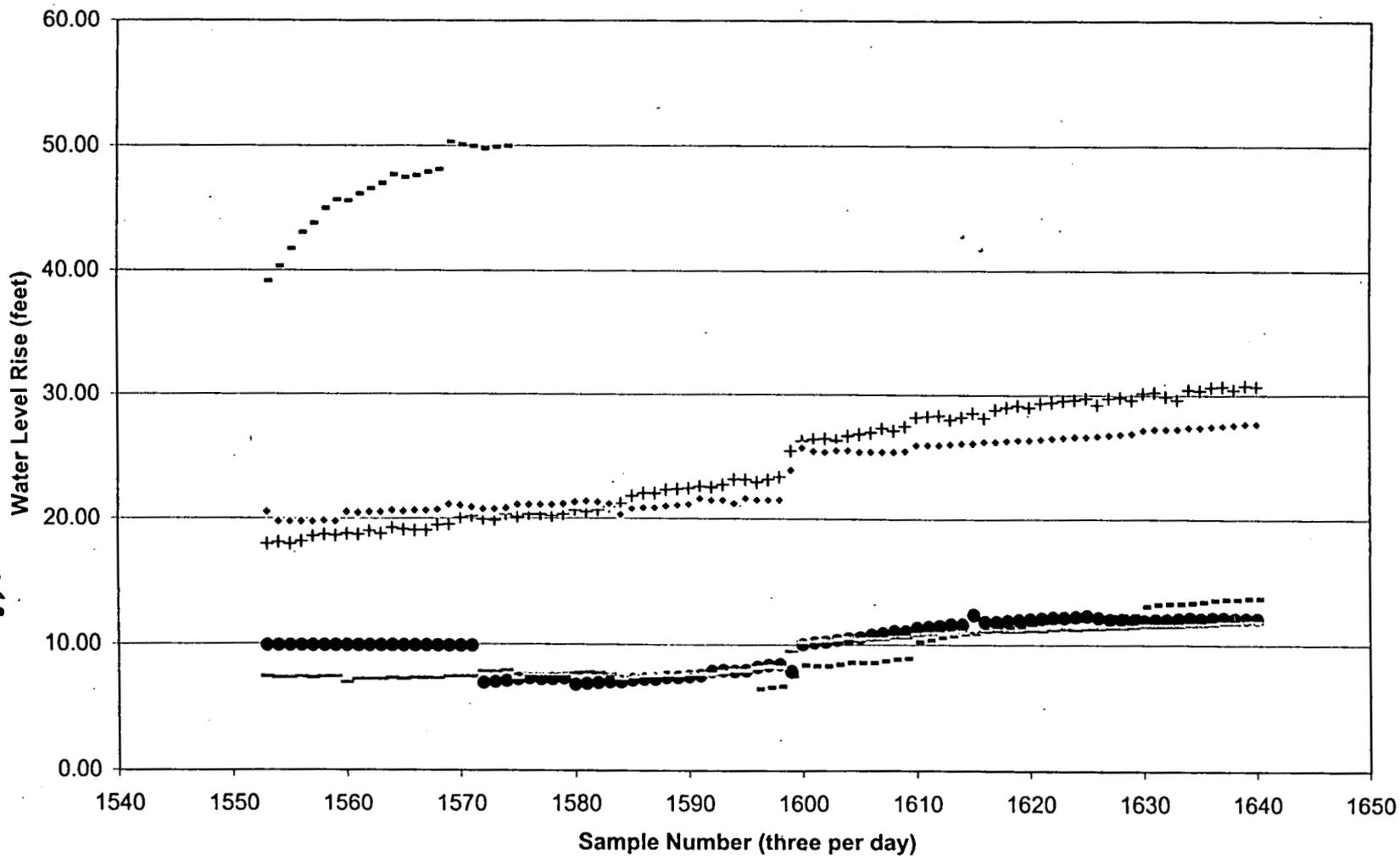
LEGEND:

- FEMP BOUNDARY
- RE-INJECTION WELL



FIGURE 2. LOCATION OF RE-INJECTION WELLS

Figure 3.  
Re-Injection Wells, Water Level Rise  
February 1, 2000 to March 1, 2000



BT

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