



**Department of Energy**

**Ohio Field Office  
Fernald Area Office**

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**3646**

04 MAY 2001

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-0550-01

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

Ms. Val Orr  
Division of Drinking and Ground Waters - UIC Unit  
Ohio Environmental Protection Agency  
P.O. Box 1049  
Columbus, Ohio 43216-1049

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

**FEBRUARY 2001 RE-INJECTION OPERATING REPORT**

This correspondence submits the Re-Injection Operation Report for the month of February 2001.

As specified in the Re-Injection Demonstration Test Plan, monthly re-injection operating reports are to be prepared and submitted to the United States Environmental Protection Agency (USEPA), 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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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: As stated

cc w/enclosure:

R. J. Janke, OH/FEMP  
G. Jablonowski, USPEA-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./MS52-5  
K. Broberg, Fluor Fernald, Inc./MS52-5  
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M. Jewett, Fluor Fernald, Inc./MS52-2  
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MONTHLY RE-INJECTION  
OPERATING REPORT  
FEBRUARY 2001

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OVERVIEW

On September 2, 1999, DOE completed one year of active groundwater re-injection as part of a field-scale demonstration. A report detailing the demonstration was issued to the U.S. EPA and Ohio EPA on May 30, 2000.

Re-Injection at Fernald is exempted under 40 CFR 300.400(e)(1) from requiring a permit, as it is a CERCLA action. In accord with Ohio EPA Guidelines, (OEPA 1997) DOE will prepare monthly operating reports that include:

- I. An analysis of the injectate
- II. The volume and rate of re-injection
- III. A description of any well maintenance and rehabilitation procedures conducted.

DOE will submit the monthly re-injection operating reports 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.

This report covers re-injection operations from February 1 to March 1, 2001.

Routine monitoring of the aquifer in the re-injection area is conducted as part of the groundwater remedy performance monitoring program specified in Fernald's Integrated Environmental Monitoring Plan. Results of the Integrated Monitoring Program are reported quarterly and are available for viewing on the Fernald Website, [www.fernald.gov](http://www.fernald.gov).

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, Revision 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. In addition to the monthly

grab sample, 24-hour composite samples are collected and analyzed at the on-site lab for uranium. The 24-hour composite sampler samples the combined effluent from the active treatment trains comprising the facility. The daily composite results are used by plant management for making process control decisions. They provide a daily evaluation of the quality of the water that is re-injected into the aquifer. Composite daily uranium results from the AWWT Expansion Facility effluent for days when re-injection occurred are shown in Figure 1.

The monthly grab sample was collected on February 21, 2001. Results are provided in Table 1. These results indicate that all the constituent concentrations are below their respective FRLs. The uranium concentration measured in the monthly grab sample was 1.12  $\mu\text{g/L}$ . The FRL for uranium is 20  $\mu\text{g/L}$ . The total uranium concentration of the daily composite sample also collected on February 21, 2001 was 1.2  $\mu\text{g/L}$ .

#### VOLUME AND RATE OF RE-INJECTION

Five re-injection wells are currently available. The design re-injection set point for each of the re-injection wells is 200 gpm. The combined design re-injection rate for all five wells is 1000 gallons per minute. Figure 2 illustrates the location of the five re-injection wells; Tables 2 through 6 summarize the current calendar year's operational data by month. The tables also provide averages by year for the calendar years 1998, 1999, and 2000. 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.

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 may be 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 condition of the wells, 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 variables noted above.

Figure 3 illustrates the water level rise in each of the operating re-injection wells from February 1 to March 1, 2001, as recorded 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

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 Figures 1 and 3.

#### SUMMARY OF SYSTEM OUTAGES FOR THE REPORTING PERIOD

For the month of February 2001, re-injection took place at a reduced rate due to outages of Re-Injection Wells 8, 9, and 12.

#### SUMMARY OF WELL MAINTENANCE FOR THE REPORTING PERIOD

Re-Injection Wells 8, 9, and 12 were offline through the end of February 2001 as presented in Tables 2, 3, and 6, respectively. Wells 8 and 9 are awaiting rehabilitation. Although Well 12 started up following rehabilitation, it was almost immediately shut down due to a recurrence of high water level.

- Re-Injection Well 12 underwent rehabilitation using the new method on January 17, 2001; rehabilitation continued through February 8, 2001. The well was treated using approximately 55 gallons of sodium hypochlorite with a concentration of 12.5 percent chlorine. It was also treated with 20 pounds of calcium hypochlorite, and 440 gallons of 37 percent hydrochloric acid. The pumping of the well during treatment resulted in a cumulative volume removal of approximately 26,000 gallons.

**TABLE 1**  
**ANALYSIS OF INJECTATE**  
**Sample collected February 21, 2001**

Constituents <sup>a</sup>	Result <sup>b</sup>	Groundwater FRL <sup>c</sup>	Detection Limit	Constituent Type <sup>g</sup>	Basis for FRL <sup>h</sup>
<b>General Chemistry</b>		<b>mg/L</b>			
Nitrate	0.47	11.0		MP	B
<b>Inorganics</b>		<b>mg/L</b>			
Antimony	U	0.006	0.0017	N	A
Arsenic	U	0.05	0.0032	N	A
Barium	0.0518 B <sup>d</sup>	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 <sup>f</sup>	0.0007	MP	R
Cobalt	0.0007 B	0.17		N	R
Lead	U	0.015	0.0022	N	A
Manganese	0.00075 B	0.9		N	B
Mercury	U	0.002	0.0001	MP	A
Nickel	0.0021 B	0.1		N	A
Selenium	U	0.05	0.0031	N	A
Silver	U	0.05	0.0006	N	R
Vanadium	U	0.038	0.0006	N	R
Zinc	0.0013 B	0.021		N	B
<b>Radionuclides</b>		<b>pCi/L</b>			
Neptunium-237	U	1.0	0.00272	MP	R*
Radium-226	U	20.0	0.311	N	A
Strontium-90	U	8.0	0.455	MP	A
Thorium-228	U	4.0	0.0804	N	R*
Thorium-232	U	1.2	0.00611	N	R*
<b>Total Uranium</b>	<b>1.12</b>	<b>20.0</b>		<b>MP</b>	<b>A</b>
<b>Organics</b>		<b>µg/L</b>			
Bis(2-ethylhexyl)phthalate	4 JB	6.0		N	A
Carbon disulfide	U	5.5	1.0	N	A
1, 1-Dichloroethene	U	7.0	1.0	N	A
1, 2-Dichloroethane	U	5.0	1.0	MP	A
Trichloroethene	U	5.0	1.0	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

<sup>c</sup>J = Lab qualifier. Reported result is positively detected but is estimated; the result is still usable for making decisions.

<sup>d</sup>B = Lab qualifier. Reported result is greater than the instrument detection level but less than the contract required detection limit.

<sup>e</sup>From Table 9-4 in OU5 ROD.

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

<sup>g</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>h</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 2

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RE-INJECTION WELL 22107 (IW-8)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 2001

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

Hours in reporting period<sup>a</sup> = 680.05  
Hours not injecting<sup>b</sup> = 680.05  
Hours injecting<sup>c</sup> = 0.00  
Operational percent<sup>d</sup> = 0.0

Target Injection Rate = 200 gpm

Monthly Measurements		
Month <sup>e</sup>	Million Gallons Injected <sup>f</sup>	Average Operating Injection Rate (gpm) <sup>g</sup>
1998	7.04	207
1999	7.21	199
2000	4.26	149
1/01	0.00	0
2/01	0.00	0

<sup>a</sup>First operational shift reading on February 1, 2001 to first operational shift reading on March 1, 2001.

<sup>b</sup>Downtime as noted in the text.

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

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

<sup>e</sup>Average for calendar years 1998, 1999, and 2000

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

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

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TABLE 3

RE-INJECTION WELL 22108 (IW-9)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 2001

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> = 681.75  
Hours not injecting<sup>b</sup> = 681.75  
Hours injecting<sup>c</sup> = 0.00  
Operational percent<sup>d</sup> = 0.0

Target Injection Rate = 200 gpm

Monthly Measurements		
Month <sup>e</sup>	Million Gallons Injected <sup>f</sup>	Average Operating Injection Rate (gpm) <sup>g</sup>
1998	7.67	204
1999	6.64	188
2000	4.29	164
1/01	0.00	0
2/01	0.00	0

<sup>a</sup>First operational shift reading on February 1, 2001 to first operational shift reading on March 1, 2001.

<sup>b</sup>Downtime as noted in the text.

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

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

<sup>e</sup>Average for calendar years 1998, 1999, and 2000

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

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

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TABLE 4

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**RE-INJECTION WELL 22109 (IW-10)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 2001**

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> = 677.32  
Hours not injecting<sup>b</sup> = 152.00  
Hours injecting<sup>c</sup> = 525.32  
Operational percent<sup>d</sup> = 77.6

Target Injection Rate = 200 gpm

Monthly Measurements		
Month <sup>e</sup>	Million Gallons Injected <sup>f</sup>	Average Operating Injection Rate (gpm) <sup>g</sup>
1998	7.66	204
1999	7.07	196
2000	3.96	149
1/01	2.72	206
2/01	6.27	199

<sup>a</sup>First operational shift reading on February 1, 2001 to first operational shift reading on March 1, 2001.

<sup>b</sup>Downtime as noted in the text.

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

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

<sup>e</sup>Average for calendar years 1998, 1999, and 2000

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

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

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TABLE 5

RE-INJECTION WELL 22240 (IW-11)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 2001

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> = 677.35  
Hours not injecting<sup>b</sup> = 152.00  
Hours injecting<sup>c</sup> = 525.35  
Operational percent<sup>d</sup> = 77.6

Target Injection Rate = 200 gpm

Monthly Measurements		
Month <sup>e</sup>	Million Gallons Injected <sup>f</sup>	Average Operating Injection Rate (gpm) <sup>g</sup>
1998	7.72	206
1999	7.61	199
2000	6.38	196
1/01	5.97	200
2/01	6.26	199

<sup>a</sup>First operational shift reading on February 1, 2001 to first operational shift reading on March 1, 2001.

<sup>b</sup>Downtime as noted in the text.

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

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

<sup>e</sup>Average for calendar years 1998, 1999, and 2000

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

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

TABLE 6

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RE-INJECTION WELL 22111 (IW-12)  
 OPERATIONAL SUMMARY SHEET  
 FEBRUARY 2001

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> = 679.47  
 Hours not injecting<sup>b</sup> = 679.47  
 Hours injecting<sup>c</sup> = 0.00  
 Operational percent<sup>d</sup> = 0.0

Target Injection Rate = 200 gpm

Monthly Measurements		
Month <sup>e</sup>	Million Gallons Injected <sup>f</sup>	Average Operating Injection Rate (gpm) <sup>g</sup>
1998	7.63	206
1999	7.55	198
2000	6.05	180
1/01	0.00	0
2/01	0.00	0

<sup>a</sup>First operational shift reading on February 1, 2001 to first operational shift reading on March 1, 2001.

<sup>b</sup>Downtime as noted in the text.

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

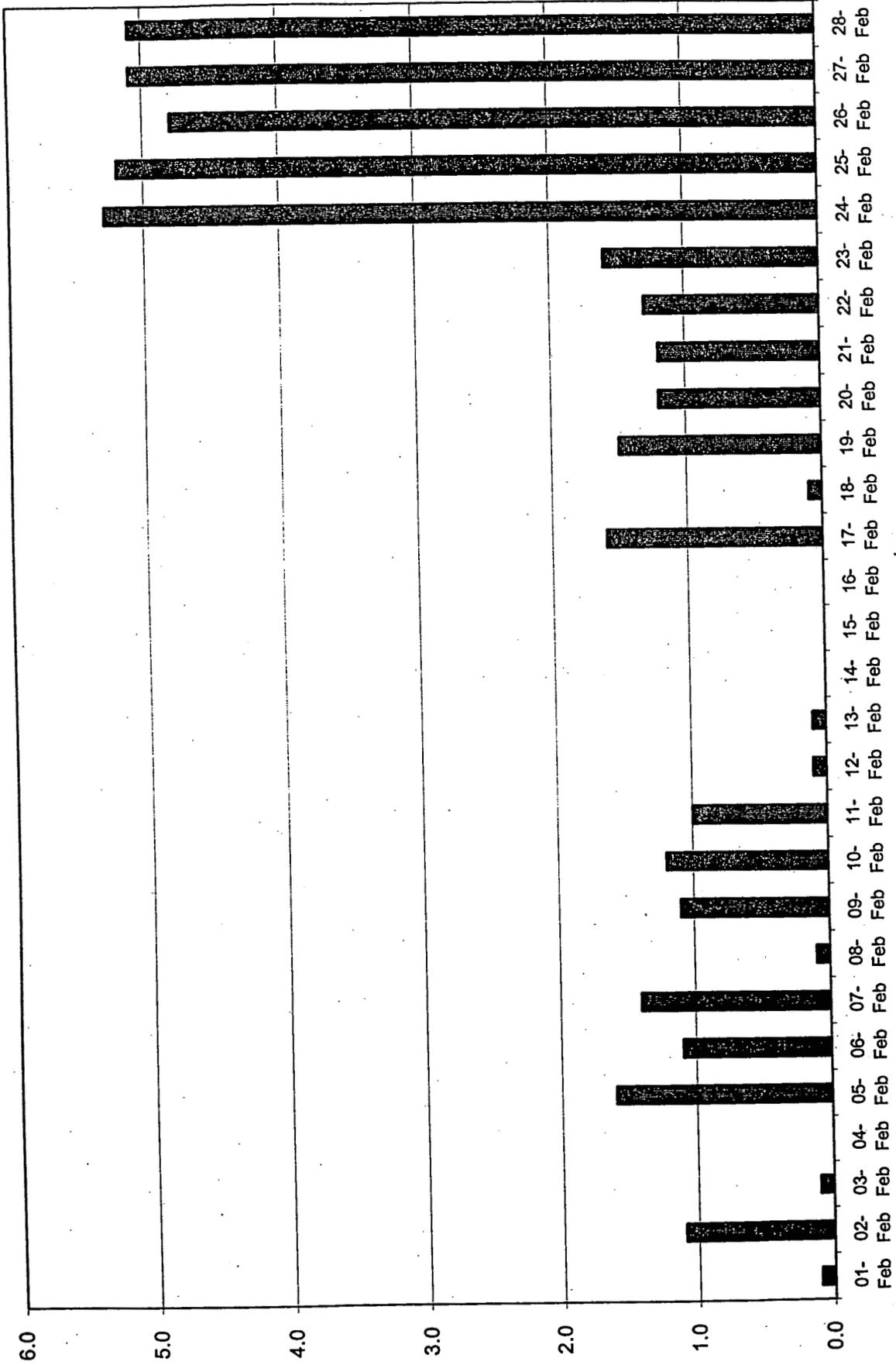
<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

<sup>e</sup>Average for calendar years 1998, 1999, and 2000

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

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

**Figure 1**  
**AWWT Expansion 1800 System Effluent Total Uranium Concentration (µg/L)**  
**on Days when Re-Injection Occurred**



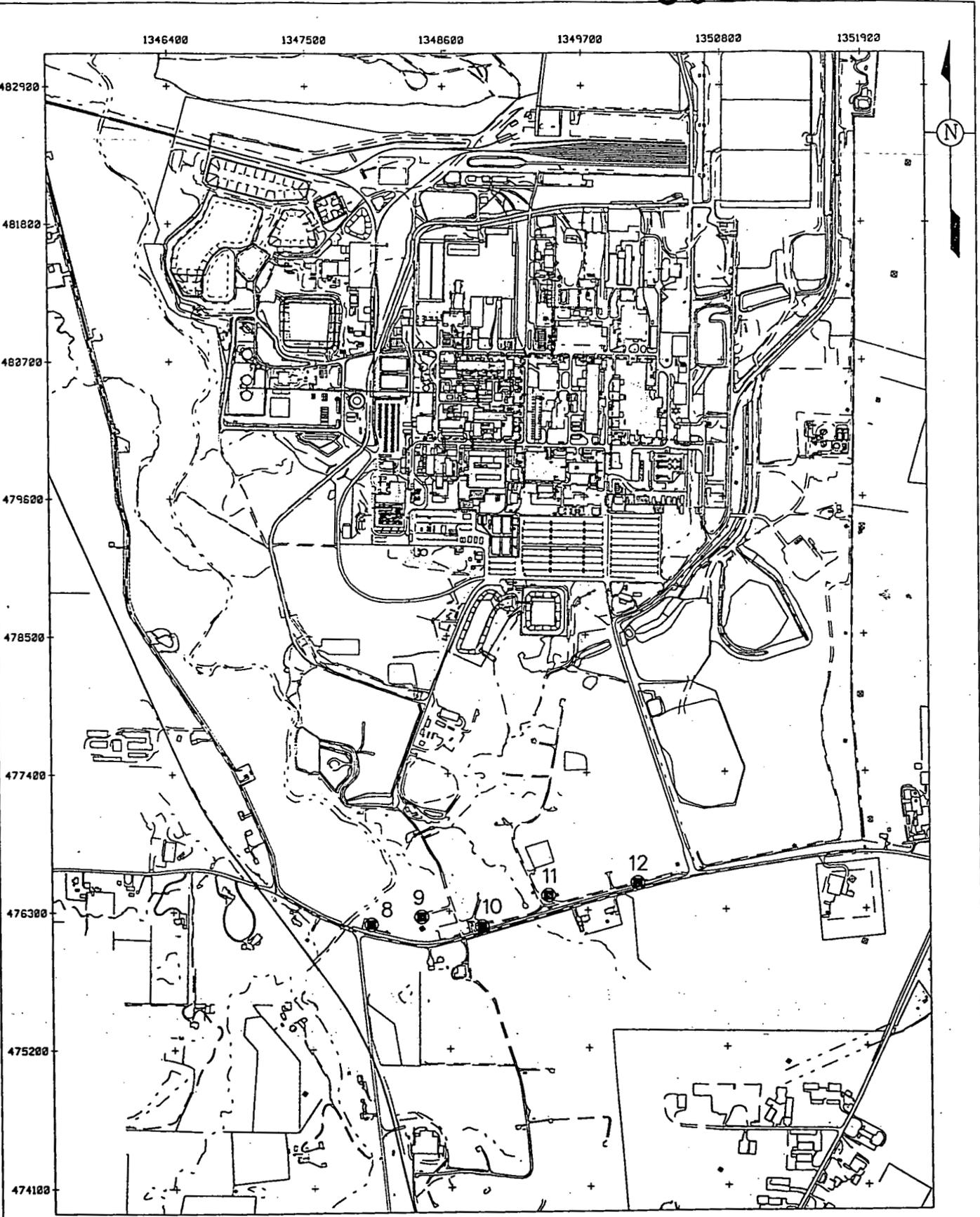
Note: Down times are discussed in the text.

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STATE PLANAR COORDINATE SYSTEM 1983

06-FEB-2001



**LEGEND:**  
 - - - - FEMP BOUNDARY  
 ● RE-INJECTION WELL

**SCALE**  
 1100 550 0 1100 FEET

FIGURE 2. LOCATION OF RE-INJECTION WELLS

Figure 3  
 Re-Injection Wells, Water Level Rise  
 First Shift on February 1, 2001 (Sample Number 2651) to First Shift on March 1, 2001 (Sample Number 2735)

