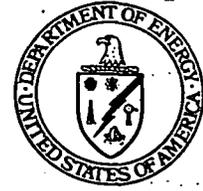




Department of Energy

**Ohio Field Office
Fernald Area Office**

P. O. Box 538705
Cincinnati, Ohio 45253-8705
(513) 648-3155



JAN 20 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-0320-00

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 43216-1049

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

SEPTEMBER 1999 OPERATING REPORT FOR THE RE-INJECTION DEMONSTRATION

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

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

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

-2-

JAN 20 2000

cc w/enclosure:

R. J. Janke, OH/FEMP
G. Jablonowski, USEPA-V, SRF-5J
M. R. Rochotte, OEPA-Columbus
T. Schneider, OEPA-Dayton (three copies of enclosure)
F. Bell, ATSDR
M. Schupe, HSI GeoTrans
R. Vandegrift, ODH
F. Barker, Tetra Tech
D. Brettschneider, FDF/52-5
K. Broberg, FDF/52-5
D. Carr, FDF/52-2
W. Hertel, FDF/52-5
R. White, FDF/52-5
AR Coordinator, FDF/78

cc w/o enclosure:

N. Hallein, EM-42/CLOV
A. Tanner, OH/FEMP
T. Hagen, FDF/65-2
J. Harmon, FDF/90
R. Heck, FDF/2
S. Hinnefeld, FDF/31
T. Walsh, FDF/65-2
ECDC, FDF/52-7

**MONTHLY OPERATING REPORT
RE-INJECTION DEMONSTRATION
SEPTEMBER 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 September 1999. It covers operation of the Re-Injection Demonstration from September 1, 1999 through October 1, 1999.

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.

However, the issues surrounding the added costs and operational demands due to the regeneration process for ion exchange resin used in treating injectate will play a key role in determining the viability of the re-injection process. This and other issues will be evaluated over the next few months as part of the comprehensive analysis of the data and to address specific issues on, and objectives of re-injection, as outlined in the test plan. DOE anticipates that the conclusions reached from this final analysis will support the preliminary decision to continue with the use of re-injection.

ANALYSIS OF THE INJECTATE

Groundwater which is being extracted from the great Miami Aquifer is being treated for uranium removal 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 grab 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 grab samples are being sent to an off-site laboratory for analysis.

Preliminary results from the monthly injectate grab sample collected in September 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 being re-injected back into the Aquifer. As discussed in the well maintenance and rehabilitation section, re-injection was not taking place on September 24, 25 and 26, when composite daily results indicated that the uranium concentration of the AWWT Expansion Facility effluent was above 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. 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 September 1, 1999 through October 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. 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. As discussed in the next section, Re-Injection Wells 8 and 10 underwent rehabilitation during September to address plugging. From September 20, 1999 to September 28, 1999 (readings 1152 to 1175) all of the re-injection wells were down (not operating) to facilitate a planned upgrade to the DCS system. Although re-injection resumed on September 28, DCS water level readings in the re-injection wells were not recorded until September 30, 1999 (reading 1182).

WELL MAINTENANCE AND REHABILITATION

Re-Injection Well 8 underwent rehabilitation to address plugging from September 9, 1999 to September 13, 1999 (readings 1113 through 1130). When the well began operating back on September 2, 1998, the initial water level rise in the well was 5.34 feet. Just prior to September 9, 1999, the water level rise in the well was 15.80 feet. This is the fourth time that Re-Injection Well 8 has been rehabilitated to address plugging.

Re-Injection Well 8 was rehabilitated using the same procedure that was used the three previous times. Approximately 2 gallons of sodium hypochlorite (12.5 percent chlorine) were added to the well. The well screen was swabbed and surged and approximately 9,250 gallons of water were pumped from the well. The chlorine concentration of the pumped water from the well at the end of rehabilitation was 0.03 ppm. Upon return to service on September 13, 1999 the water level rise in the well was approximately 4.92 feet. The water level rise following the first three rehabilitations were 4.02 feet, 7.48 feet, and 7.62 feet respectively.

Re-Injection Well 10 underwent rehabilitation to address plugging from September 13, 1999 to September 21, 1999 (readings 1113 to 1181). When the well began operating back on September 2, 1998 the initial water level rise in the well was 4.92 feet. Just prior to September 9, 1999 (the day that re-injection was stopped for the latest rehabilitation) the water level rise in the well was 51.23 feet. This is the second time that Re-Injection Well 10 has been rehabilitated to address plugging.

Re-Injection Well 10 was rehabilitated using the same procedure that was used the first time. Approximately 5 gallons of sodium hypochlorite were added to the well. The well screen was swabbed

and surged and approximately 14,450 gallons of water were pumped from the well. The chlorine concentration of the pumped water from the well at the end of rehabilitation was 0.04 ppm. The well was returned to service on September 28, 1999. Re-injection did not take place from September 20 to September 23, to facilitate an upgrade to the DCS, and to regenerate a treatment vessel. Re-injection remained shut down from September 23 to September 28, to verify that the uranium concentration of the treated effluent was at acceptable levels (i.e. $< 20 \mu\text{g/L}$) prior to resuming re-injection. Although re-injection resumed on September 28, 1999, DCS water level readings in the re-injection wells were not recorded until September 30, 1999 (reading 1182). The water level rise in the well on September 30, was approximately 4.29 feet. The water level rise following the first rehabilitation was 8.54 feet.

GROUNDWATER MONITORING RESULTS

Water quality samples during the Re-Injection Demonstration were 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 third round of water quality samples for the Re-Injection Demonstration was collected in March 1999. Results of the March sampling event were reported in the April monthly report. The fourth round of sampling took place from June 7, 1999 to August 11, 1999. The sampling was integrated with ongoing IEMP sampling activities to improve efficiency in the field. Data from the fourth round of sampling are presented in Table 7.

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 - PRELIMINARY RESULTS
Sample Collected September 13, 1999

Constituents ^a	Result ^b	Groundwater FRL ^c	Detection Limit	Constituent Type ^e	Basis for FRL ^f
General Chemistry					
		mg/L			
Nitrate	0.6	11.0		MP	B
Inorganics					
		mg/L			
Antimony	U	0.006	0.00062	N	A
Arsenic	0.0012 B	0.05		N	A
Barium	0.0486	2.0		N	A
Beryllium	U	0.004	0.00002	N	A
Cadmium	U	0.014	0.00008	N	B
Total Chromium	0.0015 B	0.022 ^d		MP	R
Cobalt	U	0.17	0.00012	N	R
Lead	U	0.015	0.00052	N	A
Manganese	0.0008 B	0.9		N	B
Mercury	U	0.002	0.0001	MP	A
Nickel	0.00037 B	0.1		N	A
Selenium	U	0.05	0.00092	N	A
Silver	U	0.05	0.00025	N	R
Vanadium	U	0.038	0.00015	N	R
Zinc	U	0.021	0.0002	N	B
Radionuclides					
		pCi/L			
Neptunium-237	U	1.0	-0.027	MP	R*
Radium-226	0.087	20.0		N	A
Strontium-90	U	8.0	0.101	MP	A
Thorium-228	U	4.0	0.085	N	R*
Thorium-232	U	1.2	0	N	R*
		µg/L			
Total Uranium	9.56	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. 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.

U = Nondetect

^cFrom Table 9-4 in OU5 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.

7

TABLE 2

**RE-INJECTION WELL 22107 (IW-8)
OPERATIONAL SUMMARY SHEET
SEPTEMBER 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 = 720.47

Target Injection Rate = 200 gpm

Hours not injecting^b = 360.00

Hours injecting^c = 360.47

Operational percent^d = 50.0

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

^aFirst operational shift reading on 9/1/99 to first operational shift reading on 10/1/99

^bDowntime. IW-8 was being rehabilitated from 9/7/99 to 9/13/99. All injection wells were not operating from 9/20/99 to 9/30/99 to facilitate a DCS upgrade.

^cHours in reporting period - Hours not injecting

^d $(\text{Hours injecting} / \text{Hours in reporting period}) \times 100$

^eSummation of daily totalizer differences

^fMillion Gallons Injected / (Hours Injecting x 60)

TABLE 3

RE-INJECTION WELL 22108 (IW-9)
 OPERATIONAL SUMMARY SHEET
 SEPTEMBER 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 = 721.85

Target Injection Rate = 200 gpm

Hours not injecting^b = 216.00

Hours injecting^c = 505.85

Operational percent^d = 70.1

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

^aFirst operational shift reading on 9/1/99 to first operational shift reading on 10/1/99

^bDowntime. All injection wells were not operating from 9/20/99 to 9/30/99 to facilitate a DCS upgrade.

^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.

TABLE 4

RE-INJECTION WELL 22109 (IW-10)
OPERATIONAL SUMMARY SHEET
SEPTEMBER 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 = 721.77
Hours not injecting^b = 528.00
Hours injecting^c = 193.77
Operational percent^d = 26.9

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

^aFirst operational shift reading on 9/1/99 to first operational shift reading on 10/1/99

^bDowntime. IW-10 was being rehabilitated from 9/7/99 to 9/20/99. All injection wells were not operating from 9/20/99 to 9/30/99 to facilitate a DCS upgrade.

^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 5

RE-INJECTION WELL 22240 (IW-11)
OPERATIONAL SUMMARY SHEET
SEPTEMBER 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 = 720.15
Hours not injecting^b = 216.00
Hours injecting^c = 504.15
Operational percent^d = 70.0
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
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

^aFirst operational shift reading on 9/1/99 to first operational shift reading on 10/1/99
^bDowntime. All injection wells were not operating from 9/20/99 to 9/30/99 to facilitate a DCS upgrade.
^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)

11

TABLE 6

**RE-INJECTION WELL 22111 (IW-12)
OPERATIONAL SUMMARY SHEET
SEPTEMBER 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 = 720.15

Target Injection Rate = 200 gpm

Hours not injecting^b = 216.00Hours injecting^c = 504.15Operational percent^d = 70.0

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
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

^aFirst operational shift reading on 9/1/99 to first operational shift reading on 10/1/99^bDowntime. All injection wells were not operating from 9/20/99 to 9/30/99 to facilitate a DCS upgrade.^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)

2764

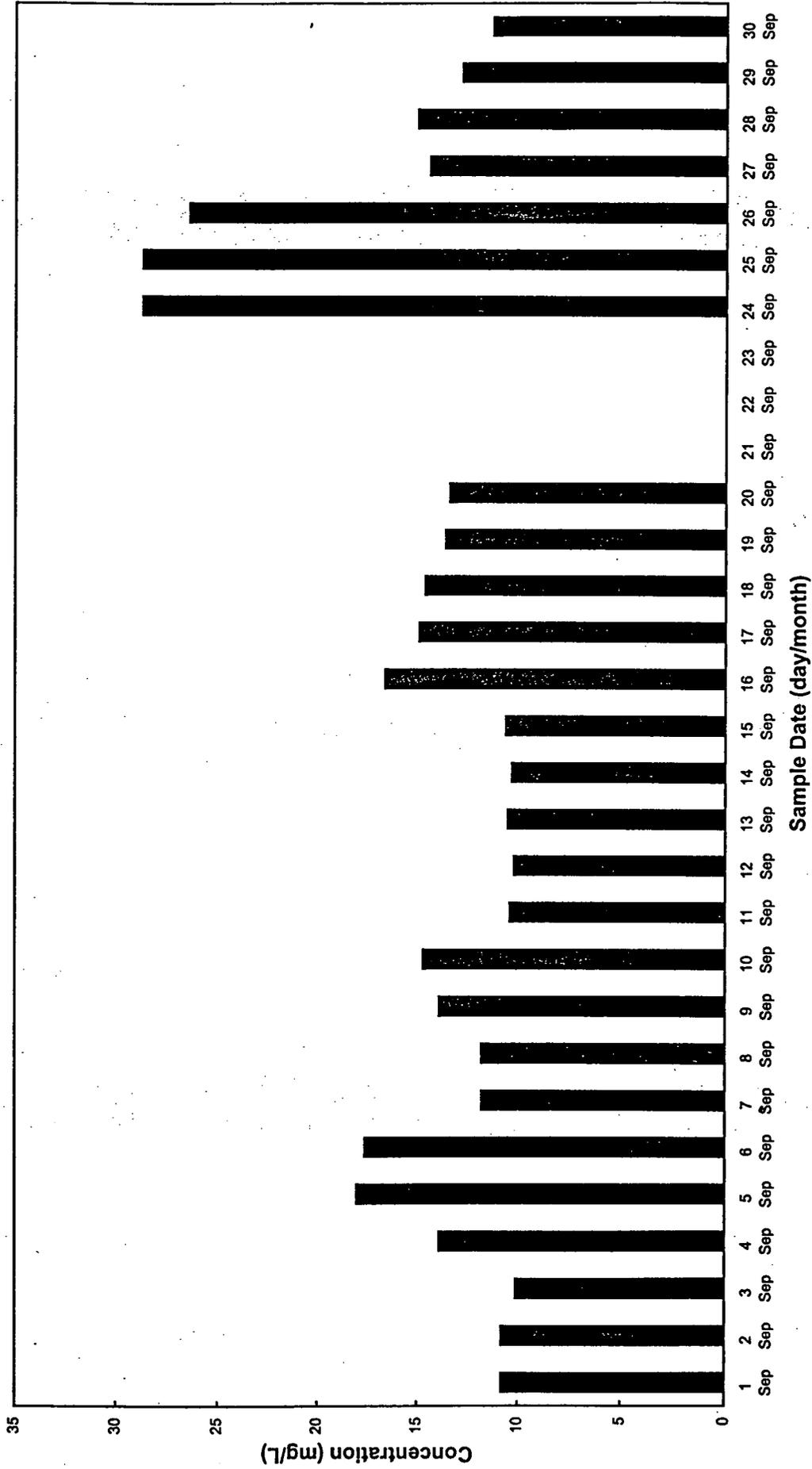
TABLE 7

PRELIMINARY GROUNDWATER MONITORING RESULTS
SAMPLES COLLECTED JUNE THROUGH AUGUST, 1999 FOR THE RE-INJECTION DEMONSTRATION

Constituent	Well 2015 8/5/99	Well 2017 8/5/99	Well 2070 7/17/99	Well 2106 7/17/99	Well 2166 8/11/99	Well 2434 7/6/99	Well 3015 8/5/99	Well 3069-D 7/6/99	Well 3106 7/17/99	Well 3070 7/17/99	Well 3398 7/6/99	Well 4398 7/6/99	Well 22299 6/8/99	Well 22300 6/7/99
aluminum	0.0232	0.086	U 0.0208	0.0266	U 0.0208	0.0815	U 0.0208	U 0.0248	U 0.0248	U 0.0248	U 0.0248	U 0.0248	4.520	4.250
calcium	93	142	109	97.6	111	89.8	96	99.3	92.1	97.4	96.5	10.7	268	513
iron	0.0437	0.244	0.0375	0.192	U 0.0031	0.292	1.16	U 0.0074	0.0242	3.93	1.190	0.632	13.7	14
magnesium	24.9	32.7	31.8	25.7	28.9	23.9	23.8	24.5	24.2	25	24.2	26.9	97.3	182
manganese	0.003	0.0077	0.0043	0.0052	0.0035	0.0223	0.352	0.00930	0.0116	0.320	0.282	0.412	0.308	0.637
potassium	3.22	2.840	3.42	2.72	3.410	2.98	3.520	2.950	2.750	2.420	2.650	1.17	4.200	4.09
silicon	3.46	5.450	3.13	3.59	4.540	4.45	3.7	4.480	4.4	4.190	4.150	6.32	10.2	9.66
sodium	16.2	22.3	17.3	17.6	14.7	21.7	16	15.8	17.20	11.6	11.4	8.34	15.4	16.6
ammonia	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.10	U 0.00010	U 0.00010
nitrate-nitrogen	0.5	U 0.1	0.6	0.1	1.2	1.0	U 0.1	0.6	0.8	U 0.1	0.1	0.0003	0.7	0.6
uranium	160	3.1	106	36.8	61	22	1.2	242	0.997	0.221	0.9	0.11	12	3.7
alkalinity	270	360	227	247	275	0.254	257	260	266	240	264	255	260	269
chloride	32.8	72.2	36.0	36.0	31.6	34.0	36	34	34.0	26.0	36.0	26.0	34	32
fluoride	0.50	0.14	0.35	0.27	0.16	0.13	0.15	0.24	0.14	0.11	0.12	0.13	0.23	0.24
sulfate	78.5	78.0	70.6	77.4	113.5	86.1	93.5	85.9	74.4	82.6	67.0	108.1	85.2	87.6
TDS	496	741	456	467	564	502	533	520	456	465	489	554	501	522
phosphate(total)	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1	U 0.1	U 2.0	U 0.1	U 0.1	U 0.1	0.14	0.16
bicarbonate	329.4	439.2	277	247	340.0	254	313.5	260	266	240	264	255	260	269
carbonate	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1.0	U 1	U 1.0

Constituent	Well 22301 6/8/99	Well 22302 6/7/99	Well 22303 6/7/99	Well 32304 6/9/99	Well 2305-D 6/9/99	Well 32306 6/8/99	Well 32307 6/8/99	Well 3069-D 6/9/99	Well 3070 6/8/99	Well 3071 6/8/99	Well 3072 6/8/99	Well 3073 6/8/99	Well 3074 6/8/99	Well 3075 6/8/99	Well 3076 6/8/99	Well 3077 6/8/99	Well 3078 6/8/99	Well 3079 6/8/99	Well 3080 6/8/99	Well 3081 6/8/99	Well 3082 6/8/99	Well 3083 6/8/99	Well 3084 6/8/99	Well 3085 6/8/99	Well 3086 6/8/99	Well 3087 6/8/99	Well 3088 6/8/99	Well 3089 6/8/99	Well 3090 6/8/99	Well 3091 6/8/99	Well 3092 6/8/99	Well 3093 6/8/99	Well 3094 6/8/99	Well 3095 6/8/99	Well 3096 6/8/99	Well 3097 6/8/99	Well 3098 6/8/99	Well 3099 6/8/99	Well 3100 6/8/99	Well 3101 6/8/99	Well 3102 6/8/99	Well 3103 6/8/99	Well 3104 6/8/99	Well 3105 6/8/99	Well 3106 6/8/99	Well 3107 6/8/99	Well 3108 6/8/99	Well 3109 6/8/99	Well 3110 6/8/99	Well 3111 6/8/99	Well 3112 6/8/99	Well 3113 6/8/99	Well 3114 6/8/99	Well 3115 6/8/99	Well 3116 6/8/99	Well 3117 6/8/99	Well 3118 6/8/99	Well 3119 6/8/99	Well 3120 6/8/99	Well 3121 6/8/99	Well 3122 6/8/99	Well 3123 6/8/99	Well 3124 6/8/99	Well 3125 6/8/99	Well 3126 6/8/99	Well 3127 6/8/99	Well 3128 6/8/99	Well 3129 6/8/99	Well 3130 6/8/99	Well 3131 6/8/99	Well 3132 6/8/99	Well 3133 6/8/99	Well 3134 6/8/99	Well 3135 6/8/99	Well 3136 6/8/99	Well 3137 6/8/99	Well 3138 6/8/99	Well 3139 6/8/99	Well 3140 6/8/99	Well 3141 6/8/99	Well 3142 6/8/99	Well 3143 6/8/99	Well 3144 6/8/99	Well 3145 6/8/99	Well 3146 6/8/99	Well 3147 6/8/99	Well 3148 6/8/99	Well 3149 6/8/99	Well 3150 6/8/99	Well 3151 6/8/99	Well 3152 6/8/99	Well 3153 6/8/99	Well 3154 6/8/99	Well 3155 6/8/99	Well 3156 6/8/99	Well 3157 6/8/99	Well 3158 6/8/99	Well 3159 6/8/99	Well 3160 6/8/99	Well 3161 6/8/99	Well 3162 6/8/99	Well 3163 6/8/99	Well 3164 6/8/99	Well 3165 6/8/99	Well 3166 6/8/99	Well 3167 6/8/99	Well 3168 6/8/99	Well 3169 6/8/99	Well 3170 6/8/99	Well 3171 6/8/99	Well 3172 6/8/99	Well 3173 6/8/99	Well 3174 6/8/99	Well 3175 6/8/99	Well 3176 6/8/99	Well 3177 6/8/99	Well 3178 6/8/99	Well 3179 6/8/99	Well 3180 6/8/99	Well 3181 6/8/99	Well 3182 6/8/99	Well 3183 6/8/99	Well 3184 6/8/99	Well 3185 6/8/99	Well 3186 6/8/99	Well 3187 6/8/99	Well 3188 6/8/99	Well 3189 6/8/99	Well 3190 6/8/99	Well 3191 6/8/99	Well 3192 6/8/99	Well 3193 6/8/99	Well 3194 6/8/99	Well 3195 6/8/99	Well 3196 6/8/99	Well 3197 6/8/99	Well 3198 6/8/99	Well 3199 6/8/99	Well 3200 6/8/99	Well 3201 6/8/99	Well 3202 6/8/99	Well 3203 6/8/99	Well 3204 6/8/99	Well 3205 6/8/99	Well 3206 6/8/99	Well 3207 6/8/99	Well 3208 6/8/99	Well 3209 6/8/99	Well 3210 6/8/99	Well 3211 6/8/99	Well 3212 6/8/99	Well 3213 6/8/99	Well 3214 6/8/99	Well 3215 6/8/99	Well 3216 6/8/99	Well 3217 6/8/99	Well 3218 6/8/99	Well 3219 6/8/99	Well 3220 6/8/99	Well 3221 6/8/99	Well 3222 6/8/99	Well 3223 6/8/99	Well 3224 6/8/99	Well 3225 6/8/99	Well 3226 6/8/99	Well 3227 6/8/99	Well 3228 6/8/99	Well 3229 6/8/99	Well 3230 6/8/99	Well 3231 6/8/99	Well 3232 6/8/99	Well 3233 6/8/99	Well 3234 6/8/99	Well 3235 6/8/99	Well 3236 6/8/99	Well 3237 6/8/99	Well 3238 6/8/99	Well 3239 6/8/99	Well 3240 6/8/99	Well 3241 6/8/99	Well 3242 6/8/99	Well 3243 6/8/99	Well 3244 6/8/99	Well 3245 6/8/99	Well 3246 6/8/99	Well 3247 6/8/99	Well 3248 6/8/99	Well 3249 6/8/99	Well 3250 6/8/99	Well 3251 6/8/99	Well 3252 6/8/99	Well 3253 6/8/99	Well 3254 6/8/99	Well 3255 6/8/99	Well 3256 6/8/99	Well 3257 6/8/99	Well 3258 6/8/99	Well 3259 6/8/99	Well 3260 6/8/99	Well 3261 6/8/99	Well 3262 6/8/99	Well 3263 6/8/99	Well 3264 6/8/99	Well 3265 6/8/99	Well 3266 6/8/99	Well 3267 6/8/99	Well 3268 6/8/99	Well 3269 6/8/99	Well 3270 6/8/99	Well 3271 6/8/99	Well 3272 6/8/99	Well 3273 6/8/99	Well 3274 6/8/99	Well 3275 6/8/99	Well 3276 6/8/99	Well 3277 6/8/99	Well 3278 6/8/99	Well 3279 6/8/99	Well 3280 6/8/99	Well 3281 6/8/99	Well 3282 6/8/99	Well 3283 6/8/99	Well 3284 6/8/99	Well 3285 6/8/99	Well 3286 6/8/99	Well 3287 6/8/99	Well 3288 6/8/99	Well 3289 6/8/99	Well 3290 6/8/99	Well 3291 6/8/99	Well 3292 6/8/99	Well 3293 6/8/99	Well 3294 6/8/99	Well 3295 6/8/99	Well 3296 6/8/99	Well 3297 6/8/99	Well 3298 6/8/99	Well 3299 6/8/99	Well 3300 6/8/99	Well 3301 6/8/99	Well 3302 6/8/99	Well 3303 6/8/99	Well 3304 6/8/99	Well 3305 6/8/99	Well 3306 6/8/99	Well 3307 6/8/99	Well 3308 6/8/99	Well 3309 6/8/99	Well 3310 6/8/99	Well 3311 6/8/99	Well 3312 6/8/99	Well 3313 6/8/99	Well 3314 6/8/99	Well 3315 6/8/99	Well 3316 6/8/99	Well 3317 6/8/99	Well 3318 6/8/99	Well 3319 6/8/99	Well 3320 6/8/99	Well 3321 6/8/99	Well 3322 6/8/99	Well 3323 6/8/99	Well 3324 6/8/99	Well 3325 6/8/99	Well 3326 6/8/99	Well 3327 6/8/99	Well 3328 6/8/99	Well 3329 6/8/99	Well 3330 6/8/99	Well 3331 6/8/99	Well 3332 6/8/99	Well 3333 6/8/99	Well 3334 6/8/99	Well 3335 6/8/99	Well 3336 6/8/99	Well 3337 6/8/99	Well 3338 6/8/99	Well 3339 6/8/99	Well 3340 6/8/99	Well 3341 6/8/99	Well 3342 6/8/99	Well 3343 6/8/99	Well 3344 6/8/99	Well 3345 6/8/99	Well 3346 6/8/99	Well 3347 6/8/99	Well 3348 6/8/99	Well 3349 6/8/99	Well 3350 6/8/99	Well 3351 6/8/99	Well 3352 6/8/99	Well 3353 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3412 6/8/99	Well 3413 6/8/99	Well 3414 6/8/99	Well 3415 6/8/99	Well 3416 6/8/99	Well 3417 6/8/99	Well 3418 6/8/99	Well 3419 6/8/99	Well 3420 6/8/99	Well 3421 6/8/99	Well 3422 6/8/99	Well 3423 6/8/99	Well 3424 6/8/99	Well 3425 6/8/99	Well 3426 6/8/99	Well 3427 6/8/99	Well 3428 6/8/99	Well 3429 6/8/99	Well 3430 6/8/99	Well 3431 6/8/99	Well 3432 6/8/99	Well 3433 6/8/99	Well 3434 6/8/99	Well 3435 6/8/99	Well 3436 6/8/99	Well 3437 6/8/99	Well 3438 6/8/99	Well 3439 6/8/99	Well 3440 6/8/99	Well 3441 6/8/99	Well 3442 6/8/99	Well 3443 6/8/99	Well 3444 6/8/99	Well 3445 6/8/99	Well 3446 6/8/99	Well 3447 6/8/99	Well 3448 6/8/99	Well 3449 6/8/99	Well 3450 6/8/99	Well 3451 6/8/99	Well 3452 6/8/99	Well 3453 6/8/99	Well 3454 6/8/99	Well 3455 6/8/99	Well 3456 6/8/99	Well 3457 6/8/99	Well 3458 6/8/99	Well 3459 6/8/99	Well 3460 6/8/99	Well 3461 6/8/99	Well 3462 6/8/99	Well 3463 6/8/99	Well 3464 6/8/99	Well 3465 6/8/99	Well 3466 6/8/99	Well 3467 6/8/99	Well 3468 6/8/99	Well 3469 6/8/99	Well 3470 6/8/99	Well 3471 6/8/99	Well 3472 6/8/99	Well 3473 6/8/99	Well 3474 6/8/99	Well 3475 6/8/99	Well 3476 6/8/99	Well 3477 6/8/99	Well 3478 6/8/99	Well 3479 6/8/99	Well 3480 6/8/99	Well 3481 6/8/99	Well 3482 6/8/99	Well 3483 6/8/99	Well 3484 6/8/99	Well 3485 6/8/99	Well 3486 6/8/99	Well 3487 6/8/99	Well 3488 6/8/99	Well 3489 6/8/99	Well 3490 6/8/99	Well 3491 6/8/99	Well 3492 6/8/99	Well 3493 6/8/99	Well 3494 6/8/99	Well 3495 6/8/99	Well 3496 6/8/99	Well 3497 6/8/99	Well 3498 6/8/99	Well 3499 6
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FIGURE 1
URANIUM CONCENTRATION OF AWWT EXPANSION EFFLUENT*
SEPTEMBER 1999



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

NOTE: System was down from September 20 to September 23 in order to facilitate an upgrade to the DCS and to regenerate a treatment vessel. No samples were collected during this time period. Re-injection did not take place from September 23 to September 28 to document the uranium concentration of the treated effluent prior to resuming injection operations.

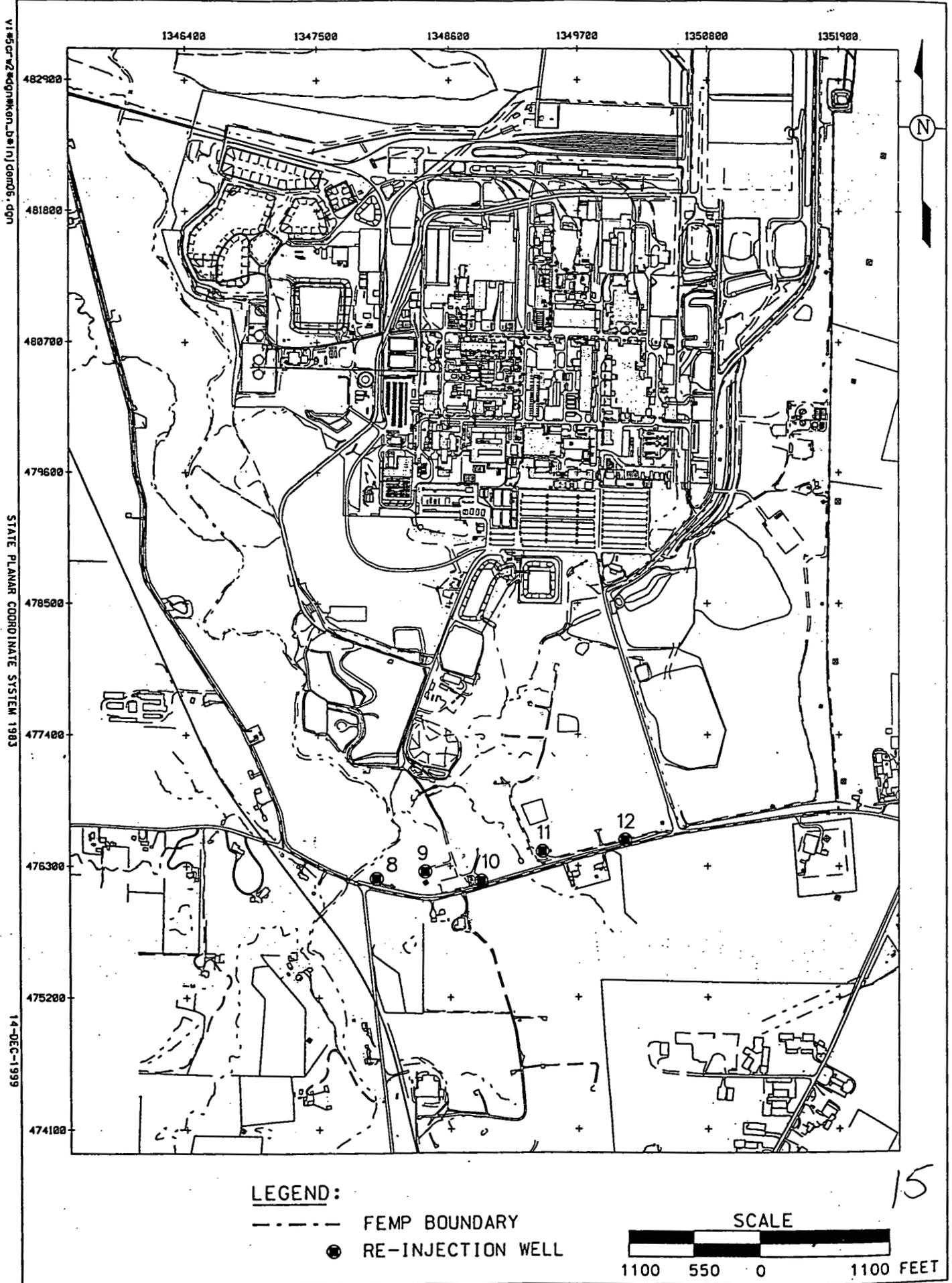
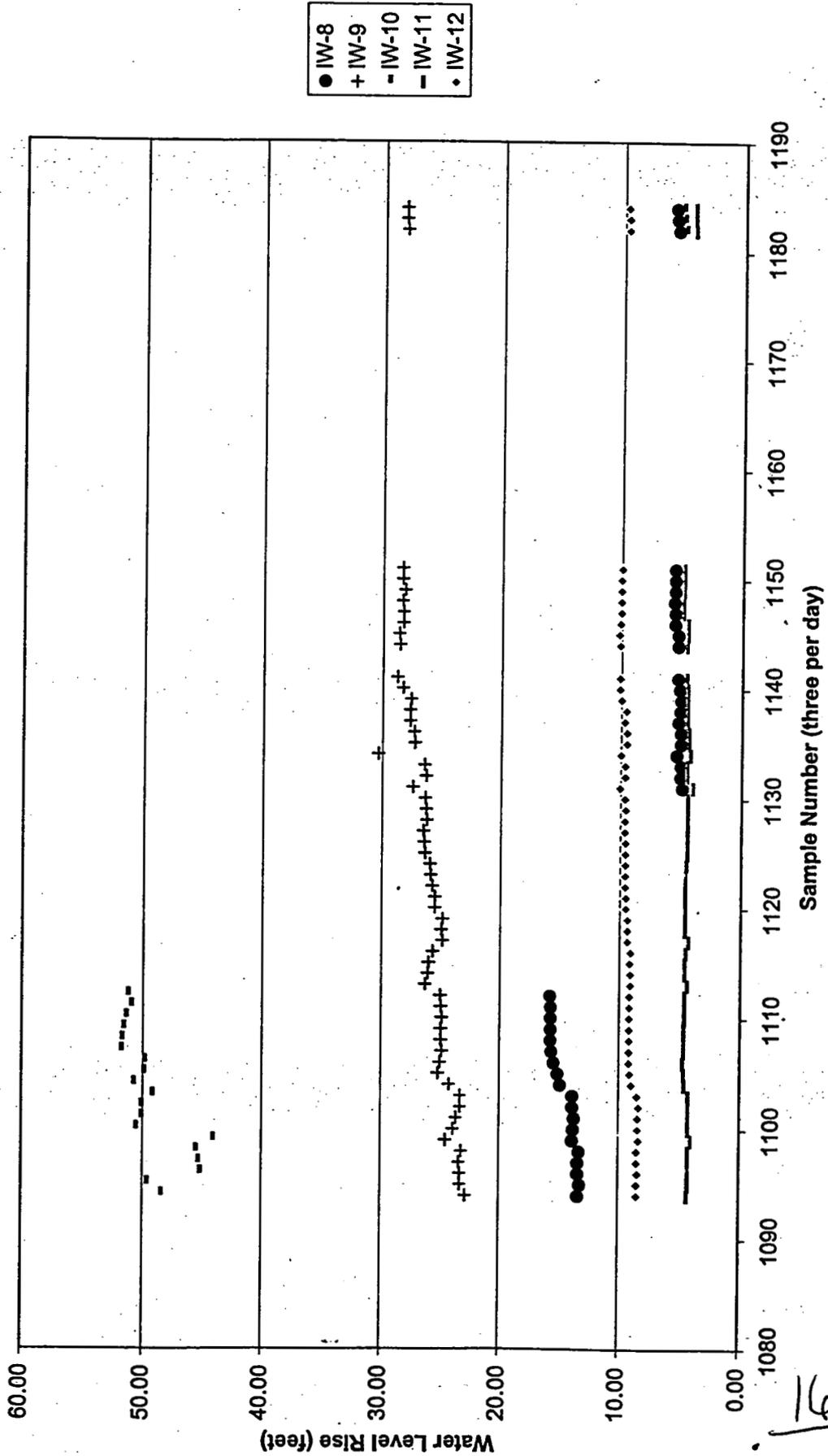


FIGURE 2. LOCATION OF RE-INJECTION WELLS

Figure 3
 Re-Injection Wells, Water Level Rise
 First Shift September 1, 1999 to October 1, 1999



16