

**MONTHLY OPERATING REPORT  
RE-INJECTION DEMONSTRATION  
FEBRUARY 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 February 1999. It covers operation of the Re-Injection Demonstration from February 1, 1999 through March 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. In past monthly operating reports it has been stated that contracted for schedules with the off-site labs for reporting analytical results were not being met and that this affected FEMP reporting of the data. The following is an explanation and update on the laboratory situation.

In the fall of 1998 the analytical processing capacity of the radiological lab, which was conducting the injectate analyses, was reached. The negotiated turnaround time of 30 days for sample results was not being met. In some instances it was taking up to 90 days to get results and the lab was offering no guarantee that the situation would improve in the short term. Frustrated with performance of the lab, a temporary task order was issued with a different lab to continue radiological analyses through the remainder of 1998. The FEMP will only use off-site laboratories that meet FEMP quality standards. Unfortunately, capacity at the other radiological labs which met FEMP quality standards was also limited, so a maximum 60 day turnaround time for the injectate samples had to be accepted. Delays in the signing of a new analytical contract for calendar year 1999 forced the project to continue to use the temporary task order in the first quarter of 1999. A new contract for calendar year 1999 was signed in March 1999, which once again has a negotiated 30 day turnaround time for sampling results. It is expected that reporting of future radiological results will become more timely as the project begins to utilize this new contract.

The January report provided partial preliminary results for injectate samples collected in January. Radiological results were not provided. Complete preliminary results for the injectate sample collected in January, which include the radiological results, are provided in Table 1 of this report. A review of radiological concentrations measured in the sample collected in January indicates that the concentrations are below their respective FRLs.

Partial preliminary results from the injectate sample collected in February are provided in Table 2. All but the total uranium result are provided. Due to laboratory problems the total uranium sample is being re-analyzed. A review of the preliminary data from February indicates that all of the constituent concentrations are below their respective FRLs. The total uranium result for the February sample will be provided in the March report.

#### 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 3 through 7.

Figure 2 illustrates the water level rise in each of the five re-injection wells from February 1, 1999 through March 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. Two planned power outages shut down the injection wells in February. The first was from February 6 to February 8 (sample number 473 to 479), and the second was on February 27 (sample number 537 to 539). In addition to the two power outages, Injection Well 8 was shut down on February 26, 1999 for maintenance to address plugging. The well remained down for the remainder of the month.

#### WELL MAINTENANCE AND REHABILITATION

On February 26, 1999, Re-Injection Well 8 was shut down for rehabilitation. This is the second time that Re-Injection Well 8 has been rehabilitated to address plugging. The first rehabilitation took place in late October after approximately two months of operation. The first rehabilitation was very successful. Following completion of the first rehabilitation, the well remained operational for approximately four months. The well was rehabilitated using the same procedure that was used in October. Rehabilitation was completed in March. Details of the procedure will be reported in the March Operation Report.

#### 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 will take place in March 1999. 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 January 27, 1999

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>		mg/L			
Nitrate	0.47	11.0		MP	B
<b>Inorganics</b>		mg/L			
Antimony	0.0031 B	0.006		N	A
Arsenic	U	0.05	0.0029	N	A
Barium	0.0511	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>d</sup>	0.0007	MP	R
Cobalt	U	0.17	0.001	N	R
Lead	U	0.015	0.0015	N	A
Manganese	0.00087 B	0.9		N	B
Mercury	U	0.002	0.0001	MP	A
Nickel	U	0.1	0.001	N	A
Selenium	U	0.05	0.0031	N	A
Silver	U	0.05	0.0001	N	A
Vanadium	U	0.038	0.0008	N	R
Zinc	U	0.021	0.0027	N	B
<b>Radionuclides</b>		pCi/L			
Neptunium-237	U	1.0	0.0461	MP	R*
Radium-226	0.569	20.0		N	A
Strontium-90	U	8.0	0.273	MP	A
Thorium-228	U	4.0	0.176	N	R*
Thorium-232	U	1.2	0.0725	N	R*
Total Uranium	2.53	μg/L 20.0		MP	A
<b>Organics</b>		μg/L			
Bis(2-ethylhexyl)phthalate	U	6.0	10	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

<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. B = Lab qualifier. 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

<sup>c</sup>From Table 9-4 in OU5 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 2**  
**ANALYSIS OF INJECTATE PRELIMINARY RESULTS**  
Sample Collected February 17, 1999

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>		mg/L			
Nitrate	0.750 J	11.0		MP	B
<b>Inorganics</b>		mg/L			
Antimony	0.0002 B	0.006		N	A
Arsenic	0.0024 B	0.05		N	A
Barium	0.0609	2.0		N	A
Beryllium	0.00001 B	0.004		N	A
Cadmium	0.00019 B	0.014		N	B
Total Chromium	0.00074 B	0.022 <sup>d</sup>		MP	R
Cobalt	0.00029 B	0.17		N	R
Lead	0.00076 B	0.015		N	A
Manganese	.293	0.9		N	B
Mercury	U	0.002	0.00012	MP	A
Nickel	0.0022 B	0.1		N	A
Selenium	U	0.05	0.0013	N	A
Silver	U	0.05	0.001	N	A
Vanadium	U	0.038	0.0022	N	R
Zinc	.0083 BE	0.021		N	B
<b>Radionuclides</b>		pCi/L			
Neptunium-237	U	1.0	0.0159	MP	R*
Radium-226	0.335	20.0		N	A
Strontium-90	U	8.0	0.362	MP	A
Thorium-228	U	4.0	0.124	N	R*
Thorium-232	U	1.2	0.0237	N	R*
		µg/L			
Total Uranium		20.0		MP	A
<b>Organics</b>		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	1	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. 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.

E - Estimated because of suspected matrix interference as demonstrated by non-compliant serial dilution data for associated sample.

J = Lab qualifier, means data is estimated.

U = Nondetect

<sup>c</sup>From Table 9-4 in OU5 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 22107 (IW-8)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 1999

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> = 671.10  
 Hours not injecting<sup>b</sup> = 72  
 Hours injecting<sup>c</sup> = 599.10  
 Operational percent<sup>d</sup> = 89.3

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
9/98	8.16	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

<sup>a</sup>First operational shift reading on 02/01/99 to first operational shift reading on 03/01/99

<sup>b</sup>Downtime. System was off due to a planned power-outage on site. Well was also down for maintenance to address plugging of the well screen.

<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)

TABLE 4

RE-INJECTION WELL 22108 (IW-9)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 1999

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> = 674.03  
Hours not injecting<sup>b</sup> = 26.42  
Hours injecting<sup>c</sup> = 647.61  
Operational percent<sup>d</sup> = 96.1

Target Injection Rate = 150 gpm<sup>g</sup>

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
01/99	4.33	181
02/99	6.07	156 <sup>g</sup>

<sup>a</sup>First operational shift reading on 02/01/99 to first operational shift reading on 03/01/99

<sup>b</sup>Downtime. System was off due to a planned power outage on site.

<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. Target Injection rate off smaller downcomer is 150 gpm.



TABLE 5

**RE-INJECTION WELL 22109 (IW-10)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 1999**

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> = 673.97

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 26.38

Hours injecting<sup>c</sup> = 647.59

Operational percent<sup>d</sup> = 96.1

**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
01/99	5.48	229
02/99	8.09	208

<sup>a</sup>First operational shift reading on 02/01/99 to first operational shift reading on 03/01/99

<sup>b</sup>Downtime. System was off due to a planned power outage on site.

<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)

TABLE 6

RE-INJECTION WELL 22240 (IW-11)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 1999

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> = 671.98  
Hours not injecting<sup>b</sup> = 25.82  
Hours injecting<sup>c</sup> = 646.16  
Operational percent<sup>d</sup> = 96.2

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
01/99	5.53	230
02/99	8.06	208

<sup>a</sup>First operational shift reading on 02/01/99 to first operational shift reading on 03/01/99

<sup>b</sup>Downtime. System was off due to a planned power outage on site.

<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)

2221

TABLE 7

**RE-INJECTION WELL 22111 (IW-12)  
OPERATIONAL SUMMARY SHEET  
FEBRUARY 1999**

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> = 671.90  
 Hours not injecting<sup>b</sup> = 25.85  
 Hours injecting<sup>c</sup> = 646.05  
 Operational percent<sup>d</sup> = 96.2

Target Injection Rate = 200 gpm

Monthly Measurements		
Month	Million Gallons Injected <sup>e</sup>	Average Operating Injection Rate (gpm) <sup>f</sup>
9/98	8.12	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

<sup>a</sup>First operational shift reading on 02/01/99 to first operational shift reading on 03/01/99

<sup>b</sup>Downtime. System was off due to a planned power outage on site.

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

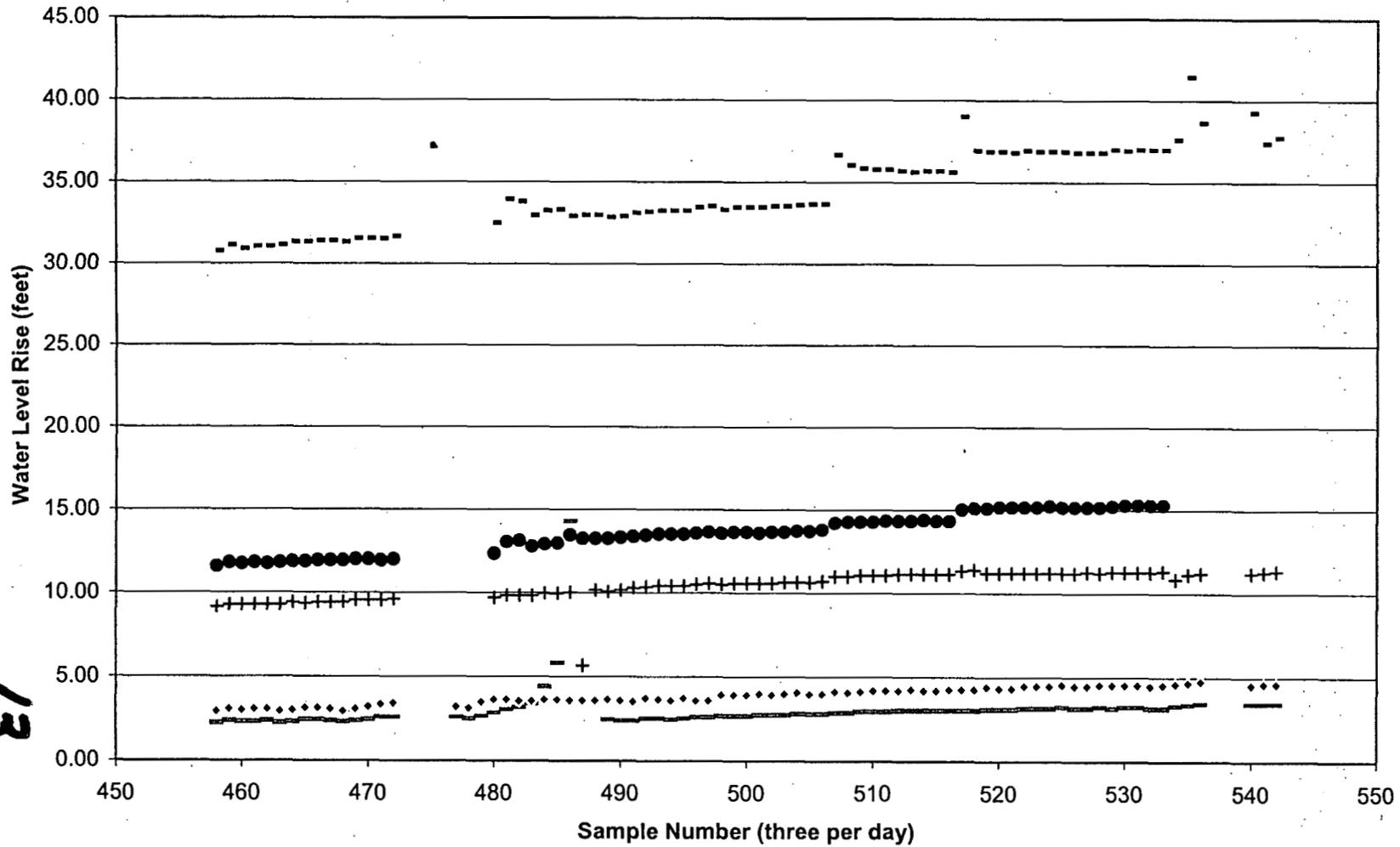
<sup>d</sup>(Hours injecting/Hours in reporting period) x 100

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

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



**Figure 2**  
**Re-Injection Wells, Water Level Rise**  
**First Shift Feb. 01, 1999 to First Shift Mar. 01, 1999**



- IW-8
- + IW-9
- IW-10
- IW-11
- IW-12

13

2221