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IEMP MID-YEAR DATA SUMMARY REPORT FOR 2002

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO



NOVEMBER 2002

U.S. DEPARTMENT OF ENERGY

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LIST OF ACRONYMS

AMS	air monitoring station
AMSL	above mean sea level
AWWT	advanced waste water treatment facility
BTV	benchmark toxicity value
DOE	U.S. Department of Energy
EARP	Enhanced Anaerobic Reductive Precipitation
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FFCA	Federal Facilities Compliance Agreement
FRL	final remediation level
ft	feet
GMA	great miami aquifer
gpm	gallons per minute
HTW	Horizontal Till Well
IEMP	Integrated Environmental Monitoring Plan
IRZ	In situ Reactive Zone
kg/d	kilograms per day
lbs	pounds
LCS	leachate collection system
LDS	leak detection system
M gal	million gallons
mg/L	milligrams per liter
mrem	millirems
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
OAB	Old Administrative Building
OEPA	Ohio Environmental Protection Agency
OSDF	on-site disposal facility
P&A	plugged and abandoned
pCi/L	picoCuries per liter
pCi/m ³	picoCuries per cubic meter
PF	Parshall Flume
PSP	project-specific plan
TLD	thermoluminescent dosimeter
µg/L	micrograms per liter
µg/m ³	micrograms per cubic meter
WPRAP	Waste Pits Remedial Action Project

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1.0 INTRODUCTION

This Integrated Environmental Monitoring Plan (IEMP) Mid-Year Data Summary for 2002 provides the environmental monitoring results collected and monitoring activities performed from January 1 through June 30, 2002. This is the first mid-year data summary prepared in accordance with an agreement between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Ohio Environmental Protection Agency (OEPA) in lieu of IEMP quarterly data summaries. This agreement is documented in the June 25 and July 1, 2002 weekly conference call notes and the First IEMP Quarterly Data Summary for 2002 (Section 1)(DOE 2002). The IEMP data continue to be provided to the EPA and OEPA via the IEMP Data Information Site (i.e., the "Extranet Site"), at <http://iempdata.fernald.gov> as data become available. In the transition from a quarterly to semi-annual reporting frequency, a portion of the IEMP data previously discussed in the First IEMP Quarterly Data Summary for 2002 (DOE 2002) is also included in this mid-year data summary. This approach provides a prompt transition to the new reporting structure and frequency which encompasses data collected and activities performed during the first half of the year.

As with the reporting approach in previous IEMP quarterly data summaries, the goal of the IEMP mid-year data summaries is to focus on notable events and results related to the data covered through a concise text discussion and presentation of data in graphical and tabular formats. Comprehensive full-year reporting, including all tables and graphs, will still be provided through the annual site environmental report. Table 1-1 identifies the IEMP data that are covered for each IEMP program under this report.

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TABLE 1-1

DATA COVERED IN THE IEMP MID-YEAR SUMMARY AND/OR
AVAILABLE ON THE IEMP DATA INFORMATION SITE

PROGRAMS	TIME PERIOD					
	First Quarter 2002			Second Quarter 2002		
	J A N	F E B	M A R	A P R	M A Y	J U N
<i>GROUNDWATER SAMPLING ACTIVITIES</i>						
Extraction/Re-injection Operational Data	◆	◆	◆	◆	◆	◆
South Plume Aquifer Conditions	-----◆-----			-----◆-----		
South Field Extraction Aquifer Conditions	-----◆-----			-----◆-----		
Waste Storage Area Aquifer Conditions	-----◆-----			-----◆-----		
Plant 6 Area Aquifer Conditions	NA ^{a,b}			-----◆-----		
Property Boundary Monitoring	◆-----			◆-----		
Private Well Monitoring	◆-----			◆-----		
Groundwater Elevations	◆-----			◆-----		
<i>OSDF SAMPLING ACTIVITIES</i>						
LCS and LDS Volumes	◆	◆	◆	◆	◆	◆
Cell 1, 2 & 3 GMA Wells/ HTW/ LCS/ LDS Analytical	-----◆-----			-----◆-----		
Cell 4 & 5 GMA Wells / HTW Analytical	◆	◆	◆	◆	◆	◆
<i>SURFACE WATER SAMPLING ACTIVITIES</i>						
NPDES	◆	◆	◆	◆	◆	◆
FFCA	◆	◆	◆	◆	◆	◆
IEMP Characterization	◆	◆	◆	◆	◆	◆
Turbidity Monitoring (for Sloan's Crayfish)	◆	◆	◆	◆	NA ^a	NA ^a
<i>AIR SAMPLING ACTIVITIES</i>						
Radiological Particulate (biweekly samples)	◆	◆	◆	◆	◆	◆
NESHAP Composite Analytical	-----◆-----			-----◆-----		
NESHAP Stack Analytical	-----◆-----			-----◆-----		
Environmental Radon	◆	◆	◆	◆	◆	◆
Silos Headspace Real Time Radon	◆	◆	◆	◆	◆	◆
Direct Radiation (TLD)	-----◆-----			-----◆-----		

◆ Data collected during this time period are covered in this mid-year summary. IEMP sampling that takes place during one scheduled event per quarter is identified with a marker (e.g., |-----◆-----) where the symbol is present in the month the samples were collected.

^aNA - not applicable.

^bPlant 6 area aquifer conditions sampling is conducted semi-annually.

2.0 GROUNDWATER MONITORING DATA

2.1 DATA COVERED

This IEMP mid-year data summary covers operational and analytical data that became available for posting to the IEMP Data Information Site during the first half of 2002. Specifically, data is discussed below or provided on the IEMP Data Information Site, including:

- Operational data collected from January 1, 2002 through June 30, 2002.
- Analytical data collected during the first half of 2002.
- Groundwater (Great Miami Aquifer) elevation data collected during the first half of 2002.

A review of aquifer restoration project activities during this reporting period was conducted to identify notable results and events listed below. Tables 2-1 through 2-5 provide an operational summary of the groundwater extraction well performance for the reporting period, as well as, a summary of all pumping efforts accomplished to date. Figures 2-1 and 2-2 provide updated uranium plume maps.

Data covered by this mid-year summary are available on the IEMP Data Information Site. Maps showing the locations of IEMP groundwater monitoring wells are also provided on the IEMP Data Information Site. All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Revision 2 (DOE 2001b).

2.2 NOTABLE RESULTS AND EVENTS

Notable results and events are those that impact, or could impact the scope of IEMP monitoring or remediation operations at the Fernald Environmental Management Project (FEMP). Notable results and events associated with IEMP groundwater monitoring data for the time period covered by this mid-year summary include:

- Waste Storage Area – Start-up of three new extraction-wells, installation of new monitoring wells, new uranium plume interpretation, and replacement of Monitoring Well 2027.
- South Field Area – The startup of a new extraction well, direct-push sampling to support the Phase-II design, the installation of new monitoring wells, updated uranium plume interpretation.
- Re-Injection along Willey Road – The replacement of two re-injection wells, and the installation of an additional re-injection well.

- Off-Property South Plume Area – Direct-push sampling conducted to update remedy progress. Uranium plume revised to reflect direct-push sampling results.
- IEMP Program Changes – Semi-annual sampling scheduled to begin in July, additional changes scheduled for January 1, 2003.
- Analysis of how uranium is sorbed and partitioned on Great Miami Aquifer matrix sediments – Aquifer matrix cores needed for the study were collected in June.
- In situ Reactive Zone (IRZ) Study – Aquifer sediment and groundwater samples needed to support a bench scale test were collected.
- Updated Uranium Plume Map – uranium concentration above groundwater final remediation level (FRL) in Plant-6 area. Further evidence for correlation of rising uranium concentrations and rising water levels.
- Miscellaneous - Plugging of the Old Administration Building (OAB) well.

Waste Storage Area

Three new extraction wells (Wells 32761, 33062, and 33063) began pumping in the Waste Storage Area on May 8, 2002 (see Figure 2-2) nearly 17 months ahead of the Operable Unit 5 Remedial Action Work Plan established start date of October 1, 2003. These three wells were installed to remediate a uranium plume in the Pilot Plant Drainage Ditch area, per the Design for Remediation of the Great Miami Aquifer in the Waste Storage and Plant 6 Areas (DOE 2001a). Table 2-5 presents operational information concerning the three new extraction wells for May and June of 2002. The uranium removal index for these three wells (pounds of uranium removed divided by millions of gallons pumped) is twice as high as the South Field Extraction wells (Table 2-1).

Nine new monitoring wells (63116, 83117, 23118, 63119, 83120, 63121, 63122, 83123, and 83124) were installed in the Pilot Plant Drainage Ditch Area to monitor the remediation of the uranium plume around the three new extraction wells (Figure 2-2). Installation of the new monitoring wells (Type-2, Type-6, and multilevel wells) was completed on January 17, 2002. Sampling from the first quarter of 2002 indicated the presence of uranium concentrations that were higher than previously recorded in the area by direct-push sampling. A revised uranium plume map for the Pilot Plant Drainage Ditch area was provided in the first quarter IEMP report for 2002. Subsequent to the map provided in the first quarter IEMP report for 2002, additional sampling conducted in the first half of 2002 indicate even higher uranium concentrations in some of the wells. The plume map has therefore been revised again to reflect the higher measured concentrations. The revised plume map is presented in Figures 2-1 and 2-2. The impact that these higher measured uranium concentrations have on modeled clean-up time predictions will be examined in the second half of 2002. Results are scheduled to be available in the first half of 2003.

Monitoring Well 2027 in the Waste Storage Area was replaced by Monitoring Well 2037 in March of 2002. Monitoring well 2027 was experiencing residual plugging. Monitoring Well 2037 is located approximately 500 feet downgradient from Monitoring Well 2027.

South Field Area

Table 2-2 provides an operational summary for the South Field. A new extraction well (Extraction Well 33061, Figure 2-2) began pumping in the South Field on May 7, 2002. As shown in Table 2-2 pumped groundwater from this well had an average uranium concentration of 73.4 µg/L. Monitoring Well 2397, located adjacent to Extraction Well 33061, had a uranium concentration of 329 µg/L during the reporting period. This resulted in a slight plume map adjustment in this area (see Figure 2-1). This well location is on Figure 2-2.

A report for the South Field Phase II Design was submitted to the EPA and OEPA on May 16, 2002. Three additional locations were sampled in the first half of 2002 (13241, 13247, and 13248) using a direct-push tool to support the design report. These locations are on Figure 2-1.

A project-specific plan (PSP) for the installation of South Field Extraction System Phase II extraction, re-injection, and monitoring wells was submitted to the EPA and OEPA on June 10, 2002. Drilling for the additional wells began the first week of June after consultation with the EPA and OEPA during the weekly teleconferences. The drilling includes four new extraction wells, one re-injection well, 12 Type-2 groundwater monitoring wells, and 10 Type-6 groundwater monitoring wells. In addition, the PSP specified the installation of four Type-8 (multilevel) groundwater-monitoring wells using a direct-push installation method.

Re-Injection along Willey Road

Table 2-4 provides an operational summary for Re-Injection along Willey Road. A project-specific plan for the Installation of Replacement Re-Injection Wells along the Southern Property Boundary was submitted to the EPA and OEPA on March 14, 2002. Rotasonic drilling for the cores needed to design the well screens was conducted in April. Installation of Wells 8a (33253) and 9a (33254) was completed in June and installation of Well 10a (33255) was nearly completed by the end of June. Construction of new infrastructure is underway, which shall allow these wells to begin operating in late 2002.

Off-Property South Plume Area

Table 2-3 provides an operational summary for the South Plume Module. Twenty locations in the off-property portion of the South Plume were sampled using a direct-push sampling tool in the first half

of 2002. The controlling document for this work, project-specific plan for Conducting Direct-Push Sampling in the South Plume was submitted to the EPA and OEPA on January 4, 2002. Results of this sampling effort were used to revise the total uranium plume map south of Willey Road, as shown in Figures 2-1 and 2-2.

The uranium concentration immediately north and northwest of Extraction Wells 32308 and 32309 was found to be below 100 µg/L, Figure 2-1. The groundwater cleanup in the area immediately northeast of these extraction wells does not appear to be progressing as fast as the area immediately north and northwest.

A small lobe of contamination was discovered just south of Willey Road, downgradient of some of the highest on-property uranium concentrations. The plume is identified by Direct-Push Location 13269, Figure 2-1. The extent of this small lobe has been identified, subsequent to this reporting period. A design report detailing the direct-push data is scheduled for issue in early 2003.

Direct-push sampling indicated that uranium concentrations in the area immediately downgradient of Re-Injection Well 22107 are below 30 micrograms per liter (µg/L). The plume map was; therefore, modified to reflect these lower concentrations.

IEMP Program Changes

Discussions between the EPA, OEPA, DOE, and Fluor Fernald regarding groundwater monitoring changes were initiated in April of 2002. As a result of the discussions, groundwater sampling that was previously conducted quarterly will now be conducted semiannually, beginning in July 2002. Additional proposed changes are detailed in Revision 3 of the IEMP, to be implemented in January 2003 upon concurrence by EPA and OEPA.

Analysis of How Uranium is Sorbed and Partitioned on Great Miami Aquifer Matrix Sediments

A PSP for this study was submitted to the EPA and OEPA in April of 2002. Comments on the PSP were received from the EPA on May 14, 2002, and from the OEPA on May 22, 2002. As of June 30, 2002, comment resolution was in progress. Cores of aquifer material were collected for the study in June. Information learned from this study will help the site refine Kd measurements.

IRZ Technology Study

The U.S. Department of Energy National Environmental Technology Laboratory is sponsoring a bench-scale test of in situ uranium precipitation from groundwater for the Fernald Site. This test is being

conducted by ARCADIS G&M Inc. and is intended to demonstrate the feasibility of using Enhanced Anaerobic Reductive Precipitation (EARP) Technology to effectively precipitate radionuclides and metals in situ. This technology has been used successfully at other sites. Pending results of the bench scale study, a recommendation could be presented to conduct a field scale demonstration of the technology at the FEMP.

During the first half of 2002, samples of aquifer material, as well as, water samples were supplied to ARCADIS G&M Inc. for the bench scale study. Results are expected in the first half of 2003.

Updated Uranium Plume Map

Uranium concentration data collected through the first half of 2002 was used to update the maximum total uranium concentration map from the fourth quarter of 2001. Figure 2-1 presents direct-push data that has been collected through June of 2002. Figure 2-2 presents the highest uranium concentration for each monitoring well that was sampled during the reporting period, and the average pumped water uranium concentration measured at each operating extraction well during the first half of 2002. Unfiltered sample results are normally posted for monitoring wells, but when the sample turbidity is high, filtered results are used. At a minimum, all direct-push samples are filtered through a 5-micron filter.

In addition to the plume revisions noted in the previous sections, uranium concentrations at several wells increased in the first half of 2002. These increases are incorporated into Figures 2-1 and 2-2. Two of the locations (Monitoring Well 2389 located in the Plant-6 Area and Monitoring Well 2045 located south of the Southern Waste Unit [SWU] Area) warrant additional discussion. Uranium concentrations measured at Wells 2389 and 2045 returned to levels above the groundwater FRL for uranium in the first half of 2002. Figures 2-3 and 2-4 are uranium concentration versus water level graphs for wells 2389 and 2045, respectively. The graphs indicate that rising water levels might be the cause for the increase in uranium concentrations.

This observation of increasing water levels and the corresponding increase in dissolved uranium concentrations has been discussed before, most recently in the Technical Memorandum for the On-Site Disposal Facility Cells 1, 2, and 3 Baseline Groundwater Conditions and associated teleconferences with EPA and OEPA. It will remain an issue throughout the aquifer remedy. As discussed during the October 15, 2002 teleconference with EPA and OEPA, the phenomenon of increasing aquifer water levels correlating with increasing groundwater uranium concentrations will be further evaluated in the annual site environmental reports. The annual evaluation will consist of providing updated graphs showing groundwater uranium concentration with corresponding water levels for all IEMP Type 2 wells and statistical analysis of water levels and uranium concentrations for a select group of Type 2 wells.

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Miscellaneous

The FEMP Old OAB Well was plugged and abandoned (P&A). This well was installed in 1950 in support of the initial site administration building north of the production area. P&A activities began in March and ended on June 11, 2002. Details concerning the P&A were provided in the weekly reports that are discussed during the weekly site teleconferences with the EPA and OEPA.

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TABLE 2-1

AQUIFER RESTORATION SYSTEM OPERATIONAL SUMMARY SHEET

	Reporting Period					
	January 2002 through June 2002			August 1993 through June 2002		
	Gallons Pumped/Re-Injected (M gal)	Total Uranium Removed/Re-Injected (lbs)	Uranium Removal Index (lbs/M gal)	Gallons Pumped/Re-injected (M gal)	Total Uranium Removed/Re-Injected (lbs)	Uranium Removal Index (lbs/M gal)
South Field (Phase I) Extraction Module	506.875	330.92	0.65	3,614.221	2,266.75	0.63
Waste Storage Area Module ^b	54.498	71.04	1.30	54.498	71.04	1.30
South Plume Module	462.400	117.04	0.25	6,880.447	1,446.52	0.21
Re-Injection Module	139.902	7.29	NA ^a	1,146.330	49.90	NA ^a
Aquifer Restoration Systems Totals						
(Extraction Wells)	1,023.773	519.00	0.51	10,549.17	3,784.31	0.36
(Re-Injection Wells)	<u>139.902</u>	<u>7.29</u>	<u>NA^a</u>	<u>1,146.33</u>	<u>49.90</u>	<u>NA^a</u>
(net)	883.871	511.71	NA ^a	9,402.84	3,734.41	NA ^a

^aNA = not applicable

^bWells did not begin pumping until May 2002

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TABLE 2-2

**SOUTH FIELD (PHASE I) EXTRACTION MODULE OPERATIONAL SUMMARY SHEET
(JANUARY THROUGH JUNE 2002)**

Extraction Well	31565 ^{a,b} (EW-13)	31564 ^{b,c} (EW-14)	31566 ^{b,d} (EW-15)	31563 (EW-16)	31567 (EW-17)	31550 (EW-18)	31560 (EW-19)	31561 (EW-20)	31562 ^b (EW-21)	32276 (EW-22)	32447 ^{b,e} (EW-23)	32446 ^b (EW-24)	33061 ^f (EW-25)
Baseline Remedial Strategy Report Target Pumping Rates (gpm)													
	200	200	200	200	100 ^e	100	100	100	100 ^f	200	NA	NA	NA
Average Pumping Rates (gpm)													
January	NA	NA	NA	220	276	110	110	90	286	330	292	200	NA
February	NA	NA	NA	219	278	110	110	110	277	333	289	201	NA
March	NA	NA	NA	222	278	110	81 ^k	109	280	332	289	199	NA
April	NA	NA	NA	204	258	227	8 ^k	60	286	328	286	257	NA
May	NA	NA	NA	220	0 ^j	145	136	92	263	300	287	219	293
June	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>218</u>	<u>246</u>	<u>107</u>	<u>108</u>	<u>107</u>	<u>254</u>	<u>325</u>	<u>272</u>	<u>173</u>	<u>300</u>
Average	NA	NA	NA	217	223	135	92	95	274	325	286	208	297
Average Total Uranium Concentrations ^m (µg/L)													
January	NA	NA	10.6	22.3	26.4	43.1	50.1	52.3	84.2	120.4	155.4	69.0	NA
February	NA	NA	12.7	22.7	27.0	43.3	48.2	49.1	84.9	121.7	157.3	69.1	NA
March	NA	NA	NA ^l	22.1	28.2	49.8	50.4	46.4	82.6	117.2	147.9	69.6	NA
April	NA	NA	NA ^l	22.5	28.8	51.9	NA	44.8	79.7	116.5	138.6	67.9	NA
May	NA	NA	NA ^l	25.8	NA	58.8	54	48.1	84.4	122.2	141.7	75.3	78.1
June	<u>NA</u>	<u>NA</u>	<u>NA^l</u>	<u>26.3</u>	<u>34</u>	<u>59.5</u>	<u>54.2</u>	<u>48</u>	<u>94.6</u>	<u>123.0</u>	<u>143.9</u>	<u>72.3</u>	<u>68.6</u>
Average	NA	NA	11.7	23.6	28.9	51.1	51.4	48.1	85.1	120.2	147.5	70.5	73.4
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)													
January	NA	NA	NA	0.19	0.22	0.36	0.42	0.44	0.70	1.00	1.30	0.58	NA
February	NA	NA	NA	0.19	0.23	0.36	0.40	0.41	0.71	1.01	1.31	0.58	NA
March	NA	NA	NA	0.18	0.24	0.42	0.42	0.39	0.69	0.98	1.23	0.58	NA
April	NA	NA	NA	0.19	0.24	0.43	0.00	0.37	0.66	0.97	1.16	0.57	NA
May	NA	NA	NA	0.22	0.00	0.49	0.45	0.40	0.70	1.02	1.18	0.63	0.65
June	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>0.22</u>	<u>0.28</u>	<u>0.50</u>	<u>0.45</u>	<u>0.40</u>	<u>0.70</u>	<u>1.03</u>	<u>1.20</u>	<u>0.60</u>	<u>0.57</u>
Average	NA	NA	NA	0.20	0.24	0.43	0.43	0.40	0.71	1.00	1.23	0.59	0.61

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TABLE 2-2
(Continued)

	Average Module Pumping Rate (gpm)	Water Pumped by Module (M gal)	Total Uranium Concentration from Module ^h (Pp/L)
January	1,914	85,857	77.59
February	1,927	77,505	78.82
March	1,900	84,868	73.67
April	2,130	82,780	75.34
May	2,030	84,686	84.10
June	<u>2,121</u>	<u>91,179</u>	<u>79.50</u>
Average	2,004	Total 506,875	Average 78.17

^aThe well was removed from service on May 22, 2001.

^bNA = not applicable

^cThis well was removed from service on December 19, 2001.

^dThis well was removed from service on August 7, 1998.

^eTarget pumping rate was increased from 100 gpm to 250 gpm on August 8, 2000.

^fTarget pumping rate was increased from 200 gpm to 290 gpm on September 14, 2000.

^gTarget pumping rate was increased from 200 gpm to 300 gpm on April 19, 2001.

^hAverage is calculated from individual well total uranium concentrations and flow rates.

ⁱWell not operational until May 2002.

^jEW-17 underwent maintenance (re-habilitation) during May 2002.

^kEW-19 underwent maintenance during March and April 2002.

^lWells not sampled between March to June.

^mAveraged from weekly measurements

T O R A

TABLE 2-3
SOUTH PLUME MODULE OPERATIONAL SUMMARY SHEET
(JANUARY THROUGH JUNE 2002)

Extraction Well	3924 (RW-1)	3925 (RW-2)	3926 ^a (RW-3)	3927 (RW-4)	32308 (RW-6)	32309 ^a (RW-7)
Baseline Remedial Strategy Report Target Pumping Rates (gpm)						
	300	300	400	400	250	250
Average Pumping Rates (gpm)						
January	280	279	0 ^c	494	300	0 ^c
February	300	298	25 ^c	497	301	101
March	305	274	394	493	298	297
April	284	209	392	490	299	299
May	300	271	337	417	262	261
June	<u>302</u>	<u>248</u>	<u>386</u>	<u>481</u>	<u>234</u>	<u>230</u>
Average	295.17	263.17	255.67	478.67	282.33	198.00
Average Total Uranium Concentrations (µg/L)						
January	29.7	28.1	NA ^c	3.5	55.6	NA ^c
February	29.7	28.8	NA ^c	3.7	53.3	55.6
March	28	27.1	35.5	3.5	54	57.8
April	28	25.1	35.8	3.5	54.4	60.6
May	29.5	25.7	37.9	4.3	54.7	64.4
June	<u>26.1</u>	<u>25.2</u>	<u>37</u>	<u>3.6</u>	<u>53.4</u>	<u>60.6</u>
Average	28.5	26.7	36.6	3.7	54.2	59.8
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)						
January	0.25	0.23	NA ^c	0.03	0.46	NA ^c
February	0.25	0.24	NA ^c	0.03	0.44	0.46
March	0.23	0.23	0.30	0.03	0.45	0.48
April	0.23	0.21	0.30	0.03	0.45	0.51
May	0.25	0.21	0.32	0.04	0.46	0.54
June	<u>0.22</u>	<u>0.21</u>	<u>0.31</u>	<u>0.03</u>	<u>0.45</u>	<u>0.51</u>
Average	0.24	0.22	0.30	0.03	0.45	0.50
	Average Module Pumping Rate (gpm)		Water Pumped by Module (M gal)		Total Uranium Concentration From Module ^b (µg/L)	
January	1,353		60,418		25.93	
February	1,522		61,353		26.87	
March	2,064		91,671		31.52	
April	1,973		85,203		32.15	
May	1,848		82,521		32.98	
June	<u>1,881</u>		<u>81,234</u>		<u>30.05</u>	
	Average	1773.5	Total	462,400	Average	29.92

^aNA = not applicable

^bAverage is calculated from individual well total uranium concentrations and flow rates.

^cRW-3 was out of service in January and most of February for maintenance. RW-7 was out of service in January for maintenance.

TABLE 2-4

RE-INJECTION MODULE OPERATIONAL SUMMARY SHEET
(JANUARY THROUGH JUNE 2002)

Re-Injection Well	22107 (IW-8)	22108 (IW-9)	22109 (IW-10)	22240 (IW-11)	22111 (IW-12)
Baseline Remedial Strategy Report Target Re-Injection Rates (gpm)					
	200	200	200	200	200
Average Re-Injection Rates (gpm)					
January	0	137	187	186	184
February	0	128	190	190	188
March	0	0	196	197	151
April	0	0	190	193	192
May	0	0	166	166	168
June	<u>0</u>	<u>0</u>	<u>74</u>	<u>74</u>	<u>75</u>
Average	0	44.17	167.2	167.7	159.7
	Average Module Re-Injection Rate (gpm)		Water Re-Injected By Module (M gal)		Total Uranium Concentration To Module ^a (μ g/L)
January	694		31,062		5.39
February	696		27,802		4.89
March	543		24,257		6.57
April	115		24,826		8.50
May	100		22,325		6.25
June	<u>45</u>		<u>9,630</u>		<u>6.03</u>
	Average 365.5		Total 139,902		Average 6.25

^aAverage is calculated from the injectate treatment facility daily uranium concentrations and individual well injection rates.

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TABLE 2-5
WASTE STORAGE AREA MODULE OPERATIONAL SUMMARY SHEET
(JANUARY THROUGH JUNE 2002)

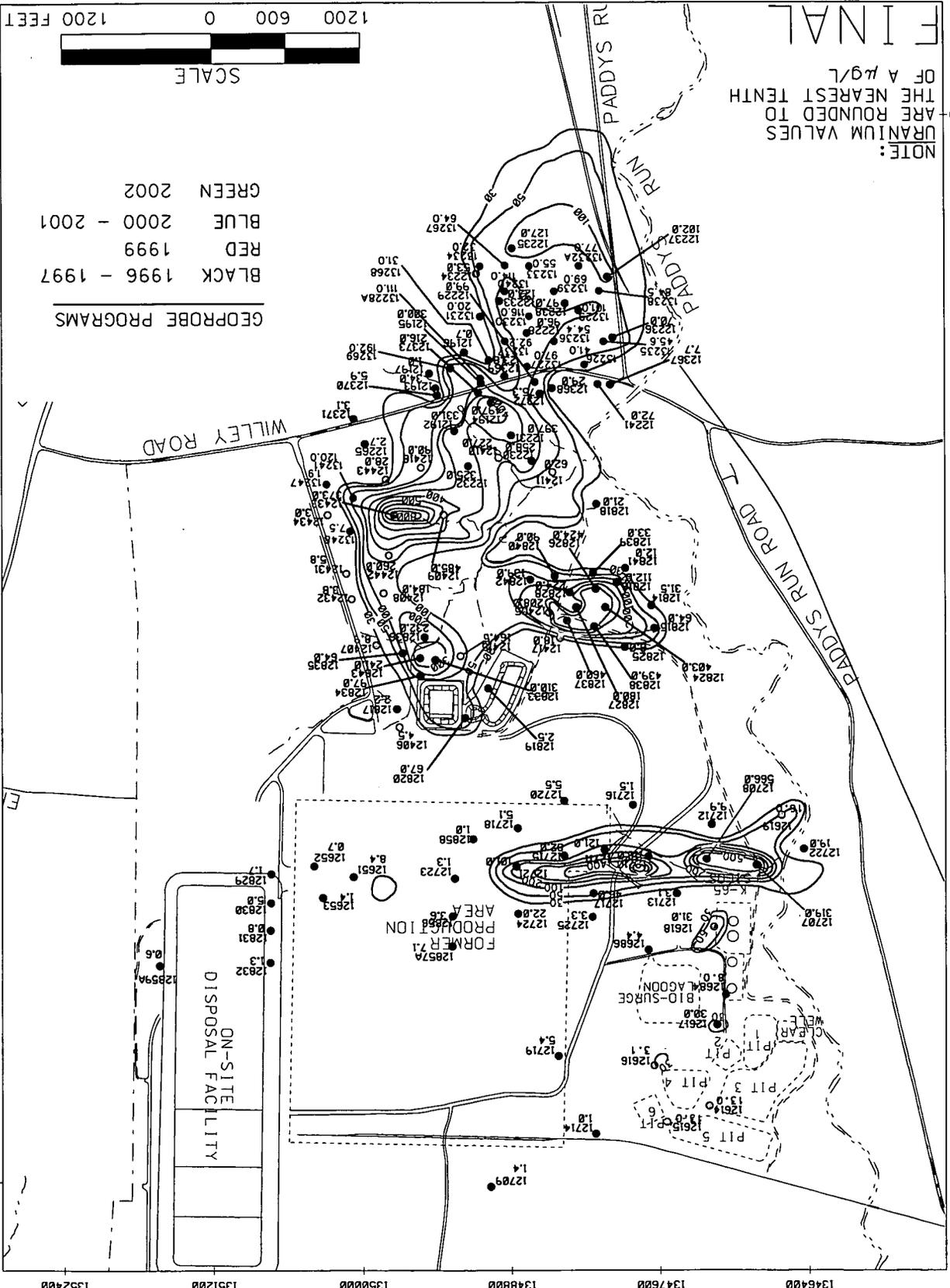
Extraction Well	32761 (EW-26) ^a	33062 (EW-27) ^a	33063 (EW-28) ^a
Baseline Remedial Strategy Report Target Pumping Rates			
	(gpm)		
	300	300	400
Average Pumping Rates			
	(gpm)		
January	NA	NA	NA
February	NA	NA	NA
March	NA	NA	NA
April	NA	NA	NA
May	175	233	376
June	<u>122</u>	<u>105</u>	<u>372</u>
Average	148.5	169	374
Average Total Uranium Concentrations			
	(µg/L)		
January	NA	NA	NA
February	NA	NA	NA
March	NA	NA	NA
April	NA	NA	NA
May	145.8	206.1	178.1
June	<u>136.4</u>	<u>188.5</u>	<u>170.4</u>
Average	141.1	197.3	174.25
Uranium Removal Index			
	(Pounds of Total Uranium Removed/Million Gallons Pumped)		
January	NA	NA	NA
February	NA	NA	NA
March	NA	NA	NA
April	NA	NA	NA
May	1.22	1.72	1.49
June	<u>1.14</u>	<u>1.57</u>	<u>1.42</u>
Average	1.18	1.65	1.46
	Average Module Pumping Rate	Water Pumped by Module (M gal)	Total Uranium Concentration From Module ^b (µg/L)
January	NA	NA	NA
February	NA	NA	NA
March	NA	NA	NA
April	NA	NA	NA
May	261	28.525	163.41
June	<u>200</u>	<u>25.973</u>	<u>147.85</u>
Average	260.5	Total 54.498	Average 155.63

^aWells not operational until May 2002.

^bAverage is calculated from individual well total uranium concentrations and flow rates.

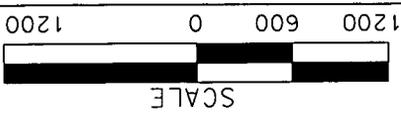
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MAXIMUM TOTAL URANIUM CONCENTRATION OF ALL DEPTHS SAMPLED
URANIUM CONTOURS BASED ON 30 µg/L FRL. MAXIMUM GEOPROBE RESULTS AND THROUGH THE FIRST HALF OF 2002
DIRECT PUSH DATA AND MAXIMUM TOTAL URANIUM PLUME THROUGH THE FIRST HALF OF 2002



GEOPROBE PROGRAMS

BLACK	1996 - 1997
RED	1999
BLUE	2000 - 2001
GREEN	2002



NOTE: URANIUM VALUES ARE ROUNDED TO THE NEAREST TENTH OF A µg/L

FINAL

LEGEND: ● GEOPROBE LOCATION AND NUMBER

482400 481200 480000 478800 477600 476400 475200 474000

STATE PLANAR COORDINATE SYSTEM 1983

21-NOV-2002

v:\55f\p1\gdgm*2002-mi\dyar*02r\vgop\um.dgn

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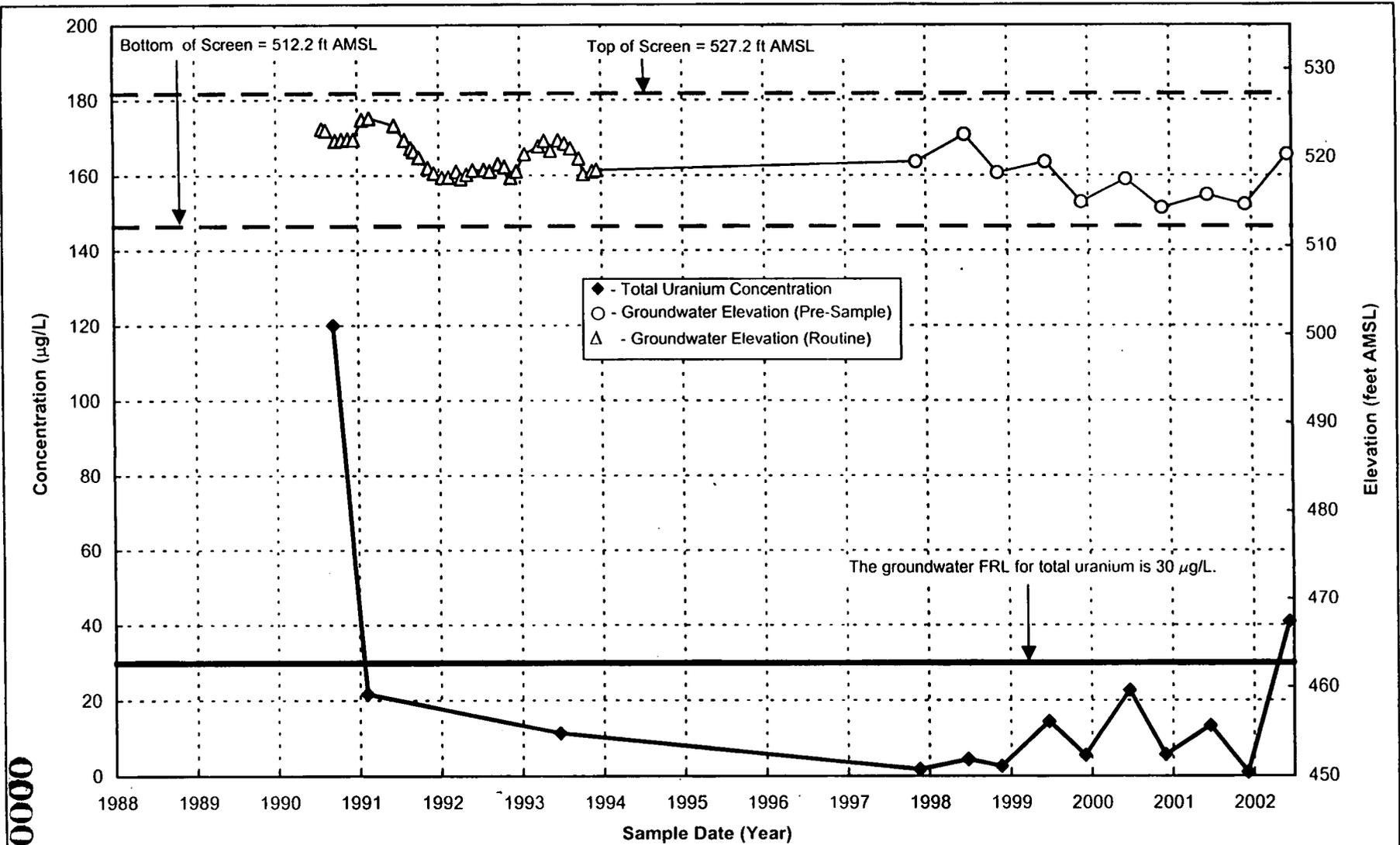


FIGURE 2-3. TOTAL URANIUM CONCENTRATION AND GROUNDWATER ELEVATION VS. TIME PLOT FOR MONITORING WELL 2389

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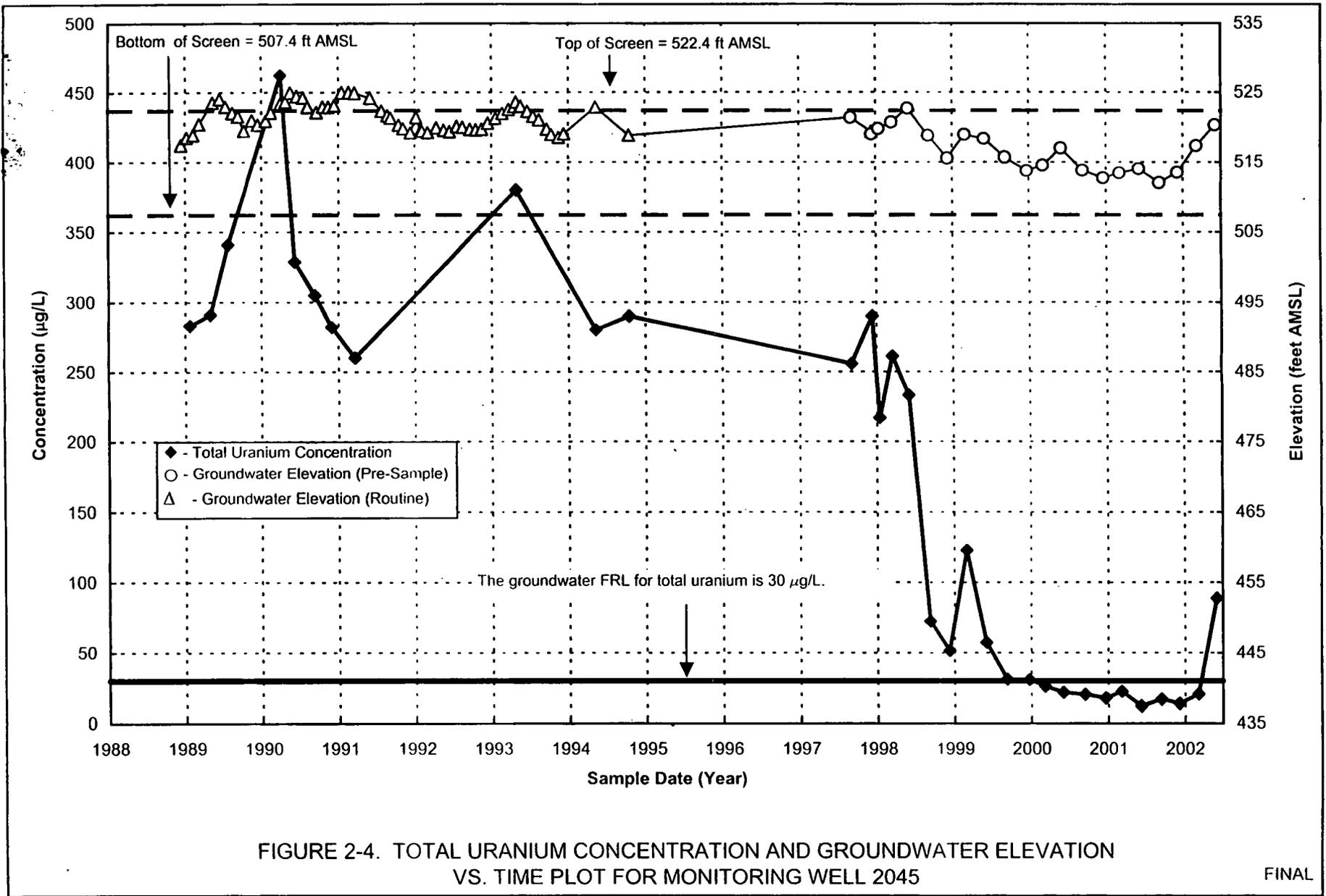


FIGURE 2-4. TOTAL URANIUM CONCENTRATION AND GROUNDWATER ELEVATION VS. TIME PLOT FOR MONITORING WELL 2045

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3.0 ON-SITE DISPOSAL FACILITY MONITORING DATA

3.1 DATA COVERED

This IEMP mid-year data summary covers the on-site disposal facility monitoring data collected during the January 2, 2002 through June 30, 2002 time period. Specifically, data is discussed below or provided on the IEMP Data Information Site, including:

- Leachate collection system (LCS) volumes, leak detection system (LDS) volumes, and accumulation rates.
- Perched water level data collected from the horizontal till wells for Cells 1, 2, 3, 4, 5 and Type 1 water level monitoring wells around Cell 1.
- Analytical data.

These data sets are complete in accordance with sampling requirements identified in the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan (DOE 1997) and subsequent agreements with the EPA and OEPA.

3.2 NOTABLE RESULTS AND EVENTS

Notable results and events are those that impact, or could potentially impact, the scope of OSDF Leak Detection monitoring or remediation operations at the FEMP. Notable results and events associated with on-site disposal facility monitoring data covered by this mid year report include the following:

- LDS Accumulation Rates: The January 2002 through June 2002 LDS accumulation rates versus precipitation for Cells 1 and 2 are provided in Figures 3-1 and 3-2, respectively. The LDS for Cell 3 did not yield any water during the reporting period, therefore a figure is not provided. The maximum accumulation rates for Cells 1 and 2 were 5.2 and 1.0 percent, respectively, of the initial response leakage rate of 20 gallons per acre per day.
- New Maximum Concentrations (refer to Tables 3-1 through 3-3): The data from the first half of 2002 indicate new maximum detected concentrations as follows: Total organic halogens in the Cell 1 LCS (0.635 milligrams per liter [mg/L]). Boron in the Cell 2 LCS (1.72 mg/L), the Cell 2 downgradient Great Miami Aquifer Well (0.0579 mg/L), and in the Cell 3 LCS (2.07 mg/L). Total uranium in the Cell 2 horizontal till well (6.25 µg/L) and in the Cell 3 horizontal till well (22.8 µg/L) and the Cell 3 upgradient Great Miami Aquifer Well (7.92 µg/L).
- Cells 1 through 3 Groundwater Baseline Technical Memorandum: In January 2002, work was completed on a draft data package for baseline groundwater conditions at on-site disposal facility Cells 1, 2, and 3. On January 16, 2001, the DOE submitted the data package to EPA and OEPA for review and discussion. EPA comments on the data package were received in mid-February 2002 and OEPA comments were received in early March 2002. A conference call with EPA, OEPA, and DOE was held on March 12, 2002 to discuss the comments.

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DOE submitted formal responses to the comments on April 5, 2002. OEPA approved the responses in a letter dated May 22, 2002. EPA provided its approval of all but one of the comment responses in a letter dated June 4, 2002. The additional comment was discussed during a June 19, 2002 conference call and a draft response was provided in the weekly report for the week of June 24. The draft response was verbally approved during the July 23, 2002 weekly conference call and the data package was revised and submitted on July 30, 2002 as the Technical Memorandum for the On-Site Disposal Facility Cells 1, 2, and 3 Baseline Groundwater Conditions. EPA approved the Technical Memorandum in a letter dated September 6, 2002. OEPA provided conditional approval in a letter dated September 24, 2002. To address OEPA's condition for approval, DOE submitted a letter and change page on October 24, 2002. As of November 19, 2002, final OEPA approval of the Technical Memorandum had not been received.

During the above noted March 12, 2002 conference call, modifications to the post-baseline sampling program were agreed upon. As discussed with EPA and OEPA during the weekly conference call for the week of August 26, 2002, these modifications were implemented in the August 2002 quarterly round of post-baseline sampling at Cells 1, 2, and 3. The modifications were detailed in the final Technical Memorandum and will also be reflected in a revision of the Groundwater/Leak Detection and Leachate Monitoring Plan later this year or early 2003.

- Baseline sampling for Cells 4 and 5: Great Miami Aquifer baseline sampling began the week of November 5, 2001, and continued monthly through the reporting period. Baseline sampling of the horizontal till wells began the week of February 25, 2002. Baseline sampling of the Cells 4 and 5 Great Miami Aquifer wells and horizontal till wells will continue on a monthly basis until waste is placed later this year. After waste placement begins, baseline sampling will go to a bimonthly frequency for all the wells. Baseline sampling results through the end of the reporting period are summarized in Tables 3-4 and 3-5. The Cell 4 horizontal till well screen section was damaged during construction activities on May 6. The May baseline sample for this location was not collected due to the damaged screen. Baseline sampling resumed in June after the repairs were made.
- Glacial Overburden Water Level Monitoring: This monitoring began in February 2002 for the Cells 1, 2, and 3 horizontal till wells and in March 2002 for the Cells 4 and 5 horizontal till wells. The water levels are being measured and stored electronically on an hourly basis and are being reviewed monthly. The purpose of this monitoring is to determine if the perched water levels beneath the cells are high enough to come in contact with the secondary liner of the cells. Based on this monitoring it appears that, at certain times of the year, perched water levels may be high enough to come in contact with portions of the liners beneath Cells 1 and 5. This information is important to the on-site disposal facility leak detection program because it indicates that perched water may be a source for flow into the Cell 1 and the Cell 5 LDS layer. The high perched water levels in the vicinity of Cell 1, and their implications, have been discussed periodically with EPA and OEPA during the weekly teleconferences and during site visits/meetings.

In addition to the water level monitoring being conducted in the horizontal till wells, four Type 1 wells (13249, 13250, 13251, and 13252) were installed around Cell 1 in early April (Figure 3-3). A fifth well (13261) was installed in early June (Figure 3-3). These wells were installed to evaluate perched water levels around the cell with respect to those found in the horizontal till well for Cell 1 (Well 12338), and to provide a basis of comparison to the liner elevations for Cell 1. They are being monitored in a manner consistent with that described above for the horizontal till wells. As discussed during the weekly teleconference on April 30, 2002, water level monitoring in these wells indicates that perched water in the vicinity of Cell 1 is, at times, high enough to come in contact with portions of the secondary liner for Cell 1 (Figure 3-3). Based on the water level monitoring results, plans are in the works to lower the perched water levels on the north side of Cell 1 by improving the drainage channels/ditches in that area. Additional information on this topic will be provided in the annual site environmental report for 2002.

A thorough review of the on-site disposal facility monitoring data covered by this mid-year data summary was conducted to identify the notable results. Supplementary tables and figures are also provided here in support of the findings listed above. Tables 3-1 through 3-5 provide analytical results from the first half of 2002 for Cells 1 through 5, respectively, along with a summary of previous data for those constituents. These tables include all constituents in the on-site disposal facility monitoring program to highlight the number of constituents that have not been detected, as well as, those detected. All data covered by this mid-year summary are available on the IEMP Data Information Site. A map of the on-site disposal facility sample locations is also provided on the IEMP Data Information Site.

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TABLE 3-1

ON-SITE DISPOSAL FACILITY CELL 1 DATA SUMMARY FOR MID-YEAR 2002

Note: Non-italicized pertains to total number of samples, *Italicized* pertains to samples collected January to June 2002 only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	Great Miami Aquifer									
	LCS ^{b,c,d,e,f} (12338C)		LDS ^{b,c,d,e,g} (12338D)		HTW ^{b,c,d,e} (12338)		Upgradient ^{b,c,d} (22201)		Downgradient ^{b,c,d} (22198)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA ^a mg/L)	16/18 <i>2/2</i>	ND to 123 <i>41.1 to 51.8</i>	15/17 <i>2/2</i>	ND to 80.9 <i>7.72 to 8.54</i>	34/38 <i>1/2</i>	ND to 12.2 <i>ND to 1.72</i>	30/33 <i>2/2</i>	ND to 59.7 <i>2.83 to 2.97</i>	27/33 <i>2/2</i>	ND to 52.5 <i>1.45 to 1.68</i>
Total Organic Halogens (NA ^a mg/L)	16/18 <i>2/2</i>	ND to 0.635 <i>0.27 to 0.635</i>	13/17 <i>1/2</i>	ND to 0.361 <i>ND to 0.0568</i>	21/37 <i>1/2</i>	ND to 0.077 <i>ND to 0.00474</i>	15/33 <i>0/2</i>	ND to 0.308 <i>ND</i>	9/33 <i>0/2</i>	ND to 0.0526 <i>ND</i>
Boron (0.33 mg/L)	19/19 <i>2/2</i>	0.0642 to 2.8 <i>1.02 to 1.37</i>	16/17 <i>2/2</i>	ND to 0.321 <i>0.215 to 0.239</i>	31/38 <i>2/2</i>	ND to 0.685 <i>0.12 to 0.162</i>	28/33 <i>2/2</i>	ND to 0.142 <i>0.108 to 0.114</i>	38/51 <i>4/4</i>	ND to 0.116 <i>0.0524 to 0.0683</i>
Mercury (0.0020 mg/L)	2/18 <i>0/2</i>	ND to 0.00047 <i>ND</i>	1/17 <i>0/2</i>	ND to 0.000072 <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/50 <i>0/4</i>	ND <i>ND</i>
Technetium-99 (94 pCi/L)	5/18 <i>0/2</i>	ND to 18.28 <i>ND</i>	1/17 <i>0/2</i>	ND to 8.92 <i>ND</i>	7/38 <i>0/2</i>	ND to 21.1 <i>ND</i>	1/33 <i>0/2</i>	ND to 13.41 <i>ND</i>	2/51 <i>0/4</i>	ND to 14.8 <i>ND</i>
Total Uranium (30 µg/L)	17/18 <i>2/2</i>	ND to 142.186 <i>38.9 to 66.2</i>	17/17 <i>2/2</i>	1.5 to 20.17 <i>9.96 to 12.1</i>	36/38 <i>2/2</i>	ND to 19 <i>3.43 to 4.2</i>	29/33 <i>2/2</i>	ND to 6.384 <i>0.303 to 0.521</i>	51/51 <i>4/4</i>	0.557 to 8.474 <i>2.84 to 5.42</i>
Alpha-chlordane (2.0 µg/L)	0/18 <i>0/2</i>	ND <i>ND</i>	0/17 <i>0/2</i>	ND <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/34 <i>0/2</i>	ND <i>ND</i>
Bis(2-chloroisopropyl)ether (5.0 µg/L)	0/18 <i>0/2</i>	ND <i>ND</i>	0/17 <i>0/2</i>	ND <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/34 <i>0/2</i>	ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/19 <i>0/2</i>	ND <i>ND</i>	1/17 <i>0/2</i>	ND to 8 <i>ND</i>	5/38 <i>0/2</i>	ND to 8 <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/34 <i>0/2</i>	ND <i>ND</i>
Carbazole (11 µg/L)	0/18 <i>0/2</i>	ND <i>ND</i>	0/17 <i>0/2</i>	ND <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/34 <i>0/2</i>	ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/19 <i>0/2</i>	ND <i>ND</i>	0/17 <i>0/2</i>	ND <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/34 <i>0/2</i>	ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^h µg/L)	0/17 <i>0/2</i>	ND <i>ND</i>	0/17 <i>0/2</i>	ND <i>ND</i>	0/38 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>	0/33 <i>0/2</i>	ND <i>ND</i>

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TABLE 3-1
(Continued)

Constituent (FRL) ^a	Great Miami Aquifer									
	LCS ^{b,c,d,e,f} (12338C)		LDS ^{b,c,d,e,g} (12338D)		HTW ^{b,c,d,e} (12338)		Upgradient ^{b,c,d} (22201)		Downgradient ^{b,c,d} (22198)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range						
	No. of Samples		No. of Samples		No. of Samples		No. of Samples		No. of Samples	
4-Nitroaniline (NA) ^h µg/L	0/19 0/2	ND ND	0/17 0/2	ND ND	0/38 0/2	ND ND	0/33 0/2	ND ND	0/33 0/2	ND ND
Tetrachloroethene (NA) ^h µg/L	0/19 0/2	ND ND	0/17 0/2	ND ND	0/38 0/2	ND ND	1/33 0/2	ND to 1 ND	0/33 0/2	ND ND
Trichloroethene (5.0 µg/L)	0/19 0/2	ND ND	0/17 0/2	ND ND	0/38 0/2	ND ND	0/33 0/2	ND ND	0/51 0/4	ND ND
Vinyl Chloride (2.0 µg/L)	0/19 0/2	ND ND	0/17 0/2	ND ND	0/33 0/2	ND ND	0/33 0/2	ND ND	0/34 0/2	ND ND

^aFrom Operable Unit 5 Record of Decision, Table 9-4

^bIf there was more than one sample result per day (e.g., a duplicate sample), then only the maximum sample concentration was counted and compared to the FRL.

^cRejected data qualified with either a R or Z were not used in this comparison.

^dND = not detected

^eLCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

^fThe LCS is also sampled for nitrate/nitrite and total dissolved solids.

^gCell 2 LDS data from December 1998 to present are suspect due to a December 1998/January 1999 back-up of leachate from the leachate transmission system line into the Cell 2 LDS layer and the resultant residual contamination of the LDS layer from the back-up.

^hNA = not applicable

TABLE 3-2

ON-SITE DISPOSAL FACILITY CELL 2 DATA SUMMARY FOR MID-YEAR 2002

Note: Non-italicized pertains to total number of samples; *Italicized* pertains to samples collected January to June 2002 only.
Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	LCS ^{b,c,d,e,f} (12339C)		LDS ^{b,c,d,e,g} (12339D)		HTW ^{b,c,d,e} (12339)		Great Miami Aquifer			
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	Upgradient ^{b,c,d} (22200)		Downgradient ^{b,c,d} (22199)	
	No. of Samples		No. of Samples		No. of Samples		No. of Samples	Range	No. of Samples	Range
Total Organic Carbon (NA ^b mg/L)	11/15 <i>2/2</i>	ND to 6.25 <i>2.27 to 2.44</i>	14/15 <i>2/2</i>	ND to 26.1 <i>3.33 to 4.97</i>	30/36 <i>1/2</i>	ND to 11.1 <i>ND to 1.97</i>	26/28 <i>2/2</i>	ND to 47.6 <i>1.4 to 1.72</i>	22/28 <i>2/2</i>	ND to 51.8 <i>1.68 to 1.79</i>
Total Organic Halogens (NA ^b mg/L)	5/15 <i>0/2</i>	ND to 0.0576 <i>ND</i>	5/15 <i>0/2</i>	ND to 0.0205 <i>ND</i>	24/36 <i>2/2</i>	ND to 0.101 <i>0.0207 to 0.0401</i>	12/28 <i>0/2</i>	ND to 0.177 <i>ND</i>	10/28 <i>0/2</i>	ND to 0.0386 <i>ND</i>
Boron (0.33 mg/L)	15/16 <i>2/2</i>	ND to 1.72 <i>1.31 to 1.72</i>	15/15 <i>2/2</i>	0.289 to 2.22 <i>0.386 to 0.474</i>	24/36 <i>2/2</i>	ND to 0.0829 <i>0.0493 to 0.0512</i>	20/28 <i>2/2</i>	ND to 0.158 <i>0.0494 to 0.0593</i>	21/28 <i>2/2</i>	ND to 0.0579 <i>0.0397 to 0.0579</i>
Mercury (0.0020 mg/L)	0/15 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	2/35 <i>0/2</i>	ND to 0.00025 <i>ND</i>	0/27 <i>0/2</i>	ND <i>ND</i>	0/27 <i>0/2</i>	ND <i>ND</i>
Technetium-99 (94 pCi/L)	1/15 <i>0/2</i>	ND to 21.25 <i>ND</i>	1/15 <i>0/2</i>	ND to 15.99 <i>ND</i>	5/37 <i>0/2</i>	ND to 12 <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
Total Uranium (30 µg/L)	15/15 <i>2/2</i>	4.51 to 68.6 <i>34.1 to 36.7</i>	15/15 <i>2/2</i>	8.69 to 71 <i>16 to 19.6</i>	36/37 <i>2/2</i>	ND to 6.25 <i>3.97 to 6.25</i>	17/28 <i>1/2</i>	ND to 1.11 <i>ND to 0.303</i>	28/28 <i>2/2</i>	0.259 to 12.1 <i>0.555 to 0.723</i>
Alpha-chlordane (2.0 µg/L)	0/15 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	0/36 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
Bis(2-chloroisopropyl)ether (5.0 µg/L)	0/15 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	0/36 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/16 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	1/36 <i>0/2</i>	ND to 0.4 <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
Carbazole (11 µg/L)	0/15 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	0/36 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/16 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	0/36 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^b µg/L)	0/14 <i>0/2</i>	ND <i>ND</i>	0/15 <i>0/2</i>	ND <i>ND</i>	0/36 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>	0/28 <i>0/2</i>	ND <i>ND</i>

TABLE 3-2
(Continued)

Constituent (FRL) ^a	Great Miami Aquifer											
	LCS ^{b,c,d,e,f} (12339C)			LDS ^{b,c,d,e,g} (12339D)			HTW ^{b,c,d,e} (12339)		Upgradient ^{b,c,d} (22200)		Downgradient ^{b,c,d} (22199)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range		
	No. of Samples		No. of Samples		No. of Samples		No. of Samples		No. of Samples			
4-Nitroaniline (NA ^h µg/L)	0/15	ND	0/15	ND	0/36	ND	0/28	ND	0/28	ND		
	0/2	ND	0/2	ND	0/2	ND	0/2	ND	0/2	ND		
Tetrachloroethene (NA ^h µg/L)	0/16	ND	0/15	ND	0/36	ND	0/28	ND	0/28	ND		
	0/2	ND	0/2	ND	0/2	ND	0/2	ND	0/2	ND		
Trichloroethene (5.0 µg/L)	0/16	ND	0/15	ND	0/36	ND	0/28	ND	0/28	ND		
	0/2	ND	0/2	ND	0/2	ND	0/2	ND	0/2	ND		
Vinyl Chloride (2.0 µg/L)	0/16	ND	0/15	ND	0/36	ND	0/28	ND	0/28	ND		
	0/2	ND	0/2	ND	0/2	ND	0/2	ND	0/2	ND		

^aFrom Operable Unit 5 Record of Decision, Table 9-4

^bIf there was more than one sample result per day (e.g., a duplicate sample), then only the maximum sample concentration was counted and compared to the FRL.

^cRejected data qualified with either a R or Z were not used in this comparison.

^dND = not detected

^eLCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

^fThe LCS is also sampled for nitrate/nitrite and total dissolved solids.

^gCell 2 LDS data from December 1998 to present are suspect due to a December 1998/January 1999 back-up of leachate from the leachate transmission system line into the Cell 2 LDS layer and the resultant residual contamination of the LDS layer from the back-up.

^hNA = not applicable

TABLE 3-3

ON-SITE DISPOSAL FACILITY CELL 3 DATA SUMMARY FOR MID-YEAR 2002

Note: Non-italicized pertains to total number of samples; *Italicized* pertains to samples collected January to June 2002 only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	Great Miami Aquifer							
	LCS ^{b,c,d,e,f} (12340C)		HTW ^{b,c,d,e} (12340)		Upgradient ^{b,c,d} (22203)		Downgradient ^{b,c,d} (22204)	
	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range
Total Organic Carbon (NA ^b mg/L)	9/12 2/2	ND to 34.2 <i>1.09 to 2.03</i>	21/31 1/2	ND to 9.81 <i>ND to 2.01</i>	15/26 2/2	ND to 14.1 <i>1.78 to 1.85</i>	14/26 2/2	ND to 8.83 <i>1.71 to 1.94</i>
Total Organic Halogens (NA ^b mg/L)	3/12 0/2	ND to 0.178 <i>ND</i>	24/31 2/2	ND to 0.158 <i>0.0106 to 0.0154</i>	11/26 1/2	ND to 0.213 <i>ND to 0.0051</i>	9/27 0/2	ND to 0.165 <i>ND</i>
Boron (0.33 mg/L)	12/12 2/2	0.109 to 2.07 <i>0.327 to 2.07</i>	26/30 2/2	ND to 0.24 <i>0.0964 to 0.102</i>	18/26 2/2	ND to 0.0776 <i>0.0407 to 0.0501</i>	19/26 2/2	ND to 0.179 <i>0.0346 to 0.0388</i>
Mercury (0.0020 mg/L)	0/12 0/2	ND <i>ND</i>	1/30 0/2	ND to 0.00026 <i>ND</i>	0/25 0/2	ND <i>ND</i>	2/25 0/2	ND to 0.00028 <i>ND</i>
Technetium-99 (94 pCi/L)	0/12 0/2	ND <i>ND</i>	2/30 0/2	ND to 38.35 <i>ND</i>	1/26 0/2	ND to 8.438 <i>ND</i>	0/26 0/2	ND <i>ND</i>
Total Uranium (30 µg/L)	12/12 2/2	9.27 to 58.582 <i>33.1 to 44.1</i>	28/30 2/2	ND to 22.8 <i>11.5 to 22.8</i>	21/26 2/2	ND to 7.92 <i>3.33 to 7.92</i>	24/26 2/2	ND to 5.924 <i>0.951 to 1.74</i>
Alpha-chlordane (2.0 µg/L)	0/12 0/2	ND <i>ND</i>	0/31 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>
Bis(2-chloroisopropyl)ether (5.0 µg/L)	0/12 0/2	ND <i>ND</i>	0/31 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>
Bromodichloromethane (100 µg/L)	1/12 0/2	ND to 0.5 <i>ND</i>	0/30 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>
Carbazole (11 µg/L)	0/12 0/2	ND <i>ND</i>	0/31 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/12 0/2	ND <i>ND</i>	0/30 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^b µg/L)	0/11 0/2	ND <i>ND</i>	0/30 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>	0/26 0/2	ND <i>ND</i>

TABLE 3-3
(Continued)

Constituent (FRL) ^a	Great Miami Aquifer							
	LCS ^{b,c,d,e,f} (12340C)		HTW ^{b,c,d,e} (12340)		Upgradient ^{b,c,d} (22203)		Downgradient ^{b,c,d} (22204)	
	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range	No. of Samples with Detections No. of Samples	Range
4-Nitroaniline (NA ^g µg/L)	0/12 0/2	ND ND	0/31 0/2	ND ND	0/26 0/2	ND ND	0/26 0/2	ND ND
Tetrachloroethene (NA ^g µg/L)	0/12 0/2	ND ND	0/30 0/2	ND ND	0/26 0/2	ND ND	0/26 0/2	ND ND
Trichloroethene (5.0 µg/L)	0/12 0/2	ND ND	0/30 0/2	ND ND	0/26 0/2	ND ND	0/26 0/2	ND ND
Vinyl Chloride (2.0 µg/L)	0/12 0/2	ND ND	0/30 0/2	ND ND	0/26 0/2	ND ND	0/26 0/2	ND ND

^aFrom Operable Unit 5 Record of Decision, Table 9-4

^bIf there was more than one sample result per day (e.g., a duplicate sample), then only the maximum sample concentration was counted and compared to the FRL.

^cRejected data qualified with either a R or Z were not used in this comparison.

^dND = not detected

^eHTW = horizontal till well; LCS = leachate collection system

^fThe LCS is also sampled for nitrate/nitrite and total dissolved solids.

^gNA = not applicable

TABLE 3-4

ON-SITE DISPOSAL FACILITY CELL 4 DATA SUMMARY FOR MID-YEAR 2002

Note: Non-italicized pertains to total number of samples, *Italicized* pertains to samples collected January to June 2002 only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	HTW ^{b,c,d,e} (12341)		Great Miami Aquifer			
	No. of Samples with Detections	Range	Upgradient ^{b,c,d} (22206)		Downgradient ^{b,c,d} (22205)	
			No. of Samples	Range	No. of Samples	Range
Total Organic Carbon (NA ^f mg/L)	4/4	2.23 to 3.99	8/8	1.2 to 2.75	7/8	ND to 4.43
	4/4	<i>2.23 to 3.99</i>	6/6	<i>1.2 to 2.21</i>	6/6	<i>1.29 to 4.43</i>
Total Organic Halogens (NA ^f mg/L)	2/4	ND to 0.0128	4/8	ND to 0.0628	2/8	ND to 0.00472
	2/4	<i>ND to 0.0128</i>	2/6	<i>ND to 0.0628</i>	1/6	<i>ND to 0.00472</i>
Boron (0.33 mg/L)	4/4	0.267 to 1.55	8/8	0.0412 to 0.0577	8/8	0.0341 to 0.0586
	4/4	<i>0.267 to 1.55</i>	6/6	<i>0.0412 to 0.0492</i>	6/6	<i>0.0341 to 0.0586</i>
Mercury (0.0020 mg/L)	0/4	ND	1/8	ND to 0.0167	1/8	ND to 0.000104
	0/4	<i>ND</i>	1/6	<i>ND to 0.0167</i>	1/6	<i>ND to 0.000104</i>
Technetium-99 (94 pCi/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
Total Uranium (30 µg/L)	4/4	5.84 to 7.91	8/8	0.335 to 0.543	8/8	0.446 to 1.83
	4/4	<i>5.84 to 7.91</i>	6/6	<i>0.335 to 0.543</i>	6/6	<i>0.446 to 1.83</i>
Alpha-chlordane (2.0 µg/L)	0/4	ND	0/8	ND	0/34	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/2	<i>ND</i>
Bis(2-chloroisopropyl) ether (5.0 µg/L)	0/4	ND	0/8	ND	1/8	ND to 0.085
	0/4	<i>ND</i>	0/6	<i>ND</i>	1/8	<i>ND to 0.085</i>
Bromodichlormethane (100 µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
Carbazole (11 µg/L)	1/4	ND to 0.05	0/8	ND	1/8	ND to 0.07
	1/4	<i>ND to 0.05</i>	0/6	<i>ND</i>	1/6	<i>ND to 0.07</i>
1,1-Dichloroethene (7.0 µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
1,2-Dichloroethene (total) (NA ^f µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
4-Nitroaniline (NA ^f µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
Tetrachloroethene (NA ^f µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
Trichloroethene (5.0 µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>
Vinyl Chloride (2.0 µg/L)	0/4	ND	0/8	ND	0/8	ND
	0/4	<i>ND</i>	0/6	<i>ND</i>	0/6	<i>ND</i>

^aFrom Operable Unit 5 Record of Decision, Table 9-4

^bIf there was more than one sample result per day (e.g., a duplicate sample), then only the maximum sample concentration was counted and compared to the FRL.

^cRejected data qualified with either a R or Z were not used in this comparison.

^dND = not detected

^eHTW = horizontal till well

^fNA = not applicable

000033

TABLE 3-5

ON-SITE DISPOSAL FACILITY CELL 5 DATA SUMMARY FOR MID-YEAR 2002

Note: Non-italicized pertains to total number of samples, *Italicized* pertains to samples collected January to June 2002 only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	Great Miami Aquifer					
	HTW ^{b,c,d,e} (12342)		Upgradient ^{b,c,d} (22207)		Downgradient ^{b,c,d} (22208)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA ^f mg/L)	5/5	3.39 to 5.85	7/8	ND to 3.78	8/8	1.3 to 14.2
	5/5	3.39 to 5.85	5/6	ND to 1.71	6/6	1.3 to 1.69
Total Organic Halogens (NA mg/L)	3/5	ND to 0.00662	2/8	ND to 0.00572	0/8	ND
	3/5	ND to 0.00662	2/6	ND to 0.00572	0/6	ND
Boron (0.33 mg/L)	5/5	0.0755 to 0.275	8/8	0.0337 to 0.0692	8/8	0.0282 to 0.0717
	5/5	0.0755 to 0.275	6/6	0.0337 to 0.0692	6/6	0.0282 to 0.0717
Mercury (0.0020 mg/L)	0/5	ND	1/8	ND to 0.000523	0/8	ND
	0/5	ND	1/6	ND to 0.000523	0/6	ND
Technetium-99 (94 pCi/L)	1/5	ND to 6.71	0/8	ND	1/8	ND to 12.8
	1/5	ND to 6.71	0/6	ND	0/6	ND
Total Uranium (30 µg/L)	5/5	13.8 to 21.1	8/8	0.3 to 0.848	8/8	0.22 to 0.514
	5/5	13.8 to 21.1	6/6	0.3 to 0.848	6/6	0.301 to 0.514
Alpha-chlordane (2.0 µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
Bis(2-chloroisopropyl)ether (5.0 µg/L)	0/5	ND	0/8	ND	0/7	ND
	0/5	ND	0/6	ND	0/6	ND
Bromodichlormethane (100 µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
Carbazole (11 µg/L)	1/5	ND to 0.052	0/8	ND	0/7	ND
	1/5	ND to 0.052	0/6	ND	0/6	ND
1,1-Dichloroethene (7.0 µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
1,2-Dichloroethene (total) (NA ^f µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
4-Nitroaniline (NA ^f µg/L)	0/5	ND	0/8	ND	0/7	ND
	0/5	ND	0/6	ND	0/6	ND
Tetrachloroethene (NA ^f µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
Trichloroethene (5.0 µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND
Vinyl Chloride (2.0 µg/L)	0/5	ND	0/8	ND	0/8	ND
	0/5	ND	0/6	ND	0/6	ND

^aFrom Operable Unit 5 Record of Decision, Table 9-4

^bIf there was more than one sample result per day (e.g., a duplicate sample), then only the maximum sample concentration was counted and compared to the FRL.

^cRejected data qualified with either a R or Z were not used in this comparison.

^dND = not detected

^eHTW = horizontal till well

^fNA = not applicable

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4607

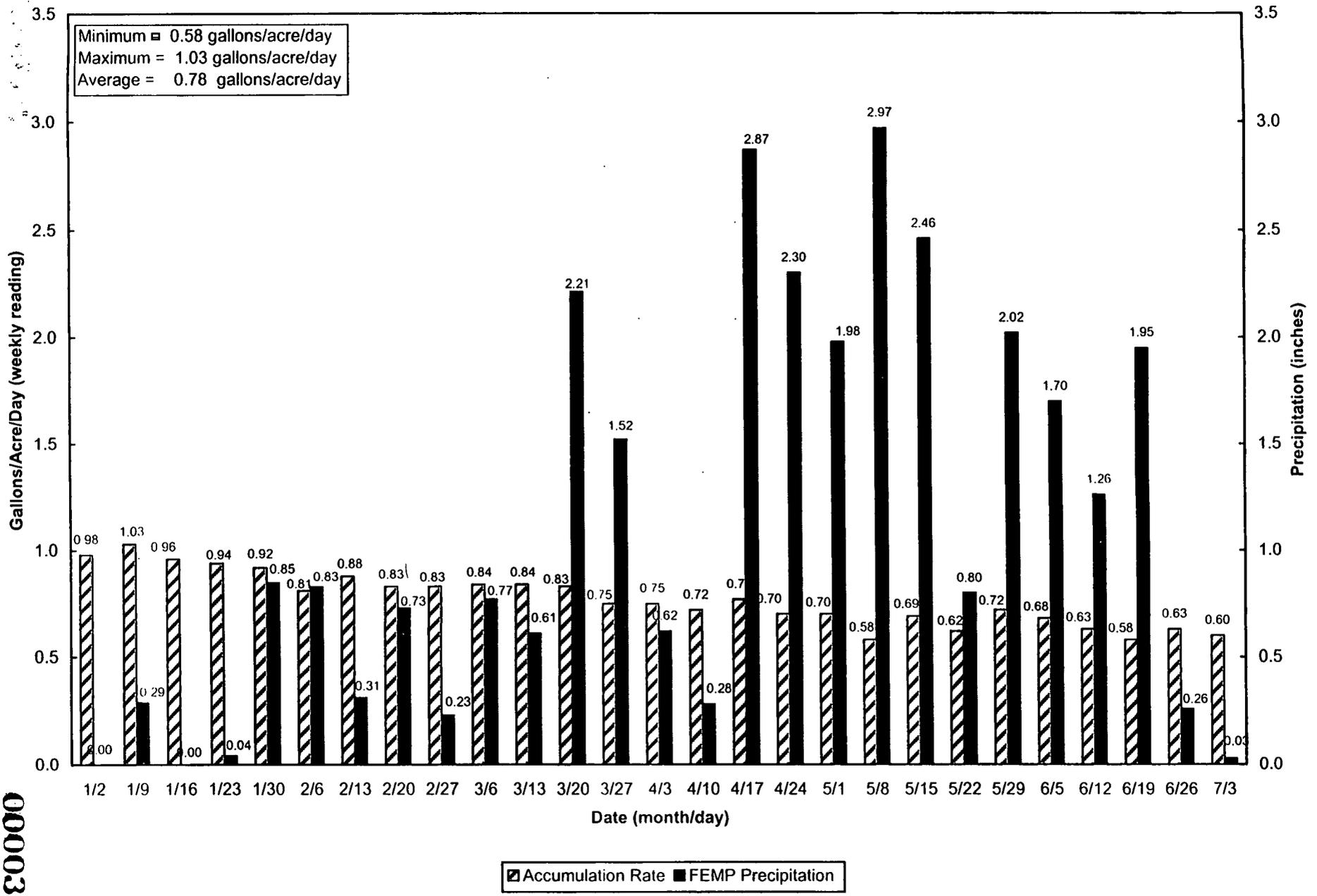


FIGURE 3-1. JANUARY 2002 THROUGH JUNE 2002 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 1

FINAL

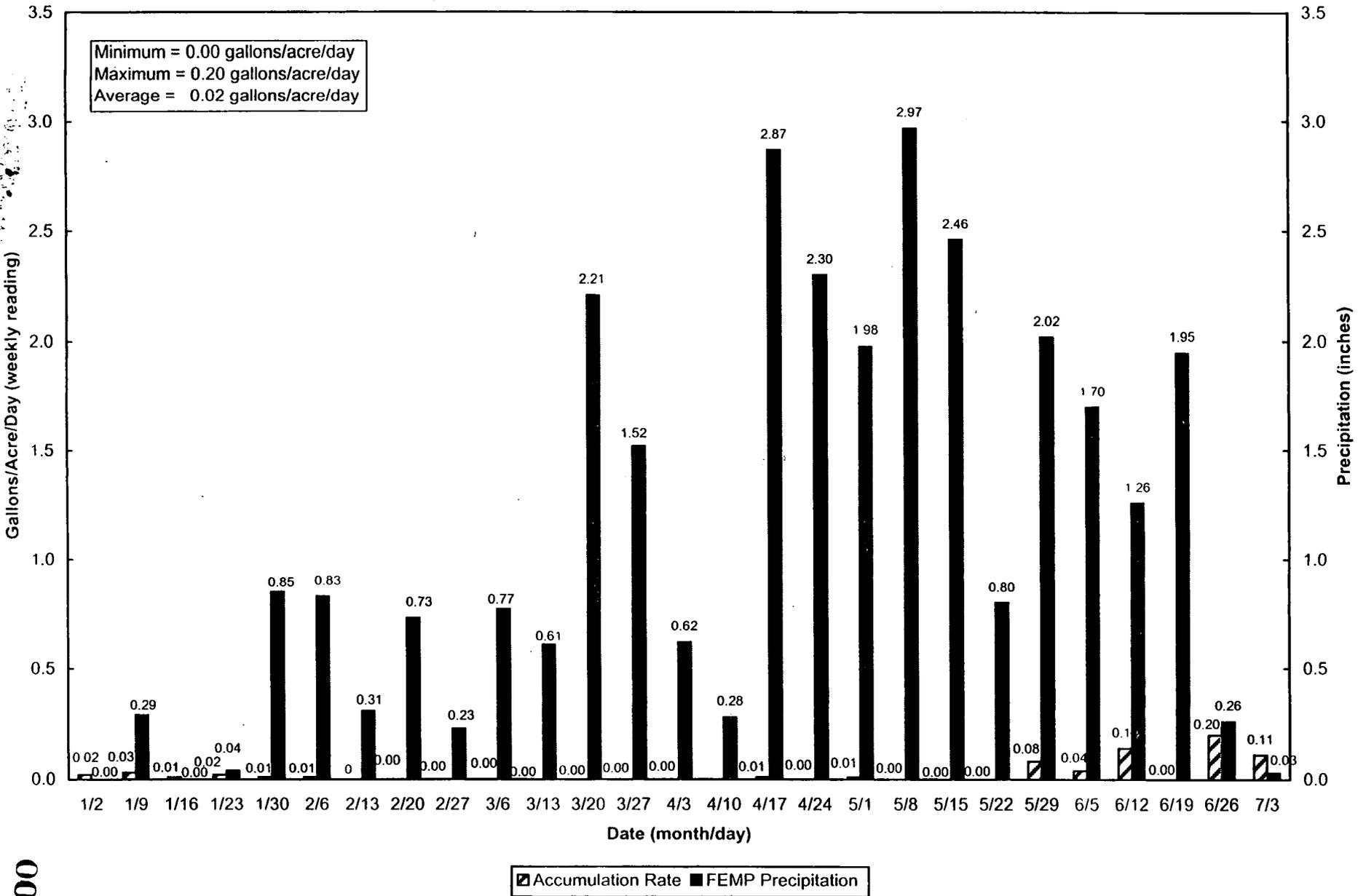
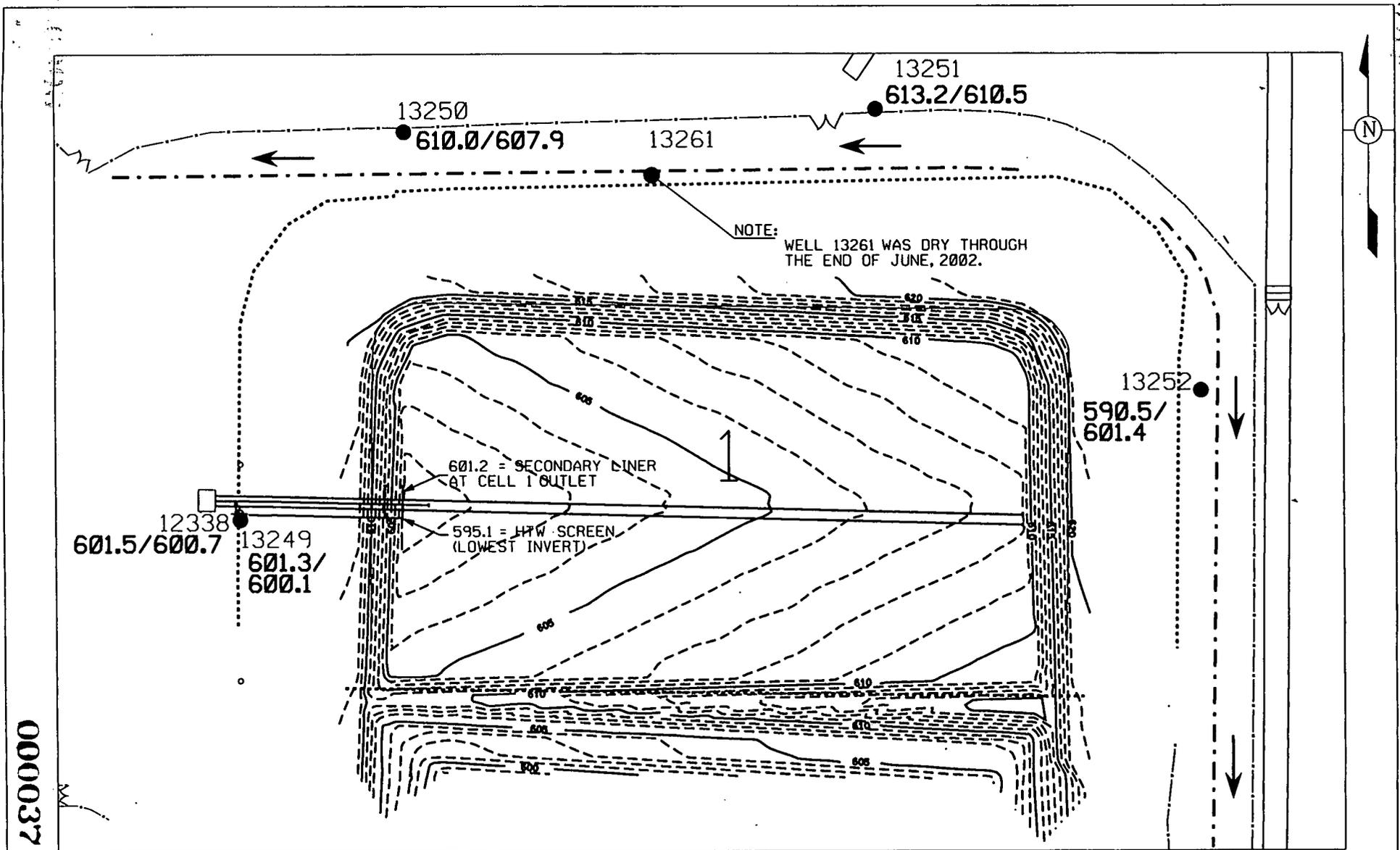


FIGURE 3-2. JANUARY 2002 THROUGH JUNE 2002 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 2 FINAL

000036

4607

4607



LEGEND:

- TILL WELL (SCREENED 10 - 20 FEET BELOW GROUND SURFACE)
- ◆ HORIZONTAL TILL WELL (HTW)
- ← DITCH FLOW DIRECTION
- 605 --- TOP OF CLAY LINER - BASE OF SECONDARY LINER
- EXTENT OF FINAL COVER SYSTEM
- - - - - CENTER LINE OF DITCH

FINAL 601.3/600.1 PERCHED GROUNDWATER ELEVATION (APRIL 15/JUNE 30, 2002)

FIGURE 3-3. OSDF CELL 1 LINER ELEVATIONS (FEET MSL) AND PERCHED GROUNDWATER ELEVATIONS

000037

4607

509A

4.0 SURFACE WATER MONITORING DATA

4.1 DATA COVERED

This IEMP mid-year data summary covers all surface water monitoring data collected under the IEMP program during the January 1, 2002 through June 30, 2002 time period. Specifically, this includes:

- National Pollutant Discharge Elimination System (NPDES) data.
- Federal Facilities Compliance Agreement (FFCA)/Operable Unit 5 Record of Decision data.
- IEMP characterization monitoring data.

All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Revision 2.

4.2 NOTABLE RESULTS AND EVENTS

Notable results and events are those that impact, or could potentially impact, the scope of IEMP monitoring or remediation operations at the FEMP. Notable results and events associated with the surface water monitoring program data identified above are as follows:

- NPDES Permit noncompliances: One NPDES noncompliance for Oil & Grease occurred and was reported to OEPA, as required, during the period under evaluation. The data for the noncompliance is given below:

Date	Location	Parameter	Limit	Result
5/6/02	PF 4001	Oil & Grease	105 kg/Day	142.2 kg/Day

- FFCA/Operable Unit 5 Record of Decision compliance: The monthly average total uranium concentration of 30 µg/L for discharge to the Great Miami River was met every month in the reporting period. The monthly average for May of 29.4 µg/L was achieved by accounting for three storm water bypass days during the storm water bypass events that occurred on May 9 and May 13 through May 15, 2002.

The FEMP is on track in complying with the 600 pounds per year limit of uranium discharged to the Great Miami River. At the end of June 2002, the total mass of uranium discharged was 237.75 pounds.

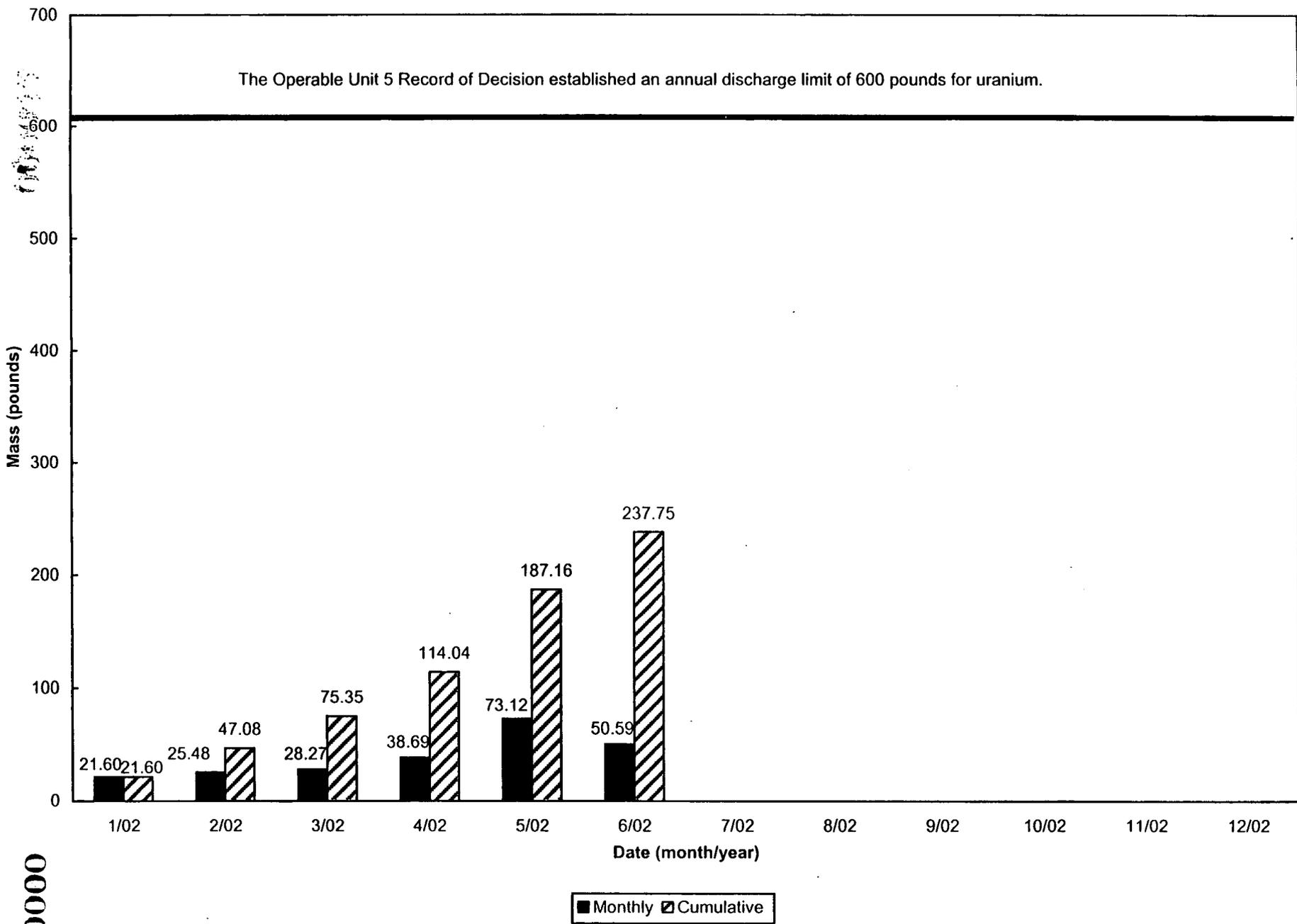
- IEMP Final Remediation Level (FRL)/benchmark toxicity value (BTV) exceedances: For the first half of 2002, there were two FRL exceedances and one BTV exceedance that may be attributable to the FEMP and one FRL exceedance not considered to be attributable to the FEMP.
 - The BTV exceedance was for cadmium at the Parshall Flume (PF 4001), and occurred on February 18, 2002. After applying the mixing equation, the cadmium concentration in the river was 0.0097 mg/L which exceeds the BTV of 0.0035 mg/L. However, this exceedance is the result of using the background concentration of 0.0098 mg/L in the mixing equation.

- There were two lead FRL exceedances at location STRM 4003. Under the NPDES Permit renewal sampling effort, there were two samples collected for lead on January 24, 2002; one grab sample and one composite sample. The grab sample result of 0.0137 mg/L and the composite sample result of 0.0103 mg/L both exceeded the lead FRL of 0.010 mg/L.
- Additionally, there was a chromium concentration of 0.0138 mg/L at location SWP-01 exceeding the hexavalent chromium FRL of 0.010 mg/L. However, SWP-01 is a background location and is not under the influence of FEMP drainages, therefore, this exceedance is not related to FEMP activities.
- Sampling for the NPDES Permit Renewal Application was accomplished during January, February, and March 2002. The renewal application was submitted to OEPA on April 30, 2002. The data related to IEMP parameters and locations generated as a result of this effort have been posted to the IEMP Data Information Site.

A thorough review of the surface water monitoring data covered in this mid-year data summary was conducted to identify the notable results and events. Supplementary figures are also provided here in support of the findings listed above. Figure 4-1 shows pounds of uranium discharged to the Great Miami River from the Parshall Flume. Figure 4-2 shows the monthly average total uranium concentrations in water discharged from the Parshall Flume. All data covered by this mid-year data summary are available on the IEMP Data Information Site. Maps of NPDES and surface water sample locations are also provided on the IEMP Data Information Site.

Additionally, Figure 4-3, Controlled Surface Water Areas and Uncontrolled Flow Directions, has been revised and is included with this mid-year report. The revisions have been made to reflect the addition of On-Site Disposal Facility Cells 4 and 5 as areas where surface water is controlled. In addition, a minor adjustment in the drainage divide of Cell 1 has been made.

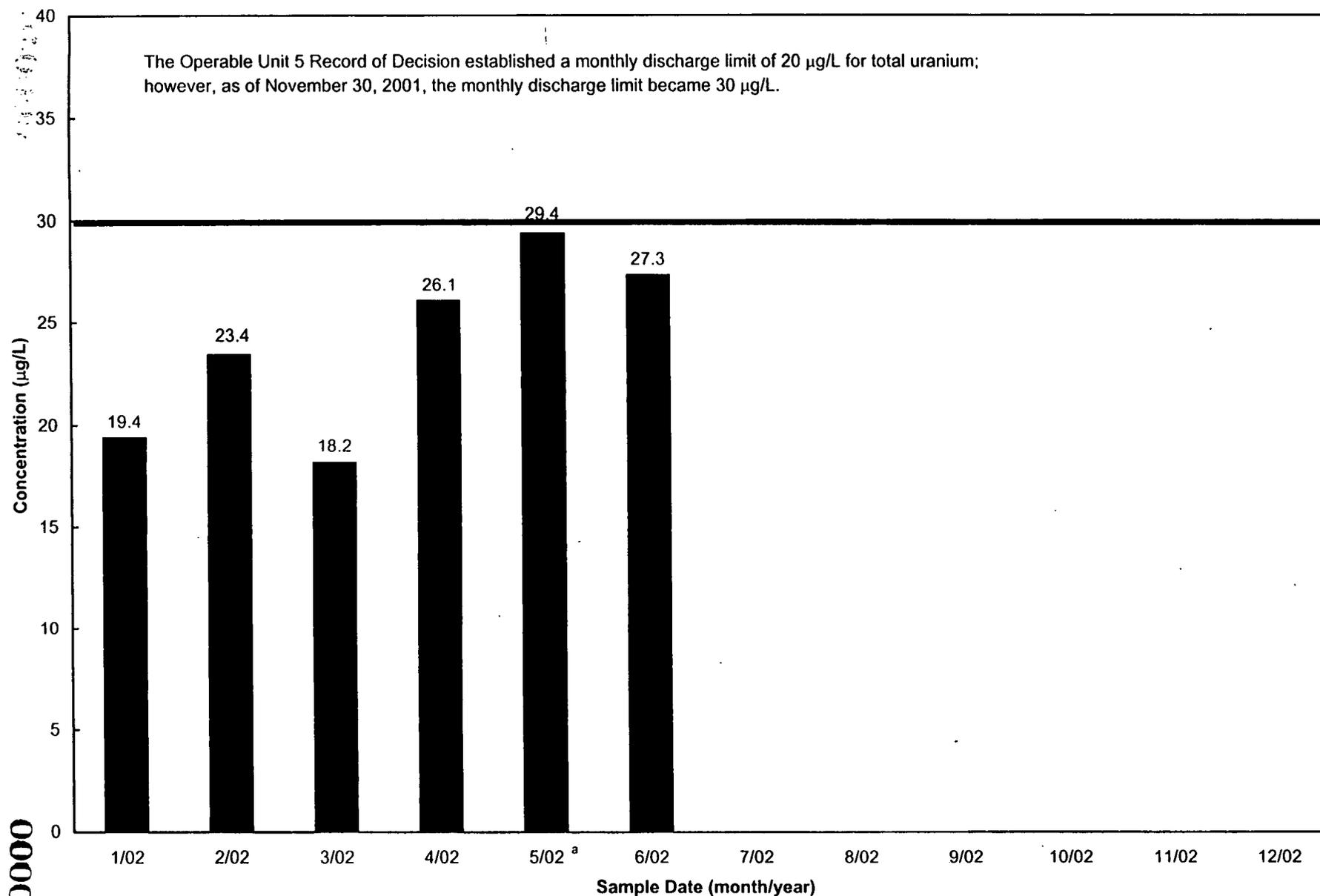
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FIGURE 4-1. POUNDS OF URANIUM DISCHARGED TO THE GREAT MIAMI RIVER FROM THE PARSHALL FLUME (PF 4001) IN JANUARY 2002 THROUGH JUNE 2002

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^aThe monthly average for May of 29.4 µg/L was achieved by accounting for three storm water bypass days during the storm water bypass events that occurred on May 9 and May 13 through May 15, 2002.

FIGURE 4-2. JANUARY 2002 THROUGH JUNE 2002 MONTHLY AVERAGE TOTAL URANIUM CONCENTRATION IN WATER DISCHARGED FROM THE PARSHALL FLUME (PF 4001) TO THE GREAT MIAMI RIVER

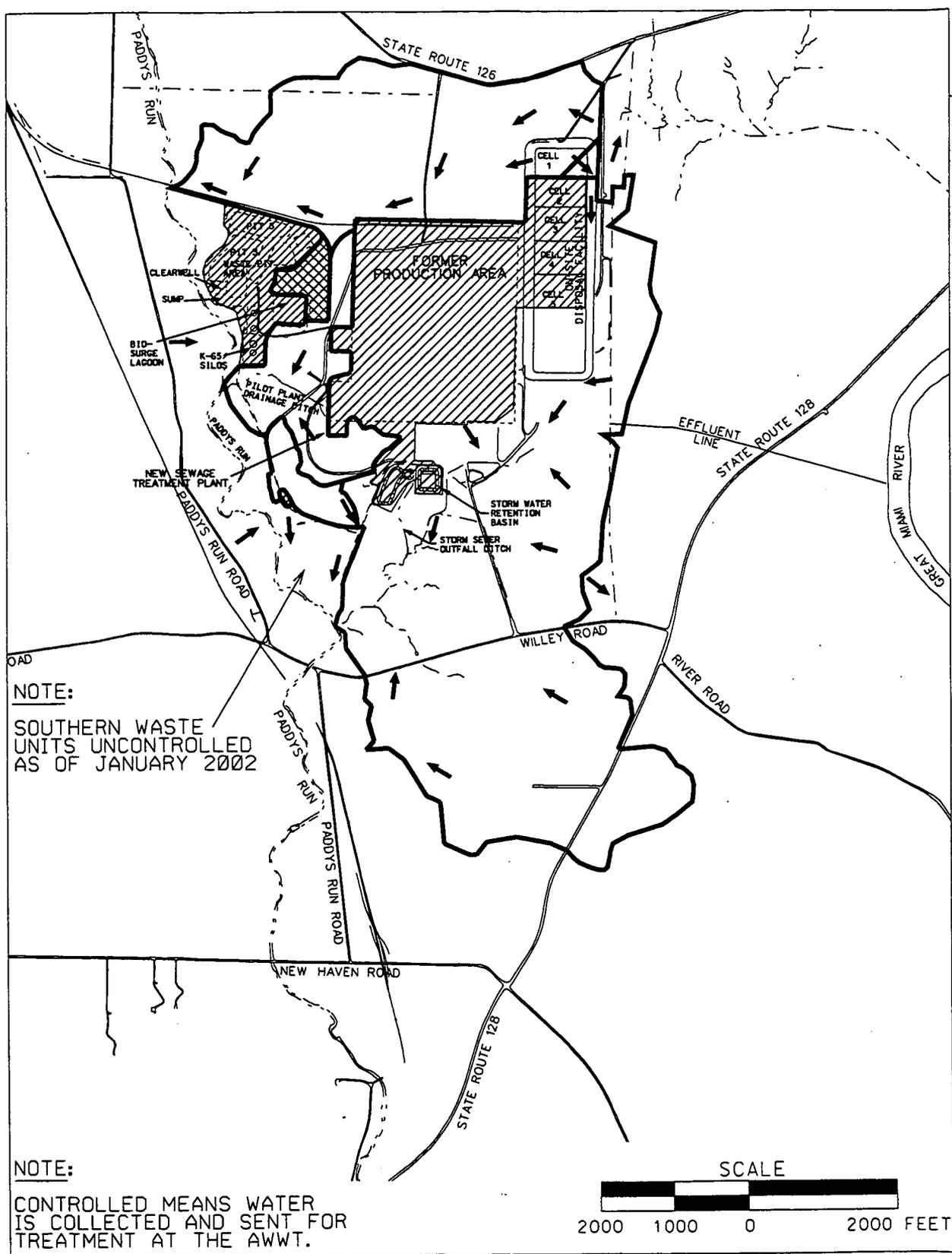
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STATE PLANNING COORDINATE SYSTEM 1983

21-NOV-2002



NOTE:
 SOUTHERN WASTE
 UNITS UNCONTROLLED
 AS OF JANUARY 2002

NOTE:
 CONTROLLED MEANS WATER
 IS COLLECTED AND SENT FOR
 TREATMENT AT THE AWWT.

LEGEND:

- FEMP BOUNDARY
- DRAINAGE BASIN BOUNDARY
- ↖ UNCONTROLLED RUNOFF FLOW DIRECTION
- ▨ CONTROLLED AREA
- ▩ WATER TREATED IF TOTAL URANIUM RESULT IS >30 µg/L

FINAL

FIGURE 4-3. CONTROLLED SURFACE WATER AREAS AND UNCONTROLLED FLOW DIRECTIONS

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5.0 AIR MONITORING DATA

5.1 DATA COVERED

This IEMP mid-year data summary covers all air monitoring data collected under the IEMP program during the January 1, 2002 through June 30, 2002 time period. Specifically, this includes:

- Radiological air particulate monitoring results from biweekly samples covering the period of December 26, 2001 through June 25, 2002 (i.e., biweekly samples were actually collected January 8, 2002 through June 25, 2002). The biweekly sample results for the first and second quarters of 2002 are compiled in table form (Tables 5-1 through 5-5) for the purpose of comparison to previous calendar quarters.
- Radiological air particulate quarterly composite samples collected during the second quarter of 2002 for National Emissions Standards for Hazardous Air Pollutants (NESHAP) compliance purposes
- NESHAP stack emissions monitoring samples collected during the first and second quarter of 2002
- Environmental radon monitoring data collected from January 1 through June 30, 2002
- Silos headspace radon concentrations data collected from January 1 through June 30, 2002
- Direct radiation (thermoluminescent dosimeter [TLD]) monitoring data collected during the first and second quarter of 2002.

All of the data sets for the aforementioned programs are complete in accordance with sampling requirements identified in the IEMP, Revision 2.

5.2 NOTABLE RESULTS AND EVENTS

Notable results and events are those that impact, or could potentially impact, the environmental pathways under the scope of IEMP monitoring at the FEMP. Notable results and events associated with IEMP air monitoring data for the time period covered by this mid-year data summary include the following:

Biweekly Air Particulate Results

- Figures 5-1 through 5-3 illustrate that there was a relative increase in uranium concentrations at the site fenceline during the period from January, 2002 through February, 2002 when compared to biweekly data reported in the fourth quarter of 2001. Per the data evaluation criteria of the IEMP, the impact of the higher concentrations was evaluated with respect to the NESHAP annual limit of 10 millirem (mrem)/year. The estimated dose from the short-term increase in uranium concentrations was less than one millirem. The higher uranium concentrations are attributed to size reducing contaminated material near the on-site disposal facility material transfer area, fugitive emissions from the decontamination and dismantlement of Plant 6, as well as, fugitive emissions from the Waste Pits Remedial Action Project (WPRAP).
- Figures 5-4 through 5-6 illustrate that, excluding a short-term increase in March, thorium-230 concentrations at the site fenceline during the first half of 2002 were comparable to the biweekly data from the second half of 2001. WPRAP began operating on a 24 hours/day, seven days/week schedule in May 2002. The pugmill ventilation system (which began operating in April) is

expected to control fugitive emissions from pugmill operations and limit thorium-230 levels at the fenceline monitors even though the rate of waste processing has increased. In turn, the annual average fenceline thorium-230 concentrations are expected to remain at levels such that the annual dose from emissions is well below the 10 mrem limit.

NESHAP Quarterly Composite Air Data

- The maximum second quarter 2002 dose at the site fenceline air monitoring stations, as determined from quarterly composite samples, was 0.15 mrem as summarized in Table 5-6. In comparison, the maximum first quarter 2002 dose was 0.27 mrem. The maximum 2002 year-to-date (as of June) dose at the site fenceline air monitoring stations (AMS-9C) was 0.44 mrem as summarized in Table 5-7. On average, thorium isotopes contributed approximately 59 percent of the year-to-date dose measured at all air monitors. In particular, thorium-230 contributed an average of 54 percent of the dose, while uranium and radium-226 contributed an average of approximately 28 percent and 13 percent, respectively.

Direct Radiation Results

- In recent years, direct radiation TLD measurements have shown an upward trend in the immediate area of the K-65 Silos (locations 22 through 26) and, to a lesser extent, at the site fenceline nearest the K-65 Silos (location 6). Direct radiation levels in the vicinity of the K-65 and at location 6 are influenced by the radon headspace concentrations and tend to reflect the general trend in headspace radon concentrations. During the first and second quarter of 2002, direct radiation measurements in the vicinity of the K-65 Silos and at location 6 were comparable to radiation measurements during the fourth quarter of 2001, as shown in Figures 5-7 and 5-8, respectively.

Radon Monitoring Results

- During the first and second quarter of 2002, the silo headspace radon concentrations (refer to Figure 5-9) began to decrease from concentrations measured in late 2001 and early 2002. Periodic fluctuations in silo headspace concentrations have occurred in the past and are apparently related to seasonal weather patterns.
- During the period of January 2002 through June 2002, there were seven exceedance events of the 100 picoCurie per liter (pCi/L) radon limit in the Silos exclusion area. For comparison, there were three exceedance events during the January 2001 through June 2001 time period. Exceedance events are defined as a period of time during which the hourly average radon concentration exceeds the DOE Order 5400.5 100 pCi/L limit. An exceedance event may involve one or more radon monitors for a period of an hour or more. The increase in the number of exceedance events is primarily due to the meteorological conditions (i.e., frequent atmospheric inversions) that prevent the mixing and movement of air at ground level. During these periods of atmospheric stability, radon concentrations in the vicinity of the silos tend to gradually increase and, depending on the duration and strength of atmospheric inversion, may reach levels of greater than 100 pCi/L. The inversions led to a moderate increase in the monthly average radon concentrations at the KNE and KSE exclusion fence monitors in comparison to concentrations measured during the same time period in 2001 (refer to Figure 5-10).

NESHAP Stack Emissions Results

- The second quarter 2002 and mid year summary NESHAP stack emission results for Building 71, WPRAP Dryer Stack, and WPRAP Pugmill Stack are within expected ranges (Table 5-10). No significant changes in the source operations were noted with Building 71 Stack. An increase in source operations for the WPRAP Dryer Stack occurred with the start of a 24 hours/day, seven days/week schedule in May 2002. The WPRAP Pugmill Stack, which is part of the pugmill ventilation system, began operating in April.

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A thorough review of the air monitoring data covered by this mid-year data summary was conducted to identify the notable results. Supplementary tables and figures are also provided in support of the information above. Tables 5-1 through 5-5 summarize the biweekly total uranium, total particulate, and isotopic thorium concentrations from January through June of 2002. Tables 5-1 through 5-5 also include 2001 annual summary results and 1990 through 2000 summary results. Table 5-6 contains the second quarter 2002 doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 5-7 contains the 2002 year-to-date doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 5-8 summarizes the environmental radon data from continuous monitors from January 2002 through June 2002 and the annual summary results for 2001. Table 5-9 provides the direct radiation measurements from the first and second quarter 2002 and the annual summary results for 2001. Table 5-10 contains the NESHAP stack results from second quarter 2002, the mid-year summary results and the annual summary results for 2001. All data covered by this mid-year data summary are available on the IEMP Data Information Site, as well as, maps showing the locations of air monitoring stations.

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TABLE 5-1

TOTAL URANIUM PARTICULATE CONCENTRATIONS IN AIR
FROM BIWEEKLY SAMPLES

	Mid-Year 2002 Results ^a (January - June) (pCi/m ³ x 1E-6)				2001 Annual Summary Results ^a (pCi/m ³ x 1E-6)				1990 through 2000 Summary Results ^a (pCi/m ³ x 1E-6)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
Fenceline										
AMS-2	13	34	257	135	26	19	433	127	0.0	3500
AMS-3	13	34	1499	374	26	53	908	260	0.0	17000
AMS-4	13	21	278	86	26	0.0	105	46	0.0	2300
AMS-5	13	2.7	64	39	26	13	139	51	0.0	4400
AMS-6	13	27	242	84	26	13	257	79	0.0	3200
AMS-7	13	5.0	209	58	26	0.0	102	46	0.0	7800
AMS-8A	13	39	1862	407	26	57	928	266	0.0	1135
AMS-9C ^b	13	44	1712	396	26	63	989	290	0.0	784
AMS-22	13	18	275	115	26	0.0	743	111	0.0	238
AMS-23	13	19	226	115	26	24	191	82	0.0	202
AMS-24	13	0.0	76	33	26	7.6	87	38	0.0	207
AMS-25	13	0.0	66	27	26	2.6	88	35	0.0	402
AMS-26	13	8.0	93	38	26	19	340	74	0.0	267
AMS-27	13	22	294	66	26	2.7	117	57	0.0	170
AMS-28	13	34	170	91	26	23	239	93	0.0	445
AMS-29	13	13	325	97	26	7.6	314	88	0.0	326
Background										
AMS-12	13	0.0	31	16	26	0.0	53	19	0.0	480
AMS-16	13	0.0	63	30	26	0.0	56	22	0.0	350

^aFor blank corrected concentrations less than or equal to 0.0 pCi/m³, the concentration is set as 0.0 pCi/m³.

^bSummary results for 1990 through 2000 include AMS-9B/C data.

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TABLE 5-2
TOTAL PARTICULATE CONCENTRATIONS IN AIR
FROM BIWEEKLY SAMPLES

	Mid-Year 2002 Results (January-June) ($\mu\text{g}/\text{m}^3$)				2001 Annual Summary Results ($\mu\text{g}/\text{m}^3$)				1990 through 2000 Summary Results ($\mu\text{g}/\text{m}^3$)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
Fenceline										
AMS-2	13	15	62	31	26	17	61	34	7.0	77
AMS-3	13	17	62	36	26	16	53	30	8.0	159
AMS-4	13	18	55	30	26	17	52	33	13	79
AMS-5	13	15	43	26	26	15	48	29	9.6	62
AMS-6	13	13	45	27	26	18	53	32	8.0	69
AMS-7	13	18	44	29	26	3.0	55	32	6.8	84
AMS-8A	13	18	53	30	26	17	57	34	13	89
AMS-9C ^a	13	20	90	45	26	15	62	32	7.1	136
AMS-22	13	18	45	29	26	17	54	32	13	57
AMS-23	13	14	51	27	26	15	71	30	11	57
AMS-24	13	19	61	33	26	15	51	33	5.4	79
AMS-25	13	16	43	29	26	18	54	30	17	69
AMS-26	13	16	42	27	26	17	46	28	15	52
AMS-27	13	40	76	54	26	19	82	50	16	92
AMS-28	13	13	38	23	26	5.8	69	29	12	68
AMS-29	13	16	48	27	26	7.6	53	32	11	62
Background										
AMS-12 ^b	13	14	38	24	26	14	49	29	6.0	416
AMS-16 ^b	13	23	100	46	26	17	62	39	18	84
Project-Specific										
WPTH-2 ^c	13	22	49	34	26	22	77	37	25	46

^aSummary results for 1990 through 2000 include AMS-9B/C data.

^bTotal particulate analysis was discontinued during 1994 and was reinstated for AMS-12 and AMS-16 in 1997.

^cMonitor associated with the Waste Pits Remedial Action Project (WPRAP)

TABLE 5-3
THORIUM-228 PARTICULATE CONCENTRATIONS IN AIR
FROM BIWEEKLY SAMPLES

	Mid-Year 2002 Results (January-June) (pCi/m ³ x 1E-6)				2001 Annual Summary Results (pCi/m ³ x 1E-6)				1990 through 2000 Summary Results (pCi/m ³ x 1E-6)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
Fenceline										
AMS-2	13	0.0	38	7.5	26	0.0	20	8.1	0.8	10
AMS-3	13	0.0	24	9.5	26	2.2	25	12	1.1	10
AMS-4	13	0.0	12	4.7	26	0.0	22	7.8	0.0	8.6
AMS-5	13	0.0	7.9	4.3	26	0.0	14	5.7	0.0	6.1
AMS-6	13	0.0	10	5.4	26	0.0	16	7.3	0.0	8.1
AMS-7	13	0.37	14	5.4	26	0.0	17	6.9	4.4	11
AMS-8A	13	0.0	17	8.7	26	0.0	39	11	1.2	13
AMS-9C ^b	13	0.0	25	15	26	0.0	28	12	3.0	13
AMS-22	13	0.0	18	8.1	26	0.0	30	8.7	1.4	8.6
AMS-23	13	2.0	18	6.4	26	0.0	22	6.6	0.0	7.6
AMS-24	13	0.0	23	8.2	26	0.0	15	6.0	0.38	7.5
AMS-25	13	0.0	17	5.6	26	0.0	13	6.2	0.0	6.7
AMS-26	13	0.0	15	5.3	26	0.0	24	6.6	2.6	14
AMS-27	13	0.0	19	8.2	26	0.0	22	9.5	0.37	7.4
AMS-28 ^c	13	0.0	17	5.5	26	0.0	39	8.8	0.0	14
AMS-29	13	0.0	12	3.4	26	0.0	20	8.3	0.0	7.1
Background										
AMS-12	13	0.0	11	5.2	26	0.0	17	5.6	0.0	6.7
AMS-16	13	0.0	41	14	26	0.0	19	8.1	0.0	17
Project-Specific										
WPTH-2 ^d	13	1.9	14	8.7	26	0.0	28	8.9	0.0	17

^aFor blank corrected concentrations less than or equal to 0.0 pCi/m³, the concentration is set as 0.0 pCi/m³.

^bSummary results for 1990 through 2000 include AMS-9B/C data.

^cAMS-28 includes WPTH-1 results.

^dMonitor associated with the Waste Pits Remedial Action Project (WPRAP).

TABLE 5-4
THORIUM-230 PARTICULATE CONCENTRATIONS IN AIR
FROM BIWEEKLY SAMPLES

	Mid-Year 2002 Results (January-June) (pCi/m ³ x 1E-6)			2001 Annual Summary Results (pCi/m ³ x 1E-6)			1990 through 2000 Summary Results (pCi/m ³ x 1E-6)			
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
Fenceline										
AMS-2	13	0.0	140	45	26	0.0	104	39	3.1	27
AMS-3	13	9.2	277	109	26	0.0	744	115	3.4	63
AMS-4	13	0.0	65	27	26	0.0	91	27	0.0	23
AMS-5	13	1.6	66	20	26	0.0	620	46	0.0	43
AMS-6	13	12	215	66	26	0.0	226	43	0.0	74
AMS-7	13	0.0	77	22	26	0.0	74	19	0.0	44
AMS-8A	13	0.41	248	93	26	5.1	461	91	6.3	71
AMS-9C ^b	13	5.8	316	118	26	3.2	407	95	12	78
AMS-22	13	30	289	118	26	0.37	493	70	12	46
AMS-23	13	9.9	210	66	26	0.0	153	44	1.5	19
AMS-24	13	3.9	73	29	26	0.0	125	18	3.4	24
AMS-25	13	0.0	53	20	26	0.0	223	20	0.37	23
AMS-26	13	0.0	115	36	26	0.0	233	30	2.6	37
AMS-27	13	3.8	160	41	26	0.0	126	32	0.0	99
AMS-28 ^c	13	22	384	108	26	5.1	401	67	0.0	357
AMS-29	13	4.1	70	25	26	0.0	537	50	6.1	45
Background										
AMS-12	13	0.0	17	5.0	26	0.0	42	8.6	0.0	9.3
AMS-16	13	0.0	30	13	26	0.0	38	10	0.0	18
Project Specific										
WPTH-2 ^d	13	0.0	17	5.0	26	0.0	42	8.6	0.0	9.3

^aFor blank corrected concentrations less than or equal to 0.0 pCi/m³, the concentration is set as 0.0 pCi/m³.

^bSummary results for 1990 through 2000 include AMS-9B/C data.

^cAMS-28 includes WPTH-1 results.

^dMonitor associated with the Waste Pits Remedial Action Project (WPRAP).

TABLE 5-5
THORIUM-232 PARTICULATE CONCENTRATIONS IN AIR
FROM BIWEEKLY SAMPLES

	Mid-Year 2002 Results (January-June) (pCi/m ³ x 1E-6)				2001 Annual Summary Results (pCi/m ³ x 1E-6)				1990 through 2000 Summary Results (pCi/m ³ x 1E-6)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
Fenceline										
AMS-2	13	0.0	22	4.4	26	0.0	19	8.4	0.0	8.6
AMS-3	13	0.0	13	8.2	26	0.0	23	9.9	0.0	9.8
AMS-4	13	0.0	9.3	4.0	26	0.0	22	5.7	0.0	9.3
AMS-5	13	0.39	7.2	2.8	26	0.0	25	5.8	0.0	9.1
AMS-6	13	0.0	14	4.9	26	0.0	22	5.8	0.0	8.1
AMS-7	13	0.0	10	3.5	26	0.0	16	5.4	0.38	12
AMS-8A	13	0.0	17	5.9	26	1.1	33	11	0.0	8.4
AMS-9C ^b	13	6.3	21	12	26	0.0	34	12	1.8	11
AMS-22	13	0.39	11	5.9	26	0.0	35	8.0	0.0	6.5
AMS-23	13	0.0	24	5.8	26	0.0	75	9.3	0.0	5.2
AMS-24	13	0.0	11	4.8	26	0.0	11	4.3	0.0	9.1
AMS-25	13	0.0	8.2	4.0	26	0.0	10	3.7	1.1	10
AMS-26	13	0.0	7.1	3.6	26	0.0	12	4.9	0.38	14
AMS-27	13	0.0	13	6.1	26	0.0	22	7.5	0.0	7.8
AMS-28 ^c	13	0.0	13	3.9	26	0.0	33	6.9	0.0	17
AMS-29	13	0.0	8.7	2.1	26	0.0	19	5.9	0.0	13
Background										
AMS-12	13	0.0	6.2	2.8	26	0.0	34	5.1	0.0	9.3
AMS-16	13	0.0	35	11	26	0.0	18	6.6	0.0	14
Project Specific										
WPTH-2 ^d	13	1.2	9.8	6.3	26	0.31	22	7.2	0.0	17

^aFor blank corrected concentrations less than or equal to 0.0 pCi/m³, the concentration is set as 0.0 pCi/m³.

^bSummary results for 1990 through 2000 include AMS-9B/C data.

^cAMS-28 includes WPTH-1 results.

^dMonitor associated with the Waste Pits Remedial Action Project (WPRAP).

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TABLE 5-6
SECOND QUARTER 2002 NESHAP COMPLIANCE TRACKING

40 CFR 61 (NESHAP) Subpart H Appendix E, Table 2; Net Ratios^a

Location	Ac-228 ^b	Ra-224 ^b	Ra-226	Ra-228 ^b	Th-228	Th-230	Th-231 ^b	Th-232	Th-234 ^b	U-234	U-235/ U-236	U-238	Ratio Totals	Dose ^c (mrem)
Fenceline														
AMS-2	--	--	4.0E-004	--	--	2.8E-003	3.9E-009	--	4.4E-006	1.2E-003	1.5E-004	1.2E-003	0.006	0.057
AMS-3	1.3E-007	3.3E-006	7.0E-004	8.4E-005	--	5.9E-003	4.2E-009	8.0E-004	6.8E-006	1.9E-003	1.7E-004	1.8E-003	0.011	0.113
AMS-4	--	--	6.3E-004	--	--	1.6E-003	--	--	2.4E-006	4.9E-004	--	6.3E-004	0.003	0.034
AMS-5	--	--	--	--	--	2.1E-003	--	--	1.3E-006	9.4E-005	--	3.5E-004	0.003	0.026
AMS-6	--	--	4.9E-004	--	--	9.4E-003	2.5E-009	--	4.9E-006	9.2E-004	9.8E-005	1.3E-003	0.012	0.122
AMS-7	--	--	--	--	--	1.9E-003	--	--	1.5E-006	2.4E-004	--	3.9E-004	0.003	0.025
AMS-8A	--	--	4.3E-004	--	--	3.7E-003	4.0E-009	--	5.5E-006	1.5E-003	1.6E-004	1.5E-003	0.007	0.072
AMS-9C	3.1E-007	7.6E-006	3.8E-003	1.9E-004	--	4.7E-003	--	1.9E-003	7.0E-006	2.1E-003	--	1.9E-003	0.015	0.145
AMS-22	--	--	--	--	--	4.5E-003	5.3E-009	--	5.9E-006	1.3E-003	2.1E-004	1.6E-003	0.008	0.076
AMS-23	--	--	8.4E-004	--	--	2.6E-003	2.7E-009	--	4.6E-006	1.1E-003	1.1E-004	1.2E-003	0.006	0.060
AMS-24	--	--	2.3E-003	--	--	1.4E-003	1.2E-009	--	9.4E-007	1.5E-004	4.8E-005	2.5E-004	0.004	0.041
AMS-25	--	--	--	--	--	2.6E-004	--	--	7.6E-007	1.2E-004	--	2.0E-004	0.001	0.006
AMS-26	--	--	--	--	--	5.2E-003	--	--	1.5E-006	3.2E-004	--	4.0E-004	0.006	0.059
AMS-27	1.2E-007	2.9E-006	8.2E-004	7.5E-005	--	4.3E-003	--	7.1E-004	4.9E-006	4.8E-004	--	1.3E-003	0.008	0.077
AMS-28	--	--	--	--	--	7.0E-003	4.7E-009	--	5.4E-006	9.7E-004	1.8E-004	1.4E-003	0.010	0.096
AMS-29	--	--	--	--	--	2.5E-003	--	--	2.8E-006	6.4E-004	--	7.3E-004	0.004	0.039
Background														
AMS-12	1.9E-007	4.7E-006	1.4E-003	1.2E-004	--	4.5E-004	--	1.1E-003	7.2E-007	2.4E-004	--	1.9E-004	NA ^d	
AMS-16	1.1E-006	2.8E-005	5.8E-003	7.1E-004	1.9E-003	1.3E-003	--	6.7E-003	1.5E-006	5.0E-004	--	3.9E-004	NA ^d	
QA/QC														
Column Check ^e	0.000	0.000	0.104	0.004	0.000	0.599	0.000	0.034	0.001	0.136	0.011	0.161	NA ^d	1.05

Maximum Quarterly Ratio: 0.0145
Maximum Quarterly Dose (mrem): 0.15

^aA "--" indicates the filter results were less than or equal to the blank results, and/or the indicator concentrations were less than or equal to the average net background concentrations.

^bIsotopes assumed to be in equilibrium with their parents.

^cDose conversions are based on the NESHAP standard of 10 mrem per year.

^dNA = not applicable

^eColumn check is the sum of doses from each radionuclide, followed by the sum of doses (1.05) at all fenceline monitors.

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TABLE 5-7
2002 MID-YEAR NESHAP COMPLIANCE REPORT

40 CFR 61 (NESHAP) Subpart H Appendix E, Table 2; Net Ratios^a

Location	Ac-228 ^b	Ra-224 ^b	Ra-226	Ra-228 ^b	Th-228	Th-230	Th-231 ^b	Th-232	Th-234 ^b	U-234	U-235/ U-236	U-238	Ratio Totals	Dose ^c (mrem)
Fenceline														
AMS-2	2.7E-007	6.6E-006	4.0E-004	1.7E-004	4.0E-004	8.2E-003	1.0E-008	1.6E-003	1.2E-005	3.1E-003	4.1E-004	3.3E-003	0.017	0.175
AMS-3	4.1E-007	1.0E-005	1.9E-003	2.6E-004	2.5E-004	1.6E-002	1.5E-008	2.5E-003	3.3E-005	9.0E-003	6.0E-004	8.8E-003	0.039	0.394
AMS-4	--	--	1.9E-003	--	--	4.0E-003	6.8E-010	--	4.4E-006	9.9E-004	2.7E-005	1.2E-003	0.008	0.080
AMS-5	--	--	1.2E-003	--	--	3.3E-003	--	--	1.8E-006	3.0E-004	--	4.8E-004	0.005	0.053
AMS-6	--	--	1.8E-003	--	--	1.6E-002	3.3E-009	--	7.4E-006	1.5E-003	1.3E-004	2.0E-003	0.021	0.214
AMS-7	--	--	--	--	--	3.8E-003	--	--	2.9E-006	6.0E-004	--	7.6E-004	0.005	0.052
AMS-8A	2.8E-007	7.0E-006	3.4E-003	1.8E-004	3.9E-004	1.5E-002	1.7E-008	1.7E-003	2.6E-005	7.5E-003	6.8E-004	7.0E-003	0.036	0.363
AMS-9C	7.4E-007	1.8E-005	4.7E-003	4.7E-004	6.4E-004	1.5E-002	1.5E-008	4.4E-003	3.1E-005	9.0E-003	5.8E-004	8.2E-003	0.044	0.435
AMS-22	1.2E-007	2.9E-006	3.1E-003	7.4E-005	6.0E-006	1.5E-002	8.2E-009	7.0E-004	1.4E-005	3.1E-003	3.2E-004	3.6E-003	0.026	0.258
AMS-23	2.2E-007	5.4E-006	1.9E-003	1.4E-004	3.2E-004	9.1E-003	7.2E-009	1.3E-003	1.3E-005	3.3E-003	2.8E-004	3.5E-003	0.020	0.198
AMS-24	1.2E-007	3.0E-006	2.5E-003	7.6E-005	--	3.9E-003	2.2E-009	7.2E-004	2.3E-006	4.2E-004	8.5E-005	6.2E-004	0.008	0.083
AMS-25	--	--	1.3E-003	--	--	1.2E-003	--	--	1.3E-006	3.3E-004	--	3.4E-004	0.003	0.032
AMS-26	--	--	--	--	3.7E-005	8.8E-003	6.8E-011	--	2.5E-006	5.9E-004	2.7E-006	6.6E-004	0.010	0.100
AMS-27	4.1E-007	1.0E-005	1.1E-003	2.6E-004	5.0E-004	6.3E-003	1.8E-009	2.5E-003	6.5E-006	9.9E-004	7.2E-005	1.7E-003	0.013	0.134
AMS-28	8.3E-008	2.0E-006	3.3E-003	5.2E-005	2.2E-005	1.9E-002	6.8E-009	4.9E-004	1.1E-005	2.0E-003	2.7E-004	2.9E-003	0.028	0.278
AMS-29	2.7E-009	6.7E-008	2.6E-003	1.7E-006	1.9E-005	6.4E-003	4.6E-009	1.6E-005	1.2E-005	3.0E-003	1.8E-004	3.1E-003	0.015	0.153
Background														
AMS-12	4.3E-007	1.1E-005	1.7E-002	2.7E-004	3.5E-004	9.6E-004	2.6E-010	2.6E-003	1.2E-006	3.6E-004	1.0E-005	3.2E-004	NA ^d	
AMS-16	1.5E-006	3.7E-005	2.0E-002	9.5E-004	2.5E-003	1.8E-003	1.2E-009	9.0E-003	2.4E-006	7.5E-004	4.7E-005	6.3E-004	NA ^d	
QA/QC														
Column														
Check ^e	0.000	0.001	0.311	0.017	0.026	1.515	0.000	0.159	0.002	0.457	0.036	0.480	NA ^d	3.00

Maximum Year-To-Date Ratio: 0.0435

Maximum Year-To-Date Dose (mrem): 0.44

^aA "--" indicates the filter results were less than or equal to the blank results, and/or the indicator concentrations were less than or equal to the average net background concentrations.

^bIsotopes assumed to be in equilibrium with their parents.

^cDose conversions are based on the NESHAP standard of 10 mrem per year.

^dNA = not applicable

^eColumn check is the sum of doses from each radionuclide, followed by the sum of doses (3.00) at all fenceline monitors.

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FEMP-IEMP-MY FINAL
Revision 0
November 2002

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TABLE 5-8
CONTINUOUS ENVIRONMENTAL RADON MONITORING
MONTHLY AVERAGE CONCENTRATIONS^a

Location	Mid-Year 2002 Results (January - June) (Instrument Background Corrected) ^b (pCi/L)			2001 Summary Results (Instrument Background Corrected) ^b (pCi/L)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Fenceline						
AMS-02	0.0	0.6	0.3	0.1	0.6	0.3
AMS-03	0.2	0.5	0.3	0.1	0.7	0.3
AMS-04	0.1	0.2	0.1	0.1	0.5	0.3
AMS-05	0.1	0.3	0.2	0.1	0.8	0.4
AMS-06	0.1	0.4	0.2	0.1	0.6	0.3
AMS-07	0.2	0.4	0.3	0.2	0.8	0.4
AMS-08A	0.1	0.3	0.2	0.1	0.7	0.4
AMS-09C	0.0	0.7	0.2	0.0	0.8	0.3
AMS-22	0.1	0.3	0.1	0.1	0.3	0.2
AMS-23	0.0	0.2	0.1	0.1	0.3	0.2
AMS-24	0.1	0.3	0.2	0.1	0.7	0.3
AMS-25	0.1	0.3	0.2	0.1	0.7	0.3
AMS-26	0.1	0.3	0.2	0.2	0.5	0.3
AMS-27	0.1	0.3	0.2	0.1	0.8	0.4
AMS-28	0.1	0.4	0.2	0.1	0.6	0.3
AMS-29	0.1	0.5	0.3	0.1	0.5	0.2
Background						
AMS-12	0.1	0.2	0.1	0.1	0.5	0.3
AMS-16	0.1	0.2	0.2	0.0	0.3	0.1
On Site						
KNE	3.0	5.6	4.5	1.1	13.1	3.9
KNO	0.2	3.1	1.5	0.0	2.3	1.9
KNW/KNW-A	0.5	1.5	1.0	0.4	1.9	0.8
KSE	1.4	3.1	2.4	0.9	4.5	2.1
KSO	0.2	1.2	0.6	0.3	1.6	0.6
KSW/KSW-A	0.7	1.7	1.0	0.2	1.8	0.8
KTOP	3.2	8.8	5.7	3.0	9.0	5.5
LP2	0.1	0.8	0.4	0.3	1.2	0.6
Pilot Plant Warehouse	0.1	0.5	0.3	0.3	0.8	0.4
PR-1	0.1	0.5	0.3	0.3	0.9	0.6
Rally Point 4	0.2	0.6	0.3	0.2	0.7	0.4
Surge Lagoon	0.4	1.3	0.8	0.2	1.4	0.6
T117	0.2	1.0	0.4	0.2	1.3	0.5
T28/T28A	0.4	0.7	0.6	0.3	1.1	0.6
TS4	0.4	0.6	0.5	0.2	1.0	0.5
WP-17A	0.1	0.7	0.4	0.2	0.7	0.4

^aMonthly average radon concentrations are calculated from daily average concentrations. Daily average concentrations are calculated by summing all hourly count data, treating the sum as a single daily measurement, and then converting the sum to a (daily average) concentration.

^bInstrument background changes as monitors are replaced.

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TABLE 5-9
DIRECT RADIATION TLD MEASUREMENTS

Location	Direct Radiation (mrem)		
	Mid Year 2002 Summary Results		2001 Summary Results
	First Qtr	Second Qtr	
Fenceline			
2	21	20	79
3	20	20	77
4	19	19	73
5	20	19	73
6	24	24	90
7	20	19	75
8A	20	20	78
9C	21	21	82
13	21	21	78
14	20	21	80
15	23	21	86
16	24	24	90
17	19	19	78
34	20	20	79
35	19	18	75
36	17	17	69
37	21	21	84
38	17	17	69
39	22	21	86
40	19	18	74
41	21	20	79
On Site (K-65 area)			
22	307	313	1204
23A	331	300	1103
24	236	266	951
25	301	259	1056
26	177	174	668
32 (Bldg. 53A Dosimetry Lab)	14	14	58
Background			
19	18	18	69
20	17	17	67
27	18	17	68
33	19	18	79
42	21	20	79

TABLE 5-10

NESHAP STACK EMISSION MONITORING RESULTS

Analysis Performed	Second Quarter Results		Mid-Year Results		2001 Year End Results	
	No. of Samples	Total Pounds ^{a,b}	No. of Samples	Total Pounds ^{a,b,c}	No. of Samples ^b	Total Pounds ^{a,b}
Building 71 Stack						
Uranium, Total	1	1.1E-05	2	2.1E-05	5	3.4E-05
Thorium-232	1	3.9E-06	2	1.9E-05	5	4.5E-05
Thorium-230	1	4.0E-11	2	1.9E-10	5	1.5E-09
Thorium-228	1	4.0E-16	2	2.7E-15	NA	NA
Total Particulate	1	1.0E-02	2	1.0E-02	5	4.6E-02
WPRAP Dryer Stack						
Uranium-238	3	5.0E-06	7	1.0E-05	13	5.6E-05
Uranium-235/236	3	2.5E-08	7	2.5E-08	13	9.3E-07
Uranium-234	3	2.0E-10	7	4.0E-10	13	2.0E-09
Thorium-232	3	ND	7	ND	13	1.5E-05
Thorium-230	3	3.3E-11	7	8.8E-11	13	1.0E-09
Thorium-228	3	5.7E-17	7	3.2E-16	13	1.5E-15
Radium-226 ^d	3	1.7E-13	7	2.9E-13	13	1.6E-12
WPRAP Pugmill Stack						
Uranium-238	9	1.5E-04	9	1.5E-04	NA	NA
Uranium-235/236	9	8.3E-07	9	8.3E-07	NA	NA
Uranium-234	9	6.7E-09	9	6.7E-09	NA	NA
Thorium-232	9	6.2E-05	9	6.2E-05	NA	NA
Thorium-230	9	1.1E-08	9	1.1E-08	NA	NA
Thorium-228	9	1.5E-14	9	1.5E-14	NA	NA
Radium-226 ^d	9	4.4E-12	9	4.4E-12	NA	NA

2002 Mid-Year Results

Analysis Performed	Average Hourly Release (μCi)	Maximum Daily Release (μCi)	Estimated Maximum Hourly Release Rate, (μCi/hr)
WPRAP Dryer Stack			
Radon-222	915	143,277	13,000

^aTotal pounds are only determined from detected results.
^bND = not detectable.
NA = not applicable.
^cIncludes sample probe rinse.
^dRadium analysis for tracking only.

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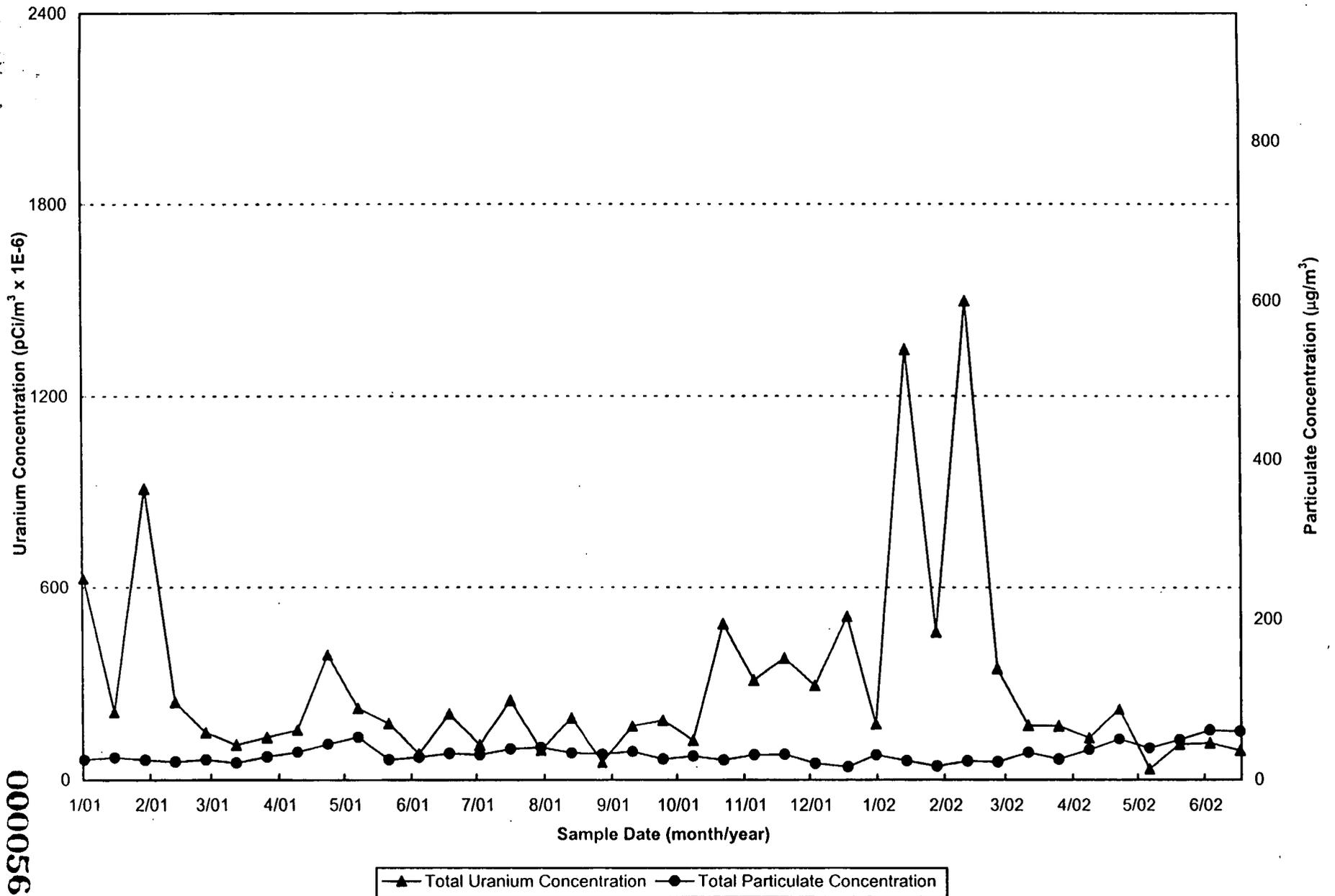


FIGURE 5-1. JANUARY 2001 THROUGH JUNE 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

1001

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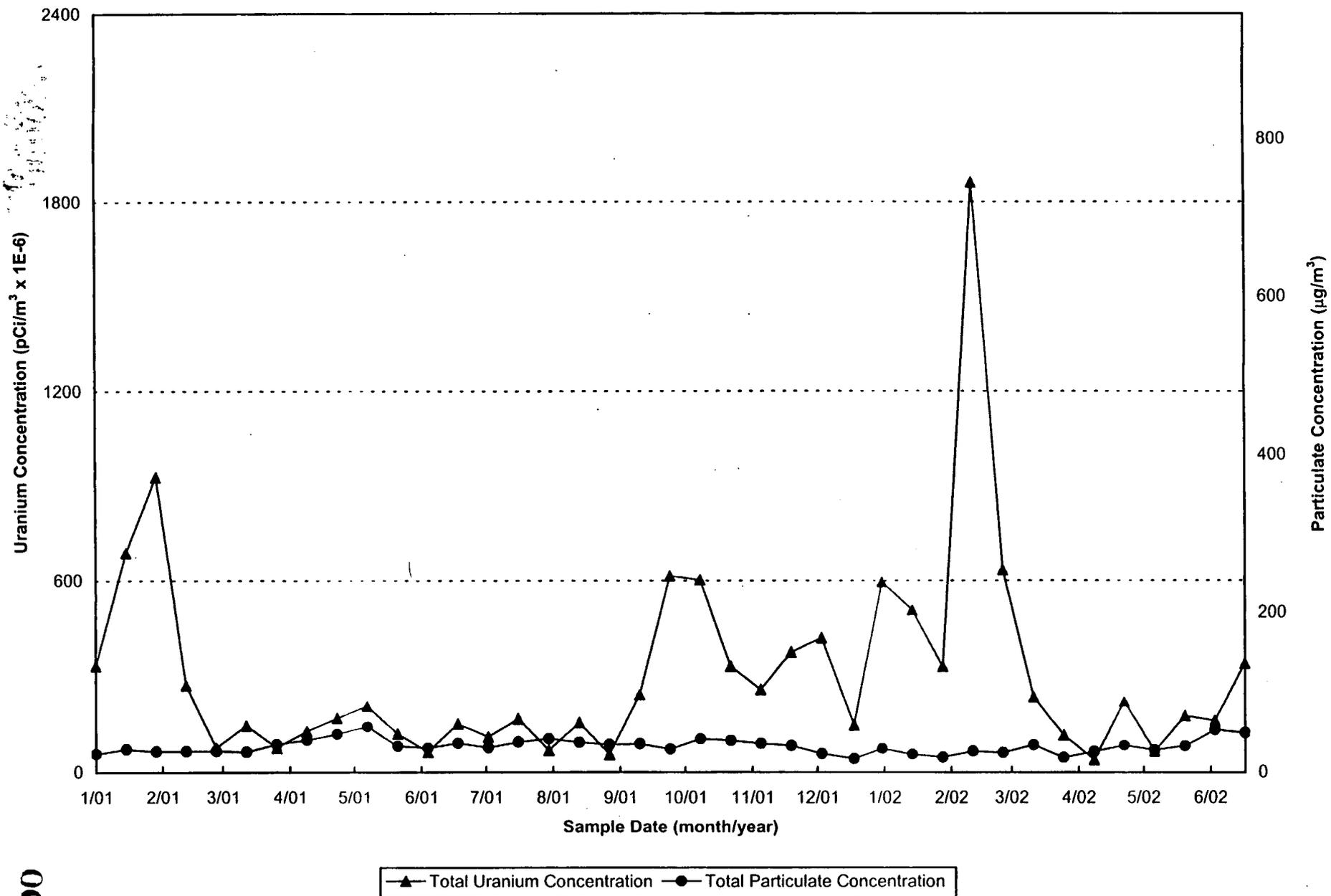


FIGURE 5-2. JANUARY 2001 THROUGH JUNE 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

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4805

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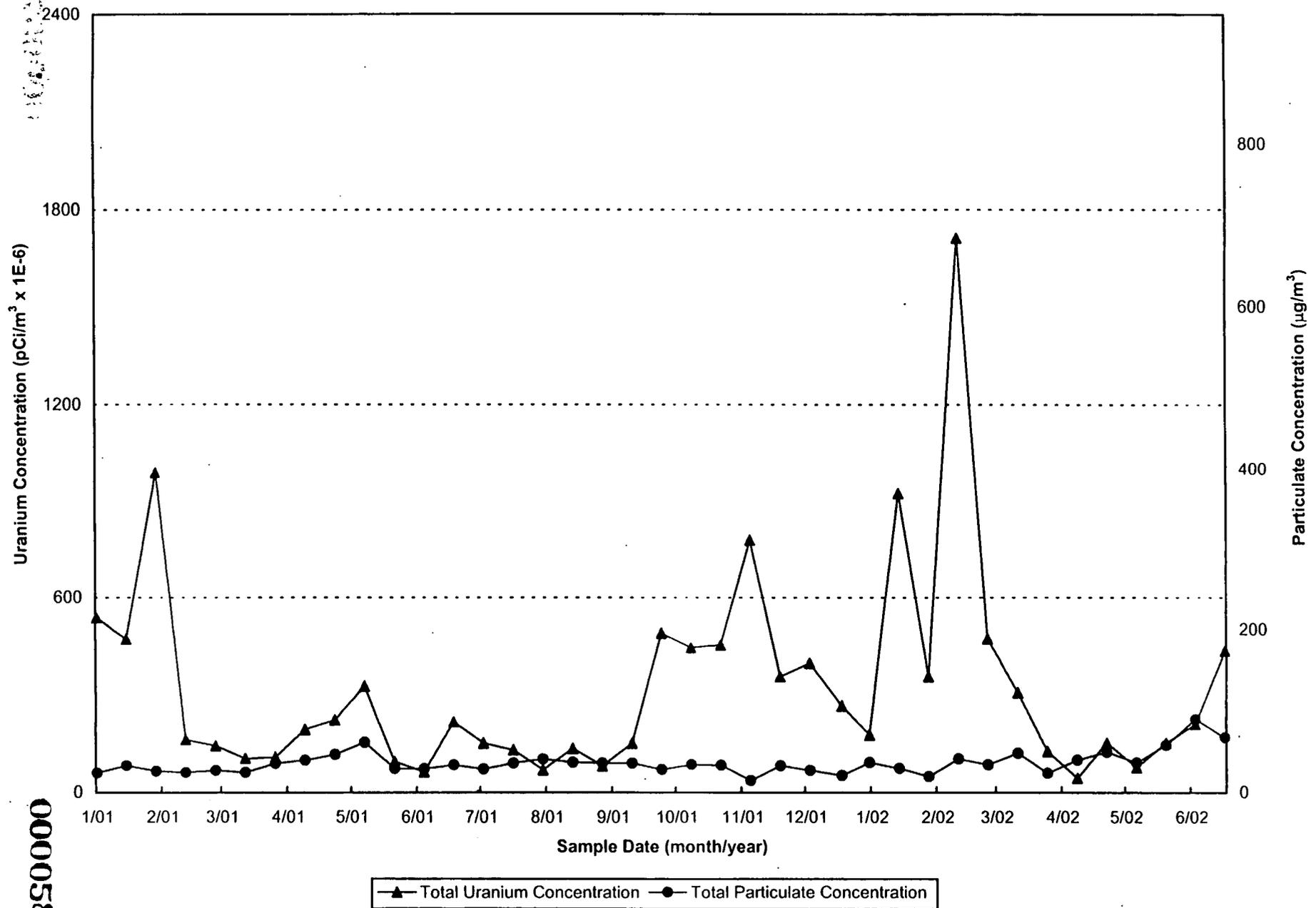


FIGURE 5-3. JANUARY 2001 THROUGH JUNE 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C

8550000

7084

4607

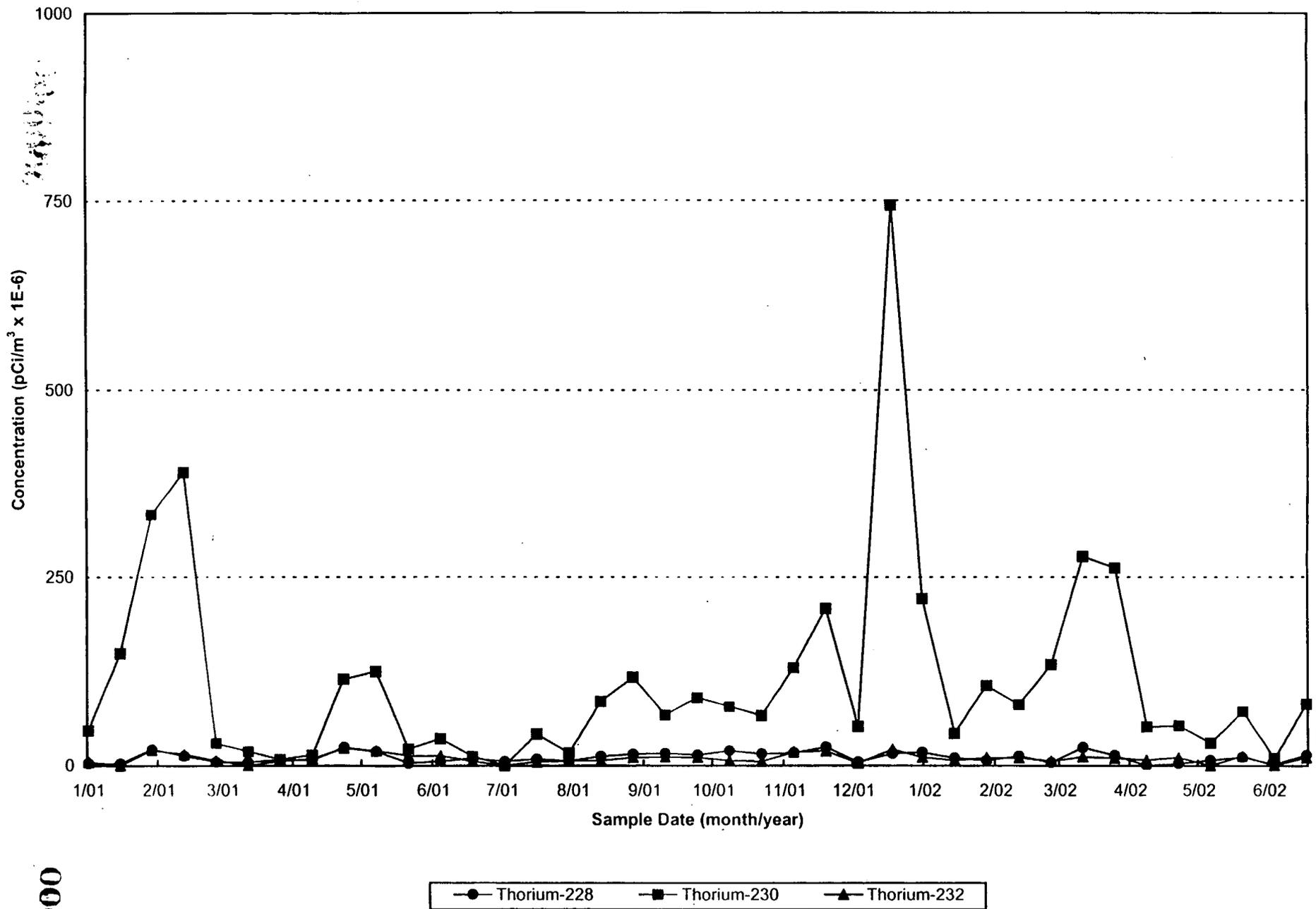


FIGURE 5-4. JANUARY 2001 THROUGH JUNE 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

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4607

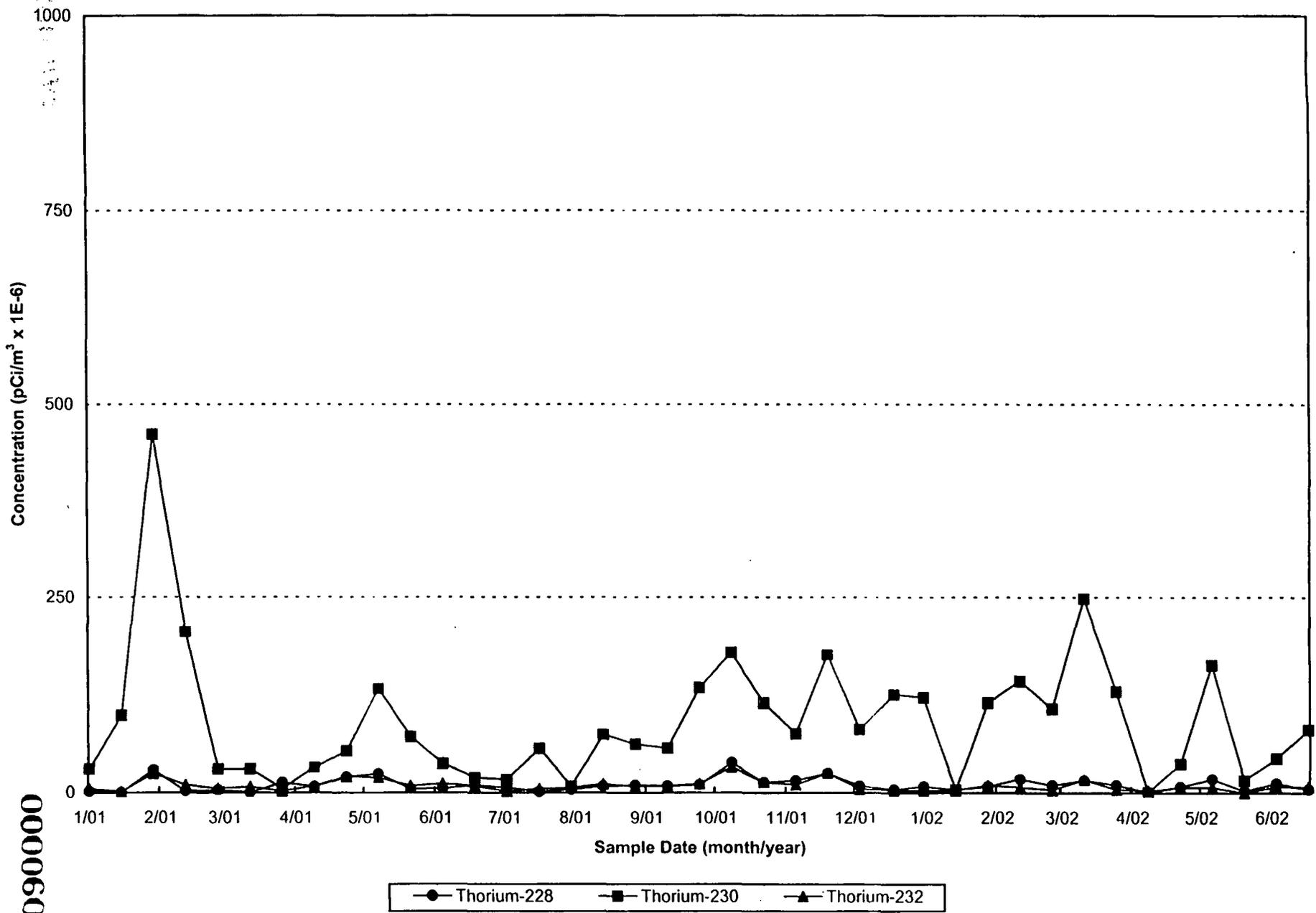


FIGURE 5-5. JANUARY 2001 THROUGH JUNE 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

5083

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090000

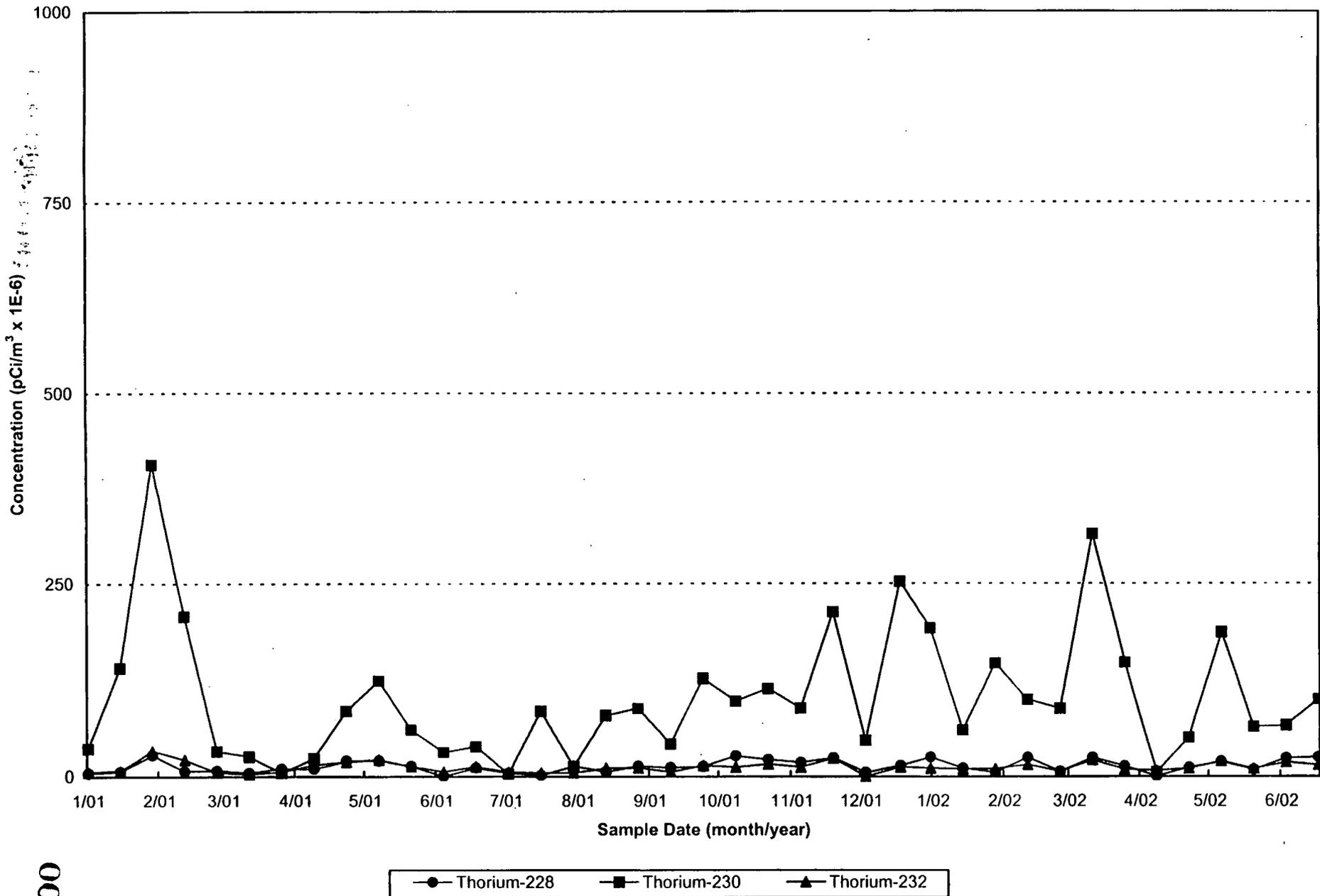
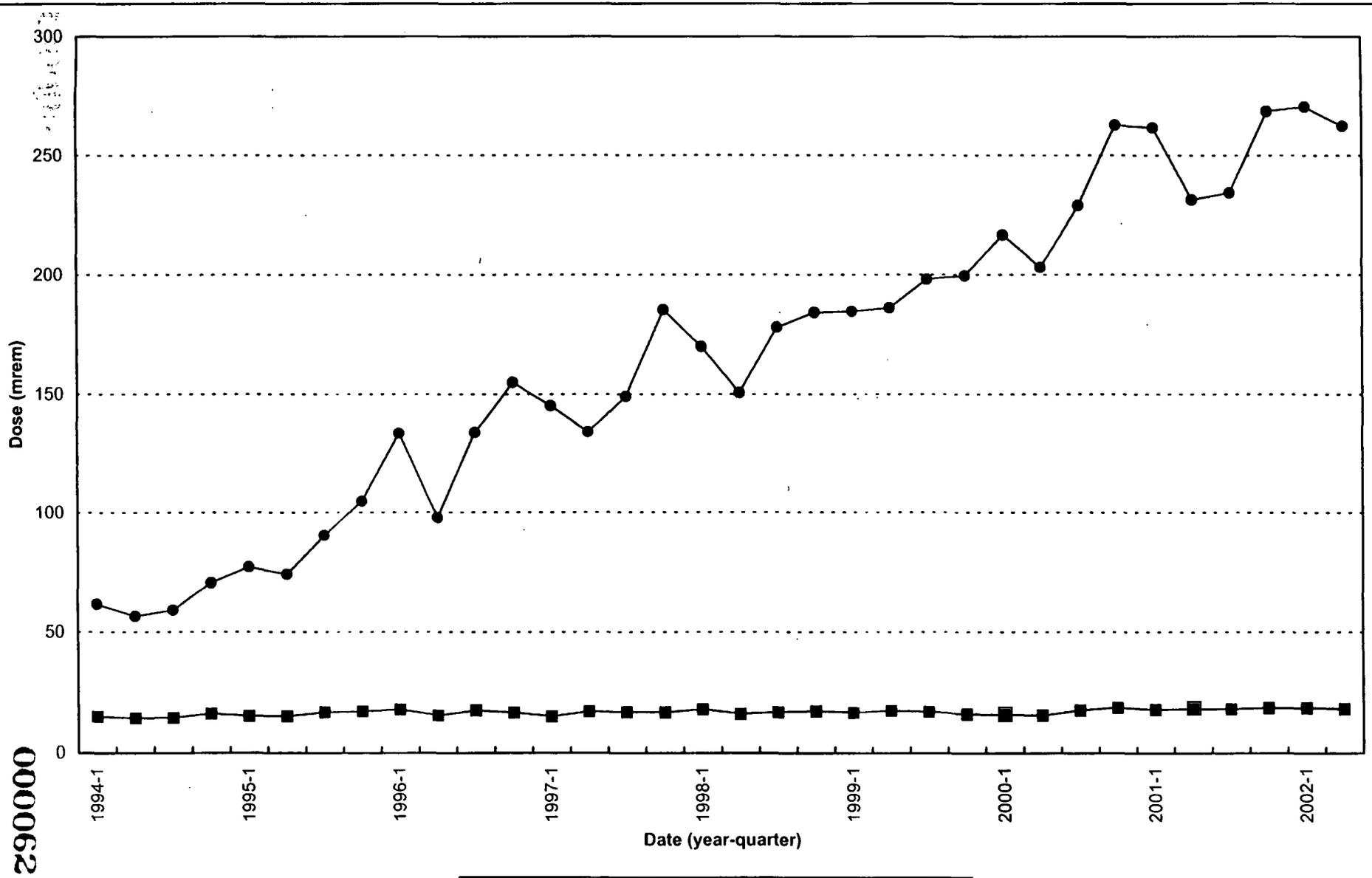


FIGURE 5-6. JANUARY 2001 THROUGH JUNE 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C

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15043

4607



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Pre-Bentonite Silos Fenceline Average
1991: 484 mrem

● K-65 Silos Fenceline Average ■ Background Average

FIGURE 5-7. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2002
(K-65 SILOS FENCELINE AVERAGE VERSUS BACKGROUND AVERAGE)

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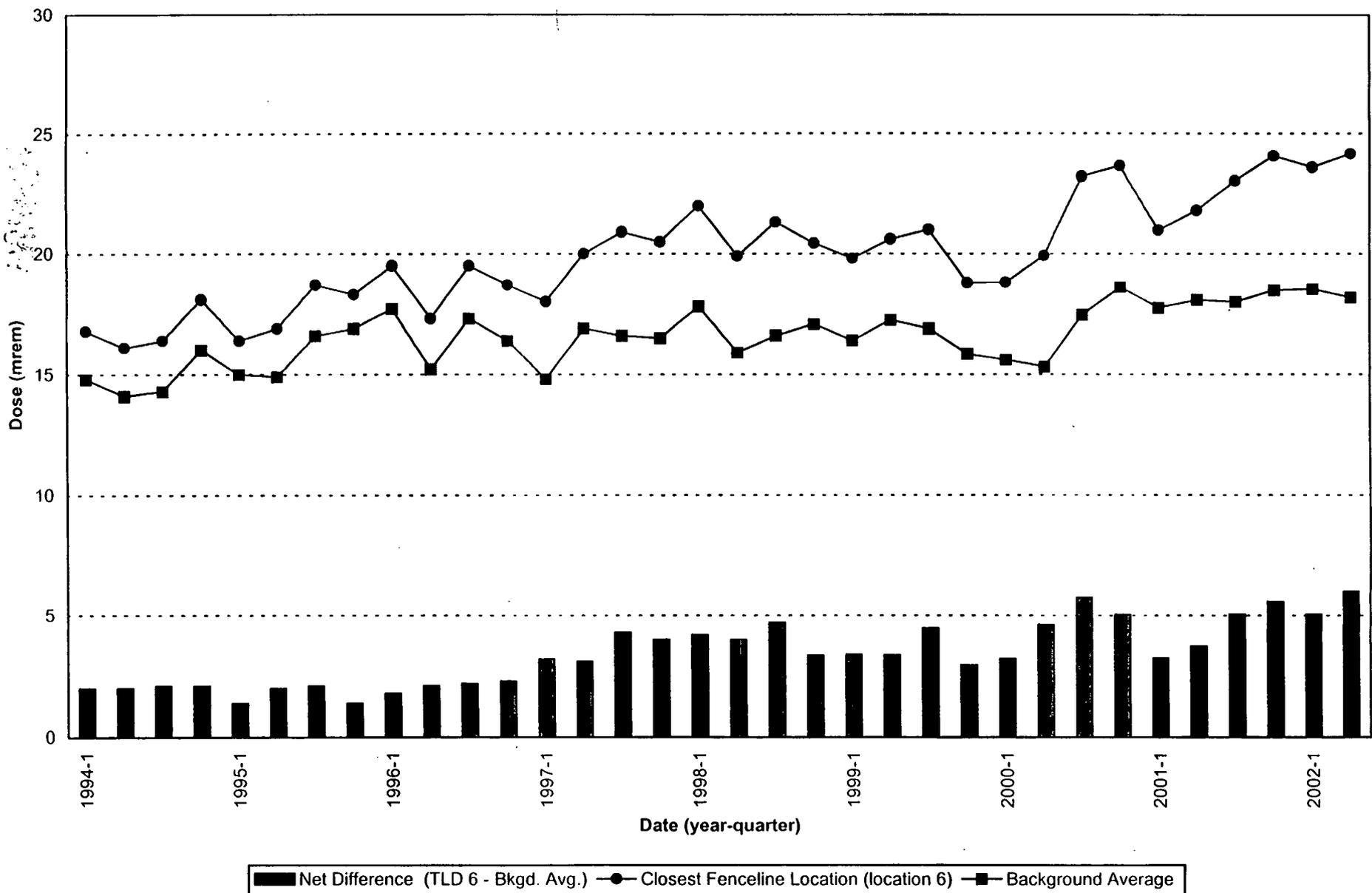
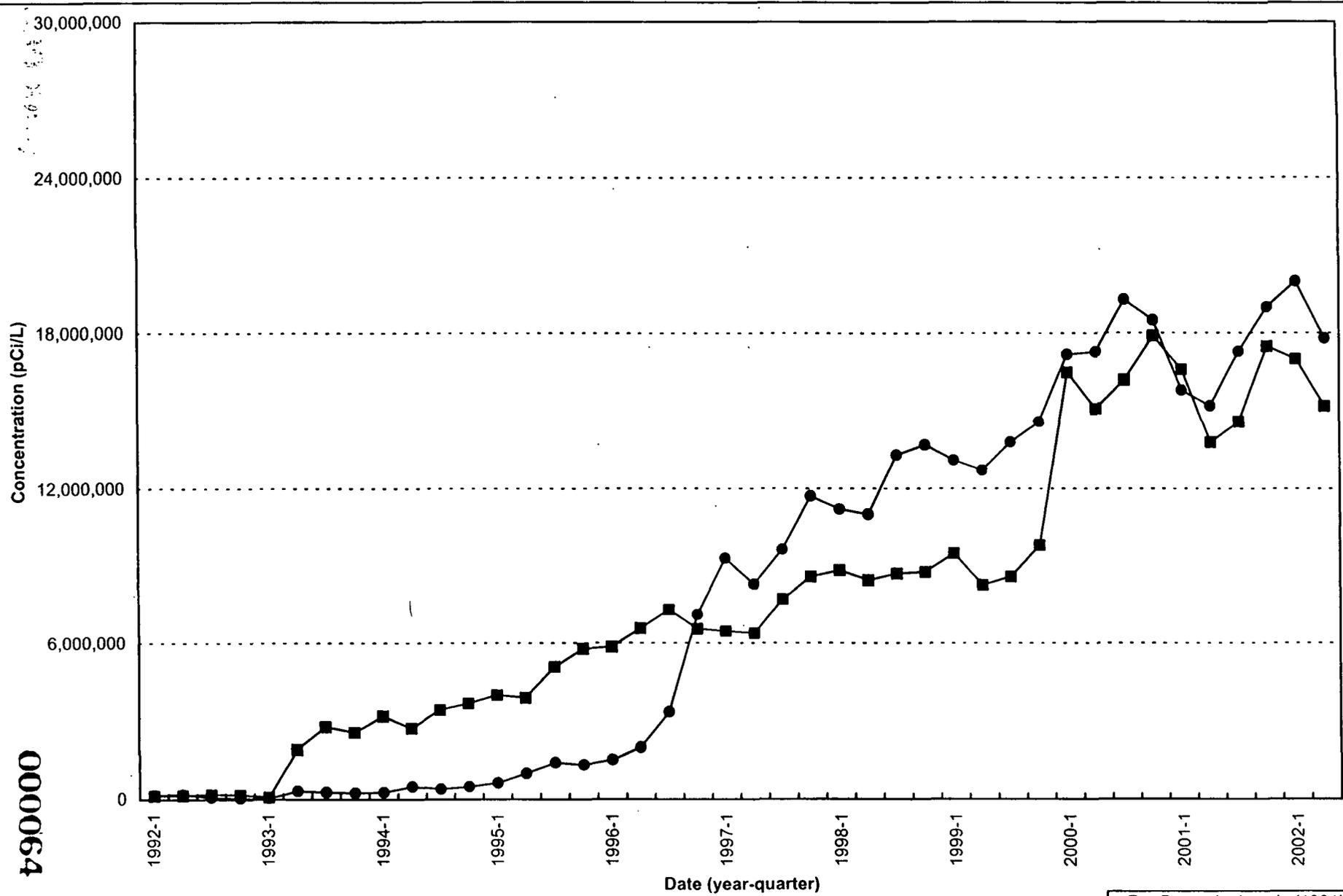


FIGURE 5-8. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2002
(LOCATION 6 VERSUS BACKGROUND AVERAGE)

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17905

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Note: 1) Defective sample line for Silo 1 was replaced during fourth quarter 1996.
 2) Silo headspace correction was applied beginning with the first quarter of 2000.

● Silo 1 ■ Silo 2

Pre-Bentonite Levels (1991):
 Silo 1 ~ 26,000,000 pCi/L
 Silo 2 ~ 30,000,000 pCi/L

FIGURE 5-9. QUARTERLY K-65 SILO HEADSPACE RADON CONCENTRATIONS, 1992 - Second Quarter, 2002

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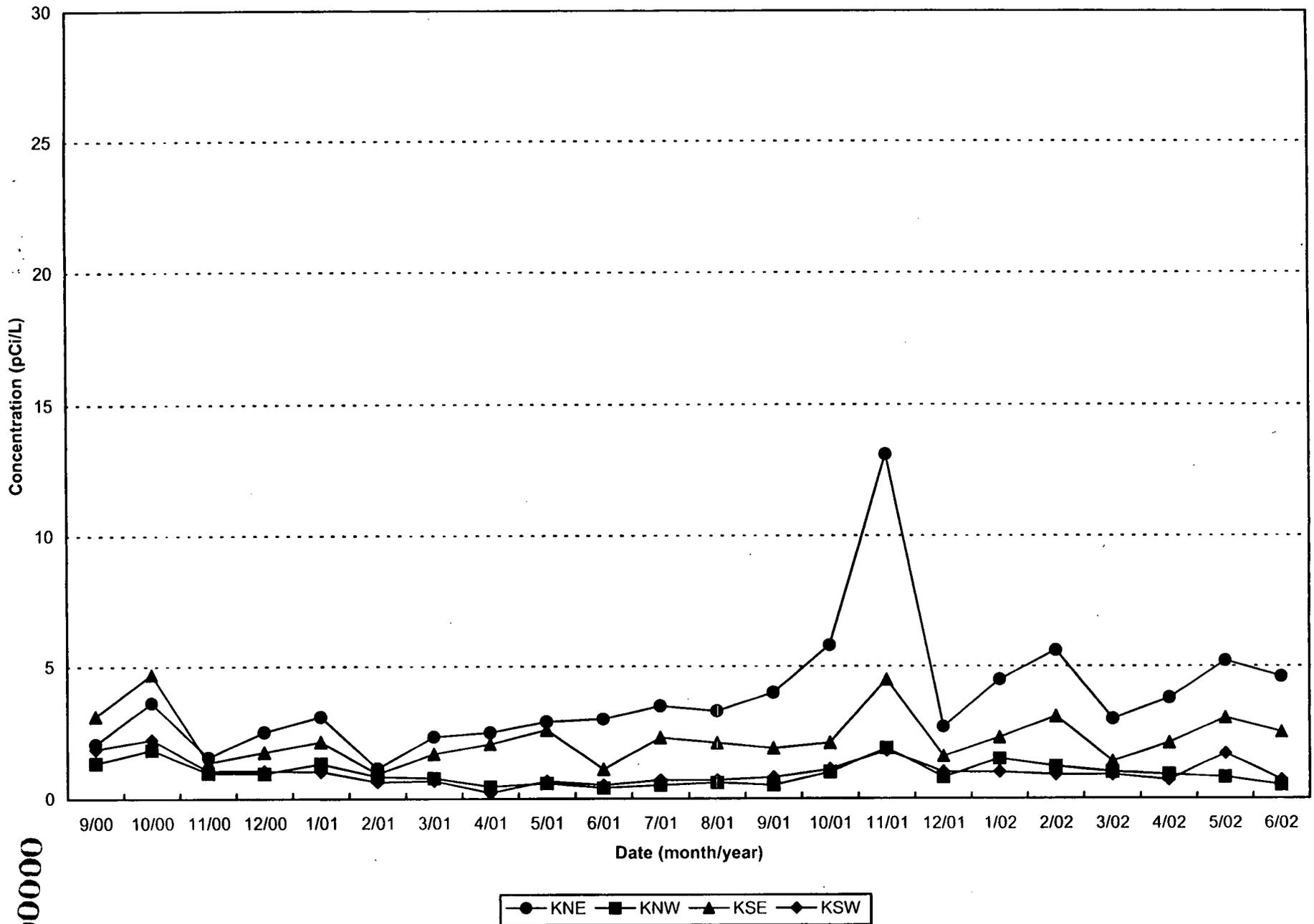


FIGURE 5-10. MONTHLY AVERAGE RADON CONCENTRATIONS FOR SILO EXCLUSION FENCE MONITORS, 9/00 - 6/02

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