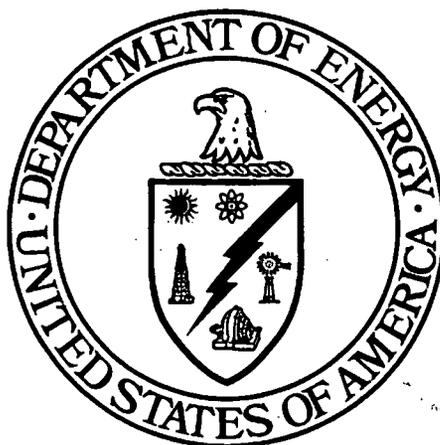


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FIRST IEMP DATA QUARTERLY SUMMARY FOR 2002

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO



APRIL 2002

U.S. DEPARTMENT OF ENERGY

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FINAL

REFERENCES

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LIST OF ACRONYMS

AMS	air monitoring station
BTV	benchmark toxicity value
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FFCA	Federal Facilities Compliance Agreement
FRL	final remediation level
gpm	gallons per minute
HTW	Horizontal Till Well
IEMP	Integrated Environmental Monitoring Plan
kg/d	kilograms per day
lbs	pounds
LCS	leachate collection system
LDS	leak detection system
M gal	million gallons
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
OEPA	Ohio Environmental Protection Agency
pCi/L	picoCuries per liter
pCi/m ³	picoCuries per cubic meter
TLD	thermoluminescent dosimeter
µg/L	micrograms per liter
µg/m ³	micrograms per cubic meter

1.0 INTRODUCTION

This First Integrated Environmental Monitoring Plan (IEMP) Data Quarterly Summary for 2002 has been prepared in a manner consistent with Revision 2 of the IEMP (DOE 2001), and incorporates subsequent input from the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA). All IEMP data are now being provided to the EPA and OEPA on an ongoing basis via the IEMP Data Information Site (i.e., the "Extranet Site"), at <http://iempdata.fernald.gov>. This quarterly summary covers all data that became available for posting on the IEMP Data Information Site during the first quarter of 2002 and not covered under the previous quarterly summary. Table 1-1 identifies the IEMP data that are covered under this document for each IEMP Program.

As recently discussed with the EPA and OEPA, it is the U.S. Department of Energy's (DOE's) intent for this to be the final IEMP data quarterly summary. Upcoming discussions with the agencies will take place regarding the scope and content of an IEMP semi-annual data summary. More information on this will be provided to the EPA in the near future. All data and information included in the summaries will continue to be provided on the IEMP Data Information Site and/or through weekly conference calls. Comprehensive reporting will still be provided through the annual site environmental reports.

TABLE 1-1

SCHEDULE FOR IEMP DATA INFORMATION SITE AVAILABILITY AND REPORTING

IEMP PROGRAM	TIME PERIOD								
	Third Quarter 2001			Fourth Quarter 2001			First Quarter 2002		
	J U L	A U G	S E P	O C T	N O V	D E C	J A N	F E B	M A R
<u>GROUNDWATER SAMPLING ACTIVITIES</u>									
Extraction/Re-injection Operational Data			☒	☒	☒	◆	◆	◆	
South Plume Aquifer Conditions	-----☒-----			-----◆-----					
South Field Extraction Aquifer Conditions	-----☒-----			-----◆-----					
Waste Storage Area Aquifer Conditions	-----☒-----			-----◆-----					
Plant 6 Area Aquifer Conditions	Not Applicable ^a			-----◆-----			Not Applicable ^a		
Property Boundary Monitoring	☒-----			◆-----					
Private Well Monitoring	☒-----			◆-----					
Groundwater Elevations				☒-----			◆-----		
<u>OSDF SAMPLING ACTIVITIES</u>									
LCS and LDS Volumes			☒	☒	☒	◆	◆	◆	
Analytical				-----◆-----					
<u>SURFACE WATER SAMPLING ACTIVITIES</u>									
NPDES			☒	☒	☒	◆	◆	◆	
FFCA			☒	☒	☒	◆	◆	◆	
IEMP Characterization	☒	☒	☒	◆	◆	◆			
Turbidity Monitoring (for Sloan's Crayfish)				☒	☒	☒	◆	◆	◆
<u>AIR SAMPLING ACTIVITIES</u>									
Radiological Particulate ^b			☒	☒	☒/◆	◆	◆	◆	
NESHAP Composite	-----☒-----			-----◆-----					
NESHAP Stack	-----☒-----			-----◆-----					
Environmental Radon ^c			☒	☒	☒	☒/◆	◆	◆	◆
Silos Headspace Real Time Radon			☒	☒	☒	☒	◆	◆	◆
Direct Radiation (TLD)	-----☒-----			-----◆-----					

◆ Data collected during this time period are covered in this quarterly 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 sample was collected.

☒ Data collected during this time period were covered in the previous IEMP data quarterly summary (January 2002).

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

^bThis quarterly summary covers radiological air particulate data from biweekly samples covering the period of November 27 through February 19, 2001 (i.e., biweekly samples collected December 11, 2001 through February 19, 2002).

^cDecember environmental radon data from the Silos exclusion fence were covered in the fourth quarterly summary for 2001 (January 2002). The December environmental radon data from all other monitors is covered under this quarterly summary.

2.0 GROUNDWATER MONITORING DATA

2.1 DATA COVERED

This quarterly summary covers all IEMP groundwater monitoring data that became available for posting to the IEMP Data Information Site during the first quarter of 2002. Specifically, this includes:

- Operational data collected from December 1, 2001 through February 28, 2002.
- All analytical data collected during the fourth quarter of 2001. This includes the South Field, South Plume, Property Boundary, Private Well, and the Waste Storage Area and Plant 6 Monitoring Programs.
- Groundwater (Great Miami Aquifer) elevations from the first quarter of 2002.

All of the data for these programs are complete in accordance with sampling requirements identified in the IEMP Revision 2 for the time periods identified.

2.2 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 Fernald Environmental Management Project (FEMP).

Notable results and events associated with IEMP groundwater monitoring data for the time period covered by this quarterly summary include:

- **Groundwater Extraction Wells:** Two wells were rehabbed and brought back online during the quarter. Extraction Well 32309 (RW-7) was shut down on December 21, 2001, and was returned to service on February 20, 2002, and Extraction Well 3926 (RW-3) was also shut down on December 21, 2001, and was returned to service on February 27, 2002. Table 2-3 provides additional operational data for these wells. South Field Extraction Well 31564 (RW-14) was shut down on December 17, 2001 to allow for soil removal activities in the vicinity of the well. As noted in the Fourth IEMP Data Quarterly Summary for 2001 (DOE 2002), the long-term disposition of this well will be addressed in the South Field Phase II Design Package to be completed in 2002.
- **Groundwater Re-Injection Wells:** The re-injection rate continued to be below the design rate during the reporting period due to residual plugging of the re-injection wells (refer to Table 2-4). However, implementation of a revised treatment process to alleviate plugging in the re-injection wells continued during the quarter. For a brief time in December, all five re-injection wells were operating. The revised treatment process appears to be economically viable in three of the five wells (22111 [IW-12], 22240 [IW-11], and 22109 [IW-10]). The other two wells (22107 [IW-8] and 22108 [IW-9]) will need to be replaced due to rapid plugging after treatment. Re-injection Well 22107 (IW-8) came online on December 3, 2001, and had to be shut down on December 25, 2001 due to plugging. Re-injection Well 22108 (IW-9) came online November 29, 2001, and was shut down on February 27, 2002 due to plugging. A project specific plan for the installation of replacement re-injection wells was submitted to EPA and OEPA on March 14, 2002 for review and approval.

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- **Waste Storage Area Phase I Groundwater Restoration Module:** Construction of the piping and infrastructure for the three new extraction wells (Extraction Wells 33061 [EW-25], 33062 [EW-27] and 33063 [EW-28]) continued through the reporting period. Pumping of the new wells has been delayed due to project electricians being moved to serve the more critical Waste Pits Remedial Action Project needs.

The Project Specific Plan for the Installation of Monitoring Wells in the Pilot Plant Drainage Ditch Plume, covering the installation of the monitoring wells for the Waste Storage Area Phase I Module was submitted for EPA/OEPA review on November 19, 2001. Installation of groundwater monitoring wells in support of the Phase I Module began in early December with the installation of four multilevel wells (Monitoring Wells 83124, 83117, 83120, and 83123). Installation of the remaining five conventional monitoring wells (Monitoring Wells 63116, 23118, 63119, 63121, and 63122) occurred in January 2002. Construction information on these wells is available on the IEMP Data Information Site. Development and sampling of the wells occurred during the quarter. Preliminary sampling results from the multilevel wells indicate the total uranium concentration in the Pilot Plant Drainage Ditch plume is greater than that interpreted from the pre-design direct push sampling data. Figure 2-1 is a revised map of this total uranium plume, based on data from the direct push sampling and the new monitoring wells.

- **Direct Push Sampling:** Direct push sampling of the aquifer was completed in two areas during the first quarter of 2002:
 - Six locations were completed in the South Plume off-property area as part of the pre-design effort for the South Plume Optimization Phase II Module. This effort has been delayed due to wet field conditions. Pre-design sampling will continue in the second quarter of 2002 and may be delayed further due to wet conditions and the planting of crops in the areas scheduled to be sampled. Results of this effort will be provided in the design report to be submitted after the sampling is completed.
 - Three locations were completed in support of the South Field Phase II Module. These locations were in the eastern portion of the South Field plume just west of the south access road. The results of this sampling were discussed during the weekly site teleconference on February 19, 2002. Based on the direct push sampling results, the revised plume interpretation has extended the plume boundary slightly to the southeast. This extension will be addressed by new extraction wells to be installed as part of the South Field Phase II Module. The design report for this module will be submitted in the second quarter of 2002.

Additional locations planned for the second quarter of 2002 include: one beneath the former Plant 6 as a result of high total uranium concentrations found in water accumulating in the basement following decontamination & dismantling of Plant 6; and one just downgradient of the old administration building well in the northern portion of the former production area. In late March 2002, uranium contaminated surface/perched water (up to 500 micrograms per liter [$\mu\text{g/L}$] total uranium) was found in the well during the initial plugging and abandonment activities.

- **Total Uranium Plume Map:** The total uranium plume map for the fourth quarter of 2002 will be included in the 2001 Site Environmental Report to be submitted June 1, 2002.
- **Monitoring Well 2027:** Due to residual plugging, plans are to replace this monitoring well with Monitoring Well 2037, which is located approximately 500 feet downgradient from Monitoring Well 2027. This will affect the Waste Storage Area and Groundwater Elevation Monitoring Programs.

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- A revised groundwater remedy performance monitoring and reporting approach was developed during the quarter. The revised approach was based on data collected under the IEMP groundwater remedy performance monitoring program since its inception in 1997. The revised approach is being discussed with EPA and OEPA and will be forwarded for their review and approval during the second quarter of 2002.

A thorough review of the groundwater monitoring data covered by this quarterly summary was conducted to identify the notable results listed above. Supplementary tables are also provided here in support of the findings. Tables 2-1 through 2-4 provide an operational summary of the groundwater extraction well performance for December 2001, and January and February 2002 as well as a summary of all pumping efforts accomplished to date. All data covered by this quarterly 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.

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TABLE 2-1

AQUIFER RESTORATION SYSTEM OPERATIONAL SUMMARY SHEET

	Reporting Period					
	December 2001 through February 2002			August 1993 through February 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	240.455	154.95	0.64	3,270.708	2,042.53	0.62
South Plume Module	192.355	44.63	0.23	6,539.818	1,356.35	0.21
Re-Injection Module	91.382	4.35	NA ^a	1,065.292	45.15	NA ^a
Aquifer Restoration Systems Totals						
Extraction Wells	432.810	199.58	0.46	9,810.526	3,398.88	0.35
(Re-Injection Wells)	<u>91.382</u>	<u>4.35</u>	NA ^a	<u>1,065.292</u>	<u>45.15</u>	NA ^a
net	341.428	195.23	NA ^a	8,745.234	3,353.73	NA ^a

^aNA = not applicable

TABLE 2-2

SOUTH FIELD (PHASE I) EXTRACTION MODULE
OPERATIONAL SUMMARY SHEET
(DECEMBER 2001 THROUGH FEBRUARY 2002)

Extraction Well	31565 ^{a,b}	31564 ^{b,c}	31566 ^{b,d}	31563	31567 ^e	31550	31560	31561	31562 ^{b,f}	32276	32447 ^{b,g}	32446 ^b
	(EW-13)	(EW-14)	(EW-15)	(EW-16)	(EW-17)	(EW-18)	(EW-19)	(EW-20)	(EW-21)	(EW-22)	(EW-23)	(EW-24)
Baseline Remedial Strategy Report Target Pumping Rates (gpm)												
	200	200	200	200	100	100	100	100	100	200	NA	NA
Average Pumping Rates (gpm)												
December	NA	124	NA	222	164	110	110	111	89	332	298	166
January	NA	NA	NA	220	276	110	110	90	286	330	292	200
February	NA	NA	NA	219	278	110	110	110	277	333	289	201
Average	NA	124	NA	220	239	110	110	104	217	332	293	189
Average Total Uranium Concentrations (µg/L)												
December	NA	11.4	7.4	20.5	28.0	35.7	47.9	56.3	89.2	119.1	151.5	66.5
January	NA	NA	10.6	22.3	26.4	43.1	50.1	52.3	84.2	120.4	155.4	69.0
February	NA	NA	12.7	22.7	27.0	43.3	48.2	49.1	84.9	121.7	157.3	69.1
Average	NA	11.4	10.2	21.8	27.1	40.7	48.7	52.6	86.1	120.4	154.7	68.2
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)												
December	NA	0.10	NA	0.17	0.23	0.30	0.40	0.47	0.74	0.99	1.26	0.55
January	NA	NA	NA	0.19	0.22	0.36	0.42	0.44	0.70	1.00	1.30	0.58
February	NA	NA	NA	0.19	0.23	0.36	0.40	0.41	0.71	1.01	1.31	0.58
Average	NA	0.10	NA	0.18	0.23	0.34	0.41	0.44	0.72	1.00	1.29	0.57
	Average Module Pumping Rate (gpm)				Water Pumped by Module (M gal)				Total Uranium Concentration from Module ^b (µg/L)			
December	1,726				77.093				74.91			
January	1,914				85.857				77.59			
February	1,927				77.505				78.82			
Average	1,856				Total 240.455				Average 77.11			

^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.

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TABLE 2-3
SOUTH PLUME MODULE
OPERATIONAL SUMMARY SHEET
(DECEMBER 2001 THROUGH FEBRUARY 2002)

Extraction Well	3924 (RW-1)	3925 (RW-2)	3926* (RW-3)	3927 (RW-4)	32308 (RW-6)	32309* (RW-7)
Baseline Remedial Strategy Report Target Pumping Rates (gpm)						
	300	300	400	400	250	250
Average Pumping Rates (gpm)						
December	295	287	195	381	289	134
January	280	279	0	494	300	0
February	<u>300</u>	<u>298</u>	<u>25</u>	<u>497</u>	<u>301</u>	<u>101</u>
Average	292	288	73	457	297	78
Average Total Uranium Concentrations (µg/L)						
December	31.1	28.1	30.5	3.4	55.4	53.6
January	29.7	28.1	NA	3.5	55.6	NA
February	<u>29.7</u>	<u>28.8</u>	<u>NA</u>	<u>3.7</u>	<u>53.3</u>	<u>55.6</u>
Average	30.2	28.3	30.5	3.5	54.8	54.6
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)						
December	0.26	0.23	0.25	0.03	0.46	0.45
January	0.25	0.23	NA	0.03	0.46	NA
February	<u>0.25</u>	<u>0.24</u>	<u>NA</u>	<u>0.03</u>	<u>0.44</u>	<u>0.46</u>
Average	0.25	0.23	0.25	0.03	0.45	0.46
	Average Module Pumping Rate (gpm)			Water Pumped by Module (M gal)		Total Uranium Concentration From Module ^b (µg/L)
December				70.584		30.11
January				60.418		25.93
February				<u>61.353</u>		<u>26.87</u>
Average	1,485		Total	192.355	Average	27.64

*NA = not applicable

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

TABLE 2-4

**RE-INJECTION MODULE
OPERATIONAL SUMMARY SHEET
(DECEMBER 2001 THROUGH FEBRUARY 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)					
December	88	131	172	171	168
January	0	137	187	186	184
February	<u>0</u>	<u>128</u>	<u>190</u>	<u>190</u>	<u>188</u>
Average	29	132	183	182	180
	Average Module Re-Injection Rate (gpm)	Water Re-Injected By Module (M gal)		Total Uranium Concentration To Module ^a (µg/L)	
December	730	32.518		6.65	
January	694	31.062		5.39	
February	<u>696</u>	<u>27.802</u>		<u>4.89</u>	
Average	707	Total	91.382	Average	5.71

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

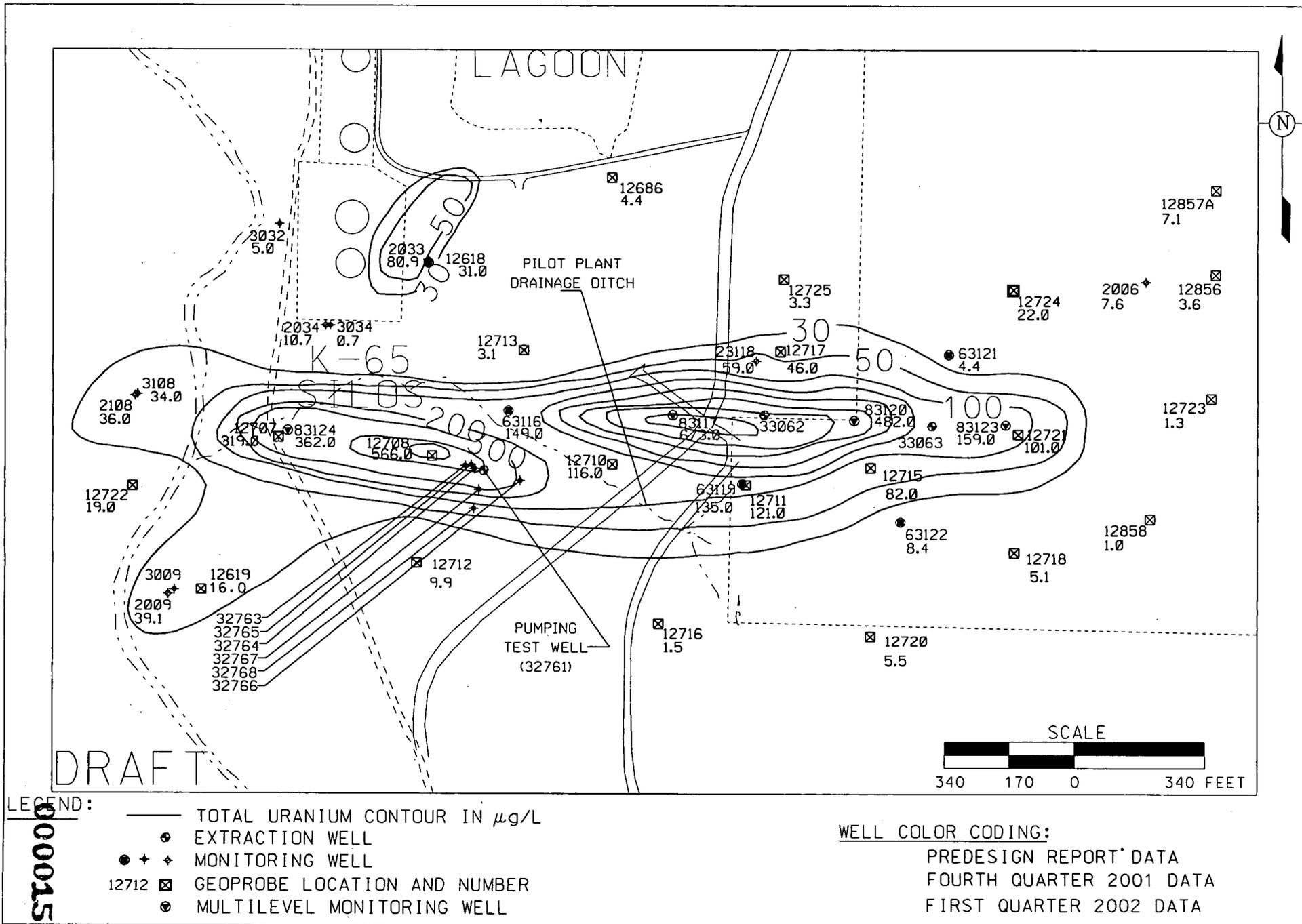


FIGURE 2-1. PILOT PLANT DRAINAGE DITCH TOTAL URANIUM PLUME

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3.0 ON-SITE DISPOSAL FACILITY MONITORING DATA

3.1 DATA COVERED

This IEMP data quarterly summary covers all on-site disposal facility monitoring data collected under the IEMP program that became available for posting to the IEMP Data Information Site during the first quarter of 2002. Specifically, this includes:

- Leachate collection system (LCS) volumes, leak detection system (LDS) volumes, and accumulation rates obtained during December 2001, and January and February 2002.
- Analytical data collected during the fourth quarter of 2001.

These data sets are complete for these time periods, 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 IEMP monitoring or remediation operations at the FEMP. Notable results and events associated with on-site disposal facility monitoring data covered by this quarterly summary include the following:

- **LDS Accumulation Rates:** The December 2001 through February 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 7.4 and 0.2 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 fourth quarter 2001 data indicated a new maximum detected total uranium concentrations as follows: Cell 2 LCS (68.6 µg/L) and horizontal till well (HTW) (3.61 µg/L) and the Cell 3 HTW (9.23 µg/L). A new maximum boron concentration was observed in the Cell 2 LCS (1.06 milligrams per liter [mg/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. During the conference call, modifications to the post-baseline sampling program were agreed upon and will be reflected in a revision the Groundwater/Leak Detection and Leachate Monitoring Plan later this year. DOE submitted formal responses to the comments on April 5, 2002. After the comments are resolved, the data package will be revised and submitted as the Groundwater Baseline Technical Memorandum.

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- **Baseline sampling for Cells 4 and 5:** Great Miami Aquifer baseline sampling began the week of November 5, 2001, and continued bimonthly through the first quarter of 2002. Baseline sampling of the HTWs began the week of February 25, 2002. During the initial pre-sample purging of the HTWs for Cells 4 and 5, the Cell 4 HTW yielded about 950 gallons before going dry and the Cell 5 HTW yielded about 3,150 gallons before going dry. The only apparent difference between the wells is that a field tile was found and broken during construction of the Cell 5 well. It appears that the field tile is recharging the well. The tile will be removed to the greatest degree possible prior to construction of the Cell 5 liner system. Baseline sampling of the Cells 4 and 5 HTWs 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 the HTWs.
- **Glacial Overburden Water Level Monitoring Wells:** Four Type 1 wells are being installed around Cell 1 in early April. These wells are being installed in order to evaluate perched water levels around the cell with respect to those found in the HTW for Cell 1 (Well 12338), and to provide a basis of comparison to the liner elevation for Cell 1. A variance to install these wells was included in the weekly report for March 4 to March 10, 2002. OEPA approved the installation of the wells on March 18, 2002.

A thorough review of the on-site disposal facility monitoring data covered by this quarterly 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 3-3 provide analytical results from the fourth quarter of 2001 for Cells 1 through 3, 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 quarterly 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 FOURTH QUARTER 2001

Note: Non-italicized pertains to total number of samples (including fourth quarter samples); *Italicized* pertains to fourth quarter samples only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	LCS ^{b,c,d,e,f} (12338C)		LDS ^{b,c,d,e} (12338D)		HTW ^{b,c,d,e} (12338)		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} (22201)		Downgradient ^{b,c,d} (22198)	
	No. of Samples		No. of Samples		No. of Samples		No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA ^g mg/L)	14/16 <i>1/1</i>	ND to 123 <i>38.1</i>	13/15 <i>1/1</i>	ND to 80.9 <i>8.52</i>	33/36 <i>1/1</i>	ND to 12.2 <i>2.39</i>	28/31 <i>1/1</i>	ND to 59.7 <i>3.05</i>	25/31 <i>0/1</i>	ND to 52.5 <i>ND</i>
Total Organic Halogens (NA ^g mg/L)	14/16 <i>1/1</i>	ND to 0.352 <i>0.205</i>	12/15 <i>1/1</i>	ND to 0.361 <i>0.0285</i>	20/35 <i>0/1</i>	ND to 0.077 <i>ND</i>	15/31 <i>0/1</i>	ND to 0.308 <i>ND</i>	9/31 <i>0/1</i>	ND to 0.0526 <i>ND</i>
Boron (0.33 mg/L)	17/17 <i>1/1</i>	0.0642 to 2.8 <i>1.27</i>	14/15 <i>1/1</i>	ND to 0.321 <i>0.245</i>	29/36 <i>1/1</i>	ND to 0.685 <i>0.0758</i>	26/31 <i>1/1</i>	ND to 0.142 <i>0.132</i>	34/47 <i>1/1</i>	ND to 0.116 <i>0.0678</i>
Mercury (0.0020 mg/L)	2/16 <i>0/1</i>	ND to 0.00047 <i>ND</i>	1/15 <i>0/1</i>	ND to 0.000072 <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/46 <i>0/1</i>	ND to ND <i>ND</i>
Technetium-99 (94 pCi/L)	5/16 <i>1/1</i>	ND to 18.28 <i>10.7</i>	1/15 <i>0/1</i>	ND to 8.92 <i>ND</i>	7/36 <i>0/1</i>	ND to 28.77 <i>ND</i>	1/31 <i>0/1</i>	ND to 13.41 <i>ND</i>	2/47 <i>0/1</i>	ND to 14.8 <i>ND</i>
Total Uranium (30 µg/L)	15/16 <i>1/1</i>	ND to 142.186 <i>105</i>	15/15 <i>1/1</i>	1.5 to 20.17 <i>10.5</i>	34/36 <i>1/1</i>	ND to 19 <i>3.03</i>	27/31 <i>1/1</i>	ND to 6.384 <i>0.606</i>	47/47 <i>1/1</i>	0.557 to 8.474 <i>5.65</i>
Alpha-chlordane (2.0 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <i>ND</i>
Bis(2-chloroisopropyl) ether (5.0 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/17 <i>0/1</i>	ND to ND <i>ND</i>	1/15 <i>0/1</i>	ND to 10 <i>ND</i>	5/36 <i>0/1</i>	ND to 10 <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <i>ND</i>
Carbazole (11 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/17 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^g µg/L)	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>
4-Nitroaniline (NA ^g µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>
Tetrachloroethene (NA ^g µg/L)	0/17 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	1/31 <i>0/1</i>	ND to 10 <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>
Trichloroethene (5.0 µg/L)	0/17 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/47 <i>0/1</i>	ND to ND <i>ND</i>
Vinyl Chloride (2.0 µg/L)	0/17 <i>0/1</i>	ND to ND <i>ND</i>	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/36 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/1</i>	ND to ND <i>ND</i>	0/32 <i>0/1</i>	ND to ND <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

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

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

^gNA = not applicable

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TABLE 3-2

ON-SITE DISPOSAL FACILITY CELL 2 DATA SUMMARY FOR FOURTH QUARTER 2001

Note: Non-italicized pertains to total number of samples (including fourth quarter samples); *Italicized* pertains to fourth quarter samples 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 with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA ^h mg/L)	9/13 <i>1/1</i>	ND to 6.25 <i>3.7</i>	12/13 <i>1/1</i>	ND to 26.1 <i>3.17</i>	29/34 <i>1/1</i>	ND to 11.1 <i>2.65</i>	24/26 <i>1/1</i>	ND to 47.6 <i>2.17</i>	20/26 <i>0/1</i>	ND to 51.8 <i>ND</i>
Total Organic Halogens (NA ^h mg/L)	5/13 <i>0/1</i>	ND to 0.0576 <i>ND</i>	5/13 <i>0/1</i>	ND to 0.138 <i>ND</i>	22/34 <i>1/1</i>	ND to 0.101 <i>0.0109</i>	12/26 <i>0/1</i>	ND to 0.177 <i>ND</i>	10/26 <i>0/1</i>	ND to 0.386 <i>ND</i>
Boron (0.33 mg/L)	13/14 <i>1/1</i>	ND to 1.06 <i>1.06</i>	13/13 <i>1/1</i>	0.289 to 2.22 <i>0.343</i>	22/34 <i>1/1</i>	ND to 0.0829 <i>0.0529</i>	18/26 <i>1/1</i>	ND to 0.158 <i>0.0665</i>	19/26 <i>1/1</i>	ND to 0.0569 <i>0.0566</i>
Mercury (0.0020 mg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	2/33 <i>0/1</i>	ND to 0.00037 <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>
Technetium-99 (94 pCi/L)	1/13 <i>0/1</i>	ND to 21.25 <i>ND</i>	1/13 <i>0/1</i>	ND to 15.99 <i>ND</i>	5/35 <i>0/1</i>	ND to 12 <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Total Uranium (30 µg/L)	13/13 <i>1/1</i>	4.51 to 68.6 <i>68.6</i>	13/13 <i>1/1</i>	8.69 to 71 <i>8.69</i>	34/35 <i>1/1</i>	ND to 3.61 <i>3.61</i>	16/26 <i>1/1</i>	ND to 1.11 <i>0.287</i>	26/26 <i>1/1</i>	0.259 to 12.1 <i>0.499</i>
Alpha-chlordane (2.0 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Bis(2-chloroisopropyl)ether (5.0 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	1/34 <i>0/1</i>	ND to 10 <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Carbazole (11 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^h µg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
4-Nitroaniline (NA ^h µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Tetrachloroethene (NA ^h µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Trichloroethene (5.0 µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>
Vinyl Chloride (2.0 µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/34 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/1</i>	ND to ND <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

^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 FOURTH QUARTER 2001

Note: Non-italicized pertains to total number of samples (including fourth quarter samples); *Italicized* pertains to fourth quarter samples only. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) ^a	LCS ^{b,c,d,e,f} (12340C)		HTW ^{b,c,d,e} (12340)		Great Miami Aquifer			
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	Upgradient ^{b,c,d} (22203)		Downgradient ^{b,c,d} (22204)	
	No. of Samples		No. of Samples		No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA ^g mg/L)	7/10 <i>1/1</i>	ND to 34.2 <i>1.92</i>	20/29 <i>1/1</i>	ND to 9.81 <i>2.62</i>	13/24 <i>1/1</i>	ND to 14.1 <i>2.26</i>	12/24 <i>0/1</i>	ND to 8.83 <i>ND</i>
Total Organic Halogens (NA ^g mg/L)	3/10 <i>0/1</i>	ND to 0.178 <i>ND</i>	22/29 <i>1/1</i>	ND to 0.158 <i>0.00822</i>	10/24 <i>0/1</i>	ND to 0.213 <i>ND</i>	9/25 <i>0/1</i>	ND to 0.165 <i>ND</i>
Boron (0.33 mg/L)	10/10 <i>1/1</i>	0.109 to 1.51 <i>0.35</i>	24/28 <i>1/1</i>	ND to 0.24 <i>0.135</i>	16/24 <i>1/1</i>	ND to 0.0776 <i>0.0558</i>	17/24 <i>1/1</i>	ND to 0.179 <i>0.0498</i>
Mercury (0.0020 mg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	1/28 <i>0/1</i>	ND to 0.00026 <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	2/23 <i>0/1</i>	ND to 0.00028 <i>ND</i>
Technetium-99 (94 pCi/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	2/28 <i>0/1</i>	ND to 38.35 <i>ND</i>	1/24 <i>0/1</i>	ND to 22.92 <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Total Uranium (30 µg/L)	10/10 <i>1/1</i>	9.27 to 58.582 <i>43.4</i>	26/28 <i>1/1</i>	ND to 9.23 <i>9.23</i>	19/24 <i>1/1</i>	ND to 4.75 <i>1.7</i>	22/24 <i>1/1</i>	ND to 5.924 <i>0.571</i>
Alpha-chlordane (2.0 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/29 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Bis(2-chloroisopropyl) ether (5.0 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/29 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Carbazole (11 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/29 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^g µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
4-Nitroaniline (NA ^g µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/29 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Tetrachloroethene (NA ^g µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Trichloroethene (5.0 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>
Vinyl Chloride (2.0 µg/L)	0/10 <i>0/1</i>	ND to ND <i>ND</i>	0/28 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/24 <i>0/1</i>	ND to ND <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; LCS = leachate collection system

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

^gNA = not applicable

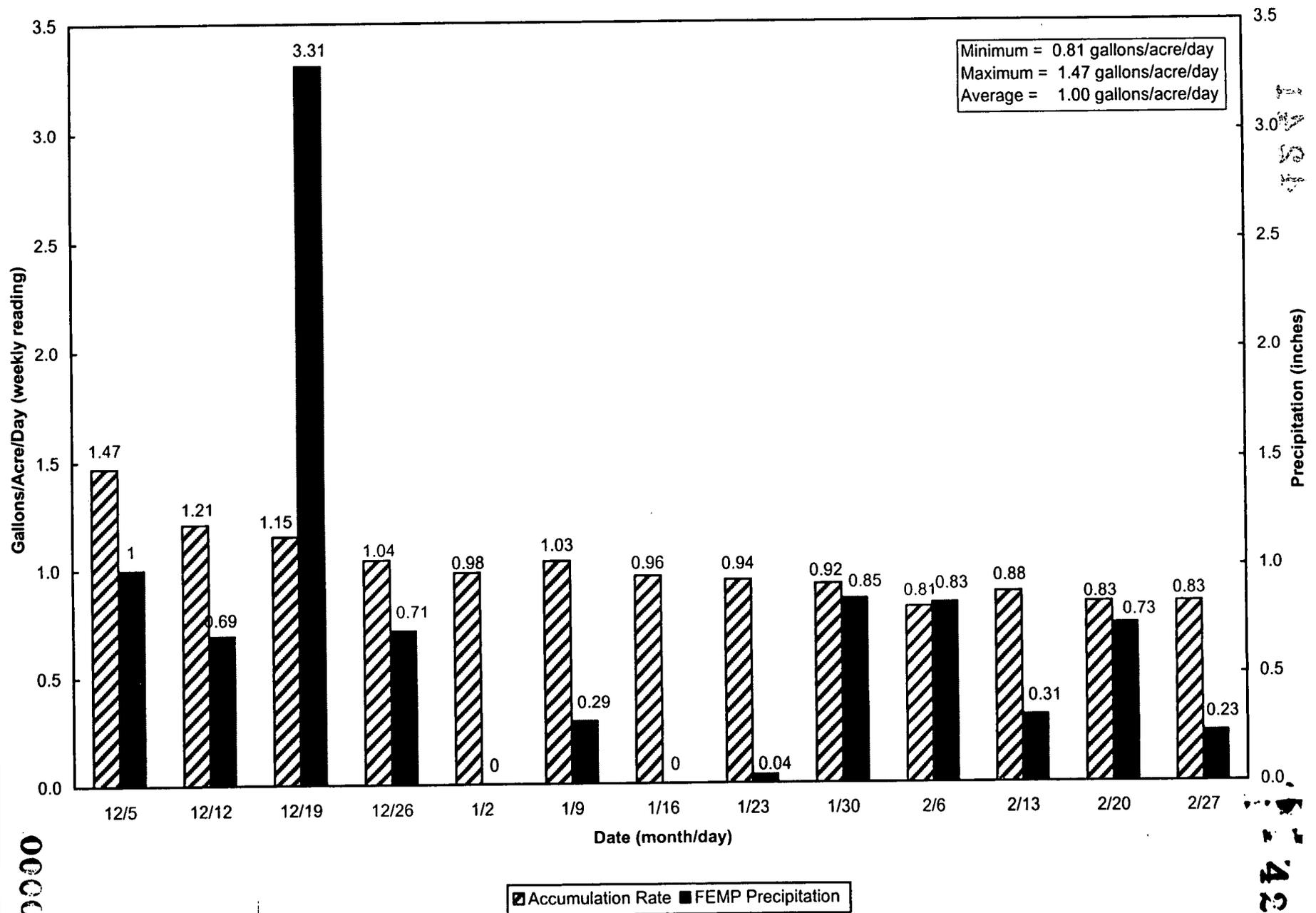


FIGURE 3-1. DECEMBER 2001 THROUGH FEBRUARY 2002 ON-SITE DISPOSAL FACILITY
LDS ACCUMULATION RATES FOR CELL 1

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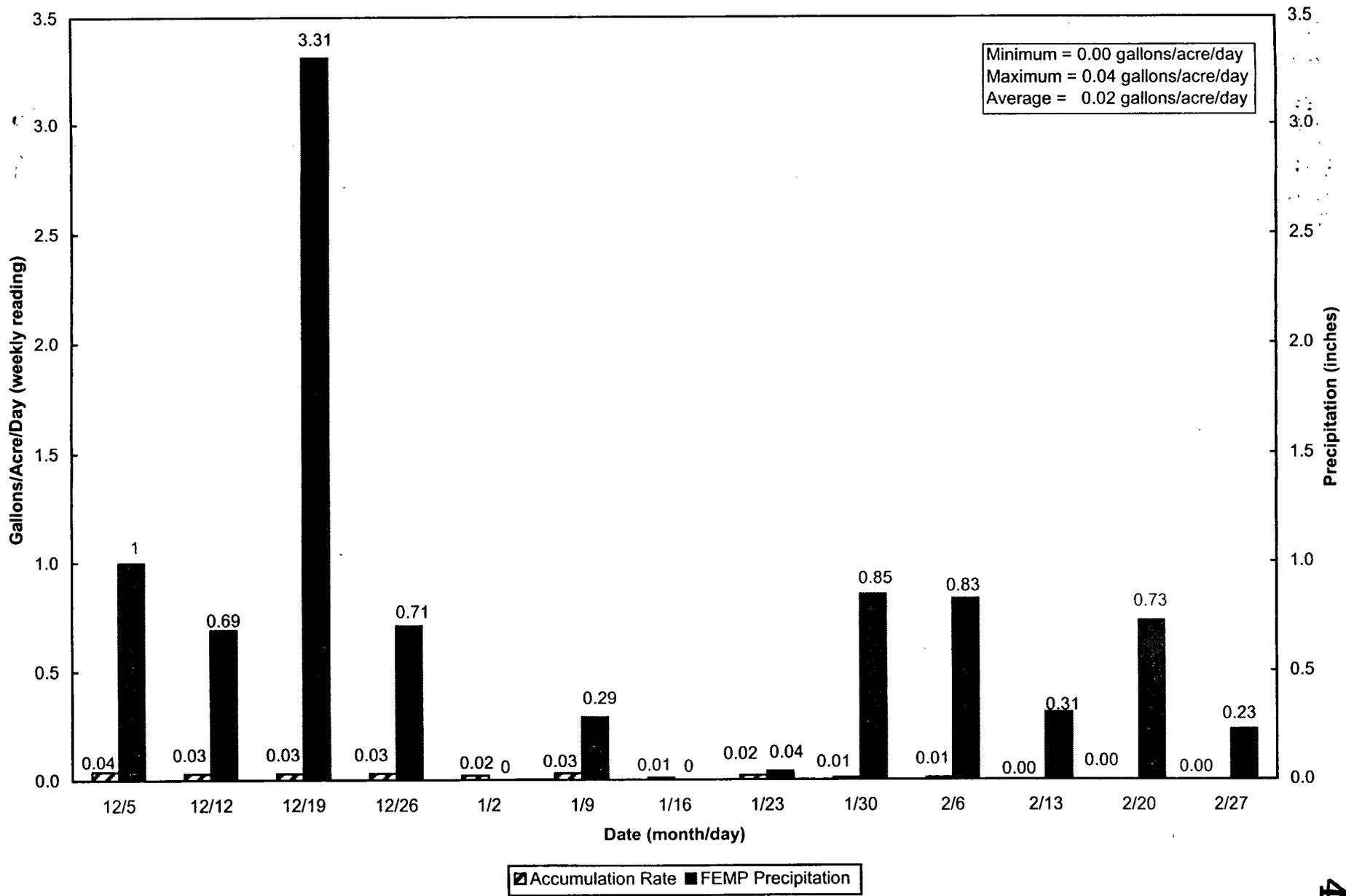


FIGURE 3-2. DECEMBER 2001 THROUGH FEBRUARY 2002 ON-SITE DISPOSAL FACILITY
LDS ACCUMULATION RATES FOR CELL 2

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4.0 SURFACE WATER MONITORING DATA

4.1 DATA COVERED

This IEMP data quarterly summary covers all surface water monitoring data collected under the IEMP program that became available for posting to the IEMP Data Information Site during the first quarter of 2002. Specifically, this includes:

- National Pollutant Discharge Elimination System (NPDES) data collected during December 2001, and January and February 2002
- Federal Facilities Compliance Agreement (FFCA) data collected during December 2001, and January and February 2002
- IEMP characterization monitoring data collected during the fourth quarter of 2001
- Turbidity monitoring in Paddys Run (as related to the Sloan's crayfish population) information obtained during the first quarter of 2002.

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

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: The following table lists the NPDES noncompliances that occurred and were reported to OEPA, as required, during the period under evaluation.

Date	Location	Parameter	Limit	Result
12/14/01	PF 4001	CBOD-5 day	14 mg/L	26.3 mg/L
12/14/01	PF 4001	CBOD-5 day	315 kg/d	447.0 kg/d
12/17/01	STP 4601	TSS	40 mg/L	50.4 mg/L
Dec. 2001	STP 4601	TSS (monthly avg.)	20 mg/L	26.8 mg/L

- FFCA/Record of Decision compliance: The FEMP began implementing the new uranium limit of 30 µg/L at the Parshall Flume (PF 4001) in accordance with the Operable Unit 5 Explanation of Significant Differences approved by EPA on November 30, 2001. The monthly average total uranium concentration of 30 µg/L was met every month in the reporting period. The monthly average for December of 25.7 µg/L was achieved by accounting for one storm water bypass day during the storm water bypass event that occurred from December 17 through December 19, 2001.

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Compliance with the 600 pounds per year limit of uranium discharged to the Great Miami River was achieved during 2001. At the end of December 2001, the total mass of uranium discharged was 353.31 pounds.

- IEMP Final Remediation Level (FRL)/benchmark toxicity value (BTV) exceedances: There were no FRL exceedances and two BTV exceedances identified in data covered under this report (refer to Section 4.1) that may be attributable to the FEMP. The two BTV exceedances were for cadmium at the Parshall Flume (PF 4001), and occurred on December 19, 2001 and February 18, 2002. After applying the mixing equation, the cadmium concentration in the river was 0.0098 mg/L for both events, 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 was also a lead concentration of 0.0176 mg/L at location SWR-01. However, this result was from a duplicate sample, and the lead concentration in the normal sample was a non-detect at 0.00202 mg/L. In any event, SWR-01 is a background location, it is not under the influence of FEMP drainages, and is not a reportable FRL exceedance.
- Sampling for the NPDES Permit Renewal Application was accomplished during January, February, and March 2002. Analytical data are under review and will be made available when the application has been submitted to OEPA on or before May 5, 2002.
- Ten observations were made for turbidity impacts from the northern drainage ditch on Paddys Run (as related to the Sloan's crayfish population) during the first quarter of 2002. No incidents of increased downstream turbidity were observed in Paddys Run during this period.

A thorough review of the surface water monitoring data covered in this quarterly 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 through the end of 2001, plus the first two months of 2002. Figure 4-2 shows the December 2001, January 2002, and February 2002 monthly average total uranium concentrations in water discharged from the Parshall Flume. All data covered by this quarterly 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.

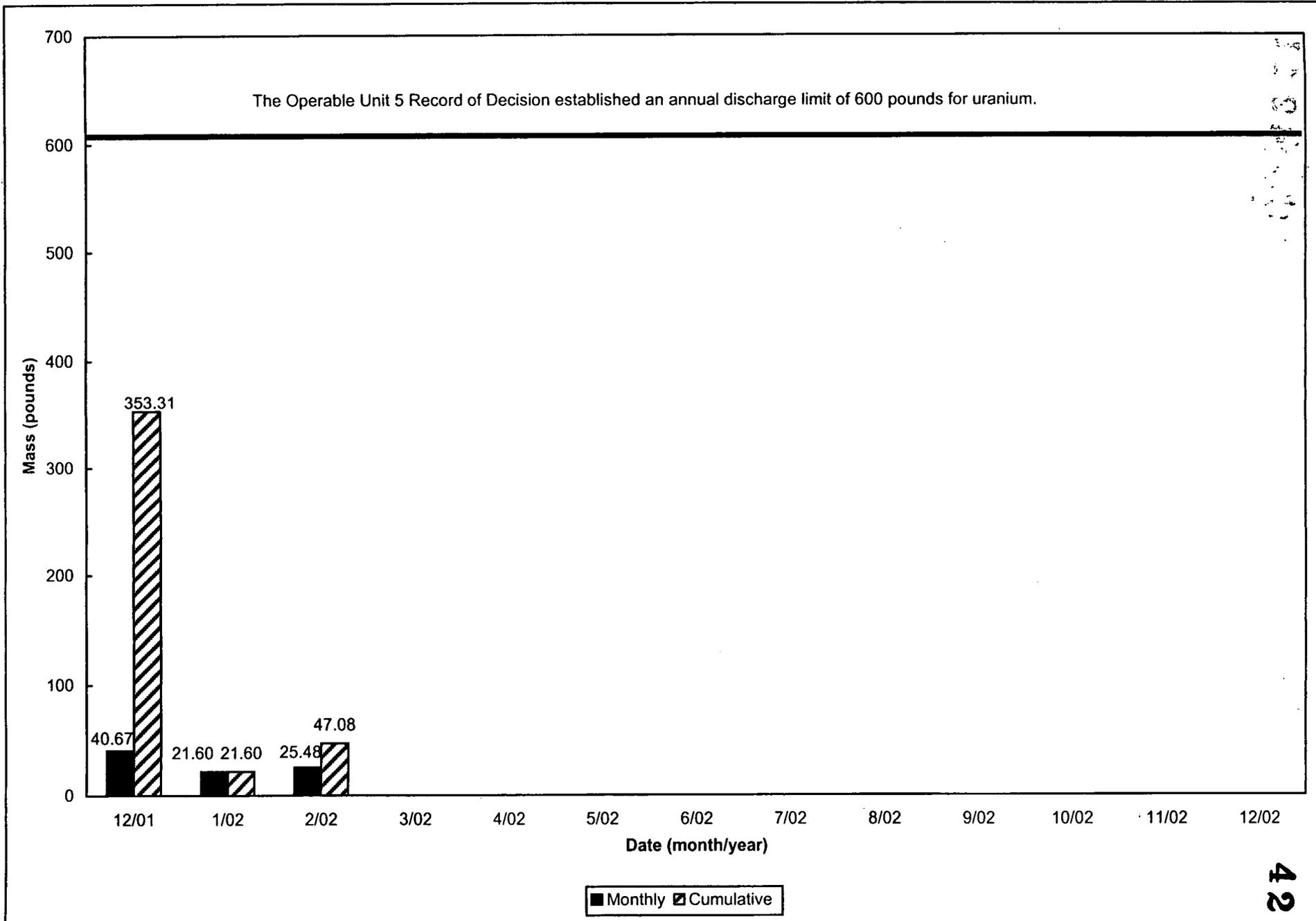
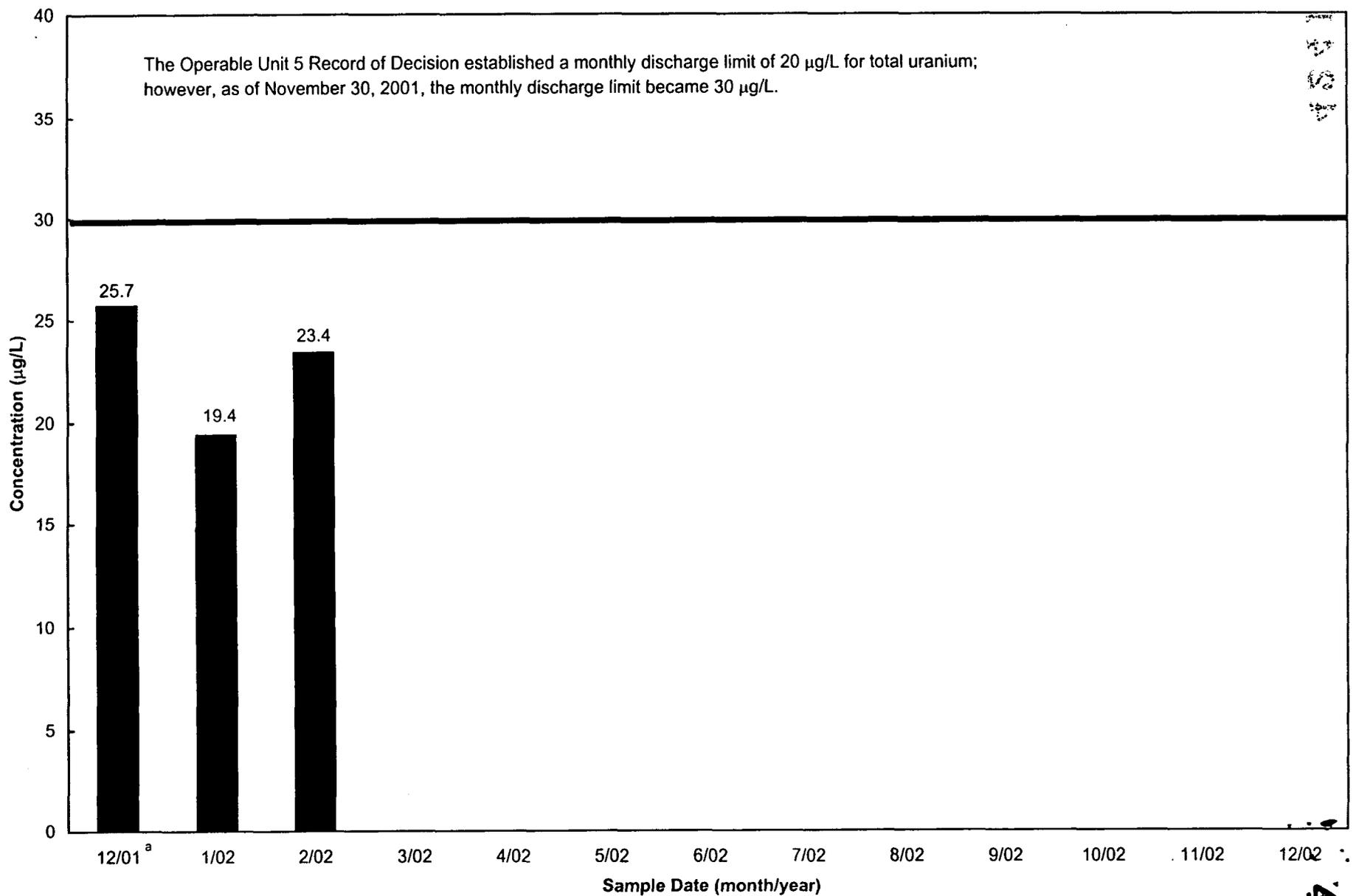


FIGURE 4-1. POUNDS OF URANIUM DISCHARGED TO THE GREAT MIAMI RIVER FROM THE PARSHALL FLUME (PF 4001) IN DECEMBER 2001 THROUGH FEBRUARY 2002

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^aActual concentration was 30.7 µg/L. Eliminating 1 "significant precipitation" bypass day reduces average to 25.7 µg/L.

FIGURE 4-2. DECEMBER 2001 THROUGH FEBRUARY 2002 MONTHLY AVERAGE TOTAL URANIUM CONCENTRATION IN WATER DISCHARGED FROM THE PARSHALL FLUME (PF 4001) TO THE GREAT MIAMI RIVER

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5.0 AIR MONITORING DATA

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5.1 DATA COVERED

This IEMP data quarterly summary covers all air monitoring data collected under the IEMP program that became available for posting to the IEMP Data Information Site during the first quarter of 2002.

Specifically, this includes:

- Radiological air particulate monitoring results from biweekly samples covering the period of November 27, 2001 through February 19, 2002 (i.e., biweekly samples collected December 11, 2001 through February 19, 2002). The biweekly sample results for the fourth quarter of 2001, the most recent full calendar quarter of data available, are compiled in table form (Tables 5-3 through 5-7) for the purpose of comparison to previous calendar quarters.
- Radiological air particulate monitoring quarterly composite samples collected during the fourth quarter of 2001 for National Emissions Standards for Hazardous Air Pollutants (NESHAP) compliance purposes
- NESHAP stack emissions monitoring samples collected during the fourth quarter of 2001
- All environmental radon monitoring data collected from January 1 through March 31, 2002; as well as December 2001 environmental radon monitoring data from monitors other than the Silo exclusion fence monitors. December 2001 data from the Silo exclusion fence monitors were covered in the previous quarterly summary (January 2002).
- Silos headspace radon concentrations data collected from January 1 through March 31, 2002
- Direct radiation (thermoluminescent dosimeter [TLD]) monitoring data collected during the fourth quarter of 2001.

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

5.2 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 IEMP air monitoring data for the time period covered by this quarterly summary include the following:

- Figures 5-1 through 5-6 illustrate, in comparison to biweekly data reported in the Fourth IEMP Data Quarterly Summary for 2001, that there was a relative increase in uranium and thorium-230 concentrations at the site fenceline during the period from November 27, 2001 to February 19, 2002. Per the data evaluation criteria of the IEMP, the impact of the higher concentrations has been evaluated with respect to the NESHAP annual limit of 10 millirem (mrem)/year. After accounting for the relative increase in uranium and thorium-230 concentrations, the projected annual dose for 2002 is well below 10 mrem. The higher uranium concentrations are attributed to size reducing contaminated material near the on-site 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. The higher thorium-230 concentrations are primarily attributed to fugitive emissions from the Waste Pits Remedial Action Project.

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- The maximum fourth quarter 2001 dose at the site fenceline air monitoring stations, as determined from quarterly composite samples, was 0.27 mrem as summarized in Table 5-1. The maximum 2001 annual dose at the site fenceline air monitoring stations (AMS-3) was 0.8 mrem as summarized in Table 5-2. On average, thorium isotopes contributed approximately 57 percent of the year-to-date dose measured at all air monitors. In particular, thorium-230 contributed 47 percent of the dose, while uranium and radium-226 contributed an average of approximately 29 percent and 12 percent, respectively.
- 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). During the fourth quarter of 2001, a slight increase in the direct radiation measurements in the vicinity of the K-65 Silos and at location 6 was again observed, as shown on Figures 5-7 and 5-8.
- During the first quarter of 2002, Silo 1 headspace radon concentrations (Figure 5-9) continued to increase as it has for the previous three quarters, while Silo 2 concentrations were comparable to concentrations measured during the fourth quarter of 2001.
- During the period of January 2002 through March 2002, there were five exceedance events. For comparison, there were no exceedance events of the 100 picoCurie per liter (pCi/L) radon limit during the January 2001 through March 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 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 lead 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).

A thorough review of the air monitoring data covered by this quarterly summary was conducted to identify the notable results. Supplementary tables and figures are also provided in support of the information above. Table 5-1 contains the fourth quarter 2001 doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 5-2 contains the 2001 annual doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Tables 5-3 through 5-7 summarize the biweekly total uranium, total particulate and isotopic thorium concentrations from the fourth quarter of 2001. Tables 5-3 through 5-7 also include 2001 annual summary results and 1990 through 2000 summary results. Table 5-8 summarizes the environmental radon data from continuous monitors from December 2001 through March 2002 and the annual summary results for 2001. All data covered by this quarterly 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

FOURTH QUARTER 2001 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	2.9E-07	7.1E-06	--	1.8E-04	7.4E-05	3.1E-03	2.4E-09	1.7E-03	8.0E-06	1.8E-03	9.6E-05	2.1E-03	0.009	0.091
AMS-3	5.2E-07	1.3E-05	5.7E-04	3.3E-04	3.7E-04	1.3E-02	8.2E-09	3.1E-03	1.9E-05	4.5E-03	3.2E-04	5.1E-03	0.027	0.273
AMS-4	7.4E-08	1.8E-06	--	4.6E-05	--	1.4E-03	5.6E-10	4.4E-04	1.4E-06	3.0E-04	2.2E-05	3.6E-04	0.003	0.026
AMS-5	--	--	--	--	--	5.2E-04	2.4E-10	--	2.0E-06	6.2E-04	9.2E-06	5.2E-04	0.002	0.017
AMS-6	2.1E-08	5.1E-07	--	1.3E-05	--	2.2E-03	3.4E-10	1.2E-04	3.5E-06	7.8E-04	1.3E-06	9.3E-04	0.004	0.041
AMS-7	4.6E-08	1.1E-06	1.1E-03	2.9E-05	--	9.5E-04	--	2.7E-04	1.1E-06	2.5E-04	--	3.0E-04	0.003	0.029
AMS-8A	5.0E-07	1.2E-05	1.9E-03	3.2E-04	5.0E-04	8.1E-03	8.6E-09	3.0E-03	1.9E-05	4.7E-03	3.4E-04	4.9E-03	0.024	0.239
AMS-9C	4.8E-07	1.2E-05	2.5E-03	3.0E-04	8.5E-04	8.3E-03	1.4E-08	2.8E-03	1.7E-05	4.4E-03	5.4E-04	4.4E-03	0.024	0.242
AMS-22	4.4E-08	1.1E-06	5.6E-04	2.8E-05	--	4.3E-03	9.4E-10	2.6E-04	4.8E-06	8.3E-04	3.7E-05	1.3E-03	0.007	0.073
AMS-23	3.1E-08	7.6E-07	9.9E-04	1.9E-05	--	3.0E-03	2.6E-09	1.8E-04	6.0E-06	1.5E-03	1.0E-04	1.6E-03	0.007	0.074
AMS-24	2.4E-08	5.9E-07	--	1.5E-05	--	7.3E-04	3.8E-11	1.4E-04	6.3E-07	2.7E-04	1.5E-06	1.7E-04	0.001	0.013
AMS-25	--	--	--	--	--	1.4E-04	--	--	1.4E-07	1.3E-05	--	3.6E-05	0.000	0.002
AMS-26	--	--	--	--	--	9.5E-04	8.5E-10	--	1.4E-06	4.4E-04	3.3E-05	3.8E-04	0.002	0.018
AMS-27	2.1E-07	5.3E-06	--	1.3E-04	4.6E-05	2.2E-03	2.5E-10	1.3E-03	2.0E-06	5.8E-04	9.7E-06	5.4E-04	0.005	0.048
AMS-28	2.4E-07	5.8E-06	--	1.5E-04	1.0E-04	4.9E-03	2.5E-09	1.4E-03	4.5E-06	7.4E-04	9.9E-05	1.2E-03	0.009	0.086
AMS-29	9.1E-08	2.3E-06	3.8E-04	5.7E-05	1.5E-04	3.9E-03	1.9E-09	5.4E-04	4.2E-06	1.5E-03	7.4E-05	1.1E-03	0.008	0.077
Background														
AMS-12	2.3E-07	5.6E-06	1.1E-02	1.4E-04	6.5E-04	6.7E-04	--	1.4E-03	1.2E-06	2.4E-04	--	3.1E-04	NA ^d	
AMS-16	6.3E-07	1.5E-05	1.1E-02	3.9E-04	1.1E-03	1.1E-03	9.6E-10	3.7E-03	1.6E-06	2.7E-04	3.8E-05	4.1E-04	NA ^d	
QA/QC														
Column Check ^e	0.000	0.001	0.080	0.016	0.021	0.577	0.000	0.153	0.001	0.232	0.017	0.250	NA ^d	1.35

Maximum Quarterly Ratio: 0.027

Maximum Quarterly Dose (mrem): 0.27

^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 (1.35) at all fenceline monitors.

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TABLE 5-2

2001 ANNUAL 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	8.1E-07	2.0E-05	--	5.1E-04	1.0E-03	1.0E-02	8.5E-09	4.8E-03	2.2E-05	5.1E-03	3.3E-04	5.9E-03	0.028	0.281
AMS-3	1.3E-06	3.2E-05	6.6E-03	8.2E-04	2.2E-03	3.0E-02	2.6E-08	7.8E-03	5.5E-05	1.3E-02	1.0E-03	1.5E-02	0.076	0.758
AMS-4	4.2E-08	1.0E-06	--	2.6E-05	5.5E-04	4.1E-03	7.5E-10	2.5E-04	5.9E-06	1.2E-03	2.9E-05	1.6E-03	0.008	0.078
AMS-5	--	--	1.5E-02	--	2.3E-04	5.5E-03	3.1E-10	--	6.8E-06	1.5E-03	1.2E-05	1.8E-03	0.024	0.243
AMS-6	1.3E-07	3.2E-06	--	8.0E-05	5.0E-04	1.6E-02	4.5E-10	7.7E-04	1.3E-05	2.7E-03	1.7E-05	3.5E-03	0.024	0.239
AMS-7	1.6E-07	4.1E-06	--	1.0E-04	1.4E-04	6.0E-03	--	9.8E-04	4.9E-06	1.1E-03	--	1.3E-03	0.010	0.096
AMS-8A	1.7E-06	4.1E-05	4.5E-03	1.0E-03	3.1E-03	2.4E-02	2.3E-08	1.0E-02	5.2E-05	1.2E-02	9.0E-04	1.4E-02	0.070	0.698
AMS-9C	1.3E-06	3.2E-05	--	8.1E-04	2.1E-03	2.6E-02	3.0E-08	7.7E-03	5.4E-05	1.3E-02	1.2E-03	1.4E-02	0.065	0.649
AMS-22	5.7E-07	1.4E-05	3.7E-03	3.5E-04	7.0E-04	1.8E-02	7.0E-09	3.4E-03	2.0E-05	4.0E-03	2.7E-04	5.4E-03	0.036	0.360
AMS-23	2.6E-07	6.5E-06	3.4E-03	1.7E-04	3.9E-04	1.1E-02	7.4E-09	1.6E-03	1.7E-05	3.7E-03	2.9E-04	4.6E-03	0.025	0.250
AMS-24	--	--	6.5E-03	--	2.5E-05	3.9E-03	1.0E-09	--	3.7E-06	9.2E-04	3.9E-05	9.7E-04	0.012	0.124
AMS-25	--	--	--	--	--	5.1E-03	1.3E-09	--	2.7E-06	5.8E-04	5.1E-05	7.2E-04	0.006	0.064
AMS-26	--	--	1.0E-03	--	4.0E-05	7.5E-03	5.6E-09	--	1.1E-05	2.4E-03	2.2E-04	2.9E-03	0.014	0.140
AMS-27	7.8E-07	1.9E-05	3.5E-03	4.9E-04	8.0E-04	7.2E-03	3.9E-09	4.6E-03	7.8E-06	1.6E-03	1.5E-04	2.1E-03	0.020	0.204
AMS-28	7.4E-07	1.8E-05	--	4.7E-04	1.1E-03	1.9E-02	7.5E-09	4.4E-03	1.7E-05	2.9E-03	2.9E-04	4.6E-03	0.033	0.332
AMS-29	3.9E-07	9.6E-06	6.6E-03	2.4E-04	9.5E-04	1.5E-02	1.0E-08	2.3E-03	1.7E-05	4.4E-03	3.9E-04	4.5E-03	0.035	0.348
Background														
AMS-12	1.1E-06	2.6E-05	4.4E-02	6.7E-04	1.6E-03	2.2E-03	--	6.4E-03	3.4E-06	9.1E-04	--	8.9E-04	NA ^d	
AMS-16	1.9E-06	4.8E-05	5.0E-02	1.2E-03	2.8E-03	2.8E-03	1.7E-09	1.2E-02	5.0E-06	1.2E-03	6.5E-05	1.3E-03	NA ^d	
QA/QC														
Column														
Check ^e	0.000	0.002	0.512	0.051	0.139	2.090	0.000	0.486	0.003	0.706	0.052	0.822	NA ^d	4.86

Maximum Year-To-Date Ratio: 0.076
Maximum Year-To-Date Dose (mrem): 0.8

^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 (4.86) at all fenceline monitors.

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TABLE 5-3

TOTAL URANIUM PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Fourth Quarter 2001 Results ^a (October - December) (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	6	56	433	208	26	19	433	127	0.0	3500
AMS-3	6	122	509	351	26	53	908	260	0.0	17000
AMS-4	6	7.5	87	46	26	0.0	105	46	0.0	2300
AMS-5	6	28	100	48	26	13	139	51	0.0	4400
AMS-6	6	38	136	73	26	13	257	79	0.0	3200
AMS-7	6	31	60	43	26	0.0	102	46	0.0	7800
AMS-8A	6	148	602	357	26	57	928	266	0.0	1135
AMS-9C ^b	6	286	779	449	26	63	989	290	0.0	784
AMS-22	6	24	285	111	26	0.0	743	111	0.0	238
AMS-23	6	44	169	86	26	24	191	82	0.0	202
AMS-24	6	23	44	31	26	7.6	87	38	0.0	207
AMS-25	6	2.6	52	24	26	2.6	88	35	0.0	402
AMS-26	6	23	81	52	26	19	340	74	0.0	267
AMS-27	6	27	91	64	26	2.7	117	57	0.0	170
AMS-28	6	46	165	94	26	23	239	93	0.0	445
AMS-29	6	21	177	88	26	7.6	314	88	0.0	326
Background										
AMS-12	6	17	47	26	26	0.0	53	19	0.0	480
AMS-16	6	16	48	27	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 5-4

TOTAL PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Fourth Quarter 2001 Results (October - December) ($\mu\text{g}/\text{m}^3$)			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	6	17	40	32	26	17	61	34	7.0	77
AMS-3	6	16	31	25	26	16	53	30	8.0	159
AMS-4	6	17	34	28	26	17	52	33	13	79
AMS-5	6	15	30	25	26	15	48	29	9.6	62
AMS-6	6	18	44	28	26	18	53	32	8.0	69
AMS-7	6	16	35	28	26	3.0	55	32	6.8	84
AMS-8A	6	17	42	32	26	17	57	34	13	89
AMS-9C ^a	6	15	34	27	26	15	62	32	7.1	136
AMS-22	6	17	33	25	26	17	54	32	13	57
AMS-23	6	15	28	24	26	15	71	30	11	57
AMS-24	6	19	38	31	26	15	51	33	5.4	79
AMS-25	6	18	25	22	26	18	54	30	17	69
AMS-26	6	17	30	24	26	17	46	28	15	52
AMS-27	6	38	75	55	26	19	82	50	16	92
AMS-28	6	13	26	21	26	5.8	69	29	12	68
AMS-29	6	7.6	36	24	26	7.6	53	32	11	62
Background										
AMS-12 ^b	6	14	37	27	26	14	49	29	6.0	416
AMS-16 ^b	6	23	45	35	26	17	62	39	18	84
Project-Specific										
WPTH-2	6	22	77	40	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.

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TABLE 5-5

THORIUM-228 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Fourth Quarter 2001 Results* (October - December) (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	6	6.5	20	14	26	0.0	20	8.1	0.8	10
AMS-3	6	5.0	25	16	26	2.2	25	12	1.1	10
AMS-4	6	4.1	17	12	26	0.0	22	7.8	0.0	8.6
AMS-5	6	2.7	13	8.2	26	0.0	14	5.7	0.0	6.1
AMS-6	6	5.3	14	9.9	26	0.0	16	7.3	0.0	8.1
AMS-7	6	3.3	15	9.9	26	0.0	17	6.9	4.4	11
AMS-8A	6	4.0	39	18	26	0.0	39	11	1.2	13
AMS-9C ^b	6	4.9	27	18	26	0.0	28	12	3.0	13
AMS-22	6	4.2	30	14	26	0.0	30	8.7	1.4	8.6
AMS-23	6	3.1	14	10	26	0.0	22	6.6	0.0	7.6
AMS-24	6	0.0	13	6.5	26	0.0	15	6.0	0.38	7.5
AMS-25	6	3.7	13	8.0	26	0.0	13	6.2	0.0	6.7
AMS-26	6	1.4	12	8.4	26	0.0	24	6.6	2.6	14
AMS-27	6	0.7	22	12	26	0.0	22	9.5	0.37	7.4
AMS-28 ^c	6	3.7	16	10	26	0.0	39	8.8	0.0	14
AMS-29	6	0.4	14	8.0	26	0.0	20	8.3	0.0	7.1
Background										
AMS-12	6	0.4	17	9.5	26	0.0	17	5.6	0.0	6.7
AMS-16	6	5.5	19	11	26	0.0	19	8.1	0.0	17
Project Specific										
WPTH-2	6	6.9	17	12	26	0.0	28	8.9	0.0	17

*For 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.

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TABLE 5-6

THORIUM-230 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Fourth Quarter 2001 Results ^a (October – December) (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	6	42	92	58	26	0.0	104	39	3.1	27
AMS-3	6	52	744	213	26	0.0	744	115	3.4	63
AMS-4	6	4.3	91	33	26	0.0	91	27	0.0	23
AMS-5	6	6.1	48	29	26	0.0	620	46	0.0	43
AMS-6	6	9.0	85	42	26	0.0	226	43	0.0	74
AMS-7	6	13	39	23	26	0.0	74	19	0.0	44
AMS-8A	6	76	179	126	26	5.1	461	91	6.3	71
AMS-9C ^b	6	47	252	136	26	3.2	407	95	12	78
AMS-22	6	0.4	198	67	26	0.37	493	70	12	46
AMS-23	6	3.1	125	52	26	0.0	153	44	1.5	19
AMS-24	6	0.0	17	9.4	26	0.0	125	18	3.4	24
AMS-25	6	0.0	22	8.6	26	0.0	223	20	0.37	23
AMS-26	6	6.5	39	25	26	0.0	233	30	2.6	37
AMS-27	6	14	57	37	26	0.0	126	32	0.0	99
AMS-28 ^c	6	16	123	71	26	5.1	401	67	0.0	357
AMS-29	6	4.2	66	30	26	0.0	537	50	6.1	45
Background										
AMS-12	6	3.9	16	9.4	26	0.0	42	8.6	0.0	9.3
AMS-16	6	1.1	38	21	26	0.0	38	10	0.0	18
Project Specific										
WPTH-2	6	26	88	50	26	12	110	53	0.73	557

^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.

TABLE 5-7

THORIUM-232 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Fourth Quarter 2001 Results ^a (October – December) (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	6	5.1	17	12	26	0.0	19	8.4	0.0	8.6
AMS-3	6	3.4	21	12	26	0.0	23	9.9	0.0	9.8
AMS-4	6	3.3	8.2	5.6	26	0.0	22	5.7	0.0	9.3
AMS-5	6	0.0	25	7.9	26	0.0	25	5.8	0.0	9.1
AMS-6	6	1.1	11	5.8	26	0.0	22	5.8	0.0	8.1
AMS-7	6	0.0	10	5.9	26	0.0	16	5.4	0.38	12
AMS-8A	6	2.9	33	15	26	1.1	33	11	0.0	8.4
AMS-9C ^b	6	0.0	23	12	26	0.0	34	12	1.8	11
AMS-22	6	0.0	12	8.2	26	0.0	35	8.0	0.0	6.5
AMS-23	6	1.2	22	8.2	26	0.0	75	9.3	0.0	5.2
AMS-24	6	0.0	9.2	4.3	26	0.0	11	4.3	0.0	9.1
AMS-25	6	0.0	8.3	3.3	26	0.0	10	3.7	1.1	10
AMS-26	6	0.0	8.7	4.5	26	0.0	12	4.9	0.38	14
AMS-27	6	3.0	11	7.0	26	0.0	22	7.5	0.0	7.8
AMS-28 ^c	6	0.0	12	5.8	26	0.0	33	6.9	0.0	17
AMS-29	6	0.0	10	4.9	26	0.0	19	5.9	0.0	13
Background										
AMS-12	6	0.0	34	8.3	26	0.0	34	5.1	0.0	9.3
AMS-16	6	0.0	11	6.7	26	0.0	18	6.6	0.0	14
Project Specific										
WPTH-2	6	4.2	10	7.4	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.

TABLE 5-8

CONTINUOUS ENVIRONMENTAL RADON MONITORING
MONTHLY AVERAGE CONCENTRATIONS^a

Location	December 2001 through March 2002 Summary Results (Instrument Background Corrected) ^b (pCi/L)			2001 Summary Results (Instrument Background Corrected) ^b (pCi/L)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Fenceline						
AMS-02	0.2	0.5	0.4	0.1	0.5	0.3
AMS-03	0.3	0.4	0.4	0.1	0.5	0.3
AMS-04	0.1	0.5	0.2	0.1	0.3	0.2
AMS-05	0.1	0.4	0.3	0.1	0.7	0.3
AMS-06	0.1	0.6	0.3	0.1	0.5	0.3
AMS-07	0.2	0.3	0.3	0.2	0.6	0.4
AMS-08A	0.1	0.3	0.2	0.1	0.7	0.4
AMS-09C	0.0	0.1	0.0	0.1	0.8	0.3
AMS-22	0.1	0.1	0.1	0.1	0.3	0.2
AMS-23	0.1	0.1	0.1	0.1	0.3	0.2
AMS-24	0.1	0.3	0.2	0.1	0.5	0.3
AMS-25	0.1	0.3	0.2	0.1	0.5	0.3
AMS-26	0.1	0.3	0.2	0.2	0.4	0.3
AMS-27	0.1	0.3	0.2	0.1	0.5	0.3
AMS-28	0.1	0.2	0.1	0.1	0.6	0.3
AMS-29	0.1	0.3	0.2	0.1	0.3	0.2
Background						
AMS-12	0.1	0.1	0.1	0.2	0.5	0.3
AMS-16	0.1	0.2	0.2	0.0	0.2	0.1
On Site						
KNE	2.7	5.6	4.0	1.1	5.8	3.2
KNO ^c	0.3	3.1	1.5	0.3	2.6	1.2
KNW/KNW-A	0.8	1.5	1.1	0.4	1.3	0.7
KSE	1.4	3.1	2.1	0.9	2.6	1.9
KSO ^c	0.3	1.2	0.9	0.3	1.1	0.5
KSW/KSW-A	0.9	1.0	1.0	0.2	1.1	0.7
KTOP	5.5	8.8	6.6	3.0	9.0	5.5
LP2 ^d	0.2	0.8	0.5	0.3	0.7	0.5
Pilot Plant Warehouse	0.2	0.5	0.4	0.3	0.5	0.4
PR-1 ^e	0.1	0.3	0.2	0.4	0.9	0.6
Rally Point 4	0.2	0.6	0.4	0.2	0.6	0.3
Surge Lagoon	0.8	1.3	1.1	0.2	1.0	0.5
T117 ^d	0.2	1.0	0.7	0.2	0.8	0.4
T28/T28A	0.4	0.7	0.6	0.3	0.8	0.5
TS4	0.4	0.6	0.5	0.2	0.9	0.5
WP-17A	0.1	0.7	0.4	0.2	0.5	0.3

^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.

^cUnit was placed in service in April 2000.

^dUnit was placed in service in November 2000.

^eUnit was placed in service in March 2000.

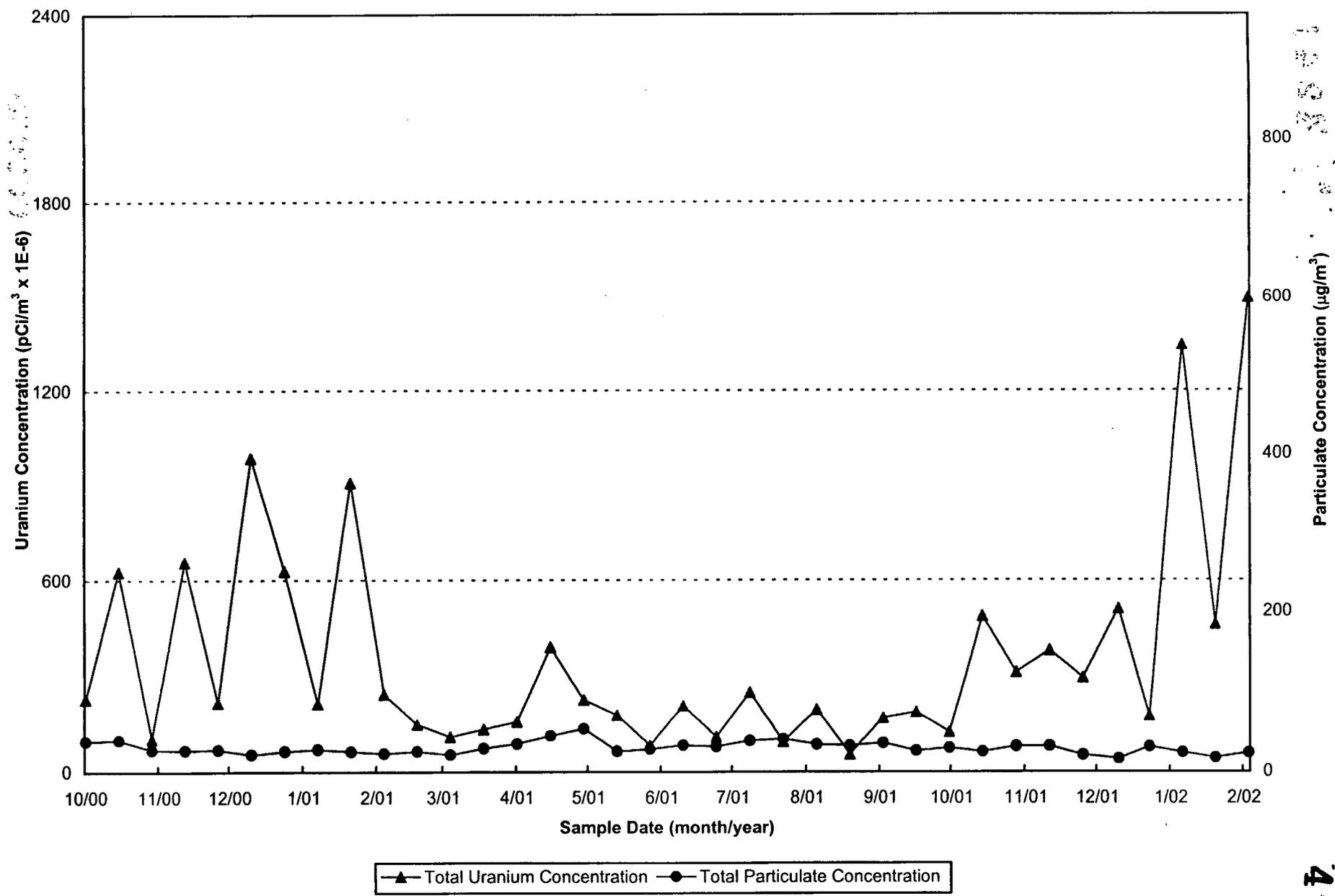


FIGURE 5-1. OCTOBER 2000 THROUGH FEBRUARY 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

20037

4241

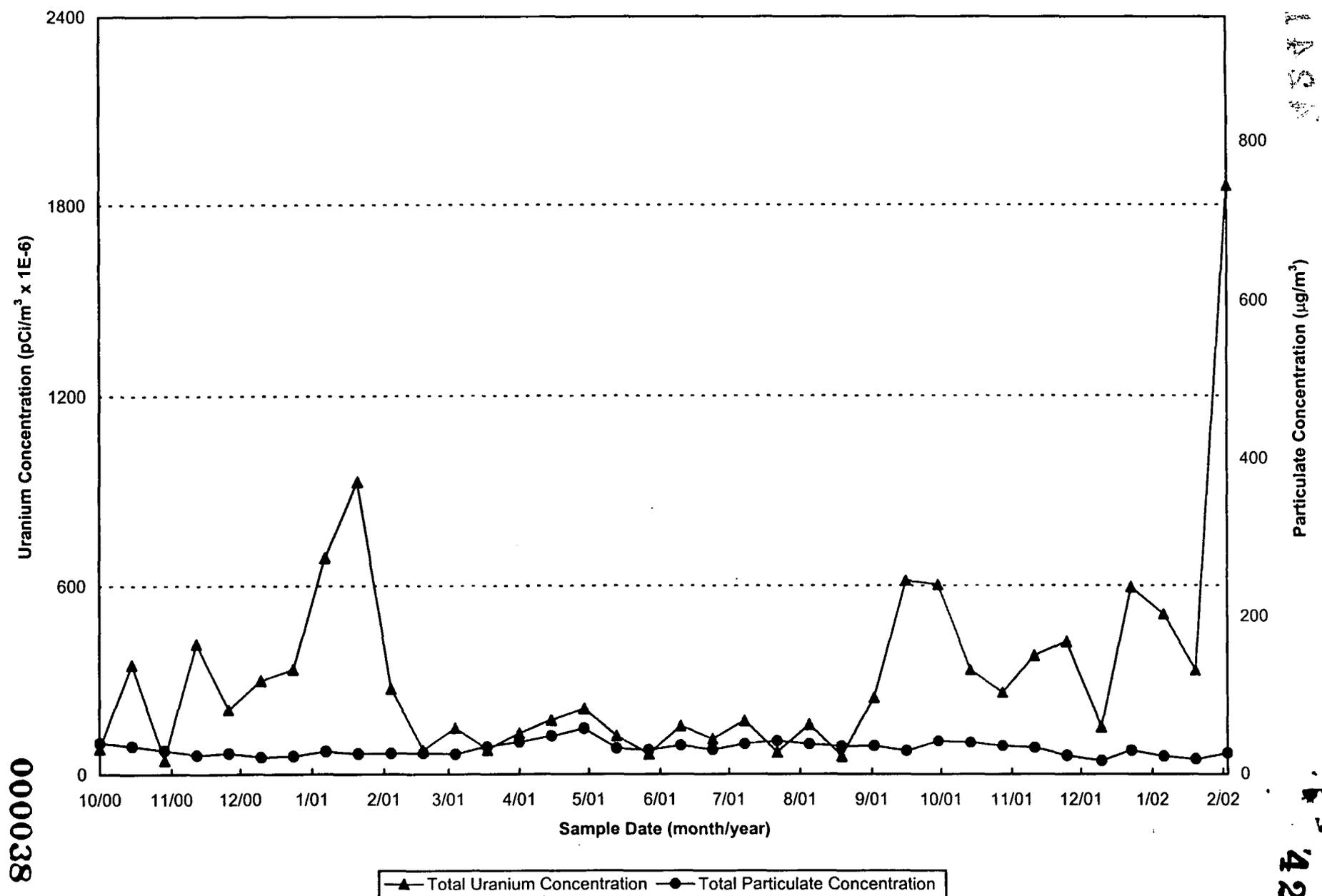


FIGURE 5-2. OCTOBER 2000 THROUGH FEBRUARY 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

000038

14541

14241

AMS-9C

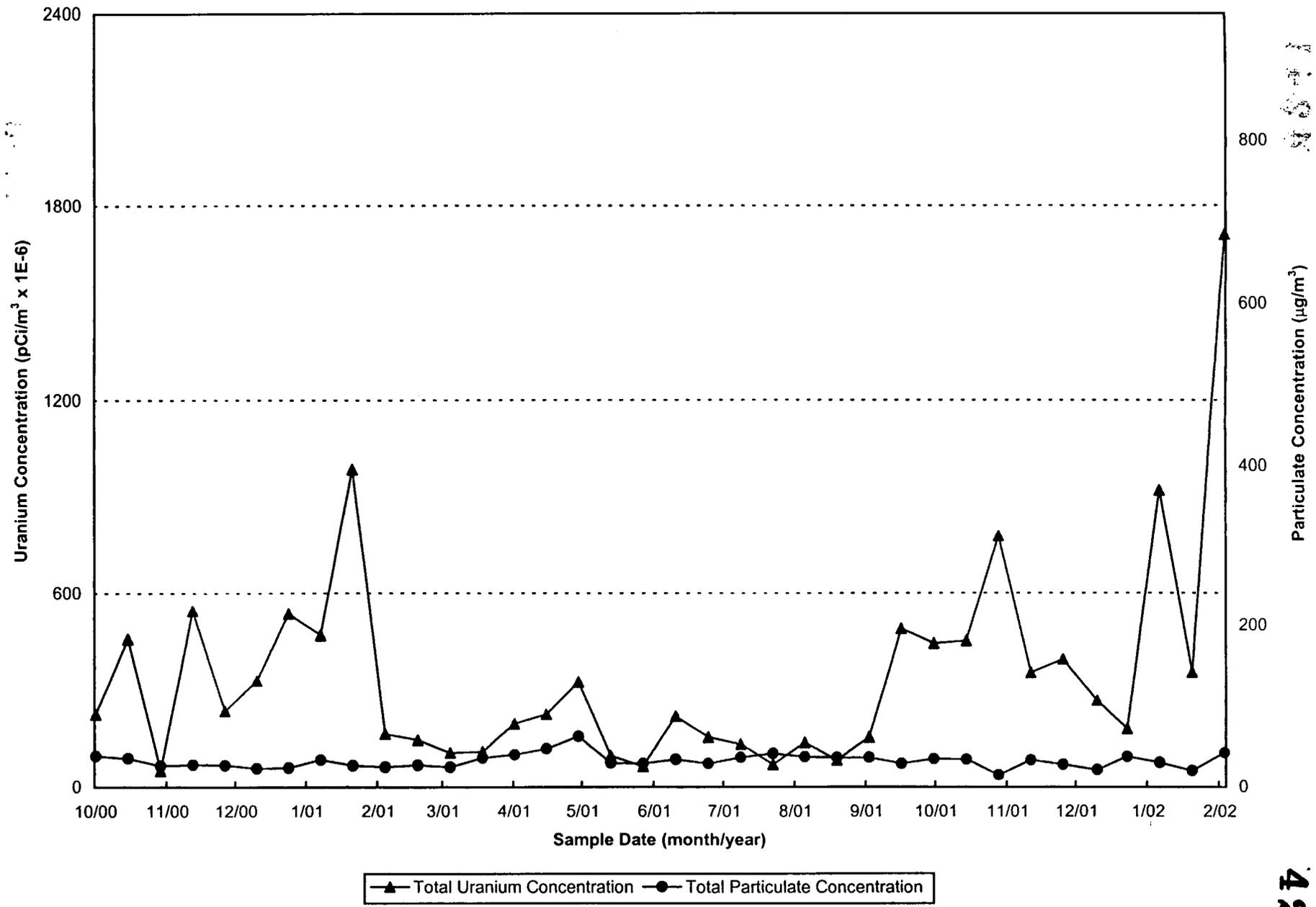


FIGURE 5-3. OCTOBER 2000 THROUGH FEBRUARY 2002 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C

000039

4241

000040

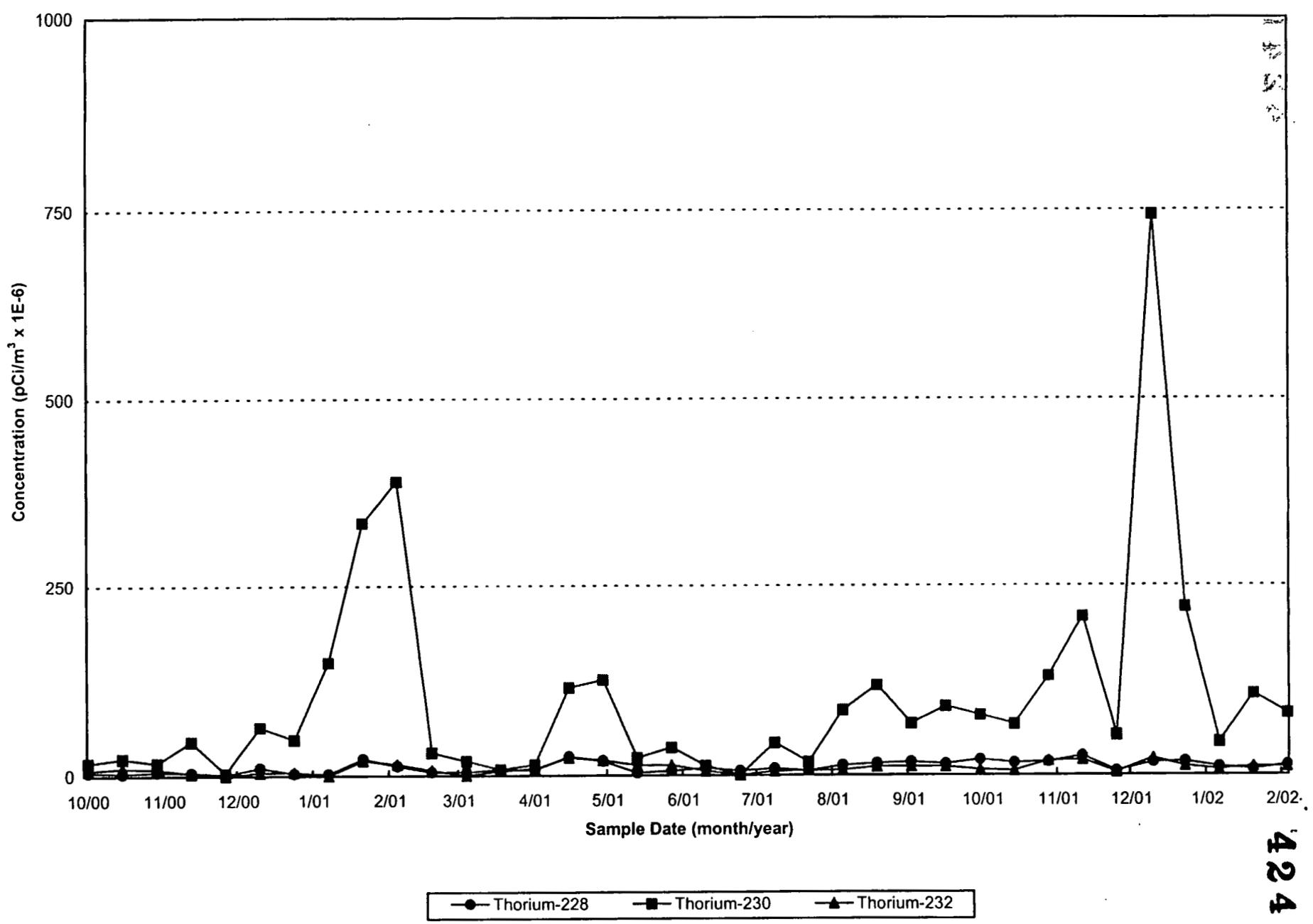


FIGURE 5-4. OCTOBER 2000 THROUGH FEBRUARY 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

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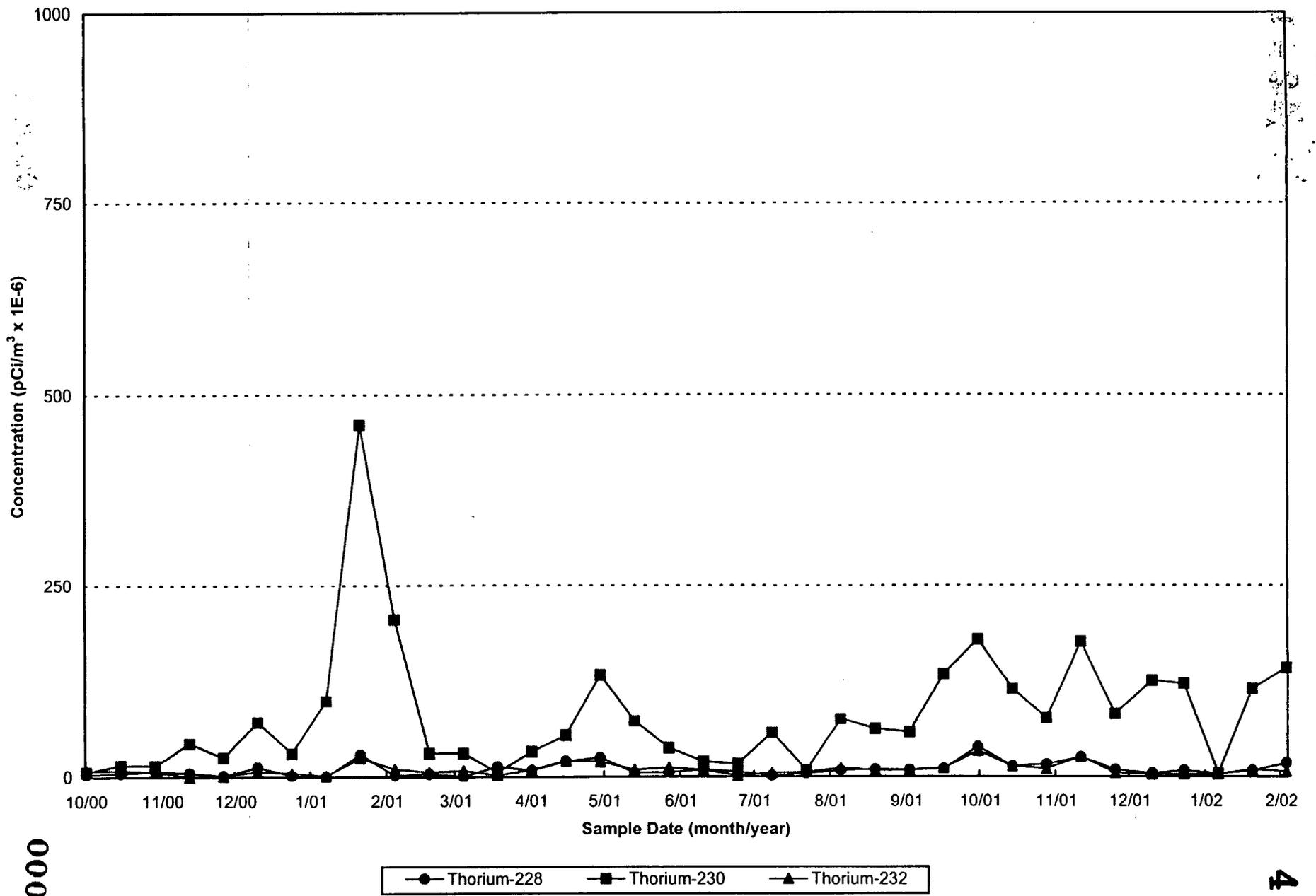


FIGURE 5-5. OCTOBER 2000 THROUGH FEBRUARY 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

000041

4241

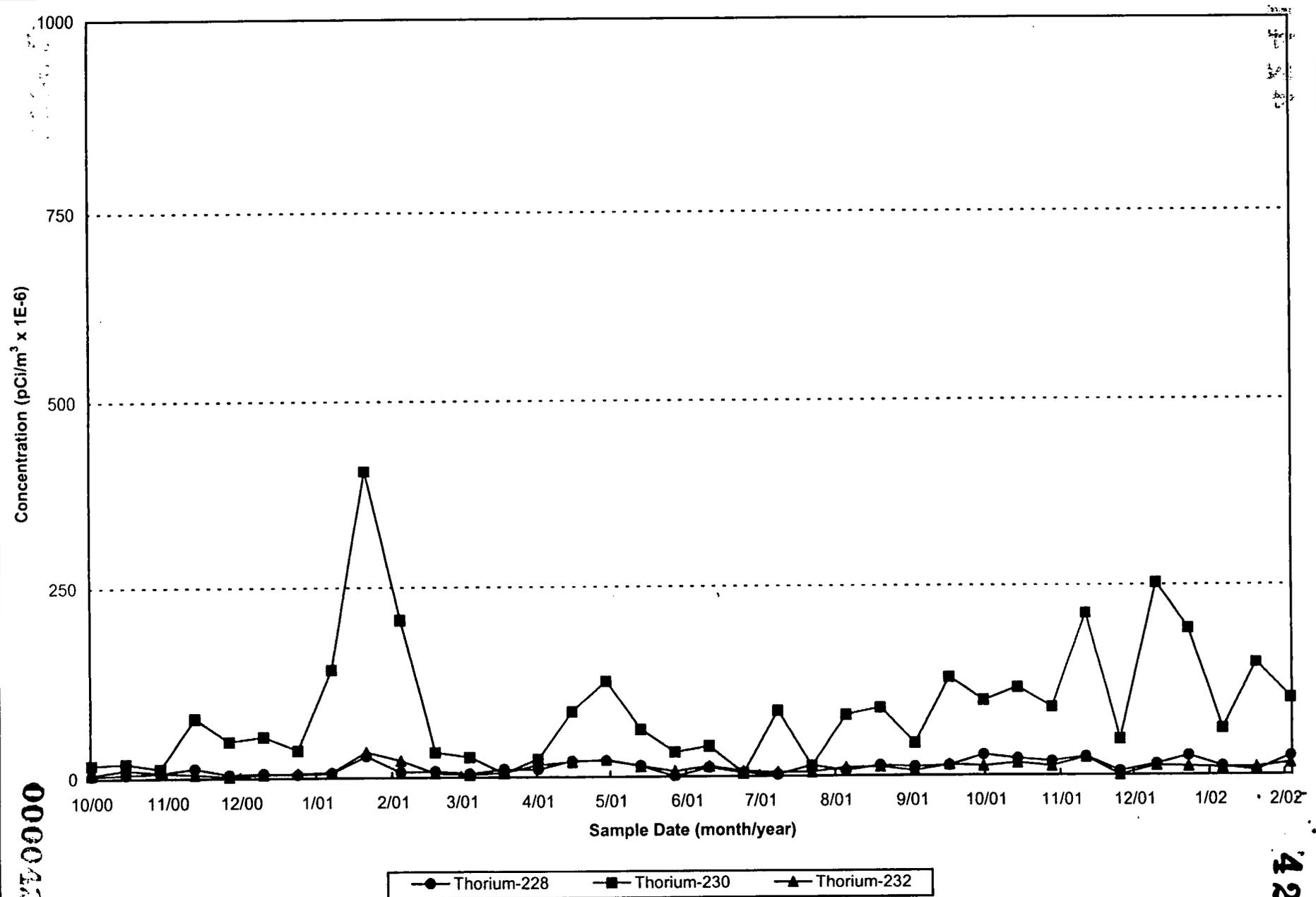
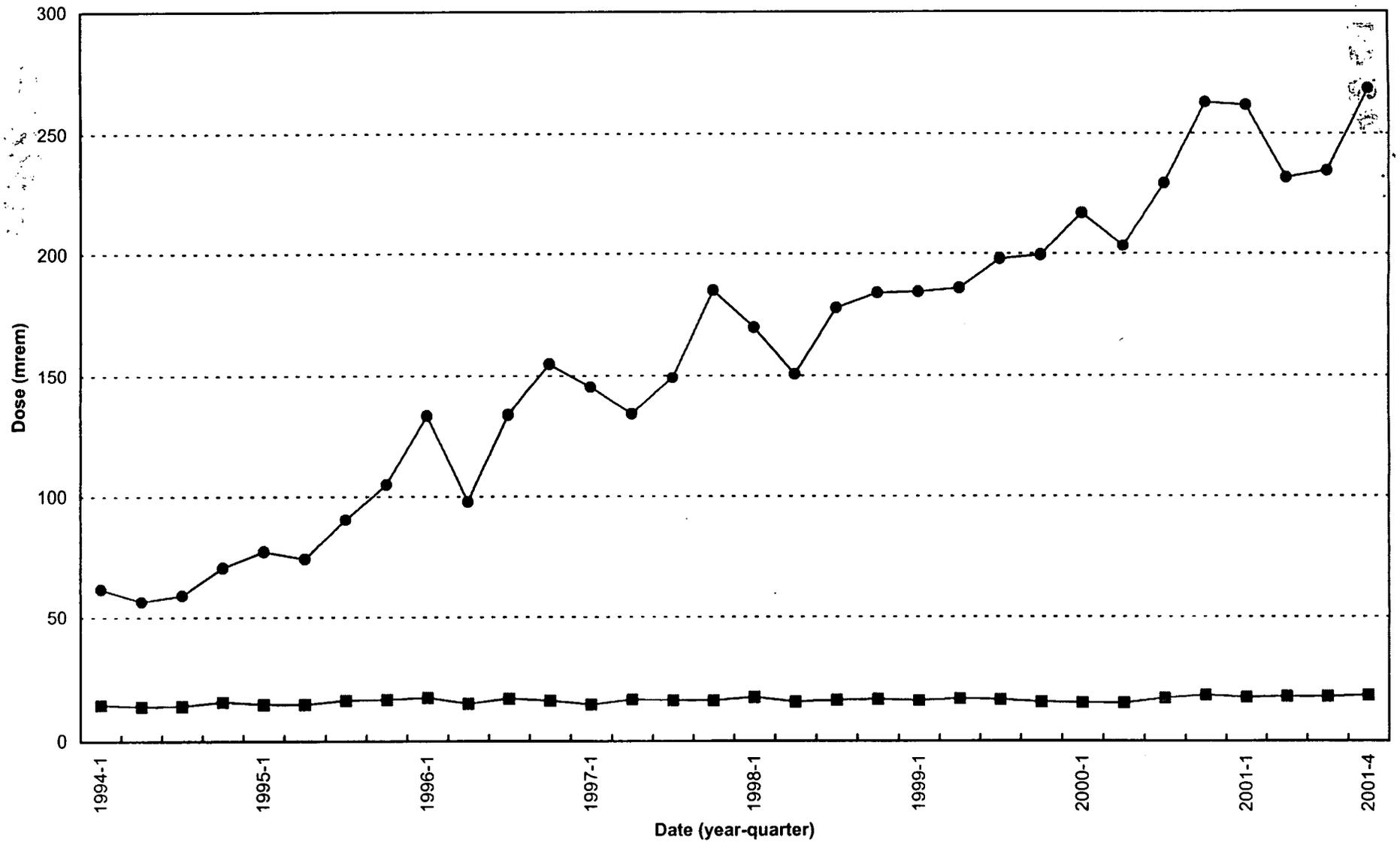


FIGURE 5-6. OCTOBER 2000 THROUGH FEBRUARY 2002 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C



Pre-Bentonite Silos Fenceline Average
1991: 484 mrem

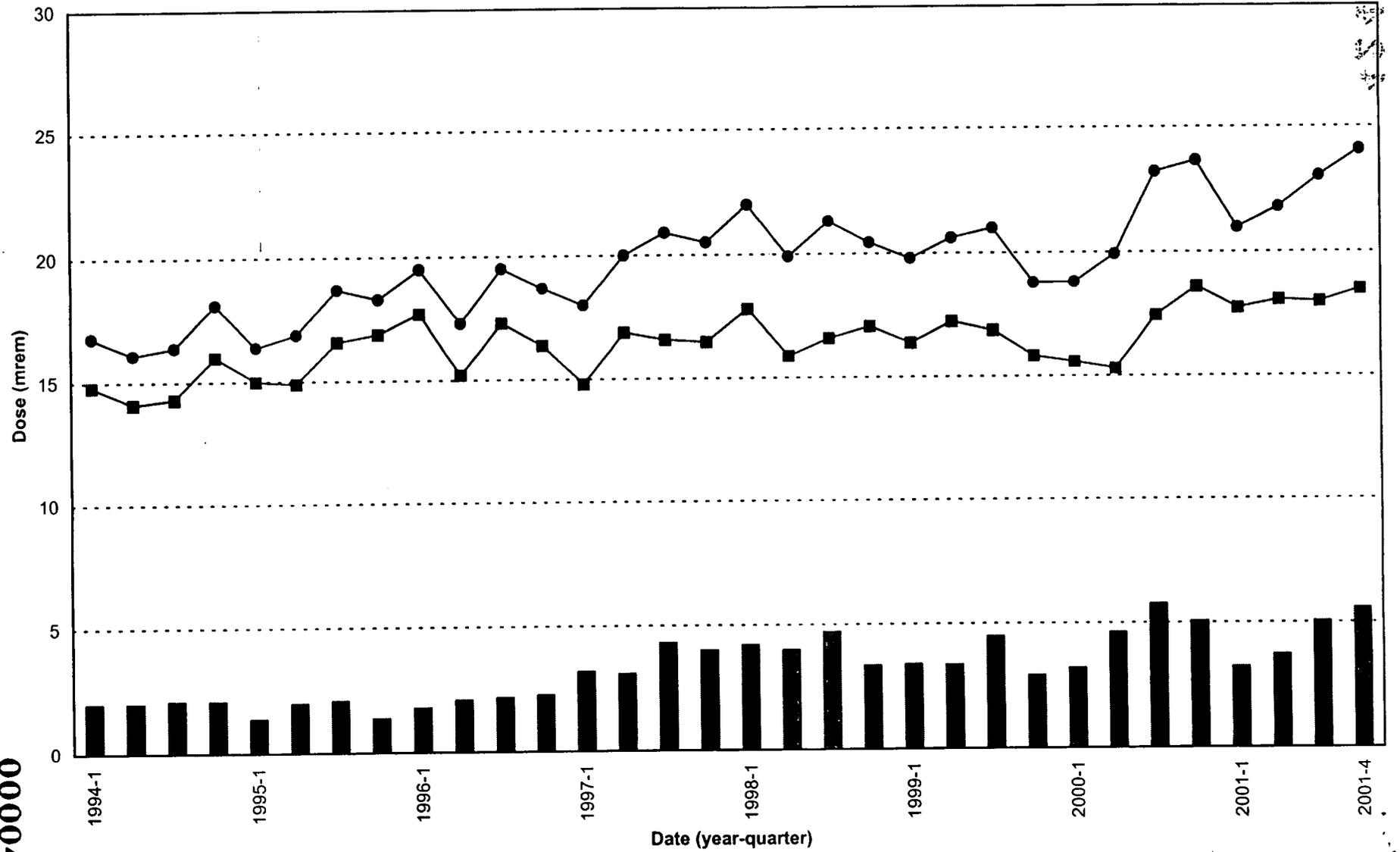
● K-65 Silos Fenceline Average ■ Background Average

FIGURE 5-7. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2001
(K-65 SILOS FENCELINE AVERAGE VERSUS BACKGROUND AVERAGE)

00043

4241

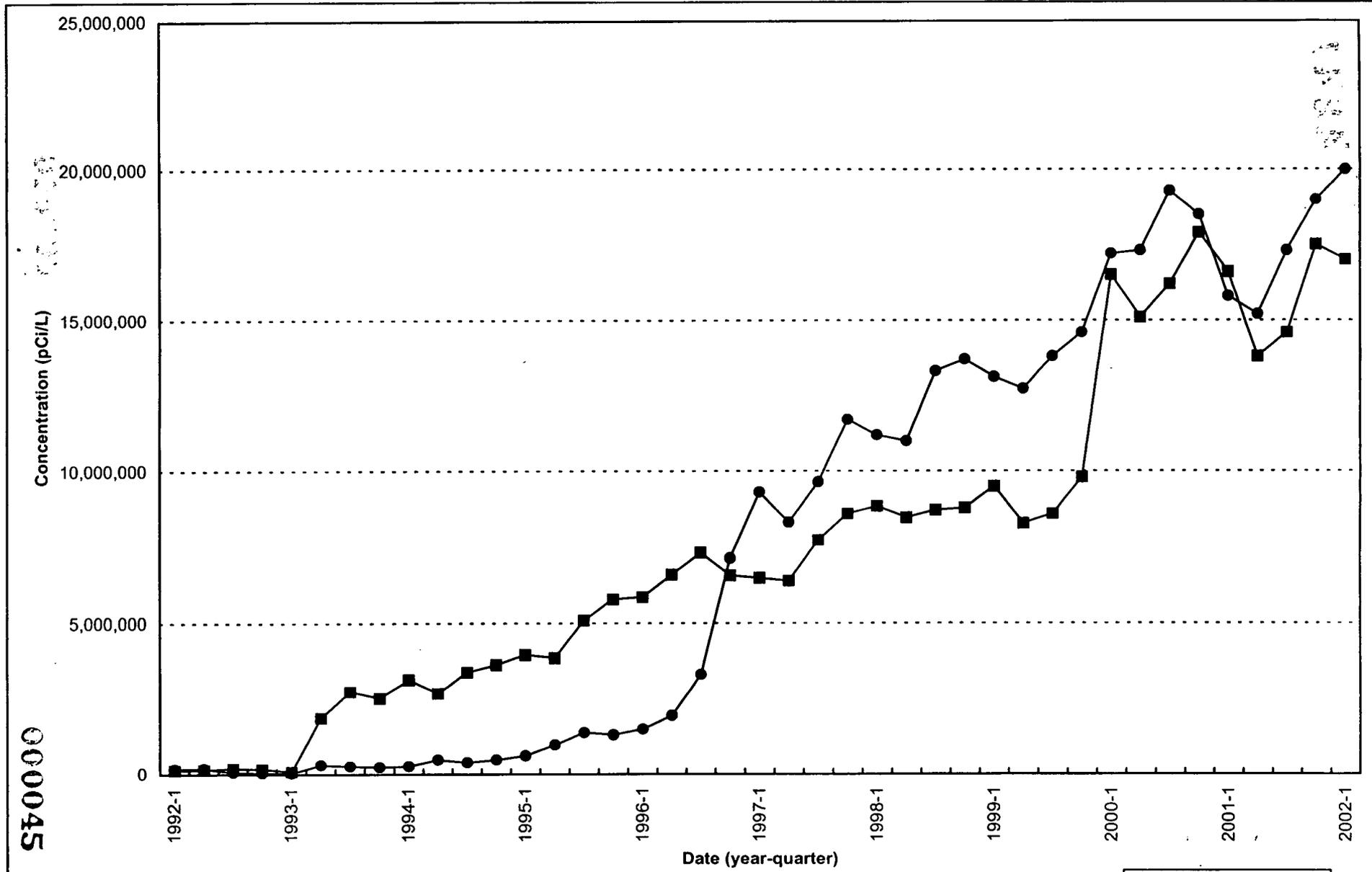
000044



Net Difference (TLD 6 - Bkgd. Avg.)
 Closest Fenceline Location (location 6)
 Background Average

FIGURE 5-8. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2001
(LOCATION 6 VERSUS BACKGROUND AVERAGE)

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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:
 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 - First Quarter, 2002

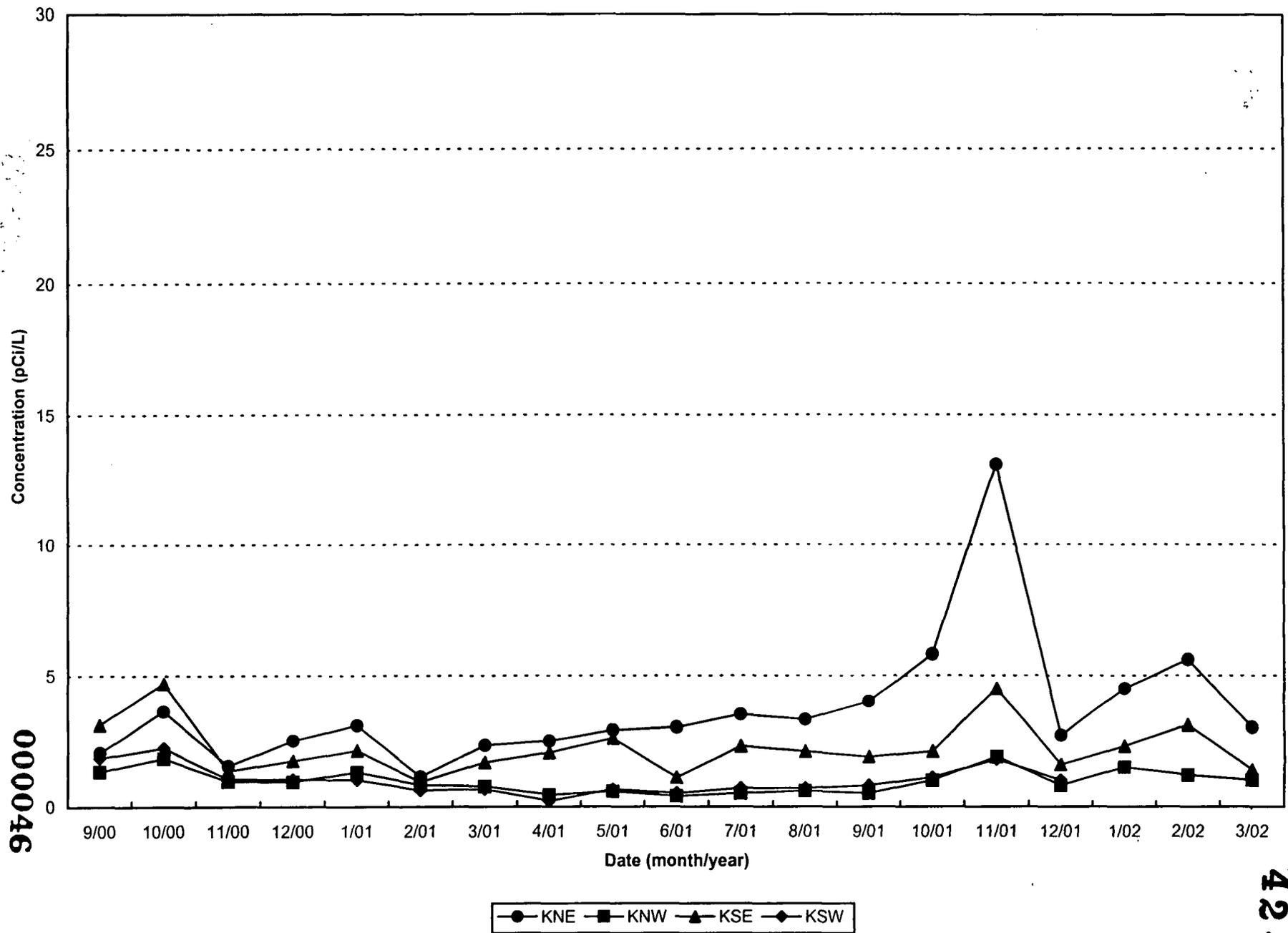


FIGURE 5-10. MONTHLY AVERAGE RADON CONCENTRATIONS FOR SILO EXCLUSION FENCE MONITORS, 9/00 - 3/02

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