

4103

FOURTH IEMP DATA QUARTERLY SUMMARY FOR 2001

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

INFORMATION
ONLY



JANUARY 2002

U.S. DEPARTMENT OF ENERGY

51350-RP-0018

REV. 0

000001 FINAL

TABLE OF CONTENTS

4103

1.0 Introduction	1-1
2.0 Groundwater Monitoring Data	2-1
2.1 Data Covered	2-1
2.2 Notable Results and Events	2-1
3.0 On-Site Disposal Facility Monitoring Data	3-1
3.1 Data Covered	3-1
3.2 Notable Results and Events	3-1
4.0 Surface Water Monitoring Data	4-1
4.1 Data Covered	4-1
4.2 Notable Results and Events	4-1
5.0 Sediment Monitoring Data	5-1
5.1 Data Covered	5-1
5.2 Notable Results and Events	5-1
6.0 Air Monitoring Data	6-1
6.1 Data Covered	6-1
6.2 Notable Results and Events	6-1
References	R-1

LIST OF FIGURES

- Figure 2-1.A Direct Push Data and Total Uranium Plume, Second Quarter 2001
- Figure 2-1.B Total Uranium Plume Map, Second Quarter 2001
- Figure 3-1 2001 On-Site Disposal Facility LDS Accumulation Rates for Cell 1
- Figure 3-2 2001 On-Site Disposal Facility LDS Accumulation Rates for Cell 2
- Figure 4-1 Pounds of Uranium Discharged to the Great Miami River from the Parshall Flume (PF 4001) in 2001
- Figure 4-2 2001 Monthly Average Total Uranium Concentration in Water Discharged from the Parshall Flume (PF 4001) to the Great Miami River
- Figure 6-1 2000-2001 Total Uranium and Particulate Concentrations in Air from Biweekly Samples at AMS-3
- Figure 6-2 2000-2001 Total Uranium and Particulate Concentrations in Air from Biweekly Samples at AMS-8A
- Figure 6-3 2000-2001 Total Uranium and Particulate Concentrations in Air from Biweekly Samples at AMS-9C
- Figure 6-4 2000-2001 Thorium-228, Thorium-230, and Thorium-232 Concentrations in Air from Biweekly Samples at AMS-3
- Figure 6-5 2000-2001 Thorium-228, Thorium-230, and Thorium-232 Concentrations in Air from Biweekly Samples at AMS-8A
- Figure 6-6 2000-2001 Thorium-228, Thorium-230, and Thorium-232 Concentrations in Air from Biweekly Samples at AMS-9C
- Figure 6-7 Quarterly Direct Radiation (TLD) Measurements, 1994 - 2001 (K-65 Silos Fenceline Average Versus Background Average)
- Figure 6-8 Quarterly Direct Radiation (TLD) Measurements, 1994 - 2001 (Location 6 Versus Background Average)
- Figure 6-9 Quarterly K-65 Silo Headspace Radon Concentrations, 1992 - 2001
- Figure 6-10 Monthly Average Radon Concentrations for Silo Exclusion Fence Monitors, 6/00 - 12/01

LIST OF TABLES

4103

Table 1-1	Schedule for IEMP Data Information Site Availability and Reporting
Table 2-1	Aquifer Restoration System Operational Summary Sheet
Table 2-2	South Field (Phase I) Extraction Module Operational Summary Sheet (September 2001 through November 2001)
Table 2-3	South Plume Module Operational Summary Sheet (September 2001 through November 2001)
Table 2-4	Re-Injection Module Operational Summary Sheet (September 2001 through November 2001)
Table 3-1	On-Site Disposal Facility Cell 1 Data Summary for Third Quarter 2001
Table 3-2	On-Site Disposal Facility Cell 2 Data Summary for Third Quarter 2001
Table 3-3	On-Site Disposal Facility Cell 3 Data Summary for Third Quarter 2001
Table 6-1	Third Quarter 2001 NESHAP Compliance Tracking
Table 6-2	2001 Year-to-Date NESHAP Compliance Tracking
Table 6-3	Total Uranium Particulate Concentrations in Air from Biweekly Samples
Table 6-4	Total Particulate Concentrations in Air from Biweekly Samples
Table 6-5	Thorium-228 Particulate Concentrations in Air from Biweekly Samples
Table 6-6	Thorium-230 Particulate Concentrations in Air from Biweekly Samples
Table 6-7	Thorium-232 Particulate Concentrations in Air from Biweekly Samples
Table 6-8	Continuous Environmental Radon Monitoring Monthly Average Concentrations

LIST OF ACRONYMS

4103

AMS	air monitoring station
BTV	benchmark toxicity value
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FEMP	Fernald Environmental Management Project
FFCA	Federal Facilities Compliance Agreement
FRL	final remediation level
GMA	Great Miami Aquifer
gpad	gallons per acre per day
gpm	gallons per minute
HTW	Horizontal Till Well
IEMP	Integrated Environmental Monitoring Plan
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
NTU	Nephelometric Turbidity Units
OEPA	Ohio Environmental Protection Agency
pCi/L	picoCuries per liter
pCi/m ³	picoCuries per cubic meter
QA/QC	Quality Assurance/Quality Control
SDWA	Safe Drinking Water Act
SWRB	Storm Water Retention Basin
TLD	thermoluminescent dosimeter
WPRAP	Waste Pits Remedial Action Project
µg/L	micrograms per liter
µg/m ³	micrograms per cubic meter

4103

1.0 INTRODUCTION

This Fourth Integrated Environmental Monitoring Plan (IEMP) Data Quarterly Summary for 2001 has been prepared in a manner consistent with Revision 2 of the IEMP (DOE 2001a), 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 fourth quarter of 2001. It also covers some data that were slightly behind schedule and became available by January 15, 2002, in order to consolidate IEMP program data for reporting in a manner consistent with previous quarterly summaries. Table 1-1 identifies the IEMP data that are covered under this quarterly summary for each IEMP Program.

The goal of the IEMP quarterly summaries is to minimize textual discussion by focusing on notable events and results related to the data covered, while summarizing data in the form of graphical and tabular presentations. Comprehensive reporting, including all tables and graphs, will still be provided through IEMP annual integrated site environmental reports.

TABLE 1-1

SCHEDULE FOR IEMP DATA INFORMATION SITE AVAILABILITY AND REPORTING

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

◆ Data collected during this time period were available for posting on the IEMP Data Information Site as of January 15, 2002, and 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 (October 2001).

^a Though not included in this Table, 2001 sediment data are also covered in this quarterly summary.

^b Some of the non-radiological data from the Waste Storage Area were not yet available for reporting in this quarterly summary. However they will be available on the IEMP Data Information Site by the end of January 2002, and any notables will be reported in the next quarterly summary (April 2002).

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

^d This quarterly summary covers radiological air particulate data from biweekly samples covering the period of September 4 through November 27, 2001 (i.e., biweekly samples collected September 18 through November 27).

4103

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 from October 1, 2001 through January 15, 2002, as discussed in Section 1.0. Specifically, this includes:

- Operational data collected from September 1, 2001 through November 30, 2001.
- All radiological analytical data collected during the third quarter of 2001. This includes the South Field, South Plume, Property Boundary, Private Well, and the Waste Storage Area Monitoring Programs.
- Non-radiological analytical data collected during the third quarter of 2001 from the South Plume, South Field and Property Boundary Monitoring Programs. Some of the non-radiological data from the Waste Storage Area Monitoring Program were not yet available; therefore, any notable results will be included with the next quarterly summary in April 2002.
- Groundwater (Great Miami Aquifer) elevations from the fourth quarter of 2001.

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, excluding exceptions noted above.

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

- Explanation of Significant Differences (ESD) on the Adoption of the Safe Drinking Water Act Final Maximum Contaminant Level For Uranium into the Operable Unit 5 Record of Decision: This ESD amends the Operable Unit 5 Record Of Decision by adopting the Safe Drinking Water Act Maximum Contaminant Level for uranium as both the final remediation level (FRL) for groundwater restoration and the uranium effluent discharge limit to the Great Miami River. The public comment period closed August 31, 2001. Draft responses to public comments on the ESD were emailed to EPA/OEPA for review on October 15. Based on EPA verbal agreement with DOE's responses during the October 16 weekly teleconference, the Draft Final Responsiveness Summary and ESD were sent via email for final review the week of October 29. After addressing additional verbal comments from OEPA, the Final ESD was submitted for EPA signature on November 15 via DOE letter #: DOE-0126-02. EPA approved the ESD in a letter dated November 30, 2001. The ESD became effective for December 2001 operations.

- Total Uranium Plume Map: The total uranium plume map has been revised to reflect the new uranium groundwater FRL of 30 micrograms per liter ($\mu\text{g/L}$) and recent data collected in support of the design of the South Field Phase II Aquifer Restoration Module. The plume is posted on two maps to show all of the data it incorporates in an 8 ½ by 11-inch format. Figure 2-1.A displays the 30 $\mu\text{g/L}$ total uranium plume outline and direct-push sampling data. Figure 2-1.B presents the 30 $\mu\text{g/L}$ total uranium plume and monitoring well data. As noted in the last quarterly, this plume map utilizes second quarter IEMP data as they correspond most closely with the additional data collected to support the South Field Phase II design. It is anticipated that in the future, an updated total uranium map will be provide on an annual basis, and more frequently, if warranted by the quarterly data evaluations.
 - An objective of this and future map revisions is to take a very conservative approach when reducing the extent of the uranium plume contours. These reductions have and will continue to be based on a combination of direct-push data and monitoring well data, as the monitoring well data alone does not always reflect the highest plume concentration at a particular location.
 - The direct-push data presented in Figure 2-1.A is a projection of the maximum uranium concentration measured at each sampling location, regardless of the depth at which it was measured. In areas where both “older” and “newer” direct push data are available, the more recent data weighs more heavily than older data in subjective contouring decisions.
 - Extensive Geoprobe™ direct-push data were collected in 2000 and 2001 in the South Field area to support the design of the Phase II Aquifer Restoration Module for the area. Some additional monitoring well data were also collected in this area to support the design of the Phase II Module. The data indicate that the uranium plume beneath the former inactive flyash pile is smaller than previously identified for this area.
 - The uranium concentration in Monitoring Well 62433 is approximately 677 $\mu\text{g/L}$. This well is located along the eastern edge of the on-property portion of the Southern Plume. Two additional extraction wells are being planned for this area of the plume as part of the South Field Phase II Aquifer Restoration Module.
- Proposed Shut Down of Extraction Wells: DOE submitted a letter (reference DOE Letter #: DOE-198-02) on December 19, 2001 notifying the EPA and OEPA of plans to shut down three extraction wells in the South Field (Extraction Wells 31565, 31564, and 31563) and one Extraction well in the South Plume (Extraction Well 3927). The South Field Extraction System Module, Phase II Design will provide backup information justifying the long-term disposition of the three South Field wells and the South Plume well will be addressed in the South plume Optimization Module Phase II Pre-Design or Design report.
- Waste Storage Area Phase I Groundwater Restoration Module: Construction of the piping and infrastructure for the three new extraction wells (Extraction Wells 33061, 33062 and 33063) continued through the reporting period. Pumping of the new wells is scheduled to begin in early 2002. A Project Specific Plan covering the installation of the monitoring wells for Phase I (monitoring wells in the Pilot Plant Drainage Ditch plume) was submitted for EPA/OEPA review on November 19. Installation of groundwater monitoring wells in support of the Waste Storage Area Phase I Module began in early December with the installation of four multi-level wells (Monitoring Wells 83124, 83117, 83120, 83123). Installation of the remaining wells listed in the Project Specific Plan will occur in January 2002.

- **Groundwater Re-Injection:** The re-injection rate continued to be below the design rate during the reporting period (Table 2-4) due to residual plugging of the re-injection wells. 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, 22240, and 22109). Two wells (22107 and 22108) will likely need to be replaced due to rapid plugging after treatment. Re-injection Well 22107 came online on December 3, 2001 and had to be shut down on December 25, 2001 due to plugging. Re-injection Well 22108 came online November 29, 2001 and is expected to be shut down in January or early February 2002 due to plugging. Plans are being implemented to replace these two wells in 2002.
- **Monitoring Well 2400:** This well was located just east of the south access road in the On-Site Disposal Facility borrow area, and was used for IEMP Groundwater Elevation Monitoring. Given the deep excavation and restoration plans for this area, it would be difficult to access this well in the future; therefore, it was plugged the week of November 5, 2001. Plans are in the works to install a replacement well in 2002, approximately 200 feet to the west of Monitoring Well 2400, adjacent to the borrow area excavation.
- **South Field Multi-level Monitoring Well 82433:** The well was installed during the week of October 1, 2001 to test the applicability of the multilevel well technology as an enhancement to the monitoring well network at the Fernald Environmental Management Project. Well development was completed and the well was sampled for total uranium the week of October 15, 2001, with promising results. As reported during the weekly teleconference on October 30, 2001, five of the six intervals sampled in the multi-level well were fairly consistent with adjacent direct-push data. However the sample collected from the channel monitoring the bottom of the well had a total uranium concentration much higher than expected. After researching the depth of the plume in this area of the South Field, it was concluded that the high uranium concentration found in samples from the bottom of the well must be due to cross-contamination from a higher zone in the well. Plans are to plug the bottom 10-20 feet of the cross-contaminated channel with bentonite grout or coated bentonite pellets. At future multi-level well installations, pressure testing of the individual sections will be used to prevent similar situations. This pressure testing began in December with the multi-level wells being installed in the Pilot Plant Drainage Ditch plume in support of the Waste Storage Area Phase I Aquifer Restoration Module. Depending on the performance of the multi-level wells, they may be added to the IEMP sampling program for total uranium.
- **Five-Year Sampling:** The five-year groundwater sampling event for constituents identified as "<N" in the IEMP took place during the second and third quarters of 2001. There were five results that exceeded the FRL for bis(2-ethylhexyl)phthalate from wells in several parts of the site (Wells 2125 and 3095 in the South Plume; Well 3390 in the South Field; Well 2398 on the Property Boundary; and Well 2109 in Plant 6 area). Bis(2-ethylhexyl)phthalate was detected in both laboratory and field quality control samples (i.e., laboratory blanks and field blanks) which is identified by a laboratory qualifier of B or identified in the comment field on the IEMP Data Information Site, respectively. This indicates that the detected results of the constituent should be considered suspect and more than likely a result of laboratory blank contamination rather than being present in the actual sample. Additional discussion will be provided in the IEMP annual integrated site environmental report.

A thorough review of the groundwater monitoring data covered by this quarterly summary was conducted to identify the notable results. Supplementary tables are also provided here in support of the findings listed above. Tables 2-1 through 2-4 provide an operational summary of the groundwater extraction well performance for September, October, and November 2001. 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.

4103

TABLE 2-1
AQUIFER RESTORATION SYSTEM OPERATIONAL SUMMARY SHEET

	Reporting Period					
	September 2001 through November 2001			August 1993 through November 2001		
	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	235.937	133.84	0.57	3,030.253	1,887.58	0.62
South Plume Module	256.885	64.88	0.25	6,347.463	1,311.72	0.21
Re-Injection Module	30.154	1.69	NA ^a	973.910	40.80	NA ^a
Aquifer Restoration Systems Totals						
Extraction Wells	492.822	198.72	0.40	9,377.716	3,199.30	0.34
(Re-Injection Wells)	<u>30.154</u>	<u>1.69</u>	NA ^a	<u>973.910</u>	<u>40.80</u>	NA ^a
net	462.668	197.03	NA ^a	8,403.806	3,158.50	NA ^a

^aNA = not applicable

TABLE 2-2

SOUTH FIELD (PHASE I) EXTRACTION MODULE
OPERATIONAL SUMMARY SHEET
(SEPTEMBER 2001 THROUGH NOVEMBER 2001)

Extraction Well	31565 ^{a,b}	31564	31566 ^b	31563	31567 ^c	31550	31560	31561	31562 ^{b,d}	32276	32447 ^{b,c}	32446 ^b
Baseline Remedial Strategy Report Target Pumping Rates												
	200	200	200	200	100	100	100	100	100	200	NA	NA
Average Pumping Rates (gpm)												
September	NA	221	NA	221	279	111	96	111	0	332	299	200
October	NA	215	NA	217	278	106	106	107	0	330	290	191
November	<u>NA</u>	<u>198</u>	<u>NA</u>	<u>194</u>	<u>251</u>	<u>94</u>	<u>94</u>	<u>89</u>	<u>133</u>	<u>226</u>	<u>241</u>	<u>178</u>
Average	NA	211	NA	211	269	104	99	102	44.3	296	277	190
Average Total Uranium Concentrations (µg/L)												
September	NA	11.2	8.7	18.3	23.1	37.5	49.7	59.8	NA	122.1	174.1	67.0
October	NA	10.8	8.8	16.9	21.8	33.5	46.1	59.5	NA	123.7	163.8	61.1
November	<u>NA</u>	<u>10.6</u>	<u>8.3</u>	<u>18.4</u>	<u>22.6</u>	<u>35.4</u>	<u>46.5</u>	<u>60.9</u>	<u>88.4</u>	<u>120.9</u>	<u>152.5</u>	<u>61.7</u>
Average	NA	10.9	8.6	17.9	22.5	35.5	47.4	60.1	88.4	122.2	163.5	63.3
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)												
September	NA	0.09	NA	0.15	0.19	0.31	0.41	0.50	NA	1.02	1.45	0.56
October	NA	0.09	NA	0.14	0.18	0.28	0.38	0.50	NA	1.03	1.37	0.51
November	<u>NA</u>	<u>0.09</u>	<u>NA</u>	<u>0.15</u>	<u>0.19</u>	<u>0.30</u>	<u>0.39</u>	<u>0.51</u>	<u>0.74</u>	<u>1.01</u>	<u>1.27</u>	<u>0.51</u>
Average	NA	0.09	NA	0.15	0.19	0.30	0.39	0.50	0.74	1.02	1.36	0.53
	Average Module Pumping Rate (gpm)						Water Pumped by Module (M gal)			Total Uranium Concentration from Module ^f (µg/L)		
September	1,870						81.116			68.88		
October	1,840						81.911			69.46		
November	<u>1,698</u>						<u>72.910</u>			<u>65.03</u>		
Average	1,803						Total 235.937			Average 67.79		

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

^bNA = not applicable

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

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

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

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

TABLE 2-3
SOUTH PLUME MODULE
OPERATIONAL SUMMARY SHEET
(SEPTEMBER 2001 THROUGH NOVEMBER 2001)

Extraction Well	3924	3925	3926	3927	32308	32309
Baseline Remedial Strategy Report Target Pumping Rates (gpm)						
	300	300	400	400	250	250
Average Pumping Rates (gpm)						
September	303	300	339	497	293	291
October	305	293	337	497	301	289
November	<u>289</u>	<u>270</u>	<u>319</u>	<u>470</u>	<u>284</u>	<u>205</u>
Average	299	288	332	488	293	262
Average Total Uranium Concentrations (µg/L)						
September	31.9	24.5	31.3	2.5	62.7	60.7
October	29.3	23.4	31.0	2.5	57.8	56.9
November	<u>32.1</u>	<u>24.1</u>	<u>32.1</u>	<u>2.9</u>	<u>56.7</u>	<u>56.2</u>
Average	31.1	24.0	31.5	2.6	59.1	57.9
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)						
September	0.27	0.20	0.26	0.02	0.52	0.51
October	0.24	0.20	0.26	0.02	0.48	0.47
November	<u>0.27</u>	<u>0.20</u>	<u>0.27</u>	<u>0.02</u>	<u>0.47</u>	<u>0.47</u>
Average	0.26	0.20	0.26	0.02	0.49	0.48
	Average Module Pumping Rate (gpm)		Water Pumped by Module (M gal)		Total Uranium Concentration From Module ^a (µg/L)	
September	2,023		87,521		30.17	
October	2,021		89,946		30.57	
November	<u>1,836</u>		<u>79,418</u>		<u>29.90</u>	
Average	1,960	Total	256,885	Average	30.21	

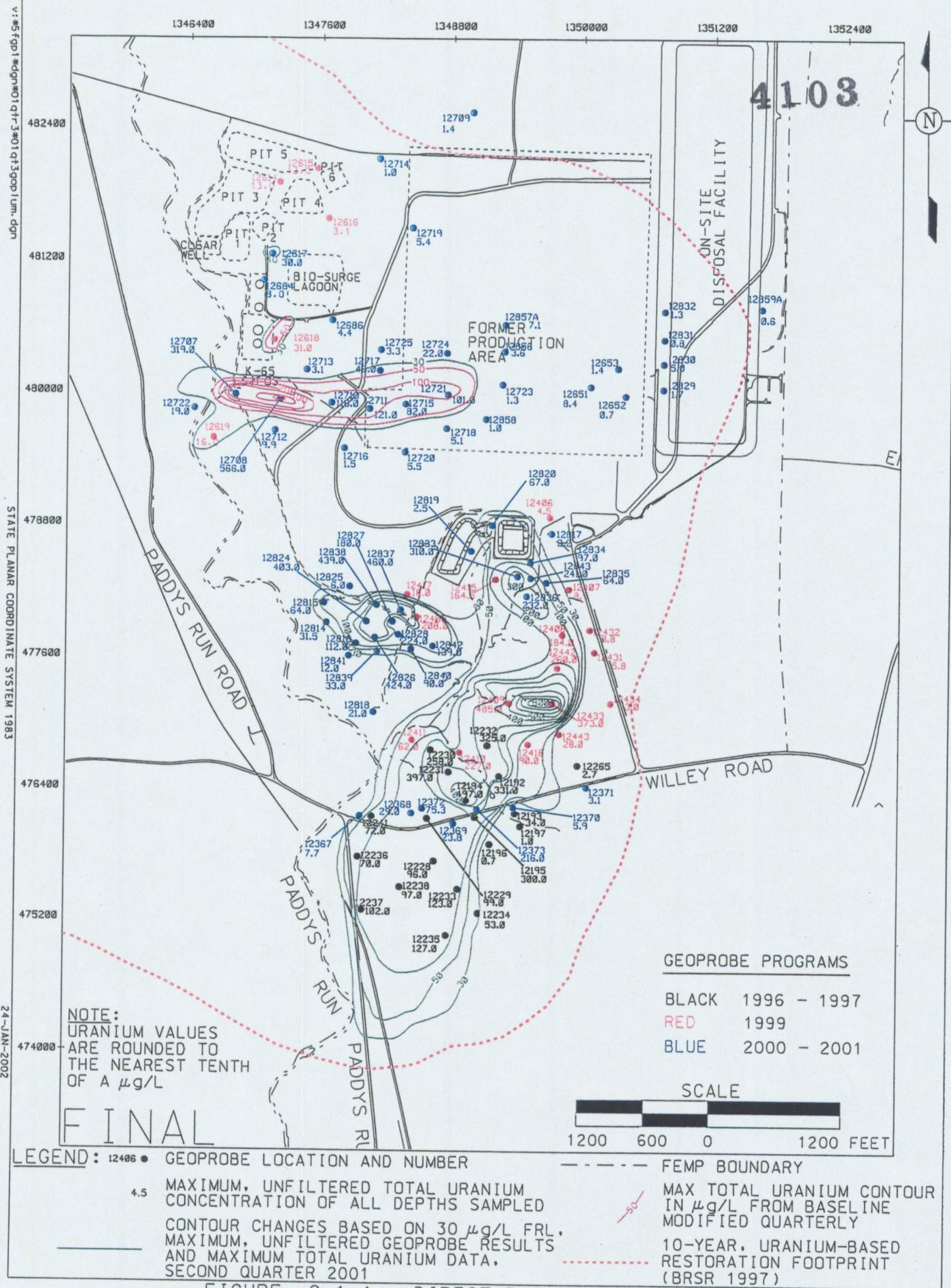
^aAverage is calculated from individual well total uranium concentrations and flow rates.

TABLE 2-4
RE-INJECTION MODULE
OPERATIONAL SUMMARY SHEET
(SEPTEMBER 2001 THROUGH NOVEMBER 2001)

Re-Injection Well	22107	22108	22109	22240	22111
Baseline Remedial Strategy Report Target Re-Injection Rates (gpm)					
	200	200	200	200	200
Average Re-Injection Rates (gpm)					
September	0	0	0	77	24
October	0	0	42	120	135
November	<u>0</u>	<u>11</u>	<u>93</u>	<u>93</u>	<u>92</u>
Average	0	3.7	45	97	84

	Average Module Re-Injection Rate (gpm)	Water Re-Injected By Module (M gal)	Total Uranium Concentration To Module ^a (µg/L)
September	101	4.325	3.86
October	298	13.316	7.61
November	<u>290</u>	<u>12.513</u>	<u>6.74</u>
Average	230	Total 30.154	Average 6.72

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



V:\MS_FDP\1\4dgn\01\q1r\3\01\q13gop\um.dgn

STATE PLANNING COORDINATE SYSTEM 1983

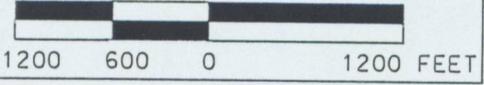
24-JAN-2002

NOTE:
URANIUM VALUES
ARE ROUNDED TO
THE NEAREST TENTH
OF A $\mu\text{g/L}$

GEOPROBE PROGRAMS

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

SCALE



LEGEND: 12406 ● GEOPROBE LOCATION AND NUMBER

4.5 _____ MAXIMUM, UNFILTERED TOTAL URANIUM CONCENTRATION OF ALL DEPTHS SAMPLED

_____ CONTOUR CHANGES BASED ON 30 $\mu\text{g/L}$ FRL, MAXIMUM, UNFILTERED GEOPROBE RESULTS AND MAXIMUM TOTAL URANIUM DATA, SECOND QUARTER 2001

----- FEMP BOUNDARY

--- MAX TOTAL URANIUM CONTOUR IN $\mu\text{g/L}$ FROM BASELINE MODIFIED QUARTERLY

----- 10-YEAR, URANIUM-BASED RESTORATION FOOTPRINT (BRSR 1997)

FIGURE 2-1.A. DIRECT PUSH DATA AND TOTAL URANIUM PLUME, SECOND QUARTER 2001

000016

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 from October 1 through January 15, 2002, as discussed in Section 1.0. Specifically, this includes:

- Leachate collection system (LCS) volumes, leak detection system (LDS) volumes, and accumulation rates obtained during September, October and November 2001.
- Analytical data collected during the third 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 Fernald site. Notable results and events associated with on-site disposal facility monitoring data covered by this quarterly summary include the following:

- **LDS Accumulation Rates:** The September through November 2001 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 5.7 and 3.9 percent, respectively, of the initial response leakage rate of 20 gallons per acre per day.
- **New Maximum Concentrations:** The third quarter 2001 data indicated a new maximum detected mercury concentration of 0.000072 milligrams per liter (mg/L) in the Cell 1 LDS (12338D), and new maximum total uranium concentrations in the Cell 2 LCS (48.035 µg/L at 12339C) and in the downgradient Great Miami Aquifer monitoring well for Cell 1 (8.474 µg/L at Monitoring Well 22198).
- **Cells 1-3 Groundwater Baseline Technical Memorandum:** Work continued during the fourth quarter on the evaluation of the baseline data set for Cells 1, 2, and 3. At the close of the quarter, a data package was undergoing DOE review prior to EPA submittal, scheduled for January 2002. After the data package is reviewed by the EPA and OEPA, DOE plans to meet with the agencies to discuss the baseline data package and reach consensus on the path forward.
- **Due to the accelerated schedule for construction of Cells 4 and 5, the installation of the remaining three Great Miami Aquifer monitoring wells for these two cells is being accelerated as well so that the baseline sampling can begin ahead of waste placement. The downgradient well for Cell 4**

(Monitoring Well 22205) was installed in August 1999. The PSP for the installation of the remaining planned on-site disposal facility Great Miami Aquifer monitoring wells was submitted to the EPAs on August 14, 2001 (reference DOE Letter # DOE-0805-01). Drilling and development of the remaining three wells for Cells 4 and 5 was completed in October 2001. Baseline sampling of all four of the wells for Cells 4 and 5 began in November 2001.

- Geoprobe™ sampling was initiated at each of the to-be-drilled on-site disposal facility Great Miami Aquifer monitoring well locations to provide additional aquifer uranium profile data in the vicinity of the on-site disposal facility footprint. This Geoprobe™ sampling was conducted in conjunction with the Cells 4 and 5 monitoring well installations, and is based on discussions with EPA and OEPA at the August 23, 2001 on-site disposal facility meeting. At the close of the reporting period, Geoprobe™ sampling at two of the three monitoring well locations had been completed. As discussed in the October 1, 2001 weekly teleconference with EPA and OEPA, Geoprobe™ sampling at the third location was postponed due to probe rod breakage resulting in the loss of portions of two Geoprobe™ tool strings near that location (downgradient of Cell 5). Larger diameter probe rods are being procured and this sampling is scheduled for completion in 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 third 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. Based on the large number of non-detects, revisions to the on-site disposal facility monitoring program constituent list may be pursued in 2002 once the baseline groundwater conditions for Cells 1, 2, and 3 are established. 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.

TABLE 3-1

ON-SITE DISPOSAL FACILITY CELL I DATA SUMMARY FOR THIRD QUARTER 2001

Note: Non-italicized pertains to total number of samples (including third quarter samples); *Italicized* pertains to third 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	Range	No. of Samples	Range	No. of Samples	Range	Upgradient ^{b,c,d} (22201)		Downgradient ^{b,c,d} (22198)	
							No. of Samples	Range	No. of Samples	Range
Total Organic Carbon (NA ^g mg/L)	13/15 <i>1/1</i>	ND to 123 <i>25.6</i>	12/14 <i>1/1</i>	ND to 80.9 <i>7.63</i>	32/35 <i>1/1</i>	ND to 12.2 <i>1.89</i>	27/30 <i>1/1</i>	ND to 59.7 <i>2.67</i>	25/30 <i>1/1</i>	ND to 52.5 <i>1.83</i>
Total Organic Halogens (NA ^g mg/L)	13/15 <i>1/1</i>	ND to 0.352 <i>0.148</i>	11/14 <i>1/1</i>	ND to 0.361 <i>0.0289</i>	19/34 <i>0/1</i>	ND to 0.077 <i>ND</i>	15/30 <i>1/1</i>	ND to 0.308 <i>0.00386</i>	9/30 <i>1/1</i>	ND to 0.0526 <i>0.00354</i>
Boron (0.33 mg/L)	16/16 <i>1/1</i>	0.0642 to 2.8 <i>1.41</i>	13/14 <i>1/1</i>	ND to 0.321 <i>0.197</i>	28/35 <i>1/1</i>	ND to 0.685 <i>0.0655</i>	25/30 <i>1/1</i>	ND to 0.142 <i>0.0996</i>	33/46 <i>2/2</i>	ND to 0.116 <i>0.0369 to 0.0442</i>
Mercury (0.0020 mg/L)	2/15 <i>0/1</i>	ND to 0.00047 <i>ND</i>	1/14 <i>1/1</i>	ND to 0.000072 <i>0.000072</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/45 <i>0/2</i>	ND to ND <i>ND to ND</i>
Technetium-99 (94 pCi/L)	4/15 <i>0/1</i>	ND to 18.28 <i>ND</i>	1/14 <i>0/1</i>	ND to 8.92 <i>ND</i>	7/35 <i>0/1</i>	ND to 28.77 <i>ND</i>	1/30 <i>0/1</i>	ND to 13.41 <i>ND</i>	2/46 <i>0/2</i>	ND to 14.8 <i>ND to ND</i>
Total Uranium (20 µg/L)	14/15 <i>1/1</i>	ND to 142.186 <i>59.554</i>	14/14 <i>1/1</i>	1.5 to 20.17 <i>9.364</i>	33/35 <i>1/1</i>	ND to 19 <i>2.097</i>	25/30 <i>1/1</i>	ND to 6.384 <i>1.896</i>	47/47 <i>2/2</i>	0.557 to 8.474 <i>4.629 to 8.474</i>
Alpha-chlordane (2.0 µg/L)	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to ND</i>
Bis(2-chloroisopropyl) ether (5.0 µg/L)	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to ND</i>
Bromodichloromethane (100 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	1/14 <i>0/1</i>	ND to 10 <i>ND</i>	5/35 <i>0/1</i>	ND to 10 <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to ND</i>
Carbazole (11 µg/L)	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to ND</i>
1,2-Dichloroethene (total) (NA ^g µg/L)	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>
4-Nitroaniline (NA ^g µg/L)	0/15 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>
Tetrachloroethene (NA ^g µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	1/30 <i>0/1</i>	ND to 10 <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>
Trichloroethene (5.0 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/46 <i>0/2</i>	ND to ND <i>ND to ND</i>
Vinyl Chloride (2.0 µg/L)	0/16 <i>0/1</i>	ND to ND <i>ND</i>	0/14 <i>0/1</i>	ND to ND <i>ND</i>	0/35 <i>0/1</i>	ND to ND <i>ND</i>	0/30 <i>0/1</i>	ND to ND <i>ND</i>	0/31 <i>0/2</i>	ND to ND <i>ND to 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

TABLE 3-2

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

Note: Non-italicized pertains to total number of samples (including third quarter samples); *Italicized* pertains to third quarter samples 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} (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	Range	No. of Samples	Range	No. of Samples	Range	No. of Samples	Range	No. of Samples	Range
Total Organic Carbon (NA ^h mg/L)	8/12 <i>1/1</i>	3.12 to 6.25 <i>3.12</i>	11/12 <i>1/1</i>	2.61 to 26.1 <i>2.61</i>	28/33 <i>1/1</i>	ND to 11.1 <i>2.01</i>	23/25 <i>1/1</i>	ND to 47.6 <i>1.77</i>	21/26 <i>2/2</i>	ND to 51.8 <i>1.73 to 1.76</i>
Total Organic Halogens (NA ^h mg/L)	5/12 <i>1/1</i>	ND to 0.0576 <i>0.00504</i>	5/12 <i>0/1</i>	ND to 0.138 <i>ND</i>	21/33 <i>0/1</i>	ND to 0.101 <i>ND</i>	12/25 <i>1/1</i>	ND to 0.177 <i>0.00474</i>	10/26 <i>0/2</i>	ND to 0.155 <i>ND to ND</i>
Boron (0.33 mg/L)	12/13 <i>1/1</i>	ND to 0.915 <i>0.401</i>	12/12 <i>1/1</i>	0.289 to 2.22 <i>0.296</i>	21/33 <i>1/1</i>	ND to 0.0829 <i>0.0436</i>	17/25 <i>1/1</i>	ND to 0.158 <i>0.0507</i>	19/26 <i>2/2</i>	ND to 0.056 <i>0.0447 to 0.04</i>
Mercury (0.0020 mg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	2/32 <i>0/1</i>	ND to 0.00037 <i>ND</i>	0/24 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/2</i>	ND to ND <i>ND to ND</i>
Technetium-99 (94 pCi/L)	1/12 <i>0/1</i>	ND to 21.25 <i>ND</i>	1/12 <i>0/1</i>	ND to 15.99 <i>ND</i>	5/34 <i>0/1</i>	ND to 12 <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Total Uranium (20 µg/L)	12/12 <i>1/1</i>	4.51 to 48.035 <i>48.035</i>	12/12 <i>1/1</i>	8.764 to 71 <i>8.764</i>	33/34 <i>1/1</i>	ND to 3.607 <i>2.902</i>	15/25 <i>0/1</i>	ND to 1.11 <i>ND</i>	26/26 <i>2/2</i>	0.259 to 12 <i>0.485 to 0.48</i>
Alpha-chlordane (2.0 µg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Bis(2-chloroisopropyl) ether (5.0 µg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Bromodichloromethane (100 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	1/33 <i>0/1</i>	ND to 10 <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Carbazole (11 µg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
1,2-Dichloroethene (total) (NA ^h µg/L)	0/11 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
4-Nitroaniline (NA ^h µg/L)	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Tetrachloroethene (NA ^h µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Trichloroethene (5.0 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to ND</i>
Vinyl Chloride (2.0 µg/L)	0/13 <i>0/1</i>	ND to ND <i>ND</i>	0/12 <i>0/1</i>	ND to ND <i>ND</i>	0/33 <i>0/1</i>	ND to ND <i>ND</i>	0/25 <i>0/1</i>	ND to ND <i>ND</i>	0/26 <i>0/2</i>	ND to ND <i>ND to 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 THIRD QUARTER 2001

Note: Non-italicized pertains to total number of samples (including third quarter samples); *Italicized* pertains to third 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	Range	No. of Samples	Range
Total Organic Carbon (NA ^g mg/L)	6/9 <i>1/1</i>	3.19 to 34.2 <i>3.19</i>	19/28 <i>1/1</i>	2.22 to 9.81 <i>2.22</i>	12/23 <i>1/1</i>	ND to 14.1 <i>1.88</i>	12/23 <i>1/1</i>	ND to 8.83 <i>1.8</i>
Total Organic Halogens (NA ^g mg/L)	3/9 <i>0/1</i>	ND to 0.178 <i>ND</i>	21/28 <i>0/1</i>	ND to 0.158 <i>ND</i>	10/23 <i>0/1</i>	ND to 0.213 <i>ND</i>	9/24 <i>0/1</i>	ND to 0.165 <i>ND</i>
Boron (0.33 mg/L)	9/9 <i>1/1</i>	0.109 to 1.51 <i>0.109</i>	23/27 <i>1/1</i>	ND to 0.24 <i>0.124</i>	15/23 <i>1/1</i>	ND to 0.0776 <i>0.0435</i>	16/23 <i>1/1</i>	ND to 0.179 <i>0.0345</i>
Mercury (0.0020 mg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	1/27 <i>0/1</i>	ND to 0.00026 <i>ND</i>	0/22 <i>0/1</i>	ND to ND <i>ND</i>	2/22 <i>0/1</i>	ND to 0.00028 <i>ND</i>
Technetium-99 (94 pCi/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	2/27 <i>0/1</i>	ND to 38.35 <i>ND</i>	1/23 <i>0/1</i>	ND to 22.92 <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Total Uranium (20 µg/L)	9/9 <i>1/1</i>	9.27 to 58.582 <i>28.129</i>	25/27 <i>1/1</i>	ND to 9.14 <i>8.514</i>	18/23 <i>1/1</i>	ND to 4.75 <i>3.748</i>	20/23 <i>1/1</i>	ND to 5.924 <i>1.223</i>
Alpha-chlordane (2.0 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>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Bis(2-chloroisopropyl)ether (5.0 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>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Bromodichloromethane (100 µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Carbazole (11 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>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
1,1-Dichloroethene (7.0 µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
1,2-Dichloroethene (total) (NA ^g µg/L)	0/8 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
4-Nitroaniline (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>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Tetrachloroethene (NA ^g µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Trichloroethene (5.0 µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>
Vinyl Chloride (2.0 µg/L)	0/9 <i>0/1</i>	ND to ND <i>ND</i>	0/27 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <i>0/1</i>	ND to ND <i>ND</i>	0/23 <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

000023

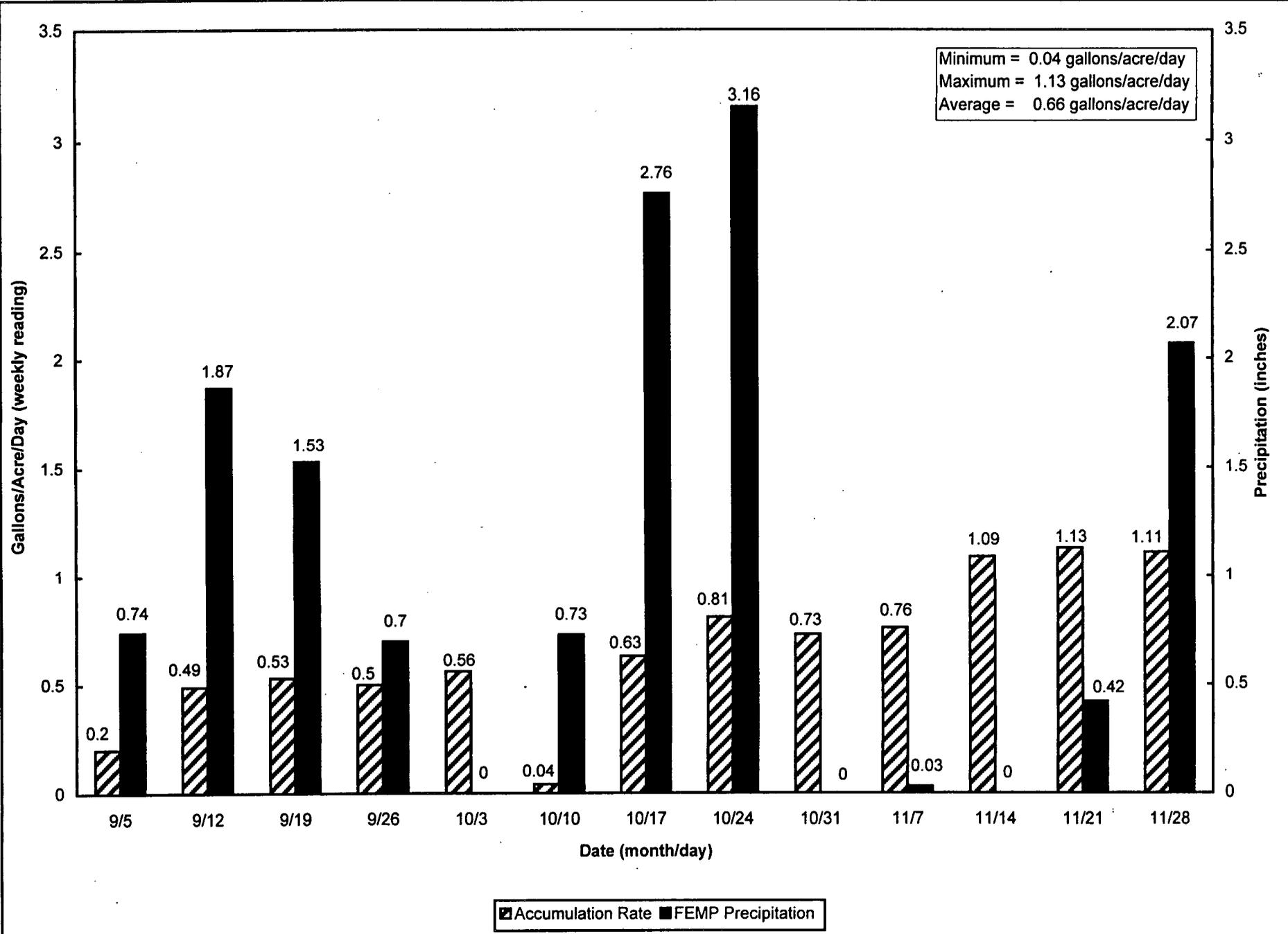


FIGURE 3-1. 2001 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 1

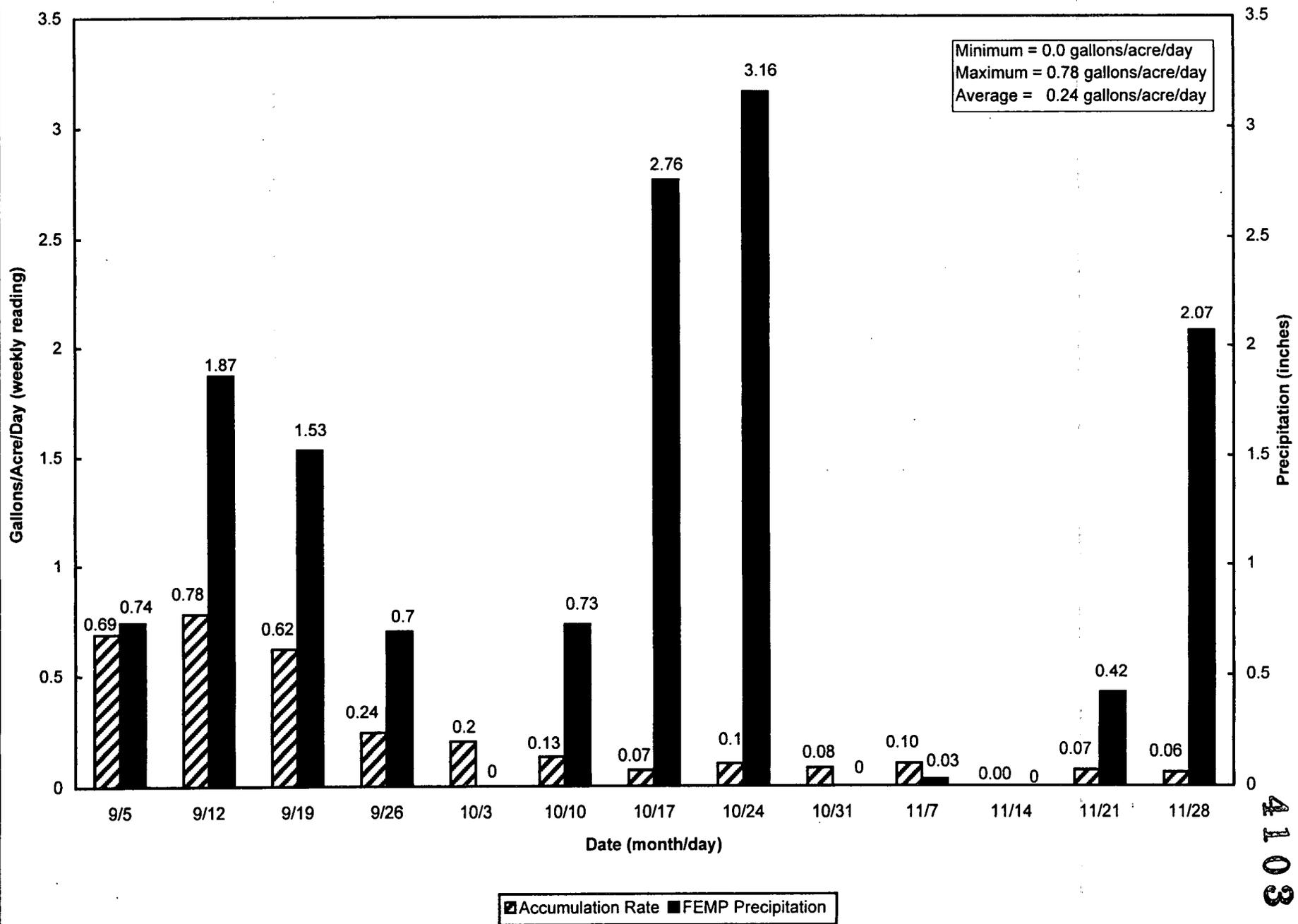


FIGURE 3-2. 2001 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 2

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4.0 SURFACE WATER MONITORING DATA

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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 from October 1, 2001 through January 15, 2002, as discussed in Section 1.0. Specifically, this includes:

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

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 Fernald site. 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
11/25/01	PF 4001	Oil & Grease	10 mg/L	41.14 mg/L
11/25/01	PF 4001	Oil & Grease	105 kg/d	771.8 kg/d
11/28/01	PF 4001	Oil & Grease	10 mg/L	137 mg/L
11/28/01	PF 4001	Oil & Grease	105 kg/d	2863.2 kg/d
Nov. 2001	PF 4001	Oil & Grease (avg.)	10 mg/L	25.0 mg/L
Nov. 2001	PF 4001	Oil & Grease (avg.)	105 kg/d	537.1 kg/d
Nov. 2001	STP 4601	TSS (avg.)	20 mg/L	23.4 mg/L

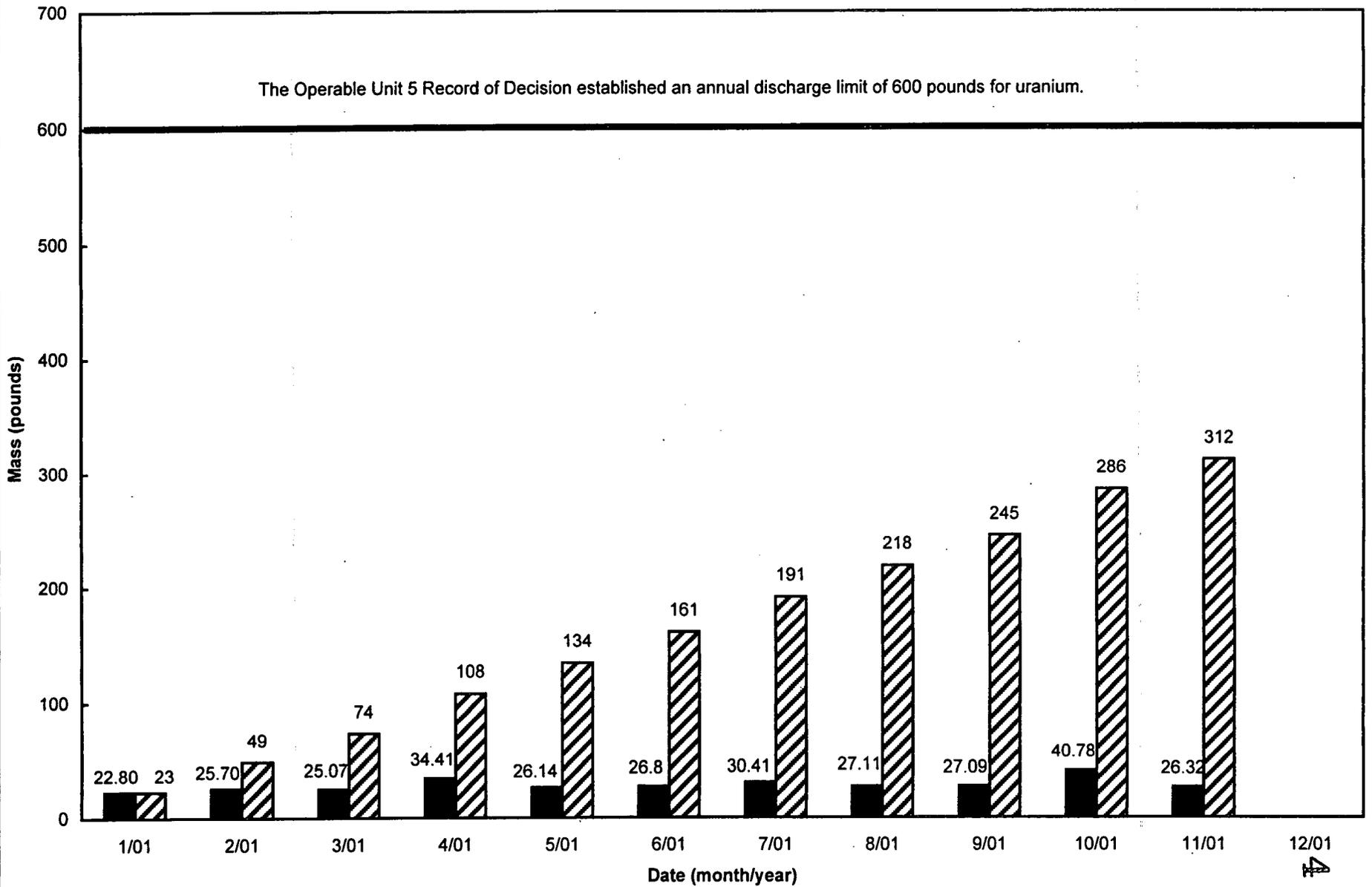
- FFCA/Record of Decision compliance: The Operable Unit 5 Record of Decision limit of 20 µg/L at the Parshall Flume (PF 4001) was met in every month during the reporting period. The monthly average uranium concentration of 17.6 µg/L in October 2001 takes into account two

significant precipitation bypass days that resulted from the bypass event of October 24 through October 26, 2001. The monthly average uranium concentration of 19.3 µg/L in November 2001 takes into account three treatment plant maintenance days from November 4 through November 7, 2001.

- IEMP FRL/benchmark toxicity value (BTV) exceedances: There were two surface water FRL exceedances and two BTV exceedances during the evaluation period that may be attributable to the FEMP. There were also four results (cadmium, chromium, copper, and lead) above the surface water FRL at background location SWR-01 on September 10, 2001. Because this is a background location, this sampling point is not under the influence of FEMP discharges and these results are not reported as FRL exceedances. The two FRL exceedances that may be attributable to the FEMP occurred at downstream location SWR-4902. On September 10, 2001, there was a copper result of 0.0138 mg/L, exceeding the FRL of 0.012 mg/L; and a lead result of 0.0104 mg/L, exceeding the FRL of 0.010 mg/L. Note that both of these constituents of concern also exceeded the FRL at the upstream, background location (SWR-01) on that same date. The two BTV exceedances were both for cadmium on September 21 and October 3, 2001. 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.
- As a result of the completion of the Southern Waste Units excavation and the remaining topography of the area, DOE moved the sampling location from existing location 4004 to alternative location 4004A. A site visit with OEPA confirmed the appropriateness of this change in location. This change became effective for the third quarter (September 19, 2001) sampling event, and all future reports under the IEMP program will use data from location 4004A.
- Preparations were initiated to prepare the NPDES Permit Renewal Application including the efforts to accomplish the required sampling at NPDES Outfalls.
- Eight observations were made for turbidity impacts from the northern drainage ditch on Paddys Run (as related to the Sloan's crayfish population) during the fourth quarter of 2001. No incidences of increased downstream turbidity were observed in Paddys Run during this period.
- As discussed in Section 2.0, DOE prepared, submitted, received and addressed public comments and had approved by EPA an ESD to the Operable Unit 5 Record of Decision revising the groundwater FRL for total uranium to reflect the finalized EPA drinking water standard for total uranium of 30 µg/L. The surface water uranium discharge limit to the Great Miami River established in the Operable Unit 5 Record of Decision was also revised to reflect the 30 µg/L standard. The ESD was approved on November 30, 2001. Compliance with the new 30 µg/L limit began December 1, 2001.

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 to-date in 2001. Figure 4-2 shows the 2001 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.

The Operable Unit 5 Record of Decision established an annual discharge limit of 600 pounds for uranium.



Note: Sum of monthly discharges may not always agree with cumulative total due to rounding differences.

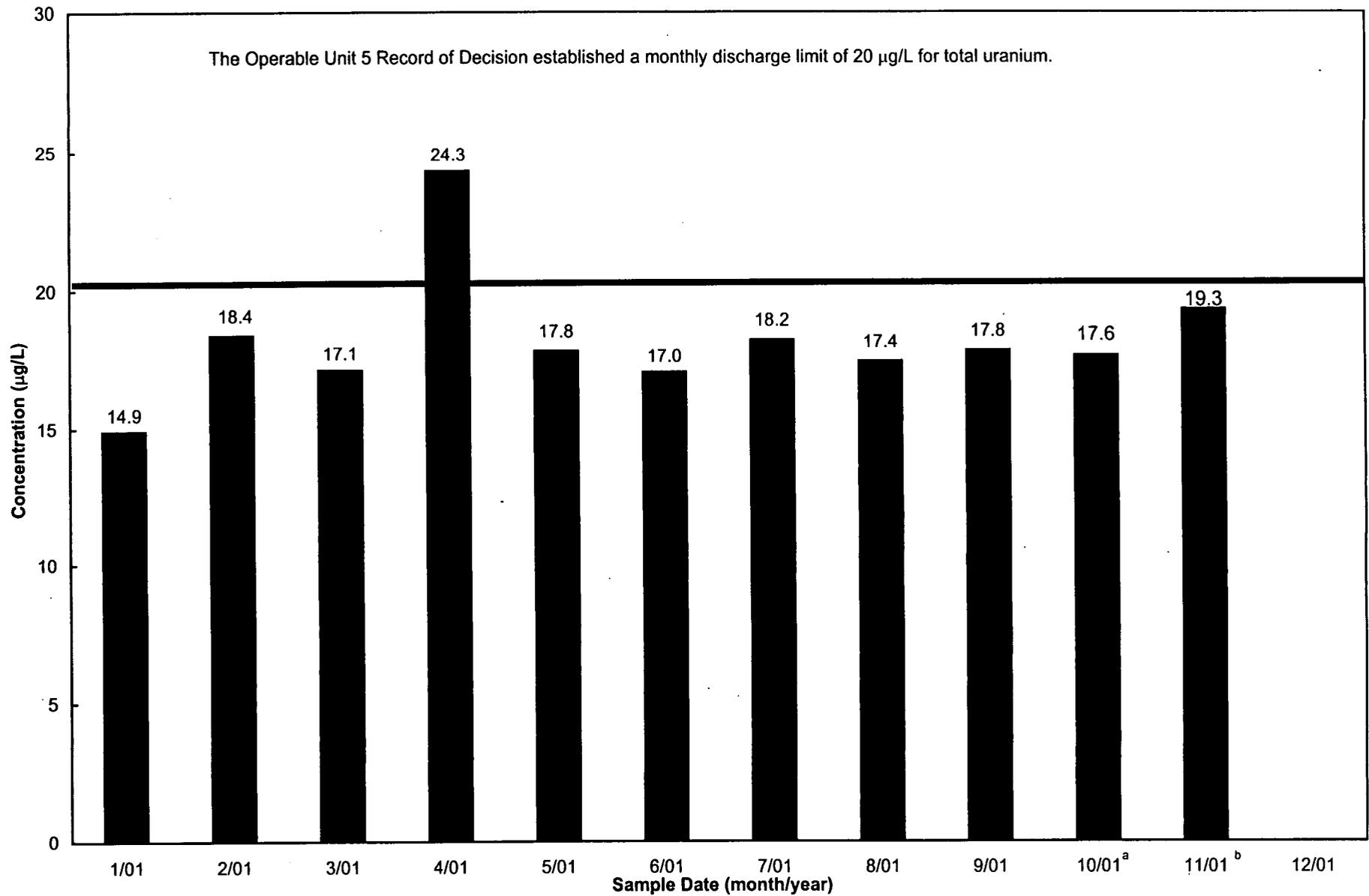
■ Monthly ▨ Cumulative

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

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^aActual concentration was 24.9 µg/L. Eliminating 2 "significant precipitation" bypass days reduces average to 17.6 µg/L.

^bActual concentration was 20.0 µg/L. Eliminating 3 "treatment plant maintenance" bypass days reduces average to 19.3 µg/L.

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

5.0 SEDIMENT MONITORING DATA

4103

5.1 DATA COVERED

This IEMP data quarterly summary covers the 2001 sediment monitoring data. The sediment sampling took place in August 2001, and the data became available for posting to the IEMP Data Information Site during the fourth quarter of 2001.

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 Fernald site. There were no notable results and events associated with 2001 sediment monitoring data. All results are below the applicable FRL and consistent with historical ranges. These data will be discussed in more detail in the 2001 Integrated Site Environmental Report, which will be submitted to the EPA and OEPA on June 1, 2002.

A map of the sediment sample locations is provided on the IEMP Data Information Site.

6.0 AIR MONITORING DATA

4103

6.1 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 from October 1, 2001 through January 15, 2001, as discussed in Section 1.0. Specifically, this includes:

- Radiological air particulate monitoring results from biweekly samples covering the period of September 4 through November 27, 2001 (i.e., biweekly samples collected September 18 through November 27). The biweekly sample results for the third quarter of 2001, the most recent full calendar quarter of data available, are compiled in table form (Tables 6-3 through 6-7) for the purpose of comparison to previous calendar quarters.
- Radiological air particulate monitoring quarterly composite samples collected during the third quarter of 2001 for National Emissions Standards for Hazardous Air Pollutants (NESHAP) compliance purposes.
- NESHAP stack emissions monitoring samples collected during the third quarter of 2001.
- Environmental radon monitoring data collected from September 1 through November 30, 2001.
- Silos headspace radon concentrations data collected from October 1 through December 31, 2001
- Direct radiation (thermoluminescent dosimeter [TLD]) monitoring data collected during the third 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.

6.2 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 site. Notable results and events associated with IEMP air monitoring data for the time period covered by this quarterly summary include the following:

- Figures 6-1 through 6-6 illustrate, in comparison to data reported in the third quarterly summary, that there was a relative increase in uranium and thorium-230 concentrations at the site fenceline during the period from September 4 to November 27, 2001. The higher uranium concentrations are attributed to 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 predominantly attributed to fugitive emissions from the Waste Pits Remedial Action Project.

- The maximum third quarter 2001 dose at the site fenceline air monitoring stations, as determined from quarterly composite samples, was 0.15 millirem (mrem) as summarized in Table 6-1. The maximum year-to-date dose through the third quarter at the site fenceline air monitoring stations (AMS-3) is 0.49 mrem as summarized in Table 6-2. On average, thorium isotopes contributed approximately 53 percent of the year-to-date dose measured at all air monitors. In particular, thorium-230 contributed 42 percent of the dose, while uranium and radium-226 contributed an average of approximately 25 percent and 20 percent, respectively.
- In recent years, direct radiation (TLD) measurements have shown a positive 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). The previous quarterly summary (October 2001) noted a reverse in this trend. During the third 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 6-7 and 6-8.
- During the fourth quarter of 2001, silo headspace radon concentrations (Figure 6-9) continued to increase, yet are comparable to levels measured during the fourth quarter of 2000.
- During the period of October through December 2001, there were 12 exceedances of the DOE Order 5400.5 100 pCi/L radon limit. For comparison, there were no exceedances of the 100 pCi/L radon limit during that same time period in 2000. The increase in the number of exceedances 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 strongest inversions occurred during late October and November and produced a general increase in the average radon levels at the exclusion fence monitors, in particular at the KNE and KSE monitors (refer to Figure 6-10).

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 here in support of the findings listed above. Table 6-1 contains the third quarter doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 6-2 contains the year-to-date doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Tables 6-3 through 6-7 summarize the total uranium, total particulate and isotopic thorium concentrations from the third quarter of 2001. Tables 6-3 through 6-7 also include 2001 annual summary results and 1990 through 2000 summary results. Figures 6-1 through 6-6 illustrate total uranium, total particulate and isotopic thorium concentrations at selected fenceline locations (AMS-3, AMS-8A and AMS-9C) through November 27, 2001. Table 6-8 summarizes the current (September through November) and 2001 year-to-date environmental radon data from continuous monitors. 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.

4103

TABLE 6-1
THIRD 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	7.1E-08	1.8E-06	--	4.5E-05	3.9E-05	1.8E-03	1.1E-09	4.3E-04	3.4E-06	6.0E-04	4.4E-05	9.1E-04	0.004	0.039
AMS-3	2.4E-07	6.0E-06	2.5E-04	1.5E-04	9.1E-04	4.3E-03	3.1E-09	1.4E-03	7.8E-06	2.0E-03	1.2E-04	2.1E-03	0.011	0.113
AMS-4	4.4E-08	1.1E-06	1.8E-03	2.7E-05	6.3E-04	1.3E-03	--	2.6E-04	1.8E-06	3.6E-04	--	4.7E-04	0.005	0.049
AMS-5	--	--	6.7E-04	--	1.8E-04	1.1E-03	9.5E-11	--	2.1E-06	3.1E-04	3.7E-06	5.5E-04	0.003	0.028
AMS-6	--	--	--	--	--	2.4E-03	8.4E-11	--	3.0E-06	4.1E-04	3.3E-06	8.0E-04	0.004	0.036
AMS-7	--	--	--	--	5.5E-05	7.9E-04	--	--	7.7E-07	1.6E-04	--	2.0E-04	0.001	0.012
AMS-8A	3.7E-07	8.4E-06	1.1E-03	2.1E-04	1.3E-03	5.5E-03	3.6E-09	2.0E-03	9.9E-06	2.2E-03	1.4E-04	2.6E-03	0.015	0.151
AMS-9C	2.5E-07	6.1E-06	--	1.6E-04	3.8E-04	5.6E-03	3.6E-09	1.5E-03	8.4E-06	1.9E-03	1.4E-04	2.2E-03	0.012	0.119
AMS-22	3.5E-08	8.7E-07	8.7E-04	2.2E-05	1.3E-04	2.5E-03	--	2.1E-04	3.4E-06	5.9E-04	--	8.9E-04	0.005	0.053
AMS-23	4.7E-08	1.2E-06	6.0E-04	3.0E-05	5.8E-05	2.2E-03	3.8E-10	2.8E-04	3.1E-06	5.2E-04	1.5E-05	8.3E-04	0.005	0.045
AMS-24	--	--	--	--	--	8.1E-04	2.5E-10	--	1.2E-06	2.6E-04	1.0E-05	3.2E-04	0.001	0.014
AMS-25	--	--	--	--	1.1E-04	9.9E-04	4.0E-10	--	1.2E-06	2.1E-04	1.5E-05	3.1E-04	0.002	0.016
AMS-26	--	--	1.5E-03	--	8.9E-05	1.0E-03	9.8E-10	--	1.6E-06	2.0E-04	3.8E-05	4.3E-04	0.003	0.033
AMS-27	2.5E-07	6.1E-06	1.9E-03	1.6E-04	2.7E-04	1.3E-03	7.2E-10	1.5E-03	2.0E-06	2.9E-04	2.8E-05	5.2E-04	0.006	0.060
AMS-28	2.1E-08	5.2E-07	--	1.3E-05	3.2E-04	3.8E-03	9.4E-10	1.3E-04	3.3E-06	4.4E-04	3.7E-05	8.7E-04	0.006	0.056
AMS-29	4.7E-08	1.2E-06	5.3E-03	2.9E-05	1.8E-04	1.9E-03	2.5E-09	2.8E-04	2.0E-06	6.1E-04	9.9E-05	5.4E-04	0.009	0.089
Background														
AMS-12	2.6E-07	6.3E-06	9.2E-03	1.6E-04	3.0E-04	2.2E-04	--	1.5E-03	5.5E-07	1.3E-04	--	1.4E-04	NA ^d	
AMS-16	4.1E-07	1.0E-05	1.3E-02	2.6E-04	4.6E-04	4.7E-04	7.2E-10	2.5E-03	9.4E-07	2.6E-04	2.8E-05	2.5E-04	NA ^d	
QA/QC														
Column Check ^e	0.000	0.000	0.140	0.008	0.047	0.374	0.000	0.080	0.001	0.110	0.007	0.146	NA ^d	0.91

Maximum Quarterly Ratio: 0.0151
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 (0.91) at all fenceline monitors.

TABLE 6-2
2001 YEAR-TO-DATE 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	5.3E-07	1.3E-05	3.7E-03	3.3E-04	6.8E-04	7.4E-03	6.1E-09	3.2E-03	1.4E-05	3.3E-03	2.4E-04	3.8E-03	0.023	0.226
AMS-3	7.7E-07	1.9E-05	6.7E-03	4.9E-04	1.6E-03	1.7E-02	1.7E-08	4.6E-03	3.6E-05	8.4E-03	6.8E-04	9.5E-03	0.049	0.486
AMS-4	4.4E-08	1.1E-06	1.8E-03	2.7E-05	6.3E-04	2.7E-03	8.6E-10	2.6E-04	4.5E-06	9.4E-04	3.4E-05	1.2E-03	0.008	0.076
AMS-5	--	--	1.9E-02	--	3.3E-04	4.9E-03	9.5E-11	--	4.8E-06	8.9E-04	3.7E-06	1.3E-03	0.026	0.265
AMS-6	1.4E-07	3.4E-06	1.6E-04	8.7E-05	4.4E-04	1.4E-02	8.4E-11	8.3E-04	9.5E-06	1.9E-03	3.3E-06	2.5E-03	0.020	0.197
AMS-7	2.3E-07	5.6E-06	--	1.4E-04	1.6E-04	5.1E-03	7.9E-10	1.4E-03	3.8E-06	8.4E-04	3.1E-05	1.0E-03	0.009	0.086
AMS-8A	1.2E-06	2.9E-05	4.0E-03	7.5E-04	2.3E-03	1.6E-02	1.5E-08	7.1E-03	3.3E-05	7.7E-03	5.7E-04	8.8E-03	0.047	0.472
AMS-9C	8.3E-07	2.1E-05	2.1E-03	5.2E-04	1.0E-03	1.7E-02	1.6E-08	5.0E-03	3.6E-05	8.6E-03	6.4E-04	9.7E-03	0.045	0.447
AMS-22	5.0E-07	1.2E-05	3.4E-03	3.1E-04	5.1E-04	1.4E-02	6.7E-09	3.0E-03	1.5E-05	3.1E-03	2.6E-04	4.1E-03	0.028	0.284
AMS-23	2.4E-07	5.9E-06	2.3E-03	1.5E-04	2.0E-04	7.8E-03	4.9E-09	1.4E-03	1.1E-05	2.3E-03	1.9E-04	3.0E-03	0.017	0.174
AMS-24	5.0E-08	1.2E-06	1.4E-02	3.1E-05	1.5E-05	3.0E-03	8.9E-10	3.0E-04	3.0E-06	6.6E-04	3.5E-05	8.0E-04	0.019	0.189
AMS-25	8.1E-08	2.0E-06	--	5.1E-05	1.1E-04	4.5E-03	2.0E-09	4.8E-04	2.5E-06	5.4E-04	7.9E-05	6.7E-04	0.006	0.065
AMS-26	1.0E-07	2.5E-06	3.4E-03	6.4E-05	1.7E-04	6.3E-03	4.7E-09	6.1E-04	9.2E-06	1.9E-03	1.9E-04	2.4E-03	0.015	0.151
AMS-27	5.8E-07	1.4E-05	3.4E-03	3.6E-04	6.5E-04	5.2E-03	3.7E-09	3.4E-03	6.0E-06	1.1E-03	1.4E-04	1.6E-03	0.016	0.158
AMS-28	5.6E-07	1.4E-05	2.1E-03	3.5E-04	8.4E-04	1.5E-02	5.1E-09	3.3E-03	1.3E-05	2.2E-03	2.0E-04	3.5E-03	0.027	0.273
AMS-29	3.0E-07	7.3E-06	1.0E-02	1.9E-04	7.3E-04	1.1E-02	8.0E-09	1.8E-03	1.3E-05	3.0E-03	3.1E-04	3.3E-03	0.031	0.305
Background														
AMS-12	8.7E-07	2.1E-05	3.2E-02	5.5E-04	1.0E-03	1.6E-03	--	5.2E-03	2.3E-06	7.0E-04	--	6.0E-04	NA ^d	
AMS-16	1.4E-06	3.4E-05	3.9E-02	8.5E-04	1.8E-03	1.7E-03	7.2E-10	8.1E-03	3.5E-06	9.4E-04	2.8E-05	9.4E-04	NA ^d	
QA/QC														
Column Check ^e	0.000	0.002	0.761	0.039	0.103	1.502	0.000	0.367	0.002	0.473	0.036	0.570	NA ^d	3.85

Maximum Year-To-Date Ratio: 0.0486
Maximum Year-To-Date Dose (mrem): 0.49

^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 (3.85) at all fenceline monitors.

TABLE 6-3

TOTAL URANIUM PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Third Quarter 2001 Results ^a (July - September) (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	7	27	136	79	20	19	235	102	0	3500
AMS-3	7	53	249	150	20	53	908	233	0	17000
AMS-4	7	24	92	45	20	0.0	105	46	0	2300
AMS-5	7	14	94	45	20	13	139	51	0	4400
AMS-6	7	16	153	63	20	13	257	81	0	3200
AMS-7	7	13	61	34	20	0.0	102	47	0	7800
AMS-8A	7	57	615	203	20	57	928	239	0	1135
AMS-9C ^b	7	70	489	173	20	63	989	242	0	784
AMS-22	7	47	126	79	20	0.0	743	110	0	238
AMS-23	7	37	92	65	20	24	191	81	0	202
AMS-24	7	24	53	42	20	7.6	87	40	0	207
AMS-25	7	18	57	34	20	4.9	88	38	0	402
AMS-26	7	26	169	69	20	19	340	81	0	267
AMS-27	7	19	103	56	20	2.7	117	55	0	170
AMS-28	7	38	124	75	20	23	239	93	0	445
AMS-29	7	22	122	60	20	7.6	314	88	0	326
Background										
AMS-12	7	2.7	39	19	20	0.0	53	16	0	480
AMS-16	7	11	27	22	20	0.0	56	20	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.

TABLE 6-4
TOTAL PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Third Quarter 2001 Results (July - September) ($\mu\text{g}/\text{m}^3$)			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	7	30	41	35	20	24	61	34	7.0	77
AMS-3	7	25	40	33	20	21	53	31	8.0	159
AMS-4	7	26	44	33	20	24	52	34	13	79
AMS-5	7	23	38	31	20	21	48	31	9.6	62
AMS-6	7	23	39	32	20	23	53	33	8.0	69
AMS-7	7	24	45	34	20	3.0	55	33	6.8	84
AMS-8A	7	29	42	35	20	23	57	34	13	89
AMS-9C ^a	7	28	41	35	20	24	62	34	7.1	136
AMS-22	7	21	41	33	20	19	54	33	13	57
AMS-23	7	21	38	31	20	21	71	32	11	57
AMS-24	7	30	43	36	20	15	51	33	5.4	79
AMS-25	7	18	39	30	20	18	54	33	17	69
AMS-26	7	21	37	31	20	21	46	29	15	52
AMS-27	7	19	62	48	20	19	82	48	16	92
AMS-28	7	19	39	33	20	5.8	69	31	12	68
AMS-29	7	21	53	38	20	21	53	35	11	62
Background										
AMS-12 ^b	7	21	36	29	20	20	49	29	6.0	416
AMS-16 ^b	7	17	61	40	20	17	62	40	18	84
Project-Specific										
WPTH-2	7	31	43	36	20	28	53	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.

TABLE 6-5

THORIUM-228 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Third Quarter 2001 Results ^a (July - September) (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	7	0.4	14	6.8	20	0.0	19	6.3	0.8	10
AMS-3	7	5.6	17	11	20	2.2	24	10	1.1	10
AMS-4	7	2.0	22	7.5	20	0.0	22	6.7	0.0	8.6
AMS-5	7	0.0	11	3.9	20	0.0	14	4.9	0.0	6.1
AMS-6	7	2.3	15	7.0	20	0.0	16	6.5	0.0	8.1
AMS-7	7	1.2	16	7.0	20	0.0	17	5.9	4.4	11
AMS-8A	7	1.2	10	6.8	20	0.0	29	8.4	1.2	13
AMS-9C ^b	7	1.6	13	9.0	20	0.0	28	10	3.0	13
AMS-22	7	0.0	20	8.0	20	0.0	27	7.1	1.4	8.6
AMS-23	7	0.0	13	5.0	20	0.0	22	5.6	0.0	7.6
AMS-24	7	1.2	15	8.5	20	0.0	15	5.8	0.38	7.5
AMS-25	7	2.0	13	5.7	20	0.0	13	5.7	0.0	6.7
AMS-26	7	0.0	23	6.4	20	0.0	24	6.0	2.6	14
AMS-27	7	3.2	17	9.9	20	0.0	21	8.7	0.37	7.4
AMS-28	7	0.0	18	7.7	20	0.0	39	8.4	0.0	14
AMS-29	7	0.0	17	10	20	0.0	20	8.4	0.0	7.1
Background										
AMS-12	7	2.0	14	5.1	20	0.0	14	4.4	0.0	6.7
AMS-16	7	0.0	15	7.3	20	0.0	16	7.3	0.0	17
Project Specific										
WPTH-2 ^c	7	4.5	14	8.9	20	0.0	28	7.9	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.

TABLE 6-6

THORIUM-230 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Third Quarter 2001 Results ^a (July – September) (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	7	0.0	56	31	20	0.0	104	33	3.1	27
AMS-3	7	0.0	117	59	20	0.0	391	86	3.4	63
AMS-4	7	0.0	91	31	20	0.0	91	26	0.0	23
AMS-5	7	0.0	72	17	20	0.0	620	50	0.0	43
AMS-6	7	0.0	100	34	20	0.0	226	44	0.0	74
AMS-7	7	0.0	19	12	20	0.0	74	18	0.0	44
AMS-8A	7	8.3	134	59	20	5.1	461	81	6.3	71
AMS-9C ^b	7	3.2	128	63	20	3.1	407	83	12	78
AMS-22	7	17	125	46	20	5.9	493	71	12	46
AMS-23	7	0.0	94	40	20	0.0	153	41	1.5	19
AMS-24	7	0.0	37	17	20	0.0	125	21	3.4	24
AMS-25	7	0.0	55	14	20	0.0	223	23	0.37	23
AMS-26	7	0.0	82	23	20	0.0	233	32	2.6	37
AMS-27	7	0.0	55	23	20	0.0	126	31	0.0	99
AMS-28	7	5.1	87	45	20	5.1	401	66	0.0	357
AMS-29	7	11	48	30	20	0.0	537	56	6.1	45
Background										
AMS-12	7	0.0	20	5.6	20	0.0	42	8.3	0.0	9.3
AMS-16	7	0.0	16	5.9	20	0.0	18	7.5	0.0	18
Project Specific										
WPTH-2 ^c	7	12	95	48	20	12	110	54	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 6-7

THORIUM-232 PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES

	Third Quarter 2001 Results ^a (July – September) (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	7	1.6	11	6.1	20	0.0	19	7.3	0.0	8.6
AMS-3	7	0.0	11	7.1	20	0.0	23	9.2	0.0	9.8
AMS-4	7	0.0	8.2	4.1	20	0.0	22	5.8	0.0	9.3
AMS-5	7	1.2	5.5	3.3	20	0.0	15	5.1	0.0	9.1
AMS-6	7	0.0	13	4.4	20	0.0	22	5.8	0.0	8.1
AMS-7	7	2.4	9.8	4.6	20	0.0	16	5.3	0.38	12
AMS-8A	7	1.6	11	7.3	20	1.1	24	9.2	0.0	8.4
AMS-9C ^b	7	4.8	14	8.2	20	2.7	34	11	1.8	11
AMS-22	7	3.0	12	7.1	20	0.0	35	7.9	0.0	6.5
AMS-23	7	0.0	9.2	5.0	20	0.0	75	9.6	0.0	5.2
AMS-24	7	2.0	7.5	4.3	20	0.0	11	4.3	0.0	9.1
AMS-25	7	0.0	9.9	3.3	20	0.0	10	3.8	1.1	10
AMS-26	7	0.8	7.5	4.1	20	0.0	12	5.0	0.38	14
AMS-27	7	0.0	11	7.1	20	0.0	22	7.6	0.0	7.8
AMS-28	7	0.0	10	5.5	20	0.0	33	7.2	0.0	17
AMS-29	7	0.0	12	6.0	20	0.0	19	6.3	0.0	13
Background										
AMS-12	7	0.0	8.0	4.8	20	0.0	8.4	4.2	0.0	9.3
AMS-16	7	2.0	10	5.7	20	0.0	18	6.5	0.0	14
Project Specific										
WPTH-2 ^c	7	1.9	12	5.5	20	0.31	22	7.1	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 6-8

CONTINUOUS ENVIRONMENTAL RADON MONITORING
MONTHLY AVERAGE CONCENTRATIONS^a

Location	September 2001 through November 2001 Summary Results (Instrument Background Corrected) ^b (pCi/L)			2001 Year-to-Date Summary Results (Instrument Background Corrected) ^b (pCi/L)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Fenceline						
AMS-02	0.5	0.6	0.5	0.1	0.6	0.3
AMS-03	0.5	0.7	0.6	0.1	0.7	0.3
AMS-04	0.3	0.4	0.3	0.1	0.4	0.2
AMS-05	0.4	0.8	0.6	0.1	0.8	0.4
AMS-06	0.4	0.6	0.5	0.1	0.6	0.3
AMS-07	0.5	0.8	0.6	0.2	0.8	0.4
AMS-08A	0.4	0.6	0.5	0.1	0.7	0.4
AMS-09C	0.1	0.5	0.3	0.1	0.8	0.3
AMS-22	0.2	0.2	0.2	0.1	0.3	0.2
AMS-23	0.2	0.3	0.3	0.1	0.3	0.2
AMS-24	0.4	0.7	0.5	0.1	0.7	0.3
AMS-25	0.4	0.7	0.5	0.1	0.7	0.3
AMS-26	0.3	0.5	0.4	0.2	0.5	0.3
AMS-27	0.5	0.8	0.6	0.1	0.8	0.4
AMS-28	0.3	0.4	0.4	0.1	0.6	0.3
AMS-29	0.2	0.5	0.3	0.1	0.5	0.2
Background						
AMS-12	0.2	0.4	0.3	0.2	0.5	0.3
AMS-16	0.1	0.3	0.2	0.0	0.3	0.1
On Site						
KNE	4.0	13.1	7.6	1.1	13.1	4.1
KNO ^c	1.9	2.2	2.1	0.3	4.5	1.4
KNW/KNW-A	0.5	1.9	1.1	0.4	1.9	0.8
KSE	1.9	4.5	2.8	0.9	4.5	2.1
KSO ^c	0.6	1.6	1.1	0.3	1.6	0.6
KSW/KSW-A	0.8	1.8	1.2	0.2	1.8	0.8
KTOP	3.0	5.8	4.7	3.0	9.0	5.4
LP2 ^d	0.7	1.2	0.9	0.3	1.2	0.5
Pilot Plant Warehouse	0.5	0.8	0.6	0.3	0.8	0.4
PR-1 ^e	0.5	0.8	0.7	0.4	0.9	0.7
Rally Point 4	0.3	0.7	0.4	0.2	0.7	0.4
Surge Lagoon	0.7	1.4	1.0	0.2	1.4	0.5
T117 ^d	0.7	1.3	0.9	0.2	1.3	0.4
T28/T28A	0.3	1.1	0.7	0.3	1.1	0.6
TS4	0.8	1.0	0.9	0.2	1.0	0.5
WP-17A	0.3	0.7	0.5	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.

^cUnit was placed in service in April 2000.

^dUnit was placed in service in November 2000.

^eUnit was placed in service in March 2000.

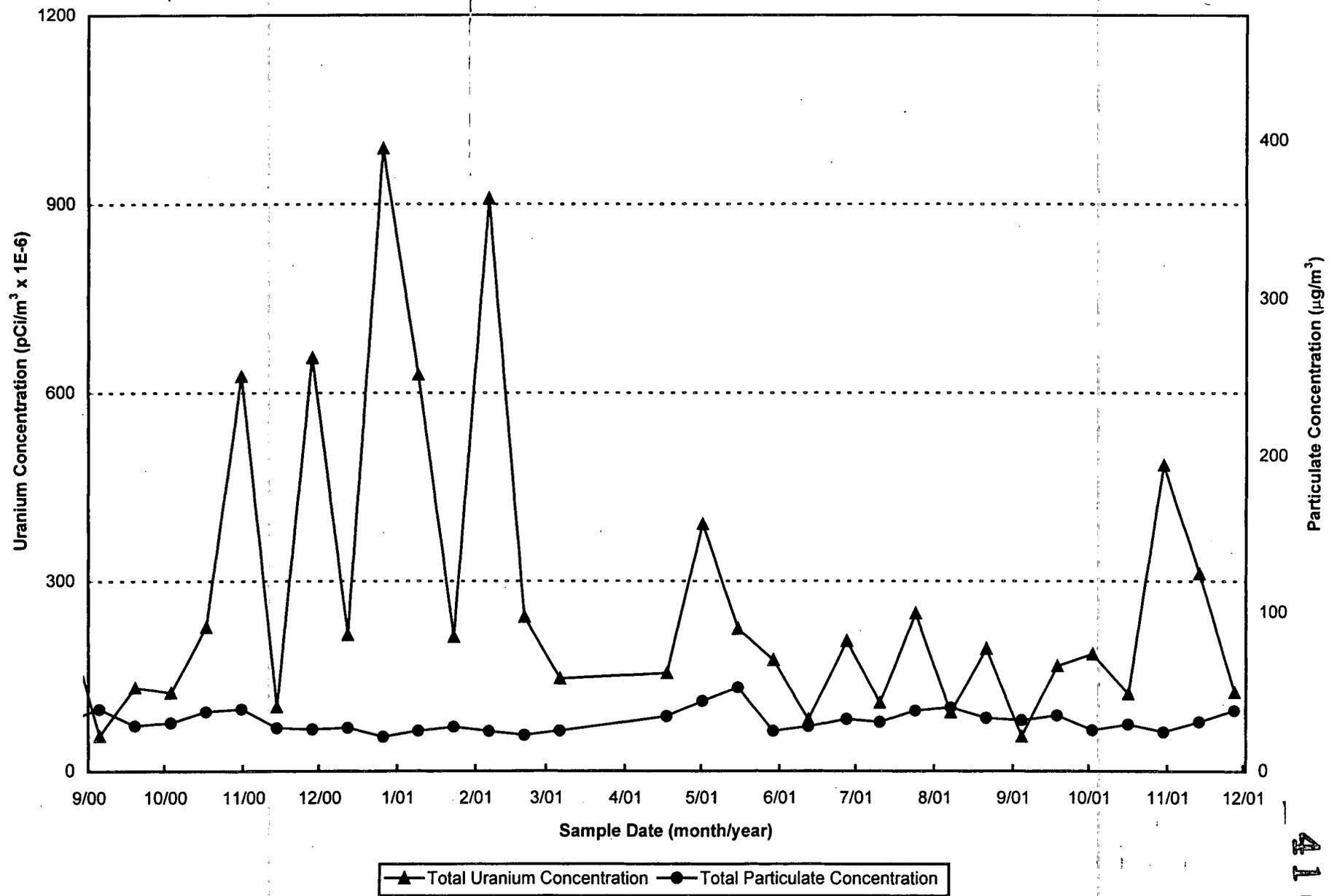


FIGURE 6-1. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

000040

4103

000041

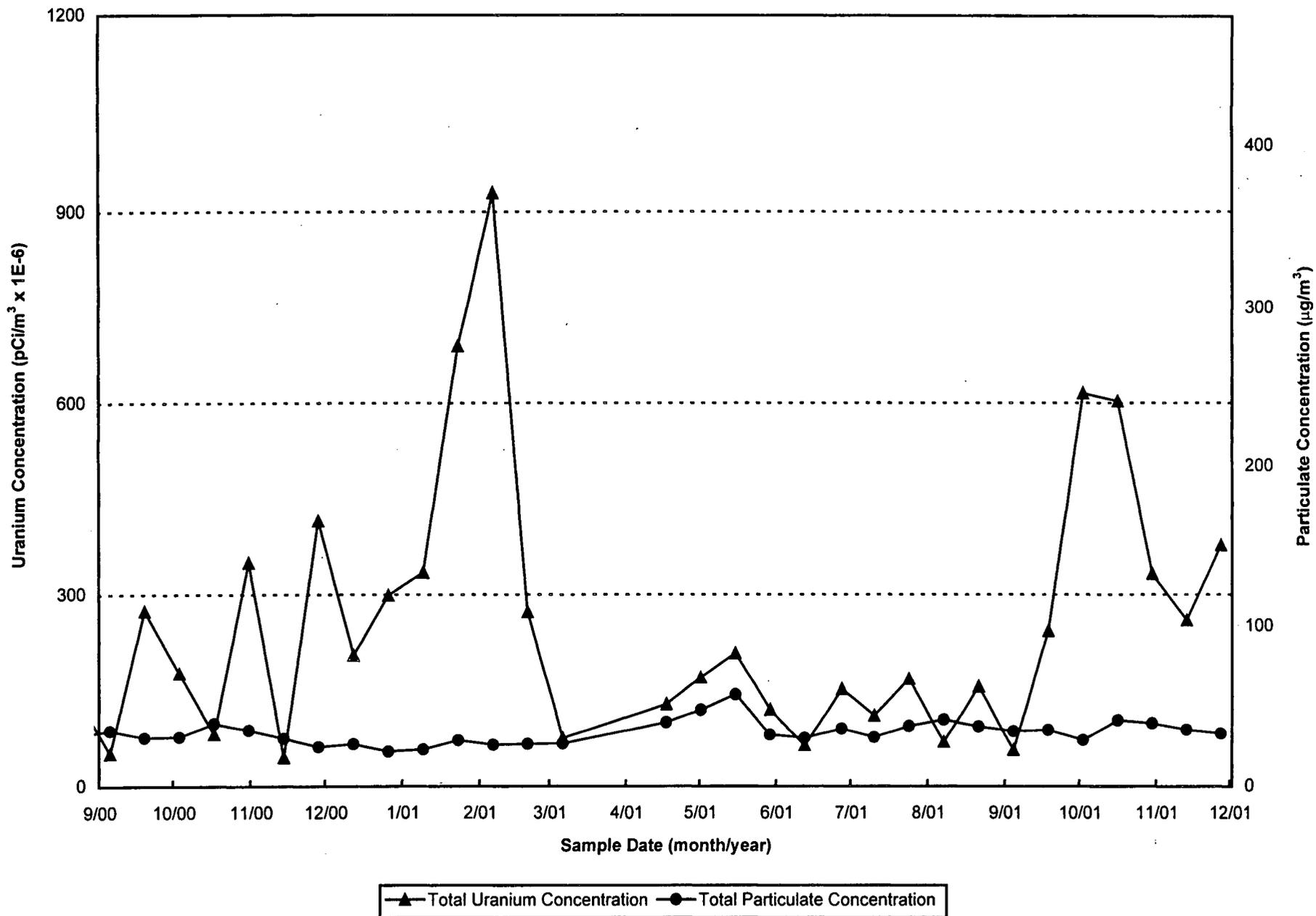
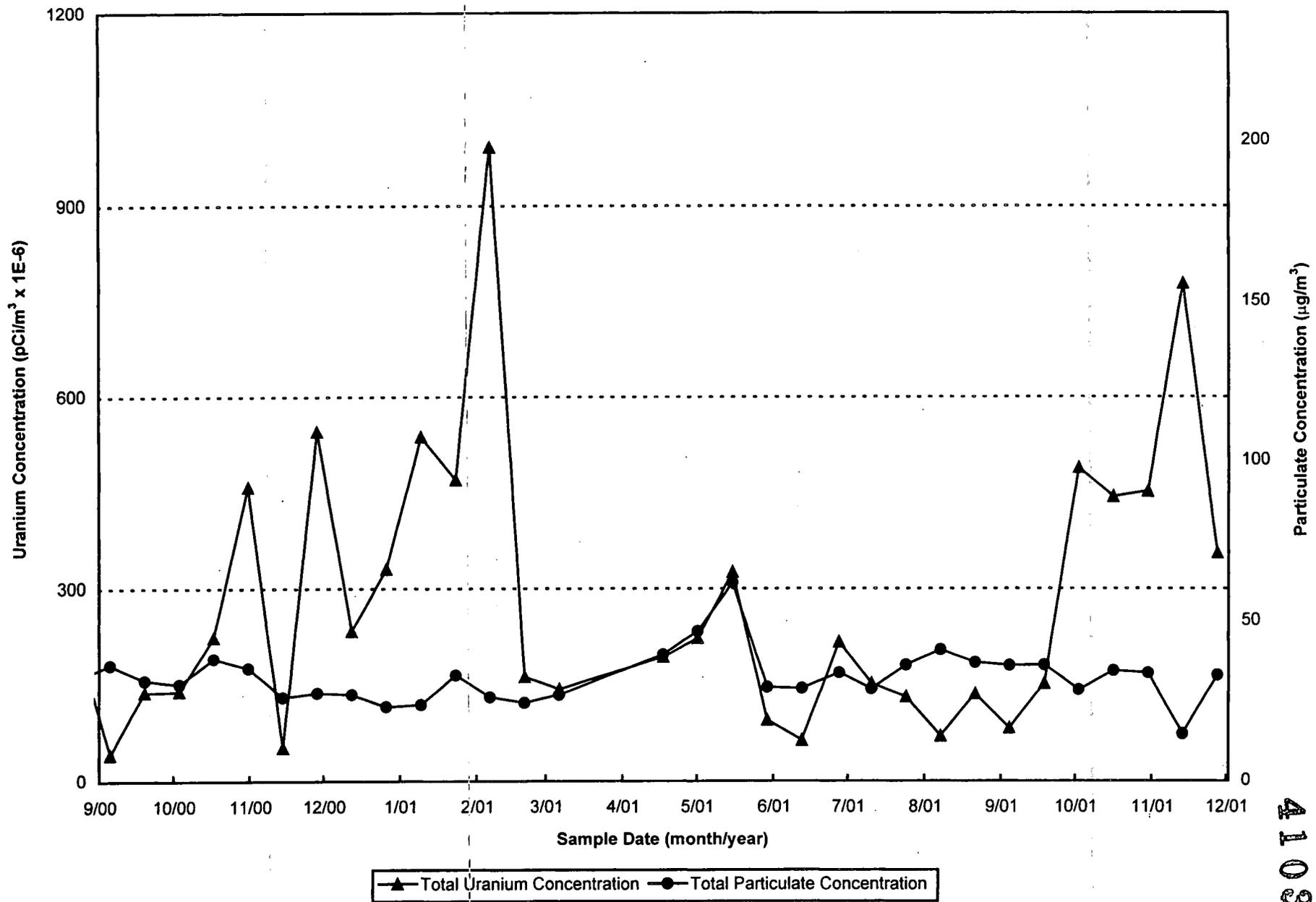


FIGURE 6-2. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

000042



4103

FIGURE 6-3. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C

000043

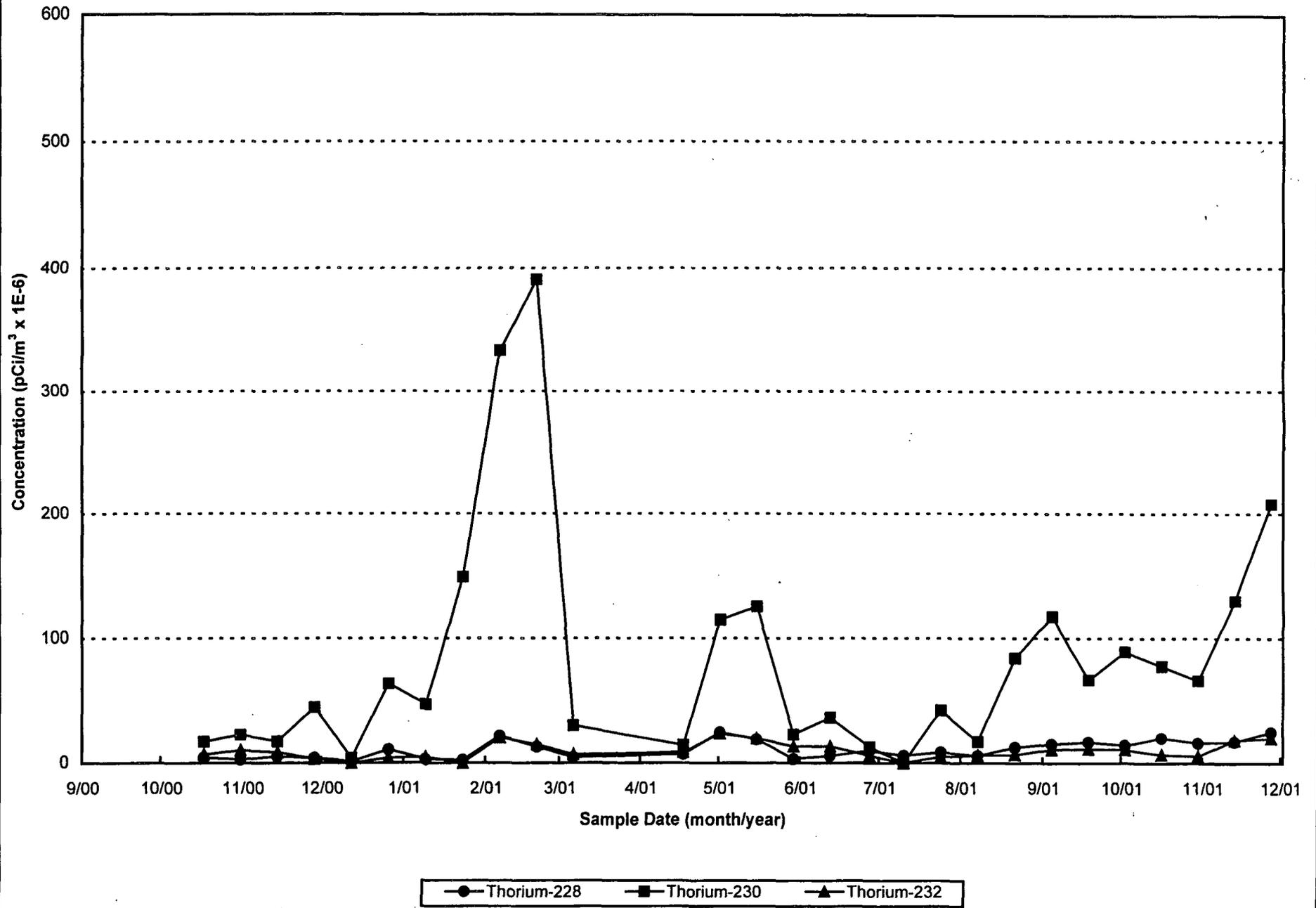


FIGURE 6-4. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3

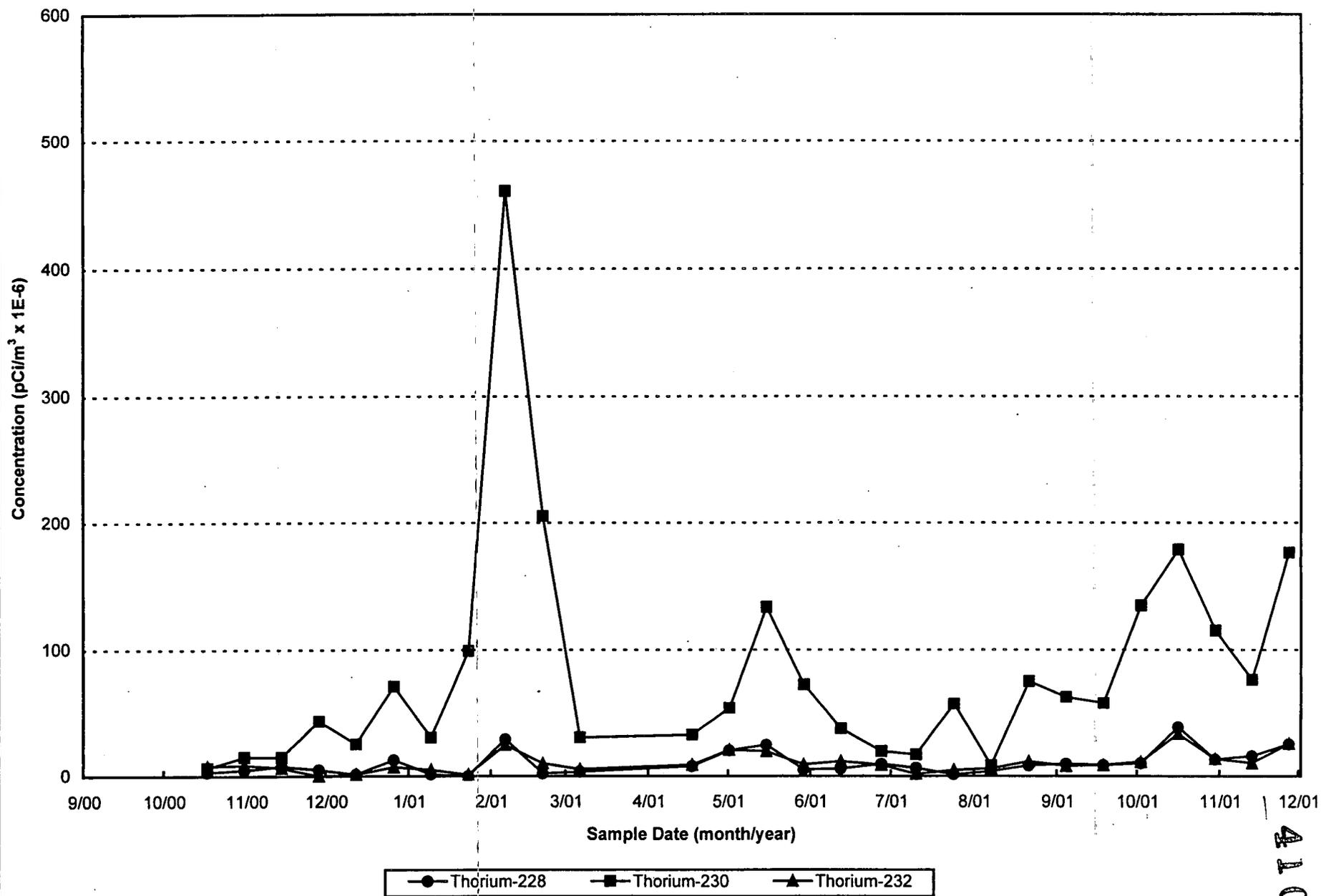


FIGURE 6-5. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A

000044

4103

000045

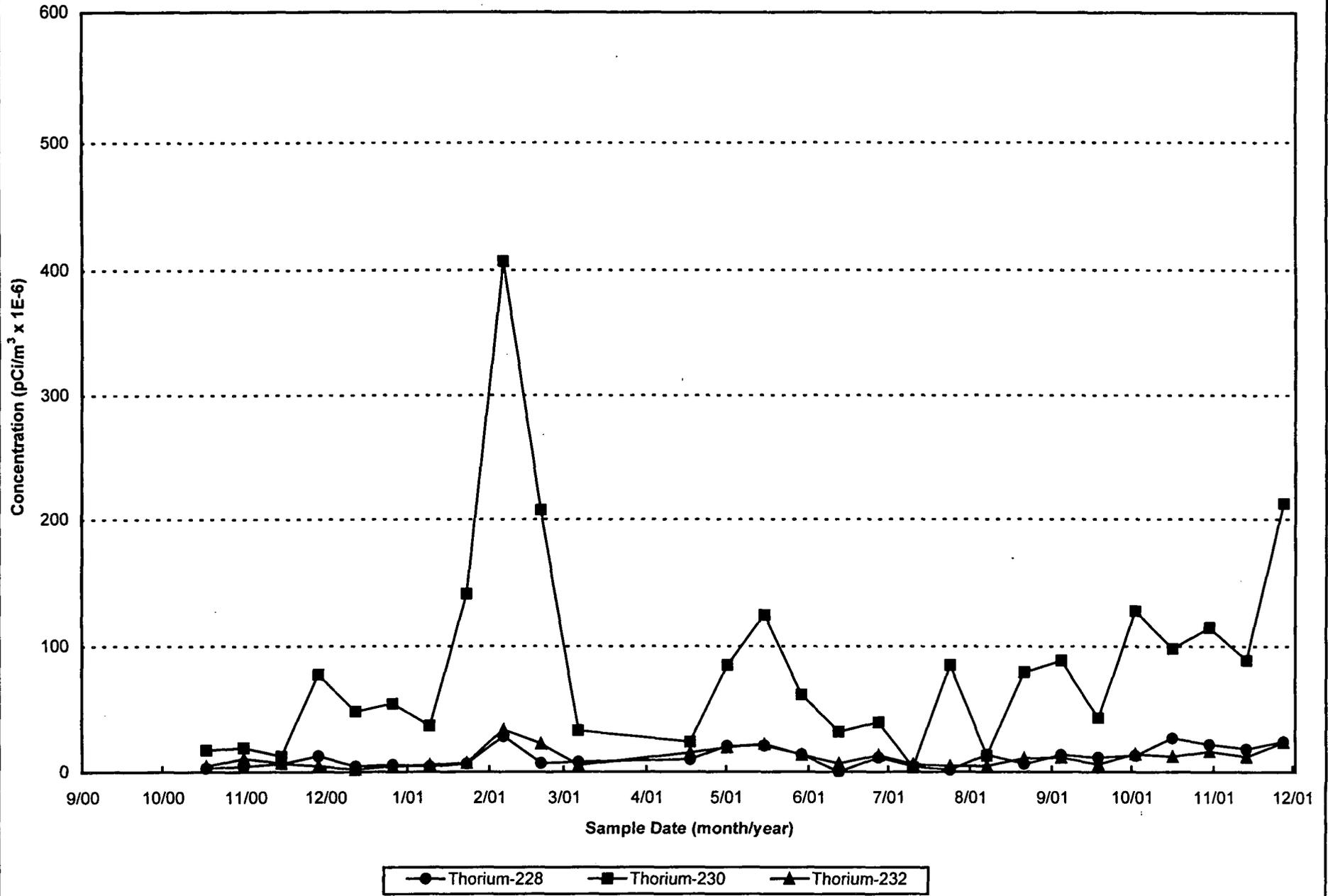
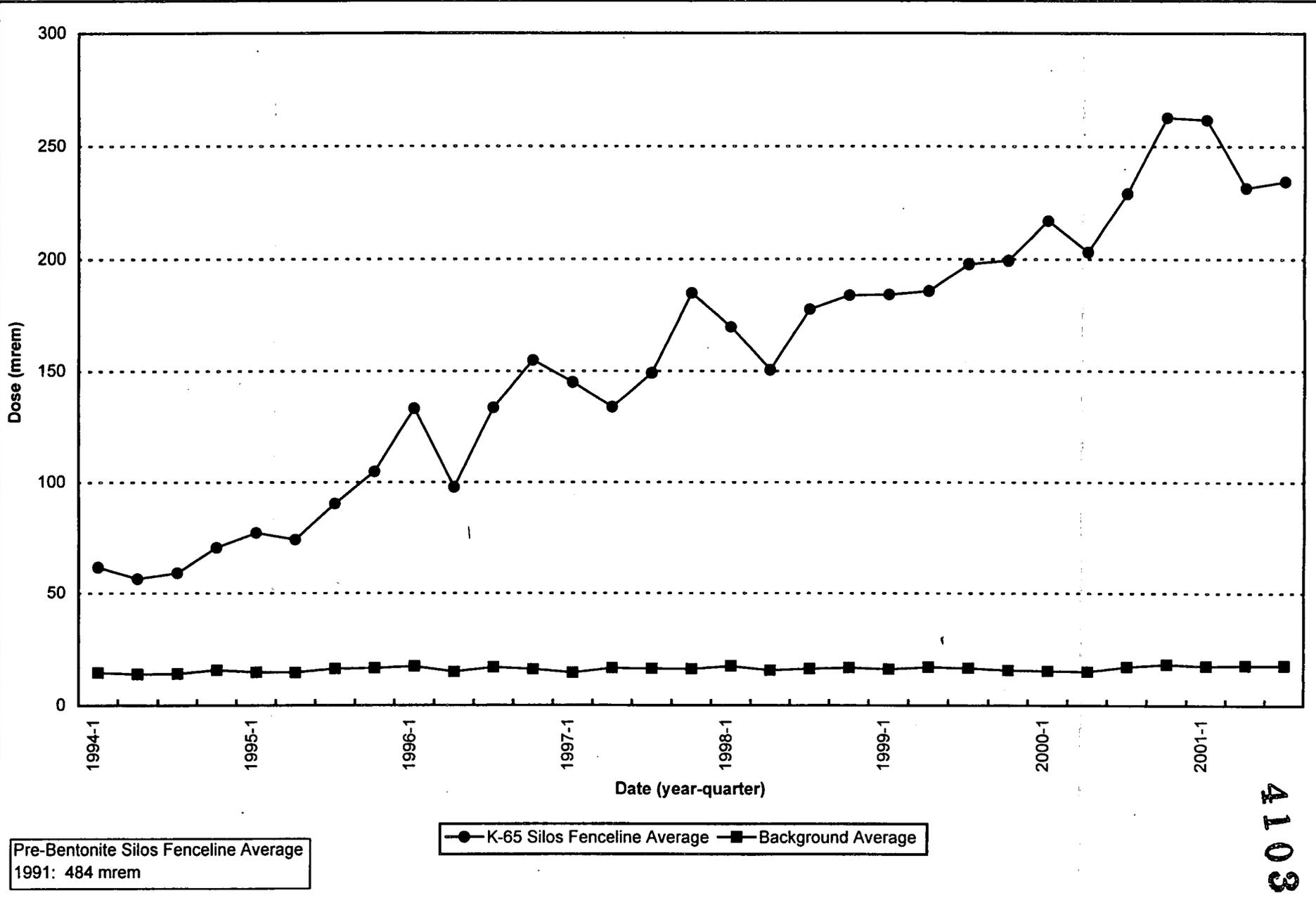


FIGURE 6-6. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C

000046



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FIGURE 6-7. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2001
(K-65 SILOS FENCELINE AVERAGE VERSUS BACKGROUND AVERAGE)

000047

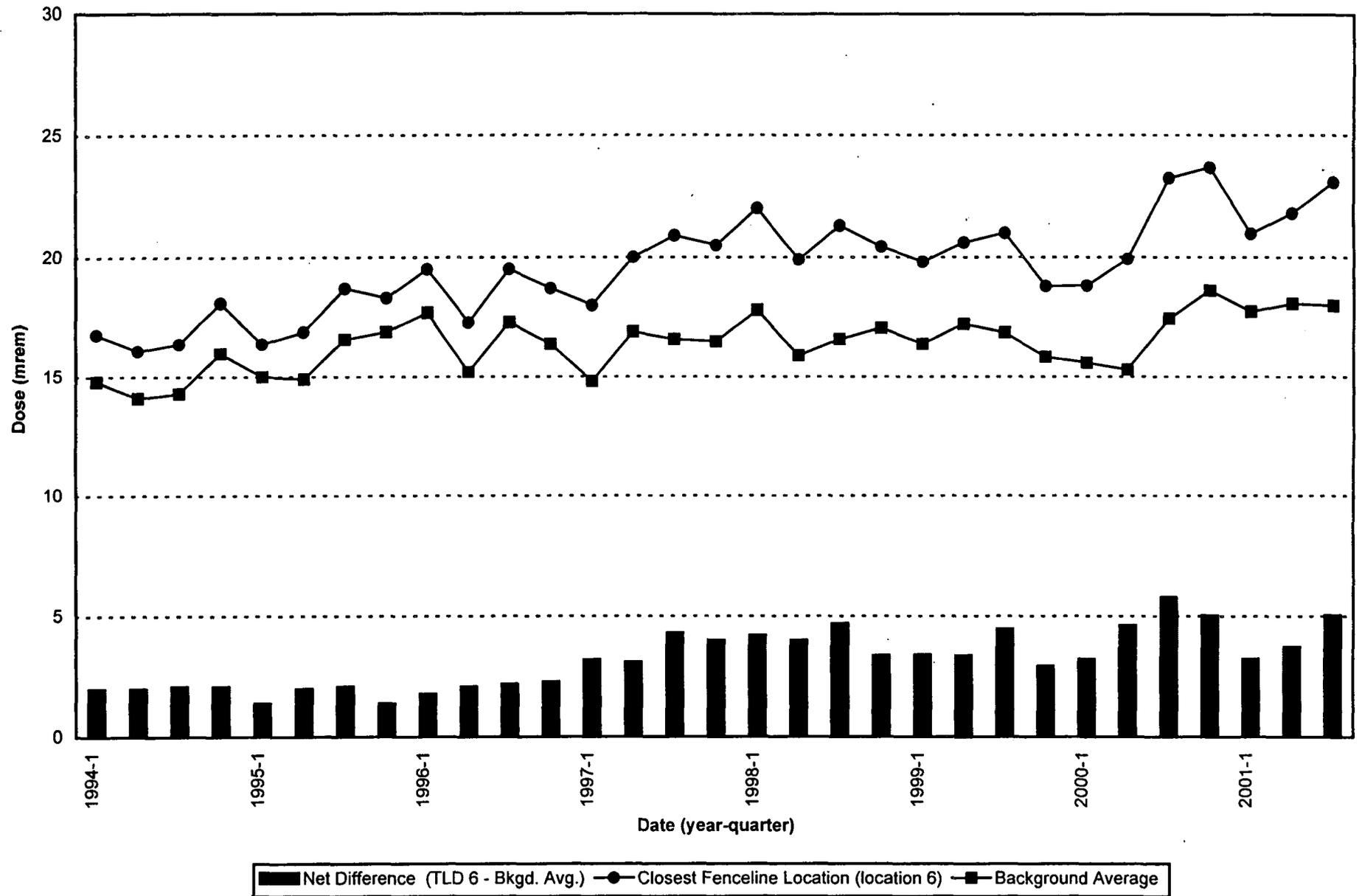
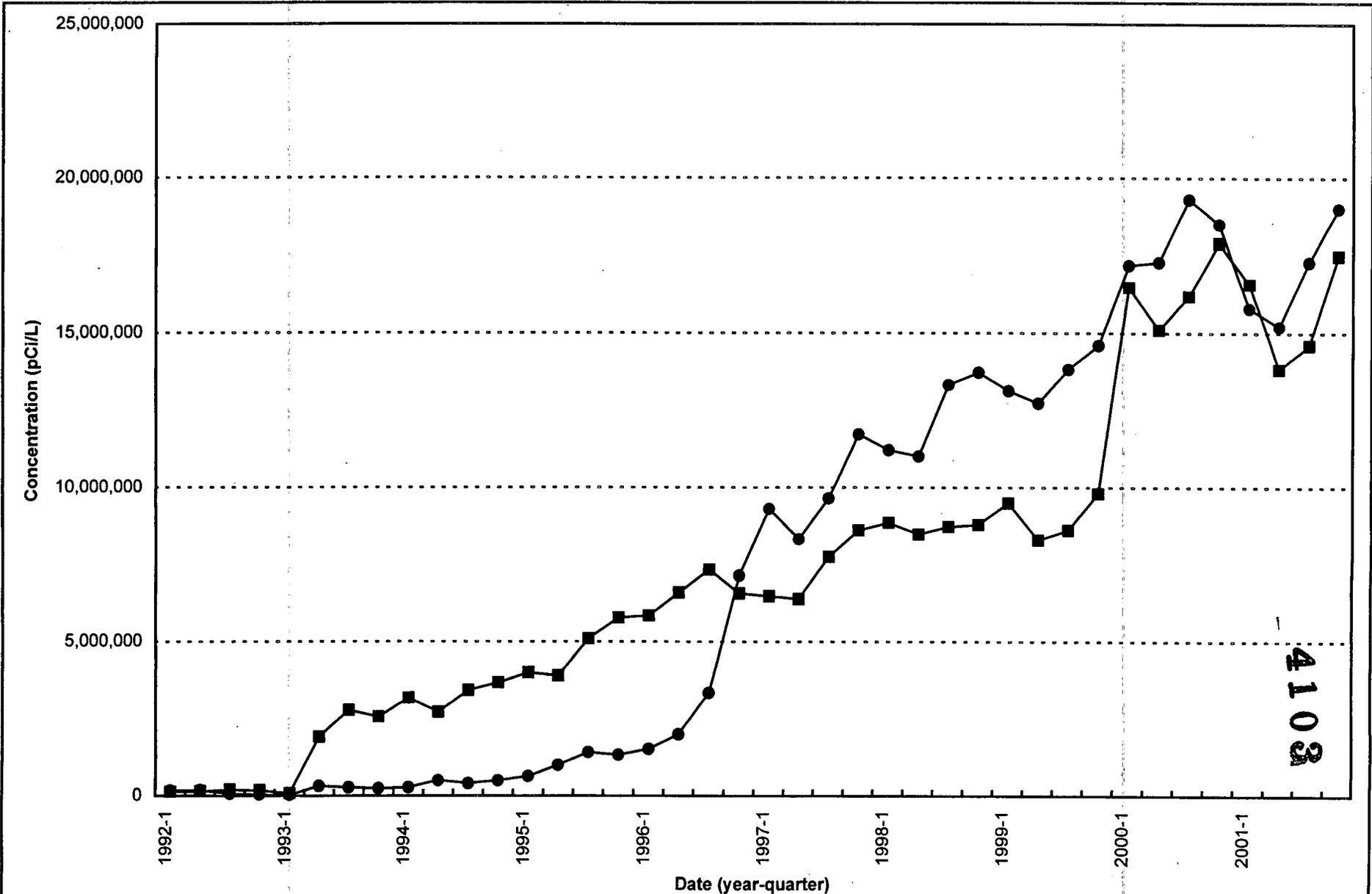


FIGURE 6-8. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2001
(LOCATION 6 VERSUS BACKGROUND AVERAGE)

000048



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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 6-9. QUARTERLY K-65 SILO HEADSPACE RADON CONCENTRATIONS, 1992 - 2001

000049

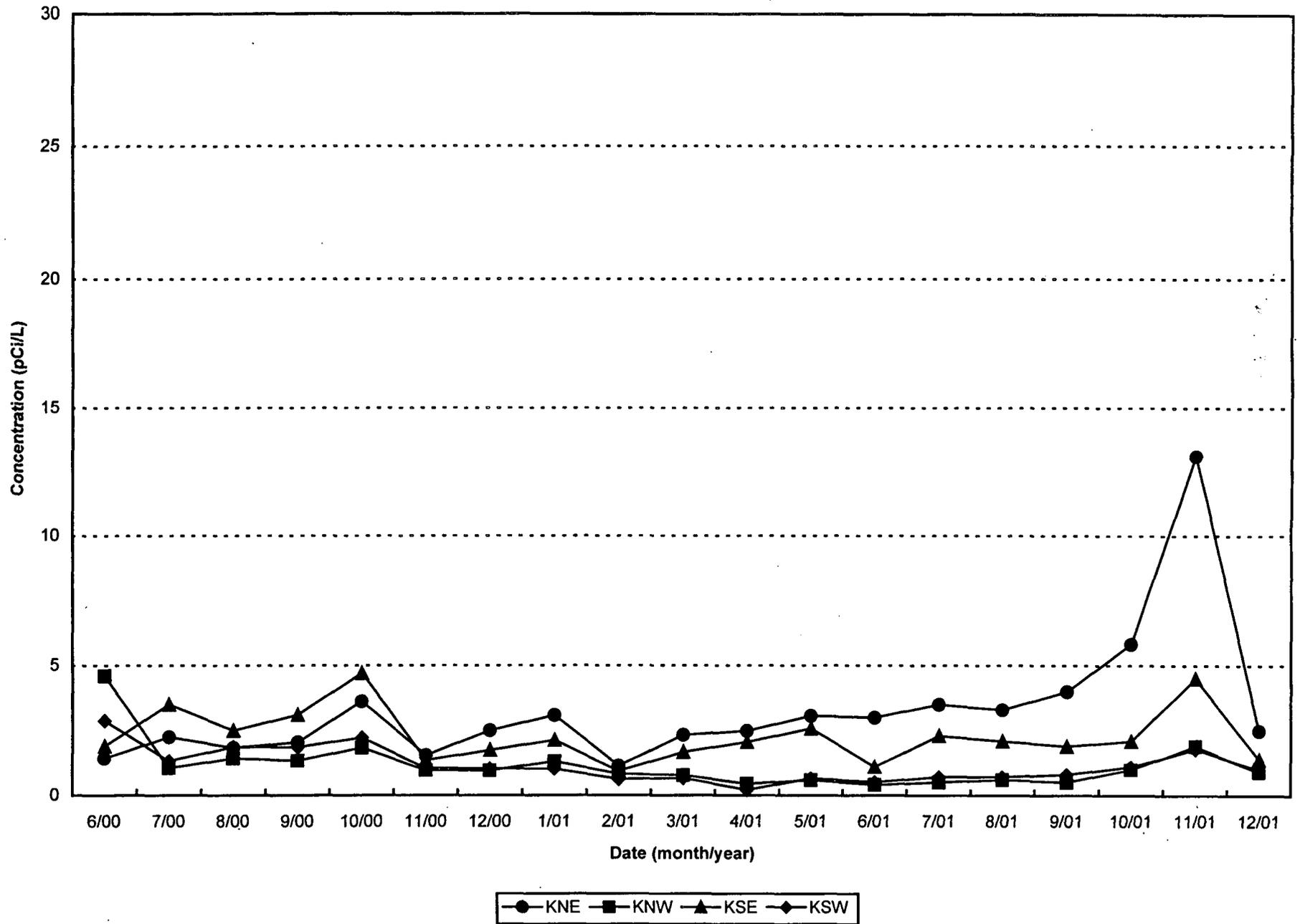


FIGURE 6-10. MONTHLY AVERAGE RADON CONCENTRATIONS FOR SILO EXCLUSION FENCE MONITORS, 6/00 - 12/01

4103**REFERENCES**

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