

**FIRST IEMP DATA QUARTERLY  
SUMMARY FOR 2001**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO**



**APRIL 2001**

**U.S. DEPARTMENT OF ENERGY**

51350-RP-0014

REV. 0

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FINAL

**3638**

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## LIST OF ACRONYMS

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AMS	air monitoring station
BTV	benchmark toxicity value
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFCA	Federal Facilities Compliance Agreement
FRL	final remediation level
gpad	gallons per acre per day
gpm	gallons per minute
IEMP	Integrated Environmental Monitoring Plan
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
OSDF	on-site disposal facility
pCi/m <sup>3</sup>	picoCuries per cubic meter
TLD	thermoluminescent dosimeter
WPRAP	Waste Pits Remedial Action Project
µg/L	micrograms per liter
µg/m <sup>3</sup>	micrograms per cubic meter

## 1.0 INTRODUCTION

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Revision 2 of the Integrated Environmental Monitoring Plan (IEMP) (DOE 2001) documents a new approach to reporting IEMP data. IEMP data are now being provided to the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (OEPA) on a routine basis via the IEMP Data Information Site (i.e., the "Extranet Site"), at <http://iempdata.fernald.gov>. In addition, the previous IEMP quarterly status reports have been replaced by the IEMP data quarterly summaries. These documents summarize the data that were made available on the IEMP Data Information Site during a quarter, thus allowing the reports to be submitted one month after the end of the quarter. This is a change from the previous quarterly status reports, which were submitted three months after the end of a quarter, when a full calendar quarter of IEMP data could be consolidated. The quarterly summaries also streamline the information reported by focusing on notable results, and reducing the quantity of routine graphical and tabular data presentations. Comprehensive reporting, including all tables and graphs, will still be provided through IEMP annual integrated site environmental reports.

This document was prepared in a manner consistent with the IEMP, Revision 2, and subsequent discussions with EPA and OEPA. The data covered under this quarterly summary are those added to the IEMP Data Information Site during the first quarter of 2001. Because this particular quarterly summary serves as a transition from the previous quarterly status reports, some additional data are also included that previously would have been covered in the fourth quarter status report for 2000. Therefore, this submittal covers all IEMP data subsequent to the Integrated Environmental Monitoring Status Report for Third Quarter 2000 (DOE 2000), through those data added to the IEMP Data Information Site on or before March 31, 2001. Table 1-1 identifies, on a general level, the data covered under this quarterly summary.

The development of this new reporting format was a collaborative effort between the U.S. Department of Energy (DOE), the EPA and OEPA. However, DOE recognizes that the quarterly summaries and the IEMP Data Information Site may require some modifications in order to meet the needs of all parties, to the extent possible.

TABLE I-1

SCHEDULE FOR IEMP DATA INFORMATION SITE AVAILABILITY AND REPORTING

IEMP PROGRAM <sup>b</sup>	TIME PERIOD <sup>a</sup>											
	Second Quarter/2000			Third Quarter/2000			Fourth Quarter/2000			First 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	J A N	F E B	M A R
<b>GROUNDWATER SAMPLING ACTIVITIES</b>												
Extraction/Re-injection Operational Data				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
South Plume Aquifer Conditions	----- <input checked="" type="checkbox"/> -----			-----◆-----								
South Field Extraction Aquifer Conditions	----- <input checked="" type="checkbox"/> -----			-----◆-----								
Waste Storage Area Aquifer Conditions	----- <input checked="" type="checkbox"/> -----			Not Applicable <sup>c</sup>						Not Applicable <sup>c</sup>		
Plant 6 Area Aquifer Conditions	----- <input checked="" type="checkbox"/> -----			Not Applicable <sup>c</sup>			-----◆-----			Not Applicable <sup>c</sup>		
Groundwater Elevations				----- <input checked="" type="checkbox"/> -----			-----◆-----			-----◆-----		
Property Boundary Monitoring	<input checked="" type="checkbox"/> -----			-----◆-----			-----◆-----					
Private Well Monitoring	<input checked="" type="checkbox"/> -----			-----◆-----			-----◆-----					
<b>OSDF SAMPLING ACTIVITIES</b>												
LCS and LDS Volumes				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
Analytical	----- <input checked="" type="checkbox"/> -----			-----◆-----								
<b>SURFACE WATER SAMPLING ACTIVITIES</b>												
NPDES				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
FFCA				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
IEMP Characterization	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	◆			
Turbidity Monitoring (for Sloan's Crayfish)				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	◆
<b>AIR SAMPLING ACTIVITIES</b>												
Radiological Particulate				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
NESHAP Composite				----- <input checked="" type="checkbox"/> -----			-----◆-----					
NESHAP Stack				----- <input checked="" type="checkbox"/> -----			-----◆-----					
Radon (Environmental and Silos Headspace)				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	◆	◆	◆	◆	◆	
Direct Radiation (TLD)				----- <input checked="" type="checkbox"/> -----			-----◆-----					

◆ Data available on the IEMP Data Information Site on March 31, 2001, and summarized in this quarterly summary. Subsequent data were not yet made available on the IEMP Data Information Site by March 31, 2001; and therefore, will be summarized in future quarterly summaries.

Data summarized/evaluated in last IEMP quarterly status report (December 2000)

<sup>a</sup>IEMP sampling that takes place during one scheduled event per quarter is identified with a marker (e.g., |-----◆-----|) in the month the samples were collected.

<sup>b</sup>Sediment and biota data collected in 2000 are also covered under this current quarterly summary. Because these data are only collected annually and every three years, respectively, they will not be included in this schedule.

<sup>c</sup>Waste storage area and Plant 6 area aquifer conditions sampling is conducted semi-annually.

## 2.0 GROUNDWATER MONITORING DATA

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### 2.1 DATA COVERED

This IEMP data quarterly summary covers all IEMP groundwater monitoring data added to the IEMP Data Information Site through March 31, 2001, as discussed in Section 1.0. Specifically, this includes:

- Operational data from October 2000 through February 2001
- Analytical data from third quarter 2000, plus fourth quarter 2000 analytical data from the Property Boundary Monitoring Program, the Private Well Monitoring Program, and the Plant 6 Monitoring Program
- Groundwater (Great Miami Aquifer) elevations for the fourth quarter of 2000 and the first quarter of 2001.

All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Rev. 1 (DOE 1999) and/or Rev. 2 (DOE 2001) 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 site. Notable results and events associated with IEMP groundwater monitoring data for the time period covered by this quarterly summary include the following:

- Two IEMP monitoring wells were recently plugged and abandoned. Monitoring Wells 3027 and 3068 were plugged and abandoned on October 27, 2000 and December 15, 2000, respectively. Both wells were plugged because leaking casings were allowing contaminated perched water and/or surface water to infiltrate the well, and thus providing results that were not representative of the Great Miami Aquifer. Of note, Monitoring Well 3020 was also plugged January 15, 2001 because of a leaking casing, however, this well is not part of the IEMP program.
- The location for a monitoring well to replace Monitoring Well 2551 has been established with EPA and OEPA concurrence at approximately 300 feet southeast of where Monitoring Well 2551 was located. Landowner access agreements are being negotiated and it is anticipated that the new well will be installed this summer.
- The EPA drinking water standard for total uranium was finalized at 30 micrograms per liter ( $\mu\text{g/L}$ ) in December 2000. In light of this change, DOE is preparing an Explanation of Significant Differences to the Operable Unit 5 Record of Decision to support revising the groundwater final remediation level (FRL) for total uranium to reflect the finalized standard.
- Direct-push (Geoprobe<sup>TM</sup>) sampling in support of the waste storage area and the Plant 6 area aquifer restoration designs was completed. The results have been summarized in the weekly site teleconference as they have become available and will be provided in detail in the design documentation being submitted to EPA and OEPA in April 2001.

- Geoprobe™ sampling continued in the northeastern portion of the South Field plume in support of the design of an additional extraction well to be added to the South Field (Phase I) Extraction Module. The results have been summarized in the weekly site teleconference as they have become available and will be provided in detail in the design documentation being submitted to EPA and OEPA in April 2001.
- Ongoing Geoprobe™ sampling continued in the South Field in support of the Phase II South Field Extraction System design. Preliminary results of this investigation show that the total uranium plume in this area of the site has lower total uranium concentrations than anticipated and is smaller than anticipated both in size and in depth below the water table. Results will be incorporated into the fourth quarter 2000 total uranium plume map, and will be presented in the 2000 Integrated Site Environmental Report to be submitted June 1, 2001.
- A more aggressive re-injection well treatment for biofouling involving the use of hydrochloric acid was proposed and, after EPA and OEPA approval, was implemented in December of 2000. As of the end of March 2001, the success rate of the new method was minimal. Of the three wells treated, only one was successfully restored to a condition where it would continuously accept treated water at the design rate. The DOE is continuing to investigate alternative well rehabilitation methods for the re-injection wells.
- There were no significant changes from the second quarter 2000 total uranium plume map to that prepared for the third quarter of 2000 (refer to Figure 2-1).
- As reported in the Integrated Environmental Monitoring Status Report for Third Quarter 2000, Monitoring Wells 2389 (Plant 6 area), 3068 and 62433 (South Field), 2648 and 3027 (waste storage area), and 2426 (Property Boundary) all showed increased total uranium concentrations during the second quarter of 2000. As mentioned above, Monitoring Wells 3068 and 3027 have since been plugged due to casing leakage. Samples collected from Monitoring Wells 2389 and 2426 during the third and/or fourth quarter 2000 indicate that results returned to previous levels. Total uranium concentrations at Monitoring Well 62433 remained elevated, and as mentioned in the Integrated Environmental Monitoring Status Report for Third Quarter 2000, this information is being used as a driver for modifying pumping configurations in the South Field Extraction Module. The viability of installing higher capacity pumps in some of the South Field Module wells is being assessed. The purpose of the higher capacity pumps would be to increase the pumping rates, such that the area being actively flushed by the pumping would be extended to the east. Finally, fourth quarter data from Monitoring Well 2648 are not yet available; this will be included in the Second IEMP Data Quarterly Summary for 2001.

A thorough review of the groundwater monitoring data covered in 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 2-1 through 2-4 provide an operational summary of the groundwater extraction well performance for October 2000 through February 2001. Figure 2-1 shows the third quarter 2000 total uranium plume map. 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					
	October 2000 through February 2001			August 1993 through February 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	449.258	268.01	0.60	2,248.934	1,437.62	0.64
South Plume Module	386.749	108.60	0.28	5,605.050	1,103.37	0.20
Re-Injection Module	64.531	1.82	NA <sup>a</sup>	880.153	36.49	NA <sup>a</sup>
<b>Aquifer Restoration Systems Totals</b>						
(Extraction Wells)	836.007	376.61	0.45	7,853.984	2,540.99	0.32
(Re-Injection Wells)	<u>64.531</u>	<u>1.82</u>	NA <sup>a</sup>	<u>880.153</u>	<u>36.49</u>	NA <sup>a</sup>
(net)	771.476	374.79	NA <sup>a</sup>	6,973.831	2,504.50	NA <sup>a</sup>

<sup>a</sup>NA = not applicable

TABLE 2-2

**SOUTH FIELD (PHASE I) EXTRACTION MODULE  
OPERATIONAL SUMMARY SHEET  
(OCTOBER 2000 THROUGH FEBRUARY 2001)**

Extraction Well	31565	31564	31566 <sup>ab</sup>	31563	31567 <sup>c</sup>	31550	31560	31561	31562 <sup>d</sup>	32276	32447	32446	
	Baseline Remedial Strategy Report Target Pumping Rates (gpm)												
	200	200	200	200	100	100	100	100	100	200	NA	NA	
Average Pumping Rates (gpm)													
October	187	180	NA	182	232	88	91	94	240	262	135	139	
November	203	203	NA	204	255	101	97	94	276	279	195	194	
December	201	200	NA	200	252	99	100	88	291	301	192	152	
January	204	203	NA	203	254	96	96	97	271	304	191	191	
February	<u>218</u>	<u>217</u>	<u>NA</u>	<u>219</u>	<u>274</u>	<u>108</u>	<u>109</u>	<u>110</u>	<u>267</u>	<u>322</u>	<u>197</u>	<u>197</u>	
Average	203	201	NA	202	253	98	99	97	269	294	182	175	
Average Total Uranium Concentrations (µg/L)													
October	9.4	11.8	7.6	22.4	33.0	54.7	72.5	53.2	127.5	136.9	182.7	87.3	
November	8.9	12.3	8.0	22.1	29.9	45.0	64.7	46.7	114.9	128.1	184.1	81.4	
December	9.0	12.9	7.3	22.6	31.0	46.1	67.4	53.7	117.2	135.5	182.7	80.2	
January	8.8	12.7	NS	22.0	28.6	44.6	66.5	55.9	107.9	128.6	181.6	80.3	
February	<u>8.7</u>	<u>12.8</u>	<u>7.9</u>	<u>21.5</u>	<u>27.4</u>	<u>39.9</u>	<u>63.2</u>	<u>53.1</u>	<u>98.8</u>	<u>122.6</u>	<u>167.7</u>	<u>75.8</u>	
Average	9.0	12.5	7.7	22.1	30.0	46.1	66.9	52.5	113.3	130.3	179.8	81.0	
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)													
October	0.08	0.10	NA	0.19	0.28	0.46	0.60	0.44	1.06	1.14	1.52	0.73	
November	0.07	0.10	NA	0.18	0.25	0.38	0.54	0.39	0.96	1.07	1.54	0.68	
December	0.08	0.11	NA	0.19	0.26	0.38	0.56	0.45	0.98	1.13	1.52	0.67	
January	0.07	0.11	NA	0.18	0.24	0.37	0.55	0.47	0.90	1.07	1.51	0.67	
February	<u>0.07</u>	<u>0.11</u>	<u>NA</u>	<u>0.18</u>	<u>0.23</u>	<u>0.33</u>	<u>0.53</u>	<u>0.44</u>	<u>0.82</u>	<u>1.02</u>	<u>1.40</u>	<u>0.63</u>	
Average	0.07	0.11	NA	0.18	0.25	0.38	0.56	0.44	0.94	1.09	1.50	0.68	
Average Module Pumping Rate (gpm)													
October	1,830												
November	2,101												
December	2,076												
January	2,110												
February	<u>2,238</u>												
Average	2,071												
Water Pumped by Module (M gal)													
October	81.245												
November	90.908												
December	92.906												
January	94.248												
February	<u>89.951</u>												
Average	2,071			Total	449.258				Average	71.5			
Total Uranium Concentration from Module <sup>e</sup> (µg/L)													
October	73.8												
November	71.7												
December	74.5												
January	71.3												
February	<u>66.0</u>												
Average	2,071												

<sup>a</sup>NA = not applicable

<sup>b</sup>NS = not sampled

<sup>c</sup>Target pumping rate was increased from 100 gpm to 250 gpm on August 8, 2000.

<sup>d</sup>Target pumping rate was increased from 200 gpm to 290 gpm on September 14, 2000.

<sup>e</sup>Average is calculated from individual well total uranium concentrations and flow rates.

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**TABLE 2-3**  
**SOUTH PLUME MODULE**  
**OPERATIONAL SUMMARY SHEET**  
**(OCTOBER 2000 THROUGH FEBRUARY 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)						
October	261	262	306	420	125	126
November	300	274	346	451	257	257
December	299	254	360	489	246	246
January	304	225	372	497	253	253
February	<u>298</u>	<u>87</u>	<u>367</u>	<u>366</u>	<u>295</u>	<u>294</u>
Average	292	220	350	445	235	235
Average Total Uranium Concentrations (µg/L)						
October	39.4	32.5	34.0	2.0	77.0	76.2
November	33.1	27.5	29.6	1.9	67.7	66.3
December	36.0	28.4	30.7	2.3	72.5	68.3
January	34.9	28.7	29.8	2.1	71.0	65.2
February	<u>32.0</u>	<u>29.3</u>	<u>27.7</u>	<u>2.3</u>	<u>64.3</u>	<u>57.2</u>
Average	33.5	29.3	30.4	2.1	70.5	66.6
Uranium Removal Index (Pounds of Total Uranium Removed/Million Gallons Pumped)						
October	0.33	0.27	0.28	0.02	0.64	0.64
November	0.28	0.23	0.25	0.02	0.56	0.55
December	0.30	0.24	0.26	0.02	0.60	0.57
January	0.29	0.24	0.25	0.02	0.59	0.54
February	<u>0.27</u>	<u>0.24</u>	<u>0.23</u>	<u>0.02</u>	<u>0.54</u>	<u>0.48</u>
Average	0.29	0.24	0.25	0.02	0.59	0.56
	Average Module Pumping Rate (gpm)		Water Pumped by Module (M gal)		Total Uranium Concentration From Module <sup>a</sup> (µg/L)	
October	1,500		66,903		32.8	
November	1,885		81,408		33.4	
December	1,894		84,745		34.2	
January	1,905		84,951		33.4	
February	<u>1,706</u>		<u>68,742</u>		<u>34.5</u>	
Average	1,778		Total 386,749		Average	33.7

<sup>a</sup>Average is calculated from individual well total uranium concentrations and flow rates.

TABLE 2-4

RE-INJECTION MODULE  
OPERATIONAL SUMMARY SHEET  
(OCTOBER 2000 THROUGH FEBRUARY 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)					
October	89	19	0	172	173
November	0	0	0	193	191
December	0	0	0	146	0
January	0	0	61	134	0
February	<u>0</u>	<u>0</u>	<u>154</u>	<u>154</u>	<u>0</u>
Average	18	4	43	160	73
	Average Module Re-Injection Rate (gpm)		Water Re-Injected By Module (M gal)		Total Uranium Concentration from Module (µg/L)
October	452		20.148		3.2
November	385		16.622		5.9
December	146		6.539		3.5
January	195		8.695		1.2
February	<u>308</u>		<u>12.527</u>		<u>1.6</u>
Average	297		Total 64.531	Average	3.1

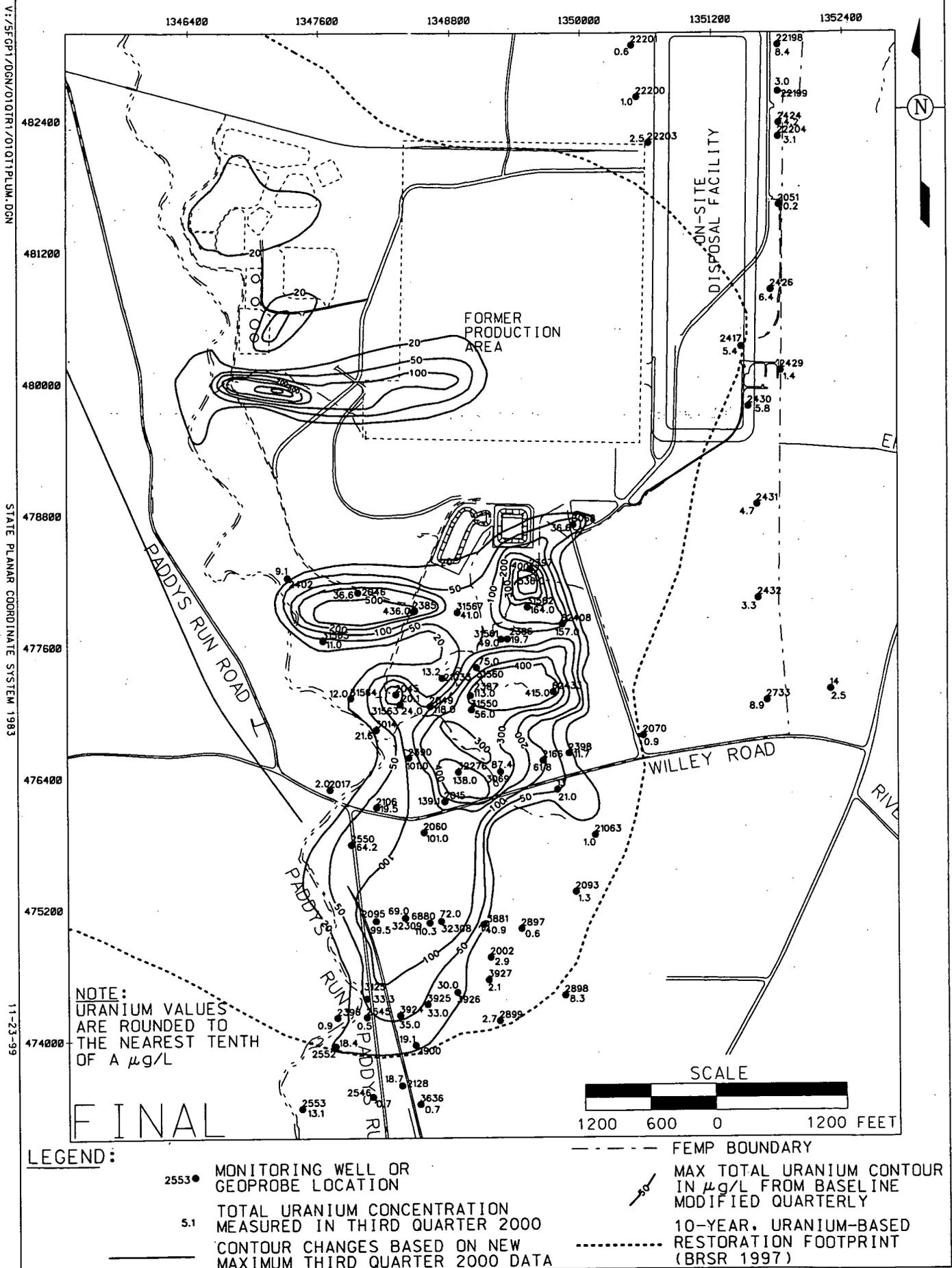


FIGURE 2-1. TOTAL URANIUM PLUME MAP, THIRD QUARTER 2000

### 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 were added to the IEMP Data Information Site through March 31, 2001, as discussed in Section 1.0. Specifically, this includes:

- Leachate collection system (LCS) volumes, and leak detection system (LDS) volumes and accumulation rates from October 2000 through February 2001
- Analytical data from the third quarter of 2000.

All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Rev. 1 and/or Rev. 2 for the time periods identified.

#### 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:

- As of the end of March 2001, construction of the enhanced permanent leachate transmission system was nearing completion. Tie-ins to the new system were initiated at Cell 1 in late March. Cells 1, 2, and 3 are to be tied in to the new system by May 2001. Construction of the new system and demolition of the old system manholes have affected our ability to get consistent, reliable LDS accumulation rate readings for Cell 1. These activities are expected to affect Cell 2 and Cell 3 LDS accumulation rate measurements as well. Reliable LDS accumulation rate readings are anticipated when the tie-ins to the new system are complete and the new LDS containment tanks become operational.
- Leachate back up into the Cell 3 Primary Containment Vessel: Approximately 57 gallons of water accumulated in the Cell 3 LDS primary containment vessel on January 30, 2001 between 10 and 11 PM. Prior to this accumulation, no water had accumulated in this vessel during the previous 15 months since Cell 3 became operational. The January 30 accumulation of water was determined to be a back up of leachate through the Cell 3 LDS isolation valve that was inadvertently left open. As of early April 2001, no water had accumulated in this vessel since the January 30 back up was pumped out.
- Construction water in the Cell 1 LDS manhole: On March 16, 2001, a data logger installed in the Cell 1 LDS Primary Containment Vessel record an inflow of 46.5 gallons between 5 and 6 PM. An additional inflow of 63 gallons was recorded between 6 and 7 PM at which point the vessel began to overflow. Earlier in the day, approximately 0.5 inch of rainfall was recorded at the site. An additional 0.25 inch fell between 4 and 8 PM. By the morning of March 17, approximately

~~2 feet of water had accumulated in the manhole. The data logger had indicated normal volume inflow to the containment vessel prior to this incident and has indicated normal inflow since the sump and manhole were pumped out on March 17, 2001.~~

A visual inspection of the manhole on March 19 revealed that demolition activities associated with the tie-in of the new enhanced permanent leachate transmission system line had removed a large portion of the concrete that had topped out the manhole. Further, there was extensive excavation around the area and the interior of the manhole contained residual mud.

The unusually large inflow of water within a few hours, in conjunction with heavy rainfall, the return to normal flow after pumping, and the mud within the manhole, appear to indicate that construction activities had breached the integrity of the manhole and rainwater run-off infiltrated the system.

- Cells 1, 2, and 3 baseline groundwater conditions: By the close of December 2000, all the samples to be used in determining baseline conditions for perched water and the Great Miami Aquifer beneath Cells 1 through 3 have been collected. A single report documenting the establishment of baseline conditions for Cells 1 through 3 will be submitted to EPA and OEPA later in 2001. This is in accordance with the consensus reached with EPA and OEPA in 2000.
- New maximum total uranium concentration in Cell 1 down gradient monitoring well: The third quarter 2000 sample results for Monitoring Well 22198 indicated total uranium concentrations were up to 8.4 µg/L. The previous maximum was 3.8 µg/L. These data are part of the data set to be used in calculating baseline groundwater conditions for Cell 1 as it represents residual background aquifer contamination, not related to the on-site disposal facility.

A thorough review of the on-site disposal facility monitoring data covered in 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 detected results for the third quarter of 2000 for Cells 1 through 3, respectively, along with a summary of previous data for those constituents. The fourth quarter analytical data were not yet available at the time of this report, however these data will be included in the 2000 Integrated Site Environmental Report. Figures 3-1 and 3-2 show accumulation rates plotted against weekly precipitation for Cells 1 and 2, respectively. 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 1 DATA SUMMARY FOR CONSTITUENTS DETECTED DURING  
THIRD QUARTER 2000

Note: Non-italicized pertains to total number of samples (including third quarter samples).  
*Italicized* pertains to third quarter samples only.

Constituent (FRL) <sup>a</sup>	Great Miami Aquifer									
	LCS <sup>b,c,d,e</sup> (12338C)		LDS <sup>b,c,d,e</sup> (12338D)		HTW <sup>b,c,d,e</sup> (12338)		Upgradient <sup>b,c,d</sup> (22201)		Downgradient <sup>b,c,d</sup> (22198)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA <sup>f</sup> mg/L)	9/11 <i>1/1</i>	ND to 123 <i>28.4</i>	8/10 <i>1/1</i>	ND to 80.9 <i>3.22</i>	27/30 <i>1/1</i>	ND to 12.2 <i>1.1</i>	23/26 <i>1/1</i>	ND to 59.7 <i>3.4</i>	21/26 <i>0/1</i>	ND to 52.5 <i>ND</i>
Total Organic Halogens (NA <sup>f</sup> mg/L)	9/11 <i>1/1</i>	ND to 0.352 <i>0.352</i>	7/10 <i>0/1</i>	ND to 0.361 <i>ND</i>	17/29 <i>1/1</i>	ND to 0.077 <i>0.00719</i>	14/26 <i>1/1</i>	ND to 0.308 <i>0.0181</i>	8/26 <i>0/1</i>	ND to 0.0526 <i>ND</i>
Boron (0.33 mg/L)	12/12 <i>1/1</i>	0.0642 to 2.8 <i>0.768</i>	9/10 <i>0/1</i>	ND to 0.321 <i>ND</i>	23/30 <i>0/1</i>	ND to 0.685 <i>ND</i>	21/26 <i>1/1</i>	ND to 0.142 <i>0.125</i>	28/38 <i>1/2</i>	ND to 0.116 <i>ND to 0.0466</i>
Mercury (0.0020 mg/L)	1/11 <i>1/1</i>	ND to 2.4E-07 <i>2.4E-07</i>	0/10 <i>0/1</i>	ND <i>ND</i>	0/30 <i>0/1</i>	ND <i>ND</i>	0/26 <i>0/1</i>	ND <i>ND</i>	0/37 <i>0/2</i>	ND <i>ND</i>
Total Uranium (20 µg/L)	10/11 <i>1/1</i>	ND to 119 <i>49.85</i>	10/10 <i>1/1</i>	1.5 to 20.17 <i>6.041</i>	30/31 <i>1/1</i>	ND to 19 <i>1.686</i>	22/26 <i>1/1</i>	ND to 6.384 <i>0.592</i>	38/38 <i>2/2</i>	0.557 to 8.365 <i>6.937 to 8.365</i>

<sup>a</sup>From Operable Unit 5 Record of Decision, Table 9-4

<sup>b</sup>If 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.

<sup>c</sup>Rejected data qualified with either a R or Z were not used in this comparison.

<sup>d</sup>ND = not detected

<sup>e</sup>LCS = leachate collection system

LDS = leak detection system

HTW = horizontal till well

<sup>f</sup>NA = not applicable

TABLE 3-2

ON-SITE DISPOSAL FACILITY CELL 2 DATA SUMMARY FOR CONSTITUENTS DETECTED DURING  
THIRD QUARTER 2000

Note: Non-italicized pertains to total number of samples (including third quarter samples).  
*Italicized* pertains to third quarter samples only.

Constituent (FRL) <sup>a</sup>	Great Miami Aquifer									
	LCS <sup>b,c,d,e</sup> (12339C)		LDS <sup>b,c,d,e,f</sup> (12339D)		HTW <sup>b,c,d,e</sup> (12339)		Upgradient <sup>b,c,d</sup> (22200)		Downgradient <sup>b,c,d</sup> (22199)	
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range	No. of Samples with Detections	Range
	No. of Samples		No. of Samples		No. of Samples		No. of Samples		No. of Samples	
Total Organic Carbon (NA <sup>g</sup> mg/L)	5/8 <i>1/1</i>	ND to 6.25 <i>1.21</i>	8/9 <i>1/1</i>	ND to 26.1 <i>1.22</i>	23/28 <i>1/1</i>	ND to 11.1 <i>1.2</i>	19/21 <i>1/1</i>	ND to 47.6 <i>1.2</i>	16/21 <i>0/1</i>	ND to 51.8 <i>ND</i>
Total Organic Halogens (NA <sup>g</sup> mg/L)	4/8 <i>0/1</i>	ND to 0.0576 <i>ND</i>	4/9 <i>0/1</i>	ND to 0.0205 <i>ND</i>	19/28 <i>1/1</i>	ND to 0.101 <i>0.0373</i>	10/21 <i>1/1</i>	ND to 0.177 <i>0.0181</i>	9/21 <i>0/1</i>	ND to 0.0386 <i>ND</i>
Boron (0.33 mg/L)	8/9 <i>1/1</i>	ND to 0.915 <i>0.327</i>	8/8 <i>1/1</i>	0.296 to 2.22 <i>0.296</i>	16/28 <i>0/1</i>	ND to 0.0829 <i>ND</i>	14/21 <i>0/1</i>	ND to 0.158 <i>ND</i>	15/21 <i>1/1</i>	ND to 0.0569 <i>0.033</i>
Total Uranium (20 µg/L)	9/9 <i>1/1</i>	4.51 to 39.299 <i>36.115</i>	8/8 <i>1/1</i>	11.162 to 71 <i>11.162</i>	28/29 <i>1/1</i>	ND to 3.607 <i>3.045</i>	14/21 <i>1/1</i>	ND to 1.11 <i>0.991</i>	21/21 <i>1/1</i>	0.259 to 12.1 <i>3.028</i>

<sup>a</sup>From Operable Unit 5 Record of Decision, Table 9-4

<sup>b</sup>If 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.

<sup>c</sup>Rejected data qualified with either a R or Z were not used in this comparison.

<sup>d</sup>ND = not detected

<sup>e</sup>LCS = leachate collection system

LDS = leak detection system

HTW = horizontal till well

<sup>f</sup>Cell 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.

<sup>g</sup>NA = not applicable

TABLE 3-3

ON-SITE DISPOSAL FACILITY CELL 3 DATA SUMMARY FOR CONSTITUENTS DETECTED DURING  
THIRD QUARTER 2000

Note: Non-italicized pertains to total number of samples (including third quarter samples).  
*Italicized* pertains to third quarter samples only.

Constituent (FRL) <sup>a</sup>	LCS <sup>b,c,d,e</sup> (12340C)		HTW <sup>b,c,d,e,f,g</sup> (12340)		Great Miami Aquifer			
	No. of Samples with Detections	Range	No. of Samples with Detections	Range	Upgradient <sup>b,c,d</sup> (22203)		Downgradient <sup>b,c,d</sup> (22204)	
	No. of Samples		No. of Samples		No. of Samples with Detections	Range	No. of Samples with Detections	Range
Total Organic Carbon (NA <sup>f</sup> mg/L)	3/5	ND to 34.2	14/24	ND to 9.81	8/19	ND to 5.66	9/19	ND to 8.83
	<i>1/1</i>	<i>1.92</i>	<i>1/1</i>	<i>1.6</i>	<i>1/1</i>	<i>1.9</i>	<i>1/1</i>	<i>1.7</i>
Total Organic Halogens (NA <sup>f</sup> mg/L)	3/5	ND to 0.178	19/24	ND to 0.158	9/19	ND to 0.213	8/19	ND to 0.165
	<i>0/1</i>	<i>ND</i>	<i>1/1</i>	<i>0.0243</i>	<i>0/1</i>	<i>ND</i>	<i>0/1</i>	<i>ND</i>
Boron (0.33 mg/L)	5/5	0.202 to 1.51	18/22	ND to 0.24	12/19	ND to 0.0776	12/19	ND to 0.179
	<i>1/1</i>	<i>0.202</i>	<i>NS</i>	<i>NA</i>	<i>0/1</i>	<i>ND</i>	<i>1/1</i>	<i>0.0314</i>
Total Uranium (20 µg/L)	5/5	9.27 to 34.997	20/22	ND to 9.14	14/19	ND to 2.522	18/19	ND to 5.924
	<i>1/1</i>	<i>28.993</i>	<i>NS</i>	<i>NA</i>	<i>1/1</i>	<i>2.522</i>	<i>1/1</i>	<i>3.138</i>

<sup>a</sup>From Operable Unit 5 Record of Decision, Table 9-4

<sup>b</sup>If 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.

<sup>c</sup>Rejected data qualified with either a R or Z were not used in this comparison.

<sup>d</sup>ND = not detected

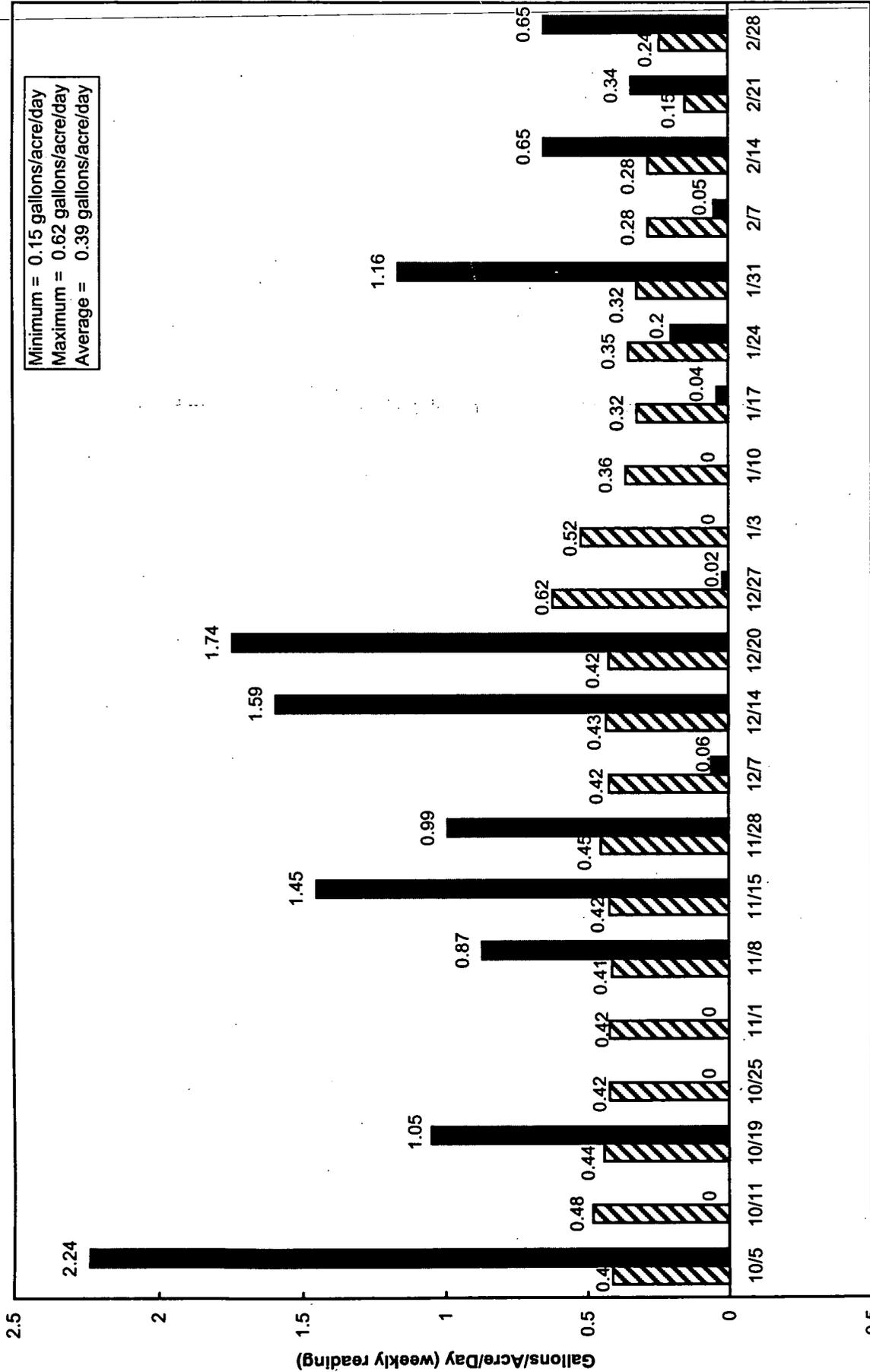
<sup>e</sup>HTW = horizontal till well

LCS = leachate collection system

<sup>f</sup>NA = not applicable

<sup>g</sup>NS = not sampled

020000

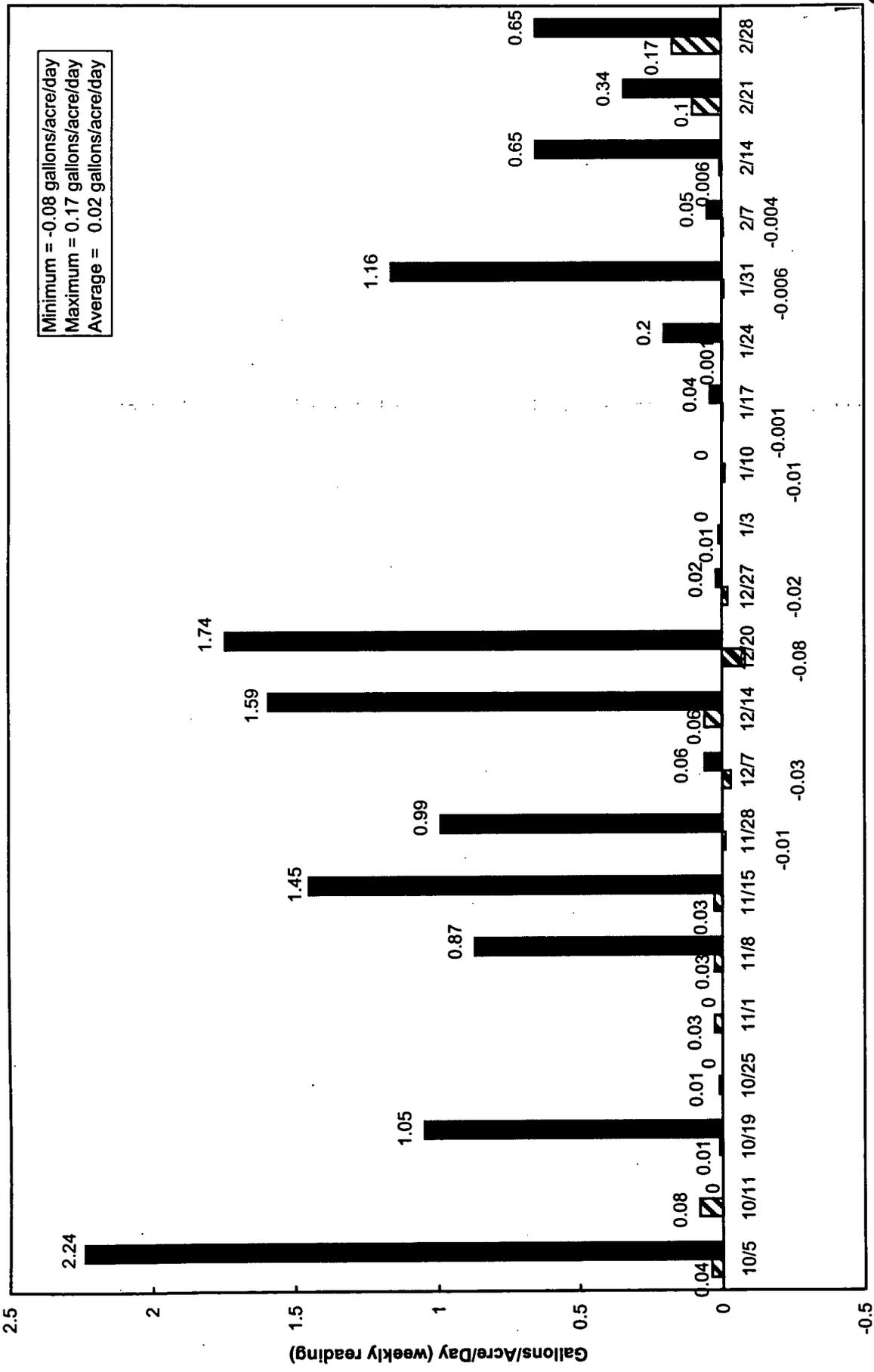


Minimum = 0.15 gallons/acre/day  
Maximum = 0.62 gallons/acre/day  
Average = 0.39 gallons/acre/day

Date (month/day)

▨ Accumulation Rate ■ FEMP Precipitation

FIGURE 3-1. 2000-2001 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 1



Date (month/day)

Accumulation Rate ■ FEMP Precipitation

FIGURE 3-2. 2000-2001 ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 2

FINAL

## 4.0 SURFACE WATER MONITORING DATA

**3638**

### 4.1 DATA COVERED

This IEMP data quarterly summary covers all surface water monitoring data collected under the IEMP program that were added to the IEMP Data Information Site through March 31, 2001, as discussed in Section 1.0. Specifically, this includes:

- National Pollutant Discharge Elimination System (NPDES) data from October 1, 2000 through February 28, 2001
- Federal Facilities Compliance Agreement (FFCA) data from October 1, 2000 through February 28, 2001
- IEMP characterization monitoring data from July 1 through December 31, 2000
- Turbidity monitoring in Paddys Run from October 1, 2000 through March 31, 2001.

All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Rev. 1 and/or Rev. 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 by the NPDES Permit during the period under evaluation.

---

Date	Location	Parameter	Limit	Result
10/26/00	STP 4601	Total Suspended Solids	40 mg/L	41 mg/L
12/6/00	STP 4601	Total Suspended Solids	40 mg/L	48.8 mg/L

---

- FFCA/Record of Decision compliance: The total mass discharged for 2000 was 252 pounds which is well below the 600 pound annual discharge limit. The Operable Unit 5 Record of Decision limit of 20 µg/L was met every month during 2000. Mass loading and concentration data are in compliance for 2001 through February 28, 2001.
- IEMP FRL/benchmark toxicity value (BTV) exceedances: As identified in the table below, there were five FRL and no BTV exceedances based on the review of all IEMP characterization monitoring data available from July 1, 2000 through December 31, 2000 and NPDES/FFCA Record of Decision data from October 1, 2000 through February 28, 2001. There were two

exceedances of chromium and one exceedance of copper at SWP-03 and one exceedance each of mercury and zinc at SWR-01 (background location for the Great Miami River).

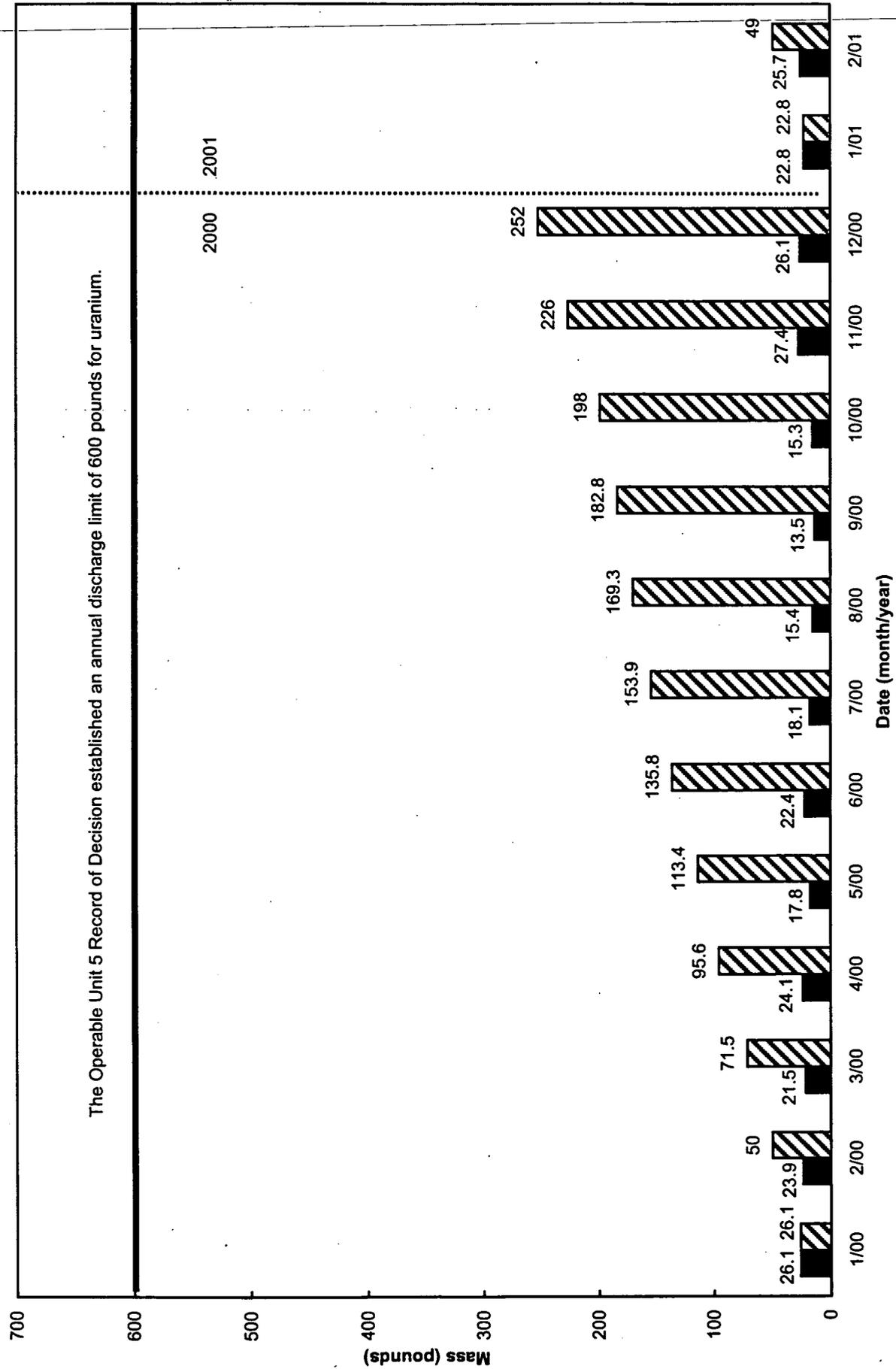
Date	Location	Constituent	Limit	Result
9/6/00	SWR-01	Zinc	0.11 mg/L	0.114 mg/L
9/25/00	SWP-03	Chromium	0.010 mg/L	0.0153 mg/L
9/25/00	SWP-03	Copper	0.012 mg/L	0.0159 mg/L
10/5/00	SWP-03	Chromium	0.010 mg/L	0.0121 mg/L
11/6/00	SWR-01	Mercury	0.00020 mg/L	0.00021 mg/L

- On January 31, 2001 there was a reported release of approximately 35,000 gallons of water from a leaking transfer line from the bio-surge lagoon to the advanced wastewater treatment facility. It was believed that several thousand gallons of water potentially drained through a 30-inch culvert to Paddys Run via the pilot plant drainage ditch. This event could have directly impacted water quality at IEMP locations SWD-03 and STRM 4005 and may have influenced SWP-03 (the Paddys Run sample location at the southern end of the Fernald site boundary). It is also possible the Great Miami Aquifer could be impacted via infiltration if this water reached the pilot plant drainage ditch.
- Elevated total uranium concentrations have been experienced at locations SWD-03 and STRM 4005. These elevated concentrations have been discussed with OEPA and EPA. The degree to which the bio-surge lagoon line leak may have contributed to these elevated total uranium concentrations has been speculated and will be further evaluated after additional routine sampling events occur.
- Twelve observations were made for turbidity impacts from the northern drainage ditch on Paddys Run during the fourth quarter of 2000 and the first quarter of 2001. During two of these observations, a visibly turbid plume from the northern drainage ditch was found to be affecting the turbidity conditions in Paddys Run. Both of these instances took place in October of 2000. As discussed in previous IEMP reports, the source of this plume is believed to be the railyard sedimentation basin, and several corrective measures have been implemented. Information on turbidity monitoring can be found on the IEMP Data Information Site under Natural Resources Monitoring.
- The investigation of elevated total uranium concentrations (discovered in March 2000) in the northern drainage ditch area was completed in December of 2000. Sampling in the northern drainage area revealed elevated total uranium concentrations in drainage from the solid waste landfill. Alternatives for addressing this drainage are being evaluated.
- As mentioned in Section 2.0, DOE is preparing an Explanation of Significant Differences to the Operable Unit 5 Record of Decision to support 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 is also being revised to reflect 30 µg/L standard.

A thorough review of the surface water monitoring data covered in this quarterly summary was conducted to identify the notable results. 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 in 2000 and 2001. Figure 4-2 shows the 2000 and 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.

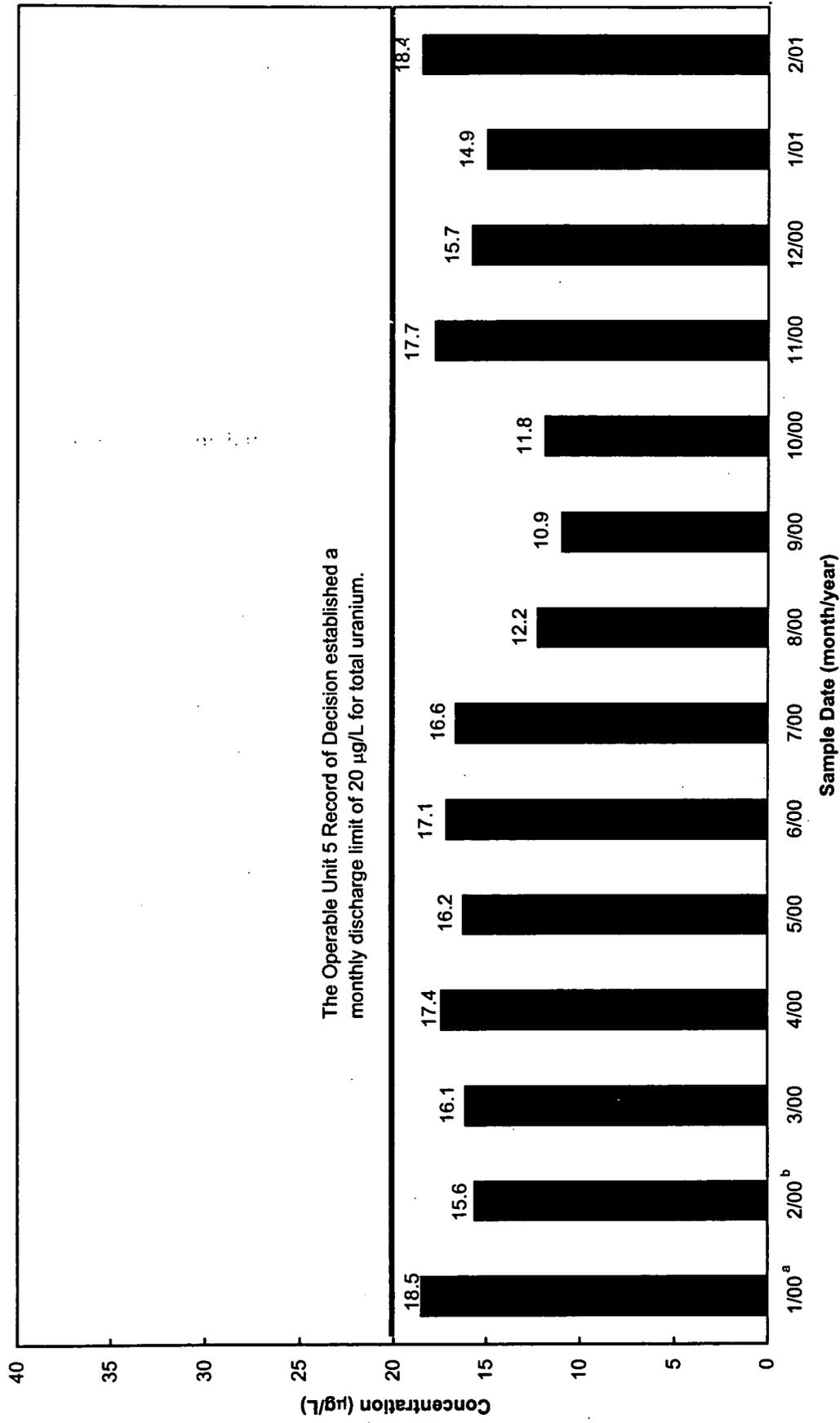


Note: Sum of monthly discharges may not always agree with cumulative total due to rounding differences.

■ Monthly ▨ Cumulative

FINAL

FIGURE 4-1. POUNDS OF URANIUM DISCHARGED TO THE GREAT MIAMI RIVER FROM THE PARSHALL FLUME (PF 4001) IN 2000 - 2001



<sup>a</sup> Actual concentration was 20.9 µg/L. Eliminating one "significant precipitation" bypass day reduces average to 18.5 µg/L.

<sup>b</sup> Actual concentration was 18.7 µg/L. Eliminating one "significant precipitation" bypass day reduces average to 15.6 µg/L.

FIGURE 4-2. 2000 - 2001 MONTHLY AVERAGE TOTAL URANIUM CONCENTRATION IN WATER DISCHARGED FROM THE PARSHALL FLUME (PF 4001) TO THE GREAT MIAMI RIVER FINAL

## 5.0 SEDIMENT MONITORING DATA

### 5.1 DATA COVERED

This IEMP data quarterly summary covers all sediment monitoring data collected under the IEMP program that were added to the IEMP Data Information Site through March 31, 2001. This includes the complete data set for samples collected in August of 2000 as part of the annual IEMP sediment monitoring program.

### 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 sediment monitoring data covered by this quarterly summary, and all results are within historical ranges. These data will be discussed in more detail in the 2000 Integrated Site Environmental Report, which will be submitted to the EPA and OEPA on June 1, 2001.

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

## 6.0 AIR MONITORING DATA

### 6.1 DATA COVERED

This IEMP data quarterly summary covers all air monitoring data collected under the IEMP program that were added to the IEMP Data Information Site through March 31, 2001, as discussed in Section 1.0.

Specifically, this includes:

- Radiological air particulate monitoring results from biweekly and quarterly composite samples from October 2000 through February 2001
- National Emissions Standards for Hazardous Air Pollutants stack emissions monitoring from the fourth quarter of 2000
- Radon monitoring, including environmental radon and silos headspace radon, from October 2000 through February 2001
- Direct radiation (thermoluminescent dosimeter [TLD]) monitoring from the fourth quarter of 2000.

All data sets are complete in accordance with sampling requirements identified in the IEMP, Rev. 1 and/or Rev. 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:

- Isotopic thorium analysis began in October 2000 on each biweekly IEMP air particulate sample from all IEMP air monitoring stations, as documented in the IEMP, Rev. 2. There was a general increase in uranium and thorium-230 concentrations at the site fenceline, particularly in the northeastern sector of the site. The uranium increases reflect the demolition of Plant 5 and the sequential operations phase testing of the Waste Pits Remedial Action Project (WPRAP). The thorium-230 increases are attributable to WPRAP emissions. Figures 6-1 through 6-6 demonstrate these findings.
- The maximum 2000 annual dose at the site fenceline air monitoring stations was 1.1 millirem (mrem). Thorium isotopes contributed an average of approximately 52 percent of the annual dose. In particular, thorium-230 contributed 45 percent of the dose, while uranium and radium-226 contributed an average of approximately 25 percent and 22 percent, respectively.
- Signal cables for the silo headspace monitors were severed on September 20, 2000, and remained out of service until October 13, 2000. As discussed in the Integrated Environmental Monitoring Status Report for Third Quarter 2000, this hampered the ability to trend and calculate average

radon concentrations during this time period; however, the monitors were still functional, and were checked to verify that headspace radon concentrations remained within expected levels.

- In December 2000 moisture in K-65 headspace sample lines froze and blocked the flow of the air to the Silo 1 and Silo 2 headspace monitors. The data indicate the Silo 1 line froze on December 17, 2000, while the Silo 2 line froze on December 24, 2000. No headspace concentration data are available for the periods when the sample lines were blocked with ice.
- The KNW and KSW radon monitors were relocated approximately 35 feet to the west of their former locations on October 24, 2000 to remove them from the Accelerated Waste Retrieval Project construction area. The new locations (KNW-A and KSW-A) are expected to show lower average radon concentrations due to the increased distance from the silos but still serve the purpose of monitoring Silo 1 and Silo 2 radon emissions.
- Two radon-monitoring locations (LP2 and T117) were added in the K-65 Silo area. The T-28 radon monitor was relocated to a new location, designated as T-28A, in order to remove the monitor from an active construction area. The new monitoring locations are documented in the IEMP, Rev. 2.
- As noted in previous IEMP quarterly status reports, direct radiation (TLD) measurements have shown a positive upward trend in the immediate area of the K-65 Silos (locations 22 through 26 [refer to Figure 6-7]) and, to a lesser extent, at the site fenceline nearest the K-65 Silos (location 6 [refer to Figure 6-8]).

A thorough review of the air monitoring data covered in 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 6-1 and 6-2 contain the fourth quarter and annual doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 6-3 summarizes October 2000 through February 2001 and annual summary results for 2000 of environmental radon data from continuous monitors. All data covered by this quarterly summary are available on the IEMP Data Information Site. Maps showing the locations of air monitoring stations are also provided on the IEMP Data Information Site.

TABLE 6-1  
FOURTH QUARTER 2000 NESHAP COMPLIANCE TRACKING

40 CFR 61 (NESHAP) Subpart H Appendix E, Table 2; Net Ratios <sup>a</sup>														
Location	Ac-228 <sup>b</sup>	Ra-224 <sup>b</sup>	Ra-226	Ra-228 <sup>b</sup>	Th-228	Th-230	Th-231 <sup>b</sup>	Th-232	Th-234 <sup>b</sup>	U-234	U-235/ U-236	U-238	Ratio Totals	Dose <sup>c</sup> (mrem)
<b>Fenceline</b>														
AMS-2	--	--	--	--	8.3E-05	7.6E-04	--	--	4.4E-06	7.8E-04	--	1.2E-03	0.003	0.03
AMS-3	3.0E-08	7.4E-07	6.5E-03	1.9E-05	3.9E-05	1.4E-03	1.1E-08	1.8E-04	2.9E-05	6.1E-03	4.4E-04	7.7E-03	0.022	0.22
AMS-4	--	--	5.9E-03	--	--	2.3E-04	1.2E-09	--	1.9E-06	4.3E-04	4.6E-05	5.0E-04	0.007	0.07
AMS-5	--	--	6.4E-03	--	--	1.4E-04	8.5E-10	--	2.7E-06	4.7E-04	3.3E-05	7.2E-04	0.008	0.08
AMS-6	--	--	2.0E-03	--	4.8E-05	1.9E-03	2.3E-09	--	5.5E-06	1.1E-03	9.0E-05	1.4E-03	0.007	0.07
AMS-7	--	--	3.9E-03	--	2.8E-05	6.1E-04	--	--	1.4E-06	2.3E-04	--	3.7E-04	0.005	0.05
AMS-8A	--	--	5.5E-03	--	1.3E-04	1.7E-03	4.8E-09	--	1.2E-05	2.5E-03	1.9E-04	3.1E-03	0.013	0.13
AMS-9C	--	--	2.8E-03	--	1.4E-04	2.4E-03	4.5E-09	--	1.1E-05	2.2E-03	1.8E-04	3.0E-03	0.011	0.11
AMS-22	--	--	--	--	2.1E-04	1.2E-03	1.2E-09	--	3.2E-06	5.5E-04	4.6E-05	8.4E-04	0.003	0.03
AMS-23	--	--	5.1E-04	--	--	3.9E-04	--	--	2.6E-06	3.0E-04	--	6.9E-04	0.002	0.02
AMS-24	--	--	--	--	2.3E-04	5.0E-04	6.5E-10	--	1.9E-06	2.9E-04	2.6E-05	4.9E-04	0.002	0.02
AMS-25	--	--	6.8E-03	--	--	3.5E-04	--	--	2.3E-06	4.2E-04	--	6.0E-04	0.008	0.08
AMS-26	--	--	6.2E-03	--	--	3.2E-04	1.8E-09	--	4.3E-06	7.0E-04	7.0E-05	1.1E-03	0.008	0.09
AMS-27	--	--	3.3E-03	--	1.5E-04	1.4E-03	1.4E-09	--	2.3E-06	5.6E-04	5.5E-05	6.2E-04	0.006	0.06
AMS-28	--	--	6.9E-03	--	--	9.8E-04	1.5E-09	--	2.1E-06	2.8E-04	5.7E-05	5.7E-04	0.009	0.09
AMS-29	--	--	3.6E-03	--	1.8E-05	6.1E-04	2.6E-09	--	7.0E-06	1.3E-03	1.0E-04	1.9E-03	0.007	0.08
<b>Background</b>														
AMS-12	2.4E-07	6.0E-06	4.8E-03	1.5E-04	2.8E-04	3.4E-04	--	1.5E-03	7.6E-07	2.1E-04	--	2.0E-04	NA <sup>d</sup>	
AMS-16	6.1E-07	1.5E-05	9.9E-03	3.8E-04	6.1E-04	9.7E-04	--	3.6E-03	1.3E-06	3.5E-04	--	3.4E-04	NA <sup>d</sup>	
<b>QA/QC</b>														
Column														
Check <sup>e</sup>	0.000	0.000	0.604	0.000	0.011	0.149	0.000	0.002	0.001	0.182	0.013	0.248	NA <sup>d</sup>	1.21

Maximum Quarterly Ratio: 0.022  
Maximum Quarterly Dose (mrem): 0.22

<sup>a</sup>A "--" 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.

<sup>b</sup>Isotopes assumed to be in equilibrium with their parents.

<sup>c</sup>Dose conversions are based on the NESHAP standard of 10 mrem per year.

<sup>d</sup>NA = not applicable

<sup>e</sup>Column check is the sum of doses from each radionuclide, followed by the sum of doses (1.21) at all fenceline monitors.

TABLE 6-2

2000 YEAR-TO-DATE NESHAP COMPLIANCE TRACKING

40 CFR 61 (NESHAP) Subpart H Appendix E, Table 2; Net Ratios<sup>a</sup>

Location	Ac-228 <sup>b</sup>	Ra-224 <sup>b</sup>	Ra-226	Ra-228 <sup>b</sup>	Th-228	Th-230	Th-231 <sup>b</sup>	Th-232	Th-234 <sup>b</sup>	U-234	U-235/ U-236	U-238	Ratio Totals	Dose <sup>c</sup> (mrem)
<b>Fenceline</b>														
AMS-2	1.8E-07	4.3E-06	--	1.1E-04	8.6E-05	1.0E-02	5.8E-09	1.0E-03	1.9E-05	3.7E-03	2.3E-04	5.1E-03	0.021	0.21
AMS-3	1.2E-06	2.9E-05	1.6E-02	7.3E-04	1.1E-03	5.5E-02	2.4E-08	6.9E-03	5.6E-05	1.1E-02	9.3E-04	1.5E-02	0.11	1.1
AMS-4	4.0E-07	9.8E-06	4.2E-03	2.5E-04	1.8E-04	8.2E-03	5.4E-09	2.4E-03	7.9E-06	1.7E-03	2.1E-04	2.1E-03	0.019	0.19
AMS-5	9.8E-08	2.4E-06	7.2E-03	6.2E-05	1.2E-04	8.8E-03	2.5E-09	5.9E-04	9.3E-06	1.5E-03	9.7E-05	2.5E-03	0.021	0.21
AMS-6	2.6E-07	6.4E-06	1.6E-03	1.6E-04	--	1.7E-02	4.5E-09	1.6E-03	1.8E-05	2.8E-03	1.7E-04	4.8E-03	0.028	0.28
AMS-7	1.0E-07	2.5E-06	5.5E-03	6.4E-05	8.9E-06	5.0E-03	2.3E-09	6.1E-04	7.0E-06	1.3E-03	9.1E-05	1.8E-03	0.014	0.14
AMS-8A	5.4E-07	1.3E-05	6.2E-03	3.4E-04	5.6E-04	2.3E-02	1.6E-08	3.2E-03	4.3E-05	9.1E-03	6.2E-04	1.1E-02	0.055	0.55
AMS-9C	1.1E-06	2.8E-05	1.1E-02	7.1E-04	5.6E-04	3.0E-02	1.3E-08	6.8E-03	3.6E-05	7.1E-03	5.0E-04	9.5E-03	0.066	0.66
AMS-22	2.2E-07	5.3E-06	2.4E-03	1.4E-04	3.4E-04	1.2E-02	2.9E-09	1.3E-03	1.4E-05	2.2E-03	1.1E-04	3.6E-03	0.022	0.22
AMS-23	3.7E-07	9.0E-06	4.7E-03	2.3E-04	3.7E-04	1.0E-02	2.4E-09	2.2E-03	1.3E-05	2.0E-03	9.6E-05	3.4E-03	0.023	0.23
AMS-24	4.7E-07	1.1E-05	3.6E-03	2.9E-04	5.3E-04	1.6E-02	5.4E-09	2.8E-03	1.4E-05	2.9E-03	2.1E-04	3.7E-03	0.030	0.30
AMS-25	3.2E-07	8.0E-06	1.3E-02	2.0E-04	4.0E-04	9.3E-03	2.4E-09	1.9E-03	8.0E-06	1.5E-03	9.4E-05	2.1E-03	0.029	0.29
AMS-26	--	--	5.6E-03	--	2.0E-04	8.3E-03	3.9E-09	--	1.1E-05	1.9E-03	1.5E-04	3.0E-03	0.019	0.19
AMS-27	3.8E-07	9.3E-06	1.2E-02	2.4E-04	8.7E-04	1.0E-02	2.1E-09	2.2E-03	1.1E-05	1.8E-03	8.1E-05	2.8E-03	0.031	0.31
AMS-28	--	--	5.9E-03	--	--	1.5E-02	6.0E-09	--	1.6E-05	1.9E-03	2.4E-04	4.3E-03	0.027	0.27
AMS-29	4.0E-07	9.8E-06	1.2E-02	2.5E-04	4.7E-04	1.3E-02	8.5E-09	2.4E-03	1.8E-05	3.5E-03	3.3E-04	4.8E-03	0.037	0.37
<b>Background</b>														
AMS-12	9.8E-07	2.4E-05	2.1E-02	6.1E-04	1.8E-03	1.8E-03	6.7E-10	5.8E-03	2.9E-06	7.7E-04	2.6E-05	7.8E-04	NA <sup>d</sup>	
AMS-16 <sup>e</sup>	1.7E-06	4.1E-05	2.4E-02	1.0E-03	2.5E-03	2.6E-03	--	9.9E-03	3.4E-06	9.3E-04	--	8.9E-04	NA <sup>d</sup>	
<b>QA/QC</b>														
Column														
Check <sup>f</sup>	0.000	0.001	1.108	0.038	0.058	2.510	0.000	0.359	0.003	0.565	0.042	0.798	NA <sup>d</sup>	5.48

Maximum Year-To-Date Ratio: 0.11  
Maximum Year-To-Date Dose (mrem): 1.1

<sup>a</sup>A "--" 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.

<sup>b</sup>Isotopes assumed to be in equilibrium with their parents.

<sup>c</sup>Dose conversions are based on the NESHAP standard of 10 mrem per year.

<sup>d</sup>NA = not applicable

<sup>e</sup>Second quarter AMS-16 background sample results were rejected because not representative of historical background levels

<sup>f</sup>Column check is the sum of doses from each radionuclide, followed by the sum of doses (5.48) at all fenceline monitors.

TABLE 6-3

CONTINUOUS ENVIRONMENTAL RADON MONITORING  
AVERAGE CONCENTRATIONS<sup>a</sup>

Location	October 2000 through February 2001 Summary Results (Instrument Background Corrected) <sup>b</sup> (pCi/L)			2000 Summary Results (Instrument Background Corrected) <sup>b</sup> (pCi/L)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
<b>Fenceline</b>						
AMS-02	0.1	0.6	0.3	0.2	0.6	0.4
AMS-03	0.1	1.0	0.5	0.3	1.0	0.6
AMS-04	0.1	0.8	0.5	0.2	0.8	0.4
AMS-05	0.1	0.7	0.4	0.2	0.7	0.4
AMS-06	0.1	0.7	0.3	0.2	0.7	0.4
AMS-07	0.2	0.9	0.5	0.3	0.9	0.5
AMS-08A	0.1	0.5	0.3	0.2	0.6	0.4
AMS-09C	0.1	0.8	0.4	0.1	0.8	0.4
AMS-22	0.1	0.4	0.2	0.1	0.5	0.3
AMS-23	0.1	0.3	0.2	0.1	0.3	0.2
AMS-24	0.1	0.8	0.3	0.2	0.8	0.4
AMS-25	0.1	0.6	0.4	0.2	0.6	0.3
AMS-26	0.2	0.7	0.4	0.2	0.7	0.4
AMS-27	0.1	0.8	0.3	0.2	0.8	0.4
AMS-28	0.1	0.6	0.3	0.2	0.6	0.3
AMS-29	0.1	0.6	0.3	0.2	0.7	0.4
<b>Background</b>						
AMS-12	0.2	0.5	0.4	0.1	0.5	0.3
AMS-16	0.1	0.4	0.2	0.1	0.4	0.2
<b>On Site</b>						
KNE	1.1	3.6	2.4	1.5	3.6	2.2
KNO <sup>c</sup>	1.3	3.7	2	1.3	3.7	2.7
KNW/KNW-A	0.8	1.8	1.2	1	4.2	1.9
KSE	0.9	4.7	2.2	1.3	4.7	2.8
KSO <sup>c</sup>	0.3	0.9	0.5	0.3	0.9	0.5
KSW/KSW-A	0.6	2.2	1.2	1	2.4	1.6
KTOP	4.3	11.8	6.8	1.8	11.8	4.7
LP2 <sup>d</sup>	0.4	0.5	0.4	0.4	0.5	0.4
Pilot Plant Warehouse	0.4	1.1	0.6	0.1	1.1	0.4
PR-1 <sup>e</sup>	0.4	1.0	0.6	0.3	1	0.6
Rally Point 4	0.3	0.8	0.4	0.3	0.8	0.4
Surge Lagoon	0.3	0.6	0.5	0.2	0.6	0.4
T117 <sup>d</sup>	0.2	0.4	0.3	0.2	0.4	0.3
T28/T28A	0.4	1.2	0.8	0.7	1.2	1
TS4	0.2	0.7	0.4	0.1	0.7	0.3
WP-17A	0.2	1.0	0.5	0.2	1	0.4

<sup>a</sup>Monthly 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.

<sup>b</sup>Instrument background changes as monitors are replaced.

<sup>c</sup>Unit was placed in service in April 2000.

<sup>d</sup>Unit was placed in service in November 2000.

<sup>e</sup>Unit was placed in service in March 2000.

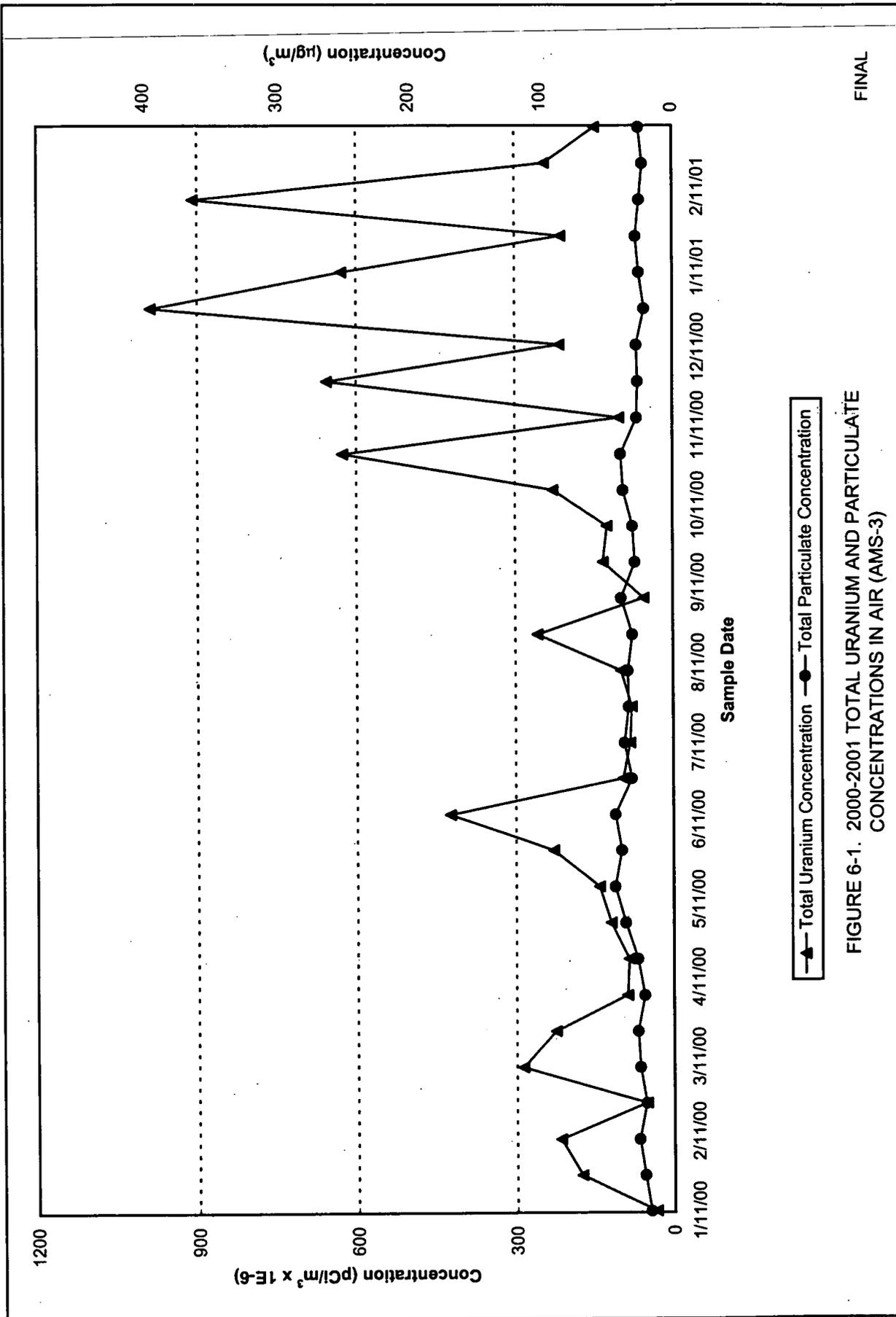
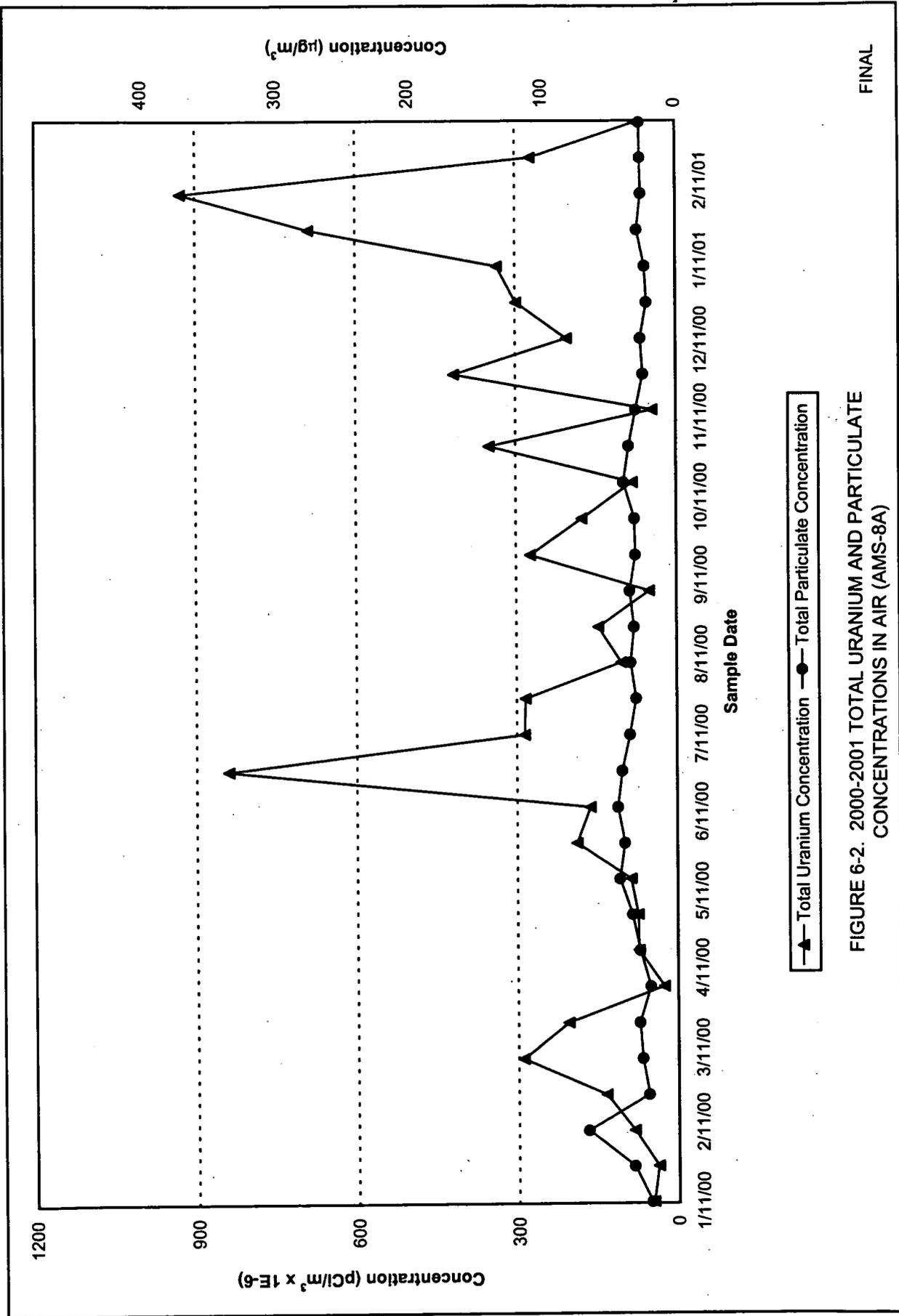


FIGURE 6-1. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR (AMS-3)

FINAL



FINAL

FIGURE 6-2. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR (AMS-8A)

▲ Total Uranium Concentration ● Total Particulate Concentration

Concentration (pCi/m³ x 1E-6)

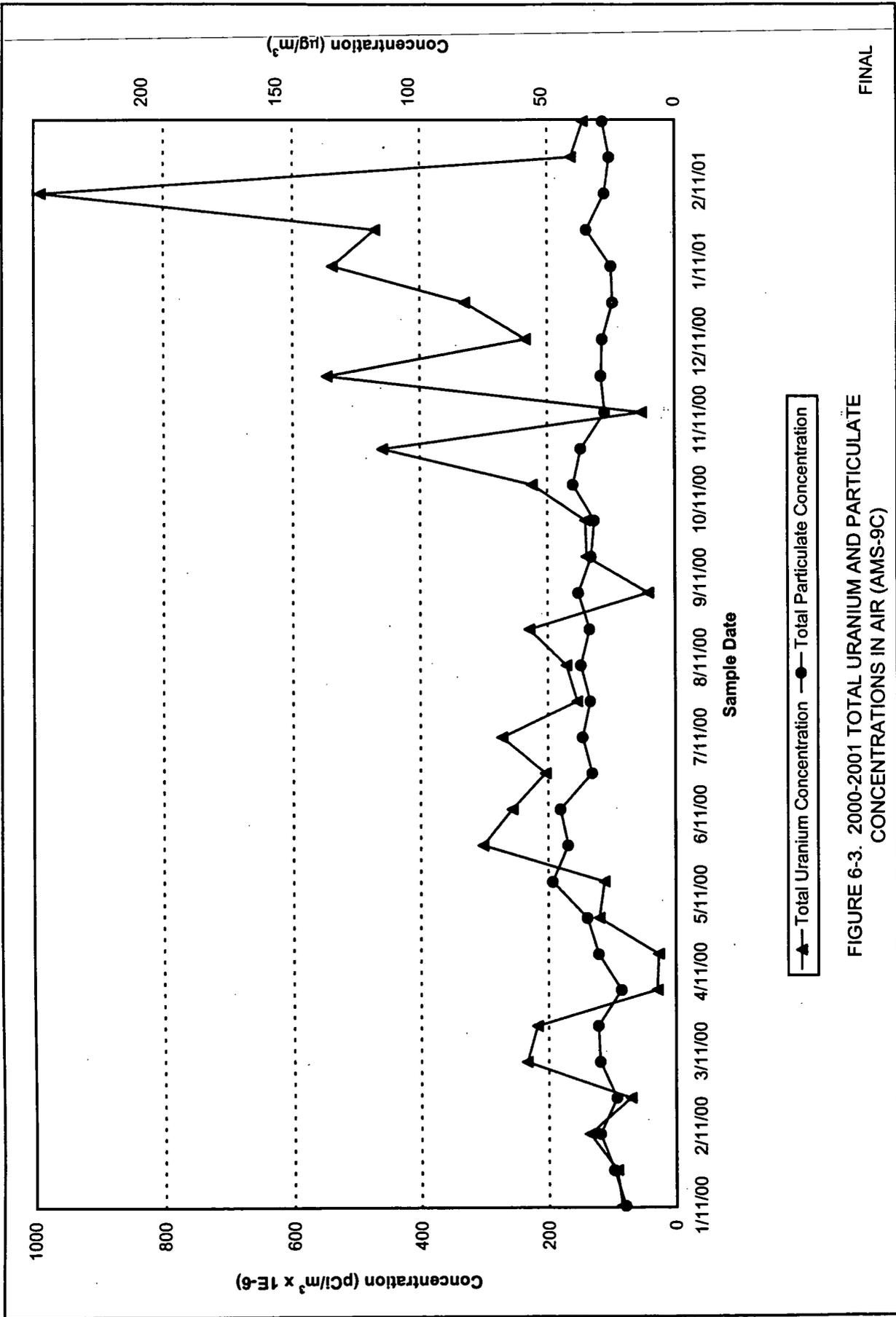


FIGURE 6-3. 2000-2001 TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR (AMS-9C)

FINAL

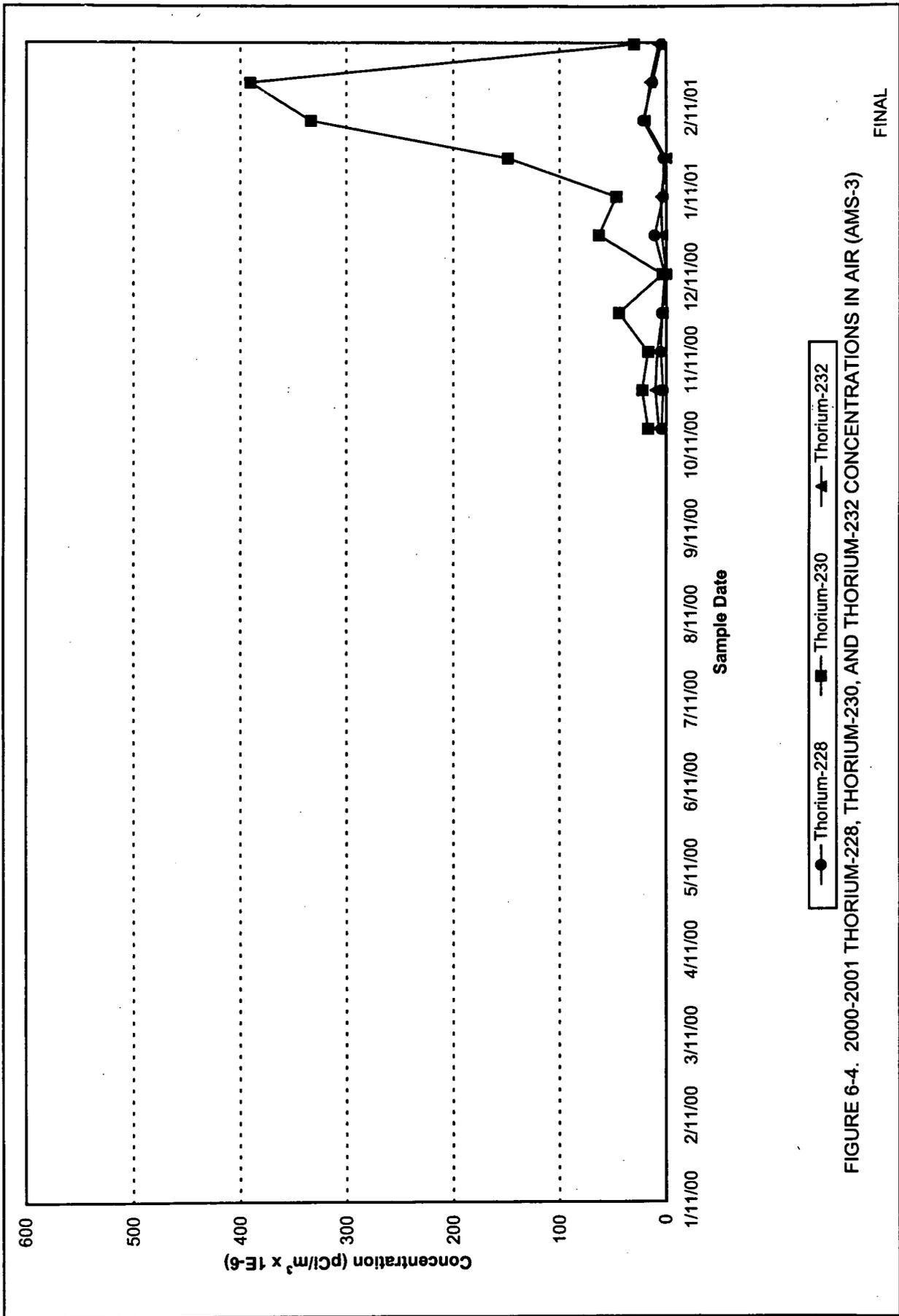


FIGURE 6-4. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR (AMS-3)

FINAL

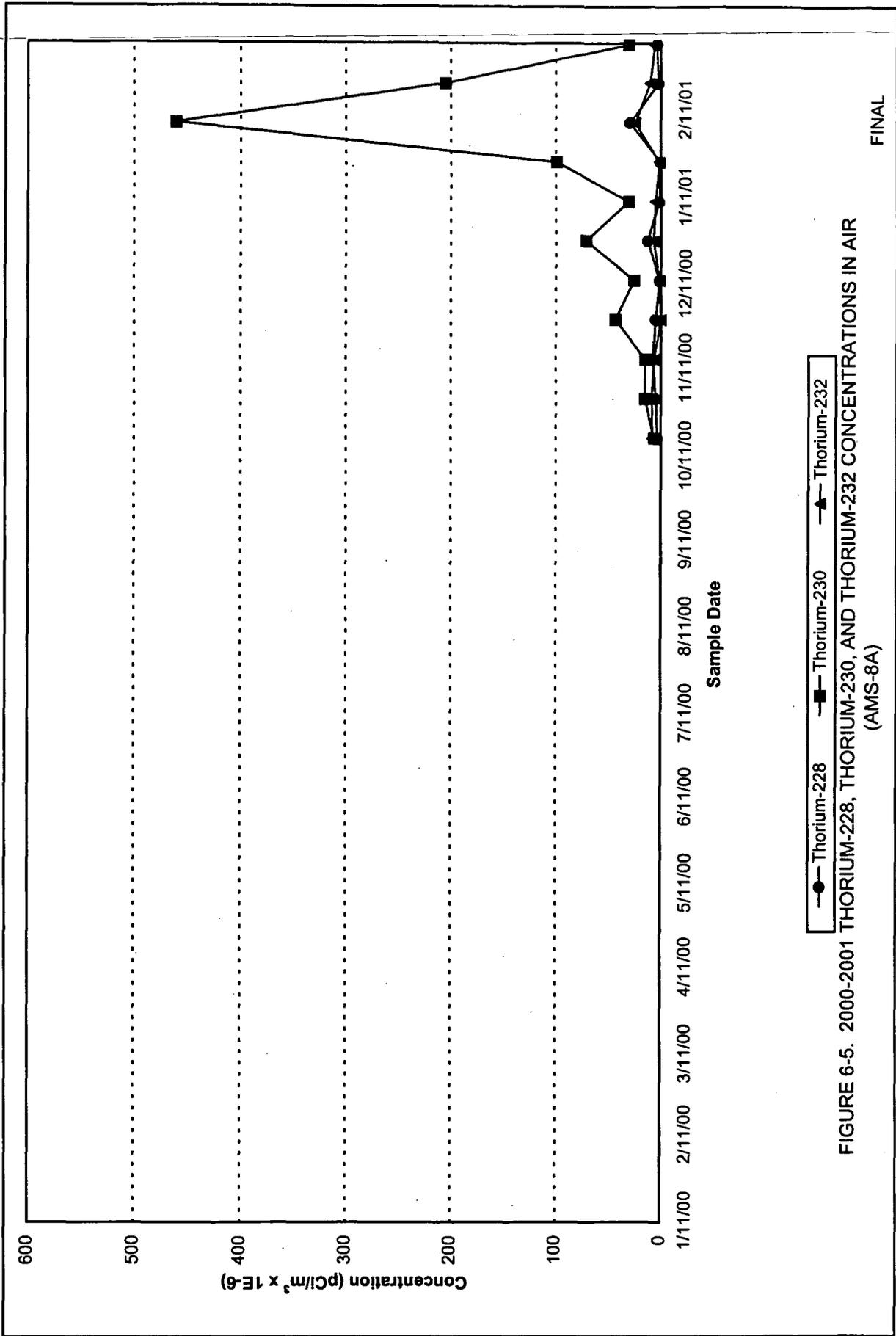


FIGURE 6-5. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR (AMS-8A)

FINAL

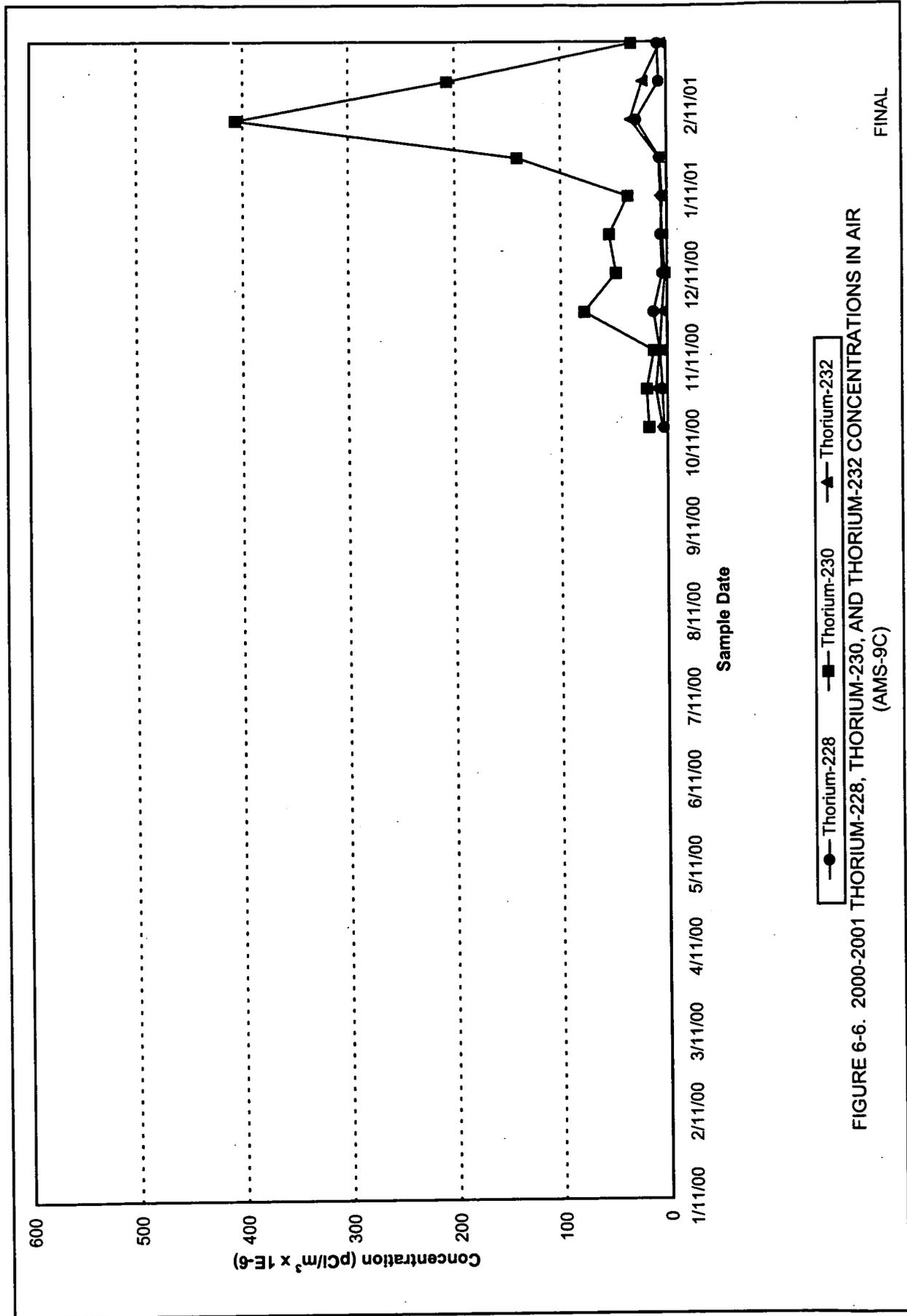


FIGURE 6-6. 2000-2001 THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR (AMS-9C)

FINAL

8638

000038

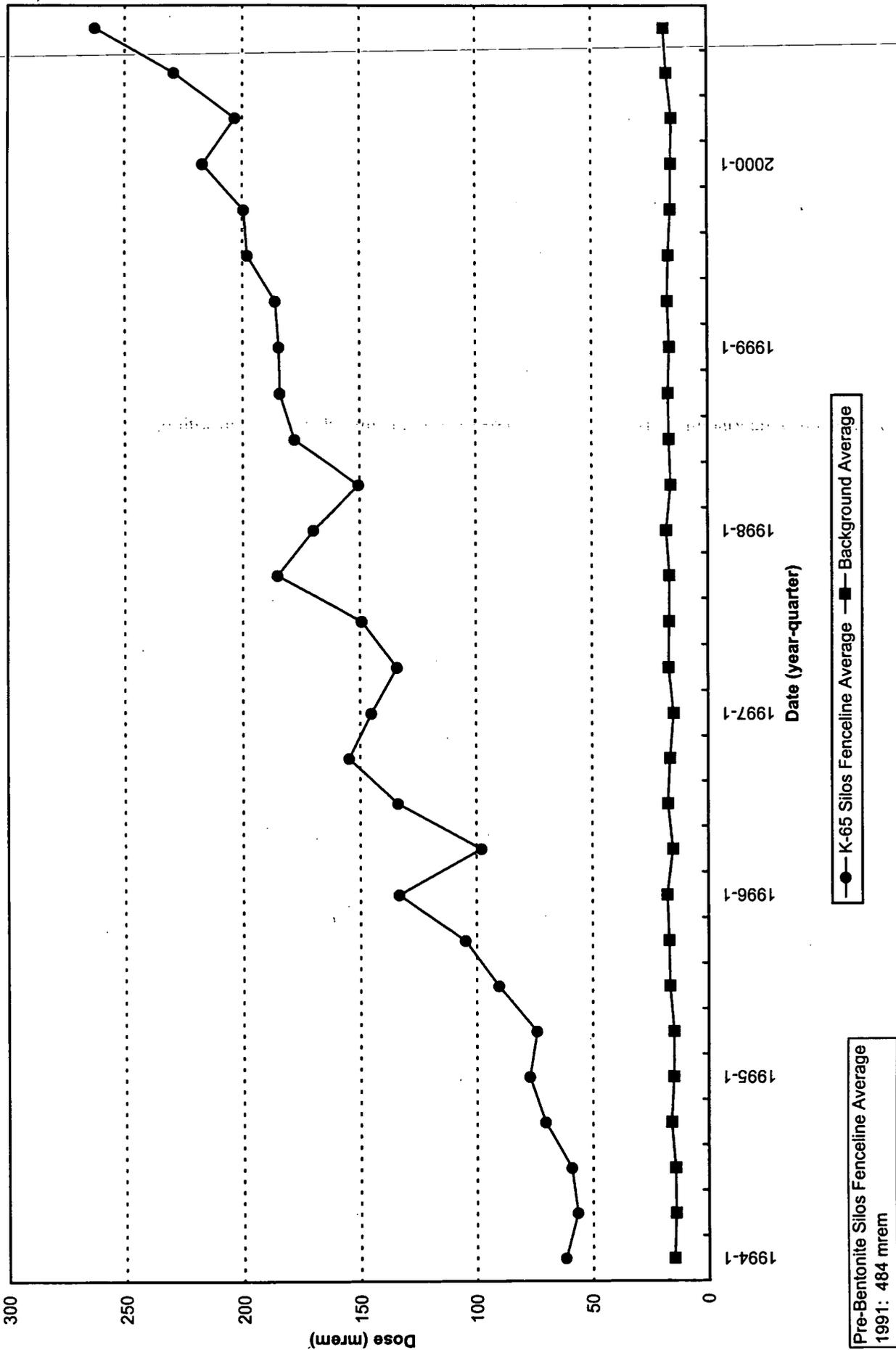
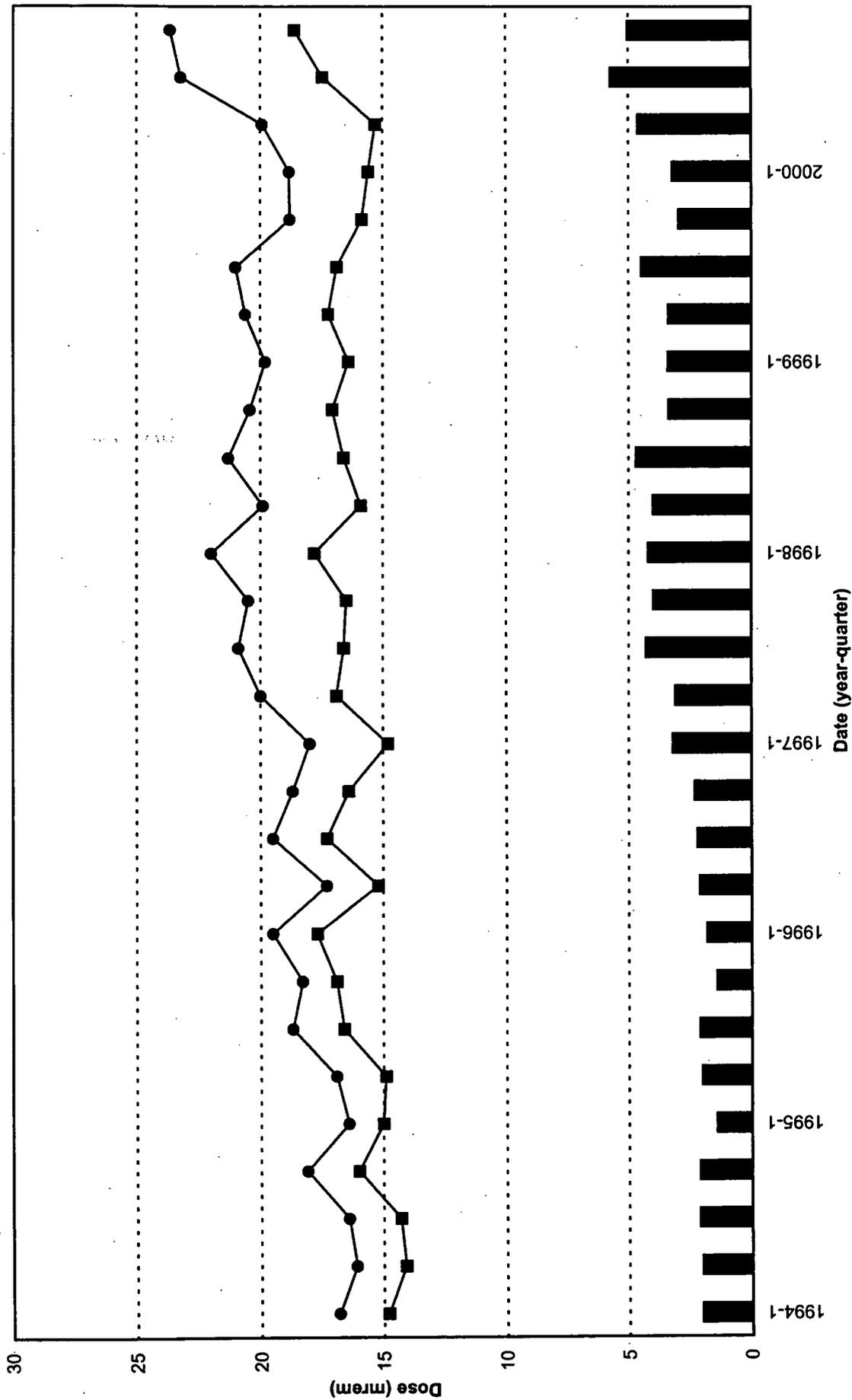


FIGURE 6-7. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2000  
(K-65 SILOS FENCELINE AVERAGE VERSUS BACKGROUND AVERAGE)



FINAL

FIGURE 6-8. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS, 1994 - 2000 (LOCATION 6 VERSUS BACKGROUND AVERAGE)

## 7.0 BIOTA MONITORING DATA

### 7.1 DATA COVERED

This IEMP data quarterly summary covers all biota (produce) monitoring data collected under the IEMP program that were added to the IEMP Data Information Site through March 31, 2001. This includes the complete initial data set for samples collected in summer of 2000 under the IEMP biota monitoring program, which takes place once every three years.

### 7.2 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 biota monitoring data for the time period covered by this quarterly summary are discussed below.

A large percentage of the initial biota monitoring results were reported at levels that were less than the analytical detection limit and a few of the initial total uranium results for corn were reported at levels which were outside the historical range of data. Re-analysis of the selected produce samples has been performed in order to provide additional information for use in reporting and utilizing the biota monitoring data. Although the complete initial data file for biota is on the IEMP Data Information Site, it is being re-evaluated and reviewed with the results from the sample re-analysis. Therefore, it is likely that the results will be updated with respect to the re-analysis and evaluation. As the data are updated, it will be placed on the IEMP Data Information Site and identified with a note.

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

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