



## Department of Energy

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NOV 28 2005

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DOE-0025-06

Mr. Thomas Schneider, Project Manager  
Ohio Environmental Protection Agency  
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Dear Mr. Saric and Mr. Schneider:

### **TRANSMITTAL OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN (IEMP) MID-YEAR DATA SUMMARY FOR 2005**

Reference: Letter, W. Taylor to J. Saric, T. Schneider, B. Kurey, "Transmittal of the Revised Comprehensive Legacy Management (Volume I) and Institutional Controls Plan (Volume II), Integrated Environmental Monitoring Plan, Final, Revision 4A (Attachment D) and Community Involvement Plan (Attachment E)," dated September 28, 2005

This letter transmits the subject document to the U.S. Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA).

The IEMP Mid-Year Data Summary for 2005 summarizes the January 1 through June 30 environmental monitoring results and activities. The IEMP data continue to be provided to the EPA and OEPA via the IEMP Data Information Site (i.e., the "Extranet Site"), at <http://iempdata.fernald.gov>, as the data become available.

Note: It was requested in the annual review of the IEMP (Revision 4), which was submitted as part of the Comprehensive Legacy Management and Institutional Controls Plan (LMICP) – Attachment D (Reference), that this be the last mid-year data summary. This request is based on the fact that there will be limited environmental impacts with the completion of many primary site remediation activities in late 2005 and early 2006. Data will continue to be provided electronically and through the annual Site Environmental Report.

Mr. James A. Saric  
Mr. Tom Schneider

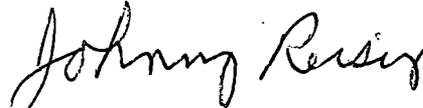
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DOE-0025-06

Questions on the IEMP Data Information Site can also be addressed by clicking on the "Data Questions" email link found at the top of the IEMP Data Information Site screen.

If you have any questions concerning the attached document or the IEMP Data Information Site, please contact Ed Skintik at (513) 246-1369 or me at (513) 648-3139.

Sincerely,



Johnny W. Reising  
Director

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**IEMP MID-YEAR DATA SUMMARY  
REPORT FOR 2005**

**FERNALD CLOSURE PROJECT  
FERNALD, OHIO**



**NOVEMBER 2005**

**U.S. DEPARTMENT OF ENERGY**

**51350-RP-0027**

**REV. 0**

**FINAL**

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## LIST OF ACRONYMS

AWWT	advanced wastewater treatment facility
CAWWT	converted advanced wastewater treatment facility
CFR	Code of Federal Regulations
D&D	decontamination and dismantling
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFCA	Federal Facilities Compliance Agreement
FRL	final remediation level
GMA	Great Miami Aquifer
gpm	gallons per minute
GWLMP	Groundwater/Leak Detection and Leachate Monitoring Plan
HTW	horizontal till well
IEMP	Integrated Environmental Monitoring Plan
lbs	pounds
LCS	leachate collection system
LDS	leak detection system
LMICP	Comprehensive Legacy Management and Institutional Controls Plan
$\mu\text{Ci}$	microCuries
$\mu\text{g/L}$	micrograms per liter
$\mu\text{g/m}^3$	micrograms per cubic meter
M gal	million gallons
mg/L	milligrams per liter
mrem	millirem
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
OEPA	Ohio Environmental Protection Agency
OMMP	Operations and Maintenance Master Plan
OSDF	on-site disposal facility
PCB	polychlorinated biphenyl
pCi/L	picoCuries per liter
pCi/m <sup>3</sup>	picoCuries per cubic meter
RCS	Radon Control System
TIE	Technical Integration Exchange
TLD	thermoluminescent dosimeter

## 1.0 INTRODUCTION

This Integrated Environmental Monitoring Plan (IEMP) Mid-Year Data Summary Report for 2005 provides the environmental monitoring results from monitoring activities performed from January 1 through June 30, 2005 at the Fernald site. This is the fourth mid-year data summary prepared in accordance with an agreement between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Ohio Environmental Protection Agency (OEPA) (as identified in IEMP, Revision 4 [DOE 2005d], requirements). As they become available, the IEMP data continue to be provided to the EPA and OEPA via the IEMP Data Information Site (i.e., the "Extranet Site"), at <http://iempdata.fernald.gov>.

Comprehensive full-year reporting, including all tables and graphs, are still provided through the annual Site Environmental Report. Table 1-1 identifies the IEMP data for each IEMP program under this report.

TABLE 1-1

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

PROGRAMS	TIME PERIOD					
	Semiannual 2005					
	First Quarter 2005 <sup>a</sup>			Second Quarter 2005 <sup>a</sup>		
	J A N	F E B	M A R	A P R	M A Y	J U N
<b>GROUNDWATER SAMPLING ACTIVITIES</b>						
Extraction Operational Data	◆	◆	◆	◆	◆	◆
Total Uranium Only	-----◆-----					
Non-uranium Monitoring <sup>b</sup>	◆-----◆-----◆					
Groundwater Elevations	◆-----			◆-----		
<b>OSDF SAMPLING ACTIVITIES</b>						
LCS and LDS Volumes	◆	◆	◆	◆	◆	◆
Cells 1, 2, and 3 GMA Wells/HTW/LCS/LDS Analytical	-----◆			-----◆-----		
Cells 4 and 5 GMA LCS/LDS Analytical	-----◆-----			-----◆-----		
Cell 6 GMA Wells/HTW Analytical <sup>c</sup>	NA	◆ <sup>d</sup>	NA	◆	NA	◆
Cell 6 GMA LCS/LDS Analytical	-----◆-----			-----◆-----		
Cells 7 and 8 GMA Wells/HTW Analytical <sup>c</sup>	NA	◆	NA	◆	NA	◆
Cells 7 and 8 LCS/LDS Analytical	-----◆-----			-----◆-----		
<b>SURFACE WATER SAMPLING ACTIVITIES</b>						
NPDES	◆	◆	◆	◆	◆	◆
FFCA	◆	◆	◆	◆	◆	◆
IEMP Characterization	◆-----◆-----◆			◆-----◆-----◆		
<b>AIR SAMPLING ACTIVITIES</b>						
Radiological Particulate (biweekly/monthly samples)	◆	◆	◆	◆	◆	◆
NESHAP Composite Analytical	-----◆			-----◆-----		
NESHAP Stack Analytical	-----◆-----			-----◆-----		
Environmental Radon	◆	◆	◆	◆	◆	◆
Silos Headspace Real Time Radon	◆	◆	◆	NA	NA	NA
Direct Radiation (TLD)	-----◆			-----◆-----		

◆ Data collected during this time period are covered in this mid-year summary. IEMP sampling that takes place during one scheduled event or round, quarterly or semiannually, is identified with a marker (e.g., |-----◆-----|) where the symbol is present in the month or months the samples were collected and the dashed line indicates the sampling period.

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

<sup>b</sup>Includes South Field Extraction, Waste Storage Area, Property/Plume Boundary monitoring for final remediation level (FRL) exceedances, and Property/Plume Boundary monitoring for Paddys Run Road Site constituents.

<sup>c</sup>This monitoring is bimonthly.

<sup>d</sup>Location was inaccessible.

## 2.0 GROUNDWATER MONITORING DATA

### 2.1 DATA COVERED

This IEMP mid-year data summary covers operational and analytical data from January 1 through June 30, 2005. The data are available on the IEMP Data Information Site. Specifically, the data include:

- Operational data collected during the first half of 2005
- Analytical data collected during the first half of 2005
- Groundwater (Great Miami Aquifer) elevation data collected during the first half of 2005.

Maps showing the locations of IEMP groundwater monitoring wells are also provided on the IEMP Data Information Site. All of these data sets are complete in accordance with sampling requirements identified in the IEMP, Revision 4.

A review of activities during this reporting period was conducted to identify notable results and events (listed below). Tables 2-1 through 2-4 provide an operational summary of the groundwater extraction well performance for the reporting period, as well as a summary of all groundwater restoration pumping efforts accomplished to date. Figure 2-1 is an extraction well location map. Figures 2-2 through 2-4 are updated uranium plume maps.

### 2.2 NOTABLE RESULTS AND EVENTS

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

- Waste Storage Area – Geoprobings conducted in support of the Phase II design indicates that uranium concentrations are much higher than what was previously mapped for the area
- South Field Area – Monitoring Well 63285 had a new maximum concentration
- Former Production Area – Monitoring Well 2389 had a uranium concentration of 63.1 micrograms per liter ( $\mu\text{g/L}$ )
- Installation of flumes in the storm sewer outfall ditch to support an infiltration test
- Construction activities at the converted advanced wastewater treatment facility (CAWWT)
- Development of a groundwater certification plan
- Plugging and abandonment of 29 groundwater-monitoring wells.

More detailed information on these notable results and events follows.

#### Waste Storage Area

Thirteen locations in the waste storage area were sampled using a direct-push sampling tool between October 2004 and April 2005 in support of the Waste Storage Area (Phase II) Design. Eight of the 13 locations (12614b, 13320, 13322, 13324, 13325, 13327, 13328, 13329) were sampled in the first half of 2005. Locations are identified in Figure 2-2.

The sampling process at each location consisted of collecting a water sample just beneath the water table, and at subsequent 10-foot depth intervals beneath the water table down to a pre-defined depth. The pre-defined depth was based on Geoprobings results conducted in 1999 in support of the Waste Storage Area (Phase I) Design. Each location was probed deep enough to ensure the base of any plume that might be present was sampled. Sampling was limited to the portion of the plume located above the clay interbed layer that is present in the Great Miami Aquifer in the waste storage area. The analytes tested for were uranium, technetium-99, nitrate/nitrite, manganese, molybdenum, nickel, carbon disulfide, and trichloroethene.

The maximum uranium concentration detected at each location (regardless of depth) is shown in Figure 2-2. The results indicate that much higher uranium concentrations are present in the area of the silos than were previously mapped. Location 13320 had the highest uranium concentration (2,060 µg/L). Details concerning the characterization effort and other sampling results are presented in the Waste Storage Area (Phase II) Design Report (DOE 2005g), which was issued to EPA and OEPA for review in July 2005.

Based on recommendations made in the Waste Storage Area (Phase II) Design Report, and comments received from the EPA and OEPA, additional work concerning the remediation of the manganese plume in the Waste Storage Area is being conducted in the second half of 2005. It is anticipated that an addendum to the Waste Storage Area (Phase II) Design Report will be issued in the second half of 2005.

#### **South Field Area**

Monitoring Well 63285 had a new maximum uranium concentration. This monitoring well is located in the eastern portion of the South Field uranium plume, about half way between the eastern Storm Water Retention Basin and Willey Road. In 2004, the location was mapped as being just outside of the 200-µg/L uranium contour. The water sample collected on April 27, 2005 had a uranium concentration of 231 µg/L. In Figures 2-3 and 2-4, the location is mapped just inside of the 200-µg/L uranium contour.

#### **Former Production Area**

Monitoring Well 2389 had a uranium concentration of 63.1 µg/L in the first half of 2005. It is up from a concentration of 49.7 µg/L, measured in the second half of 2004. The uranium concentration at Monitoring Well 2389 has had a history of intermittent final remediation level (FRL) exceedances (refer to Figure 2-5). Data dating back to 1990 indicate that after a groundwater FRL exceedance for uranium in 1990, the uranium concentrations were below the groundwater FRL until 2002. In 2002, an FRL exceedance was detected, but uranium concentrations were once again below the FRL by early 2003. Direct-push sampling conducted around Monitoring Well 2389 in 2004 indicated that no uranium FRL exceedances were present. Based on routine groundwater monitoring results and direct-push sampling conducted through the end of 2004, a determination was made that no additional groundwater

extraction wells were needed in excavation areas 3A/4A to support site closure in 2006. EPA concurrence with this decision was received via a letter dated February 2, 2005 (EPA 2005a). OEPA concurrence with this decision was received via a letter dated April 28, 2005 (OEPA 2005a).

A commitment to continue to monitor the well has revealed that in 2004 and in early 2005, uranium FRL exceedances are once again present in Monitoring Well 2389. The increase in uranium concentrations does not appear to be related to high water levels and the desorbing of contamination from sediment grains in the vadose zone. The well will continue to be monitored. At this time, uranium concentrations do not indicate the need to install an extraction well in this area.

#### **Installation of Flumes in the Storm Sewer Outfall Ditch to Support an Infiltration Test**

Groundwater modeling suggests that an induced recharge rate of 500 gallons per minute (gpm) of clean water through the storm sewer outfall ditch would decrease the length of the aquifer remedy by one year. An infiltration test in the storm sewer outfall ditch was conducted to determine the amount of water that potentially infiltrates through the ditch, and to assess whether or not a 500-gpm infiltration rate is feasible. Flumes to support the test were installed at six locations in the storm sewer outfall ditch in the first half of 2005. The purpose of the flumes is to measure the amount of water flowing into the ditch, and the amount of water flowing out of the ditch and entering Paddys Run. The difference between the two flow rates is the rate of water infiltrating through the base of the storm sewer outfall ditch and recharging the Great Miami Aquifer. Installation of the flumes began during the week of May 16, 2005 and was completed during the week of June 6, 2005.

The test was conducted in August and September of 2005. A construction well located in the eastern portion of the site, in a non-contaminated area of the aquifer, was used to deliver a flow rate of 500 gpm of clean groundwater to the storm sewer outfall ditch. Results of the test were provided informally to the EPA and OEPA at the September 15, 2005 Technical Integration Exchange (TIE) meeting. Preliminary results indicate that the average engineered percent infiltration rate into the storm sewer outfall ditch is approximately 49 percent. A report that summarizes the work and presents results is being prepared for EPA and OEPA review.

#### **Construction Activities at the Advanced Wastewater Treatment Facility**

Conversion of the advanced wastewater treatment facility (AWWT) to the CAWWT began in September 2004. Construction work was divided into two stages. During Stage I, the expansion system was reconfigured to meet the scope of continuing treatment needs. During Stage II, infrastructure that was no longer needed to meet treatment needs was removed, and a new modular laboratory and control room were installed. All Stage I construction was completed the week of February 6, 2005. Systems operability testing began on February 11, 2005. Conditional turnover of the CAWWT Stage I to

operations was completed on March 7, 2005. Stage II construction began the week of May 16, 2005. The majority of Stage II construction was completed by June 30, 2005. During the first half of 2005, various extraction wells were turned off at various times to facilitate construction activities at the CAWWT. The downtimes are noted for each extraction well impacted in Tables 2-2 through 2-4.

#### **Development of a Groundwater Certification Plan**

Work began in the first half of 2005 on the Groundwater Certification Plan. The plan establishes the process that will be used to guide groundwater restoration and conduct certification. The draft Groundwater Certification Strategy was sent to the EPA and Ohio EPA on May 25, 2005. The draft strategy provided a starting point for discussions with regulators for developing the Groundwater Certification Plan. Following issuance of the draft strategy, TIE meetings were held in May, July, August, and September. During these meetings, issues and strategies for certification of the remedy were discussed and an outline for the Groundwater Certification Plan was developed. The plan was issued to the EPA and OEPA for review in October 2005 (DOE 2005b).

#### **Plugging and Abandonment of 29 Groundwater Monitoring Wells**

A letter issued on March 18, 2005 (DOE 2005e) recommended that 46 groundwater-monitoring wells be plugged and abandoned prior to site closure in 2006. The 46 groundwater monitoring wells are not needed to support continuation of the groundwater remediation and certification past site closure in 2006. EPA concurrence to proceed was received in a letter dated April 13, 2005 (EPA 2005b). OEPA concurrence to proceed was received in a letter dated April 11, 2005 (OEPA 2005b). In the first half of 2005, 29 of the 46 wells were plugged and abandoned. The 29 wells are: 2066, 2391, 2392, 2395, 2555, 2558, 2560, 2728, 3043, 3044, 3066, 3091, 3092, 3098, 3107, 3391, 3678, 3679, 3910, 3911, 3912, 3916, 3917, 3918, 3921, 3922, 3923, 4091, and 4451. None of these wells were being monitored in support of the groundwater restoration effort. Plugging and abandonment of the remaining groundwater monitoring wells will continue during the second half of 2005.

#### **Updated Uranium Plume Map**

In addition to the notable results discussed above, the maximum total uranium concentration map was updated using uranium concentration data collected through the first half of 2005. Figure 2-2 presents direct-push data that have been collected through June 2005. Figures 2-3 and 2-4 present the highest uranium concentration for each monitoring well that was sampled during the reporting period, and the average pumped water uranium concentration at each operating extraction well during the first half of 2005. Unfiltered sample results are normally posted for monitoring wells, but when the sample turbidity is high, filtered results are used. At a minimum, all direct-push samples are filtered through a 5-micron filter.

TABLE 2-1

AQUIFER RESTORATION SYSTEM OPERATIONAL SUMMARY SHEET

	Reporting Period					
	January 2005 through June 2005			August 1993 through June 2005		
	Gallons Pumped (M gal)	Total Uranium Removed (lbs)	Uranium Removal Index (lbs/M gal) <sup>a</sup>	Gallons Pumped/Re-injected (M gal)	Total Uranium Removed/Re-injected (lbs)	Uranium Removal Index (lbs/M gal) <sup>a</sup>
South Field (Phase I) Extraction Module	417.52	180.737	0.43	6984.069	3972.077	0.57
Waste Storage Area Module	89.377	47.4	0.53	1318.734	947.35	0.72
South Plume Module	307.735	60.7	0.20	9198.124	1967.28	0.21
<b>Aquifer Restoration Systems Totals</b>						
Extraction Wells	814.632	288.837	0.35	17500.927	6886.707	0.39
Former Re-injection				<u>1936.478</u>	<u>76.27</u>	<u>NA</u>
Net	814.632	288.837	NA	15564.449	6810.437	NA

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

**TABLE 2-2**  
**SOUTH FIELD EXTRACTION MODULE OPERATION SUMMARY SHEET**  
**(JANUARY THROUGH JUNE 2005)**

Extraction Well <sup>ab</sup>	OMMP Target Pumping Rates for March 1, 2005 to March 31, 2006 (gpm)												
	33262 <sup>cd</sup> (EW-15a)	31567 <sup>e</sup> (EW-17)	31550 <sup>af</sup> (EW-18)	31560 <sup>d</sup> (EW-19)	31561 <sup>dg</sup> (EW-20)	33298 (EW-21a)	32276 <sup>h</sup> (EW-22)	32447 <sup>d</sup> (EW-23)	32446 <sup>d</sup> (EW-24)	33061 <sup>di</sup> (EW-25)	33264 <sup>d</sup> (EW-30)	33265 <sup>d</sup> (EW-31)	33266 <sup>d</sup> (EW-32)
	200	175	100	100	100	200	300	300	300	100	200	300	200
	Average Pumping Rates (gpm)												
January	91	157	28	27	13	95	261	27	15	40	15	44	29
February	49	80	7	1	10	51	146	16	7	21	7	189	130
March	80	81	9	156	77	144	124	188	203	230	237	282	190
April	142	84	2	120	125	140	244	178	209	156	250	213	176
May	180	113	74	88	88	162	236	178	218	88	262	179	176
June	149	152	90	103	97	145	220	144	139	0	216	193	183
Average	115	111	35	83	68	123	205	122	132	89	165	183	147
	Average Total Uranium Concentrations <sup>f</sup> (µg/L)												
January	50.5	27.8	36.6	38.2	31.0	57.9	58.0	83.2	56.4	37.5	105.3	26.6	21.9
February	65.6	24.6	NS	NS	NS	70.8	60.8	NS	NS	NS	NS	29.0	25.6
March	42.4	35.6	NS	37.0	35.1	61.9	44.3	81.6	53.8	50.2	87.5	27.3	23.2
April	56.2	33.2	NS	36.1	32.1	60.8	56.8	78.1	51.9	50.3	102.8	27.0	21.8
May	56.9	29.0	48.7	41.7	30.4	59.7	60.1	78.6	52.4	61.0	96.0	24.7	18.8
June	62.1	26.9	46.5	41.7	37.1	62.8	63.2	84.3	59.1	NS	101.5	25.4	20.1
Average	55.6	29.5	43.9	38.9	33.1	62.3	57.2	81.2	54.7	49.8	98.6	26.7	21.9
	Uranium Removal Index (pounds of total uranium removed/million gallons pumped)												
January	0.42	0.23	0.31	0.32	0.26	0.48	0.48	0.69	0.47	0.31	0.88	0.22	0.18
February	0.55	0.21	NA	NA	NA	0.59	0.51	NA	NA	NA	NA	0.24	NA
March	0.35	0.30	NA	0.31	0.29	0.52	0.37	0.68	0.45	0.42	0.73	0.23	0.19
April	0.47	0.28	NA	0.30	0.27	0.51	0.47	0.65	0.43	0.42	0.86	0.23	0.18
May	0.47	0.24	0.41	0.35	0.25	0.50	0.50	0.66	0.44	0.51	0.80	0.21	0.16
June	0.52	0.22	0.39	0.35	0.31	0.52	0.53	0.70	0.49	NA	0.85	0.21	0.17
Average	0.46	0.25	0.37	0.32	0.28	0.52	0.48	0.68	0.46	0.42	0.82	0.22	0.18

**TABLE 2-2  
(Continued)**

	Average Module Pumping Rate (gpm)	Water Pumped by Module (M gal)	Total Uranium Concentration from Module <sup>k</sup> (µg/L)
January	843	36.175	47.1
February	666	28.437	41.9
March	2000	91.753	50.2
April	2040	88.148	53.7
May	2043	91.209	54.3
June	<u>1832</u>	<u>81.798</u>	<u>54.2</u>
Average	1571	417.52	50.2

<sup>a</sup>Several South Field extraction wells are no longer operating. Well 31565 (EW-13) was removed from service on May 22, 2001. Well 31564 (EW-14) was removed from service on December 19, 2001. Well 31566 (EW-15) was removed from service on August 7, 1998. Well 31563 (EW-16) was removed from service on December 9, 2002. It was converted into a re-injection well.

<sup>b</sup>All South Field wells were down for portions of January, February, and early March because the treatment systems were down to allow construction tie-ins for the CAWWT; April 5 to 7 for a site-wide power outage; May 3 to 5 for CAWWT construction tie-in to the main discharge; and at various times in June when CAWWT was shut down to allow AWWT demolition to proceed.

<sup>c</sup>Well 33262 (EW-15a) was shut down most of March due to a power outage while a new feeder was being installed; and April 18 to 26 due to no power at the Process Control Station.

<sup>d</sup>NA = not applicable; NS = not sampled

<sup>e</sup>Well 31567 (EW-17) was shut down most of March due to a power outage while a new feeder was being installed; April 18 to 26 due to no power at the Process Control Station; April 27 to 30 due to power problems; and May 1 to 11 for maintenance.

<sup>f</sup>Well 31550 (EW-18) was shut down for most of March and April for maintenance; and May 9 to 11 for maintenance.

<sup>g</sup>Well 31561 (EW-20) was down March 21 to 29 for maintenance.

<sup>h</sup>Well 32276 (EW-22) was shut down most of March due to a power outage while a new feeder was being installed.

<sup>i</sup>Well 33061 (EW-25) was shut down in June for rehabilitation.

<sup>j</sup>Average is from weekly measurements.

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

TABLE 2-3

**SOUTH PLUME MODULE OPERATIONAL SUMMARY SHEET  
(JANUARY THROUGH JUNE 2005)**

Extraction Well <sup>a</sup>	3924 <sup>b</sup> (RW-1)	3925 <sup>c</sup> (RW-2)	3926 <sup>d,e</sup> (RW-3)	3927 (RW-4)	32308 <sup>f</sup> (RW-6)	32309 <sup>g</sup> (RW-7)
OMMP Target Pumping Rates for March 3, 2005 to March 31, 2006 (gpm)						
	200	200	200	200	200	200
Average Pumping Rates (gpm)						
January	292	144	299	391	113	0
February	118	245	220	285	162	0
March	287	266	150	330	193	195
April	220	199	127	289	127	207
May	190	170	0	292	181	188
June	<u>193</u>	<u>186</u>	<u>95</u>	<u>291</u>	<u>186</u>	<u>187</u>
Average	217	202	149	313	160	130
Average Total Uranium Concentrations (µg/L)						
January	29.5	21.2	28.4	2.8	41.3	0.0
February	29.5	21.5	27.5	2.6	39.6	0.0
March	24.8	24.7	34.5	3.1	40.9	52.9
April	20.8	21.9	29.8	2.9	40.6	44.4
May	20.2	26.8	29.3	3.3	39.9	46.3
June	<u>20.9</u>	<u>15.5</u>	<u>34.9</u>	<u>3.4</u>	<u>42.0</u>	<u>47.1</u>
Average	24.3	21.9	30.7	3.0	40.7	47.7
Uranium Removal Index (pounds of total uranium removed/million gallons pumped)						
January	0.25	0.18	0.24	0.02	0.34	NA
February	0.25	0.18	0.23	0.02	0.33	NA
March	0.21	0.21	0.29	0.03	0.34	0.44
April	0.17	0.18	0.25	0.02	0.34	0.37
May	0.17	0.22	NA	0.03	0.33	0.39
June	<u>0.17</u>	<u>0.13</u>	<u>0.29</u>	<u>0.03</u>	<u>0.35</u>	<u>0.39</u>
Average	0.20	0.18	0.26	0.03	0.34	0.40
	Average Module Pumping Rate (gpm)		Water Pumped by Module (M gal)		Total Uranium Concentration from Module <sup>a</sup> (µg/L)	
January	1,239		56,946		21.0	
February	1,030		40,610		21.0	
March	1,421		63,300		26.8	
April	1,169		50,516		23.9	
May	1,021		45,587		24.8	
June	<u>1,137</u>		<u>50,776</u>		<u>24.4</u>	
Average	1,170	Total	307,735	Average	23.7	

<sup>a</sup>All recovery wells were shut down March 3 to 4 for maintenance of the Valve House Cla-Valve; April 7 for a site-wide power outage; April 18 due to a power problem; and May 3 to 5 for CAWWT construction tie-in to main discharge line.

<sup>b</sup>Recovery Well 1 was down February 8 to 22 for maintenance; and various days in April due to control and power problems.

<sup>c</sup>Recovery Well 2 was shut down January 9 to 25 for repairs to the flow meter; and February 18 to 21 for maintenance.

<sup>d</sup>Recovery Well 3 was shut down February 18 to 21 for maintenance; March 21 to 31 for maintenance; various days during April due to control and power problems; the entire month of May due to a plugged screen; and the first part of June for replacement of the flow meter.

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

<sup>f</sup>Recovery Well 6 was shut down January 1 to 20 due to electrical work on Well 7; February 18 to 21 for maintenance; March 9 to 14 to reduce uranium concentration at the Parshall Flume; and various days in April due to control and power problems.

<sup>g</sup>Recovery Well 7 was shut down January and February due to electrical problems; March 1 to 6 to complete electrical repairs; and March 9 to 14 to reduce uranium concentration at the Parshall Flume.

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

TABLE 2-4

**WASTE STORAGE AREA MODULE OPERATIONAL SUMMARY SHEET  
(JANUARY THROUGH JUNE 2005)**

Extraction Well <sup>a</sup>	32761 <sup>b,c</sup> (EW-26)	33062 (EW-27)	33063 <sup>c,d</sup> (EW-28)
OMMP Target Pumping Rates, 3/1/05 to 3/31/06 (gpm)			
	300	200	0
Average Pumping Rates (gpm)			
January	0	0	0
February	0	0	0
March	52	220	0
April	264	324	0
May	277	337	0
June	<u>229</u>	<u>299</u>	<u>0</u>
Average	137	197	0
Average Total Uranium Concentrations (µg/L)			
January	0	0	NA
February	0	0	NA
March	54.7	63.0	NA
April	70.1	63.5	NA
May	65.0	61.9	NA
June	<u>61.5</u>	<u>61.3</u>	<u>NA</u>
Average	62.8	62.4	NA
Uranium Removal Index (pounds of total uranium removed/million gallons pumped)			
January	NA	NA	NA
February	NA	NA	NA
March	0.46	0.53	NA
April	0.59	0.53	NA
May	0.54	0.52	NA
June	<u>0.51</u>	<u>0.51</u>	<u>NA</u>
Average	0.52	0.52	NA
	Average Module Pumping Rate (gpm)	Water Pumped by Module (M gal)	Total Uranium Concentration from Module <sup>e</sup> (µg/L)
January	0	0	0
February	0	0	0
March	273	13.05	61.4
April	588	25.400	66.5
May	614	27.393	63.3
June	<u>527</u>	<u>23.534</u>	<u>61.4</u>
Average	501	89.377	63.15

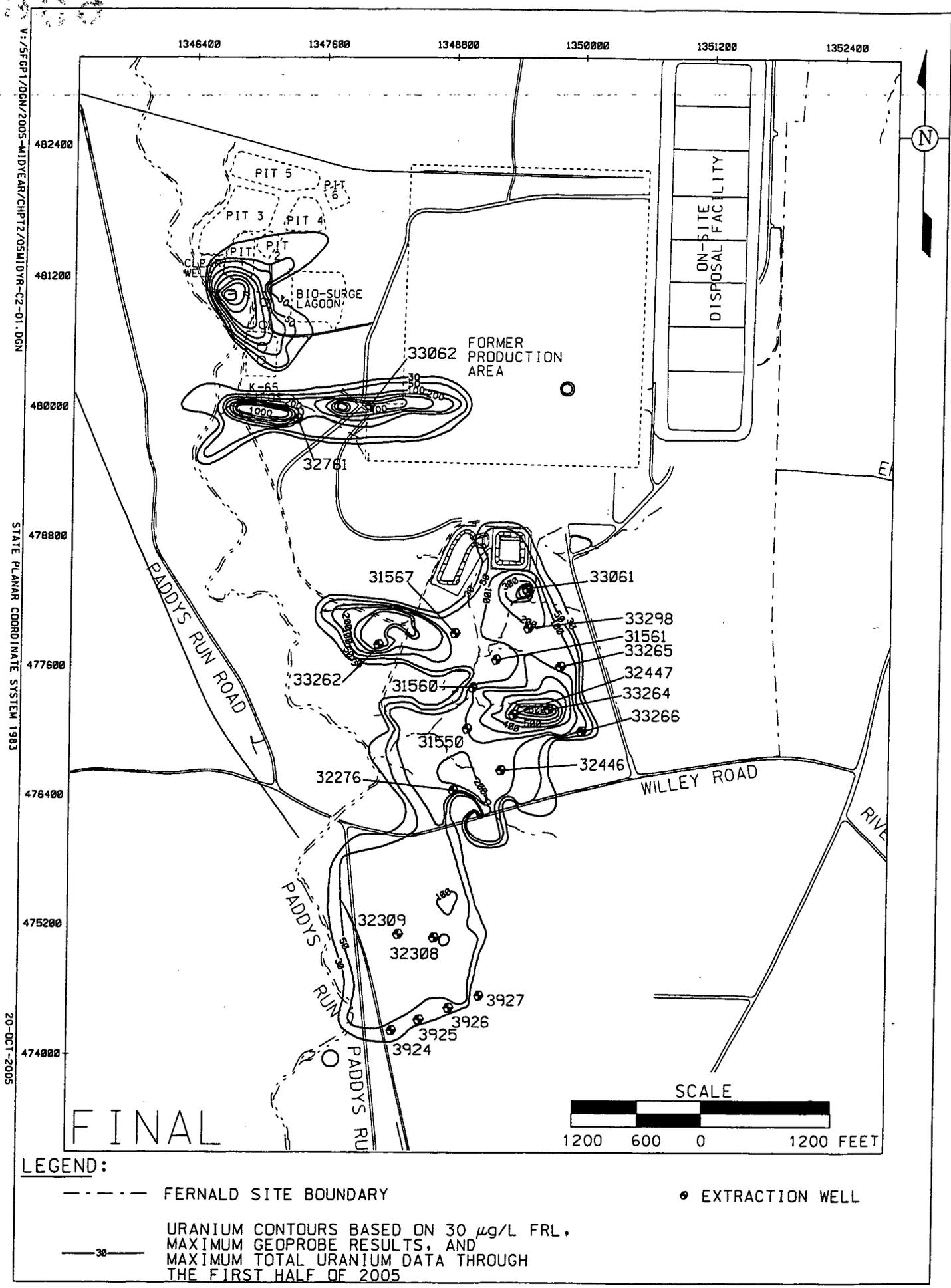
<sup>a</sup>All waste storage area wells were shut down January through the first half of March to facilitate construction of the CAWWT; April 5 to 7 for CAWWT construction tie-ins to the main discharge line; and at various time in June when CAWWT was shutdown to allow for AWWT demolition to proceed.

<sup>b</sup>Extraction Well 26 was shut down for maintenance from March 21 to 31.

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

<sup>d</sup>Extraction Well 28 remained shut down January to June to complete decontamination and dismantling (D&D) and soil remediation work in Area 4B, and to install a new replacement well.

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



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STATE PLANAR COORDINATE SYSTEM 1983

20-OCT-2005

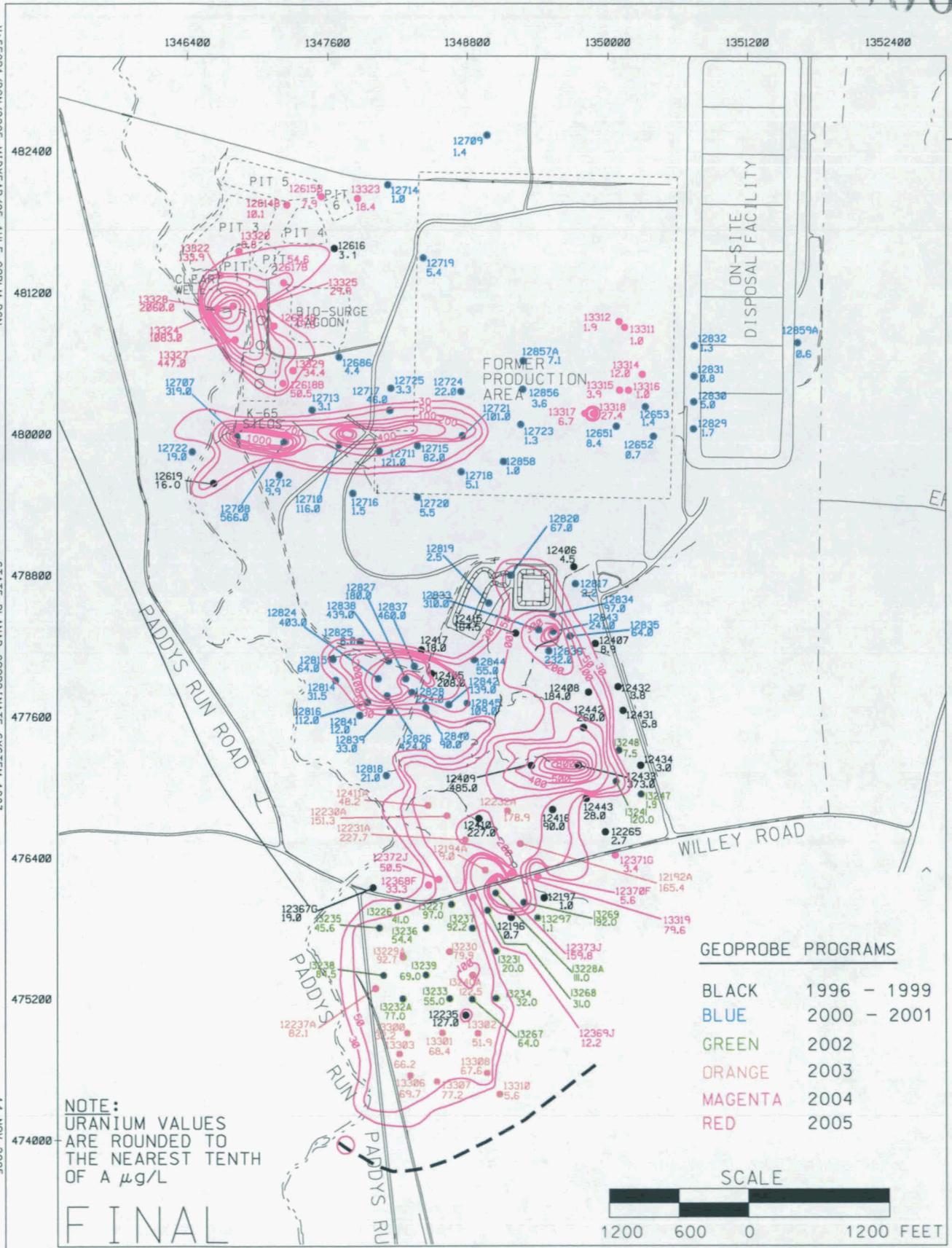
FINAL

**LEGEND:**

- FERNALD SITE BOUNDARY
- EXTRACTION WELL
- 30 — URANIUM CONTOURS BASED ON 30  $\mu\text{g/L}$  FRL, MAXIMUM GEOPROBE RESULTS, AND MAXIMUM TOTAL URANIUM DATA THROUGH THE FIRST HALF OF 2005

FIGURE 2-1. EXTRACTION WELL LOCATION MAP

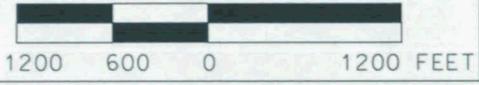
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STATE PLANAR COORDINATE SYSTEM 1983  
14-NOV-2005



**GEOPROBE PROGRAMS**

BLACK	1996 - 1999
BLUE	2000 - 2001
GREEN	2002
ORANGE	2003
MAGENTA	2004
RED	2005

**SCALE**



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

**FINAL**

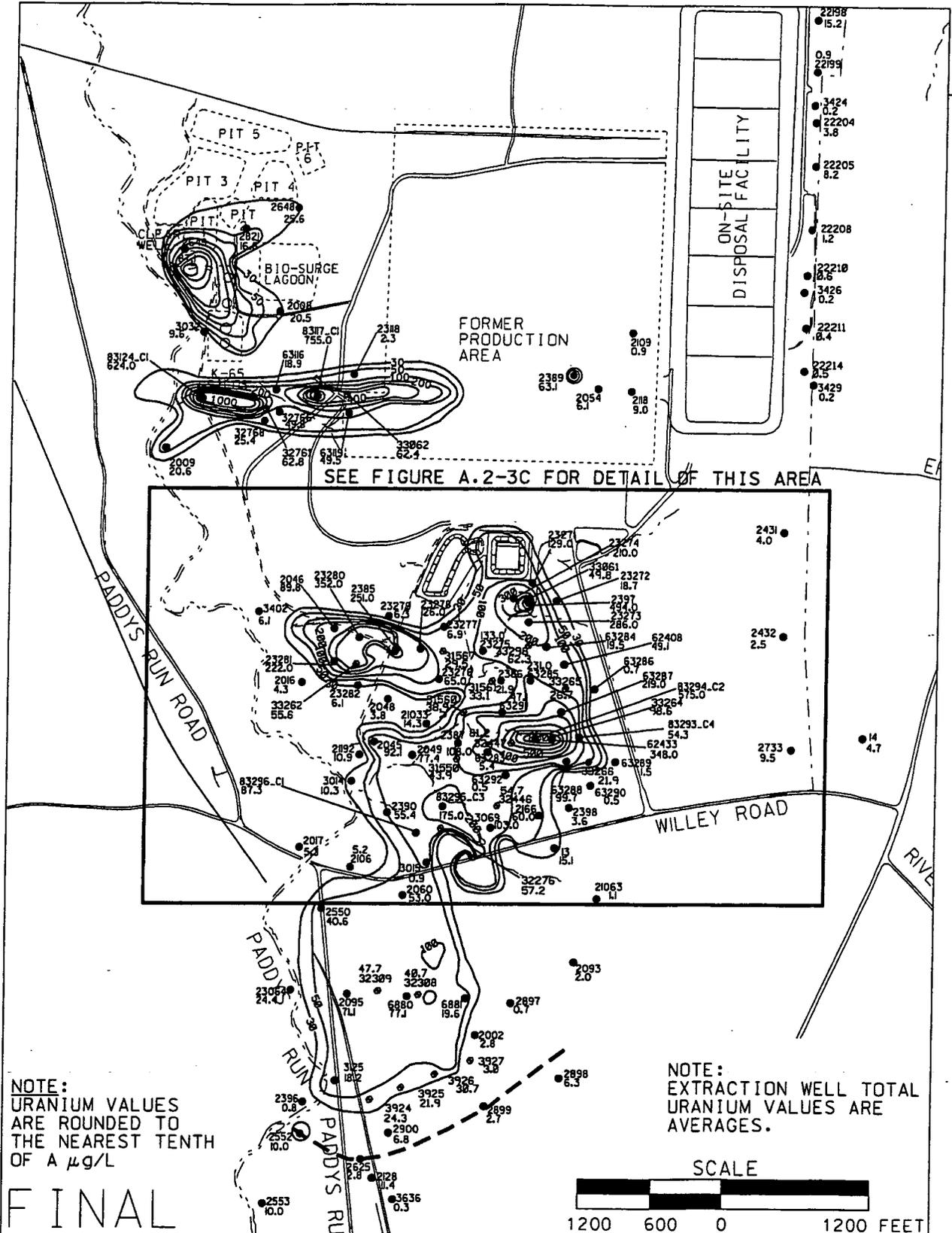
- LEGEND:**
- 12486 ● GEOPROBE LOCATION AND NUMBER
  - 4.5 MAXIMUM TOTAL URANIUM CONCENTRATION OF ALL DEPTHS SAMPLED
  - URANIUM CONTOURS BASED ON 30 µg/L FRL, MAXIMUM GEOPROBE RESULTS, AND MAXIMUM TOTAL URANIUM DATA THROUGH THE FIRST HALF OF 2005
  - FERNALD SITE BOUNDARY
  - MAX TOTAL URANIUM CONTOUR IN µg/L MODIFIED FROM BASELINE
  - ADMINISTRATIVE BOUNDARY FOR AQUIFER RESTORATION

FIGURE 2-2. DIRECT-PUSH DATA AND MAXIMUM TOTAL URANIUM PLUME THROUGH THE FIRST HALF OF 2005

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STATE PLANAR COORDINATE SYSTEM 1983

20-OCT-2005



FINAL

- LEGEND:
- FERNALD SITE BOUNDARY
  - 5.1 TOTAL URANIUM CONCENTRATION MEASURED IN THE FIRST HALF OF 2005
  - URANIUM CONTOURS BASED ON 30 µg/L FRL, MAXIMUM GEOPROBE RESULTS, AND MAXIMUM TOTAL URANIUM DATA THROUGH THE FIRST HALF OF 2005
  - ADMINISTRATIVE BOUNDARY FOR AQUIFER RESTORATION
  - MONITORING WELL
  - ⊙ EXTRACTION WELL

FIGURE 2-3. MONITORING WELL DATA AND MAXIMUM TOTAL URANIUM PLUME THROUGH THE FIRST HALF OF 2005



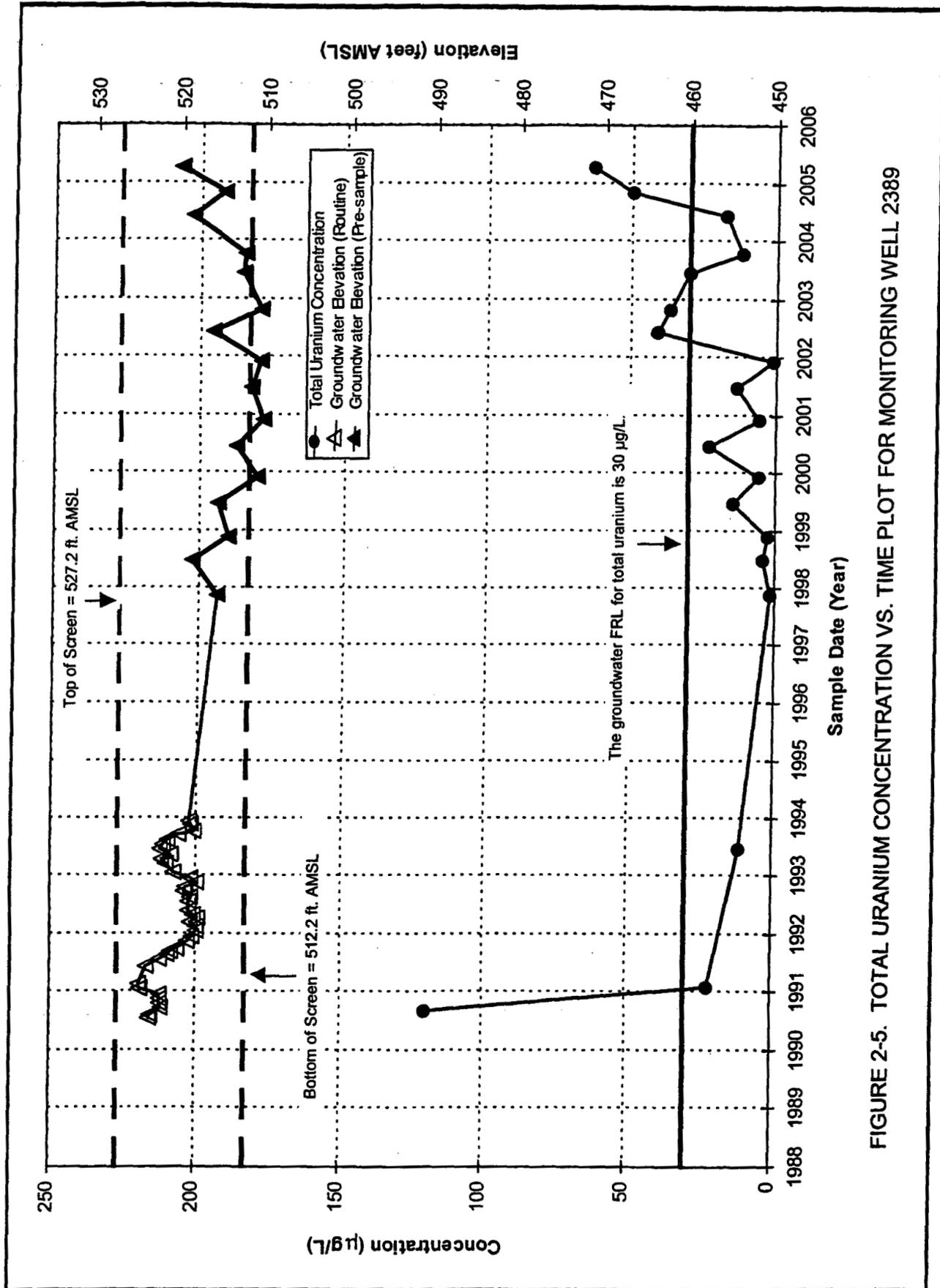


FIGURE 2-5. TOTAL URANIUM CONCENTRATION VS. TIME PLOT FOR MONITORING WELL 2389

### 3.0 ON-SITE DISPOSAL FACILITY MONITORING DATA

#### 3.1 DATA COVERED

This IEMP mid-year data summary covers the on-site disposal facility monitoring data collected from January 1 through June 30, 2005. Specifically, data are discussed below or provided on the IEMP Data Information Site, including:

- Leak detection system (LDS) volumes and accumulation rates, and leachate collection system (LCS) volumes
- Analytical data.

These data sets are complete in accordance with sampling requirements identified in the On-site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan (OSDF GWLMP) (DOE 2005c) and subsequent agreements with the EPA and OEPA. The OSDF GWLMP is Attachment C of Volume II of the Comprehensive Legacy Management and Institutional Controls Plan (LMICP) (DOE 2005a).

Figure 3-1 shows those on-site disposal facility groundwater locations monitored during the first half of 2005.

#### 3.2 NOTABLE RESULTS AND EVENTS

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

- **LDS Accumulation Rates:** The January through June 2005 LDS accumulation rates with precipitation for Cell 1 and Cells 3 through 8 are provided in Figures 3-2 through 3-8. (Note: The Cell 2 LDS was dry January through July.) The maximum accumulation rates for Cell 1 and Cells 3 through 8 were 0.7, 5.8, 22.1, 56.8, 48.7, 53.5, and 27.0 percent, respectively, of the initial response leakage rate of 20 gallons per acre per day. Tables 3-1 and 3-2 provide precipitation volumes that fell on Cells 7 and 8 during construction of the secondary and primary liners. The calculated volume that fell on Cells 7 and 8 during construction of the primary and secondary liners was 827,171 gallons and 1,330,766 gallons, respectively. A portion of this water became trapped, as construction water, in the geosynthetic clay liner on top of the LDS and in the geotextile cushion within the LDS. The total water yields recorded for the Cells 7 and 8 LDS for January through June 2005 were 2,510 gallons and 843 gallons, respectively.

- Tables 3-3 through 3-10 provide the January through June 2005 analytical summary information for Cells 1 through 8 and the following provides some specific sampling information:
  - Refined baseline sampling was continued in Cells 1 through 3. (Note: The annual LDS sampling for these cells was conducted in May 2005.)
    - As previously mentioned, the Cell 2 LDS was dry January through July; however, in August there was some liquid, and samples were collected. Due to the limited amount of liquid available in the Cell 2 LDS, the entire annual list of constituents for the LDS could not be collected August.
    - 1,1-Dichloroethene was detected in the annual Cell 3 LCS sample at a concentration of 9.2 µg/L with an associated detection limit and groundwater FRL of 1.0 µg/L and 7.0 µg/L, respectively. Confirmatory sampling of 1,1-dichloroethene in the Cell 3 LCS will begin in the fourth quarter of 2005 and continue in 2006.
  - Initial baseline sampling was continued in Cells 4 through 8. (Note: The 2004 Site Environmental Report [DOE 2005f], submitted in June 2005, recommended Cells 4 through 6 sampling continue from a refined list based on initial baseline results). Refined baseline monitoring in Cells 4 through 6 was initiated in August 2005.
    - In February 2005, technetium-99 was detected at low concentrations in Cell 4 Monitoring Well 22206 (8.54 picoCuries per liter [pCi/L]), Cell 6 LCS (11.7 pCi/L), and Cell 6 Monitoring Well 22209 (8.61 pCi/L). The associated detection limit and groundwater FRL are 10 pCi/L and 94 pCi/L, respectively. Second quarter technetium-99 concentrations from these locations were not detectable.
    - Baseline sampling for Cells 7 and 8 will be summarized in the 2005 Site Environmental Report.
  - Installation of the two, southern-most Cell 8 wells (22215 and 22216) was completed in June 2005. Initial baseline sampling of these wells was initiated in August.
  - Sampling of each cell's LCS was conducted in May 2005 for the annual Appendix I and polychlorinated biphenyl (PCB) parameters specified in OAC 3754-27-10 and 19.
  - At the March 8, 2005 TIE meeting, it was agreed upon by DOE, EPA, and OEPA that common ion monitoring would be conducted for eight rounds in the LCS, LDS, and horizontal till wells for each cell. Common ions, which are being sampled and analyzed, include calcium, iron, magnesium, manganese, phosphorous, potassium, silicon, sodium, alkalinity, chloride, fluoride, nitrate/nitrite, and oxidation reduction potential. This monitoring was initiated in May 2005. Summary information will be presented in a TIE meeting between DOE, EPA, and OEPA either later this year or early next year, as more data become available.
  - Per the August 2005 LMICP Comment Response #138, toxaphene was sampled as a one-time event in each cell's LCS to see if it was detected and possibly a good leak detection constituent. As discussed in October 2005 weekly conference calls, toxaphene was sampled in August and there were no detections; therefore, sampling for toxaphene will not continue. The toxaphene data collected are available on the IEMP Data Information Site.
  - New maximum concentrations, which occurred during the first half of 2005, are identified in Tables 3-3 through 3-10 (the new maximum concentrations are in bold larger font).

A thorough review of the on-site disposal facility monitoring data covered by this mid-year data summary was conducted to identify the notable results as presented in associated tables and figures. All data covered by this mid-year summary are available on the IEMP Data Information Site.

TABLE 3-1

**PRECIPITATION DURING CONSTRUCTION OF CELL 7  
SECONDARY AND PRIMARY LINERS**

Activity / Item	Cell 7
Secondary liner construction	Start: June 2, 2004 Finish: June 25, 2004
Precipitation during construction (inches)	2.24
Cell area (acres)	6.4
Precipitation volume on cell during Construction (gallons)	389,257
Primary liner construction	Start: July 8, 2004 Finish: July 24, 2004
Precipitation during construction (inches)	2.52
Cell area (acres)	6.4
Precipitation volume on cell during Construction (gallons)	437,914
Total precipitation volume on cell during secondary and primary liner construction periods (gallons)	827,171

**TABLE 3-2**

**PRECIPITATION DURING CONSTRUCTION OF CELL 8  
SECONDARY AND PRIMARY LINERS**

Activity / Item	Cell 8
Secondary liner construction Start: July 21, 2004 Finish: August 9, 2004	
Precipitation during construction (inches)	3.41
Cell area (acres)	9.3
Precipitation volume on cell during Construction (gallons)	861,084
Primary liner construction Start: August 23, 2004 Finish: September 17, 2004	
Precipitation during construction (inches)	1.86
Cell area (acres)	9.3
Precipitation volume on cell during Construction (gallons)	469,682
Total precipitation volume on cell during secondary and primary liner construction periods (gallons)	1,330,766

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TABLE 3-3

ON-SITE DISPOSAL FACILITY CELL 1 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. **Shading** indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12338C)		LDS <sup>c,d,e,f</sup> (12338D)		HTW <sup>c,d,e,f</sup> (12338)		Great Miami Aquifer	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Total Organic Carbon (NA mg/l)	27/30 2/2	ND to 123 <i>25.9 to 26.3</i>	25/29 2/2	ND to 80.9 <i>6.26 to 7.38</i>	39/50 2/2	ND to 12.2 <i>1.68 to 2.53</i>	36/45 2/2	ND to 59.7 <i>4.2 to 12.4</i>
Total Organic Halogens (NA mg/l)	28/30 2/2	ND to 1.52 <i>0.275 to 0.276</i>	22/29 7/2	ND to 0.361 <i>ND to 0.0413</i>	26/49 2/2	ND to 0.077 <i>0.00476 to 0.00722</i>	17/45 1/2	ND to 0.308 <i>ND to 0.0031</i>
Boron (0.33 mg/l)	30/31 2/2	ND to 2.8 <i>1.27 to 1.52</i>	28/29 2/2	ND to 0.321 <i>0.177 to 0.232</i>	43/50 2/2	ND to 0.685 <i>0.175 to 0.199</i>	38/45 2/2	ND to 0.142 <i>0.105 to 0.134</i>
Total Uranium (30 µg/l)	29/30 2/2	ND to 142.186 <i>67.9 to 72</i>	29/29 2/2	1.5 to 23.2 <i>9.63 to 9.89</i>	48/50 2/2	ND to 19 <i>5.41 to 9.9</i>	41/45 2/2	ND to 8.33 <i>0.854 to 1.56</i>
Sulfate (NA mg/l)	15/15 2/2	707 to 1590 <i>998 to 1130</i>	10/10 2/2	675 to 1590 <i>1200 to 1210</i>	10/10 2/2	634 to 907 <i>634 to 820</i>	10/10 2/2	91.8 to 1980 <i>91.8 to 105</i>

<sup>a</sup>From Operable Unit 5 Record of Decision, Table 9-4.  
<sup>b</sup>NA = not applicable

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

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

<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.



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TABLE 3-5  
ON-SITE DISPOSAL FACILITY CELL 3 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. **Shading** indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12340C)		LDS <sup>c,d,e,f</sup> (12340D)		HTW <sup>c,d,e,f</sup> (12340)		Great Miami Aquifer	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Total Organic Carbon (NA mg/L)	14/24 2/2	ND to 34.2 <b>3.25 to 4.21</b>	7/11 2/2	ND to 7.94 <b>7.23 to 7.82</b>	26/43 2/2	ND to 9.81 <b>2.42 to 2.74</b>	21/38 2/2	ND to 14.1 <b>1.67 to 2.05</b>
Total Organic Halogens (NA mg/L)	7/24 2/2	ND to 0.178 <b>0.0191 to 0.039</b>	3/11 2/2	ND to 0.0408 <b>0.0334 to 0.0408</b>	32/43 0/2	ND to 0.158 ND	14/38 0/2	ND to 0.213 ND
Boron (0.35 mg/L)	24/25 2/2	ND to 4.8 <b>4.02 to 4.8</b>	11/11 2/2	0.115 to 0.557 <b>0.115 to 0.155</b>	38/42 2/2	ND to 0.24 <b>0.0963 to 0.0967</b>	24/38 1/2	ND to 0.0776 <b>ND to 0.0267</b>
Total Uranium (30 µg/L)	24/24 2/2	9.27 to 83.7 <b>69.5 to 74.5</b>	11/11 2/2	13.3 to 72.4 <b>13.3 to 15.9</b>	40/42 2/2	ND to 29.3 <b>22.8 to 27</b>	33/38 2/2	ND to 7.92 <b>1.77 to 6.8</b>
1,1-Dichloroethene (7.0 µg/L)	2/16 1/1	ND to 9.2 <b>9.2</b>	0/3 0/1	ND ND	0/30 0/1	ND	0/26 0/26	ND
Sulfate (NA mg/l)	15/15 2/2	26.1 to 1790 <b>1690 to 1790</b>	9/9 2/2	112 to 2510 <b>1440 to 1520</b>	10/10 2/2	403 to 958 <b>703 to 765</b>	10/10 2/2	217 to 735 <b>397 to 461</b>
								338 to 740 <b>534 to 544</b>

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

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

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

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

<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

TABLE 3-6  
ON-SITE DISPOSAL FACILITY CELL 4 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. ***Italicized/bold/larger font size*** pertains to new maximums. **Shading** indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a</sup>	LCS <sup>a,b,c,d</sup> (12341C)		LDS <sup>a,d,e,f</sup> (12341D)		HTW <sup>a,d,e,f</sup> (12341)		Great Miami Aquifer	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	Upgradient <sup>a,c,e</sup> (22206)	Downgradient <sup>a,c,e</sup> (22205)
Total Organic Carbon (NA mg/L)	6/9	ND to 5.39	7/10	ND to 8	14/22	ND to 4.42	16/26	15/26
	2/2	<b>4.1 to 5.39</b>	2/2	6.33 to 7.47	2/2	2.89 to 3.58	2/2	ND to 4.43
Total Organic Halogens (NA mg/L)	3/9	ND to 0.0209	5/10	ND to 0.0282	14/22	ND to 0.0193	7/26	1.49 to 2.06
	1/2	<b>ND to 0.0209</b>	1/2	ND to 0.0281	2/2	0.00412 to 0.00648	1/2	ND to 0.016
Boron (0.33 mg/l)	9/9	0.0626 to 0.886	10/10	0.636 to 1.81	21/22	ND to 1.55	22/26	ND
	2/2	<b>0.763 to 0.814</b>	2/2	0.636 to 0.697	2/2	0.181 to 0.193	2/2	ND to 0.0586
Technetium-99 (94 pCi/L)	4/9	ND to 37.8	1/10	ND to 7.26	0/22	ND	1/26	0.0383 to 0.0401
	0/2	ND	0/2	ND	0/2	ND	1/2	ND
Total Uranium (30 µg/L)	9/9	4.41 to 165	10/10	5.74 to 16.4	22/22	4.89 to 7.91	24/26	0.446 to 19.7
	2/2	<b>88.8 to 114</b>	2/2	12.9 to 16.3	2/2	7.1 to 7.83	2/2	1.01 to 8.2
Sulfate (NA mg/l)	9/9	140 to 1920	10/10	1650 to 3020	19/13	185 to 241	13/13	197 to 650
	2/2	<b>1860 to 1870</b>	2/2	1650 to 1750	2/2	201 to 215	2/2	222 to 535

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

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

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

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

<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

TABLE 3-7

ON-SITE DISPOSAL FACILITY CELL 5 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12342C)		LDS <sup>c,d,e,f</sup> (12342D)		HTW <sup>c,d,e,f</sup> (12342)		Great Miami Aquifer			
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range		
Total Organic Carbon (NA mg/L)	4/11 22	ND to 3.6 <b>3.02 to 3.6</b>	7/9 22	ND to 10.7 <b>9.51 to 10.7</b>	15/23 22	ND to 5.85 <b>4.18 to 5.27</b>	14/26 22	ND to 4.15 <b>1.49 to 2.17</b>	16/26 22	ND to 14.2 <b>1.42 to 1.94</b>
Total Organic Halogens (NA mg/L)	2/11 02	ND to 0.0118 <b>ND</b>	3/9 22	ND to 0.0469 <b>0.0466 to 0.0469</b>	13/23 22	ND to 0.0186 <b>0.0033 to 0.0117</b>	6/26 02	ND to 0.015 <b>ND</b>	10/6 12	ND to 0.014 <b>ND to 0.014</b>
Boron (30 µg/L)	9/11 22	ND to 0.745 <b>0.571 to 0.669</b>	9/9 22	0.396 to 1.2 <b>0.396 to 0.539</b>	22/23 22	ND to 0.275 <b>0.0499 to 0.0817</b>	21/26 22	ND to 0.0692 <b>0.0396 to 0.0399</b>	17/26 12	ND to 0.0717 <b>ND to 0.0215</b>
Sulfate (NA mg/L)	11/11 22	140 to <b>211</b> 218 to 2330	22 22	13.6 to <b>22.4</b> 1300 to 2290	23/23 22	8.51 to 21.1 <b>9.9 to 10.2</b>	23/26 22	ND to 4.48 <b>0.587 to 0.624</b>	21/30 23	ND to 2.1 <b>ND to 1.24</b>
		<b>1140 to 2330</b>		<b>1300 to 1500</b>		<b>112 to 403</b>		<b>196 to 770</b>		<b>221 to 503</b>
						<b>112 to 124</b>		<b>318 to 770</b>		<b>231 to 340</b>

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

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

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

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

<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

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TABLE 3-8  
ON-SITE DISPOSAL FACILITY CELL 6 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. Shading indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12343C)		LDS <sup>c,d,e,f</sup> (12343D)		HTW <sup>c,d,e,f</sup> (12343)		Great Miami Aquifer	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Total Organic Carbon (NA mg/L)	7/8 2/2	ND to 25.4 2.07 to 2.33	5/7 2/2	ND to 10.4 7.94 to 8.17	10/16 2/2	ND to 3.72 2.47 to 2.62	9/21 2/2	ND to 1.65 1.23 to 1.65
Total Organic Halogens (NA mg/L)	2/8 0/2	ND to 0.0159 ND	4/7 2/2	ND to 0.0427 0.0388 to 0.0427	10/16 0/2	ND to 0.0187 ND	3/21 0/2	1.41 to 2.15 ND to 0.0126
Boron (0.33 mg/L)	8/8 2/2	0.0566 to 0.834 0.244 to 0.359	7/7 2/2	0.289 to 2.38 0.289 to 0.577	15/16 2/2	ND to 0.116 0.0887 to 0.0949	14/21 0/2	ND to 0.0416 ND to 0.0324
Technetium-99 (94 pCi/L)	3/8 1/2	ND to 11.7 ND to 11.7	0/7 0/2	ND ND	1/16 0/2	ND to 10.6 ND	1/21 1/2	ND to 6.61 ND
Total Uranium (30 µg/L)	8/8 2/2	8.03 to 144 136 to 144	7/7 2/2	3.1 to 29.5 29.5 to 29.5	15/16 2/2	ND to 10.9 7.5 to 8.19	16/21 1/2	ND to 1.02 ND to 0.603
Sulfate (NA mg/L)	8/8 2/2	167 to 2630 491 to 1300	7/7 2/2	1300 to 2180 1310 to 1540	15/16 2/2	ND to 494 428 to 494	20/20 2/2	117 to 211 197 to 202

<sup>a</sup>From Operable Unit 5 Record of Decision, Table 9-4.  
<sup>b</sup>NA = not applicable  
<sup>c</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>d</sup>Rejected data qualified with either an R or Z were not used in this comparison.  
<sup>e</sup>ND = not detected  
<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well  
<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

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TABLE 3-9  
ON-SITE DISPOSAL FACILITY CELL 7 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. Sliding indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12344C)		LDS <sup>c,d,e,f</sup> (12344D)		HTW <sup>c,d,e,f</sup> (12344)		Upgradient <sup>c,d,e</sup> (22212)		Great Miami Aquifer Downgradient <sup>c,d,e</sup> (22211)	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Total Organic Carbon (NA mg/L)	4/4	1.78 to 3.03	3/3	2.99 to 8.8	11/12	ND to 4.57	7/13	ND to 2.24	7/13	ND to 2.15
	2/2	<b>2 to 3.03</b>	2/2	<b>3.37 to 8.8</b>	3/3	<b>2.45 to 4.57</b>	3/3	<b>1.4 to 2.24</b>	3/3	<b>1.4 to 1.85</b>
Total Organic Halogens (NA/mg/L)	2/4	ND to 0.0039	0/3	ND to 0.026	4/12	ND to 0.0233	1/13	ND to 0.00948	0/13	ND
	1/2	<b>ND to 0.00286</b>	1/2	<b>ND to 0.0193</b>	1/3	<b>ND to 0.0233</b>	1/3	<b>ND to 0.00948</b>	0/3	ND
Boron (0.33 mg/L)	4/4	0.0625 to 1.31	3/3	0.648 to 2.1	7/11	ND to 0.0361	10/13	ND to 0.0402	0/3	ND
	2/2	<b>0.0625 to 0.288</b>	2/2	<b>0.648 to 1.08</b>	3/3	<b>0.0252 to 0.0361</b>	3/3	<b>0.0345 to 0.0353</b>	6/13	ND to 0.0363
Mercury (0.0020 mg/L)	0/4	ND	0/3	ND	1/11	ND to 0.000088	2/13	ND to 0.000098	0/13	ND
	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
Technetium-99 (94 pCi/l)	2/4	ND to 11.7	0/3	ND	0/12	ND	1/13	ND to 11	0/13	ND
	2/2	<b>10.8 to 11.7</b>	0/2	ND	0/3	ND	1/3	<b>ND to 11</b>	0/3	ND
Total Uranium (30 µg/L)	4/4	4.72 to 202	3/3	12.2 to 39.3	12/12	0.674 to 3.91	11/13	ND to 4.46	10/14	ND to 0.751
	2/2	<b>142 to 202</b>	2/2	<b>16.2 to 33.7</b>	3/3	<b>2.12 to 3.91</b>	3/3	<b>0.414 to 4.46</b>	4/4	<b>0.171 to 0.369</b>
alpha-Chlordane (2.0 µg/L)	0/4	ND	0/3	ND	0/10	ND	0/13	ND	0/13	ND
bis(2-Chloroisopropyl)ether (5.0 µg/L)	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
	0/4	ND	0/3	ND	0/11	ND	0/13	ND	0/13	ND
	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND

TABLE 3-9  
 (Continued)

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,g</sup> (12344C)		LDS <sup>c,d,e,f</sup> (12344D)		HTW <sup>c,d,e,f</sup> (12344)		Upgradient <sup>c,d,e</sup> (22212)		Great Miami Aquifer Downgradient <sup>c,d,e</sup> (22211)	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Bromodichloromethane (100 µg/L)	0/4	ND	0/3	ND	0/12	ND	0/13	ND	0/13	ND
Carbazole (11 µg/L)	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
1,1-Dichloroethene (7.0 µg/L)	0/4	ND	0/3	ND	0/11	ND	0/13	ND	0/13	ND
1,2-Dichloroethene (total) (NA µg/L)	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
4-Nitroaniline (NA µg/L)	0/4	ND	0/3	ND	0/12	ND	0/13	ND	0/13	ND
Tetrachloroethene (NA µg/L)	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
Trichloroethene (5.0 µg/L)	0/4	ND	0/3	ND	0/11	ND	0/13	ND	0/13	ND
Vinyl Chloride (2.0 µg/L)	0/2	ND	0/2	ND	0/3	ND	0/3	ND	0/3	ND
Stilbene (NA mg/L)	0/4	122 to 1480	0/2	ND	0/3	ND	0/3	ND	0/3	ND
	2/2	122 to 513	2/2	1740 to 2240	12/12	105 to 167	13/13	87.4 to 352	13/13	140 to 234
				1770 to 2240	3/3	120 to 134	3/3	130 to 352	3/3	140 to 193

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

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

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

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

<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

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TABLE 3-10

ON-SITE DISPOSAL FACILITY CELL 8 DATA SUMMARY FOR MID-YEAR 2005

Note: Non-italicized pertains to total number of samples. *Italicized/bold* pertains to samples collected January to June 2005 only. *Italicized/bold/larger font size* pertains to new maximums. **Shading** indicates at least one detection for that constituent at that location.

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f</sup> (12345C)		LDS <sup>c,d,e,f</sup> (12345D)		HTW <sup>c,d,e,f</sup> (12345)		Upgradient <sup>c,d,e</sup> (22213)		Great Miami Aquifer	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
Total Organic Carbon (NA mg/L)	3/3 2/2	1.78 to 5.31 1.78 to 1.83	2/2 1/1	2.32 to 2.89 <b>2.89</b>	4/6 1/1	ND to 2.14 1.72	9/12 3/3	ND to 3.77 1.24 to 1.63	9/12 3/3	ND to 3.28 1.41 to 1.86
Total Organic Halogens (NA mg/L)	0/3 0/2	ND ND	2/2 1/1	0.00274 to 0.00298 <b>0.00298</b>	6/6 1/1	0.0441 to 0.0947 0.075	1/12 0/3	ND to 0.00622 ND	2/12 1/3	ND to 0.00736 ND to 0.00736
Boron (0.33 mg/L)	3/3 2/2	0.12 to 0.291 0.12 to <b>0.291</b>	2/2 1/1	1.81 to 2 2	6/6 1/1	0.0768 to 0.101 0.0885	9/12 3/3	ND to 0.0387 0.0319 to 0.0374	6/12 3/3	ND to 0.0327 0.0282 to 0.0315
Mercury (0.0020 mg/L)	0/3	ND	0/2	ND	0/6	ND	2/12	ND to 0.000085	1/12	ND to 0.000085
Technetium-99 (94 pCi/L)	0/2 0/3	ND ND	0/1 0/2	ND ND	0/1 0/6	ND ND	0/3 1/12	ND ND to 9.97	0/3 0/12	ND ND
Total Uranium (30 µg/L)	3/3 2/2	1.51 to 142 116 to <b>142</b>	2/2 1/1	9.38 to 12.3 <b>12.3</b>	6/6 1/1	3.48 to 5.89 <b>5.89</b>	6/12 3/3	ND to 0.374 0.334 to 0.355	12/13 4/4	ND to 1.3 0.288 to 0.495
alpha-Chlordane (2.0 µg/L)	0/3 0/2	ND ND	0/2 0/1	ND ND	0/6 0/1	ND ND	0/12 0/3	ND ND	0/12 0/3	ND ND

TABLE 3-10  
(Continued)

Constituent (FRL) <sup>a,b</sup>	LCS <sup>c,d,e,f,g</sup> (12345C)		LDS <sup>c,d,e,f</sup> (12345D)		HTW <sup>c,d,e,f</sup> (12345)		Upgradient <sup>c,d,e</sup> (22213)		Great Miami Aquifer Downgradient <sup>c,d,e</sup> (22214)	
	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range	No. of Samples with Detections / No. of Samples	Range
bis(2-Chloroisopropyl)ether (5.0 µg/L)	0/3	ND	0/2	ND	0/6	ND	0/12	ND	0/12	ND
Bromodichloromethane (100 µg/L)	0/2	ND	0/1	ND	0/1	ND	0/3	ND	0/3	ND
Carbazole (11 µg/L)	0/3	ND	0/2	ND	0/6	ND	0/12	ND	0/12	ND
1,1-Dichloroethene (7.0 µg/L)	0/2	ND	0/1	ND	0/1	ND	0/3	ND	0/3	ND
1,2-Dichloroethene (total) (NA µg/L)	0/3	ND	0/2	ND	0/6	ND	0/12	ND	0/12	ND
4-Nitroaniline (NA µg/L)	0/2	ND	0/1	ND	0/1	ND	0/3	ND	0/3	ND
Tetrachloroethene (NA µg/L)	0/3	ND	0/2	ND	0/6	ND	0/12	ND	0/12	ND
Trichloroethene (5.0 µg/L)	0/2	ND	0/1	ND	0/1	ND	0/3	ND	0/3	ND
Vinyl Chloride (2.0 µg/L)	0/3	ND	0/2	ND	0/6	ND	0/12	ND	0/12	ND
Sulfate (NA mg/L)	0/2	ND	0/1	ND	0/1	ND	0/3	ND	0/3	ND
	3/3	275 to 704	2/2	2250 to 2510	0/6	94.5 to 124	12/12	84.4 to 122	12/12	177 to 262
	2/2	275 to 704	1/1	2510	1/1	101	3/3	94 to 105	3/3	191 to 234

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

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

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

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

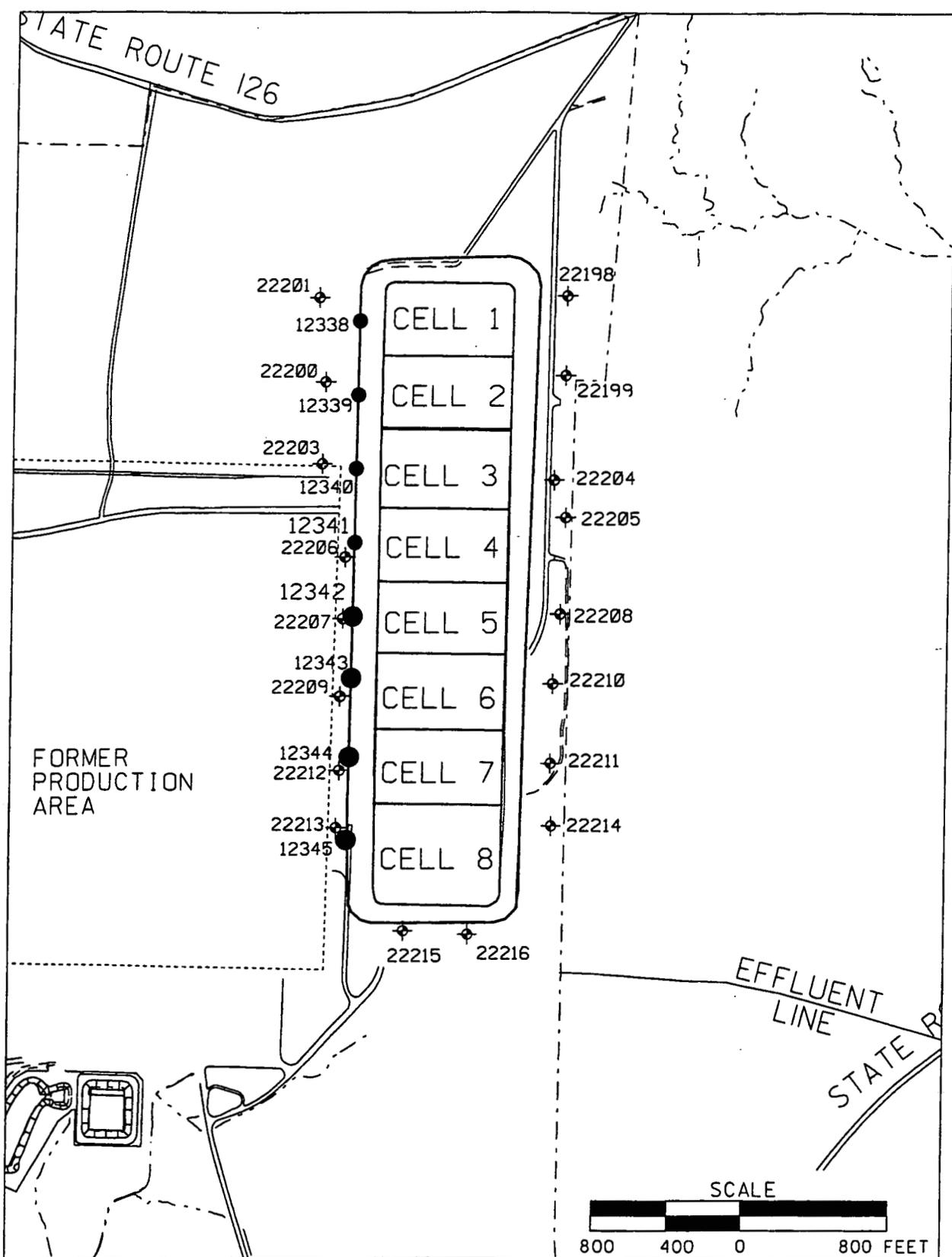
<sup>f</sup>LCS = leachate collection system; LDS = leak detection system; HTW = horizontal till well

<sup>g</sup>The LCS is also sampled for nitrate/nitrite and total dissolved solids.

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STATE PLANAR COORDINATE SYSTEM 1983

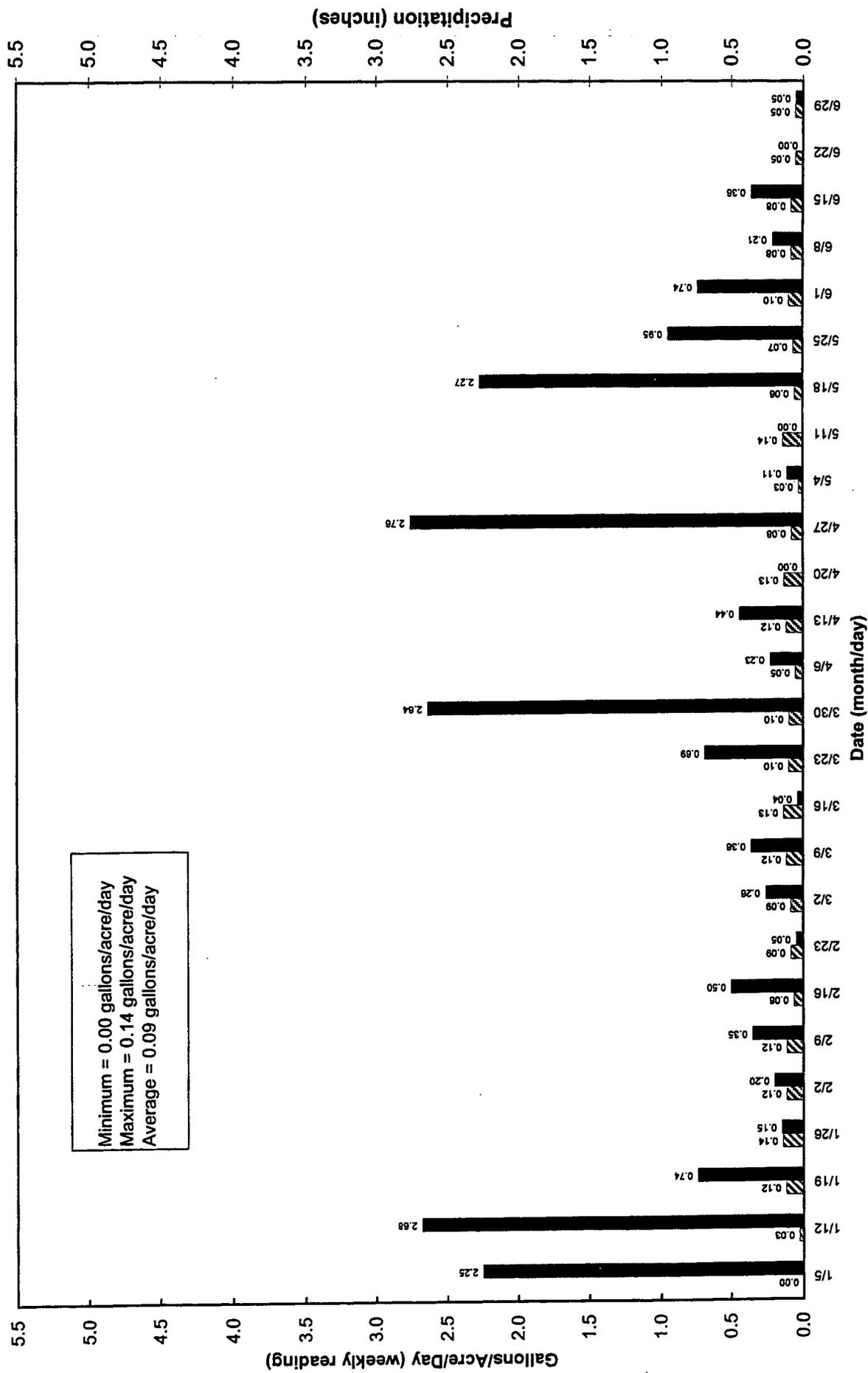
16-NOV-2005



- LEGEND:
- FERNALD SITE BOUNDARY
  - ◆ OSDF MONITORING WELL IN GREAT MIAMI AQUIFER
  - HORIZONTAL TILL WELL

FINAL

FIGURE 3-1. ON-SITE DISPOSAL FACILITY FOOTPRINT AND MONITORING WELL LOCATIONS



Minimum = 0.00 gallons/acre/day  
 Maximum = 0.14 gallons/acre/day  
 Average = 0.09 gallons/acre/day

■ Cell 1 LDS Weekly Accumulation Rates (gallons/acre/day) ■ Fernald Site Precipitation

FIGURE 3-2. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 1, JANUARY THROUGH JUNE 2005

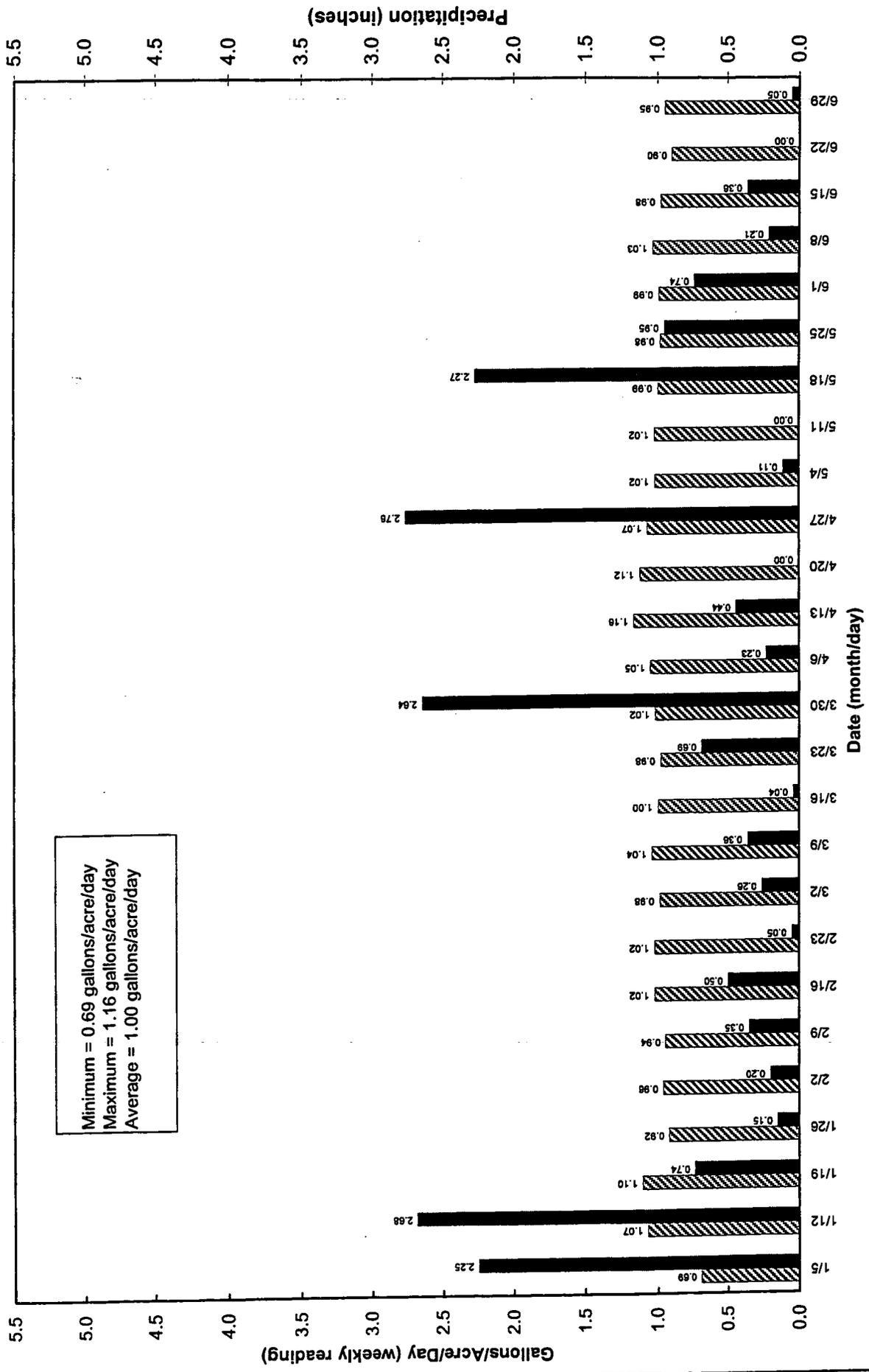


FIGURE 3-3. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 3, JANUARY THROUGH JUNE 2005

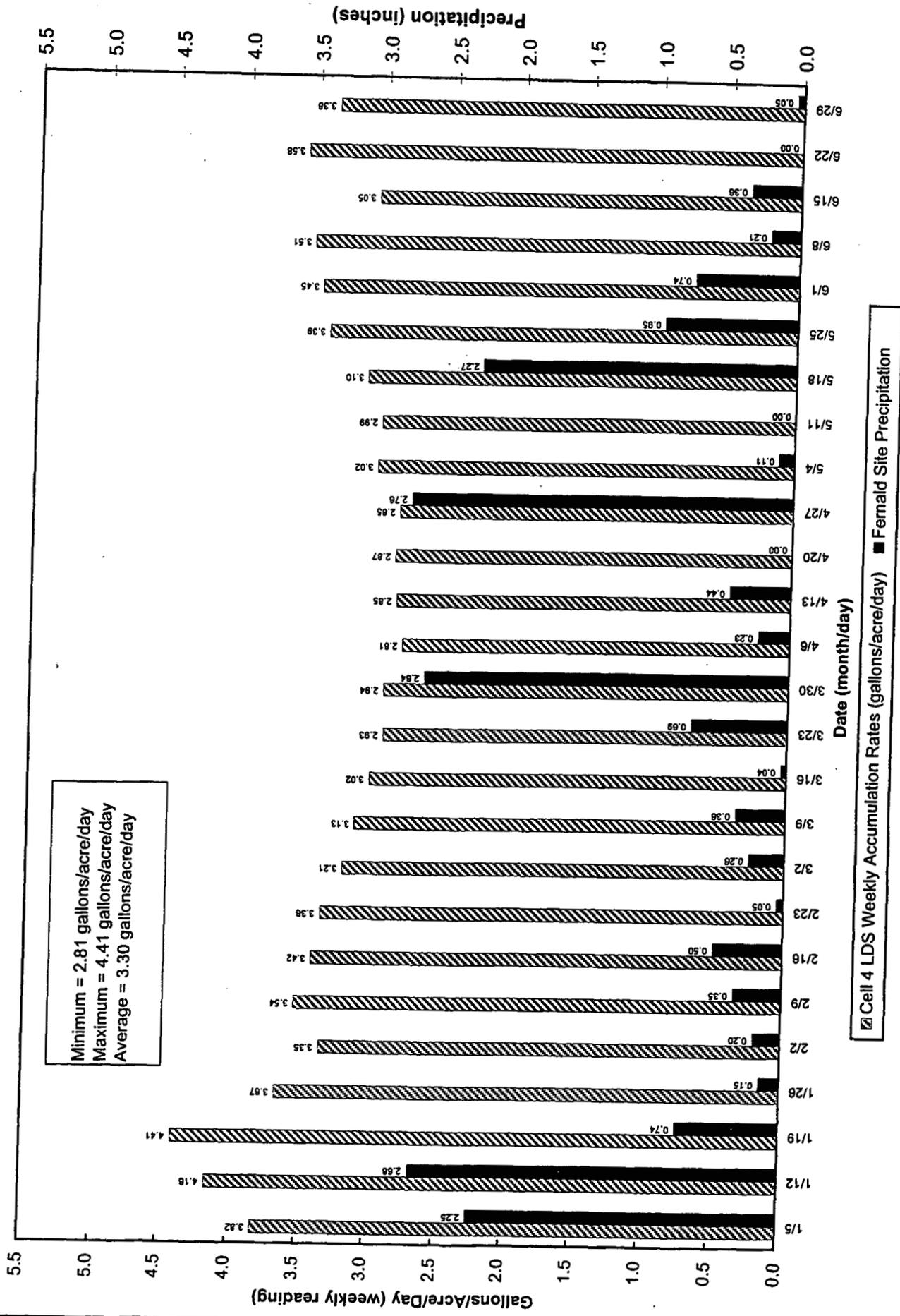


FIGURE 3-4. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 4, JANUARY THROUGH JUNE 2005

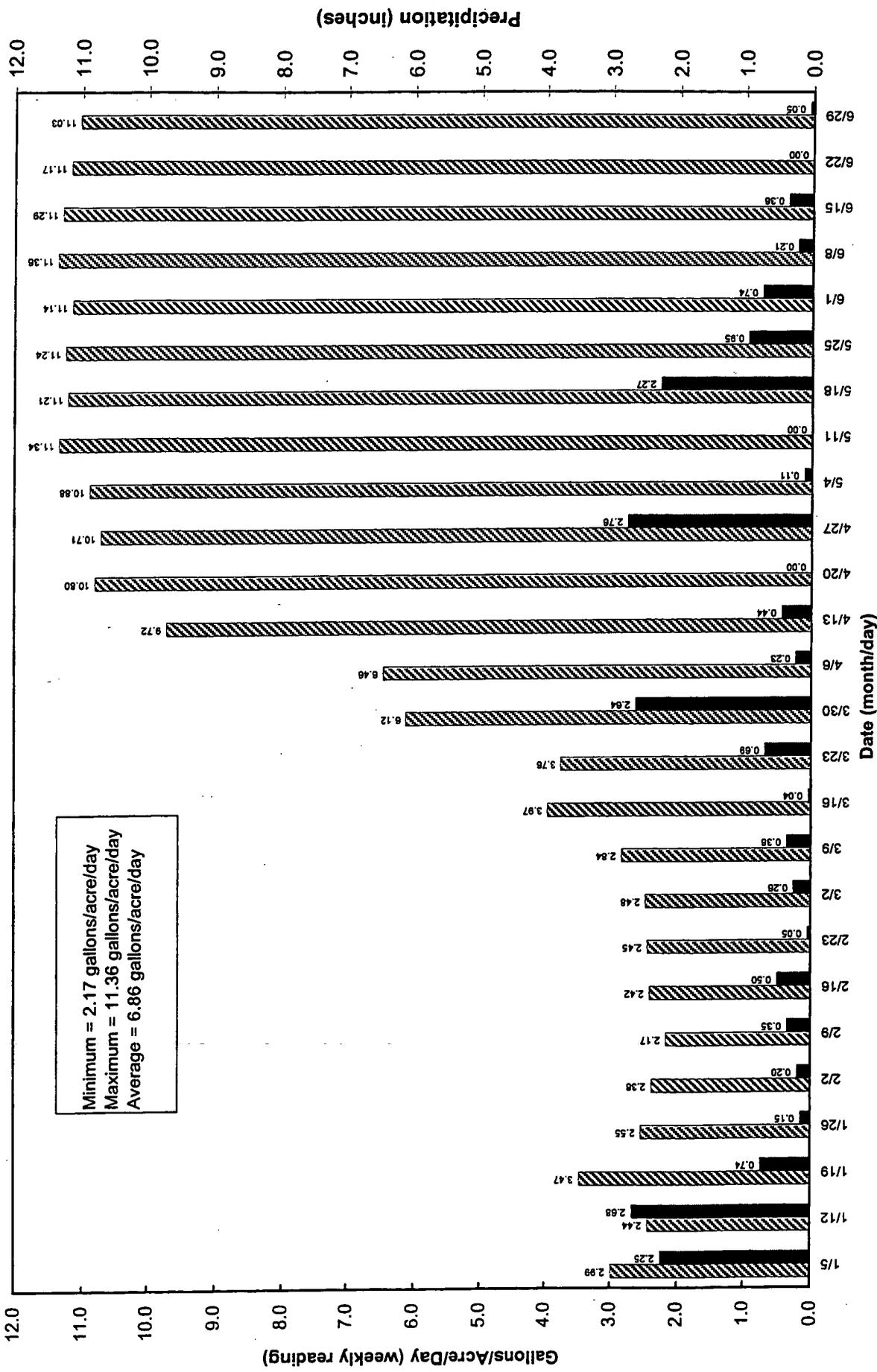


FIGURE 3-5. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 5, JANUARY THROUGH JUNE 2005

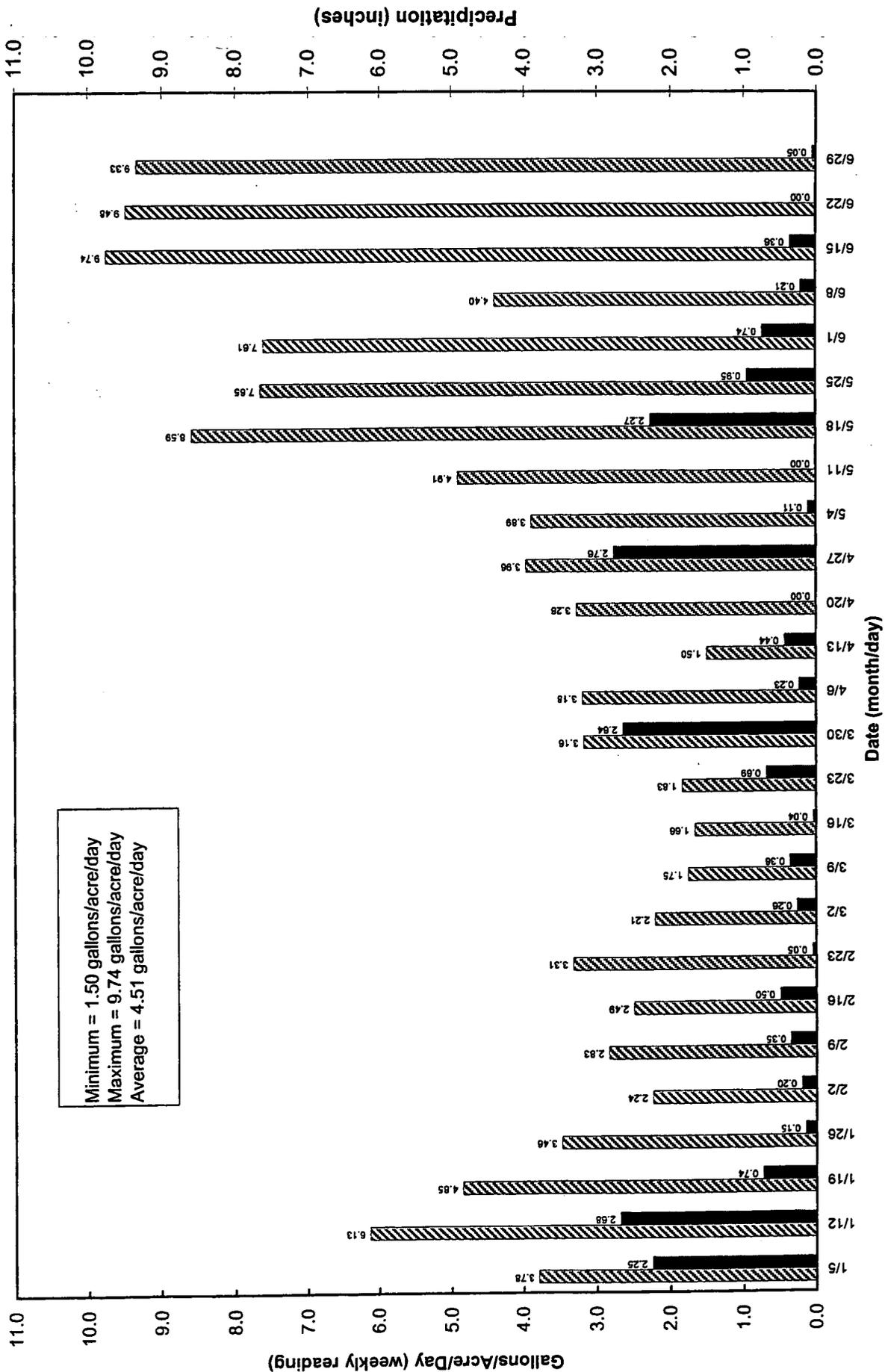
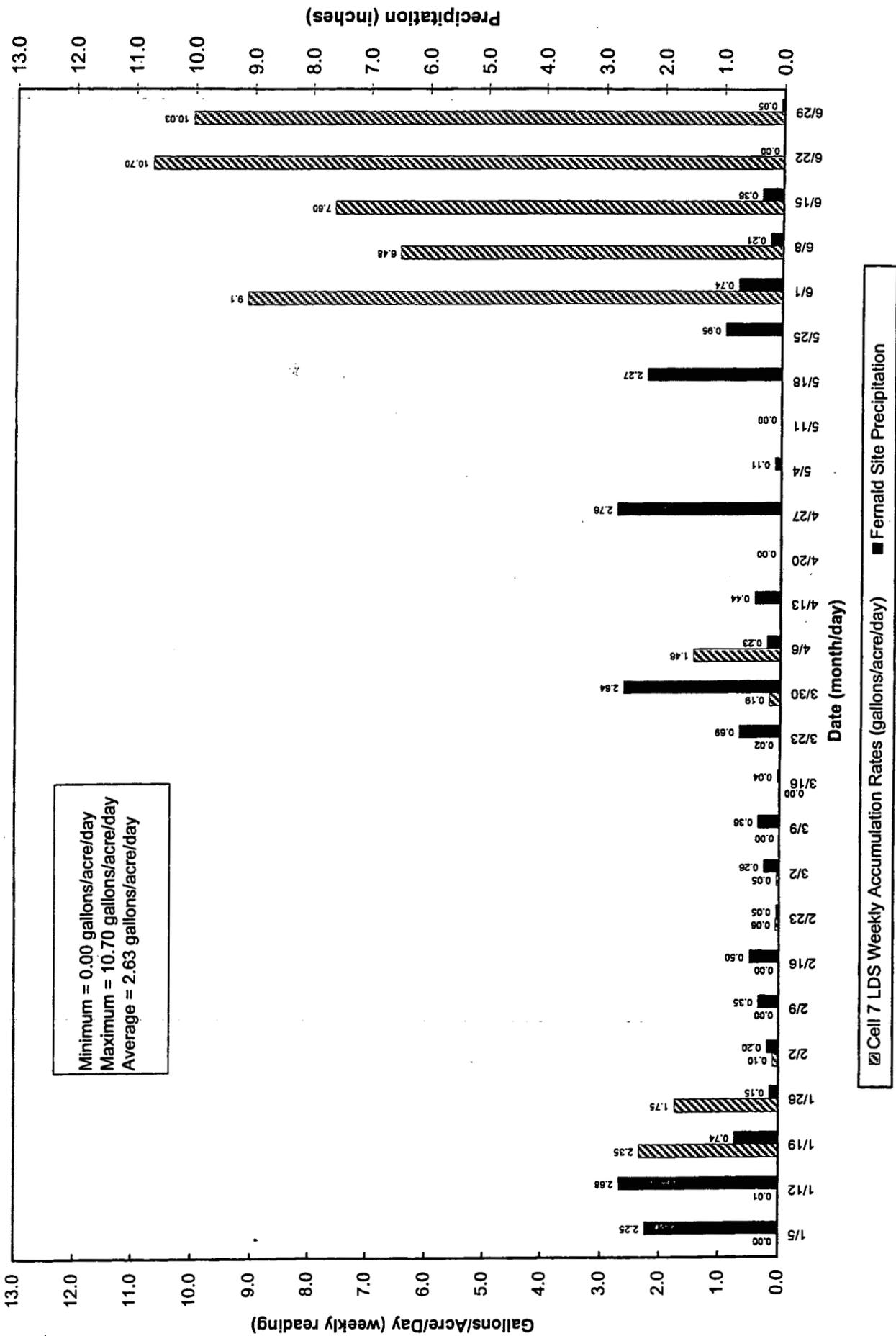


FIGURE 3-6. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 6, JANUARY THROUGH JUNE 2005



Minimum = 0.00 gallons/acre/day  
 Maximum = 10.70 gallons/acre/day  
 Average = 2.63 gallons/acre/day

FIGURE 3-7. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 7, JANUARY THROUGH JUNE 2005

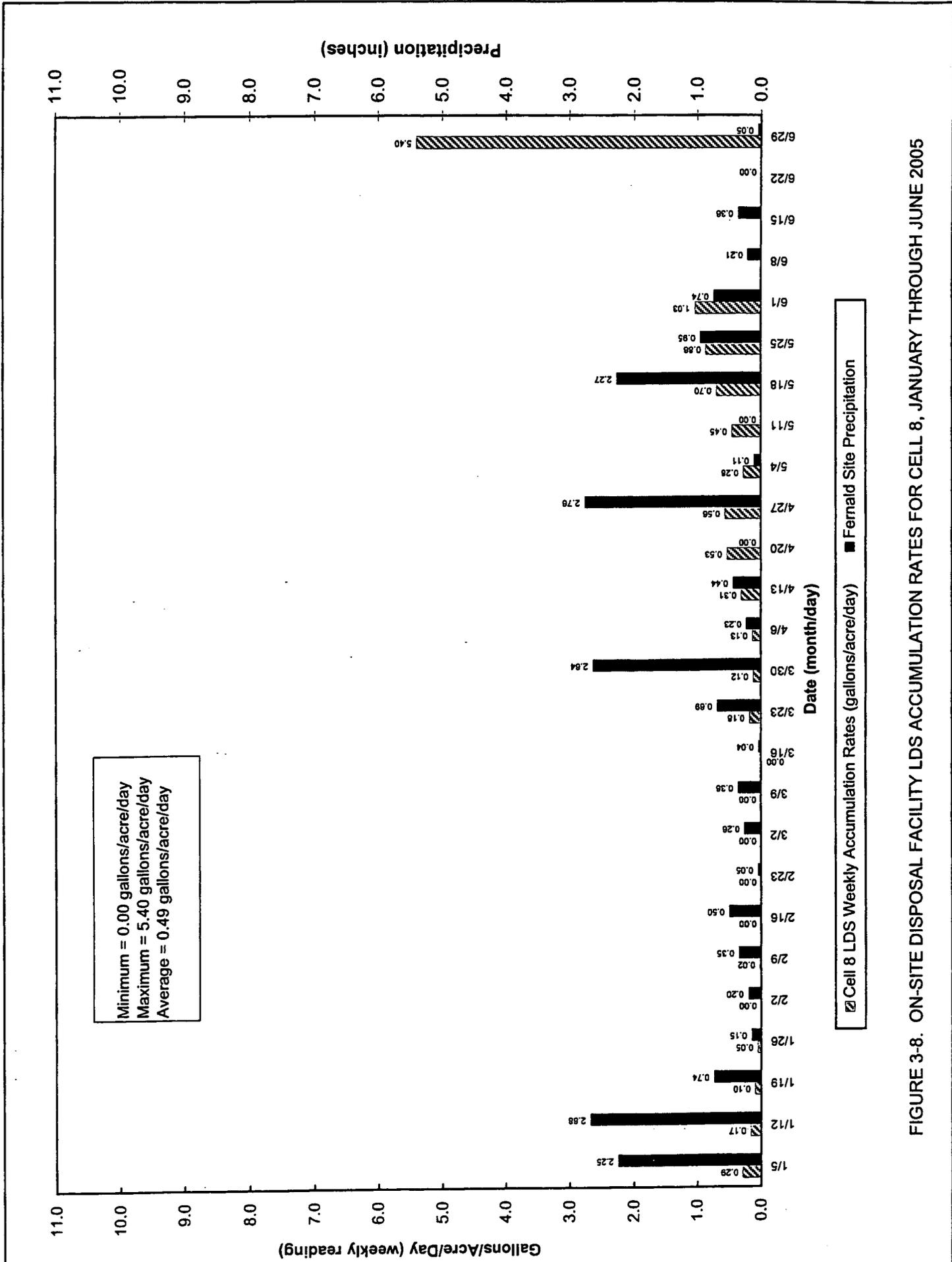


FIGURE 3-8. ON-SITE DISPOSAL FACILITY LDS ACCUMULATION RATES FOR CELL 8, JANUARY THROUGH JUNE 2005

## 4.0 SURFACE WATER MONITORING DATA

### 4.1 DATA COVERED

This mid-year data summary covers all surface water monitoring data collected under the IEMP program from January 1 through June 30, 2005. Specifically, this includes:

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

All of these data sets are complete and in accordance with sampling requirements identified in the IEMP, Revision 4.

### 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 non-compliances. Three NPDES non-compliances occurred and were reported to OEPA, as required, during the period under evaluation. Following are the data for these non-compliances:

Date	Location	Parameter	Limit	Result
June 13, 2005	STRM 4004	pH	6.5 S.U. (min.)	6.38 S.U.
June 13, 2005	STRM 4005	pH	6.5 S.U. (min.)	6.09 S.U.
June 13, 2005	STRM 4006	pH	6.5 S.U. (min.)	6.36 S.U.

- The sewage treatment plant was removed from service in May 2005: No discharge from this facility has occurred; therefore, no data have been submitted under the NPDES Permit (IEMP Monitoring Location STP 4601).
- FFCA/Operable Unit 5 Record of Decision compliance: The monthly average total uranium concentration of 30 µg/L for discharge to the Great Miami River was met every month in the reporting period (refer to Figure 4-1).
- The Fernald site is on track complying with the 600-pounds-per-year limit of uranium discharged to the Great Miami River. At the end of June 2005, the total mass of uranium discharged was 186.08 pounds (refer to Figure 4-2).
- IEMP FRL exceedances: For the first half of 2005, there was one FRL exceedance attributable to the Fernald site. One surface water sample collected on January 14 from the cross-medium impact location SWD-03 had a total uranium concentration of 40.8 µg/L that exceeded the associated groundwater FRL of 30 µg/L.

A thorough review of the surface water monitoring data covered in this mid-year data summary was conducted to identify the notable results and events. All data covered by this mid-year data summary are available on the IEMP Data Information Site. Maps of NPDES and surface water sample locations are also provided on the IEMP Data Information Site.

The Operable Unit 5 Record of Decision established a monthly discharge limit of 20 µg/L for total uranium; however, on November 30, 2001 the monthly discharge limit became 30 µg/L.

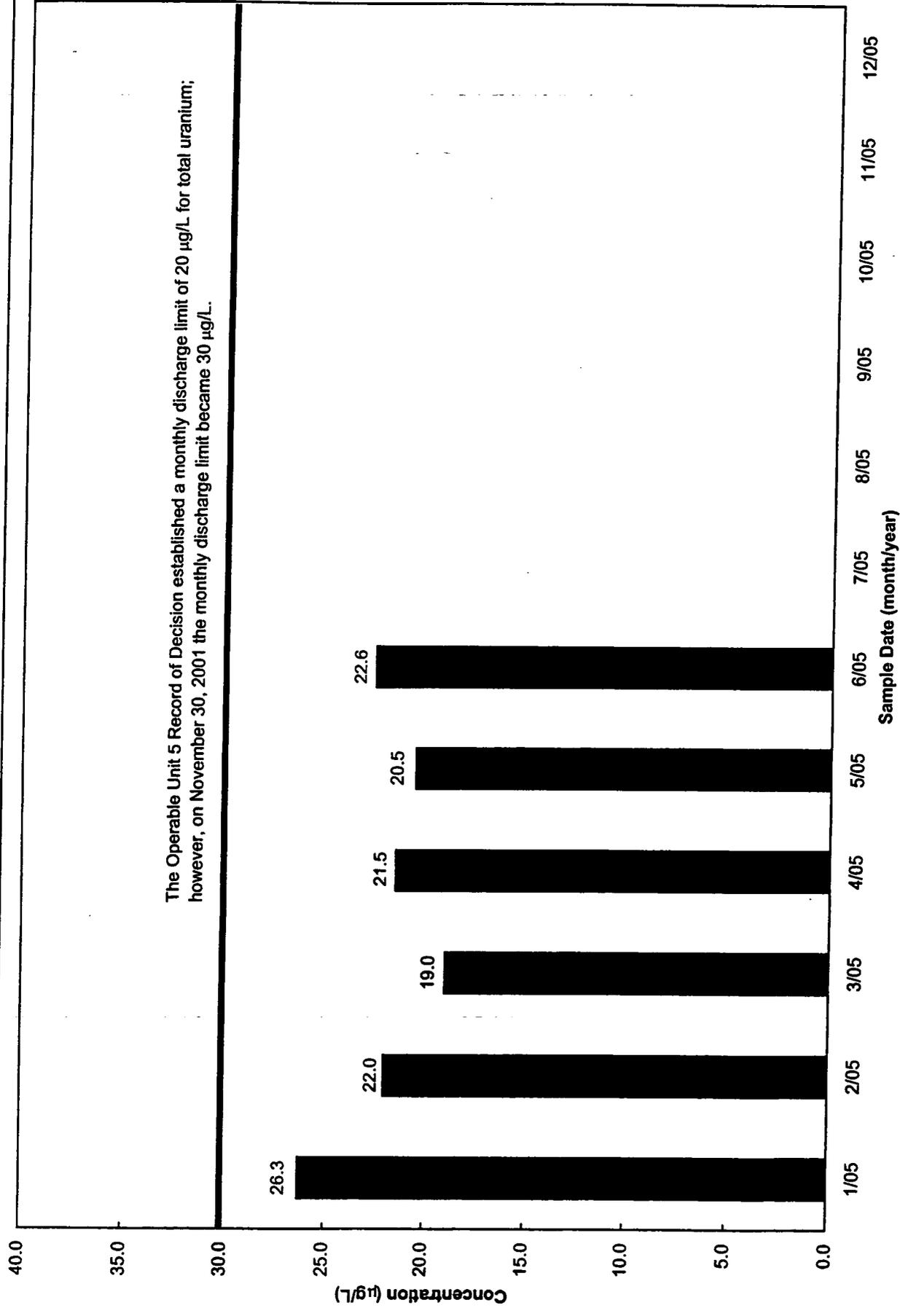


FIGURE 4-1. MONTHLY AVERAGE TOTAL URANIUM CONCENTRATION IN WATER DISCHARGED FROM THE PARSHALL FLUME (PF 4001) TO THE GREAT MIAMI RIVER, JANUARY THROUGH JUNE 2005

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

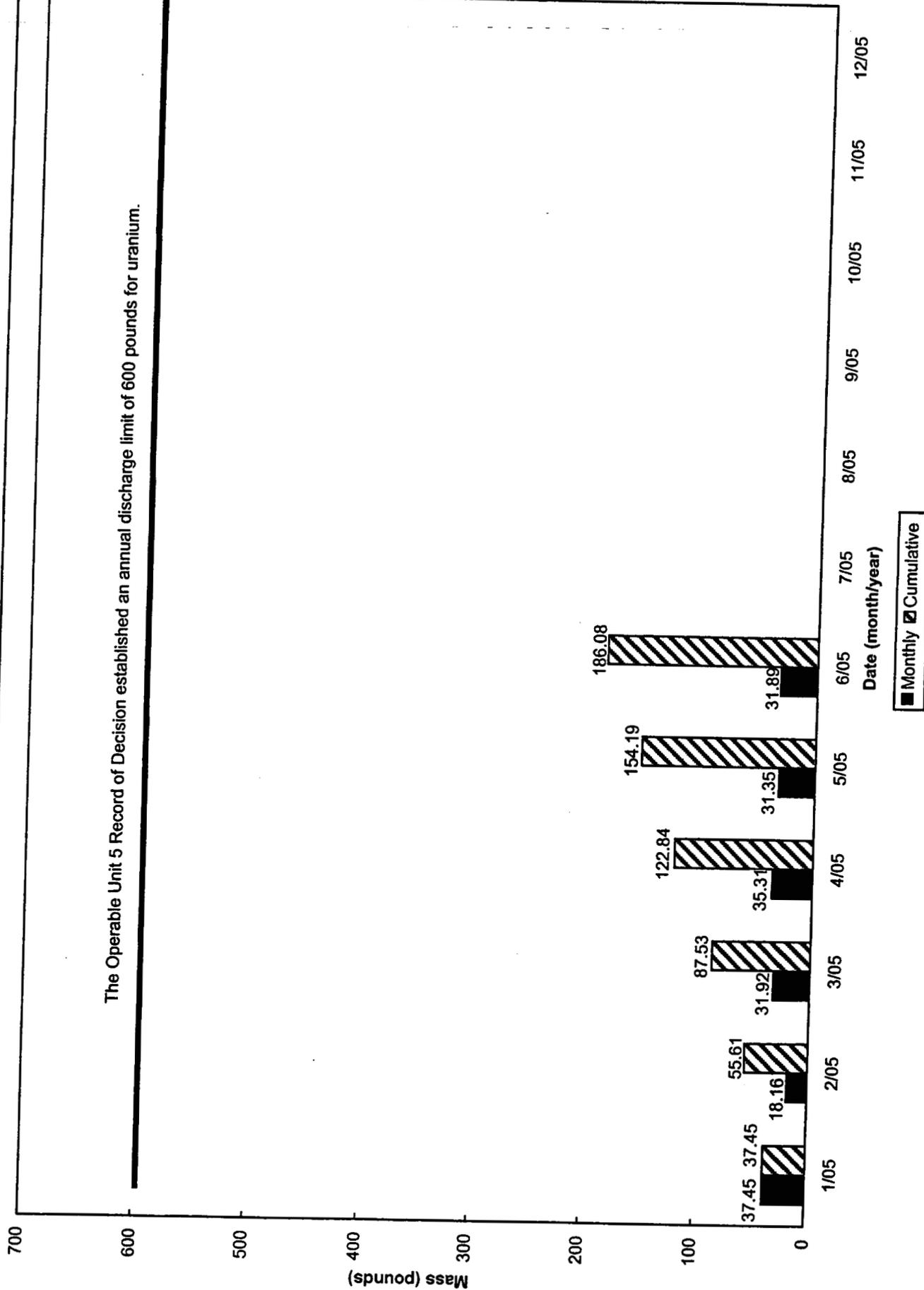


FIGURE 4-2. POUNDS OF URANIUM DISCHARGED TO THE GREAT MIAMI RIVER FROM THE PARSHALL FLUME (PF 4001), JANUARY THROUGH JUNE 2005

## 5.0 AIR MONITORING DATA

### 5.1 DATA COVERED

This IEMP mid-year data summary covers all air monitoring data collected under the IEMP program from January 1 through June 30, 2005. Specifically, this includes:

- Radiological air particulate monitoring results from biweekly samples covering the period of December 21, 2003 through June 21, 2005. The biweekly sample results for the first half of 2005 are compiled in Tables 5-1 through 5-5 for the purpose of comparison to previous results.
- Radiological air particulate quarterly composite samples collected during the first half of 2005 for NESHAP compliance purposes
- NESHAP stack emissions monitoring samples collected during the first half of 2005
- Environmental radon monitoring data collected during the first half of 2005
- Silos headspace radon concentrations data collected during the first quarter of 2005
- Direct radiation (thermoluminescent dosimeter [TLD]) monitoring data collected during the first half of 2005.

All of the data sets for the aforementioned programs are complete in accordance with requirements identified in the IEMP, Revision 4, and those requirements identified in subsequent agreements with the regulatory agencies (OEPA 2005c). It should also be noted that through discussions with EPA and OEPA, several monitors have been relocated or removed from service based on site remediation progress. Specifically, radon locations K-TOP and Silo 1 headspace were removed from service in February; Silo 2 headspace was removed in March; and KNO, KNW-A, KSW-A were removed in August. Additionally, direct radiation monitoring locations 23A, 24, 25, 26, 43, 44, 45, and 46 were removed in August. The following monitors were relocated: radon monitors KSO (August) and Bio-Surge Lagoon (October), which have been renamed KSO-A and BSL-A, respectively. Radon monitor WP17-A was removed from service on November 10.

## 5.2 NOTABLE RESULTS AND EVENTS

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

### Biweekly Air Particulate Results

- Figures 5-1 through 5-3 illustrate that there was a relative decrease in uranium concentrations at the site boundary during the first half of 2005, when compared to biweekly data reported in 2004.
- Figures 5-4 through 5-6 illustrate that thorium-230 concentrations at the site boundary during the first half of 2005 also indicated a decrease compared to the concentrations reported in 2004. This is most likely attributed to the completion of the Waste Pits Project.
- Table 5-6 indicates the air inhalation dose contribution from thorium-230 is approximately half of the contribution from radium-226. This is most likely attributable to the completion of the Waste Pits Project and the startup of processing operations of radium-bearing waste at the Silos Project. Now, radium-226 is the primary isotope of concern at the site.

### NESHAP Quarterly Composite Air Data

- The maximum 2005 year-to-date (as of June) dose at the site boundary air monitoring stations (AMS-6) was 0.24 millirem (mrem) as summarized in Table 5-6. For comparison, the maximum mid-year dose in 2004 was 0.52 mrem. The radium-226 dose contribution at AMS-6 represented 54 percent of the dose, with thorium and uranium contributing 31 and 14 percent, respectively.

### Direct Radiation Results

- Prior to the continuous operation of the Radon Control System (RCS), direct radiation (TLD) measurements indicated a general upward trend in the immediate area of the K-65 Silos (locations 22 through 26) and, to a lesser extent, at the site boundary nearest the K-65 Silos (location 6). Following the startup of the RCS in May 2003, there was a significant decrease in direct radiation levels in the vicinity of the K-65 Silos and at the western boundary of the site. The decrease in direct radiation levels is related to the decrease in headspace radon concentration from the operation of the RCS. Figures 5-7 and 5-8 illustrate the decrease in direct radiation measurements in the vicinity of the K-65 Silos and at Location 6 during the first half of 2005, respectively. The upward trend during 2005 is the result of moving the radium-bearing source materials from the former K-65 silos to the transfer tank area and associated processing operations.

### Radon Monitoring Results

- During the first quarter of 2005, the silo headspace radon concentrations (refer to Figure 5-9) were comparable to concentrations measured during the last quarter of 2004. In addition, mining operations (removal of K-65 material through sluicing operations) began in September 2004 and were completed in the first quarter of 2005.

### NESHAP Stack Emissions Results

- The mid-year summary NESHAP stack emission results for the Silos RCS stack and the Silo 3 stack are presented in Table 5-9. Indicated results are within expected ranges. No significant changes in the sources operations were noted. Refer to Figure 5-10 for NESHAP stack monitoring locations.

A thorough review of the air monitoring data covered by this mid-year data summary was conducted to identify the notable results. Supplementary tables and figures are also provided in support of the information above. Tables 5-1 through 5-5 summarize the biweekly total uranium, total particulate, and isotopic thorium concentrations from January through June of 2005. Tables 5-1 through 5-5 also include 2004 annual summary results and 1990 through 2004 summary results. Table 5-6 contains the 2005 year-to-date doses for each air monitoring station and the fractional contribution of each radionuclide to the total dose. Table 5-7 summarizes the environmental radon data from continuous monitors from January through June 2005 and the annual summary results for 2004. Table 5-8 provides the direct radiation (TLD) measurements from the first and second quarter 2005, and the annual summary results for 2004. Table 5-9 shows the National Emissions Standards for Hazardous Air Pollutants (NESHAP) stack results from the first half of 2005 and the annual summary results for 2004. All data covered by this mid-year data summary, as well as maps showing the locations of monitoring stations, are available on the IEMP Data Information Site.

TABLE 5-1

TOTAL URANIUM PARTICULATE CONCENTRATIONS IN AIR  
FROM BIWEEKLY SAMPLES

	Mid-Year 2005 Results <sup>a</sup> (January through June) (pCi/m <sup>3</sup> x 1E-6)			2004 Annual Summary Results (pCi/m <sup>3</sup> x 1E-6)				1990 through 2004 Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)		
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
<b>Boundary</b>										
AMS-2	13	10	124	48	26	19	9060	558	0.0	9060
AMS-3	13	37	256	117	26	19	648	184	0.0	17000
AMS-4	13	20	53	32	26	8.0	239	63	0.0	2300
AMS-5	13	16	71	35	26	3.7	358	76	0.0	4400
AMS-6	13	0.0	186	80	26	30	1556	259	0.0	3200
AMS-7	13	22	55	37	26	3.5	321	73	0.0	7800
AMS-8A	13	23	195	75	26	11	2125	315	0.0	2125
AMS-9C <sup>b</sup>	13	34	239	101	26	27	1193	262	0.0	1712
AMS-22	13	17	183	72	26	19	8105	641	0.0	8105
AMS-23	13	8.8	155	53	26	17	13425	687	0.0	13425
AMS-24	13	17	36	27	26	7.7	122	43	0.0	207
AMS-25	13	10	45	20	26	1.3	103	35	0.0	402
AMS-26	13	22	112	48	26	15	1524	202	0.0	1524
AMS-27	13	29	153	56	26	19	539	115	0.0	1348
AMS-28	13	14	79	51	26	20	3018	404	0.0	3018
AMS-29	13	28	105	51	26	16	407	122	0.0	1888
<b>Background</b>										
AMS-12	13	0.0	23	12	26	0.0	109	16	0.0	480

<sup>a</sup>For blank corrected concentrations less than or equal to 0.0 pCi/m<sup>3</sup>, the concentration is set as 0.0 pCi/m<sup>3</sup>.

<sup>b</sup>Summary results for 1990 through 2004 include AMS-9B/C data.

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

	Mid-Year 2005 Results (January through June) ( $\mu\text{g}/\text{m}^3$ )			2004 Annual Summary Results ( $\mu\text{g}/\text{m}^3$ )				1990 through 2004 Summary Results ( $\mu\text{g}/\text{m}^3$ )		
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
<b>Boundary</b>										
AMS-2	13	14	43	31	26	15	58	33	7.0	77
AMS-3	13	17	83	42	26	17	102	51	8.0	159
AMS-4	13	17	49	35	26	16	57	35	13	81
AMS-5	13	13	38	28	26	13	48	28	9.6	62
AMS-6	13	15	44	32	26	17	50	31	8.0	69
AMS-7	13	14	40	29	26	13	49	30	6.8	84
AMS-8A	13	14	52	33	26	11	66	34	9.0	89
AMS-9C <sup>a</sup>	13	21	69	43	26	23	83	45	7.1	136
AMS-22	13	20	45	33	26	17	42	30	13	57
AMS-23	13	13	38	29	26	22	75	32	11	75
AMS-24	13	12	35	24	26	15	39	26	5.4	114
AMS-25	13	11	29	21	26	15	53	30	11	69
AMS-26	13	16	38	29	26	14	100	31	5.0	124
AMS-27	13	21	78	49	26	24	79	51	16	92
AMS-28	13	13	36	26	26	8.1	42	27	8.1	68
AMS-29	13	17	60	36	26	13	71	40	11	93
<b>Background</b>										
AMS-12 <sup>b</sup>	13	11	32	24	26	6.2	42	26	6.0	416
<b>Project-Specific</b>										
WPTH-2 <sup>c</sup>	13	18	54	35	26	17	54	35	17	77

<sup>a</sup>Summary results for 1990 through 2004 include AMS-9B/C data.

<sup>b</sup>Total particulate analysis was discontinued during 1994 and was reinstated for AMS-12 in 1997.

<sup>c</sup>Monitor associated with the Waste Pits Project.

TABLE 5-3

THORIUM-228 PARTICULATE CONCENTRATIONS IN AIR  
FROM MONTHLY SAMPLES

	Mid-Year 2005 Results <sup>a</sup> (January through June) (pCi/m <sup>3</sup> x 1E-6)				2004 Annual Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)				1990 through 2004 Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
<b>Boundary</b>										
AMS-2	9	5.8	25	13	18	5.4	11	9.6	0.0	38
AMS-3	9	7.7	31	17	18	6.4	30	18	0.0	30
AMS-4	9	5.9	35	16	18	4.0	16	8.3	0.0	22
AMS-5	9	6.1	17	12	18	0.6	7.5	5.1	0.0	18
AMS-6	9	4.4	25	15	18	3.2	21	8.8	0.0	21
AMS-7	9	4.2	29	17	18	3.3	16	8.6	0.0	17
AMS-8A	9	3.5	26	13	18	2.7	18	12	0.0	39
AMS-9C <sup>b</sup>	9	9.8	26	16	18	1.6	25	13	0.0	50
AMS-22	9	1.1	19	8.2	18	5.6	21	12	0.0	30
AMS-23	9	2.4	24	15	18	3.1	20	9.7	0.0	22
AMS-24	9	6.4	25	13	18	0.6	18	7.3	0.0	27
AMS-25	9	3.6	15	9.3	18	1.6	13	5.9	0.0	17
AMS-26	9	6.5	24	14	18	2.9	12	6.8	0.0	24
AMS-27	9	7.3	34	17	18	4.6	25	12	0.0	25
AMS-28 <sup>c</sup>	9	3.9	15	8.2	18	0.0	19	5.5	0.0	39
AMS-29	9	3.9	31	17	18	2.0	43	15	0.0	46
<b>Background</b>										
AMS-12	9	0.0	17	7.8	18	1.4	11	5.2	0.0	17
<b>Project-Specific</b>										
WPTH-2 <sup>d</sup>	9	9.7	29	16	18	0.0	38	11	0.0	38

<sup>a</sup>For blank corrected concentrations less than or equal to 0.0 pCi/m<sup>3</sup>, the concentration is set as 0.0 pCi/m<sup>3</sup>.

<sup>b</sup>Summary results for 1990 through 2004 include AMS-9B/C data.

<sup>c</sup>AMS-28 includes WPTH-1 results.

<sup>d</sup>Monitor associated with the Waste Pits Project.

TABLE 5-4

THORIUM-230 PARTICULATE CONCENTRATIONS IN AIR  
FROM MONTHLY SAMPLES

	Mid-Year 2005 Results <sup>a</sup> (January through June) (pCi/m <sup>3</sup> x 1E-6)			2004 Annual Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)				1990 through 2004 Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)		
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
<b>Boundary</b>										
AMS-2	9	0.0	24	14	18	13	81	37	0.0	140
AMS-3	9	16	39	29	18	19	131	74	0.0	744
AMS-4	9	0.0	17	10	18	4.1	39	27	0.0	91
AMS-5	9	2.1	19	9.1	18	1.9	39	22	0.0	620
AMS-6	9	6.4	78	41	18	15	116	74	0.0	488
AMS-7	9	0.0	12	8.3	18	3.7	46	18	0.0	77
AMS-8A	9	0.0	32	20	18	12	102	50	0.0	461
AMS-9C <sup>b</sup>	9	8.2	43	32	18	17	100	64	0.0	407
AMS-22	9	0.1	40	19	18	12	120	56	0.0	493
AMS-23	9	0.0	31	19	18	14	113	50	0.0	210
AMS-24	9	1.9	10	6.6	18	5.3	25	12	0.0	125
AMS-25	9	2.1	13	8.9	18	2.2	30	15	0.0	223
AMS-26	9	6.0	18	14	18	14	68	37	0.0	233
AMS-27	9	13	51	29	18	20	67	35	0.0	189
AMS-28 <sup>c</sup>	9	2.1	23	13	18	12	84	42	4.4	401
AMS-29	9	6.4	32	22	18	10	91	49	0.0	537
<b>Background</b>										
AMS-12	9	0.0	11	4.5	18	0.0	27	11	0.0	42
<b>Project-Specific</b>										
WPTH-2 <sup>d</sup>	9	11	78	44	18	22	421	120	0.0	580

<sup>a</sup>For blank corrected concentrations less than or equal to 0.0 pCi/m<sup>3</sup>, the concentration is set as 0.0 pCi/m<sup>3</sup>.

<sup>b</sup>Summary results for 1990 through 2004 include AMS-9B/C data.

<sup>c</sup>AMS-28 includes WPTH-1 results.

<sup>d</sup>Monitor associated with the Waste Pits Project.

TABLE 5-5

THORIUM-232 PARTICULATE CONCENTRATIONS IN AIR  
FROM MONTHLY SAMPLES

	Mid-Year 2005 Results <sup>a</sup> (January through June) (pCi/m <sup>3</sup> x 1E-6)				2004 Annual Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)				1990 through 2004 Summary Results <sup>a</sup> (pCi/m <sup>3</sup> x 1E-6)	
	No. of Samples	Min.	Max.	Avg.	No. of Samples	Min.	Max.	Avg.	Min.	Max.
<b>Boundary</b>										
AMS-2	9	1.7	7.0	4.3	18	3.7	12	8.3	0.0	22
AMS-3	9	0.6	14	7.8	18	3.7	25	15	0.0	25
AMS-4	9	1.9	8.8	5.1	18	2.2	11	6.0	0.0	22
AMS-5	9	0.0	13	4.3	18	0.0	10	5.4	0.0	25
AMS-6	9	3.9	8.1	6.4	18	4.8	12	8.2	0.0	22
AMS-7	9	0.0	5.1	2.7	18	2.2	8.8	4.9	0.0	16
AMS-8A	9	3.4	14	6.7	18	5.2	15	9.7	0.0	33
AMS-9C <sup>b</sup>	9	2.8	19	10	18	5.0	29	12	0.0	36
AMS-22	9	6.4	9.4	7.4	18	5.0	18	9.9	0.0	35
AMS-23	9	0.9	8.9	4.5	18	1.5	14	9.0	0.0	75
AMS-24	9	0.4	5.7	3.9	18	1.0	7.5	5.1	0.0	16
AMS-25	9	1.1	4.5	2.2	18	0.0	6.9	4.5	0.0	14
AMS-26	9	2.1	10	5.3	18	2.0	11	7.1	0.0	14
AMS-27	9	5.7	11	7.8	18	4.2	22	11	0.0	22
AMS-28 <sup>c</sup>	9	1.2	7.4	3.4	18	3.1	17	7.2	0.0	33
AMS-29	9	2.3	12	6.1	18	3.8	27	14	0.0	31
<b>Background</b>										
AMS-12	9	1.5	3.9	2.9	18	0.0	9.0	3.8	0.0	34
<b>Project-Specific</b>										
WPTH-2 <sup>d</sup>	9	2.8	14	6.9	18	4.2	43	15	0.0	43

<sup>a</sup>For blank corrected concentrations less than or equal to 0.0 pCi/m<sup>3</sup>, the concentration is set as 0.0 pCi/m<sup>3</sup>.

<sup>b</sup>Summary results for 1990 through 2004 include AMS-9B/C data.

<sup>c</sup>AMS-28 includes WPTH-1 results.

<sup>d</sup>Monitor associated with the Waste Pits Project.

TABLE 5-6  
2005 MID-YEAR NESHAP COMPLIANCE REPORT

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

Location	U-238	U-234	U-235/ U-236	Th-232	Ra-226	Th-234 <sup>b</sup>	Ra-228 <sup>b</sup>	Ac-228 <sup>b</sup>	Ra-224 <sup>b</sup>	Th-231 <sup>b</sup>	Ratio Totals	Dose <sup>c</sup> (mrem)
<b>Boundary</b>												
AMS-2	8.0E-004	6.9E-004	1.3E-004	1.5E-003	6.5E-004	3.0E-006	1.2E-004	1.9E-007	4.6E-006	3.2E-009	0.005	0.052
AMS-3	2.7E-003	2.6E-003	2.6E-004	3.2E-003	4.0E-003	1.0E-005	6.0E-004	9.6E-007	2.4E-005	6.5E-009	0.021	0.205
AMS-4	5.3E-004	2.9E-004	8.4E-005	1.6E-003	1.1E-002	2.0E-006	4.1E-004	6.5E-007	1.6E-005	2.1E-009	0.019	0.186
AMS-5	6.3E-004	2.8E-004	-	1.2E-004	5.9E-003	2.4E-006	9.0E-005	1.4E-007	3.5E-006	-	0.009	0.085
AMS-6	2.0E-003	1.2E-003	1.6E-004	7.0E-004	1.3E-002	7.4E-006	2.7E-004	4.3E-007	1.1E-005	4.2E-009	0.024	0.239
AMS-7	7.9E-004	4.7E-004	-	1.8E-004	1.8E-003	3.0E-006	1.2E-004	2.0E-007	4.8E-006	-	0.006	0.055
AMS-8A	1.8E-003	1.4E-003	8.4E-005	4.7E-004	1.9E-003	6.6E-006	3.2E-004	5.2E-007	1.3E-005	2.1E-009	0.011	0.109
AMS-9C	2.5E-003	2.3E-003	2.1E-004	1.1E-003	4.2E-003	9.5E-006	4.9E-004	7.7E-007	1.9E-005	5.4E-009	0.018	0.180
AMS-22	1.5E-003	8.3E-004	1.5E-004	4.5E-004	4.7E-004	5.6E-006	1.0E-004	1.6E-007	4.0E-006	3.7E-009	0.007	0.069
AMS-23	1.1E-003	8.2E-004	1.5E-004	4.3E-004	4.1E-004	4.2E-006	2.1E-004	3.4E-007	8.3E-006	3.9E-009	0.006	0.063
AMS-24	3.6E-004	2.4E-004	-	4.5E-004	1.4E-004	1.3E-006	1.6E-004	2.6E-007	6.4E-006	-	0.004	0.037
AMS-25	3.1E-004	1.1E-004	5.9E-005	-	5.2E-004	1.2E-006	1.1E-004	1.8E-007	4.5E-006	1.5E-009	0.002	0.022
AMS-26	8.4E-004	7.9E-004	1.1E-004	3.7E-004	1.6E-003	3.2E-006	6.4E-005	1.0E-007	2.5E-006	2.8E-009	0.005	0.055
AMS-27	1.1E-003	8.0E-004	1.7E-004	6.1E-004	6.7E-003	4.3E-006	4.1E-004	6.5E-007	1.6E-005	4.4E-009	0.016	0.159
AMS-28	9.0E-004	3.5E-004	5.3E-005	-	1.4E-003	3.4E-006	1.4E-004	2.2E-007	5.3E-006	1.4E-009	0.005	0.054
AMS-29	1.3E-003	7.9E-004	1.5E-004	1.2E-003	1.6E-003	5.1E-006	4.3E-004	6.9E-007	1.7E-005	3.9E-009	0.012	0.117
<b>Background</b>												
AMS-12	3.7E-004	4.3E-004	-	1.0E-003	5.1E-003	1.4E-006	3.1E-004	5.0E-007	1.2E-005	-	NA <sup>d</sup>	NA <sup>d</sup>
<b>QA/QC</b>												
Column Check <sup>e</sup>	0.192	0.140	0.018	0.080	0.548	0.001	0.041	0.000	0.002	0.000	NA <sup>d</sup>	1.69

Maximum Year-to-Date Ratio: 0.0239  
Maximum Year-to-Date Dose (mrem): 0.24

<sup>a</sup>A dash (-) 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 (1.69) at all boundary monitors.

TABLE 5-7

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

Location	Mid-Year 2005 Results (January through June) (Instrument Background Corrected) <sup>b</sup> (pCi/L)			2004 Summary Results (Instrument Background Corrected) <sup>b</sup> (pCi/L)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
<b>Boundary</b>						
AMS-02	0.2	0.4	0.3	0.2	1.3	0.5
AMS-03	0.2	0.4	0.3	0.2	1.1	0.5
AMS-04	0.1	0.4	0.2	0.2	0.7	0.3
AMS-05	0.3	0.7	0.4	0.1	1.2	0.5
AMS-06	0.1	0.7	0.3	0.2	0.6	0.3
AMS-07	0.2	0.7	0.4	0.3	1.3	0.6
AMS-08A	0.3	0.4	0.3	0.2	1.0	0.4
AMS-09C	0.2	0.5	0.3	0.2	0.9	0.5
AMS-22	0.2	0.3	0.2	0.1	0.5	0.3
AMS-23	0.3	0.5	0.4	0.2	0.5	0.3
AMS-24	0.4	0.6	0.5	0.3	1.4	0.6
AMS-25	0.3	0.5	0.4	0.2	0.9	0.4
AMS-26	0.1	0.3	0.2	0.2	0.6	0.3
AMS-27	0.2	0.5	0.4	0.3	0.9	0.5
AMS-28	0.1	0.5	0.2	0.2	0.7	0.4
AMS-29	0.3	0.4	0.4	0.2	0.5	0.4
<b>Background</b>						
AMS-12	0.3	0.3	0.3	0.2	0.6	0.3
<b>On Site</b>						
KNE-B	0.3	1.7	0.9	0.3	0.8	0.5
KNO	0.3	1.2	0.7	0.3	1.1	0.6
KNW-A	0.2	0.8	0.4	0.3	1.2	0.6
KSE	0.2	1.3	0.7	0.2	0.8	0.4
KSO	0.3	0.6	0.4	0.2	0.8	0.5
KSW-A	0.5	1.0	0.7	0.3	1.2	0.7
KTOP <sup>c</sup>	0.6	0.6	0.6	0.3	1.5	0.7
LP2	0.1	0.3	0.2	0.3	0.7	0.4
PR-1	0.2	0.4	0.3	0.2	1.1	0.5
Rally Point 4	0.3	0.4	0.4	0.2	0.6	0.4
Bio-Surge Lagoon	0.1	0.2	0.1	0.3	0.8	0.4
T117-A	0.3	0.4	0.4	0.2	0.7	0.4
T28-A	0.3	0.5	0.4	0.2	0.7	0.4
WP17-A	0.2	0.5	0.3	0.3	1.1	0.5

<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>KTOP monitor removed from service on January 31, 2005

**TABLE 5-8**  
**DIRECT RADIATION (TLD) MEASUREMENTS**

Direct Radiation (mrem)			
Location	Mid-Year 2005 Summary Results		2004 Summary Results
	First Quarter	Second Quarter	
<b>Site Boundary</b>			
2	24	27	74
3	24	25	68
4	23	27	69
5	24	25	73
6	25	24	69
7	25	25	71
8A	23	26	75
9C	24	24	75
13	22	23	64
14	24	26	69
15	24	25	73
16	24	25	72
17	24	26	70
34	25	28	74
35	23	24	65
36	24	23	65
37	25	25	78
38	22	23	64
39	28	29	81
40	23	23	68
41	24	24	68
<b>On Site</b>			
22	69	88	209
23A	71	135	216
24	43	46	157
25	41	450	143
26	34	106	122
43	53	136	160
44	45	58	153
45	30	30	96
46	42	40	97
47	22	24	59
<b>Background</b>			
19	24	25	66
20	25	25	63
27	25	23	64
33	26	26	69
42	27	25	75

TABLE 5-9

NESHAP STACK EMISSION MONITORING RESULTS

Analysis Performed	Mid-Year Results		2004 Year-End Results	
	No. of Samples	Total Pounds <sup>a,b</sup>	No. of Samples <sup>c</sup>	Total Pounds <sup>a,b,c,d</sup>
<b>Silos – RCS Stack</b>				
Uranium-238	5	4.1E-05	12	3.8E-05
Uranium-235/236	5	3.4E-06	12	5.2E-06
Uranium-234	5	2.6E-09	12	3.5E-09
Thorium-232	5	6.7E-05	12	1.6E-04
Thorium-230	5	7.3E-10	12	3.9E-09
Thorium-228	5	ND	12	2.0E-14
Thorium-227	5	ND	12	ND
Radium-226	5	ND	12	1.5E-11
Polonium-210	5	ND	12	1.0E-14
Total Particulate	5	4.7E-02	12	1.1E-01
<b>Silos – Silo 3 Stack</b>				
Uranium-238	2	ND	NA	NA
Uranium-235/236	2	1.5E-07	NA	NA
Uranium-234	2	5.8E-10	NA	NA
Thorium-232	2	ND	NA	NA
Thorium-230	2	1.4E-10	NA	NA
Thorium-228	2	ND	NA	NA
Thorium-227	2	ND	NA	NA
Radium-226	2	1.5E-11	NA	NA
Polonium-210	2	3.8E-16	NA	NA
Total Particulate	2	1.9E-02	NA	NA

2005 MID-YEAR RESULTS

Analysis Performed	Average Release	Total Release (μCi)
<b>Silos – RCS Stack</b>		
Radon-220/222	198 (pCi/L)	7,476,000
<b>Silos – Silo 3 Stack</b>		
Radon-220/222	120 (pCi/L)	NS <sup>e</sup>

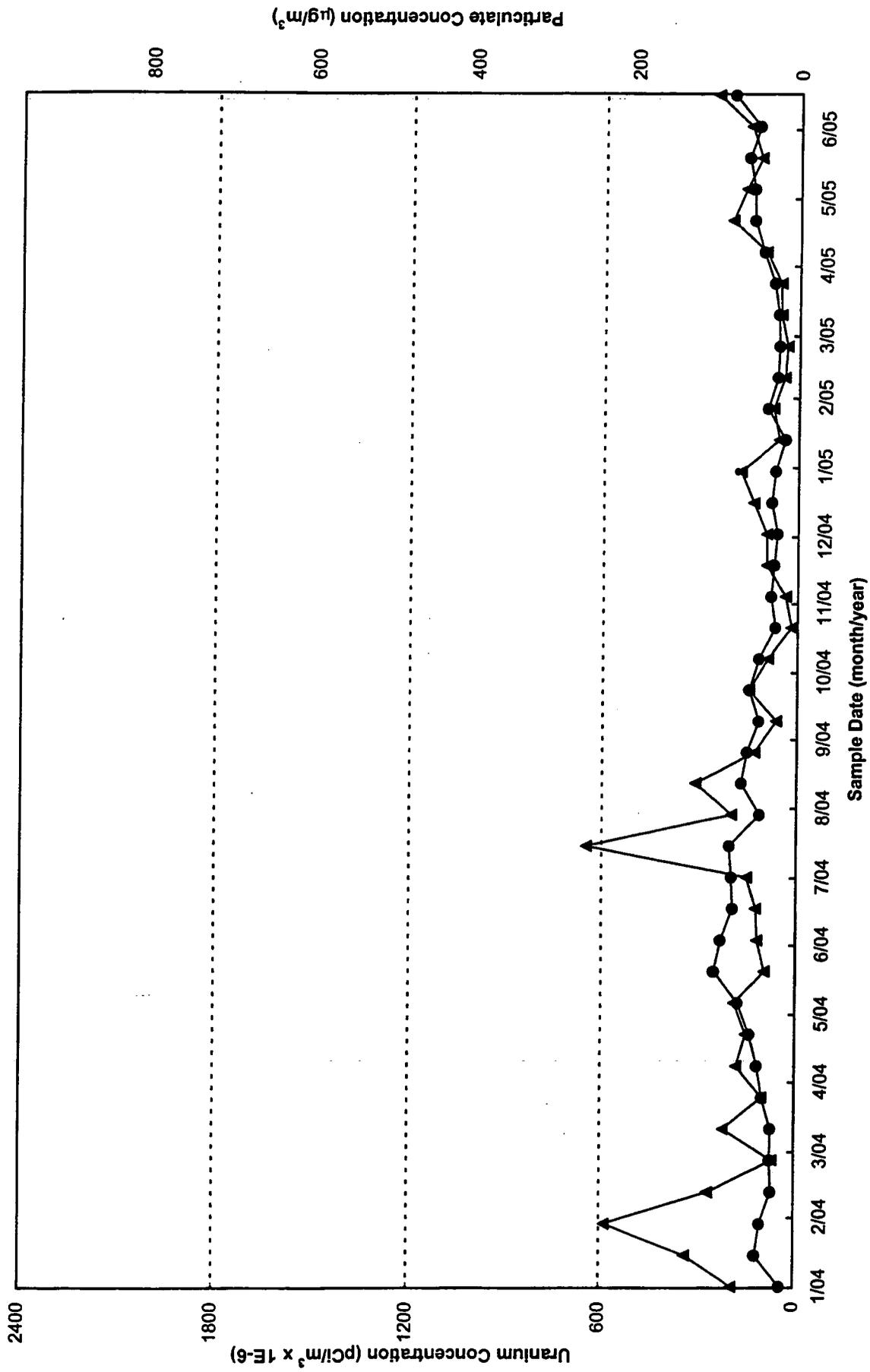
<sup>a</sup>Total pounds are only determined from detected results.

<sup>b</sup>ND = not detectable

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

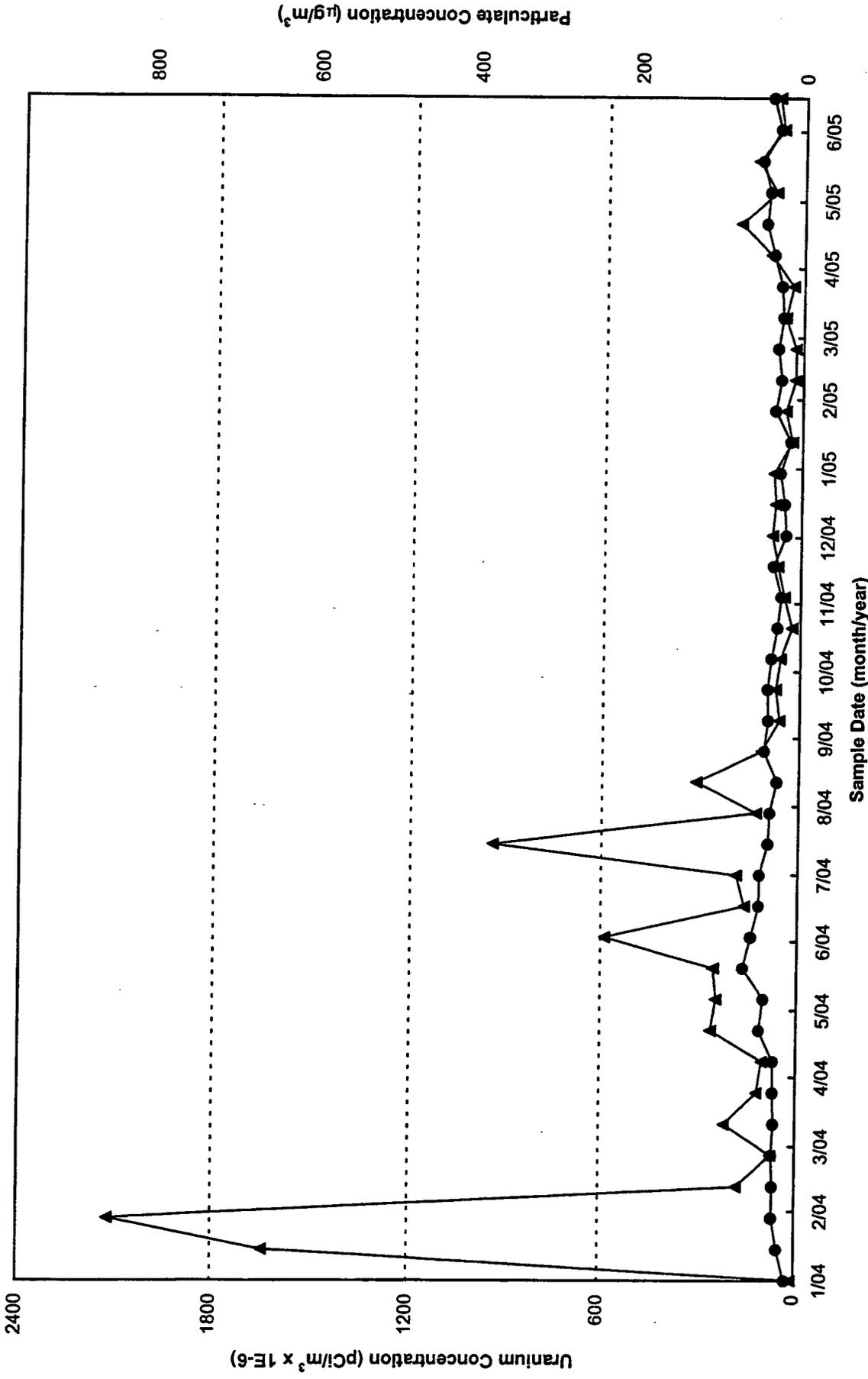
<sup>d</sup>Includes sample probe rinse.

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



▲ Total Uranium Concentration    ● Total Particulate Concentration

FIGURE 5-1. TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-3, JANUARY 2004 THROUGH JUNE 2005



▲ Total Uranium Concentration ● Total Particulate Concentration

FIGURE 5-2. TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-8A, JANUARY 2004 THROUGH JUNE 2005

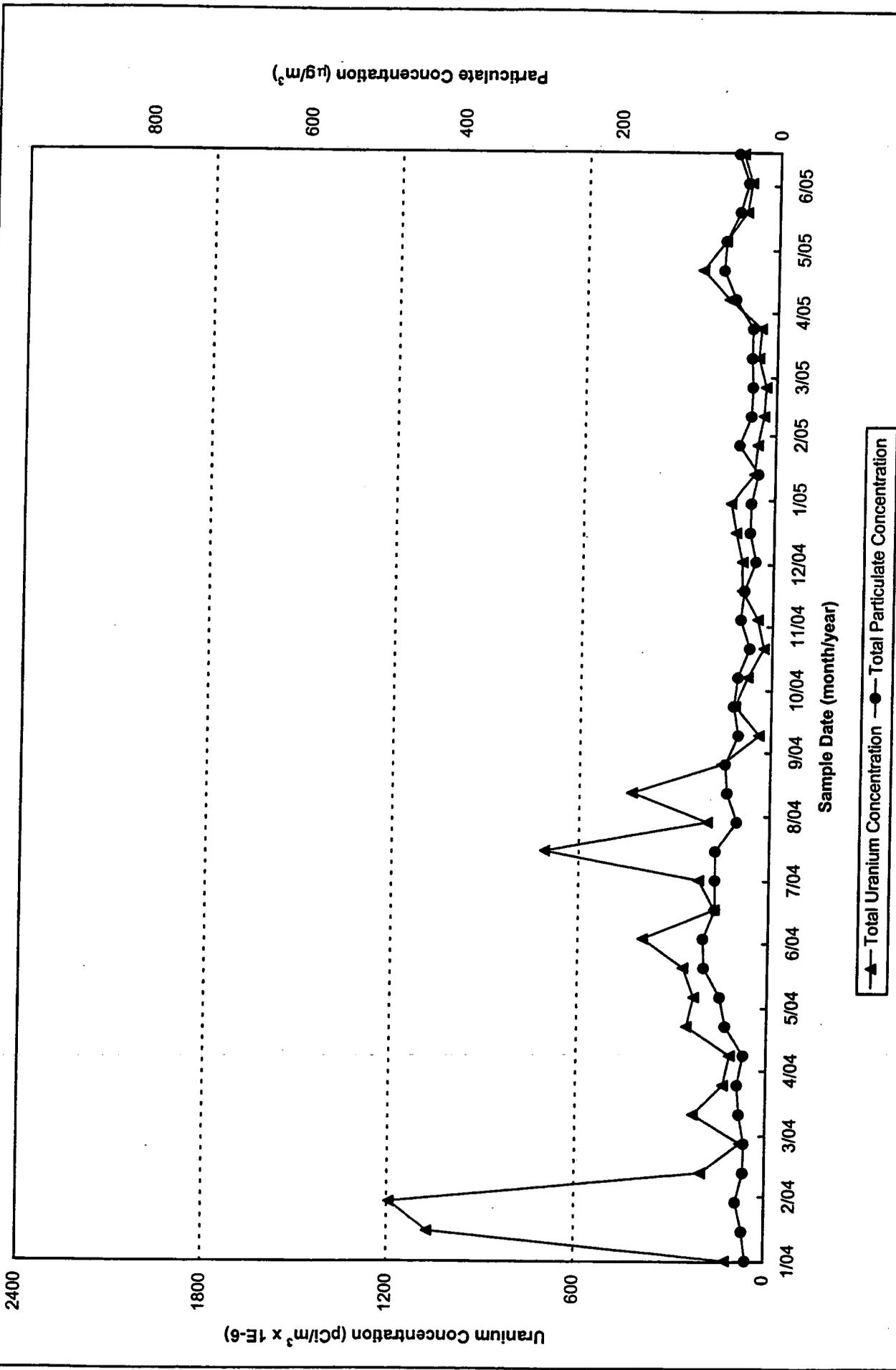


FIGURE 5-3. TOTAL URANIUM AND PARTICULATE CONCENTRATIONS IN AIR FROM BIWEEKLY SAMPLES AT AMS-9C, JANUARY 2004 THROUGH JUNE 2005

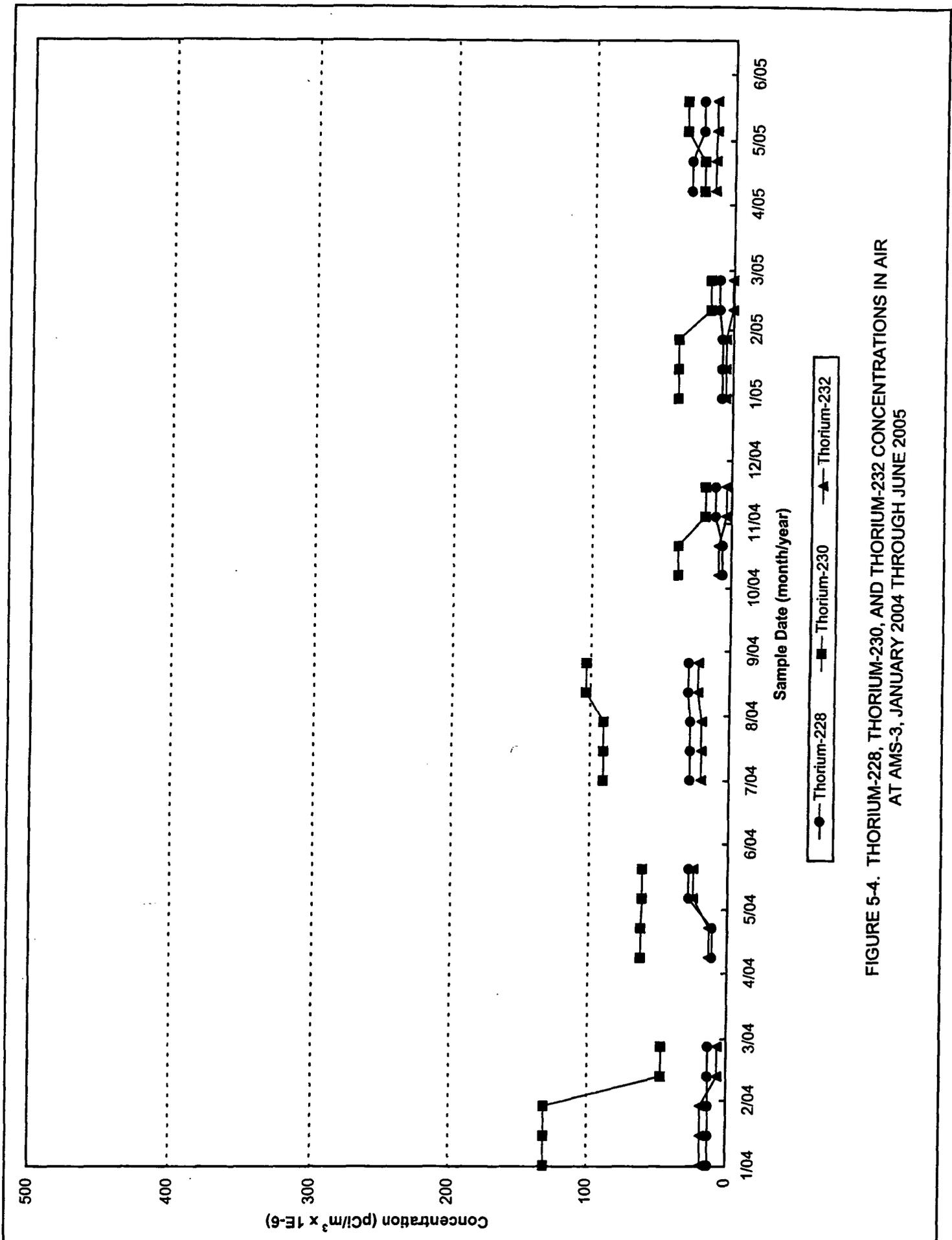


FIGURE 5-4. THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR AT AMS-3, JANUARY 2004 THROUGH JUNE 2005

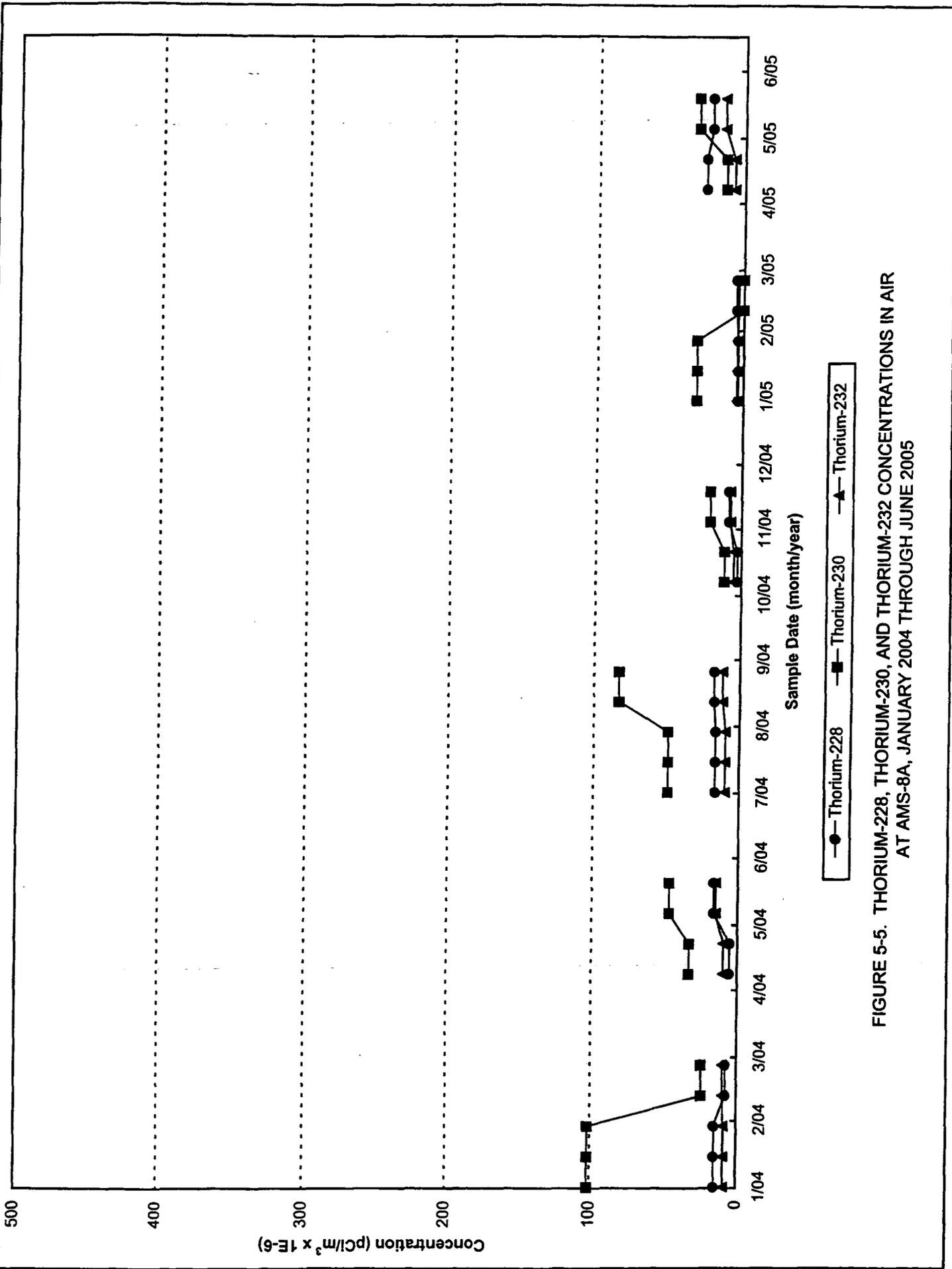


FIGURE 5-5. THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR AT AMS-8A, JANUARY 2004 THROUGH JUNE 2005

—●— Thorium-228    —■— Thorium-230    —▲— Thorium-232

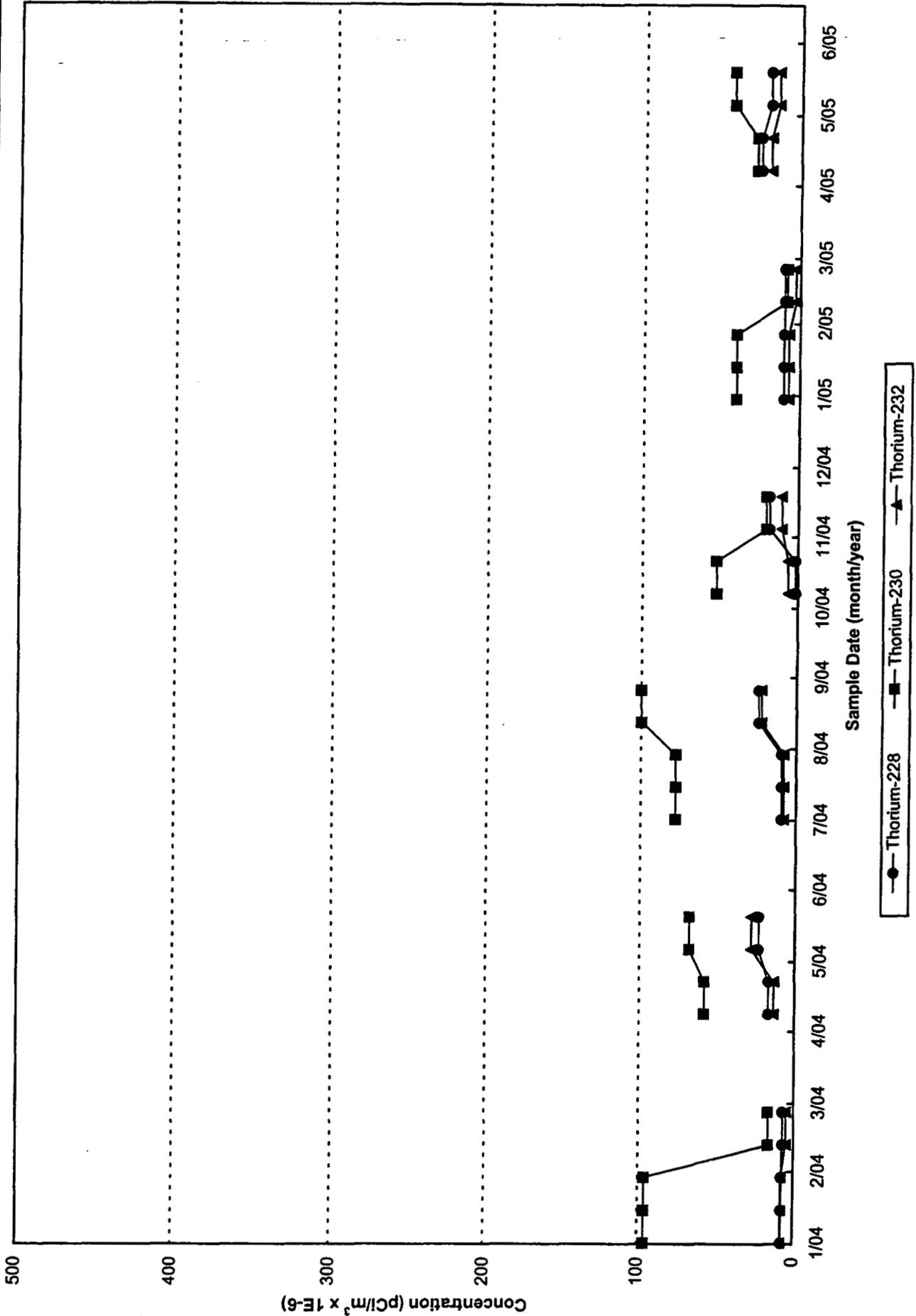


FIGURE 5-6. THORIUM-228, THORIUM-230, AND THORIUM-232 CONCENTRATIONS IN AIR AT AMS-9C, JANUARY 2004 THROUGH JUNE 2005

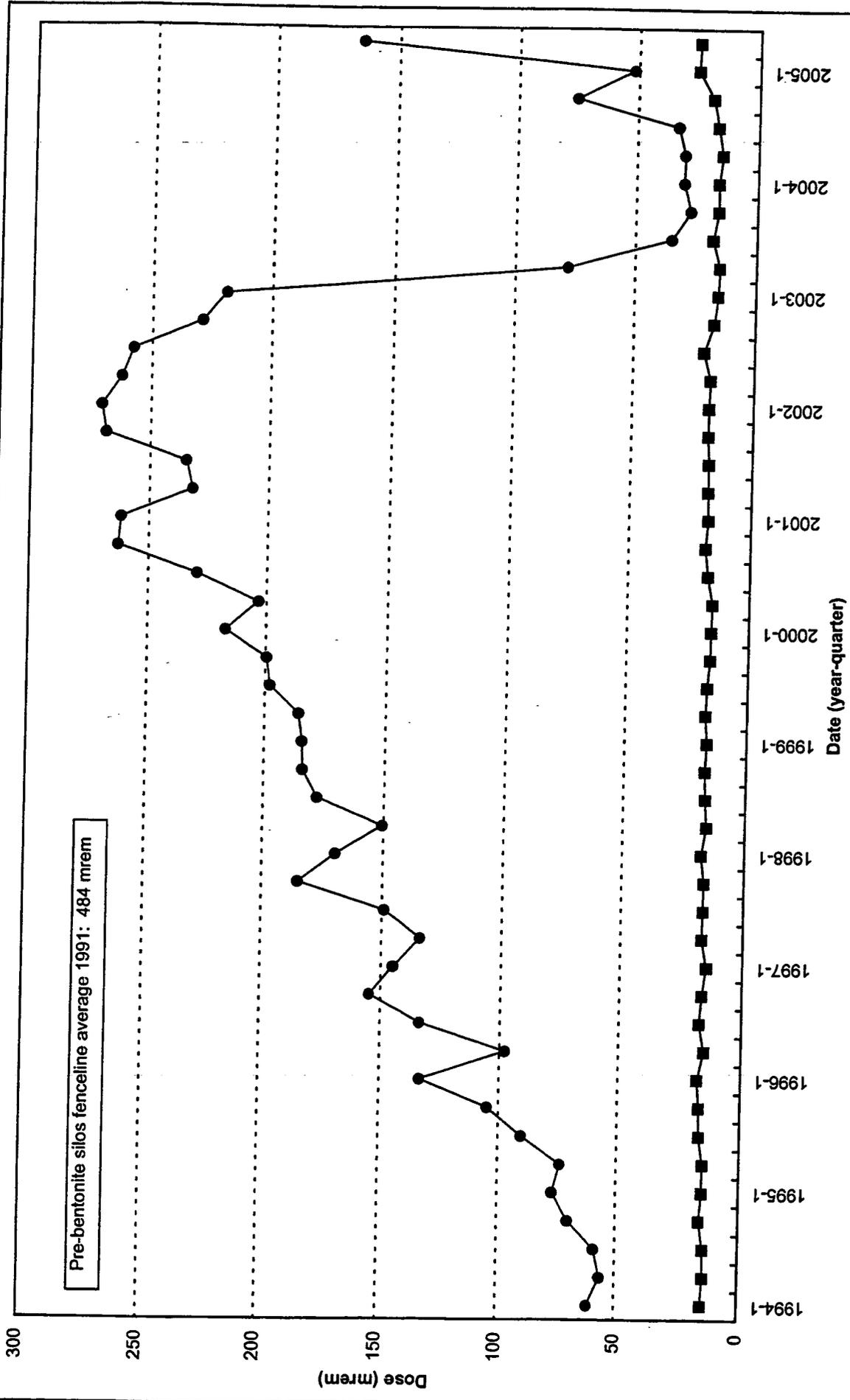


FIGURE 5-7. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS (K-65 SILOS FENCELINE AVERAGE VS. BACKGROUND AVERAGE), 1994-2005

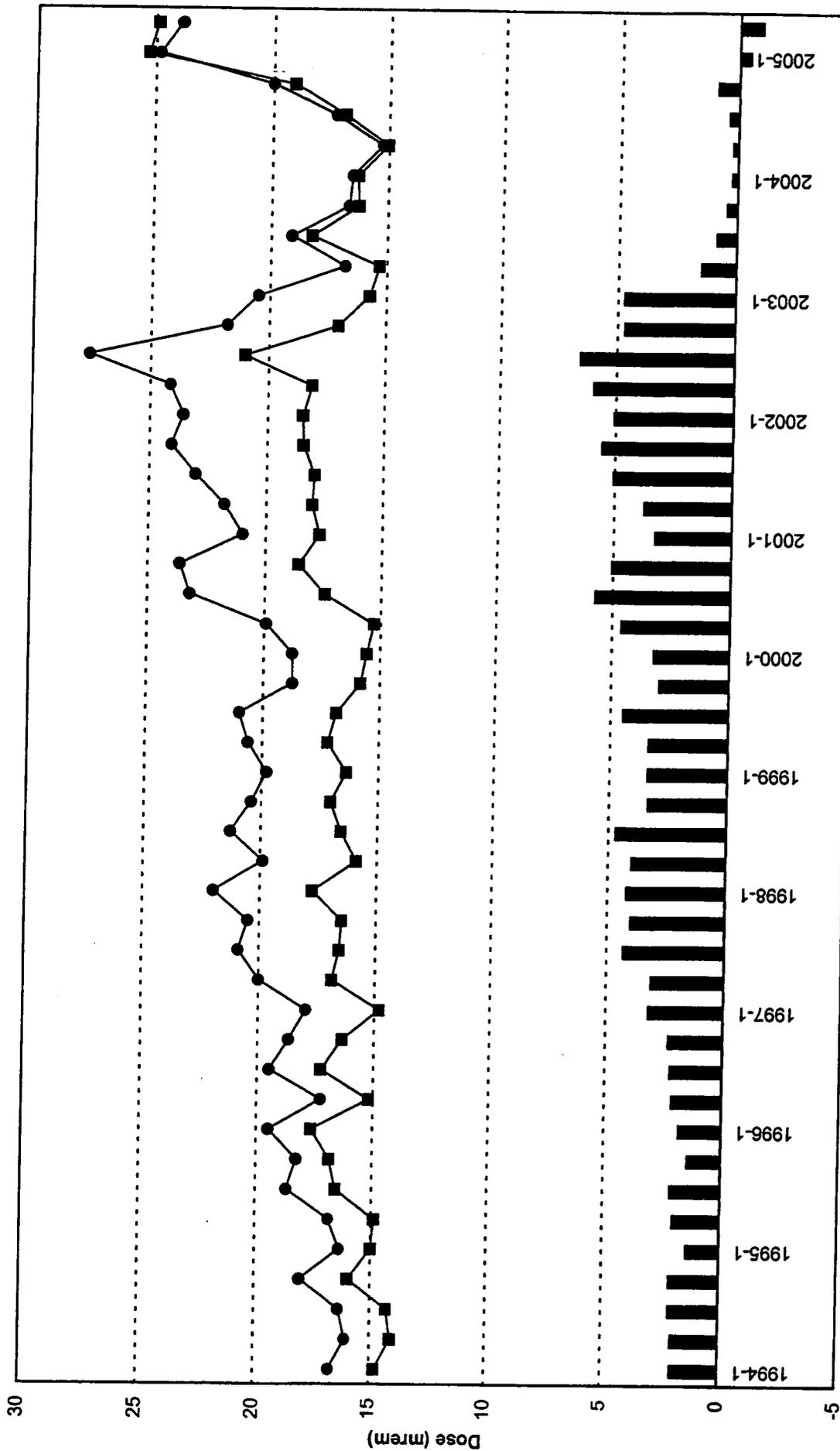


FIGURE 5-8. QUARTERLY DIRECT RADIATION (TLD) MEASUREMENTS  
(LOCATION 6 VS. BACKGROUND AVERAGE), 1994-2005

Net Difference (TLD - Background Average)
  Closest Site Boundary Location (Location 6)
  Background Average

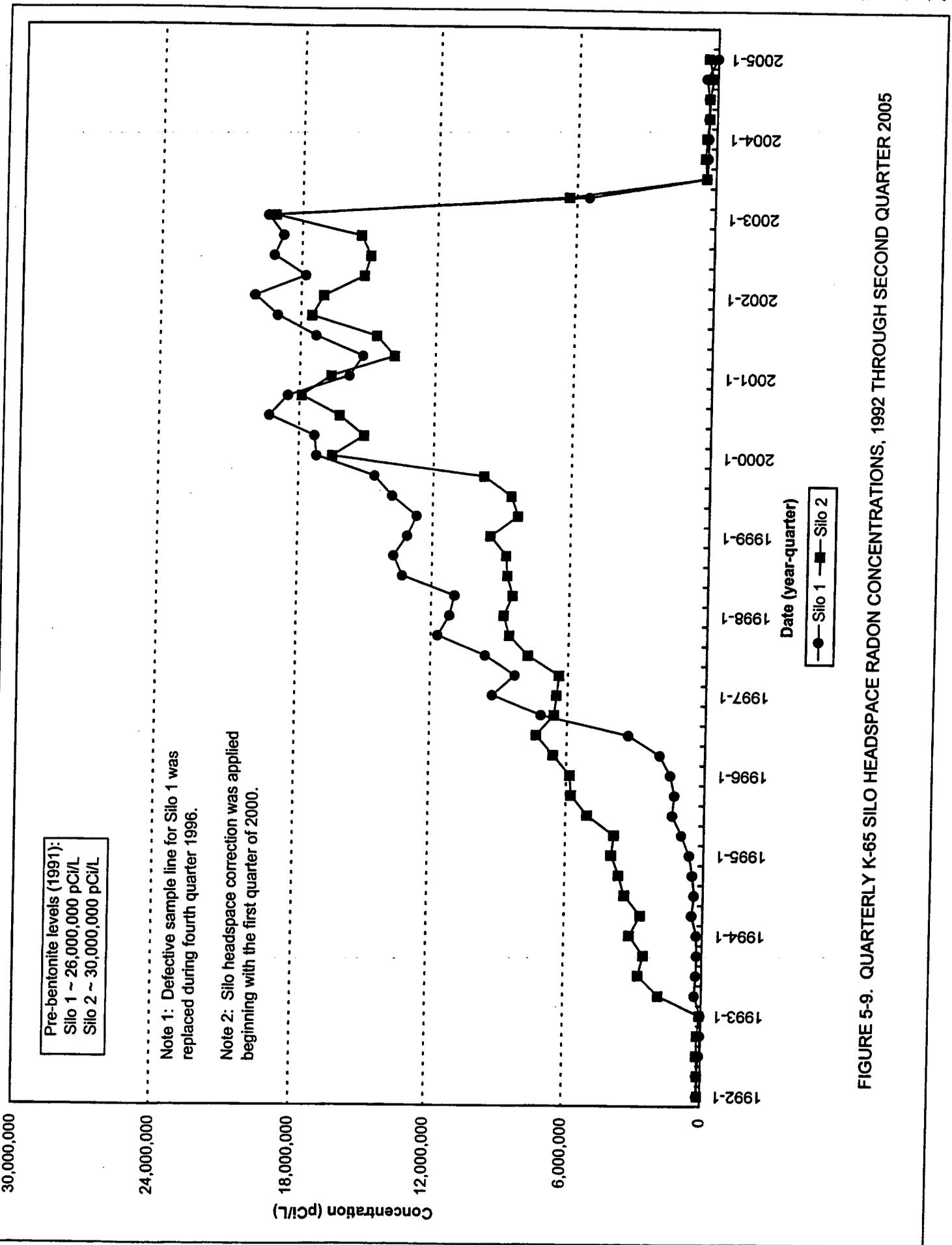
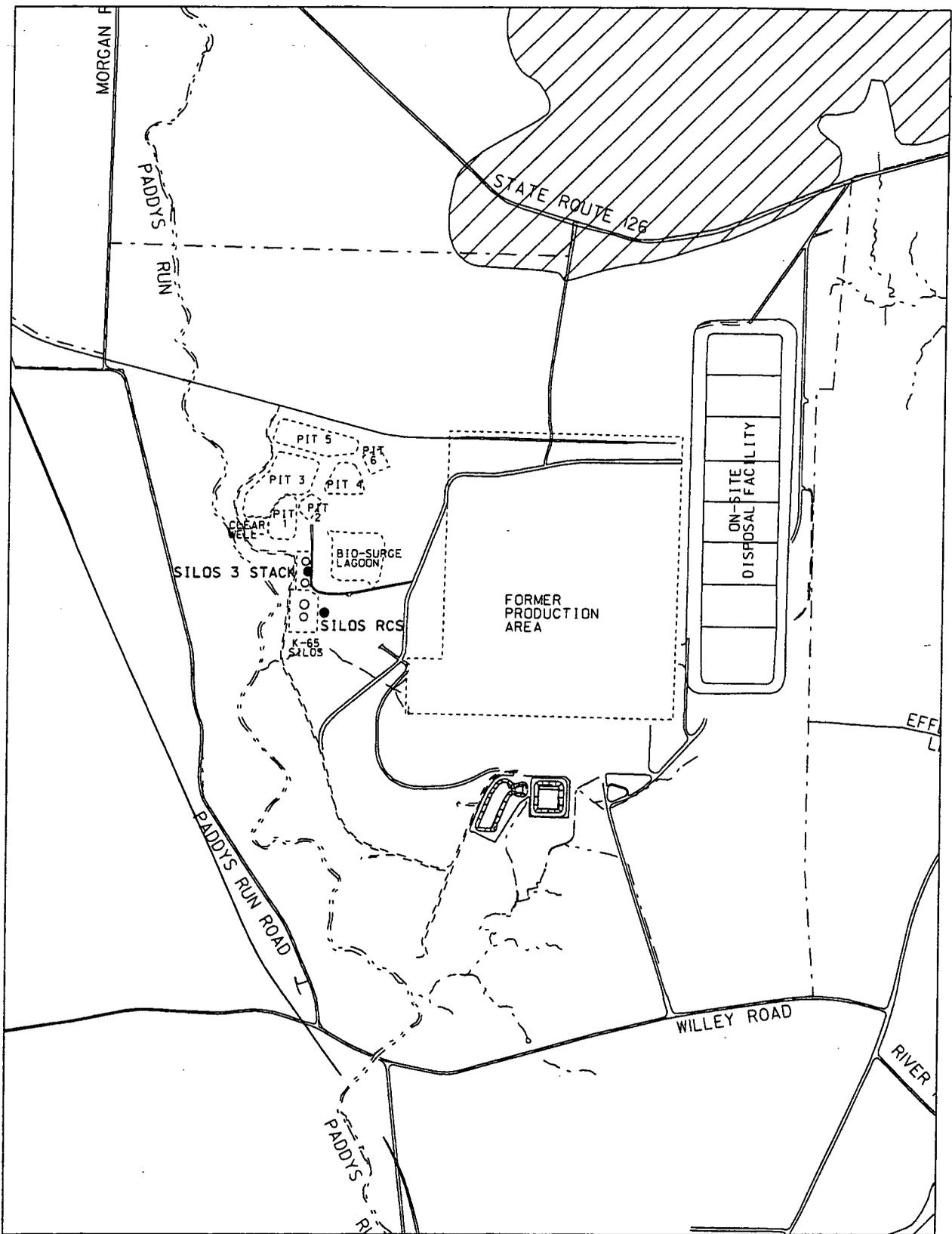


FIGURE 5-9. QUARTERLY K-65 SILO HEADSPACE RADON CONCENTRATIONS, 1992 THROUGH SECOND QUARTER 2005



LEGEND:

- FERNALD SITE BOUNDARY
- NESHAP STACK EMISSION MONITORING LOCATION



FINAL

FIGURE 5-10. NESHAP STACK EMISSION MONITORING LOCATIONS

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