



**Department of Energy**

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OCT 16 2001

Mr. James A. Saric, Remedial Project Manager  
United States Environmental Protection Agency  
Region V-SRF-5J  
77 West Jackson Boulevard  
Chicago, Illinois 60604-3590

DOE-0042-02

Mr. Tom Schneider, Project Manager  
Ohio Environmental Protection Agency  
401 East 5<sup>th</sup> Street  
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

**TRANSMITTAL OF THE INTEGRATED ENVIRONMENTAL MONITORING PLAN 2001  
ANNUAL REVIEW**

This letter transmits the Integrated Environmental Monitoring Plan (IEMP) 2001 Annual Review to the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) for review. An annual review of the IEMP is a commitment of the IEMP, Revision 2. The purpose of the annual review is to identify any programmatic changes necessary to align the IEMP with near-term remediation activities at the site; as well as to compile other changes that will need to be incorporated into the document during the next revision. All changes to the IEMP proposed in this annual review are summarized in tabular form. Several of the more detailed changes are discussed further as attachments. It is the intent of the Department of Energy (DOE) to obtain the USEPA and OEPA's approval of the proposed modifications early in December 2001 such that implementation can occur by January 1, 2002.

If you have any questions concerning the IEMP 2001 Annual Review or the attachments, please contact Kathleen Nickel at (513) 648-3166.

Sincerely,

Johnny W. Reising  
Fernald Remedial Action  
Project Manager

Enclosures: As Stated

OCT 16 2001

Mr. James A. Saric  
Mr. Tom Schneider

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cc w/enclosures:

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ECDC, Fluor Fernald, Inc./MS52-7

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**SUMMARY OF PROPOSED TECHNICAL CHANGES TO THE  
INTEGRATED ENVIRONMENTAL MONITORING PLAN, REV 2**

Section/Page Number	Description of Proposed Change	Driver/Technical Information
Pages 2-9 and 2-10	Update Table 2-2 and Figure 2-2 with the most current information from the cost/schedule re-baseline and otherwise. Refer to Attachment A.	New prime contract has resulted in changes to the planned remediation schedule.
Section 3.5.1.1/ Pages 3-28, 3-30 and 3-31 (Table 3-3, Figures 3-5 and 3-6).	Add Well 23064 to the list of wells monitored quarterly under Activities 1 and 2 of the South Plume Extraction System Monitoring Program.	Well 2551 was plugged and abandoned, as mentioned in the IEMP, Rev. 2, after the landowner chose not to renew the access agreement. Well 23064 was later added to replace 2551.
Section 3.5.1.2/ Page 3-35 (Figure 3-8) and 3-36	Add Well 2048 to the list of wells monitored as part of the South Field Extraction System Monitoring Program.	Added to provide better coverage of the South Field uranium plume east where the inactive flyash pile was formerly located.
Section 3.5.1.6/ Page 3-47 (Figure 3-12) and 3-48	Update list of groundwater elevation monitoring wells by removing Well 2421 and adding Wells 23064 and 22206.	Well 2421 was plugged and abandoned on May 24, 2001 during construction of the Enhanced Permanent Leachate Transmission System. It was located in a ditch where it could have been compromised by high water in the ditch. Well 22206 was added to replace Well 2421. Well 23064 (the replacement for Well 2551) was also added to provide better coverage of the area near the groundwater flow divide.
Section 3.5 Pages 3-32, 3-37, 3-42, and 3-45	The list of wells to be sampled for octachlorodibenzo-p-dioxin and 2,3,7,8-tetrachlorodibenzo-p-dioxin was reduced to 19 monitoring wells, as identified in the June 13, 2001 DOE letter: DOE-0642-01.	<p>These two dioxins are "&lt;N" constituents that are monitored once every five years. The extent of the dioxin sampling and analysis was scaled back due to the fact that it is highly unlikely that these dioxins would reach the aquifer, especially in areas away from where dioxins had been detected in soil or waste. Also, substantial cost-savings were realized through this reduction.</p> <p>The EPA and OEPA both approved this change, and the sampling was conducted accordingly. Future IEMP revisions that include the 5-year sampling of the "&lt;N" constituents will reflect this change.</p>
Section 4.4.2 and Table 4-3 (Pages 4-27 to 4-33)	Perform evaluation of surface water COCs as identified in Section 4.6.1 of the IEMP, and update list of location-specific COCs accordingly. This will result in updates to Section 4.4.2 including the removal of Section 4.4.2.5. Refer to Attachment B for more information.	Section 4.6.1 of the IEMP. Refer to Attachment B of this 2001 IEMP Annual Review for more information.

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**SUMMARY TABLE  
(Continued)**

Section/Page Number	Description of Proposed Change	Driver/Technical Information
Table 4-3/ Pages 4-27 to 4-33	Changed table to reflect modifications to program described above. Several other changes were also made to this table to eliminate redundancy, and to improve clarity.	See Attachment B.
Section 4.5.2.2/Page 4-41	Remove requirement for field blank sample collection associated with surface water samples.	Per the SCQ, field blanks are not required for ASL B data.
Section 8.3.3/Page 8-7	In the second paragraph, remove the sentence stating that the IEMP quarterly summaries will be posted on the fernald.gov Internet site.	The intended audience of the IEMP quarterly summaries is the EPA and OEPA, and this new streamlined reporting format requires access to the IEMP Data Information Site in order to be fully understood. The annual integrated site environmental reports will continue to be provided on the fernald.gov Internet site for stakeholders to access environmental monitoring information.
Section D.2.4/Page D-4	Paragraph 2, Line 3: Replace "are collectively developing" to "collectively developed."	The Memorandum of Understanding (MOU) was finalized and signed in August 2001.
Section D.4.1.1/Page D-8	Paragraph 2: Replace last sentence with the following: "A survey conducted in 2001 supported these findings. The tri-annual survey was accelerated one year in response to remediation activities that took place in Area 1, Phase III (A1PIII), upstream and adjacent to the on-property crayfish habitat."	Moving the scheduled survey up one year was an action item to a comment on the Implementation Plan for Paddys Run Debris Removal/Bank Stabilization and Area 1, Phase III.
Section D.4.1.3/Page D-9	Paragraph 2: Remove "recently" from sentence.	Announcement was made over one year ago.
Section D.4.2/Page D-10	Paragraph 1, Line 1: Change "10" to "11".	Additional acreage identified several years ago.
Section D.2.3/Page D-3	Paragraph 1, Lines 8-9: Delete "and that the Advisory Council on Historic Preservation has an opportunity to comment on those effects." End sentence with "...Places."	Revision and clarification of review requirements were documented in a letter to Joe Schomaker from the Ohio Historic Preservation Office.

**ATTACHMENT A**  
**FEMP INTEGRATED REMEDIATION FIELD ACTIVITIES FOR 2001 AND 2002**

TABLE 2-2

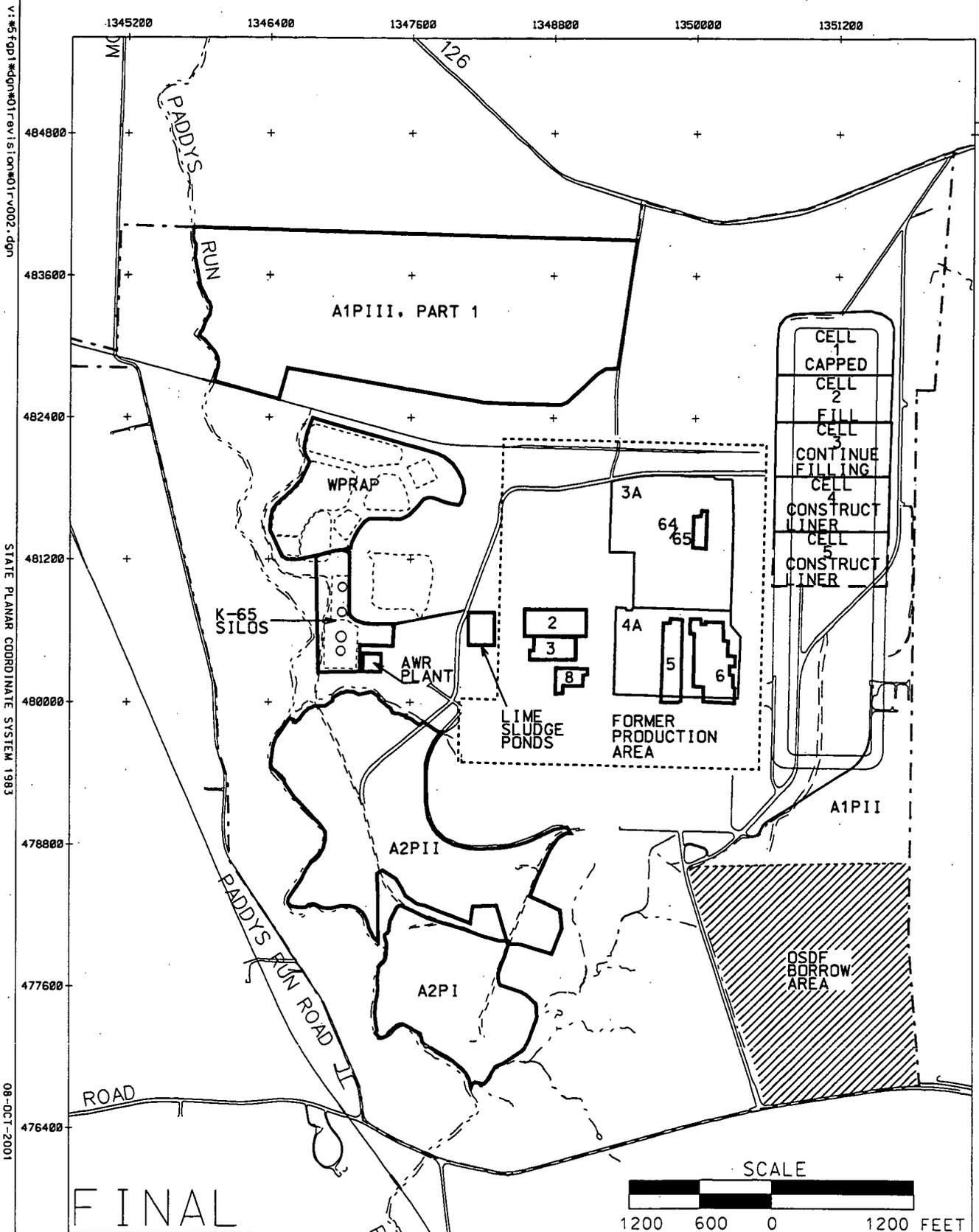
**FEMP INTEGRATED REMEDIATION FIELD ACTIVITIES FOR  
2001 AND 2002<sup>a</sup>**

Remediation Project	2001	2002
Waste Pits Remedial Action Project (WPRAP)	Continue waste excavation, treatment, shipment, and off-site disposal by rail	Continue waste excavation, treatment, shipment, and off-site disposal by rail
Soil and Disposal Facility Project (SDFP)	<p>Continue and complete Area 1, Phase III Part 1 excavation</p> <p>Continue and complete Area 1, Phase II and Area 2, Phase I excavation</p> <p>Begin Area 3A/4A excavation</p> <p>Begin and complete Lime Sludge Ponds excavation</p> <p>Begin Cell 1 cap</p> <p>Continue Cell 2 and Cell 3 impacted material placement</p> <p>Continue Borrow Area activities</p>	<p>Continue Area 3A/4A excavation</p> <p>Begin Area 2, Phase II excavation</p> <p>Complete Cell 1 cap</p> <p>Continue and complete Cell 2 impacted material placement</p> <p>Continue Cell 3 impacted material placement</p> <p>Shutdown North Access Road</p> <p>Begin and complete Cell 4 and Cell 5 liners construction</p> <p>Continue Borrow Area activities</p>
Aquifer Restoration Project (ARP)	<p>Sitewide environmental monitoring</p> <p>Continue operation of water treatment facilities</p> <p>Continue South Plume Module and South Field Module extraction well operations</p> <p>Continue Re-Injection Module well operations</p> <p>Installation and maintenance of supplemental extraction/re-injection wells (as necessary)</p> <p>Continued collection and treatment of storm water (as necessary) and wastewater</p> <p>Continued on-site disposal facility leak detection and leachate monitoring</p> <p>Install Waste Storage Area Module (Phase I) Extraction Wells</p>	<p>Sitewide environmental monitoring</p> <p>Continue operation of water treatment facilities</p> <p>Continue South Plume Module and South Field Module extraction well operations</p> <p>Continue Re-Injection Module well operations</p> <p>Installation and maintenance of supplemental extraction/re-injection wells (as necessary)</p> <p>Continued collection and treatment of storm water (as necessary) and wastewater</p> <p>Continued on-site disposal facility leak detection and leachate monitoring</p> <p>Begin Operating the Waste Storage Area (Phase I) Extraction Wells</p> <p>Begin Site Preparation activities for Vacuum Assisted Thermal Desorption Project</p>

**TABLE 2-2  
 (Continued)**

Remediation Project	2001	2002
Decontamination and Demolition Project (D&D)	Continue utility relocations	Continue utility relocations
	Miscellaneous Structure Demolition	Miscellaneous Structure Demolition
	Begin demolition activities at Multi-complex (Plant 2, 3, 8, General Sump and Liquid Storage Complex)	Complete demolition of Plant 6 Complex
	Continue demolition of Plant 6 Complex	Continue demolition activities at Multi-complex
	Complete Plant 5 Complex	Begin and complete demolition of Buildings 64 & 65
Silos Projects	Continue Silos 1 and 2 Accelerated Waste Retrieval Plant Construction and Radon Control System	Begin Silo 3 Construction
		Continue Silos 1 and 2 Accelerated Waste Retrieval Plant Construction and Radon Control System Phase I Startup

<sup>a</sup>All schedule information is based on the Fluor Fernald, Inc. revised baseline, September 2001, with updates based on additional funding made available to the Soil and Disposal Facility Project. Information is subject to change until the revised baseline receives final DOE approval.



- LEGEND:**
- FEMP BOUNDARY
  - SDFP: ACTIVITIES SHOWN BY CELL OR EXCAVATION AREA
  - SILOS: CONSTRUCTION
  - D&D: COMPLEXES IDENTIFIED BY PLANT NUMBERS
  - WPRAP: EXCAVATION, TREATMENT AND OFF-SITE DISPOSAL OF WASTE PIT MATERIALS

FIGURE 2-2. PLANNED FEMP REMEDIATION ACTIVITIES FOR 2001 AND 2002

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ATTACHMENT B  
EVALUATION OF SURFACE WATER MONITORING CONSTITUENTS

**Attachment B**  
**Evaluation of Surface Water Monitoring Constituents**

The purpose of this evaluation is to reduce the list of constituents of concern (COCs) monitored at Integrated Environmental Monitoring Plan (IEMP) surface water monitoring locations, as specified in Section 4.6.1 of the IEMP. Specifically, the focus of this effort is to evaluate COCs originally selected due to insufficient data or sporadic final remediation level/benchmark toxicity value (FRL/BTV) exceedances. During initial development of the IEMP in 1996, several criteria were used to establish the list of surface water COCs monitored under the IEMP. Sections 4.4.2.3 and 4.4.2.5 of IEMP, Rev. 2 discuss the surface water COCs that were selected for monitoring based on historical sporadic FRL/BTV exceedances or the lack of sufficient data, respectively. Since that time, approximately four years of data collection under the IEMP have provided more information on the concentration of these COCs in surface water at the FEMP.

Section 4.6.1 of the IEMP provides the basis for removing COCs from the IEMP surface water monitoring program. It specifies that COCs included in the program due to insufficient historical data and/or sporadic FRL/BTV exceedances can be removed if they do not exceed the FRL/BTV for one calendar year (or a minimum of four samples) at a specific location, unless the constituent was also selected based on modeling considerations. In order to determine what constituents should be removed, an evaluation of the data was performed.

Table B-1 summarizes the results of this evaluation, and includes those constituents monitored at each location for either sporadic exceedances or insufficient data. It also summarizes the total number of samples collected at each location from August 1997 through June 2001, the number of FRL/BTV exceedances, the date of the last exceedance, the number of samples collected since the last exceedance, and the reason for monitoring (e.g., sporadic exceedance, insufficient data). Table B-1 highlights those constituents that can be removed either because sufficient data have been collected and/or due to the lack of FRL/BTV exceedances as specified in Section 4.6.1. It is important to note that the total number of FRL and BTV exceedances that occurred over the last four years at any one location have been minimal (i.e., a maximum of four exceedances), and in many cases there have been numerous sampling events since the last FRL/BTV exceedance. Additionally, although total uranium has not exceeded the surface water FRL (530 µg/L) at any location, it will continue to be monitored quarterly at each IEMP location since it is the primary COC at the site; therefore, it is not a highlighted constituent in Table B-1.

Table 4-3, in turn, has been updated, by removing those constituents that are highlighted in Table B-1, and as follows:

- The four columns under IEMP characterization have been combined into one column, which identifies the frequency of sample collection, as well as the reason for monitoring (i.e., modeling, sporadic exceedances, background and primary COCs).

- Primary COCs have been added as a criterion for surface water monitoring. The primary COCs include total uranium (due to being a site primary COC) and three thorium isotopes (due to excavation of the waste pits). These constituents are identified as primary COCs rather than sporadic FRL exceedances to more accurately characterize the reason for monitoring.
- Insufficient data is no longer a criteria because sufficient data have now been collected to determine that these constituents are not a concern at the FEMP.
- Several constituents in Table 4-3 and B-1 have been monitored both for modeling purposes and because the constituent had sporadic FRL/BTV exceedances prior to 1997. When there is no longer a need to monitor these constituents for sporadic exceedances (i.e., an FRL or BTV has not been exceeded since at least second quarter of 2000), the purpose for monitoring has been updated solely to modeling, and the constituent will continue to be monitored at the specific location.

The following key surface water monitoring criteria have not changed:

- All IEMP Characterization sampling will continue to be conducted quarterly.
- Location SWP-03 is a key monitoring point because it represents the final point before surface water leaves the site. This location will continue to be monitored for additional constituents that are monitored at upgradient locations.
- All constituents originally selected for monitoring at SWRB 4002O will be retained because not enough data have been collected to remove any constituents (i.e., there are fewer than four samples).
- Any constituent monitored at a location because of NPDES or FFCA requirements will continue to be monitored (i.e., PF 4001) at the required NPDES/FFCA sampling location and frequency, and will remain listed under the NPDES/FFCA column of Table 4-3 of the IEMP.
- Although total uranium has not exceeded the surface water FRL (530 µg/L) at any location, it will continue to be monitored quarterly because it is the primary COC at the site.

Pending agency approval, the proposed changes will become effective on January 1, 2002. While this evaluation is comprehensive of all data through June 2001, the sampling and analysis prescribed in the IEMP, Rev. 2 will continue through the end of 2001. All additional data collected through the end of this year will be evaluated in the IEMP Quarterly Summaries. Should there be additional FRL/BTV exceedances for constituents that are currently identified for removal, these constituents will be retained in the IEMP Characterization Monitoring program. Early in 2002, a final Table 4-3 will be provided to the EPA and OEPA after all 2001 data are available and have been reviewed. This table will incorporate any new information not available at the time of this evaluation.

Evaluation of Constituents Selected for IEMP Characterization Surface Water Monitoring Due to Sporadic FRL/BTV Exceedances or Insufficient Historical Data

Location	Currently Monitored COCs	Basis for Selection of Constituent Code <sup>a, b</sup>	No. of Analyses <sup>c</sup>	No. of FRL Exceedances <sup>c</sup>	Date of Last FRL Exceedance (No. of samples since exceedance) <sup>c</sup>	No. of BTV Exceedances <sup>c</sup>	Date of Last BTV Exceedance (No. of samples since exceedance) <sup>c</sup>	
SWP-02 (Paddys Run)	<b>Inorganics:</b>							
	Beryllium	S	22	1	10/28/1997 (19)	-	-	
	Cadmium	S	22	1	10/28/1997 (19)	2	02/12/1998 (16)	
	Chromium, Total	S	22	2	12/15/1998 (9)	-	-	
	Copper	S	22	2	05/11/1998 (13)	-	-	
	Manganese	S	22	1	10/28/1997 (19)	-	-	
	Mercury	S	22	1	10/28/1997 (19)	-	-	
	<b>Radionuclides:</b>							
	Technetium-99	M, S	22	0	-	-	-	
	Total Uranium <sup>d</sup>	S <sup>d</sup>	22	0	-	-	-	
SWP-03 (Paddys Run at Downstream Property Boundary)	<b>Inorganics:</b>							
	Mercury	M, S	19	1	04/13/1998 (12)	-	-	
	Silver	M, S	20	0	-	1	10/28/1997 (18)	
	Chromium, Total	S	20	3	10/05/2000 (2)	-	-	
	Copper	S	20	1	09/25/2000 (3)	-	-	
	Barium	S	20	0	-	0	-	
	Beryllium	S	20	0	-	-	-	
	Cadmium	S	20	0	-	0	-	
	Lead	S	20	0	-	-	-	
	Manganese	S	20	0	-	-	-	
	Selenium	S	20	0	-	-	-	
	<b>Radionuclides:</b>							
	Total Uranium <sup>d</sup>	M, S <sup>d</sup>	20	0	-	-	-	
	Technetium-99 <sup>e</sup>	M, S	20	0	-	-	-	
	Lead-210	I	13	0	-	-	-	
	<b>Semi-Volatiles:</b>							
	bis(2-Ethylhexyl)phthalate	S	20	0	-	-	-	
	3,3'-Dichlorobenzidine	I	13	0	-	-	-	
	Benzo(a)anthracene	I	13	0	-	-	-	
Benzo(a)pyrene	I	13	0	-	-	-		
Dibenzo(a,h)anthracene	I	13	0	-	-	-		
Di-n-octyl phthalate	S	20	0	-	-	-		
<b>Volatiles:</b>								
Tetrachloroethene	S	21	0	-	-	-		
1,1,1-Trichloroethane	S	21	0	-	-	-		
SWD-01 (Northeast Drainage)	<b>Inorganics:</b>							
	Cyanide	M, S	24	0	-	-	-	
	Beryllium	S	24	0	-	-	-	
	Lead	S	24	0	-	-	-	
	Manganese	S	24	0	-	-	-	
Zinc	S	24	4	11/12/1998 (10)	-	-		

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TABLE B.1  
(Continued)

Location	Currently Monitored COCs	Basis for Selection of Constituent Code <sup>a, b</sup>	No. of Analyses <sup>c</sup>	No. of FRL Exceedances <sup>c</sup>	Date of Last FRL Exceedance (No. of samples since exceedance) <sup>c</sup>	No. of BTV Exceedances <sup>c</sup>	Date of Last BTV Exceedance (No. of samples since exceedance) <sup>c</sup>
SWD-02 (Storm Sewer Outfall Ditch)	Inorganics:						
	Cadmium	S	26	0	-	0	-
	Manganese	S	26	0	-	-	-
	Radionuclides:						
	Total Uranium <sup>d</sup>	M, S <sup>d</sup>	47	0	-	-	-
	Semi-Volatiles:						
SWD-03 (Waste Storage Area)	Inorganics:						
	Copper	S	25	2	04/20/2001 (0)	-	-
	Barium	S	25	0	-	0	-
	Chromium, Total	S	25	0	-	-	-
	Lead	S	25	0	-	-	-
	Manganese	S	25	0	-	-	-
	Radionuclides:						
	Total Uranium <sup>d</sup>	S <sup>d</sup>	43	0	-	-	-
	Semi-Volatiles:						
	bis(2-Ethylhexyl)phthalate	S	25	0	-	-	-
	Volatiles:						
Tetrachloroethene	S	25	0	-	-	-	
1,1,1-Trichloroethane	S	25	0	-	-	-	
PF 4001 <sup>f</sup> (Parshall Flume - Treated Effluent)	Inorganics:						
	Cyanide	M, S	216	0	-	-	-
	Mercury	M, S	43	0	-	-	-
	Beryllium	S	51	0	-	-	-
	Cadmium <sup>g</sup>	S	240	0	-	0	-
	Chromium, Total <sup>g</sup>	S	240	0	-	-	-
	Copper <sup>g</sup>	S	314	0	-	-	-
	Manganese <sup>g</sup>	S	176	0	-	-	-
	Radionuclides:						
	Technetium-99	M, S	48	0	-	-	-
	Total Uranium <sup>d</sup>	M, S <sup>d</sup>	1421	0	-	-	-
	Lead-210	S	16	0	-	-	-
	Radium-228 <sup>g</sup>	S	47	0	-	-	-
	Semi-Volatiles:						
Benzo(a)anthracene	S	16	0	-	-	-	
Benzo(a)pyrene	S	16	0	-	-	-	
Dibenzo(a,h)anthracene	S	16	0	-	-	-	
Di-n-octyl phthalate	S	16	0	-	-	-	
3,3'-Dichlorobenzidine	S	16	0	-	-	-	

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TABLE B.1  
(Continued)

Location	Currently Monitored COCs	Basis for Selection of Constituent Code <sup>a, b</sup>	No. of Analyses <sup>c</sup>	No. of FRL Exceedances <sup>c</sup>	Date of Last FRL Exceedance (No. of samples since exceedance) <sup>c</sup>	No. of BTV Exceedances <sup>c</sup>	Date of Last BTV Exceedance (No. of samples since exceedance) <sup>c</sup>
SWRB 40020 (Storm Water Retention Basin)	Inorganics:						
	Cyanide	M, S <sup>h</sup>	2	0	-	-	-
	Manganese	S <sup>h</sup>	2	0	-	-	-
	Mercury	M,	2	0	-	-	-
	Radionuclides:						
	Radium-228	S <sup>h</sup>	2	0	-	-	-
STRM 4003 <sup>i</sup> (Drainage to Paddys Run)	Radionuclides:						
	Total Uranium <sup>d</sup>	M <sup>g</sup> , S <sup>d</sup>	10	0	-	-	-
STRM 4004 <sup>i</sup> (Drainage to Paddys Run)	Radionuclides:						
	Total Uranium <sup>d</sup>	M <sup>g</sup> , S <sup>d</sup>	7	0	-	-	-
STRM 4005 <sup>i</sup> (Drainage to Paddys Run)	Radionuclides:						
	Total Uranium <sup>d</sup>	M <sup>g</sup> , S <sup>d</sup>	28	0	-	-	-
STRM 4006 <sup>i</sup> (Drainage to Paddys Run)	Radionuclides:						
	Total Uranium <sup>d</sup>	M <sup>g</sup> , S <sup>d</sup>	10	0	-	-	-

Shading indicates location-specific COCs will be removed from monitoring based on evaluation or removal of a monitoring criteria (e.g., S).

<sup>a</sup>M = Based on Modeling; S = Sporadic Exceedances; I = Insufficient Number of Historical Analyses

<sup>b</sup>Those constituents monitored based on Modeling (M) will continue to be monitored even if there has been no FRL/BTV exceedance; therefore, these constituents are not shaded.

<sup>c</sup>Based on analytical data from August 1997 through June 2001.

<sup>d</sup>Total uranium will continue to be monitored quarterly whether there is a basis or not (i.e., M, S, I) and the monitoring criteria will be identified as a Primary COC (PC).

<sup>e</sup>Based on historical information, technetium-99 should also have been identified for monitoring due to modeling criteria from an upgradient area in addition to sporadic FRL/BTV exceedances. Therefore, the revised Table 4-3 will reflect modeling as a monitoring criterion.

<sup>f</sup>There have been no FRL/BTV exceedances based upon the mixing equation using the 7 day, 10-year low flow value of 583 cubic feet per second.

<sup>g</sup>These constituents will continue to be monitored under NPDES or FFCA requirements.

<sup>h</sup>There was insufficient data from which to make an evaluation.

<sup>i</sup>The basis for the selection criteria for these locations has been changed from "M, S" to "PC" for the purpose of accurately reflecting the basis for monitoring.

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TABLE 4-3

**SUMMARY OF SURFACE WATER AND TREATED EFFLUENT SAMPLING  
REQUIREMENTS BY LOCATION**

Location	Constituent <sup>a</sup>	IEMP Characterization Requirements (reason for selection) <sup>b,c</sup>	NPDES Requirements <sup>c</sup>	FFCA Requirements <sup>c</sup>	
SWP-01 and SWR-01 (SWR-4801) (Paddys Run and Great Miami River Background)	<b>General Chemistry:</b>				
	Ammonia	-	Quarterly <sup>d</sup>	-	
	Fluoride	Quarterly (B)	-	-	
	Nitrate/Nitrite	Quarterly (B)	-	-	
	Total hardness	-	Quarterly <sup>d</sup>	-	
	<b>Inorganics:</b>				
	Antimony	Quarterly (B)	-	-	
	Arsenic	Quarterly (B)	-	-	
	Barium	Quarterly (B)	-	-	
	Beryllium	Quarterly (B)	-	-	
	Cadmium	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Chromium, Total	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Cobalt	-	Quarterly <sup>d</sup>	-	
	Copper	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Cyanide	Quarterly (B)	-	-	
	Lead	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Manganese	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Mercury	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Molybdenum	Quarterly (B)	-	-	
	Nickel	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Selenium	Quarterly (B)	-	-	
	Silver	Quarterly (B)	Quarterly <sup>d</sup>	-	
	Vanadium	Quarterly (B)	-	-	
	Zinc	Quarterly (B)	Quarterly <sup>d</sup>	-	
	<b>Radionuclides:</b>				
	Cesium-137	Quarterly (B)	-	-	
	Lead-210	Quarterly (B)	-	-	
Neptunium-237	Quarterly (B)	-	-		
Plutonium-238	Quarterly (B)	-	-		
Plutonium-239/240	Quarterly (B)	-	-		
Radium-226	Quarterly (B)	-	-		
Radium-228	Quarterly (B)	-	-		
Strontium-90	Quarterly (B)	-	-		
Technetium-99	Quarterly (B)	-	-		
Thorium-228	Quarterly (B)	-	-		
Thorium-230	Quarterly (B)	-	-		
Thorium-232	Quarterly (B)	-	-		
Uranium, Total	Quarterly (B)	-	-		
<b>Pesticides/PCBs:</b>					
alpha-Chlordane	Quarterly (B)	-	-		
Aroclor-1254	Quarterly (B)	-	-		
Aroclor-1260	Quarterly (B)	-	-		
Dieldrin	Quarterly (B)	-	-		
<b>Semi-Volatiles:</b>					
Benzo(a)anthracene	Quarterly (B)	-	-		
Benzo(a)pyrene	Quarterly (B)	-	-		
bis(2-Chloroisopropyl)ether	Quarterly (B)	-	-		
bis(2-Ethylhexyl)phthalate	Quarterly (B)	-	-		
Dibenzo(a,h)anthracene	Quarterly (B)	-	-		
3,3'-Dichlorobenzidine	Quarterly (B)	-	-		
Di-n-butylphthalate	Quarterly (B)	-	-		
Di-n-octylphthalate	Quarterly (B)	-	-		
p-Methylphenol	Quarterly (B)	-	-		
4-Nitrophenol	Quarterly (B)	-	-		

Table 4-3  
(Continued)

Location	Constituent <sup>a</sup>	IEMP Characterization Requirements (reason for selection) <sup>b,c</sup>	NPDES Requirements <sup>c</sup>	FFCA Requirements <sup>c</sup>
SWP-01 and SWR-01 (SWR-4801) Paddys Run and Great Miami River Background Contd.	<b>Volatiles:</b>			
	Benzene	Quarterly (B)	-	-
	Bromodichloromethane	Quarterly (B)	-	-
	Bromomethane	Quarterly (B)	-	-
	Chloroform	Quarterly (B)	-	-
	1,1-Dichloroethene	Quarterly (B)	-	-
	Methylene chloride	Quarterly (B)	-	-
	Tetrachloroethene	Quarterly (B)	-	-
SWP-02 (Paddys Run)	<b>Radionuclides:</b>			
	Technetium-99	Quarterly (M)	-	-
	Thorium-228 <sup>e</sup>	Quarterly (PC)	-	-
	Thorium-230 <sup>e</sup>	Quarterly (PC)	-	-
	Thorium 232 <sup>e</sup>	Quarterly (PC)	-	-
	Uranium, Total	Quarterly (PC)	-	-
SWP-03 (Paddys Run at Downstream Property Boundary)	<b>Inorganics:</b>			
	Chromium, Total	Quarterly (S)	-	-
	Copper	Quarterly (S)	-	-
	Cyanide	Quarterly (M)	-	-
	Mercury	Quarterly (M)	-	-
	Silver	Quarterly (M)	-	-
	Zinc	Quarterly (M)	-	-
	<b>Radionuclides:</b>			
	Radium-226	Quarterly (M)	-	-
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M) <sup>f</sup>	-	-
	Thorium-228 <sup>e</sup>	Quarterly (PC)	-	-
	Thorium-230 <sup>e</sup>	Quarterly (PC)	-	-
	Thorium 232 <sup>e</sup>	Quarterly (PC)	-	-
	Uranium, Total	Quarterly (PC, M)	-	-
SWD-01 (Northeast Drainage)	<b>Inorganics:</b>			
	Mercury	Quarterly (M)	-	-
	Cyanide	Quarterly (M)	-	-
	<b>Radionuclides:</b>			
	Uranium, Total	Quarterly (PC, M)	-	-
SWD-02 (Storm Sewer Outfall Ditch)	<b>Radionuclides:</b>			
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M)	-	-
	Uranium, Total	Quarterly (PC, M)	-	-
SWD-03 (Waste Storage Area)	<b>Inorganics:</b>			
	Copper	Quarterly (S)	-	-
	Cyanide	Quarterly (M)	-	-
	Mercury	Quarterly (M)	-	-
	Silver	Quarterly (M)	-	-
	Zinc	Quarterly (M)	-	-
	<b>Radionuclides:</b>			
	Technetium-99	Quarterly (M)	-	-
	Thorium-228 <sup>e</sup>	Quarterly (PC)	-	-
	Thorium-230 <sup>e</sup>	Quarterly (PC)	-	-
Thorium-232 <sup>e</sup>	Quarterly (PC)	-	-	
	Uranium, Total	Quarterly (PC)	-	-
PF 4001 (Parshall Flume - Treated Effluent)	<b>General Chemistry:</b>			
	Ammonia	-	3/Week <sup>g</sup>	-
	Carbonaceous biochemical oxygen demand	-	2/Week	-
	Total residual chlorine	-	3/Week	-
	Oil and grease	-	2/Week	-
	Total suspended solids	-	Daily	-

**Table 4-3  
(Continued)**

Location	Constituent <sup>a</sup>	IEMP Characterization Requirements (reason for selection) <sup>b,c</sup>	NPDES Requirements <sup>c</sup>	FFCA Requirements <sup>c</sup>
<b>PF 4001 (Parshall Flume Treated Effluent) Contd.</b>	<b>Inorganics:</b>			
	Cadmium	-	3/Week	-
	Chromium, Total	-	3/Week	-
	Cobalt	-	2/Week	-
	Copper	-	3/Week	-
	Cyanide	Quarterly (M) <sup>8</sup>	3/Week	-
	Lead	-	3/Week	-
	Manganese	-	2/Week	-
	Mercury	Quarterly (M) <sup>8</sup>	Monthly	-
	Nickel	-	3/Week	-
	Silver	Quarterly (M) <sup>8</sup>	3/Week	-
	Zinc	-	3/Week	-
	<b>Radionuclides:</b>			
	Radium-226	Quarterly (M)	-	-
	Radium-228	-	-	Monthly
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M)	-	Monthly
	Uranium, Total	Quarterly (PC, M)	-	Daily
	<b>Pesticides/PCBs:</b>			
	Toxaphene	-	Monthly	-
	<b>Semi-Volatiles:</b>			
	Benzidene	-	Monthly	-
	Pentachlorophenol	-	Monthly	-
	<b>Volatiles:</b>			
	Trichloroethene	-	Monthly	-
	<b>Other:</b>			
	2,3,7,8-Tetrachlorodibenzo-p-dioxin	-	Quarterly	-
	Flow Rate	-	Daily	-
<b>SWRB 4002O<sup>b</sup> (Storm Water Retention Basin)</b>	<b>General Chemistry:</b>			
	Total residual chlorine	-	Daily	-
	Total suspended solids	-	Daily	-
	<b>Inorganics:</b>			
	Beryllium	Quarterly (S)	-	-
	Cadmium	Quarterly (S)	-	-
	Copper	-	Monthly	-
	Cyanide	Quarterly (M, S)	-	-
	Manganese	Quarterly (S)	-	-
	Mercury	Quarterly (M, S)	Monthly	-
	<b>Radionuclides:</b>			
	Radium-226	Quarterly (M)	-	-
	Radium-228	Quarterly (S)	-	-
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M, S)	-	-
	Uranium, Total	Quarterly (PC, M)	-	Daily
	<b>Other:</b>			
	Flow rate	-	Daily	-
<b>SWRB 4002B (Treatment Bypass)</b>	<b>Radionuclide:</b>			
	Uranium, Total	-	-	Daily during bypass
<b>STRM 4003, STRM 4004<sup>1</sup> STRM 4005, STRM 4006 (Drainages to Paddys Run)</b>	<b>General Chemistry:</b>			
	Total suspended solids	-	Semiannually	-
	Total residual chlorine (4003, 4005, 4006)	-	Semiannually	-
	<b>Inorganics:</b>			
	Copper (4003, 4004, 4006)	-	Semiannually	-
	Lead (4004, 4005, 4006)	-	Semiannually	-
	Mercury	-	Semiannually	-
	Silver	-	Semiannually	-
	<b>Radionuclides:</b>			
	Uranium, Total	Quarterly (PC)	-	-
	<b>Other:</b>			
	Fecal coliform	-	Semiannually	-
	Flow Rate	-	Semiannually	-

Table 4-3  
(Continued)

Location	Constituent <sup>a</sup>	IEMP Characterization Requirements (reason for selection) <sup>b,c</sup>	NPDES Requirements <sup>c</sup>	FFCA Requirements <sup>c</sup>
STP 4601 (Sewage Treatment Plant Effluent)	<b>General Chemistry:</b>			
	Carbonaceous biochemical oxygen demand	-	2/Week	-
	Ammonia	-	Every two weeks	-
	Total suspended solids	-	2/Week	-
	<b>Other:</b>			
	Fecal coliform Flow Rate	-	Weekly (May-Oct) Daily	-
SWR-4902 (Downstream of FEMP Effluent)	<b>General Chemistry:</b>			
	Ammonia	-	Quarterly	-
	Total Hardness	-	Quarterly	-
	<b>Inorganics</b>			
	Cadmium	-	Quarterly	-
	Chromium	-	Quarterly	-
	Cobalt	-	Quarterly	-
	Copper	-	Quarterly	-
	Lead	-	Quarterly	-
	Manganese	-	Quarterly	-
	Mercury	-	Quarterly	-
	Nickel	-	Quarterly	-
	Silver	-	Quarterly	-
	Zinc	-	Quarterly	-

<sup>a</sup>Field parameter readings, taken at each location, include temperature, specific conductance, pH, and dissolved oxygen.

<sup>b</sup>B = Background Evaluation; M = Based on Modeling; PC = Primary COC; S = Sporadic Exceedances

<sup>c</sup>"-" indicates the constituent is not included in the sample program.

<sup>d</sup>Refers only to location SWR-1 (NPDES location SWR-4801); constituents sampled quarterly.

<sup>e</sup>Constituent being monitored during excavation of the waste pits to assess thorium releases as a whole.

<sup>f</sup>The basis for the "M" designation is because of the contribution from an upgradient location (i.e., SWP-02).

<sup>g</sup>Sampled twice a week in winter (November 1 through April 30).

<sup>h</sup>Constituents will be analyzed at each overflow event.

<sup>i</sup>New location STRM 4004A has been identified as an alternative sample location for STRM 4004. STRM 4004A will be sampled for the constituents if no flow is observed at STRM 4004 or is otherwise not accessible.