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March 19, 2024

Ms. April Webb
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PPPO-02-10026989-24C

Mr. Victor Weeks
Federal Facility Agreement Manager
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Dear Ms. Webb and Mr. Weeks:

**TRANSMITTAL OF THE OPERATION AND MAINTENANCE PLAN FOR SECTIONS
1 AND 2 OF THE NORTH-SOUTH DIVERSION DITCH AT THE PADUCAH
GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, DOE/LX/07-2484&D1**

Enclosed is the *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2484&D1*, previously DOE/OR/07-2057&D2. This document has been revised to reflect the removal of the ion exchange system from C-400 and the removal of the C-616-H lift station. A redline version of the document that identifies these revisions is included in this submittal for reference.

In accordance with Section XX of the Paducah Federal Facility Agreement (FFA), the U.S. Environmental Protection Agency and the Kentucky Department for Environmental Protection have a 90-day review period. If the FFA parties have no substantive comments, then DOE requests a letter of concurrence.

If you have any questions or require additional information, please contact Richard Bonczek at (859) 321-7127.

Sincerely,

APRIL LADD Digitally signed by APRIL LADD
Date: 2024.03.19 08:51:46
-05'00'

April Ladd
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:

1. *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky—Clean*
2. *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky—Redline*

Administrative Record File—NSDD-PD

cc w/ enclosures:

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DOE/LX/07-2484&D1
(Previously DOE/OR/07-2057&D2)
Secondary Document

**Operation and Maintenance Plan for
Sections 1 and 2 of the
North-South Diversion Ditch at the
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**



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DOE/LX/07-2484&D1
(Previously DOE/OR/07-2057&D2)
Secondary Document

**Operation and Maintenance Plan for
Sections 1 and 2 of the
North-South Diversion Ditch at the
Paducah Gaseous Diffusion Plant,
Paducah, Kentucky**

Date Issued—March 2024

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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ACRONYMS

DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
KPDES	Kentucky Pollutant Discharge Elimination System
NSDD	North-South Diversion Ditch
O&M	operation and maintenance
PGDP	Paducah Gaseous Diffusion Plant
ROD	Record of Decision
URMA	underground radiological material area
USEC	United States Enrichment Corporation

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) conducted environmental restoration activities for the North-South Diversion Ditch (NSDD) at the Paducah Gaseous Diffusion Plant (PGDP) to address contamination resulting from historic operations, waste-handling, and disposal activities and practices at PGDP. This Operation and Maintenance (O&M) Plan relates to response actions for Sections 1 and 2 of the NSDD. This O&M Plan supersedes the previously approved O&M Plan that pertained to the NSDD (i.e., *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2057&D2, February 2005 [DOE 2005a]). DOE O&M activities associated with the NSDD remedial action include the operation of a lift station (C-400-L), which is incorporated in the NSDD remedial system; keeping the components of the water transfer system clear of debris; activating and inspecting heat tracing on aboveground piping; mowing the surge basin and around structures; inspecting the concrete-paved ditch section and spillway in the surge basin, inspecting the surface cover in the surge basin to ensure maintenance of surface integrity; and conducting inspections to assure postings are legible. Two additional lift stations [C-616-L (the lift station located at the C-616-L Effluent Control Vault) and C-616-C] were incorporated into the NSDD remedial system and were previously maintained by the United States Enrichment Corporation. Inspection and maintenance of these lift stations are addressed in this document revision.

1. INTRODUCTION

The U.S. Department of Energy (DOE) conducted environmental restoration activities for the North-South Diversion Ditch (NSDD) at the Paducah Gaseous Diffusion Plant (PGDP) to address contamination that is the result of historic operations, waste handling, and disposal practices at PGDP. As part of its efforts, DOE is submitting this Operation and Maintenance (O&M) Plan documenting the completion of response and remedial actions related to Sections 1 and 2 of the NSDD. This plan follows the general outline for O&M Plans found in Appendix D of the *Federal Facility Agreement* (EPA 1998) and supersedes the previous O&M document for the NSDD (i.e., *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2057&D2, February 2005 [DOE 2005a]).

2. GENERAL HISTORY

The NSDD originates within the north central portion of PGDP (Figure 1) and joins with Little Bayou Creek to the north. Historically, the NSDD received wastewater from the C-400 Cleaning Building, C-602 Coal Storage Yard coal pile runoff, and storm water runoff. In 1977, the C-616-C Lift Station was constructed upstream of the point where the NSDD exits the PGDP security fence. This lift station diverts all normal flow from upstream locations in the NSDD to the C-616-F Full Flow Lagoon for settlement of suspended solids prior to discharge to Bayou Creek through the Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 001 ditch system. The C-616-H East-West Ditch Lift Station (also known as the Outfall 001 Ditch Lift Station and the C-615-K Lift Station) began operation in 1991 to control pH and temperature of the discharge water. This lift station pumped effluent of the C-335 and C-337 Process Buildings and the C-535 and C-537 Switchyards into the NSDD for downstream capture by the C-616-C Lift Station and treatment through the C-616-F Full Flow Lagoon. As of 2023, the C-616-H East-West Ditch Lift Station was no longer necessary for pH and temperature control and has been taken out of service. Table 1 provides a summary of the facilities used in operation of the NSDD.

Table 1. NSDD Associated Facilities

Facility (Other Names Used)	Operation
C-616-C Lift Station	Divert all normal flow from upstream locations in the NSDD to C-616-F.
C-616-H East-West Ditch Lift Station (Outfall 001 Ditch Lift Station; C-615-K Lift Station)	Control pH and temperature of the discharge water (out of service).
C-616-F Full Flow Lagoon	Settle suspended solids prior to discharge.
C-400-L Storm Water Lift Station	Divert flow northward to C-616-C.
C-616-L Lift Station	Divert flow northward to C-616-C.
East-West Ditch (Outfall 001 ditch)	Convey storm water to KPDES Outfall 001.
C-760-A NSDD Surge Basin	Contain high storm-water runoff until it can be discharged to C-616-C..

As part of its cleanup effort at PGDP, DOE, in conjunction with the U.S. Environmental Protection Agency (EPA) and with the concurrence of the Kentucky Department for Environmental Protection, signed the Interim Record of Decision (ROD) for the NSDD (DOE 1994). The primary objective of the Interim ROD was to begin control of contaminant releases into the NSDD and to mitigate the spread of contamination. Components of the 1994 Interim ROD included the following:

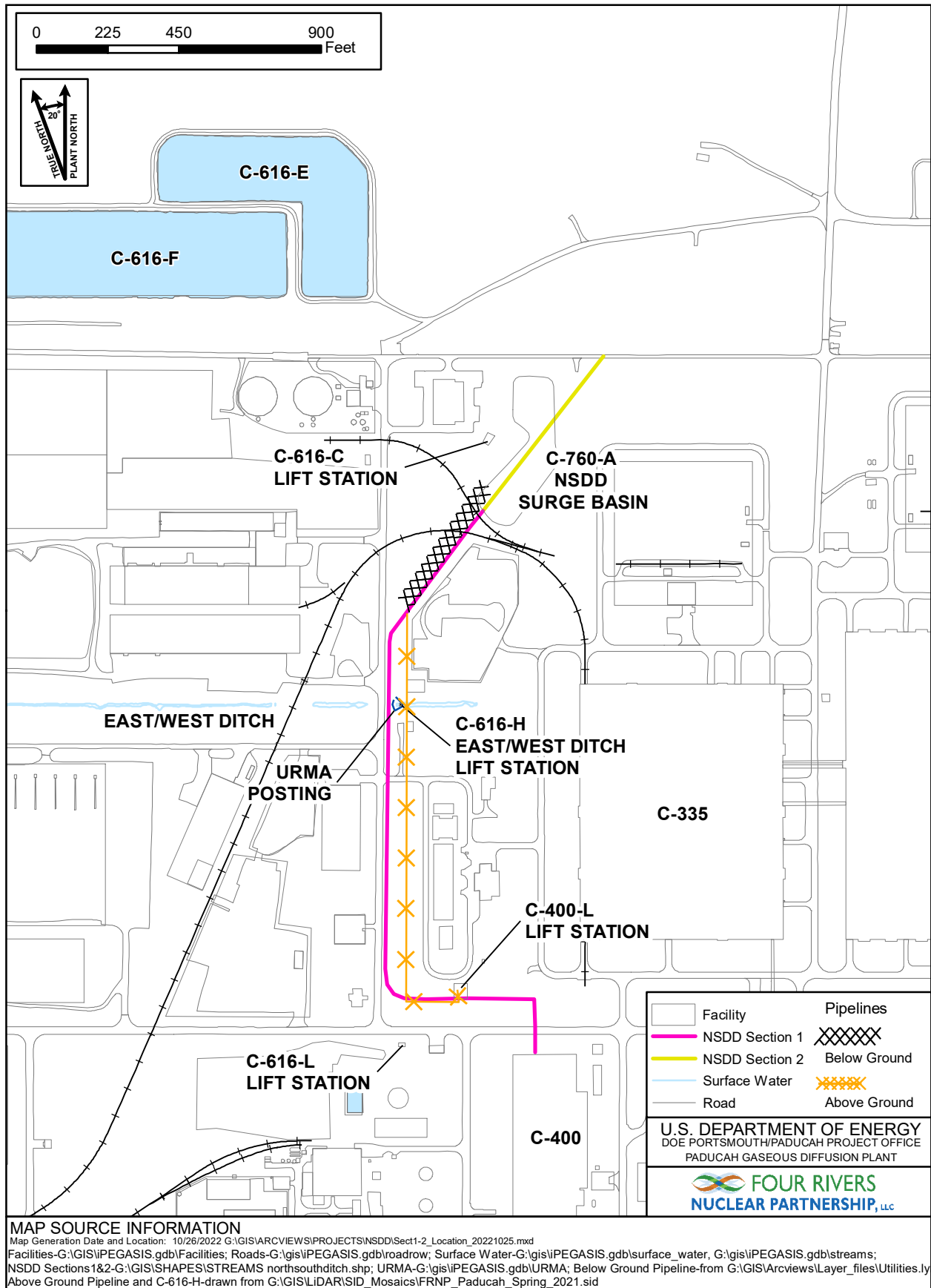


Figure 1. North-South Diversion Ditch inside PGDP

- Installation of an ion exchange system in the C-400 Cleaning Building to reduce radionuclides in the effluent discharging into the NSDD.
- Removal of fly ash from the C-600 Steam Plant effluent discharged to the NSDD.
- Construction of lift stations near the C-400 Cleaning Building (C-400-L Lift Station) and the C-600 Steam Plant [C-616-L lift station (the lift station at the C-616-L Effluent Control Vault)], a diversion dam adjacent to the C-400-L Lift Station, and an aboveground pipeline to convey flow from the southern end of the ditch to a point adjacent to the C-616-H East-West Ditch Lift Station, where flow from the pipeline was released back into the NSDD. This action was intended to reduce the potential for mobilizing sediments in the southern section of the NSDD and to reduce the amount of contaminated water infiltrating the groundwater.
- Construction of a diversion dam in the NSDD upstream of the C-616-H East-West Ditch Lift Station to address the potential for sediment transport to off-site areas from the portion of the NSDD that was bypassed with the aboveground piping (i.e., the section from the C-400-L Storm Water Lift Station to the C-616-H East-West Ditch Lift Station).
- Installation of signs along both sides of portions of the NSDD inside the plant boundary to warn plant personnel of elevated levels of radionuclides, metals, and polychlorinated biphenyl compounds in the area (DOE 1994).

Construction of the interim remedial action for the NSDD was completed August 18, 1995. Once construction was completed, two components of the action, the C-400 ion exchange and the C-600 fly ash lagoons, were incorporated into the daily operations of PGDP by the United States Enrichment Corporation (USEC), and O&M of these two facilities was performed by USEC. The discharge from the C-400 ion exchange was routed into the KPDES Outfall 008 storm-water drain, which eliminated discharges from the C-400 Cleaning Building into the NSDD. Subsequent to release of the property, C-400 operations have closed. The ion exchange system was no longer needed, and it was removed prior to the end of calendar year 2017. Lagoons constructed at the C-600 facility eliminated fly ash deposition in the NSDD.

On August 21, 2002, EPA signed a ROD for further remedial action for portions of the NSDD located inside the security-fenced area (i.e., Sections 1 and 2) (DOE 2002a). DOE signed the ROD on September 25, 2002. While considered an interim remedial action with respect to the entire NSDD, this ROD is considered a final action for Sections 1 and 2 of the NSDD. The objectives of the remedial action are as follows.

- Prevent future discharge of process water to the NSDD.
- Reduce the risk to industrial workers and ecological receptors from exposure to contaminated surface soil, sediment, and surface water to acceptable levels by eliminating direct exposure to contaminated media at the NSDD.
- Prevent future on-site runoff from being transported via the NSDD.
- Restrict unauthorized access, restrict unauthorized excavations or penetrations below prescribed contamination cleanup depth, and restrict uses of the area that are inconsistent with the assumed industrial land use (e.g., to restrict recreational and/or residential use).

Implementation of the remedial action for Sections 1 and 2 was accomplished in two phases. Phase I, which was initiated in October 2002, included the following activities:

- Installation of piping to route process discharges that currently pass through the NSDD to the C-616 Liquid Pollution Abatement Facility water treatment process;
- Plugging of the culverts at the downgradient end of Section 2 of the NSDD and in three other ditches within the NSDD watershed to prevent discharge of on-site storm-water runoff to sections of the NSDD outside the PGDP boundary; and
- Excavation of a surge basin to contain storm-water runoff until it can be routed through the C-616 facility.

Phase II activities were initiated upon the completion of construction of the surge basin and consisted of the complete excavation of contaminated soils and sediments along Sections 1 and 2 of the NSDD up to a depth of 4 ft. Following completion of the excavation activities, the ditch channel was restored to grade with 2 ft of clay cover and approximately 2 ft of clean soil and was also revegetated.

Existing lift stations at the NSDD (the C-616-C Lift Station installed in 1977 and the C-400-L and C-616-L lift stations installed during the 1994 NSDD remedial action) are utilized in the implementation of this final remedial action. During Phase I excavation of the surge basin, institutional controls, initiated as part of the 1994 remedial action (e.g., signs along the NSDD warning of contamination), were removed from sections of the NSDD affected by surge basin construction. This removal of institutional controls occurred upon installation of the clay liner in the affected NSDD sections and progressed with the further remediation of the NSDD during Phase II activities. Appropriate Hazardous Waste Operation postings were maintained along those portions of Sections 1 and 2 of the NSDD during remediation until sufficient industrial health data was available to document that the postings were no longer needed.

Upon completion of the remedial action for Sections 1 and 2 of the NSDD, the only institutional controls that remain are postings for an underground radiological material area (URMA) in a culvert beneath the NSDD at its junction with the East-West Ditch (also called the Outfall 001 ditch, which leads to KPDES Outfall 001). This culvert was not included in the scope of the remedial action for Sections 1 and 2 of the NSDD. Maintenance of institutional controls of the installed structures is addressed under this O&M Plan.

3. NORTH-SOUTH DIVERSION DITCH, SECTIONS 1 AND 2, OPERATION AND MAINTENANCE

The following paragraphs discuss the various O&M components associated with the response and remedial actions implemented for Sections 1 and 2 of the NSDD.

3.1 EQUIPMENT START-UP AND OPERATOR TRAINING

The Remedial Design/Remedial Action Work Plan for the North-South Diversion Ditch Piping and Pump Modifications at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-1967&D2 (DOE 2002b) and the Remedial Design/Remedial Action Work Plan for the North-South Diversion Ditch Detention Basin at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/OR/07-2008&D2 (DOE 2003a) summarize the as-built construction and implementation of the final remedial action for

Sections 1 and 2 of the NSDD. Construction and implementation activities and an associated chronology are documented in the *Remedial Action Completion Report for the North-South Diversion Ditch Sections 1 and 2 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2195&D2, (DOE 2005b).

DOE contractors and subcontractors will perform inspections and maintenance required by the remedial actions implemented for the NSDD as specified in Section 3.2. All personnel working on these tasks will be trained on all pertinent safety programs.

3.2 DESCRIPTION OF ROUTINE O&M

The three lift stations (C-400-L, C-616-C, and C-616-L) utilized in this final remedial action are identified in Section 2. Each lift station is fully automated. As part of the routine O&M for this final remedial action, DOE Contractor and/or subcontractor environmental personnel conduct weekly inspections of the C-400-L Storm Water Lift Station and aboveground transfer piping and also conduct inspections following storm events to ensure all equipment is operational; that the lift station screens remain clean; and that the aboveground transfer pipelines are not leaking. DOE Contractor and/or subcontractor utilities personnel inspect the C-616-C and C-616-L lift stations daily for proper operation.

The DOE Contractor or subcontractor environmental personnel conduct quarterly inspections of the URMA postings at the junction of the NSDD with the East-West Ditch (also called the Outfall 001 ditch, which leads to KPDES Outfall 001). The area adjacent to the pipeline is mowed approximately twice during the summer months. Heat tracing installed on the aboveground piping is activated in the fall and deactivated in the spring. During those months that it is in use, heat tracing is inspected weekly.

The C-760-A surge basin is mowed approximately twice during the summer months. The surface cover of the basin is inspected semiannually for signs of erosion that could threaten the integrity of the cover; the concrete-paved ditch section and spillway located within the surge basin is inspected semiannually for cracks or other signs of damage. These semiannual inspections are conducted after mowing the surge basin or in late fall after vegetation has died back to allow for detection of erosion.

All inspections for routine O&M are performed in accordance with CP4-ES-0041, *Environmental Monitoring Inspections*. The completed forms associated with these inspections are submitted to the administrative record post-decision file for the North-South Diversion Ditch Sections 1 and 2 (SWMU 59) Soil and Sediment Remediation.

3.3 DESCRIPTION OF POTENTIAL OPERATING PROBLEMS

Screens on the lift station sumps could become obstructed with debris. In such a situation, debris will be manually removed. Piping could develop a leak, or lift station pumps or heat tracing could fail or be inoperative. In these situations, the defective equipment or materials will be repaired, replaced, or otherwise made operational again. Signs of serious erosion that could threaten the integrity of the surface cover in the surge basin could be detected. If such erosion is detected, the surface cover will be repaired. The concrete-paved ditch section and spillway within the surge basin could develop cracks or damage that would threaten its integrity. If this were to occur, the concrete-paved ditch section and spillway would be repaired.

3.4 DESCRIPTION OF SAMPLING AND LABORATORY TESTING

No sampling or laboratory testing will be conducted under this O&M Plan.

3.5 DESCRIPTION OF ALTERNATE O&M

Not applicable to this final remedial action for Sections 1 and 2 of the NSDD.

3.6 SAFETY PLAN

Work control documents will be issued to personnel conducting O&M on the NSDD. The content of these documents will vary from task to task; at a minimum, the documents will describe the requirements to wear appropriate personal protective equipment. All inspections and maintenance activities will be conducted under the Integrated Safety Management System. All work will be governed by approved health and safety plans, procedures, and job hazard analyses, as required.

3.7 DESCRIPTION OF EQUIPMENT

Equipment, materials, and structures incorporated into this remedial action include three lift stations (C-400-L, C-616-C, and C-616-L), transfer piping, surge basin containing a concrete-paved ditch section and spillway, and institutional controls.

Each lift station consists of a below-grade concrete vault that serves as a sump to collect water flowing through the ditch. Each vault contains two electric pumps that convey the water from the vault to the transfer piping.

Approximately 1,500 ft of welded steel transfer piping was installed during the 1994 remedial action. An additional 2,250 ft of piping was installed during Phase I of the final remedial action. Some of the transfer piping is aboveground and some is buried. Aboveground piping that does not gravity drain is insulated and heat traced to prevent freeze damage.

A surge basin was built within Section 2 of the NSDD during completion of Phase I of the final remedial action. This surge basin contains storm-water runoff from on-site sections of the NSDD until the runoff can be routed through the C-616-F Full Flow Lagoon. Following excavation, the surface of the surge basin was completed by installation of 2 ft of clay cover overlain by approximately 2 ft of clean soil. The surface of the surge basin then was revegetated. In addition, a concrete-paved ditch section and spillway was constructed within the surge basin at the point where flow from the NSDD enters. The purpose of this paved ditch section and spillway is to minimize potential for erosion of surface cover within the basin.

Institutional controls remaining at the NSDD following completion of the remedial action consist of URMA posting at the junction of the NSDD with the East-West Ditch (also called the Outfall 001 ditch, which leads to KPDES Outfall 001). These postings are associated with a culvert that crosses beneath the NSDD. This culvert was not included in the scope of the remedial action for Sections 1 and 2 of the NSDD. Physical access to those portions of the NSDD located inside the security-fenced area (Sections 1 and 2) currently is, and will continue to be, restricted (DOE 2003b).

The features described above are annotated on Figure 1.

3.8 RECORDS AND REPORTING

Inspection forms are completed and filed with Four Rivers Nuclear Partnership, LLC, Records Management for each inspection.

3.9 PROJECTED O&M COSTS

The costs associated specifically with O&M activities are not accounted for separately, because they are performed as part of the facility-wide, long-term surveillance and maintenance and environmental monitoring programs.

4. REFERENCES

- DOE (U.S. Department of Energy) 1994. *Record of Decision for Interim Action Source Control at the North-South Diversion Ditch, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/06-1213&D3, U.S. Department of Energy, Paducah, KY, March.
- DOE 2002a. *Record of Decision for Interim Remedial Action at the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1948&D2, U.S. Department of Energy, Paducah, KY, September.
- DOE 2002b. *Remedial Design/Remedial Action Work Plan for the North-South Diversion Ditch Piping and Pump Modifications at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1967&D2, U.S. Department of Energy, Paducah, KY, September.
- DOE 2003a. *Remedial Design/Remedial Action Work Plan for the North-South Diversion Ditch Detention Basin at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2008&D2, U.S. Department of Energy, Paducah, KY, February.
- DOE 2003b. *Land Use Control Implementation Plan for the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1949&D2/R2, U.S. Department of Energy, Paducah, KY, November.
- DOE 2005a. *Operation and Maintenance Plan for Sections 1 and 2 of the North-South Diversion Ditch at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2057&D2, U.S. Department of Energy, Paducah, KY, February.
- DOE 2005b. *Remedial Action Completion Report for the North-South Diversion Ditch Sections 1 & 2 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2195&D2, U.S. Department of Energy, Paducah, KY, September.
- EPA (U.S. Environmental Protection Agency) 1998. *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*, U.S. Environmental Protection Agency, Region 4, Atlanta, GA, February 13.