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JUN 21 2013

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PPPO-02-1934964-13

Ms. Jennifer Tufts
Remedial Project Manager
U.S. Environmental Protection Agency, Region 4
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Dear Mr. Mullins and Ms. Tufts:

**TRANSMITTAL OF THE EXPLANATION OF SIGNIFICANT DIFFERENCES
TO THE RECORD OF DECISION FOR THE INTERIM REMEDIAL ACTION
OF THE NORTHEAST PLUME AT THE PADUCAH GASEOUS DIFFUSION PLANT
PADUCAH, KENTUCKY, DOE/LX/07-1291&D1**

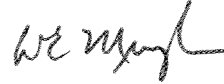
Please find enclosed the *Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant Paducah, Kentucky, DOE/LX/07-1291&D1* (ESD). This ESD is a primary document under the Federal Facility Agreement (FFA) and documents the modifications to the interim remedial action (IRA) for the Northeast Plume.

As discussed with the FFA Managers, various reviews and assessments, including the Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Review and evaluation of the continued use of the United States Enrichment Corporation (USEC) cooling tower, have resulted in recommended changes to the IRA to optimize the capture of the Northeast Plume contamination and installation of an alternate treatment unit. This ESD describes the changes to the IRA that have been identified as significant changes from the action declared in the Record of Decision.

Recent conversations with USEC indicate that shutdown of plant operations are occurring more rapidly than originally anticipated and that the use of the cooling tower to support the IRA may no longer be an option as early as the end of June 2013. As a result DOE is requesting review and approval of this document, specifically for the discharge of treated water, prior to June 28, 2013, to avoid interruption of groundwater extraction and treatment operations.

If you have any questions or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,



William E. Murphie
Manager
Portsmouth/Paducah Project Office

Enclosure:

ESD to the Record of Decision for the IRA of the Northeast Plume

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CERTIFICATION

Document Identification: *Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-1291&D1*

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

LATA Environmental Services of Kentucky, LLC



Mark J. Duff, Paducah Project Manager

6-21-13

Date Signed

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy (DOE)



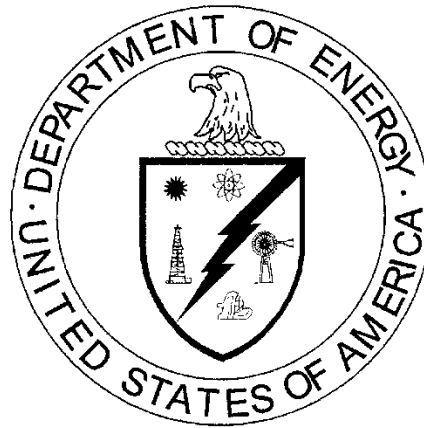
William E. Murphy, Manager
Portsmouth/Paducah Project Office

6/21/13

Date Signed

**DOE/LX/07-1291&D1
Primary Document**

**Explanation of Significant Differences
to the Record of Decision for the Interim Remedial Action
of the Northeast Plume at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky**



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**DOE/LX/07-1291&D1
Primary Document**

**Explanation of Significant Differences
to the Record of Decision for the Interim Remedial Action
of the Northeast Plume at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky**

Date Issued—June 2013

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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PREFACE

The regulations to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) require that changes to remedial actions that are proposed after the adoption of a signed Record of Decision (ROD) be documented using one of the following three processes: (1) ROD Amendment if the change “fundamentally alters” basic features of the remedy; (2) Explanation of Significant Differences (ESD) if the change is significant, but not fundamentally different from the selected remedy in the ROD; or (3) Memorandum to File if the proposed changes to the remedy are minor. The proposed changes to the Northeast Plume interim remedial action (IRA) are not considered to “fundamentally alter” the basic features of the remedy as presented in the ROD, but certain components of the proposed changes are considered “significant” changes that require development of an ESD. This *Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1291&D1, was prepared in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117(c) and 40 *CFR* § 300.435(c)(2)(i) of the NCP, and a *Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents*, EPA 540-R-98-031, July 1999. It provides the public the opportunity to understand the proposed modifications to the IRA for the Northeast Plume and changes that significantly differ from the approach delineated in the *Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/06-1356&D2 (DOE 1995).

The major components of the interim action remedy in the 1995 ROD include these:

- The contaminated groundwater was to be extracted at a location in the northern portion of the high trichloroethene (TCE) concentration area of the plume (greater than 1,000 µg/L of TCE). The contaminated groundwater was to be pumped at a rate of approximately 100 gal per minute (gpm) to initiate hydraulic control without changing groundwater gradients enough to cause adverse effects. During operation, this pumping rate may have been modified to optimize the hydraulic containment by adjusting flow from the extraction wells (EWs) and to support subsequent actions.
- The extracted groundwater was to be collected and piped to a treatment system prior to release to a Kentucky Pollutant Discharge Elimination System-permitted outfall. The treatment facility was to consist of a sand filter for removal of suspended solid materials and utilization of the Paducah Gaseous Diffusion Plant’s (PGDP’s) cooling towers for volatilization of contaminated groundwater. The chemicals of concern are TCE and 1,1-dichloroethene (1,1-DCE).
- Two treatability studies were to be conducted to include (1) photocatalytic oxidation of TCE-contaminated off-gas; and (2) *in situ* treatment of TCE-contaminated groundwater.

The U.S. Environmental Protection Agency (EPA) and Kentucky Department for Environmental Protection (KDPEP), in a letter received on April 23, 1996, agreed to remove the sand filter from the IRA since the EWs were designed with an artificial sand pack that serves as a sand filter for sediments. Thus, the quality of water being discharged from the EWs would be similar to that of a drinking water well, with the exception of the TCE contamination.

A minor modification to the ROD was written on May 2, 1996, to postpone the treatability studies [(1) photocatalytic oxidation of TCE-contaminated off-gas and (2) *in situ* treatment of TCE-contaminated groundwater].

The proposed changes described by this ESD will be implemented in a phased approach and will consist of the following anticipated modifications to the IRA:

- Replace the two existing EWs with two new groundwater EWs to be in the upgradient high concentration portion of the Northeast Plume and near the eastern edge of the PGDP industrial facility.
- Install an alternate treatment unit (ATU) to provide treatment for the existing EWs when the cooling tower no longer is available. Upon installation of two new EWs, this ATU will provide treatment for one of the new EWs.
- Install a second treatment unit to provide treatment of one of the newly installed EWs.
- Create a maximum of two new CERCLA outfalls for discharge of treated groundwater from the treatment units.

The extraction of Northeast Plume mass from new EWs located upgradient of the current EWs and in the vicinity of the eastern boundary of the plant site will assist in reducing the amount of plume mass migrating off-site.

None of the above anticipated changes is considered to be fundamentally different from the original selected remedy in the 1995 ROD; however, the creation of up to two new CERCLA outfalls for discharge of the treated groundwater will require identification and inclusion of new applicable or relevant and appropriate requirements. Under EPA guidance (EPA 1999), these new discharges would be considered to be a significant change that should be documented in an ESD. EPA guidance (EPA 1999) states that while the ESD is being prepared and made available to the public, the lead agency may proceed with the pre-design, design, construction, or operation activities associated with the remedy.

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
ATU	alternate treatment unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
<i>CFR</i>	<i>Code of Federal Regulation</i>
CWA	Clean Water Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ESD	explanation of significant differences
EW	extraction well
FFA	Federal Facility Agreement
IRA	interim remedial action
<i>KAR</i>	<i>Kentucky Administrative Regulation</i>
KDEP	Kentucky Department for Environmental Protection
KPDES	Kentucky Pollution Discharge Elimination System
MW	monitoring well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PGDP	Paducah Gaseous Diffusion Plant
RAWP	remedial action work plan
RCRA	Resource Conservation and Recovery Act
RGA	Regional Gravel Aquifer
ROD	record of decision
USEC	United States Enrichment Corporation
VOC	volatile organic compound

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EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) has prepared this Explanation of Significant Differences (ESD) to document the changes to the Record of Decision (ROD) for Interim Remedial Action (IRA) of the Northeast Plume at the Paducah Gaseous Diffusion Plant (PGDP) necessary to optimize the existing Northeast Plume Groundwater System.

The ROD was signed by DOE, the U.S. Environmental Protection Agency (EPA), and the Kentucky Department for Environmental Protection in June 1995. The primary objective of this IRA is, “to implement a first-phase remedial action as an interim action to initiate hydraulic control of the high concentration area within the Northeast Plume that extends outside the plant security fence.” The selected remedy was designed to reduce the concentrations of trichloroethene (TCE) in the most contaminated portions of the Northeast Plume. The extraction well (EW) location was defined in the ROD as the northern portion of the high TCE concentration of the plume (greater than 1,000 µg/L of TCE). The planned changes presented in the ESD will not impact the protectiveness of the IRA. As recognized in the ROD, successful control of the plume, in combination with existing controls (alternate water supply, monitoring, etc.), ensures protection during the period of the interim response.

The modification to the IRA of the Northeast Plume documented in this ESD is as follows:

- Replace the two existing EWs with two new groundwater EWs to be in the upgradient high concentration portion of the Northeast Plume and near the eastern edge of the PGDP industrial facility.
- Install an alternate treatment unit (ATU) to provide treatment for the existing EWs when the cooling tower no longer is available. Upon installation of two new EWs, this ATU will provide treatment for one of the new EWs.
- Install a second treatment unit to provide treatment of one of the newly installed EWs.
- Create a maximum of two new Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) outfalls for discharge of treated groundwater from the treatment units.

Design, construction, and operation of the listed components also will be in addition to start-up testing; installation of piping, process control equipment, electrical equipment, and placement of additional monitoring wells (MWs) to evaluate performance and effectiveness of the new optimization system. This Northeast Plume IRA optimization project is intended to increase volatile organic compound mass removal and enhance capture of contaminants migrating in the Northeast Groundwater Plume at the eastern edge of the PGDP industrial facility (see Figure 1). This optimization action was initiated in response to recommendations that are documented in the Sitewide Remedy Review (DOE 2006); *Review Report: Groundwater Remedial System Performance Optimization at PGDP, Paducah, Kentucky* (DOE 2007); 2008 CERCLA Five-Year Review (DOE 2009); Site Management Plan (DOE 2011); negotiations among the Federal Facility Agreement parties; and in response to the uncertainty regarding the United States Enrichment Corporation future operation of PGDP.

In conclusion, the planned changes presented in the ESD will not impact the protectiveness of the IRA. The interim action will continue to rely on other actions to achieve protectiveness while the IRA continues.

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1. INTRODUCTION AND PURPOSE

The U.S. Department of Energy (DOE) is conducting cleanup activities at the Paducah Gaseous Diffusion Plant (PGDP) under its Environmental Management Program. Cleanup efforts are necessary to address contamination resulting from past waste-handling and disposal practices at the plant. The cleanup activities comply with the requirements of the U.S. Environmental Protection Agency (EPA), the Kentucky Energy and Environment Cabinet, and DOE.

Pursuant to the Record of Decision (ROD) for Interim Remedial Action (IRA) of the Northeast Plume at PGDP signed by DOE, EPA, and Kentucky Department for Environmental Protection (KDEP) in June 1995, DOE currently is operating groundwater extraction wells (EWs) and a treatment system at PGDP to initiate hydraulic control of the high concentration area within the Northeast Plume that extends outside the plant security fence. The treatment system is designed to remove trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) from extracted groundwater.

Reviews and assessments, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-mandated periodic five-year review documents for years 2003 and 2008 (DOE 2003; DOE 2009) have resulted in recommended changes to the IRA to enhance capture of the Northeast Plume contamination in the vicinity of the eastern edge of PGDP industrial facility and to reduce further migration off-site. Accordingly, DOE has prepared this Explanation of Significant Differences (ESD) to document the changes made to the Northeast Plume IRA that were necessary in optimizing the IRA.

This ESD has been prepared in accordance with CERCLA Section 117(c) and 40 *CFR* § 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). An ESD is required when a significant change is made to the remedy defined in the decision document (e.g., ROD). A significant change generally involves a change to a component of a remedy that does not fundamentally alter the overall cleanup approach. This ESD describes the nature of the significant change, summarizes the information that led to making the change(s), and affirms that the revised remedy complies with the NCP and the statutory requirements of CERCLA. As required by 40 *CFR* § 300.435(c)(2)(i)(B), DOE will publish a notice of availability and a brief description of the ESD in a major local newspaper of general circulation. The ESD is made available to the public by placing it in the Administrative Record file and information repository [40 *CFR* § 300.435(c)(2)(i)(A) and 300.825(a)(2)].

1.1 SITE NAME AND LOCATION

PGDP is located in the northwestern corner of Kentucky in western McCracken County, about 10 miles west of Paducah, Kentucky, and 3.5 miles south of the Ohio River (Figure 1). Past operations and disposal of waste material resulted in the contamination of the groundwater migrating to the northeast from PGDP (Figure 2). Areas of contaminated groundwater within the Regional Gravel Aquifer (RGA) extend beyond the DOE property boundary on the north and northeast. These areas are referred to as the Northwest and Northeast Plumes, respectively. A portion of the Northwest Plume discharges to Little Bayou Creek, a perennial surface water body located northeast of the DOE property.

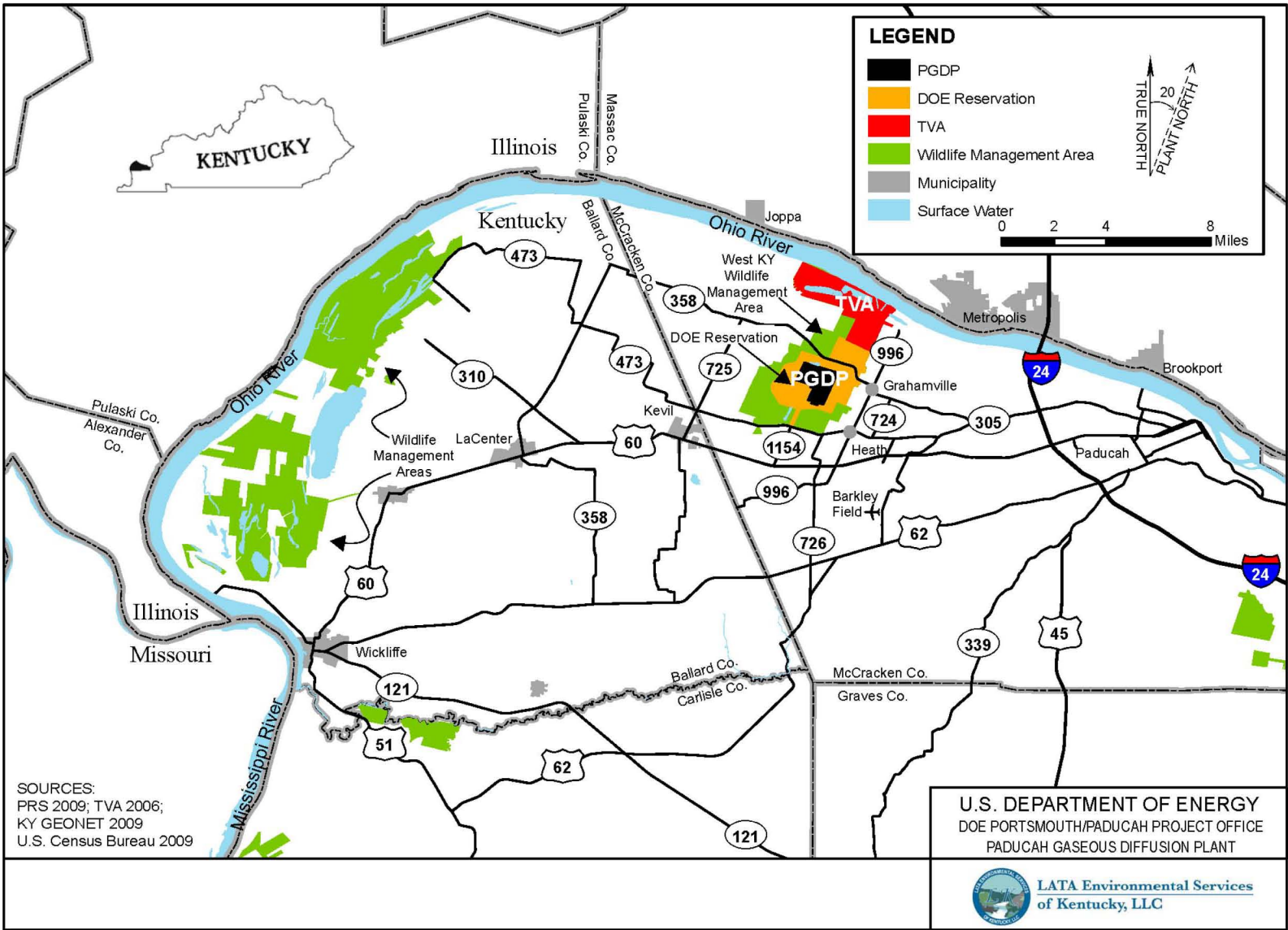


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Figure 1. PGDP Location

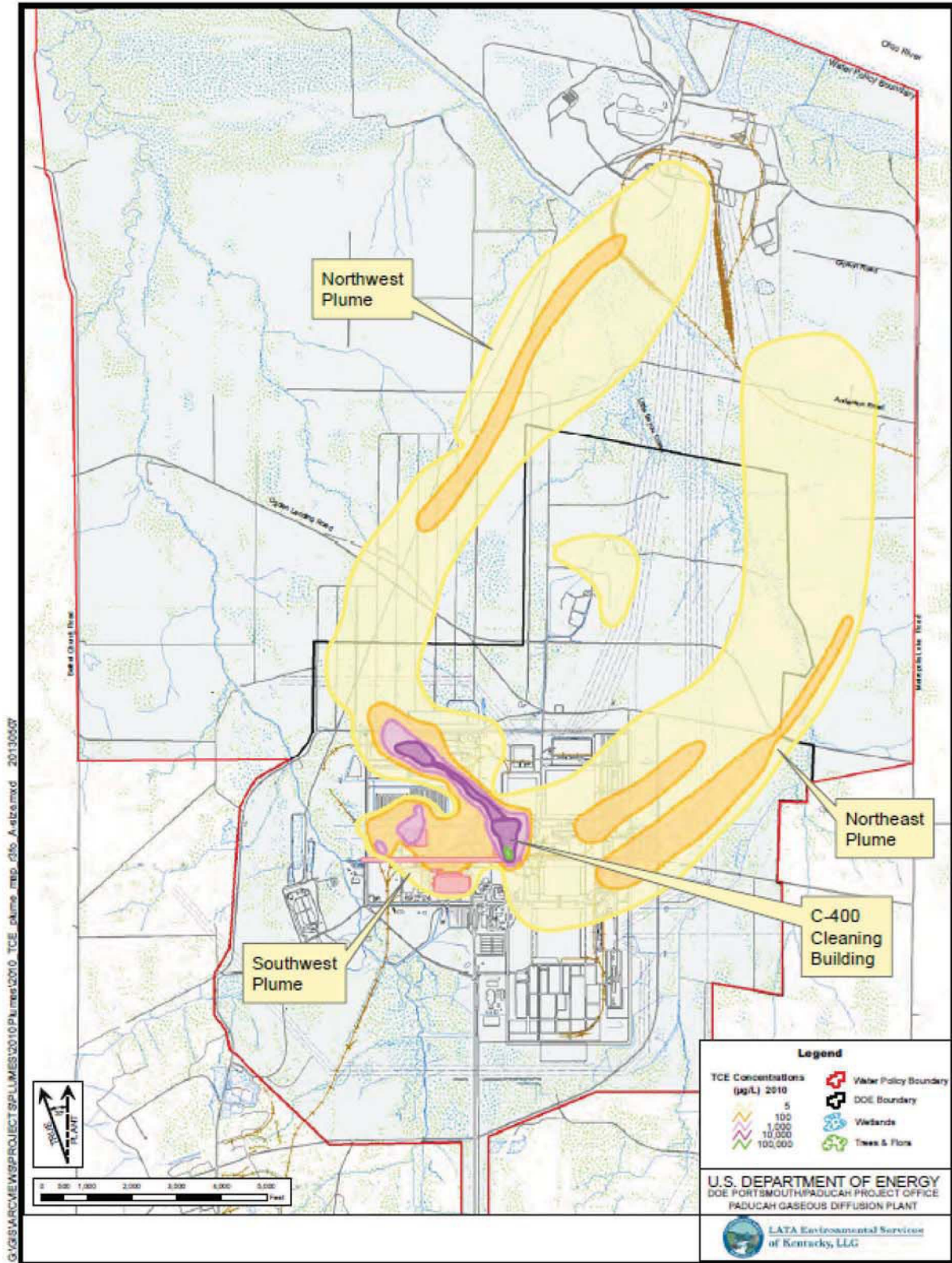


Figure 2. TCE in the Regional Gravel Aquifer in the Vicinity of PGDP (2010)

1.2 REGULATORY BACKGROUND

PGDP was placed on the National Priorities List in 1994. Pursuant to Section 120 of CERCLA, the PGDP Federal Facility Agreement (FFA) (EPA 1998) was negotiated and implemented to coordinate the CERCLA remedial action and Resource Conservation and Recovery Act (RCRA) corrective action processes into a set of comprehensive requirements for site remediation. Since 1998, DOE, EPA, and KDEP have been operating under the FFA, with DOE as the lead agency and EPA and KDEP as support agencies providing oversight.

In 1995 a decision was made among DOE, EPA, and KDEP to proceed with an IRA for the high TCE concentration groundwater plume. The ROD for this IRA of the Northeast Plume was signed by DOE, EPA, and KDEP in June 1995. The remedy has effectively achieved the remedial action objectives to hydraulically control and reduce off-site TCE levels in the Northeast Plume and, in combination with existing controls (alternate water supply, monitoring, etc.), remains protective of human health and the environment and continues to comply with federal and state applicable or relevant and appropriate requirements (ARARs) that were identified in the ROD.

1.3 CIRCUMSTANCES CREATING THE NEED FOR AN ESD

The Northeast Plume IRA optimization project is to continue to serve as an interim measure to remove TCE and 1,1-DCE mass and enhance capture of the Northeast Plume contamination in the vicinity of the eastern edge of PGDP industrial facility to reduce further migration off-site. This optimization action was initiated in response to recommendations documented in the following documents:

- Sitewide Remedy Review (DOE 2006)
- *Review Report: Groundwater Remedial System Performance Optimization at PGDP, Paducah, Kentucky* (DOE 2007)
- 2008 CERCLA Five-Year Review (DOE 2009)
- Site Management Plan (DOE 2011)

Additionally, the uncertainty regarding future operations of PGDP by the United States Enrichment Corporation (USEC) provides further need to address the circumstances, which would result in the loss of the use of the USEC cooling tower. New CERCLA outfalls are being identified because there are no DOE Kentucky Pollutant Discharge Elimination System-(KPDES) permitted outfalls in the vicinity of the new alternate treatment unit (ATU) location.

The scope of the Northeast Plume optimized project, as documented in this ESD and the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 2013), is consistent with the general findings and recommendations in the documents referenced above and with the identified modifications by the FFA parties. Additional specific supporting information from these evaluations is contained in Section 3, Basis for the ESD.

2. SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

This section provides a brief summary of the site contamination and history along with presenting the selected remedy as originally described in the ROD.

2.1 SITE HISTORY AND CONTAMINATION ASSOCIATED WITH THE NORTHEAST PLUME

In August 1988, volatile organic compounds (VOCs) and radionuclides were detected in private wells north of PGDP. The site investigation demonstrated that the principal contaminants of concern in the off-site groundwater are technetium-99 (Tc-99), a radionuclide, and TCE, an organic solvent. TCE is a nonflammable, highly volatile, colorless liquid used extensively for removing grease. The PGDP's use of TCE as a degreaser ceased July 1, 1993. Tc-99 is a radionuclide that was introduced at the PGDP through the reprocessing of uranium.

Past handling practices and disposal of waste material resulted in the contamination of the groundwater migrating to the northwest and northeast from PGDP. Over time, dissolved-phase TCE in groundwater in the RGA has spread generally northeastward toward the Ohio River in multiple plumes. In the 1993 time frame, the outer boundary of the Northeast Plume was approximately 1 mile from the northeastern border of the PGDP facility. Concentrations of TCE within the Northeast Plume exceeded 1,000 µg/L in some locations.

Figure 2 illustrates the extent of the Northeast Plume. Figures 3 and 4 compare the TCE plumes between 1994 and 2010 (the latest available plume map). The downgradient limit of the Northeast Plume is in the vicinity of the Ohio River, Tennessee Valley Authority Shawnee Fossil Plant, and Little Bayou Creek.

2.2 INTERIM REMEDIAL ACTION REMEDY APPROVED IN THE ROD

The major components of the selected remedy defined in the ROD (DOE 1995) included the following:

- The contaminated groundwater was to be extracted at a location in the northern portion of the high TCE concentration area of the plume (greater than 1,000 µg/L of TCE). The contaminated groundwater was to be pumped at a rate of approximately 100 gal per minute (gpm) to initiate hydraulic control without changing groundwater gradients enough to cause adverse effects. During operation, this pumping rate may have been modified to optimize the hydraulic containment, by adjusting flow from the EWs, and to support subsequent actions.
- The extracted groundwater was to be collected and piped to a treatment system prior to release to a KPDES-permitted outfall. The treatment facility was to consist of a sand filter for removal of suspended solid materials, and utilization of the PGDP's existing cooling towers for volatilization of contaminated groundwater. The chemicals of concern were TCE and 1,1-DCE.
- Two treatability studies were to be conducted to include (1) photocatalytic oxidation of TCE-contaminated off-gas and (2) *in situ* treatment of TCE-contaminated groundwater.

EPA and KDEP, in a letter received on April 23, 1996, agreed to remove the sand filter from the IRA because the EWs were designed with an artificial sand pack that serves as a sand filter for sediments;

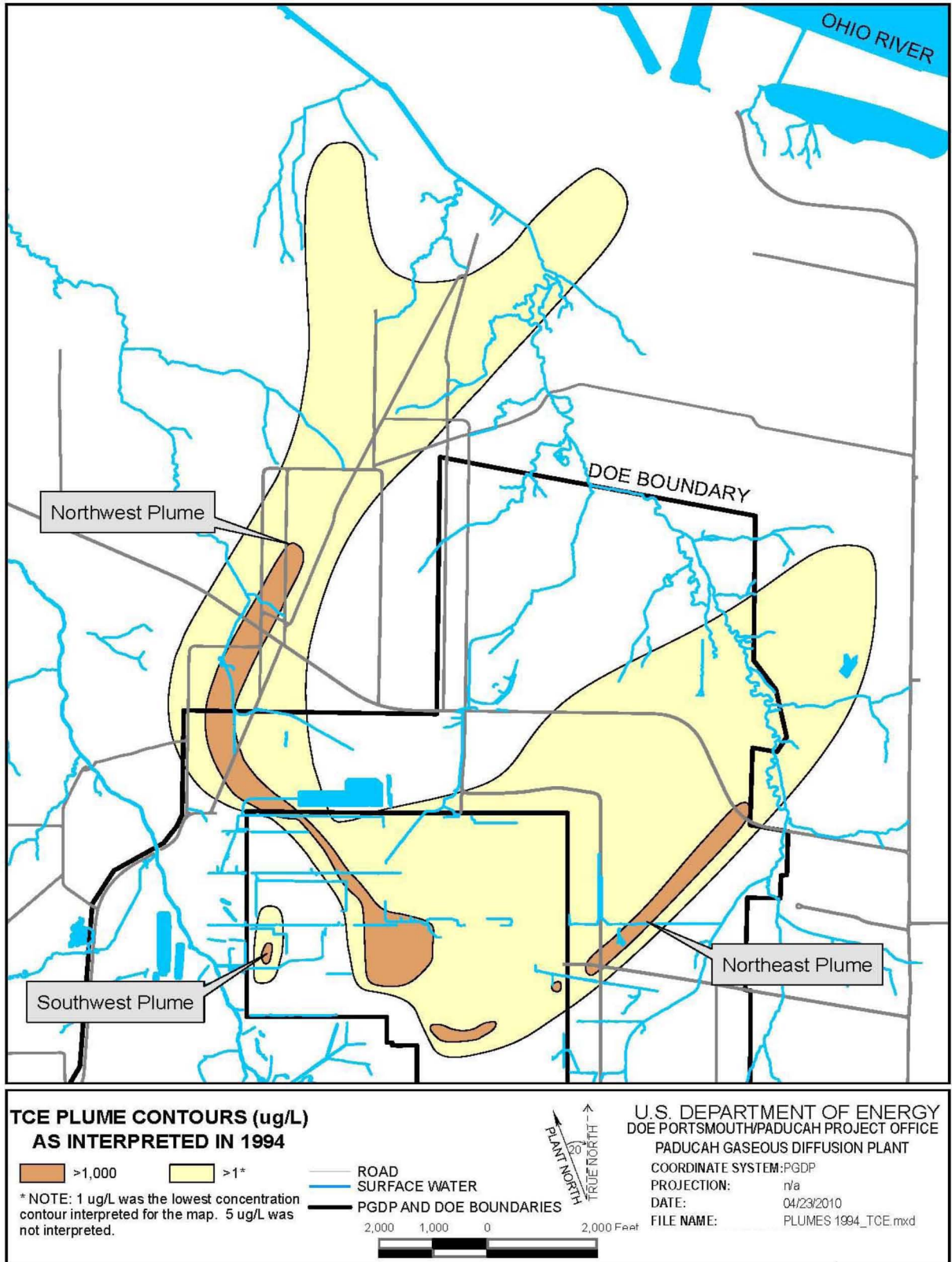


Figure 3. Extent of PGDP TCE Plumes (1994)

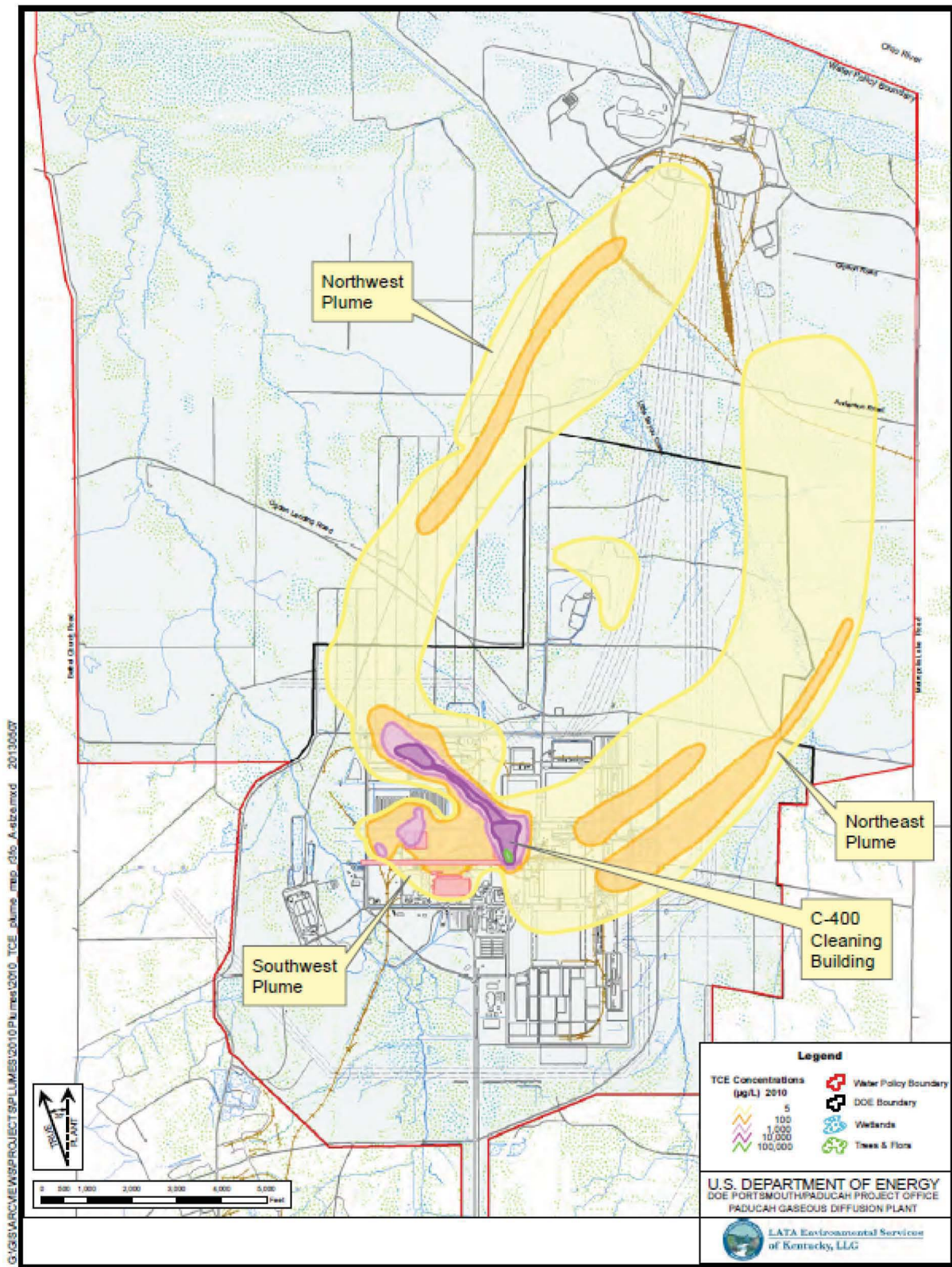


Figure 4. TCE in the Regional Gravel Aquifer in the Vicinity of PGDP (2010)

thus, the quality of water being discharged from the EWs would be similar to that of a drinking water well, with the exception of the TCE contamination.

A minor modification to the ROD was written on May 2, 1996, to postpone the treatability studies [(1) photocatalytic oxidation of TCE-contaminated off-gas and (2) *in situ* treatment of TCE-contaminated groundwater].

3. BASIS FOR THE ESD

This section presents information that formed the basis for changes to the remedy. In general, installation of the new optimization wells will reduce off-site groundwater migration of TCE; installation of the ATU and creation of the new CERCLA outfall(s) are necessary to provide an alternate treatment/discharge option to the cooling towers.

3.1 INFORMATION SUPPORTING OPTIMIZED REMEDY

Four evaluations have been conducted that support the proposed changes to the Northeast Plume Groundwater System. Summary of the evaluation and relevant findings for these four evaluations are detailed in this section.

3.1.1 Five-Year Review for Remedial Actions at the Paducah Gaseous Diffusion Plant

The Northeast Plume IRA optimization project is to serve as an interim measure to remove TCE and 1,1-DCE mass and enhance capture of the Northeast Plume contamination in the vicinity of the eastern edge of PGDP industrial facility and to reduce further migration off-site. This action was initiated in response to recommendations documented in past system evaluations and assessments as summarized as follows.

3.1.2 Sitewide Remedy Review (March 2006)

In February and March 2006, DOE Headquarters conducted a Sitewide Remedy Review at PGDP. A report following the assessment was generated and finalized in April, 2006 and was titled, Paducah 2006 Sitewide Remedy Review. The Sitewide Remedy Review report recommended an optimization of the Northeast Plume IRA.

3.1.3 Review Report: Groundwater Remedial System Performance Optimization at PGDP, Paducah, Kentucky (May 2007)

At the request of the DOE Headquarters Office of Environmental Management, the Office of Groundwater and Soil Remediation secured the services of the U.S. Army Corps of Engineers to lead a Remediation System Evaluation of the Northeast and Northwest Plume Extraction Systems at PGDP during October 2006. The review team identified the following key conclusions associated with the performance of the IRA:

- The intent of the Northeast Plume Extraction System as an interim remedial measure was to control the downgradient extent of a high-concentration ($> 1,000 \mu\text{g/L}$) TCE plume through groundwater extraction and treatment.
- TCE concentrations throughout the Northeast Plume are below $1,000 \mu\text{g/L}$ at EWs and monitoring wells (MWs).
- The interim goal of the Northeast Plume Extraction System to control migration of water contaminated by $> 1,000 \mu\text{g/L}$ TCE has been achieved.

- Groundwater transport modeling also is recommended (see Section 2.6) to assess potential concentration increases downgradient of the current EWs, if this recommendation is implemented, to confirm that potential downgradient receptors will not be negatively impacted.

The review team's main recommendation concerning the Northeast Plume IRA system was as follows.

The Review Team recommends this system be placed in stand-by mode, with continued detection monitoring to assess the potential reappearance of TCE concentrations above 1,000 µg/L.

3.1.4 2008 Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Review (May 2009)

Section 6 of the CERCLA Five-Year Review for the Northeast Plume acknowledged the following:

- The objectives of the ROD have been met by the IRAs.
- The document also reiterated the recommendation previously identified by the Remediation Systems Evaluation Team that the IRA be placed in stand-by mode following the development of decision criteria, which specify the conditions under which the system would be restarted. The CERCLA Five-Year Review was approved by the Commonwealth of Kentucky (KEEC 2009) and EPA (EPA 2009).

3.1.5 Site Management Plan (May 2011)

Implementation of an optimized IRA was evaluated along with other Groundwater Operable Unit projects relative to site priorities in the approved Site Management Plan (DOE 2011). The prioritization was performed by the FFA managers, with consideration given to the sitewide strategy that includes a series of sequenced activities consisting of source actions and control of off-site groundwater migration followed by a final action for the overall dissolved-phased plume. This evaluation resulted in the optimization of the Northeast Plume IRA being prioritized to further enhance controls to prevent off-site migration prior to implementing final actions for the off-site dissolved-phase plume.

Additionally, the uncertainty regarding future operations of PGDP by USEC provides further need to address the circumstances, which would result in the loss of the use of the USEC cooling tower.

3.2 REMEDIAL ACTION WORK PLAN FOR THE NORTHEAST PLUME INTERIM REMEDIAL ACTION OPTIMIZATION

The Remedial Action Work Plan for Optimization of the Northeast Plume IRA documents the design and construction process associated with the optimization process (DOE 2013). Detailed information is included concerning the use of the PGDP groundwater model to optimize the locations of the EWs for increased contaminant capture, treatment equipment capabilities, and EW construction, including screen size and locations.

3.3 ADMINISTRATIVE RECORD INFORMATION SUPPORTING THE NEEDED CHANGE

Information contained in the administrative record that supports the modified remedy is discussed in Section 3.1. As required by 40 *CFR* § 300.825(a)(2), this ESD will be made available to the public by placing it in the Administrative Record file. Contact information for the Administrative Record is as follows:

DOE Environmental Information Center
115 Memorial Drive, Barkley Centre
Paducah, KY 42001
(270) 554-6979
Fax: (270) 554-6987
<http://www.paducaheic.com>

Hours of Operation: Monday through Friday
8 a.m.–12:00 p.m.

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4. DESCRIPTION OF SIGNIFICANT DIFFERENCES

This section describes the key differences between the remedy in the ROD and the ESD modifications, highlighting scope, cost, and performance along with any changes in expected outcomes when the modifications are implemented.

4.1 SIGNIFICANT DIFFERENCES BETWEEN THE REMEDY AND ESD MODIFICATIONS

Table 1 summarizes the main components of the selected remedy and identifies how the remedy modification impacts these components.

Table 1. Summary of Modifications to the Selected Remedy

Selected Remedy (IRA) in the ROD	Remedy Modification
The contaminated groundwater will be extracted at a location in the northern portion of the high TCE concentration area of the plume (greater than 1,000 µg/L of TCE).	The optimized remedy modifies the location of the EWs to be in the upgradient portion of the high concentration portions of the Northeast Plume as documented in the 2010 Plume Map (see Figure 5) and near the eastern edge of the PGDP industrial facility.
The contaminated groundwater will be pumped at a rate of approximately 100 gpm to initiate hydraulic control without changing groundwater gradients enough to cause adverse effects. During operation, this pumping rate may be modified to optimize the hydraulic containment, by adjusting flow from the EWs, and to support subsequent actions.	No change. The existing IRA allows the pumping rate to be modified.
The extracted groundwater will be collected and piped to a treatment system prior to release to a KPDES-permitted outfall.	Treated groundwater will be discharged through a maximum of two newly created CERCLA outfall(s).
The treatment facility will consist of a sand filter* for removal of suspended solid materials, and utilization of the PGDP's existing cooling towers for volatilization of contaminated groundwater. The chemicals of concern are TCE and 1,1-dichloroethene.	The modified remedy will provide an engineered treatment unit, using air stripping, capable of treating TCE and 1,1-DCE in water in the range of expected contaminant concentrations.

*The EPA and KDEP, in a letter received on April 23, 1996, agreed to remove the sand filter from the IRA because the EWs were designed with an artificial sand pack that serves as a sand filter for sediments. Thus, the quality of water being discharged from the EWs would be similar to that of a drinking water well, with the exception of the TCE contamination.

None of the above anticipated changes is considered to be “fundamentally” different from the original selected remedy in the 1995 ROD; however, the creation of up to two new CERCLA outfall(s) for discharge of treated groundwater will require identification and inclusion of new ARARs. Under EPA guidance (EPA 1999), these new discharges would be considered to be a “significant” change that should be documented in an ESD. EPA guidance (EPA 1999) states that while the ESD is being prepared and made available to the public, the lead agency may proceed with the pre-design, design, construction, or operation activities associated with the remedy.

4.2 EXPECTED OUTCOMES OF THE ESD

The optimization of the Northeast Plume IRA is intended to increase TCE and 1,1-DCE mass removal and enhance the contaminant capture in the Northeast Plume in the vicinity of the eastern edge of the PGDP facility. The key components of the optimization are discontinuing the use of the two existing EWs and replacing those wells with two new EWs located as shown in Figure 5 near the eastern edge of the PGDP facility. Groundwater modeling was performed to guide the placement of EWs. The FFA parties will continue to work together to establish completion criteria for operation of the EWs. Additional key components of the optimization include increasing the treatment capacity through installation of two new engineered water treatment units and discharging the treated groundwater through up to two new CERCLA outfall(s). The changes being made to the remedial action do not alter the type of treatment technology being deployed (i.e., air stripping), or the reliability or protectiveness of the overall remedy.

4.2.1 Key Design Changes

The Northeast Plume IRA optimization was designed based on the following key changes and assumptions that are different from that documented in the ROD (DOE 1995):

- Northeast Plume EWs will be located near the eastern edge of the PGDP and the existing EWs (EW331 and EW332) were to be taken out of service.
- Use of the PGDP cooling towers for stripping TCE and 1,1-DCE will be discontinued and will be replaced with engineered water treatment units that utilize air stripping for TCE and 1,1-DCE contamination.
- Treated water discharge will be through a maximum of two CERCLA outfalls.
- A new non-USEC electrical power connection will be installed for the treatment units and EWs.

4.2.2 Key Design Assumptions

The Northeast Plume IRA optimization was designed based on the following key assumptions:

- The existing EWs—EW331 and EW332—will be out of service, but will be placed in standby.
- The optimized Northeast Plume EW field volumetric flow rate is limited by the engineered treatment plant capacity (approximately 200 gpm each).

4.2.3 Well Field Design

Well field optimization modeling indicates that a two-well configuration is optimal. The two new wells, EW234 and EW235, are to be located near the eastern edge of the PGDP facility. Refer to Figure 5 for well locations. The EWs are expected to have an operational flow rate of approximately 150 gpm each. Detailed lithologic logs and grain size analysis to the extent available will be used in well screen and filter pack design of the new EWs.

4.2.4 Construction

Construction of the optimization project will be performed consistent with the approved remedial action work plan (RAWP) and certified for construction remedial design drawings and specifications.

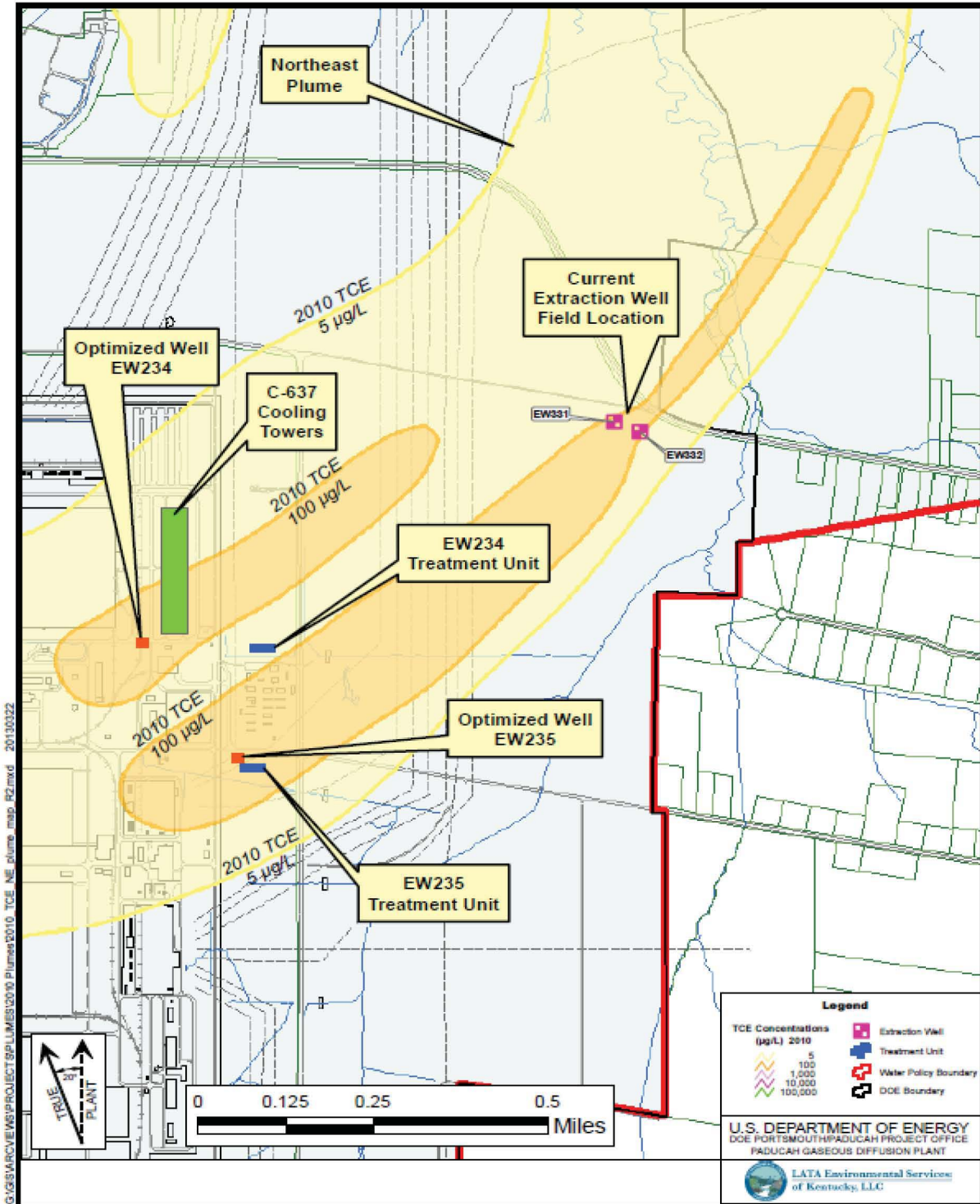


Figure 5. Locations of New and Preexisting EWs Associated with the Northeast Plume IRA at PGDP

4.2.5 Start-up and Testing

The Northeast Plume optimized IRA system will undergo start-up and integrated testing consistent with quality requirements contained in the approved RAWP and certified for construction remedial design drawings and specifications.

4.2.6 Operation and Maintenance

Following successful completion of construction and start-up and integrated testing of facilities the Northeast Plume optimized IRA operations will be initiated consistent with the approved Operation and Maintenance Plan.

4.2.7 Remedial Action Work Plan

An RAWP was developed for the implementation of the remedy modifications based on the above assumptions and expected outcomes. The RAWP included an overview of the optimization modeling, system design and construction, start-up and testing, operations and maintenance requirements, and plans for environmental compliance, waste management, worker health and safety, quality assurance, and data management.

5. SUPPORT AGENCY CONCURRENCE

KDEP and EPA have evaluated the information contained in the Administrative Record for this IRA and concur that the information supports the need for the modification to the remedy, and both agencies concur with the revised remedy selected in this ESD.

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6. STATUTORY DETERMINATIONS

The modified interim remedy, which continues to capture and remove TCE and 1,1-DCE from within the high concentration area of the Northeast Plume, meets the threshold criteria of CERCLA Section 121 and the NCP. The planned changes presented in the ESD will not impact the protectiveness of the IRA. As recognized in the ROD, successful control of the plume, in combination with existing controls (alternate water supply, monitoring, etc.), ensures protection during the period of the interim response. The remedy continues to be protective of human health and the environment and complies with ARARs. As part of this modification, ARARs included in the ROD pertaining to discharge through a KPDES-permitted outfall (i.e., 401 *KAR* 5:005 § 7, 5:029 § 2, 5:029 § 3, 5:031, 5:055, and 5:080 § 1) are being replaced with ARARs to allow the utilization of up to two CERCLA outfall(s) for treated water discharge, as defined by Table 2 of this ESD. The identified ARARs address requirements necessary to ensure the protection of the waters of the Commonwealth for the discharge of effluent through up to two CERCLA outfall(s).

The modification also would change the air emission point location and characteristics that would affect the air distribution of TCE. As a result, the project consulted with the Kentucky Division for Air Quality (KDAQ). KDAQ requested the project comply with the substantive requirements of 401 *KAR* 63:020; consequently, 401 *KAR* 63:022 is being replaced with 401 *KAR* 63:020 § 3.

The revised remedy is cost-effective and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

Table 2. Additional Applicable or Relevant and Appropriate Requirements

Action	Requirements	Prerequisite	Citation
General duty to mitigate for discharge of wastewater from groundwater treatment system	Take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of effluent standards which has a reasonable likelihood of adversely affecting human health or the environment.	Discharge of pollutants to surface waters— applicable .	401 <i>KAR</i> 5:065 § 2(1) and 40 <i>CFR</i> § 122.41(d)
Operation and maintenance of treatment system	Properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used to achieve compliance with the effluent standards. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.	Discharge of pollutants to surface waters— applicable .	401 <i>KAR</i> 5:065 § 2(1) and 40 <i>CFR</i> § 122.41(e)
Technology-based treatment requirements for wastewater discharge	To the extent that EPA promulgated effluent limitations are inapplicable, shall develop on a case-by-case Best Professional Judgment basis under § 402(a)(1)(B) of the Clean Water Act (CWA), technology based effluent limitations by applying the factors listed in 40 <i>CFR</i> § 125.3(d) and shall consider: <ul style="list-style-type: none"> • The appropriate technology for this category or class of point sources, based upon all available information; and • Any unique factors relating to the discharger. 	Discharge of pollutants to surface waters from other than a publicly owned treatment works— applicable .	40 <i>CFR</i> § 125.3(c)(2)
Water quality-based effluent limits for wastewater discharge	Must develop water quality based effluent limits that ensure that: <ul style="list-style-type: none"> • The level of water quality to be achieved by limits on point source(s) established under this paragraph is derived from, and complies with all applicable water quality standards; and • Effluent limits developed to protect narrative or numeric water quality criteria are consistent with the assumptions and any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 <i>CFR</i> § 130.7. 	Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a State water quality standard established under § 303 of the CWA— applicable .	40 <i>CFR</i> § 122.44(d)(1)(vii)

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
	Must attain or maintain a specified water quality through water quality related effluent limits established under § 302 of the CWA.	Discharge of pollutants to surface waters that causes, or has reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criteria within a state water quality standard— applicable .	40 <i>CFR</i> § 122.44(d)(2)
	The numeric water quality criteria for fish consumption specified in Table 1 of 401 <i>KAR</i> 10:031 Section 6(1) provides allowable instream concentrations of pollutants that may be found in surface waters or discharged into surface waters.		401 <i>KAR</i> 10:031 § 6(1)
Monitoring requirements for groundwater treatment system discharges	In addition to 40 <i>CFR</i> §122.48(a) and (b) and to assure compliance with effluent limitations, one must monitor, as provided in subsections (i) thru (iv) of 122.44(i)(1). <i>NOTE: Monitoring parameters, including frequency of sampling, will be developed as part of the CERCLA process and included in a Remedial Design, RAWP, or other appropriate FFA CERCLA document.</i>	Discharge of pollutants to surface waters— applicable .	40 <i>CFR</i> § 122.44(i)(1) 401 <i>KAR</i> § 5:065 2(4)
	All effluent limitations, standards and prohibitions shall be established for each outfall or discharge point, except as provided under § 122.44(k).		40 <i>CFR</i> § 122.45(a) 401 <i>KAR</i> § 5:065 2(5)
	All effluent limitations, standards and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as: Maximum daily and average monthly discharge limitations for all discharges.	Continuous discharge of pollutants to surface waters— applicable .	40 <i>CFR</i> § 122.45(d)(1) 401 <i>KAR</i> § 5:065 2(5)
Effluent limits for radionuclides in wastewater	Shall not exceed the limits for radionuclides listed on Table II—Effluent Limitations.	Discharge of wastewater with radionuclides from an NRC Agreement State licensed facility into surface waters— relevant and appropriate .	902 <i>KAR</i> 100:019 § 44 (7)(a) 10 <i>CFR</i> § 20, Appendix B

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
Mixing zone for discharge of pollutants	<p>The relevant requirements provided in 401 KAR 10:029 § 4 shall apply to a mixing zone for a discharge of pollutants.</p> <p><i>NOTE: Determination of the appropriate mixing zone will, if necessary, be documented in the CERCLA remedial design or other appropriate CERCLA document.</i></p>	Discharge of pollutants to surface waters— applicable .	401 KAR 10:029 § 4
Minimum criteria applicable to all surface waters	<p>Surface waters shall not be aesthetically or otherwise degraded by substances that:</p> <ul style="list-style-type: none"> • Settle to form objectionable deposits; • Float as debris, scum, oil, or other matter to form a nuisance; • Produce objectionable color, odor, taste, or turbidity; • Injure, are chronically or acutely toxic to or produce adverse physiological or behavioral responses in humans, animals, fish, and other aquatic life; • Produce undesirable aquatic life or result in the dominance of nuisance species; <ol style="list-style-type: none"> 1. Cause fish flesh tainting. 2. The concentration of phenol shall not exceed 300 mg/L as an instream value. 	Discharge of pollutants to surface waters— applicable .	401 KAR 10:031 § 2(1)(a-f)
	<p>The water quality criteria for the protection of human health related to fish consumption in Table 1 of 401 KAR 10:031 § 6 are applicable to all surface water at the edge of assigned mixing zone except for those points where water is withdrawn for domestic water supply use.</p> <p>(a) The criteria are established to protect human health from the consumption of fish tissue and shall not be exceeded.</p> <p>(b) For those substances associated with a cancer risk, an acceptable risk level of not more than one (1) additional cancer case in a population of 1,000,000 people, (or 1×10^{-6}) shall be utilized to establish the allowable concentration.</p>		401 KAR 10:031 § 2(2)(a) and (b)

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
<p>Criteria for surface water designated as warm water aquatic life habitat</p>	<p>The following parameters and associated criteria shall apply for the protection of productive warm water aquatic communities, fowl, animal wildlife, arborous growth, agricultural, and industrial uses:</p> <ul style="list-style-type: none"> • Natural alkalinity as CaCO₃ shall not be reduced by more than 25 percent; • pH shall not be less than 6.0 nor more than 9.0 and shall not fluctuate more than 1.0 pH units over a period of 24 hours; • Flow shall not be altered to a degree that will adversely affect the aquatic community; • Temperature shall not exceed 31.7°C (89°F); • Dissolved oxygen shall be maintained at a minimum concentration of 5.0 mg/L as a 24 hour average; instantaneous minimum shall not be less than 4.0 mg/L; • Total dissolved solids or specific conductance shall not be changed to the extent that the indigenous aquatic community is adversely affected; • Total suspended solids shall not be changed to the extent that the indigenous aquatic community is adversely affected; • Addition of settleable solids that may alter the stream bottom so as to adversely affect productive aquatic communities shall be prohibited; • Concentration of the un-ionized ammonia shall not be greater than 0.05 mg/L at any time instream after mixing; <p>Instream concentrations for total residual chlorine shall not exceed an acute criteria value of 19 µg/L or a chronic criteria value of 11 µg/L.</p>	<p>Discharge of pollutants to surface waters designated as warm water aquatic life habitat—applicable.</p>	<p>401 KAR 10:031 § 4(1)(a)-(i) and (k)</p>
	<p>The allowable instream concentration of toxic substances, or whole effluents containing toxic substances, which are noncumulative or nonpersistent with a half-life of less than 96 hours, shall not exceed:</p> <ol style="list-style-type: none"> a. 0.1 of the 96 hour median LC₅₀ of representative indigenous or indicator aquatic organisms; or b. A chronic toxicity unit of 1.00 utilizing the 25 percent inhibition concentration, or LC₂₅. 	<p>Discharge of toxic pollutants to surface waters designated as warm water aquatic life habitat—applicable.</p>	<p>401 KAR 10:031 § 4(1)(j)(1)</p>

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
	<p>The allowable instream concentration of toxic substances, or whole effluents containing toxic substances, which are bioaccumulative or persistent, including pesticides, if not otherwise regulated, shall not exceed:</p> <p>a. 0.01 of the 96 hour median LC₅₀ of representative indigenous or indicator aquatic organisms; or</p> <p>b. A chronic toxicity unit of 1.00 utilizing the LC₂₅.</p>		401 KAR 10:031 § 4(1)(j)(2)
	<p>In the absence of acute criteria for pollutants listed in Table 1 of 401 KAR 10:031 § 6, for other substances known to be toxic but not listed in this regulation, or for whole effluents that are acutely toxic, the allowable instream concentration shall not exceed the LC₁ or 1/3 LC₅₀ concentration derived from toxicity tests on representative indigenous or indicator aquatic organisms or exceed 0.3 acute toxicity units.</p>		401 KAR 10:031 § 4(1)(j)(3)
	<p>If specific factors have been determined for a toxic substance or whole effluent such as an acute to chronic ratio or water effect ratio, they may be used instead of the 0.1 and 0.01 factors upon demonstration that such factors are scientifically defensible.</p> <p><i>NOTE: Demonstration that such factors are scientifically defensible will be reflected in the appropriate CERCLA document.</i></p>		401 KAR 10:031 § 4(1)(j)(4)
	<p>If a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above the numeric criterion for whole effluent toxicity using the procedures in paragraph (d)(1)(ii), develop effluent limits for whole effluent toxicity.</p>	<p>Discharge of wastewater causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the numeric criterion for whole effluent toxicity—applicable.</p>	40 CFR § 122.44(d)(1)(iv)

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
Characterization of industrial wastewater	<p>Industrial wastewater discharges that are point source discharges subject to regulation under section 402 of the Clean Water Act, as amended, are not solid wastes for the purpose of hazardous waste management.</p> <p>[Comment: This exclusion applies only to the actual point source discharge. It does not exclude industrial wastewaters while they are being collected, stored or treated before discharge, nor does it exclude sludges that are generated by industrial wastewater treatment.]</p> <p><i>NOTE: For purpose of this exclusion, the CERCLA on-site treatment system will be considered equivalent to a wastewater treatment unit and the point source discharges subject to regulation under CWA Section 402, provided the effluent meets all identified CWA ARARs.</i></p>	Generation of industrial wastewater for treatment and discharge into surface water— applicable.	40 <i>CFR</i> § 261.4(a)(2) 401 <i>KAR</i> 31:010 § 4
Transport or conveyance of collected RCRA wastewater to a wastewater treatment unit located on the facility	<p>All tank systems, conveyance systems, and ancillary equipment used to treat, store, or convey wastewater to an on-site wastewater treatment facility are exempt from the requirements of RCRA Subtitle C standards.</p> <p><i>NOTE: For purposes of this exclusion, any dedicated tank systems, conveyance systems, and ancillary equipment used to treat, store or convey CERCLA remediation wastewater to a CERCLA on-site wastewater treatment unit that meets all of the identified CWA ARARs for point source discharges from such a facility, are exempt from the requirements of RCRA Subtitle C standards.</i></p>	On-site wastewater treatment units (as defined in 40 <i>CFR</i> § 260.10) subject to regulation under § 402 or § 307(b) of the CWA (i.e., KPDES-permitted) that manages hazardous wastewaters— applicable.	40 <i>CFR</i> § 264.1(g)(6) 401 <i>KAR</i> 34:010 § 1
Activities causing toxic substances or potentially hazardous matter emissions	Persons responsible for a source from which hazardous matter or toxic substances may be emitted shall provide the utmost care and consideration in the handling of these materials to the potentially harmful effects of the emissions resulting from such activities. No owner or operator shall allow any affected facility to emit potentially hazardous matter or toxic substances in such quantities or duration as to be harmful to the health and welfare of humans, animals and plants.	Emissions of potentially hazardous matter or toxic substances as defined in 401 <i>KAR</i> 63:020 § 2 (2)— applicable.	401 <i>KAR</i> 63:020 § 2

Table 2. Additional Applicable or Relevant and Appropriate Requirements (Continued)

Action	Requirements	Prerequisite	Citation
Activities causing radionuclide emissions	Emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Radionuclide emissions from point sources at a DOE facility — applicable.	40 <i>CFR</i> § 61.92 401 <i>KAR</i> 57:002

7. PUBLIC PARTICIPATION REQUIREMENTS

Community involvement is a critical aspect of the cleanup process at PGDP. The DOE encourages the public to review this ESD. As required by 40 *CFR* § 300.435(c)(2)(i), a Notice Availability and brief description of this ESD will be published in the local newspaper announcing the availability of the ESD for review in the Administrative Record file as required by the NCP (40 *CFR* § 300.435(c)(2)(i)(A) and 300.825(a)(2)). The Administrative Record file that contains the ROD and the CERCLA Five-Year Reviews and other associated documentation is available for review at the following:

DOE Environmental Information Center
115 Memorial Drive, Barkley Centre
Paducah, KY 42001
(270) 554-6979
Fax: (270) 554-6987
<http://www.paducaheic.com>

Hours of Operation: Monday through Friday
8 a.m.–12:00 p.m.

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8. APPROVALS

*Explanation of Significant Differences
to the Record of Decision for the Interim Remedial Action
of the Northeast Plume at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky*

DOE/LX/07-1291&D1

June 2013

William E. Murphie, Manager
Portsmouth/Paducah Project Office
U.S. Department of Energy

Date

Franklin E. Hill, Director
Superfund Division
U.S. Environmental Protection Agency—Region 4

Date

Tony Hatton, Director
Division of Waste Management
Kentucky Department for Environmental Protection

Date

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9. REFERENCES

- DOE (U.S. Department of Energy) 1995. *Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/06-1356&D2, U.S. Department of Energy, Paducah, KY, June.
- DOE 2003. *Five-Year Review for Remedial Actions at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2067&D2, U.S. Department of Energy, Paducah, KY, October.
- DOE 2006. *Paducah 2006 Sitewide Remedy Review*, Office of Environmental Management, Office of Engineering Technical Expertise Project 610, U.S. Department of Energy, April 13.
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- EPA 1999. *A Guide to Preparing Superfund Proposed Plans, Records of Decision and Other Remedy Selection Decision Documents*, EPA 540-R-98-031, Office of Solid Waste and Emergency Response, Washington, DC, July.
- EPA 2009. Franklin E. Hill, Director, Superfund Division, Sam Nunn Federal Center, Atlanta, GA, letter to William Murphie, Director Portsmouth/Paducah Project Office, U.S. Department of Energy, Paducah Site Office, Paducah, KY, “Approval of the 2008 CERCLA Five-Year Review for the Paducah Gaseous Diffusion Plant (DOE/LX/07-0117&D2),” June 4.
- KEEC (Kentucky Energy and Environment Cabinet) 2009. April J. Webb, P.E., Manager, Hazardous Waste Branch, Kentucky Energy and Environment Cabinet, Frankfort, KY, letter to Reinhard Knerr, Paducah Site Lead, Portsmouth/Paducah Project Office, U.S. Department of Energy, Paducah, KY, approval of the “Five-Year Review for Remedial Actions at the Paducah Gaseous Diffusion Plant (DOE/LX/07-0117&D2),” March 30.

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