WEST VIRGINIA

DEPARTMENT OF ENVIRONMENTAL PROTECTION

FINAL DECISION AND RESPONSE TO COMMENTS

BAYER MATERIAL SCIENCE, LLC

NEW MARTINSVILLE, WEST VIRGINIA
USEPA ID#: WVD056866312

SEPTEMBER 2013

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Acronyms and Abbreviations

bgs	below ground surface
CA	Corrective Action
CMS	Corrective Measures Study
CAO	Corrective Action Objectives
COI	Constituents of Interest
COPC	Constituents of Potential Concern
Facility	Bayer MaterialScience Facility
FDTRC	Final Decision Response to Comments
gpm	gallons per minute
HI	Hazard Index
HSWA	Hazardous and Solid Waste Amendments
IC	Institutional Control
IM	Interim Measure
ISB	In-Situ Biological
ISTD	In-Situ Thermal Destruction
MCL	maximum contaminant level
NFA	No Further Action
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SB	Statement of Basis
SWMU	Solid Waste Management Unit
SVOC	semi-volatile organic compound
TDI	toluene diisocyanate
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency (also EPA)
VOC	volatile organic compound
WVDEP	West Virginia Department of Environmental Protection (also DEP)

I. INTRODUCTION

The West Virginia Department of Environmental Protection (WVDEP) is issuing this Final Decision and Response to Comment (FDRTC or Final Decision) in connection with the Bayer MaterialScience Facility (Facility) located in New Martinsville, West Virginia.

The Facility is subject to the Corrective Action (CA) Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. Sections 6901 to 6992k. The CA program is designed to ensure that certain facilities subject to RCRA have investigated and cleaned up any releases of hazardous waste and hazardous constituents that have occurred at their property.

On July 17, 2013, WVDEP issued a Statement of Basis (SB) in which a Final Remedy for the Facility was proposed. The proposed Final Remedy consisted of: a groundwater component, a soils component, a technology demonstration component, and Facility-wide Institutional Controls. The proposed groundwater component consisted of the operation and maintenance of a groundwater capture and treatment program until such time that the Facility can demonstrate that the concentrations of constituents in the groundwater are below Maximum Contaminant Levels (MCLs) or WVDEP acceptable limits. The soils component consisted of compliance with maintaining the integrity of the vegetative cover system for Solid Waste Management Unit (SWMU) Group A. The technology demonstration component consisted of the implementation of a program that will provide site-specific data on the feasibility of various bench scales followed by pilot-scale in-situ/ex-situ technologies within SWMU Groups B, C, and D, and SWMUs 21 & 27. The last component of the proposed Final Remedy was Facility-wide Non-Engineering Controls.

On July 17, 2013, consistent with public participation provisions under RCRA, the WVDEP requested comments from the public on the proposed Final Remedy. WVDEP placed an announcement with the Wheeling Intelligencer notifying the public and requesting comments on the proposed Final Remedy. The thirty (30) day public comment period for the Wheeling Intelligencer announcement began on July 17, 2013 and ended August 16, 2013. On July 24, 2013, WVDEP placed the same announcement with the Wetzel Chronicle. The thirty (30) day public comment period for the Wetzel Chronicle announcement began on July 24, 2013 and ended August 23, 2013. No comments were received by WVDEP during the public either comment period.

Since no comments were received during the public comment period, WVDEP has determined that it is not necessary to modify its proposed Final Remedy as set forth in the SB. The Final Decision as set forth in Section II, "Final Decision," is below.

II. FINAL DECISION

The Final Remedy for the Facility consists of the following: a groundwater component, a soils component, a technology demonstration component, and Facility-wide Institutional Controls.

1. No Further Action:

The RFI concluded that for some SWMUs investigated, the data demonstrated the units presented no unacceptable risk to human health or the environment. No Further Action (NFA) is recommended for the SWMUs listed in **Attachment B**.

2. SWMU Group A:

The Final Remedy for SWMU Group A is the Interim Measures as provided by the *Corrective Measures Implementation Plan for SWMU Group A South End Remediation Project* approved by EPA in August 2011 and completed in March 2013. The Interim Measures (IM) consisted of: construction of a soil cap and groundwater collection system; abandonment of existing wells within the footprint of the landfill; cutting and re-grading in the northern half of the existing landfill and using the cut material as fill in the Ash Lagoon; installation of a geosynthetic liner system; installation of cover material and topsoil layers; establishing a vegetative cover; installation of a groundwater extraction and recovery well system; and installation of three (3) new groundwater monitoring wells, which are to be included in the Facility–wide Groundwater Monitoring Plan. Adherence to the operational and maintenance activities described in the *Operation and Maintenance Plan (O&M) for SWMU Group A South End Remediation Project* dated July 2011 will ensure the long-term effectiveness of the Interim Measures at SWMU Group A.

3. SWMU Groups B, C, and D, and SWMUs 21 & 27:

A technology demonstration program is the Final Remedy for SWMU Groups B, C, and D, and SWMUs 21 & 27. Implementation of this program will provide site-specific data on the feasibility of various in-situ/ex-situ technologies in the selected areas and treatability design data information (including, but not limited to estimating oxidant and/or bio-supplement suitability, optimum dosage rates, application methods, and monitoring protocols).

The technology demonstrations will be designed to be bench scale followed by pilot-scale, in-situ/ex-situ tests for a selected technology within the selected SWMUs. If the technology demonstrations are shown to be successful, the full-scale application will be implemented on a selective basis, leading to significant reductions in constituent levels and mass loading to the alluvial aquifer at a select SWMU. These reductions should result in an acceleration of long-term improvements in alluvial aquifer water quality. The effect of these reductions on water quality improvement will be assessed at significant milestones during the technology demonstrations.

Work at SWMU 21 has focused on parallel paths of In-Situ Biological (ISB) and In-situ Thermal Destruction (ISTD) Bench Testing. The Facility will continue to conduct studies for mass removal of pollutants; as well as, consideration of other methods of waste destruction, where necessary, including off-site and on-site incineration.

4. Facility-Wide Groundwater:

The Facility must maintain an inward gradient for groundwater to ensure that contaminated groundwater underlying the Facility is captured and treated at the Facility wastewater treatment plant. The contaminated groundwater capture and treatment program will be maintained until such time that the Facility can demonstrate that the concentrations of constituents in the groundwater at the Facility are below Maximum Contaminant Levels (MCLs) or WVDEP acceptable limits. Furthermore, the Facility will continue to identify source areas of contamination and, where possible, apply a remediation technique to reduce the impacts of the source areas. The Facility will maintain a groundwater monitoring program to demonstrate that the inward gradient is maintained and that the contaminant mass is being reduced.

The Facility-wide groundwater pumping, treating and monitoring program is to continue until Corrective Action Objectives (CAOs) are accomplished. As part of the Final Remedy, the Facility is required to submit a Facility-wide Groundwater Monitoring Plan to WVDEP for review and approval. At a minimum, the plan must include monitoring wells to be sampled, analyses to be performed, and a schedule for implementing the sampling activities.

5. Institutional Controls (ICs):

Institutional Controls (ICs) are non-engineered instruments, such as administrative and legal controls, that minimize the potential for human exposure to contamination and/or protect the integrity of the decision by limiting land or resource use. Under the Final Remedy, some contaminants remain in the groundwater and soil at the Facility above levels appropriate for residential uses. Because some contaminants remain in the soil and groundwater at the Facility at levels that exceed residential use, WVDEP's Final Remedy requires the compliance with and maintenance of land and groundwater use restrictions. The ICs shall include, but not be limited to, the following land and groundwater use restrictions:

a. Groundwater at the Facility shall not be used for any purpose other than 1) industrial use as non-contact cooling water; and 2) the operation, maintenance, and monitoring activities required by WVDEP and/or EPA, unless it is demonstrated to WVDEP, in consultation with EPA, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy and WVDEP, in consultation with EPA, provides prior written approval for such use;

b. The Facility property shall not be used for residential purposes unless it is demonstrated to WVDEP, in consultation with EPA, that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and WVDEP, in consultation with EPA, provides prior written approval for such use;

c. All earth moving activities, including excavation, drilling and construction activities, in the areas at the Facility where any contaminants remain in soils above EPA's Screening levels for non-residential use or groundwater above Federal MCLs/Tap Water Risk-Based Concentrations (RBCs), shall be prohibited unless it is demonstrated to WVDEP, in consultation with EPA, that such activity will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and WVDEP, in consultation with EPA, provides prior written approval for such use;

d. The Property will not be used in a way that will adversely affect or Interfere with the integrity and protectiveness of the final remedy;

e. No new wells will be installed on Facility property unless it is demonstrated to WVDEP, in consultation with EPA, that such wells are necessary to implement the final remedy and WVDEP provides prior written approval to install such wells;

f. Owner agrees to provide WVDEP and EPA with a "Certified, True and Correct Copy" of any instrument that conveys any interest in the Facility property or any portion thereof;

g. Owner agrees to allow the WVDEP, EPA and/or their authorized agents and representatives, access to the Property to inspect and evaluate the continued effectiveness of the final remedy and if necessary, to conduct additional remediation to ensure the protection of the public health and safety and the environment based upon the final remedy to be selected by WVDEP in the Final Decision and Response to Comments (FDRTC);

h. Require the implementation of the approved Groundwater Monitoring Plan.

6. Implementation of Institutional Controls

Land and groundwater use restrictions necessary to prevent human exposure to contaminants at the Facility will be implemented through enforceable ICs, such as Orders and/or an Environmental Covenant, pursuant to the West Virginia Uniform Environmental Covenants Act. If an Environmental Covenant is to be the Institutional Control mechanism, it will be recorded in the chain of title for the Facility property. In addition, WVDEP acknowledges that the West Virginia

Department of Health issues drinking water permits for wells and does not allow the use of contaminated groundwater as a drinking water source.

The continuation of an existing groundwater monitoring program until groundwater clean-up standards are met will be enforceable through the final enforceable instrument, such as a permit, order, or an Environmental Covenant. If WVDEP determines that additional institutional controls or other corrective actions are necessary to protect human health or the environment, WVDEP has the authority to require and enforce such additional corrective action under that instrument.

III. FACILITY BACKGROUND AND HISTORY

The 270-acre Facility is situated within the Ohio River Valley at the base of the West Virginia Northern Panhandle in Marshall and Wetzel Counties, approximately five miles north of the city of New Martinsville, West Virginia. The Facility is bounded by an industrial facility to the north, the Ohio River to the west, West Virginia Route 2 and steeply sloped terrain to the east, and the small town of Proctor, West Virginia to the south. The Facility was constructed in 1954 by Mobay Corporation to produce polyester resin. In 1956, the Facility became the first in the United States to produce toluene diisocyanate (TDI). Most of the products that have been produced at the Facility were used in the polyurethane industry. Two notable exceptions were polycarbonate (1957-1982) and iron oxide (1980-2006). Mobay Corporation changed its name to Miles Inc. in 1992 and subsequently changed its name to Bayer Corporation in 1995. Today, the Facility is part of Bayer MaterialScience, which is a subgroup of Bayer Corporation and manufactures a range of polyurethane raw materials used in the automobile, furniture and construction industries. The Facility also manufactures Texin® thermoplastic polyurethane, which is also used in the automobile industry, as well as, the tool, sporting goods and medical industries.

In 1987, EPA issued a RCRA Corrective Action Permit to the Facility to proceed with site cleanup. The Permit required the Facility to conduct a RCRA Facility Investigation (RFI); implement interim measures to stabilize known areas which pose a risk to human health or the environment; conduct a groundwater study to determine if contaminated groundwater is leaving the site; and conduct a Corrective Measures Study (CMS) to propose the final cleanup actions needed.

IV. SITE CHARACTERIZATION

The New Martinsville Facility is situated within the Ohio River Valley at the base of the West Virginia Northern Panhandle in Marshall and Wetzel Counties, approximately five miles north of the city of New Martinsville, West Virginia. The Facility is bounded by an industrial facility to the north, the Ohio River to the west, West Virginia Route 2 and steeply sloped terrain to the east, and the small town of Proctor, West Virginia to the south.

The main aquifer beneath the Facility is the Ohio River Valley Alluvial Aquifer. The

alluvial aquifer beneath the Facility consists generally of an elongated lens of up to 20 feet of fine sand with varying amounts of silt overlying a medium to coarse sand and fine gravel outwash deposit that averages 20 to 30 feet in thickness.

The alluvial aquifer beneath the Facility has been pumped by three (3) groundwater recovery wells since 1986. In addition, an adjacent industrial facility extracts groundwater periodically from a production well at the northwest corner of the Facility. Under pumping conditions, groundwater flow within the alluvial aquifer is radial toward the center of the Facility under the main plant area, with induced river flow becoming the main source of aquifer recharge (Geraghty & Miller, 1985a). In 2013, the Facility will bring two additional groundwater extraction wells on line near Solid Waste Management Unit (SWMU) Group A to minimize potential impacts from this unit.

Beneath the alluvial aquifer, there is a groundwater producing bedrock system. This upper bedrock strata yield low volumes of groundwater characterized by water quality that is significantly different from the overlying alluvial aquifer. These two strata are separated by shale confining layers and by the upward hydraulic gradient exerted by the bedrock system.

V. SUMMARY OF ENVIRONMENTAL INVESTIGATIONS

The RCRA Corrective Action process was first implemented at the Facility in the 1980's with the RCRA Facility Assessment being completed in 1988. Major RCRA Corrective Action reports for the Facility are listed in **Attachment A**, along with the submittal and approval dates (if applicable).

A RCRA Facility Investigation (RFI) three-phased approach work plan for thirty (30) SWMUs at the Facility, was submitted to EPA by the Facility in October 1995. The thirty (30) SWMUs included in the RFI are shown on **Figure 1**. The three phase RFI allowed the scope of each phase to incorporate the results of the previous phase. Phase 1 work was initiated in October 1996. An accelerated Phase 2 Program addressing SWMUs 1, 2, 4, and 30 began in October 1996, and the remaining Phase 2 scope of work commenced in June 1997. Phase 3 scope of work was implemented in November 1999.

The RFI included the collection of surface and subsurface soils, surface water and sediments, groundwater, and concrete chips. The data collected during the RFI was used to support a Corrective Measures Study (CMS), which was subsequently completed for the Facility in 2007. The approach outlined in the CMS Report was approved by EPA and WVDEP in 2010.

A risk driven approach was applied at the thirty (30) SWMUs that were evaluated as part of the RFI. The purpose of the risk assessment was to assist in the process of deciding the appropriate action to take at each SWMU. Maximum detected concentrations and detection limits from analytical results of samples collected at the various SWMUs were compared to conservative screening criteria. A total of 482 soil samples were collected from the various SWMUs during Phase 2 of the RFI. SWMUs that contained constituents exceeding RBCs or

site specific Soil Screening Levels (SSLs) were recommended for further evaluation during Phase 3 of the investigation. Based on the results of the screening-level risk assessment of the data from Phase 2 of the RFI, EPA agreed with Bayer that fourteen (14) of the thirty (30) SWMUs and the surface water and sediments of Beaver Run should be assigned a No Further Action (NFA) recommendation; a description of those SWMUs can be found in **Attachment B**.

The remaining sixteen (16) SWMUs were grouped based on proximity, usage, and similar analytical results. An additional 74 samples were collected to fill data gaps for the remaining sixteen (16) SWMUs during Phase 3. These SWMUs, which are described in **Attachment C**, were determined to have releases to soil and/or groundwater that exceeded EPA screening criteria. These units were to be evaluated in the CMS for their potential to leach constituents of interest (COIs) to groundwater at potentially unacceptable concentrations, which are listed in **Table 1** below.

1. Corrective Measures Study

The areas included in the CMS based on the results of the RFI are as follows:

- SWMU Groups A, B, C and D; SWMU 21; and SWMU 27 – based on the potential for COIs to leach from the SWMU affected soils to Facility groundwater at concentrations of potential concern, and;

- Facility groundwater.

The 2007 CMS identified twenty one (21) potential technologies to address site-specific environmental concerns that involved a full range of potential corrective actions for the SWMUs including: removal, in-situ and ex-situ treatment, containment and institutional controls. Potential technologies for groundwater included natural attenuation, physical and hydraulic containment barriers, passive treatment walls, collection trenches and institutional controls.

Six (6) Corrective Measures Alternatives were developed from various combinations of the potential technologies. All of the alternatives were assessed to be capable of meeting the approved Corrective Action Objectives (CAOs) and the proposed media-specific cleanup goals. A best-balanced alternative was selected and recommended from among the alternatives, based on a comparative analysis of their abilities to provide protection of human health and the environment; their short-term and long-term effectiveness; their ability to reduce toxicity, mobility or volume of contaminants; implementability; costs; and community and State acceptance. The recommended Alternative was further evaluated with respect to its consistency with statutory requirements related to protection of public health and the environment, cost effectiveness and preference for treatment as a primary element; and the consistency of the alternative with RCRA guidance.

2. SWMU Group A Interim Measures

A significant interim measure was completed during the first quarter of 2013 at SWMU Group A, comprising of SWMUs 1, 2, 3, and 4, located at the south end of the Facility and occupying seven (7) acres, which included the relocating of Beaver Run as part of this interim measure effort.

Beaver Run formerly flowed just beyond the southern limits of SWMU Group A but was relocated to the south to prevent the stream from eroding into the SWMUs and to eliminate any potential impacts from the SWMUs on the surface water in Beaver Run. The interim measure also included abandonment of existing wells within the footprint of the landfill; cut and re-grading in the northern half of the existing landfill and using the cut material as fill in the Ash Lagoon; installation of a geosynthetic liner system; installation of cover material and topsoil layers; establishing a vegetative cover; installation of a groundwater extraction and recovery well system; and installation of three (3) new groundwater monitoring wells. The geosynthetic liner and cover system consisted of the following components from top to bottom: vegetative cover, 6 inches of topsoil,18 inches of cover material, geocomposite drainage layer, 40 mil High Density Polyethylene (HDPE) geomembrane, 4 ounce non-woven geotextile, and a drained anchor trench to encapsulate the landfill and secure the geosynthetic liner system.

Following the installation of the liner system, a groundwater extraction and recovery system was installed. The purpose of the groundwater extraction and recovery system is to hydraulically contain, collect, and treat impacted groundwater in the SWMU Group A area. The system consists of two wells equipped with submersible centrifugal pumps, which convey extracted groundwater through a 4-inch HDPE pipe to the existing permitted Bayer water treatment facility.

3. Site-wide Groundwater

The Facility has been pumping and treating groundwater since 1986 and completing Annual Groundwater Reports since 1985. Since the recovery wells were installed in 1986, all groundwater elevation readings have demonstrated on-site plume hydraulic containment.

The RFI included a screening groundwater risk evaluation utilizing groundwater data available from on-site and off-site wells. Groundwater analytical results were compared to EPA MCLs for drinking water or to EPA Region III Risk-Based Concentrations (RBCs) for tap water. Twenty-one (21) COIs in on-site wells exceeded at least one of these screening criteria. No constituents from offsite wells exceeded the screening criteria. The RFI concluded that the affected groundwater is contained on-site. More recent groundwater data from the 2012 Groundwater Monitoring Report (Tetra Tech, Inc., 2013) confirmed that the alluvial aquifer contaminant plume is stable and is being contained on-site by existing recovery well operations.

Analytical results of data collected during a pore-water and sediment-sampling effort in the site-adjacent Ohio River during August of 2012 revealed that concentrations of constituents have decreased over time, presumably as a result of the control measures and implementation of remedy technologies that have been put in place.

TABLE 1
CONSTITUENTS OF INTEREST BY MEDIA

Volatile Organic Compounds		
Constituent	**Soil**	**Groundwater**
1,1,1-Trichlorethane		X
1,2-Dichlorobenzene		X
1,4-Dichlorobenzene	X	X
Carbon tetrachloride	X	
Chlorobenzene	X	X
Benzene	X	X
Methylene Chloride	X	
Toluene	X	X
Trichloroethene	X	X
Trichlorofluoromethane	X	X
Semi-Volatile Organic Compounds		
1,2-Dichlorobenzene	X	X
1,2,4-Trichlorobenzene	X	
2,4-Dinitrotoluene	X	X
2,6-Dinitrotoluene	X	X
2,4-Toluenediamine	X	X
4,4-Methylenedianiline		X
5-Nitro-o-toluidine		X
Aniline	X	X
Bisphenol		X
Bis(2-chloroethyl)ether	X	
Bis(2-ethylhexyl)phthalate		X
p-Chloroaniline	X	X
Chlorobenzene	X	
m-,p-Cresol	X	
p-Nitroso-di-n-propylamine	X	
n-Nitrosodiphenylamine	X	
Nitrobenzene	X	X
m-, o-, and p- Nitrotoluene		X
m-,o- and ,p-Toluidine	X	X
Metals		
Antimony	X	
Cadmium	X	
Chromium	X	
Lead	X	
Nickel	X	

VI. CORRECTIVE ACTION OBJECTIVES

The following Corrective Action Objectives (CAOs) for soils and groundwater at the Facility have been identified:

1. Soils

The CAOs for site soils is the prevention of unacceptable human exposure to contaminated soils at all levels, with "unacceptable exposure" defined as carcinogenic risks > $1x10^{-6}$ and a Hazard Index (HI) for non-carcinogenic risks of > 1 by requiring the compliance with and maintenance of land use restrictions at the Facility.

2. Groundwater

The CAOs for site groundwater are to restore groundwater to drinking water standards established by MCLs or WVDEP acceptable limits; to control the migration of Site-related groundwater contamination at concentration levels that are protective of surface water quality; and to control and reduce the sources of groundwater contamination.

VII. EVALUATION OF WVDEP'S FINAL REMEDY

WVDEP used criteria to evaluate the Final Remedy consistent with EPA guidance, "Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Fed. Reg. 19431, May 1, 1996. The criteria are applied in two phases. In the first phase, WVDEP evaluated three decision threshold criteria as general goals. In the second phase, for those remedies that meet the threshold criteria, WVDEP evaluated seven balancing criteria.

1. Threshold Criteria

a. Protect Human Health and the Environment

Overall protection of human health and the environment addresses the ability of an alternative to eliminate, reduce or control threats to public health or the environment through institutional controls, engineering controls, removal or treatment. The groundwater pumping and treating technology employed at the Facility has been a primary tool in effectively and reliably protecting public health and the environment over the past twenty-five (25) years of operation. Minimum pumping rates of 130 to 180 gpm (total of all the wells) have proven effective in containing the groundwater plume on-site.

With respect to Facility soils, all contaminated soil is below the surface and contained within Facility property. There is no direct exposure of industrial workers to subsurface soil under current land use, and direct exposure of construction/excavation workers is controlled by the existing Facility

administrative controls, including the Facility-wide excavation permitting process, and appropriate health and safety plans. With respect to future uses, land use restrictions will minimize the potential for human exposure to contamination.

b. Achieve Media Cleanup Objectives

The Facility has achieved the EPA's non-residential Risk Based Concentrations (RBCs) for industrial soils. The groundwater plume appears to be stable (not migrating), and Constituents of Potential Concern (COPCs), though above Federal MCLs, are either stable or declining over time.

In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met. The Facility meets EPA risk guidelines for human health and the environment. The Final Remedy requires the implementation and maintenance of institutional controls to ensure that Facility property is not used for residential purposes and groundwater beneath Facility property is not used for any purpose except for industrial use as non-contact cooling water and to conduct the operation, maintenance, and monitoring activities required by WVDEP and EPA.

c. Remediating the Source of Releases

In the Final Remedy, WVDEP seeks to eliminate or reduce further releases of hazardous wastes and hazardous constituents that may pose a threat to human health and the environment. Groundwater is not used for potable purposes at the Facility or at neighboring facilities. In addition, a groundwater monitoring program already in place will continue until groundwater clean-up standards are met. The West Virginia Department of Health issues drinking water permits for wells and does not allow use of contaminated groundwater as a drinking water source. There are no known unaddressed discrete sources of waste from which constituents would be released to the environment.

The technology demonstration remedy is designed to generate site-specific data on the feasibility and effectiveness of various in-situ technologies, that when implemented at full-scale application will lead to significant reductions in SWMU constituent levels and mass loading to the alluvial aquifer, resulting in an acceleration of long-term improvements in alluvial aquifer water quality. The effect of these reductions on water quality improvement will be assessed at significant milestones during the technology demonstrations.

2. Balancing/Evaluating Criteria

a. Long-Term Effectiveness

Institutional Controls (ICs) will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in soils and groundwater. The Final Remedy requires the compliance with and maintenance of land use and groundwater use restrictions at the Facility. WVDEP anticipates that the land use and groundwater use restrictions will be implemented through orders and/or an environmental covenant to be recorded in the chain of title for the Facility property. If the mechanism is to be an environmental covenant, the environmental covenant will run with the land and as such, will be enforceable by WVDEP and/or other stakeholders against future land owners. In addition, the required groundwater-monitoring plan addressing the entire Facility will provide data to assess the long-term effectiveness of the remedy.

b. Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents

The reduction of toxicity, mobility and volume of hazardous constituents at the Facility has already been achieved, as demonstrated by the data of the groundwater monitoring showing that the plume appears to be stable (not migrating), and concentrations of constituents of potential concern (COPCs) are either stable or declining over time. In addition, a groundwater-monitoring program will continue until groundwater clean-up standards are met.

c. Short-Term Effectiveness

The Final Remedy does not involve any activities, such as construction or excavation that would pose short-term risks to workers, residents, and the environment. In addition, WVDEP anticipates that the land use and groundwater use restrictions will be fully implemented shortly after the issuance of the Final Decision and Response to Comments. A new groundwater monitoring plan addressing the entire Facility including the new wells installed as part of the major interim measure completed for SWMU Group A will be submitted to WVDEP for approval. The groundwater-monitoring plan will provide data to assess the effectiveness of the remedy.

d. Implementability

The Final Remedy is readily implementable. WVDEP will implement the institutional controls through an enforceable mechanism such as an order or an Environmental Covenant, pursuant to West Virginia Code Chapter 22, Article22, and the Uniform Environmental Covenants Act, West Virginia Code Chapter 22, Article 22B. Groundwater monitoring will be continued through an enforceable mechanism such as an environmental covenant or order. Environmental Covenants are readily implemented. In addition, WVDEP does not anticipate any regulatory constraints in issuing orders.

e. Cost-Effectiveness

The Final Remedy is cost effective. The costs associated with the remedies and the continuation of groundwater monitoring are minimal. The costs to record an environmental covenant in the chain of title to the Facility property are minimal. Likewise, the costs associated with issuance of orders are also minimal. The costs to perform various in-situ, ex-situ, or incineration activities will be estimated and provided to WVDEP once potential remedies are proposed for specific areas of contamination at the Facility. WVDEP may wish to require the Facility to provide a yearly cost estimate for planned activities in advance of each calendar year. The potential technologies that the Facility has identified are recognized in the business as viable remedies to various types of contamination. None of the potential remedies appear to be costs prohibitive.

f. Community Acceptance

WVDEP evaluated community acceptance of the proposed decision during the public comment period. No comments were received during the public comment period.

g. EPA Support / Agency Acceptance

The Final Remedy has been evaluated and approved by the EPA. Furthermore, EPA provided technical oversight throughout the investigation process at the Facility.

VIII. FINANCIAL ASSURANCE

The Facility will be required to provide Financial Assurance to implement the Final Remedy. WVDEP anticipates that the Final Remedy will be implemented under an enforceable mechanism issued by WVDEP under available legal authorities which will include a financial assurance component.

IX. DECLARATION

Based on the Administrative Record, I have determined that the Final Remedy as set forth in this Final Decision is appropriate and will be protective of human health and the environment.

9-16-13
Date:

Patricia A. Hush
Interim Director, Division of Land Restoration
WV Department of Environmental Protection

ATTACHMENT A
ADMINISTRATIVE RECORD INDEX

Report Title	Content	Author/Date Submitted	Agency Approval
RCRA Facility Assessment Report	Identified documented releases and/or potential releases that required further investigation under RCRA Corrective Action protocols.	IT Corporation, 1988	—
Description of Current Conditions	Facility background, history, SWMUs and history of releases.	ICF Kaiser, 1995	—
Industrial Use Designation Letter	Confirmed that the Facility use is considered to be industrial and will be for the near future.	USEPA, August 2000	Not Applicable
RCRA Facility Investigation Report	The RFI discussed the nature and extent of releases of hazardous wastes or hazardous constituents from regulated units, solid waste management units, and other source areas at the facility, and to gather all necessary data to support the environmental indicator determinations and a Corrective Measures Study. The RFI Report also included a human health risk assessment and/or ecological evaluation.	IT Corporation, December 2001	October 13, 2004
RCRA Corrective Measures Study Report	The purpose of the CMS was to develop and evaluate the corrective action alternative(s) and to recommend the corrective measure(s) be taken at the facility.	URS / Potesta, May 2007	September 29, 2010
Corrective Measures Implementation Plan for SWMU Group A	Provided details for chosen corrective measures.	Tetra Tech, 2011	August 3, 2011
Facility Groundwater Recovery System Optimization Modeling	Provided an evaluation of pumping rates to maintain hydraulic capture of groundwater beneath the Facility.	Civil and Environmental Consultants, November 2011	Not Applicable
Construction Completion Report – SWMU Group A Corrective Measures	Documented the implementation of corrective measures for SWMU Group A (capping and recovery well installation)	Tetra Tech, 2013	
2012 Groundwater Monitoring Report	Groundwater Flow Directions and Velocities and Groundwater Analytical Results	Tetra Tech, 2013	Not Applicable
PORE water and Sediment Sampling	Summary of Sampling and Analyses	December 2012	April 2013

ATTACHMENT B
SOLID WASTE MANAGEMENT UNITS
WITH NO FURTHER ACTION DECISION

The RFI concluded that the following fourteen solid waste management units (SWMUs) investigated presented no unacceptable risks to human health or the environment and were recommended for No Further Action (NFA).

SWMU 13: The Existing Process Trench consists of a main trench and feeder branches and is used to convey wastes by gravity flow to the plant's wastewater treatment plant. The trench, located to the east of SWMU 10, is a reinforced concrete structure of varying depth. The main branches of the trench and areas that may contain acidic wastewater are lined with stainless steel.

SWMU 14: The Fill Materials Block 11 is located in the north-central portion of Block 11. Soil borings drilled for construction foundations indicated the presence of fill material.

SWMU 17: The Polyol Area is located on the southern side of Block 24. A release of 2,4-toluenediamine (TDA) occurred in May 1994 while transferring polyol from a tank truck to a storage tank. Approximately fifteen gallons of TDA was released to a concrete pad and five gallons was released to the adjoining gravel-covered ground surface. The spilled material, which was contained using oil dry, was released as a liquid and quickly cooled forming a solid or viscous liquid and was subsequently shoveled. The contained product and affected soil/gravel were placed in 55-gallon drums and was managed via disposal at a regulated off-site facility.

A single roll-off bin is located in this area to collect polyol filter cake, which consists of a potassium sulfate salt and polyol and is a non-hazardous waste. The bin is emptied every other week and no spills or bin failures have been reported. The area now has a curb and any spills would be directed to a process trench. Historically, the waste from the polyol laboratory was collected in two 55-gallon drums, one for isocyanates and one for used glassware. That waste collection practice ceased after the polyol laboratory was relocated to the control lab area.

SWMU 18: The Lab Area 24A is located in the northeastern section of Block 24 and was first used as a waste accumulation area in the 1970s. This 400 square foot area is currently paved and used for temporary storage of 55-gallon steel drums, 5-gallon buckets, and steel roll-off bins used to hold waste filter cake, lab packs, various solvents (e.g., acetone, methanol, toluene, propanol), and liquid isocyanate. Prior to paving in 1987, the area was reportedly covered with gravel and steel roll-off bins occupied the location. Two polyol spills occurred in this area in 1976 and 1979; however, details of the spill cleanup operations are not available.

SWMU 19: The Residue Fill Area Unit 3Fa was located in the southern section of Block 13 and was used to store toluene diisocyanate (TDI) residue until 1969, when the residue was excavated and placed in SWMU 30. In 1988, an additional to the Specialty Polyurethane Unit building was constructed on this location.

SWMU 20: The Nitrations Neutralization Settling Basin 5Fb was located in the southern section of Block 16. This 10 ft. by 30 ft. unit, depth unknown, was to treat wastewater from the Nitrations Process Area with limestone. Effluent was discharged to the former process trench. The unit was excavated and backfilled in 1962.

SWMU 22: The Vortex Burner was located in the southwestern corner of Block 26 and was used to burn TDA residue. Installed in 1967, the vortex burner was in operation until 1979 and was dismantled in 1980. The TDA production area presently covers the former location of the burner unit. The surface in this area is currently paved.

SWMU 23: The TDI Area 26B is located in the eastern side of Block 26. From 1971 to 1980, TDI slurry residue was collected in a tank and two bins. Five releases occurred between 1971 and 1980, all prior to reporting requirements. The spills were typically cleaned up by a vacuum truck or with a shovel. From 1980 to the present, deactivated TDI residue has been collected in steel roll-off bins. No major releases from the roll-off have occurred since 1980.

SWMU 24: The Neutralization Trench/Basin 5Fb was formerly located in the southwestern corner of Block 15 and was used to neutralize hydrochloric acid contaminated with chlorobenzene and 1,2-dichlorobenzene. Operated from the early 1960s and through the mid-1970s, this 80 ft. by 10 ft. unlined earthen basin was closed probably by simply backfilling the basin/trench. The thermal oxidizer was constructed at this location in 1993.

SWMU 25: The HCL Area 15c is located in the southern portion of Block 13 and consists of two portable steel tanks used to collect hydrochloric acid as a by-product of the isocyanate production unit. The steel tanks are situated on a gravel surface.

SWMU 26: The Former Waste Disposal Incinerator was formerly located in the northwestern corner of Block 5 and was in operation from 1956 to reportedly 1963. The date of demolition of this unit is unknown. The unit was 12 ft. by 8ft. by 11 ft. high, with a support building located nearby. The DCCR indicated that there was no information regarding the types of waste incinerated in this unit. The area is now covered with crushed stone and gravel.

SWMU 28: The Iron Oxide Area 28A is located in the southeastern corner of Block 28 and consists of portable steel tanks and tank trailers used to store aniline still bottoms. Production of aniline still bottoms began in 1978 and ended in 1991. The area is covered with a concrete slab and gravel on which staining was observed.

SWMU 29: The Fill Materials Block 29 is located in the west-central portion of Block 28 and was probably a depression about 12 feet deep in which fill material was placed to bring the elevation up to 640 ft. The fill materials may have included cinders and slag.

SWMU 30: The Residue Fill Area Unit 3Fb is located to the east, across the highway from the main plant, and contains TDI residue fill material, which was relocated from Block 13 in 1969. The fill was covered with approximately 1.5 feet of silt, sand and gravel and is now a parking lot.

ATTACHMENT C
SOLID WASTE MANAGEMENT UNITS
EVALUATED IN CORRECTIVE MEAURES STUDY

The following SWMUs were determined to have releases of constituents to soil and/or groundwater that exceeded EPA screening criteria and were to be evaluated in the CMS for their potential to leach constituents to groundwater at potentially unacceptable concentrations.

SWMU GROUP A

SWMU 1: The South Landfill began accepting fill in 1955 and a soil layer was placed over the fill in 1992-1993. Materials known to be disposed include construction debris, plant residues, polyurethane (strands and chunks), solids, shipping crates, packing materials, refractories, crushed metal, asbestos insulation, polyol and polyether type material, scrap metal, and miscellaneous 55 gallon drums. Bayer believes that process related residues (with the exception of iron oxide process residue) were not placed within the South Landfill after 1980. Placement of iron oxide residue within the South Landfill was discontinued in 1989.

Based on RFI test boring logs, waste materials encountered in the upper 5 to 12 feet of the landfill consist primarily of iron oxide pigment residues, construction debris, rubble, and small amounts of miscellaneous waste mixed with silt, clay and gravel. In general, perched groundwater zones were encountered only within the basal portion of the upper fill deposits. Wastes encountered within the lower fill (below approximately 12 feet) included waste plastics (e.g., solidified resins), construction/demolition debris, waste metal and wire, waste iron oxide pigment, sludges, and process-related residues (e.g., TDI residue). Landfilled waste is mixed with gravel, clay and silt, which comprises from 20 to over 50 percent of the materials encountered during drilling. Process-related wastes do not generally occur as discrete units within the lower landfill deposits. Rather, these wastes normally comprise only a portion of the heterogeneous matrix of debris, soil, and other materials encountered throughout the lower fill. Due to this heterogeneity, the ability to positively identify specific process-related wastes within the samples collected during RFI drilling was limited.

SWMU 2: The Sludge Lagoon is located north of the Landfill in the southern portion of the plant. The two-acre, 30 feet deep Sludge Lagoon was originally constructed to dispose of clarifier sludge. Beginning in 1971, wastewater treatment (clarifier) sludge was disposed of in the lagoon, which accepted the sludge through 1975. Sludge was intermittently placed in the Sludge Lagoon from 1975 through 1979. After 1979, bulk fill material was placed directly over the sludges. This fill material was composed of the same material sent to the South Landfill. Within the Sludge Lagoon, 18 feet of process-related residues (primarily iron oxide residue) mixed with soil have been placed as cover upon 25 feet of clay-like clarifier sludges and various plant residues.

The following materials are estimated to remain in place at this unit: iron oxide kiln residue (12,000 tons); clarifier sludge (17,000 tons); isocyanate residues (3,000 tons); filtercakes (2,500 tons); toluene diamine residue (200 tons); fill dirt (11,000 tons); and drummed isocyanates and

resins (2,000 tons). Known wastes disposed of within the lagoon include TDI residue and clarifier sludge. With the exception of iron oxide residue, landfilling of process related residues was discontinued by 1980.

SWMU 3: The Hydroblasting Station is a 24 feet by 36 feet concrete pad, which slopes to a sump located below grade. The sump was used to hold water and waste from truck washing operations. The area was used to clean equipment and remove solids, which had accumulated during operation and movement of waste during the 1980's. The hydroblasting station was constructed within the boundaries of SWMU 1 (South Landfill), which is composed of debris, process-related wastes and residues, and clayey or gravelly soils as outlined above.

SWMU 4: The Ash Lagoon was formed in 1973 by excavating and diking the area. The Ash Lagoon is an unlined, irregularly shaped impoundment capping approximately one acre, which is located over the former streambed of Beaver Run, northeast of the South Landfill and east of the Sludge Lagoon.

The depth of the waste in the impoundment ranges from approximately 12 feet in the northern portion of the lagoon to approximately 6 feet in the southern portion. The total volume of the waste in the impoundment is estimated to be approximately 14,000 cubic yards. Ash slurry from the incineration of clarifier sludge in the multiple hearth sludge furnace was discharged to the lagoon with excess water transported back to the wastewater treatment area. The lagoon is covered by impounded rainwater as well as grasses and brush. A small dike structure separates the Ash Lagoon from the backfilled Beaver Run Backwater area. No ash was deposited in the lagoon after 1980.

SWMU GROUP B

SWMU Group B is comprised of a former bulk TDI residue fill area and lies underneath the Bayer Plant wastewater and storm water storage and treatment facilities, and SWMU 5. The existing facilities have either been constructed on or within fill material consisting of alluvial soils interspersed with TDI residues. The entire SWMU Group B area is within the operating boundaries of the plant, which has controlled access. The area of SWMU Group B is estimated to be approximately 10.5 acres. SWMU 5 currently contains an equalization basin, approximately 2 acres in area, and a rainwater storage basin, approximately 1.2 acres in area. The average depth of the basins is 20 feet. The existing Bayer Plant wastewater treatment facility includes two (2) 125- ft. diameter clarifiers, two (2) 100-ft diameter aeration tanks, and other small support buildings.

Based on the RFI exposure risk assessment, no further action is warranted in SWMU Group B based on the calculated risks for the industrial and construction worker scenarios. The comparison of soil concentrations to soil screening levels (SSLs) indicate a potential for COIs to leach to groundwater at potentially unacceptable concentrations. SWMU Group B was included in the CMS based on the potential to affect groundwater.

SWMU GROUP C

SWMU Group C contains three relatively small areas (SWMUs 8, 9 and 11), and one large general residue fill area (SWMU 7). SWMUs 8 and 11 were former waste treatment pits, from 200-400 square feet (sf) in area, ranging from 7-10 feet deep. SWMU 9 was a temporary residue storage pile area, approximately 100 by 140 feet. SWMUs 8, 9 and 11 are in open, non-operations areas. SWMU 7 encompasses an approximately 4-acre area in Block 21 that includes the incinerator facilities and the fuel oil storage tank area. The entire SWMU Group C area is within the operating boundaries of the plant, which has controlled access.

The SWMU Group C Area has either been constructed on or within fill material consisting of alluvial soils interspersed with miscellaneous solid waste debris and TDI residues. Any intrusive operation and maintenance activities for the area, and for immediately adjoining facilities, are to be addressed in the institutional controls.

Based on the RFI exposure risk assessment, no further action is warranted in SWMU Group C based on the calculated risks for industrial and construction worker scenarios. The comparison of soil concentrations to SSLs indicate a potential for COIs to leach to groundwater at potentially unacceptable concentrations. SWMU Group C was included in the CMS. Technology demonstrations are to be performed to determine if in-situ bioremediation or chemical oxidation can effectively reduce the potential leaching to groundwater.

SWMU GROUP D

SWMU Group D encompasses the former wastewater trench (SWMU 10) and acid neutralization basin system. The trench was located in a former stream channel that ran through the plant and was connected to the neutralization basins (SWMUs 12, 15 and 16). The trench segment identified as SWMU 10 contains a main branch approximately 1850 feet long, and a lateral section approximately 400 feet in length. SWMU 12 was reported to be 30 ft. by 100 ft. by 17 ft. deep. SWMUs 15 and 16 are smaller, with dimensions of 10 ft. by 30 ft. and 12 ft. by 12 ft. by 15 ft., respectively. The depth of SWMU 15 is not known. Each of the basins was unlined pits used for acid wastewater neutralization. The trench and basins have all been backfilled.

The entire SWMU Group D area is within the operating boundaries of the plant, which has controlled access. Any intrusive operation and maintenance activities for the area, and for immediately adjoining facilities, will need to be addressed in the institutional controls.

Based on the RFI exposure risk assessment, no further action is warranted in SWMU Group D based on the calculated risks for industrial and construction worker scenarios. SWMU Group D was evaluated in the CMS as a potential source area for COIs in groundwater. Technology demonstrations are to be performed to determine if in-situ bioremediation or chemical oxidation can effectively reduce the potential leaching to groundwater.

SWMU 21: The former Nitrations Neutralization Basin (5Fc) was used to treat wastewater from the Nitrations Process Area with limestone. The unit was an unlined earthen basin 30 ft. by 30 ft. in area. Depth is not known. Effluent was discharged to the main process trench.

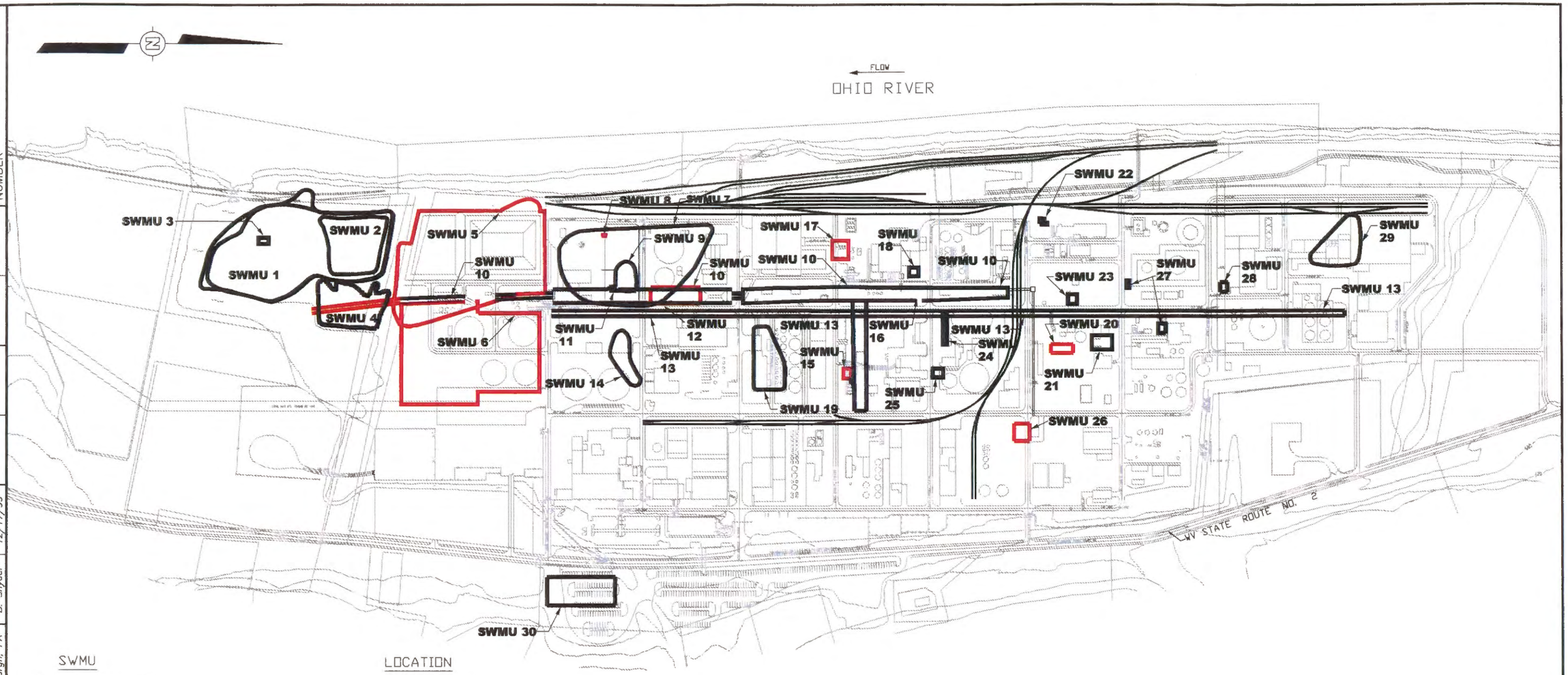
Based on the RFI exposure risk assessment, no further action is warranted at SWMU 21 based on the calculated risks for industrial and construction worker scenarios. The comparison of soil concentrations to SSLs indicate a potential for COIs to leach to groundwater at potentially unacceptable concentrations.

SWMU 27: This SWMU consists of two small areas, one located on the southeastern side of Block 27 and the other on the western side of Block 17. Two releases have been recorded in Blocks 17 and 27 from product pipelines. One release occurred on January 16, 1994 and consisted of approximately 400 pounds of benzene. The second release occurred on January 17, 1994 and consisted of approximately 150 pounds of benzene. The spilled material was collected and contaminated soils were containerized and shipped offsite for proper disposal.

Based on the RFI exposure risk assessment, no further action is warranted at SWMU 27 based on the calculated risks for industrial and construction worker scenarios. The comparison of soil concentrations to SSLs indicate a potential for COIs to leach to groundwater at potentially unacceptable concentrations.

FIGURE 1

SWMUS AND AOC LOCATION MAP



SWMU		LOCATION
1	South Landfill	South Landfill
2	Sludge Lagoon	South Landfill
3	Fill Area Hydroblasting Station	South Landfill
4	Ash Lagoon	South Landfill
5	Residue Fill Area Unit 3Fc	Equalization Basin/Rainwater Lagoon
6	Residue Fill Area Unit 3Fd	Clarifier and Bioxidation Tanks
7	Fill Materials Block 21	Block 21
8	All Purpose Burning Pit	Block 21
9	Residue Fill Area 3Fe	Block 21
10	Infilled Wastewater Ditch (Former Process Trench)	Throughout Facility
11	Acid Neutralization Facility 5Fg	Block 21
12	Former Neutralization Spill Basin	Block 22
13	Existing ProcessTrench	Throughout Facility
14	Fill Materials Block II	Block 11
15	Neutralization and Settling Basin 5Fa	Block 14
16	Neutralization Basin 5Fe	Block 24
17	Poly1 Spill	Block 24
18	Lab Area 24A	Block 24
19	Residue Fill Area Unit 3Fa	Block 13
20	Nitrations Neutraliz. /Settling Basin 5Fb	Block 16
21	Nitrations Neutraliz. /Settling Basin 5Fc	Block 16
22	Vortex Burner	Block 26
23	TDI Area 26B	Block 26
24	Neutralization Trench/Basin 5Fd	Block 15
25	HCI Area 15C	Block 15
26	Former Waste Disposal Incinerator	Block 5
27	Mononitrobenzene	Blocks 17 & 27
28	Iron Oxide Area 28A	Block 28
29	Fill Area Block 28	Block 28
30	Residue Fill Area Unit 3Fb	Parking Lot East of Rt 2

LEGEND

SWMU 7 — SWMU LOCATION

SWMU 6 — MODIFIED SWMU LOCATION

— — — BLOCK DELINEATION

SCALE

0 400 800

IT CORPORATION

BAYER NEW MARTINSVILLE
NEW MARTINSVILLE, WEST VIRGINIA

FIGURE 1-2
PLANT BASE MAP SHOWING
MODIFIED SWMU BOUNDRIES
RCRA FACILITY INVESTIGATION

DRAWING NUMBER 800588-B1

OFFICE	APPROVED BY	CHECKED BY	DRAWN BY
Pittsburgh, PA			B. Snyder 12/17/99

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