



**UNITED STATES**  
**ENVIRONMENTAL PROTECTION AGENCY**  
**REGION 3**  
**STATEMENT OF BASIS**  
**UNION CARBIDE CORPORATION**  
**TECHNOLOGY PARK**  
**SOUTH CHARLESTON, WEST VIRGINIA**  
**EPA ID NO. WVD 060 682 291**  
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## **I. Introduction**

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for the Union Carbide Corporation (UCC) South Charleston Technology Park located in South Charleston, West Virginia (Figure 1) (hereinafter referred to as the Facility). The Facility has been subdivided into four parcels, Tracts A, B, C and D, respectively. EPA's proposed remedy for the Facility consists of remedial components for each Tract as described in more detail in Section IV, below. Collectively, these components address Facility-wide groundwater contamination and Facility-wide soil contamination. This SB highlights key information relied upon by EPA in proposing its remedy for the Facility.

EPA and UCC agreed to the terms of a Facility Lead Agreement (FLA) on December 15, 1999. The FLA approach as utilized by EPA Region III since about March 1998 has encouraged RCRA corrective action facilities, such as UCC, to address corrective action in generic and non-enforceable agreements. These FLAs contain many of the same requirements typically include in permits and orders such as provisions for work plan development, report preparation and submission, and implementation of interim measures. A copy of the UCC FLA is included in the Administrative Record for the Facility.

The Facility is subject to EPA's Corrective Action program under the Solid Waste Disposal Act, as amended, commonly referred to as the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 *et seq.* The Corrective Action program requires that facilities subject to certain provisions of RCRA investigate and address releases of hazardous waste and hazardous constituents, usually in the form of soil or groundwater contamination, that have occurred at or from their property.

This SB summarizes information that can be found in greater detail in documents found in the Administrative Record for the Facility (see Section VII, below). In addition, information on the Corrective Action program as well as a fact sheet for the Facility can be found at <http://www.epa.gov/reg3wcmd/correctiveaction.htm>.

EPA is providing a 30-day public comment period on this SB. EPA may modify its proposed remedy based on comments received during this period. EPA will announce its selection of a final remedy for the Facility in a Final Decision and Response to Comments (Final Decision) after the public comment period has ended.

The Facility is currently operating under a Hazardous Waste Management Permit (HWM Permit) No. WVD060682291 issued by West Virginia Department of Environmental Protection (WVDEP), which includes a Corrective Action Module. While EPA, pursuant to Section 3006 of RCRA, has authorized West Virginia to administer the RCRA corrective action program, and WVDEP administers the HWM Permit, including the Corrective Action Module, EPA and WVDEP agreed that EPA would prepare a SB

and issue a Final Decision for the Facility. After EPA issues the Final Decision, WVDEP will modify the Facility's HWM Permit to require the corrective actions selected in the Final Decision.

## **II. Facility Background**

The Facility consists of approximately 574 acres in South Charleston, West Virginia (Figure 1). The land use for the area surrounding the Facility is primarily industrial and commercial to the north and residential to the east, south, and west of the Facility. Located downgradient from and abutting the Facility to the northwest are two parcels, owned by the West Virginia Department of Transportation (WVDOT) and CSX Transportation, respectively.

In 1947, UCC, a wholly owned subsidiary of The Dow Chemical Company (Dow), purchased individual parcels of land from the Kanawha Land Company, Westvaco Chemical Company and a dairy farm. These parcels collectively comprise the Facility property. Prior to UCC's ownership, the Facility property was undeveloped with the exception of several brine wells which were located on the former Westvaco Chemical Company parcel and were used to extract brine for the manufacture of chlorine bleach.

Currently, approximately 110 acres of the Facility property are developed with laboratory buildings, pilot plant areas (areas where materials developed are manufactured on a small scale), waste packaging, storage facilities, and office buildings. Some buildings and portions of the Facility property are currently leased to other entities.

The remaining land at the Facility includes three inactive landfills, the Lower Ward Landfill, Ward A Landfill, and Ward B Landfill. The three landfills were constructed primarily to receive fly ash slurry from the Facility. The landfills also received oxide tails from the Facility's propylene oxide production unit, and municipal sludge from the South Charleston publicly owned treatment works (POTW). The landfills were created by constructing upper and lower dikes across a hollow, designated as Ward Hollow. The Lower Ward Landfill is located between the upper and lower dikes, and the Ward A and B Landfills are located south of the upper dike (Figure 1). Use of the landfills was discontinued in 1973, after which the Lower Ward and Ward B Landfills were covered and the Ward A Landfill was turned into a scenic pond.

Between 2002 and 2003, UCC modified the central drainage channel at Ward B Landfill by installing perforated high-density polyethylene piping buried under aggregate cover. The perforated piping is referred to as the central drainage line, and it discharged into Ward A Landfill until 2007, when the discharge was rerouted to Holz Impoundment and the previously uncovered aggregate was covered with soil (Figure 6). Holz Impoundment is a 76-acre active solid waste impoundment that is used by UCC and the City of South Charleston but is not part of the Facility.

For development purposes, the Facility has been subdivided into four tracts, Tracts A through D, which are depicted on Figure 2. Currently, there is a tentative agreement in place between UCC and the State of West Virginia to donate Tracts A and B to the State of West Virginia. UCC anticipates that this land transfer will be finalized in December 2010. In addition, in July 2010 a portion of Tract D (Figure 2) was sold by UCC to United Disciple Church which plans to construct a church and other buildings on that property.

### **III. Summary of Environmental Investigations and Interim Measures**

A total of 70 solid waste management units (SWMUs) have been identified at the Facility. EPA identified sixty-two SWMUs during a 1988 RCRA Facility Assessment (RFA) conducted by EPA. The remaining eight SWMUs were later identified by UCC as part of a response to an EPA RCRA request for information. In addition to the 70 SWMUs, there are four areas with environmental impacts at the Facility (hereafter referred to as Investigation Areas) that were identified by UCC between 2005 and 2009.

Since the 1988 RFA, UCC has conducted multiple investigations including human and ecological risk assessments, to evaluate the releases from the Facility. The following EPA-approved reports summarize UCC's investigations:

*Solid Waste Management Unit Description and Investigation/Corrective Action Undertaken (1998)* – UCC evaluated the 70 SMWUs and placed them into four priority categories, A-High Priority; B- Low Priority; C- No Further Action and D-Not a SWMU. This report also includes a description of the voluntary corrective actions taken up to 1998.

*RCRA Facility Investigation Report (2001)* – This report documents UCC's investigations (soil, groundwater, surface water, sediment and waste material) for A-High Priority SWMUs.

*RCRA Facility Investigation Report (2005)* – This report documents the investigation (soil, groundwater, surface water and sediment ) at 11 SWMUs which were placed in the B, C or D categories, as described above.

*Summary of Ecological Risk for SWMU 5 and 20 (2007)* - These reports document the ecological evaluation of the fate and transport of constituents detected at the SWMUs through the ecological setting of the Facility.

*Current Conditions Report (2008)* – This report documents all the Facility investigations and corrective action work completed up to 2008.

*Human Health Risk Assessment for Ward A Pond, Ward Branch, and Vapor Intrusion (2009)* – This report documents the human health risk assessment (HHRA) to assess the potential current and future human health risks

from exposure to contaminants in surface water and sediment at Ward A Pond and Ward Branch and indoor air in Buildings 771, 2000, and 6000.

*Screening Level Risk assessment for Ward Branch and Baseline Risk Assessment for Ward A Pond (2010)* - This reports documents the ecological evaluation of the fate and transport of constituents detected at the SWMUs thru the ecological setting of the Facility.

A description of the SWMUs and Investigation Areas along with a summary of investigation results and Interim Measures performed at these SWMUs and Investigation Areas are provided in Table 1.

As stated above, the Facility property has been subdivided into four tracts, Tracts A, B, C, and D, respectively. Tract A is located within the western portion of the Facility. The northern portion of Tract A is mostly developed; however, a large portion in the south and west of this tract is undeveloped. The majority of the SWMUs identified at the Facility are located within Tract A (Table 1).

Tracts B and C, located on the northeastern edge of the Facility, are the smallest tracts at the Facility. Currently, the primary use for these tracts is office space and parking. There are four SWMUs within these two tracts.

Tract D is the largest tract at the Facility. The southern and northern portions of Tract D are mostly undeveloped, while the central portion is comprised of the three landfills.

## **A. Facility Soils**

### **1. Tract A**

Fifty-six of the 70 SWMUs and the 4 Investigation Areas are located on this Tract. Based on the 1988 RCRA Facility Assessment and the 2001 and 2005 RCRA Facility Investigations, EPA determined there have been no known releases from 45 of the 56 SWMUs located on Tract A. In addition, after reviewing analytical results from soil samples collected in 2004, 2006 and 2008, respectively, EPA determined that soils at many of the remaining 11 SWMUs did not show the presence of contaminants or contained contaminants at concentrations that did not exceed residential or industrial screening levels.

The following describes the SWMUs and Investigation Areas located on Tract A where contaminants remain in the soil:

#### **a. SWMU 70**

This SWMU is referred to as the Timberland Dump Site #2. In 2004 and 2005, UCC conducted soil sampling which revealed that samples exceeded the

industrial screening level for arsenic and that the residential screening level was exceeded for mercury. Because arsenic concentrations were below the maximum West Virginia background concentration (13 milligrams per kilogram (mg/kg)), the concentrations of arsenic are considered representative of regional background conditions.

A Screening Level Ecological Risk Assessment (SLERA) was completed in 2005 which initially identified barium and mercury as contaminants of potential concern (COPCs) posing risk to soil invertebrates and plants located at SWMU 70. No soil COPCs were associated with potential food web exposure. Potential ecological risks fell within the acceptable range for the constituents, with the exception of mercury. For mercury, a supplemental evaluation was conducted with surface soil samples collected in 2005 and 2006, that compares the detected results to a range of toxicological values. Based on the results of the supplemental evaluation, EPA and WVDEP concluded that no further action at SWMU 70 was needed.

b. Investigation Area – Building 722

In 2005, soil samples were collected in this area to facilitate leasing a portion of the Facility where Building 722 is located to a third party. Based on the analytical results from the 2005 soil sampling event, tetrachloroethene (PCE) was the only constituent detected that exceeded the industrial screening level and it was only exceeded at one location. Other samples collected within 50 feet of that same location had PCE concentrations that were either non-detect or two orders of magnitude below the industrial screening level.

c. Rocket Hollow Area

In 2008, UCC conducted soil sampling in this area of the Facility to support the prospective sale of portions of Tract A. Soil sampling revealed the presence of polycyclic aromatic hydrocarbons (PAHs) in the subsurface (4-6 feet below the ground) which exceeded their respective industrial screening levels at one location. Based on these exceedances, corrective measures to address potential human health risks related to direct contact with soil are warranted for this area.

d. SWMU 5

Three COPCs (barium, mercury, and silver) were initially identified in soil at SWMU 5 as potentially posing a risk to soil invertebrates and plants. No soil COPCs were associated with potential food web exposure. Based on the results of the evaluation for SWMU 5, EPA and WVDEP concluded that no further action was required to address risk to the ecological resources in SWMU 5.

## **2. Tracts B and C**

There are four SWMUs within Tracts B and C. Two of the SWMUs, Nos. 46 and 47, are cooling towers. Historical Facility information revealed that the third SWMU, No. 65, was not used to manage waste (Table 1). The fourth SWMU, No. 60, is shelving on a loading dock located on the north side of Building 2000 which was used as a waste transfer area to manage printing chemicals for short durations. EPA determined that there have been no known releases from these four SWMUs based on its review and evaluation of the Solid Waste Management Unit Description and Investigation/Corrective Action Undertaken Report (1998). In addition, 1996 soil sample results from SWMU 65 were non-detect for 40 CFR Part 261 Subpart E Appendix IX volatile, semi-volatiles and metals under the Toxicity Characteristic Leaching Procedure.

## **3. Tract D**

### **a. Lower Ward Landfill**

In 1965, the Lower Ward Landfill was covered with an 18-inch clay cover and was seeded. In 1978, half of the Lower Ward Landfill was paved and converted into a parking lot. The 18-inch clay cover and the parking surface currently in place prevent direct contact with waste materials in Lower Ward Landfill, thus eliminating the pathway for human health exposure.

### **b. Ward B Landfill**

In the 1970s, a clay-soil mix cover was installed at the Ward B Landfill to reduce potential human or ecological exposure to waste material. The average cover thickness across the landfill is 5.75 feet. In 2002, UCC installed additional cover material where the cover was thin near the bottom of the drainage ditches. The clay-soil mix cover currently in place prevents direct contact with waste materials in the Ward B Landfill, thus eliminating the pathway for human health exposure to soils.

In January 2010, UCC conducted a SLERA to evaluate previously identified pathways and receptors for surface water and sediment in the Ward B Landfill drainage ditches. Based on the results of the SLERA, EPA determined that there are no unacceptable risks and no further action is required to address the ecological resources associated with the Ward B Landfill.

### **c. Ward A Landfill**

The analytical results from investigations conducted at the Ward A Landfill between 2005 and 2008 were compared to EPA human health risk-based screening values. The results of the human health risk screening showed that constituent concentrations were above risk-based screening values; therefore, this

area was evaluated as part of a 2009 Human Health Risk Assessment (HHRA) performed by UCC. The HHRA report for Ward A Landfill concluded that no unacceptable human health risks were associated with the current and proposed future land use of the landfill as a scenic pond. For all these exposure scenarios, the non-carcinogenic hazards index (HI) and the carcinogenic risk are below EPA's target HI of 1, and within EPA's hazard target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ .

In January 2010, UCC conducted a baseline ecological risk assessment (BERA) to evaluate the identified pathways and receptors for surface water, sediment, and surface soil. Based on the results of the BERA, EPA and WVDEP concluded that no further action is required to address risk to the ecological resources of Ward A Landfill.

## **B. Facility Groundwater**

There are two discrete areas of groundwater contamination at the Facility namely, Ward Hollow and the Greenhouse Area.

### **1. Ward Hollow Groundwater**

Based on geologic and hydrogeologic investigations of the area, groundwater contamination in Ward Hollow is related to the three landfills and the former brine wells at the Facility. Contaminated groundwater is migrating from the landfills and former brine wells to the underlying weathered bedrock and then downgradient to the WVDOT property and potentially to the CSX Transportation property. Constituents within the Ward Hollow groundwater plume that are above their respective EPA Maximum Contaminant Levels (MCLs) codified at 40 C.F.R. Part 141 and promulgated pursuant to the Safe Drinking Water Act, 42 U.S.C. §§ 300f *et seq.* or the EPA tap water Regional Screening Levels (RSLs) include 1,4-dioxane, benzene, bis(2 chloroisopropyl) ether, arsenic, and barium.

Based on groundwater sampling results conducted since the 1980s, the Ward Hollow groundwater plume extends downgradient approximately 300 feet to the northwest of the Facility onto WVDOT property and potentially onto CSX Transportation property. Consequently, UCC performed an HHRA to evaluate human health risks related to exposure to contaminated groundwater downgradient of the Facility. Results of the HHRA indicated that if the contaminated groundwater was used for drinking water it would result in unacceptable human health risks. However, groundwater under those properties is not used for potable purposes, and there are no known plans to do so in the future. In addition, the impacted aquifer is low yielding, so it is not a practical source of potable water. The hypothetical future construction worker exposure scenario was also quantitatively evaluated for incidental contact with groundwater given that it is possible that a future construction worker could have incidental exposure to groundwater during short-term construction activities (i.e., less than 1-year duration). For the construction worker exposure scenario, the non-

carcinogenic hazards index (HI) and the carcinogenic risk are below EPA's target HI of 1, and within EPA's hazard target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Based on the results of the HHRA, EPA and WVDEP concluded that the groundwater does not pose unacceptable human health risks for the hypothetical future construction worker.

## **2. Greenhouse Area Groundwater**

The Greenhouse Area is located on Tract A above the location of a former greenhouse. Groundwater data from two monitoring wells located in the Greenhouse Area (Table 1, Figure 1) show concentrations of volatile organic compounds (VOCs) above MCLs or adjusted EPA tap water RSLs. Sample results collected in 2009 showed that VOCs did not exceed screening levels in one of the monitoring wells, and only two detected VOCs, chloroform and tetrachloroethene, exceeded screening levels in the second monitoring well. Soil results from samples collected near these wells did not show the presence of VOC soil contamination.

### **C. Surface Water**

#### **1. Ward Branch**

In 1964, the Facility started using a 78-inch-diameter culvert pipe to capture leachate from the landfills and prevent it from discharging to Ward Branch. Leachate in the culvert (estimated to be 15 to 20 gallons per minute) is intercepted by the catch basin in Building 730 at the base of the Lower Ward northern dike and is transferred to the South Charleston POTW via the Holz Impoundment decant line (Figure 3). The culvert and the catch basin collectively are referred to as the Lower Ward leachate collection system and are part of SWMU 2.

The analytical results from investigations conducted for Ward Branch (Figure 1) were compared to EPA human health risk-based screening values. Since the results of the human health risk screening showed that constituent concentrations were above risk-based screening levels, this area was evaluated as part of a HHRA. The 2009 HHRA report for Ward A Landfill concluded that no unacceptable human health risks were associated with the current and proposed future land use of the landfill as a scenic pond. For all these exposure scenarios, the non-carcinogenic hazards index (HI) and the carcinogenic risk are below EPA's target HI of 1, and within EPA's hazard target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ .

In 2010, UCC conducted a SLERA at Ward Branch to evaluate pathways and receptors for surface water and sediment. Based on the results of the SLERA, EPA and WVDEP concluded that no further action is required to address risk to the ecological resources of Ward Branch.

#### **2. Tributary to Davis Creek**

The 2010 SLERA also evaluated constituents detected in the surface water and sediment of a small stream downgradient of SWMUs Nos. 5 and 70. There were no

exceedances of conservative ecological screening values observed in either the surface water or sediment therefore indicating that there is no potential for unacceptable ecological risk.

#### **D. Subsurface Vapor Intrusion**

Generally, buildings located above a contaminated groundwater plume are vulnerable to subsurface vapor intrusion coming from the plume by entering through cracks, joints and utilities openings. The following sections discuss potential subsurface vapor intrusion associated with the two areas of groundwater contamination at the Facility which has been found in Ward Hollow and the Greenhouse Area, and with soil contamination in the vicinity of Buildings 706 and 707 located on Tract A:

##### **1. Ward Hollow**

Historical data regarding waste materials placed in Lower Ward Landfill, Ward A Landfill, and Ward B Landfill indicated that the landfills are the source of VOCs (1,4-dioxane and benzene) which have been detected in groundwater underlying and downgradient of the landfills. Consistent with the recommendations set forth in the *EPA Draft Guidance for Evaluating the Vapor Intrusion from Groundwater and Soils (November 29, 2002)*, locations within 100 feet of potential sources for vapor intrusion (i.e., vapors from volatile chemicals contained in the landfill or groundwater affected by the landfills) were evaluated to determine if there are unacceptable risks. Locations that are within 100 feet of the landfills include buildings that were in use at the time of the investigation (Buildings 771, 2000, and 6000) and an undeveloped area west of the Lower Ward Landfill. Buildings 771, 2000, and 6000 are currently used for office space; portions of Building 771 are also used as a laboratory and a pilot plant.

For these locations, soil gas and/or indoor air samples were collected and evaluated as part of an HHRA using the indoor worker exposure pathway/scenario. For the indoor worker exposure scenario, the non-carcinogenic hazards index (HI) and the carcinogenic risk are below EPA's target HI of 1, and within EPA's hazard target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Based on the sampling results and exposure assumptions in the HHRA, EPA and WVDEP concluded that current and future human health exposure would not result in unacceptable human health risks for the people occupying the buildings under the exposure pathways evaluated. Based on non-carcinogenic hazards and carcinogenic risk results for future subsurface vapor intrusion for the area west of the Lower Ward Landfill, EPA and WVDEP concluded that no further evaluation of the area is required.

There are currently no occupied buildings within Tract D; however, it is possible that occupied buildings will be constructed on Tract D in the future. Because of the presence of VOCs in material in the landfills and in the Ward Hollow groundwater plume, corrective measures for potential unacceptable human health risks related to vapor intrusion will be evaluated for the portions of Tract D that are located within 100 feet of any of the landfills at the Facility.

## 2. Greenhouse Area / Building 740

In 2007, UCC collected soil gas samples around Building 740 in order to evaluate potential vapor intrusion related to the groundwater contamination in the Greenhouse Area. Building 740, located in the Greenhouse Area, is used as office space. Sampling revealed the presence of 2-butanone and PCE in the vicinity of Building 740. The maximum detected 2-butanone concentration (109  $\mu\text{g}/\text{m}^3$ ) did not exceed its industrial air risk-based screening level (22,000  $\mu\text{g}/\text{m}^3$ ) provided in the EPA RSL for chemical contaminants, assuming an Attenuation Factor (AF) of 0.1 (Table 1-1). The detected PCE soil gas concentration did not exceed the EPA industrial air RSL (210  $\mu\text{g}/\text{m}^3$ ), assuming an AF of 0.01. Based on the sample results and exposure assumptions, EPA and WVDEP concluded that current and future human health exposure associated with vapor intrusion into Building 740 would not result in unacceptable human health risks.

## 3. Buildings 706 and 707

In 2008 and 2009, UCC removed soil contaminated with VOCs such as 1,2,4-trichlorobenzene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; and chlorobenzene in the vicinity of Buildings 706 and 707 which are located on Tract A. Building 706 is an active chemical processing facility and Building 707 is a former manufacturing building that is currently used for office space. The analytical results for the post-removal soil samples indicated that exposure to soil would not result in unacceptable human health risks. However, there was a potential for vapor intrusion into Buildings 706 and 707 based on residual VOCs concentrations.

As a result, in July 2009, sub-slab soil gas, indoor air, and ambient air samples were collected in and around the buildings and evaluated as part of an HHRA. Human health risks for Buildings 706 and 707 were evaluated for exposure to VOCs in indoor air through subsurface vapor migration from exterior soil for current/future indoor workers. For the indoor worker exposure scenario the non-carcinogenic hazards index (HI) and the carcinogenic risk are below EPA's target HI of 1, and within EPA's hazard target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Based on the sample results and exposure assumptions in the HHRA, EPA and WVDEP concluded that current and future human health exposure associated with vapor intrusion into Buildings 706 and 707 from VOCs did not pose unacceptable human health risks.

## **IV. Summary of Proposed Corrective Measures**

### **A. Introduction**

This Section IV describes EPA's proposed remedy for Facility-wide soil and groundwater contamination. The proposed remedy is comprised of components which address Tracts A, B, C, and D, respectively, and consists of inspections, institutional controls (ICs), and, if necessary, the evaluation and possible installation of vapor control systems, and the operation, maintenance and inspection of the following: the long-term

groundwater monitoring system; the landfill covers; Ward B central drain line sump pumping system; and the Lower Ward leachate collection system.

EPA's proposed remedy includes the implementation and maintenance of ICs to restrict activities that may result in human exposure to those contaminants. ICs are non-engineered instruments, such as administrative and/or legal controls, that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy.

The proposed ICs will be implemented through an enforceable mechanism such as a permit, order, or an Environmental Covenant, pursuant to the West Virginia Uniform Environmental Covenants Act, Chapter 22, Article 22.B, §§ 22-22B-1 through 22-22B-14 of the West Virginia Code (Environmental Covenant). If the mechanism is to be an Environmental Covenant, for Tracts A and D, such Environmental Covenant would include the development and implementation of a Health & Safety Plan by an appropriately qualified person familiar with the environmental conditions at the Facility, for the excavation and disturbances to the subsurface soils, on the areas in Tracts A and D, as depicted in Figure 5. UCC will be required to provide a coordinate survey as well as a metes and bounds survey of the closed surface impoundments and the Facility boundary. For properties located outside of the Facility boundary that are impacted by Facility-related contamination, WVDEP, in consultation with EPA, will require that UCC use its best efforts to obtain an Environmental Covenant from any such property owners.

If the Facility owner or subsequent owners fail to meet their obligations under the enforceable mechanisms selected or if EPA and/or WVDEP, in its sole discretion, deems that additional ICs are necessary to protect human health or the environment, EPA and/or WVDEP has the authority to require and enforce additional ICs, such as the issuance of an administrative order.

## **B. Tract A**

EPA's proposed remedy for Tract A consists of the installation of a vapor control system, the design of which shall be approved in advance by WVDEP, in consultation with EPA, in all new structures which are to be occupied in the areas identified for having Vapor Intrusion and Subsurface Work restrictions as depicted in Figure 5 and compliance with and maintenance of institutional controls.

EPA is proposing that the institutional controls for Tract A contain the following elements:

- a) Industrial/Commercial Areas, as depicted in Figure 5, 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 and/or adversely affect or interfere with the selected remedy and WVDEP, in consultation with EPA, provides prior written approval for such use; and

- b) no earth moving activities, including construction and drilling, may be done on Tract A unless such activities are required by WVDEP, in consultation with EPA, or it is demonstrated to WVDEP, in consultation with EPA, that such activities 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 activities.

### **C. Tracts B and C**

EPA's proposed remedy for Tract B includes compliance with and maintenance of institutional controls.

EPA is proposing the institutional controls contain a restriction that Tracts B and C 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.

EPA's proposed remedy for Tract B consists of the installation of vapor control system, the design of which shall be approved in advance by WVDEP, in consultation with EPA, in all new structures which are to be occupied and are located within 100 feet of any of the landfills at the Facility (see Figure 5)

### **D. Tract D**

EPA's proposed remedy for Tract D consists of the following five components:

- 1) operation and maintenance of the Ward B central drain sump pumping system;
- 2) operation and maintenance of the Lower Ward leachate collection system in compliance with the EPA-approved Operation, Maintenance and Inspection Manual (OMII) dated, April 2010;
- 3) landfill inspections in compliance with the OMII;
- 4) long-term groundwater monitoring in compliance with the EPA-approved Groundwater Monitoring Plan dated December 2009; and
- 5) compliance with and maintenance of institutional controls.

EPA is proposing the institutional controls for Tract D contain the following elements:

- a) a restriction that the Lower Ward Landfill and Ward Hollow 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;

- b) Tract D shall not be used in any way that will adversely affect or interfere with the integrity and protectiveness of the caps and the area within 100 feet of the caps placed over the Lower Ward Landfill, Ward A Landfill and Ward B Landfill and all associated pipes and wells 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 disturbance;
- c) Ward A and B Landfills and the area surrounding those landfills, as depicted in Figure 5, shall be limited to recreational uses that would result in only periodic limited use of the area such as hiking, jogging, wildlife viewing, and ecological studies (Figure 5). Based on a review of historical operations information, the area surrounding Ward A and B Landfills are not impacted by Facility related contamination. Nonetheless, the area will be limited to recreational use to ensure that the integrity and protectiveness of Ward A and B Landfills are maintained;
- d) no earth moving activities, including construction and drilling, may be done on Tract D unless such activities are required by WVDEP, in consultation with EPA, or it is demonstrated to WVDEP, in consultation with EPA, that such activities 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 activities, and
- e) the contaminated groundwater from the Facility, including any groundwater that has migrated beyond the Facility boundary, shall not be used for any purpose other than to conduct the operation and 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 written approval for such use.

## **V. Evaluation of EPA's Proposed Remedy**

This section provides a description of the criteria EPA uses to evaluate proposed remedies under the Corrective Action Program. The criteria are applied in two phases. In the first phase, EPA evaluates three criteria, known as threshold criteria. In the second phase, for those remedies that meet the threshold criteria, EPA evaluates seven balancing criteria to determine which proposed remedial alternative provides the best relative combination of attributes.

The following is a summary of EPA's evaluation of the threshold criteria:

**A. Threshold Criteria**

**(1) Protect Human Health and the Environment**

EPA's proposed remedy protects human health and the environment by adequately eliminating, reducing, or controlling unacceptable risk through the combination of the operation and maintenance of the interim measures already in place at the Facility and through the implementation of institutional controls to prevent potential future exposure. These institutional controls protect and prevent the use of groundwater at the Facility and the affected offsite properties, prevent or control the exposure to impacted soil through direct contact or vapor intrusion, and control land use to prevent changes inconsistent with the remedy.

**(2) Achieve Media Cleanup Objectives**

EPA's proposed remedy meets the appropriate cleanup objectives which is the protection of human health and the environment. The majority of Facility soils contain contaminant concentrations that are below the EPA residential or industrial soil RSLs and the mean natural background concentration for the State of West Virginia. For those areas where contaminant concentrations are above the EPA residential and/or industrial soil RSL, institutional controls will be implemented to manage potential direct contact risks.

Groundwater exceeds the MCLs and/or the EPA tap water RSLs in Ward Hollow and the Greenhouse Area; however, groundwater use restrictions will be applied to the entire Facility and the affected offsite properties (WVDOT and potentially CSX Transportation) to manage human exposure to contaminated groundwater.

**(3) Control the Source(s)**

The landfills (Lower Ward, Ward A and Ward B) are the remaining sources of hazardous constituents at the Facility for which the proposed remedy is being considered. These sources are being controlled through the interim measures described above in Section III.A.3. Groundwater monitoring data show that the groundwater plume is stable and is not expanding and that the constituent concentrations do not show an increasing trend. In addition, groundwater monitoring and inspections will continue to detect any release that may occur in the future.

**B. Balancing Criteria**

Balancing criteria are presented below to illustrate the suitability of the components of the proposed remedy.

**(1) Long-Term Reliability and Effectiveness**

The long-term reliability and effectiveness standard is intended to address protection of human health and the environment over the long term. EPA's proposed remedy meets this standard. The landfill covers are reliable and effective long-term solutions to manage direct contact with waste material in Lower Ward and Ward B Landfill. Long-term groundwater monitoring is proposed because the data have demonstrated that the groundwater plumes are stable. In addition, such long-term monitoring will provide the opportunity and the data for the agencies to evaluate any changes in the conditions of the Facility.

EPA also considers ICs long-term components of a remedy. EPA's proposed remedy includes the implementation and maintenance of ICs to restrict activities that may result in human exposure to contaminants. EPA will require the ICs to be maintained as long as those contaminants remain in place at the Facility.

**(2) Reduction of Toxicity, Mobility or Volume of Wastes**

EPA's proposed remedy requires UCC to manage the waste in the landfills in place. The landfill covers have shown to be an effective remedy controlling the mobility of the contaminants, as demonstrated by the data of the groundwater monitoring showing that the plumes are stable.

**(3) Short-Term Effectiveness**

The short-term effectiveness standard is intended to address hazards posed during the implementation of corrective measures. Short-term effectiveness is designed to take into consideration the impact to facility workers and nearby residents during construction. Since the components of the proposed remedy as described in Section IV of this SB have been in place, there are no associated short term impacts. A component of the proposed remedy is ICs. ICs are administrative and/or legal instruments and as such will not pose any hazards to facility workers. Furthermore, ICs will be implemented to reduce hazards posed by direct contact with contaminants that remain in place.

**(4) Implementability**

The implementability decision factor addresses the regulatory constraints in employing the cleanup approach. Since the proposed remedy includes the operation and maintenance of measures which have been implemented, and there do not appear to be any regulatory hurdles that would impede the implementation of ICs, EPA anticipates that the proposed remedy will be fully implementable.

**(5) Cost**

The cost for continued operation and maintenance of the interim measures and the implementation of the institutional controls is approximately \$145,000 per year.

**(6) Community Acceptance**

UCC currently meets with a Community Advisory Panel to foster an open dialogue, an exchange of ideas, better understanding and cooperation between UCC and the surrounding community regarding plant health, safety, and environmental protection programs. There have been no known conflicts within the community regarding the investigation, remediation efforts and community acceptance. Community acceptance of EPA's proposed remedy will be evaluated based on comments received during the public comment period.

**(7) State Acceptance**

WVDEP has reviewed and concurred with the proposed remedy for the Facility. Furthermore, EPA has solicited WVDEP's input and involvement throughout the investigation process at the Facility, and the proposed remedy will be implemented pursuant to a modification by WVDEP of UCC's current permit.

**VI. Financial Assurance**

EPA anticipates that the Facility's RCRA Permit will be modified to include implementation of the corrective measures once they are finalized and selected in a Final Decision and require updated financial assurance to include any costs associated with these corrective measures.

**VII. Public Participation**

Interested persons are invited to comment on EPA's proposed decision. The public comment period will last thirty (30) calendar days from the date the notice is published in a local newspaper. Comments may be submitted by mail, fax, or electronic mail to Luis Pizarro at the address listed below.

A public meeting will be held upon request. Requests for a public meeting should be made to Mr. Pizarro at the address listed below. A meeting will not be scheduled unless one is requested.

The Administrative Record contains all the information considered by EPA for the proposed decision at this Facility. The Administrative Record is available at the following location:

U.S. EPA Region III  
1650 Arch Street  
Philadelphia, PA 19103  
Contact: Mr. Luis A. Pizarro (3LC20)  
Phone: (215) 814-3431  
Fax: (215) 814-3114  
Email: [pizarro.luis@epa.gov](mailto:pizarro.luis@epa.gov)

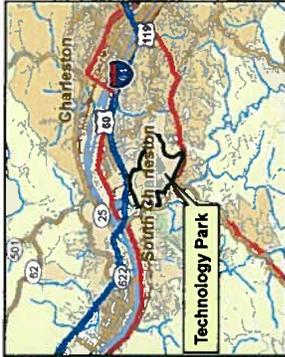


Figure 1  
 Site Location Map  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

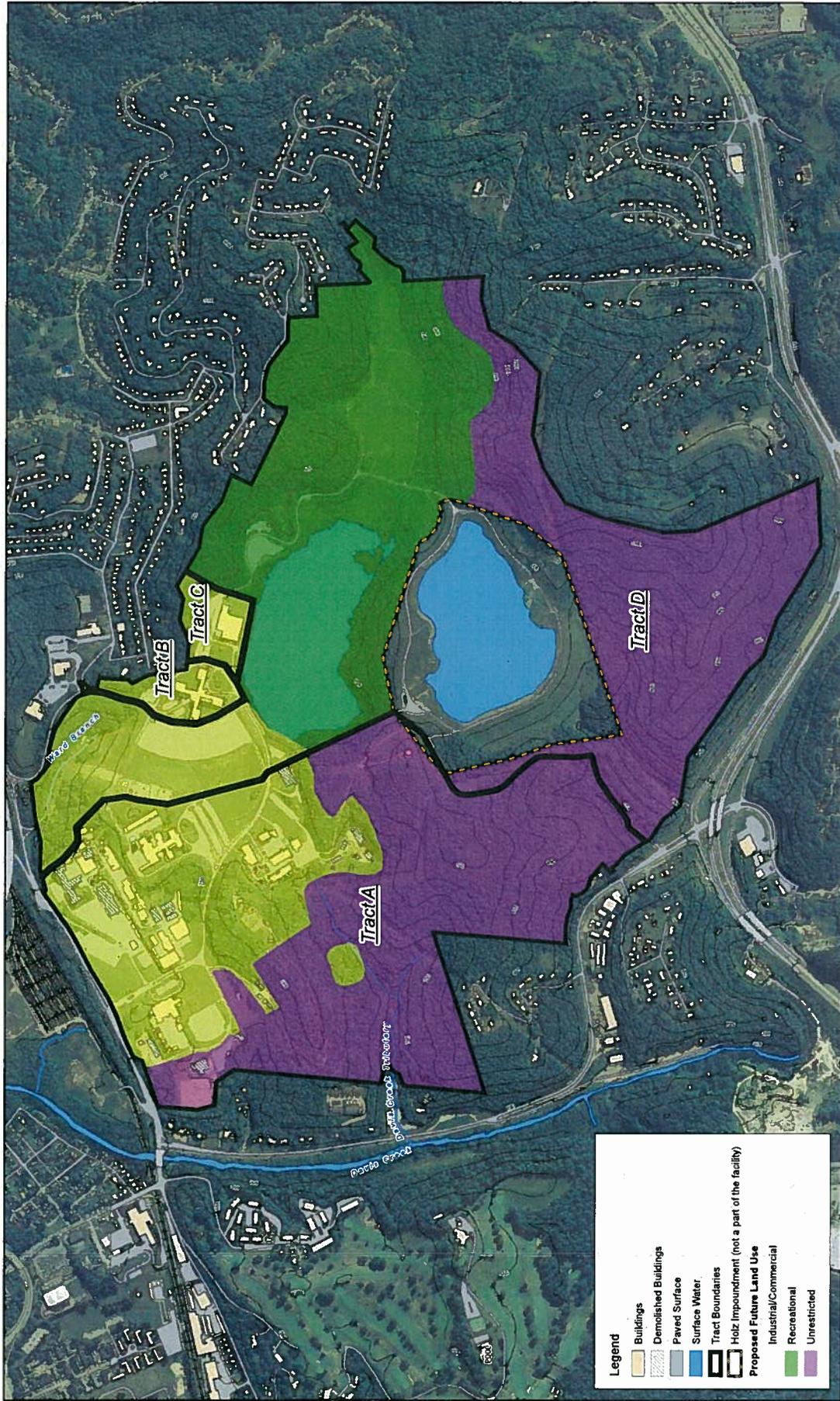


Figure 2  
 Proposed Future Land Use  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

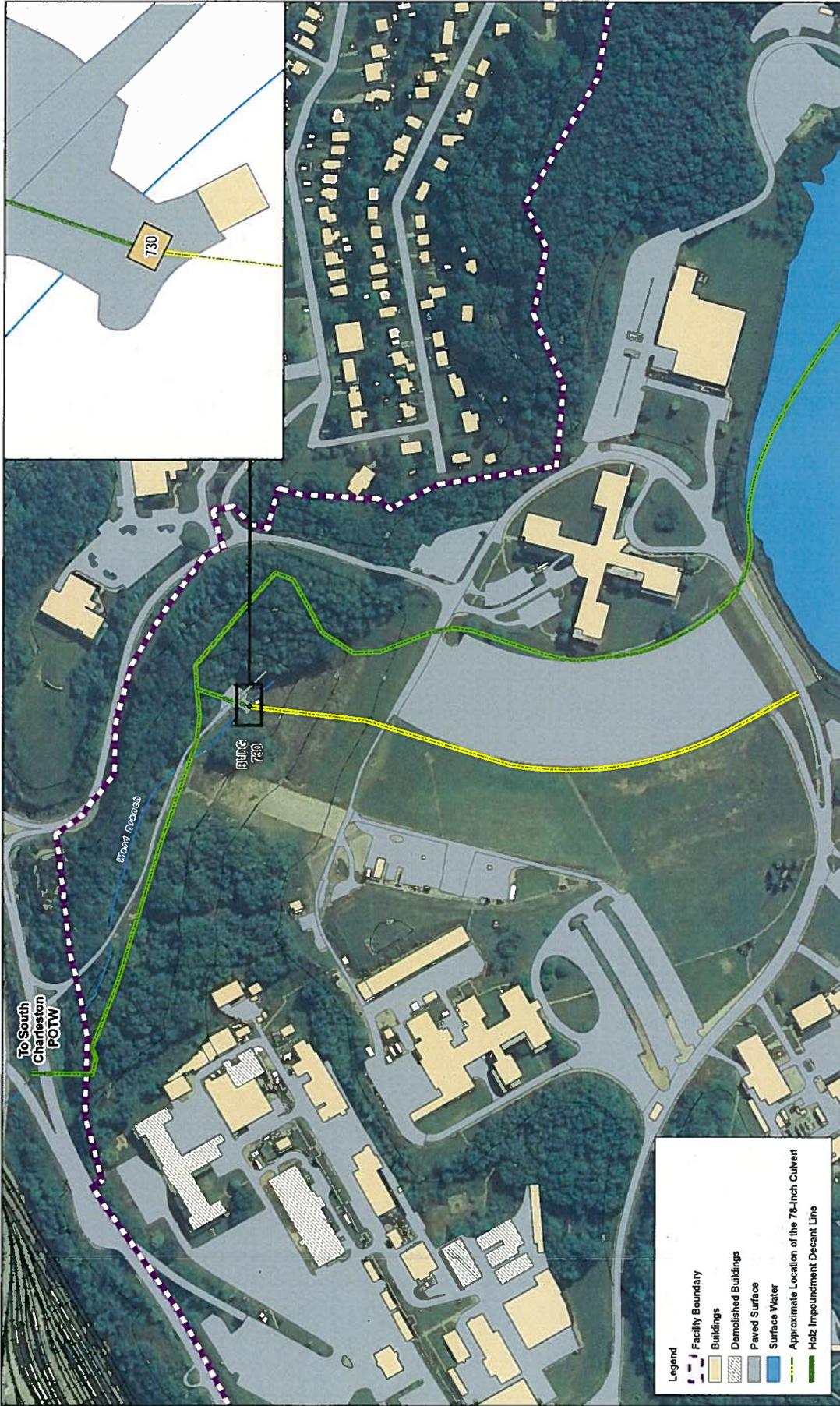


Figure 3  
 Lower Ward Leachate Collection System  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

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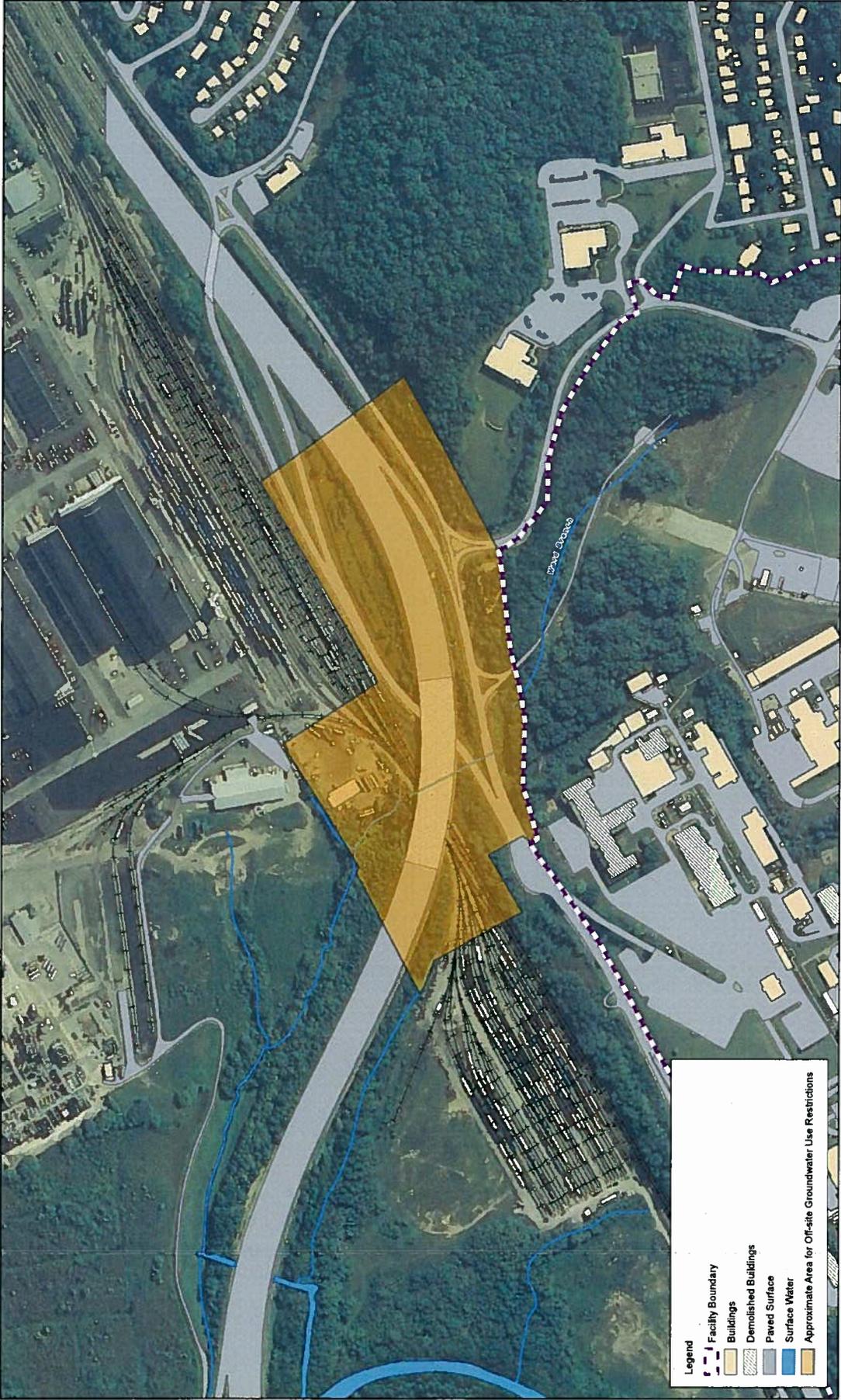


Figure 4  
 Off-Site Groundwater Use Restrictions  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

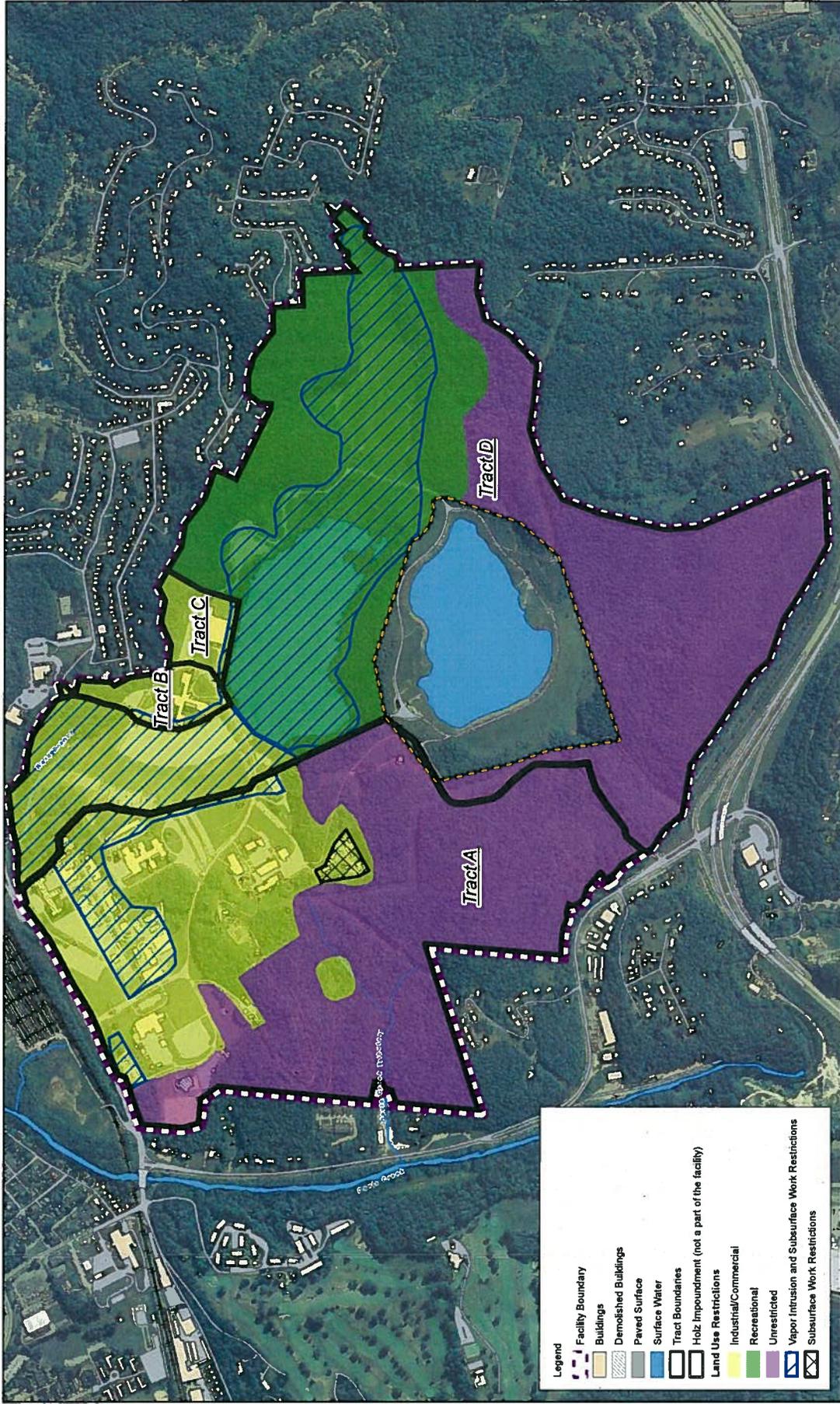


Figure 5  
 Restrictions  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

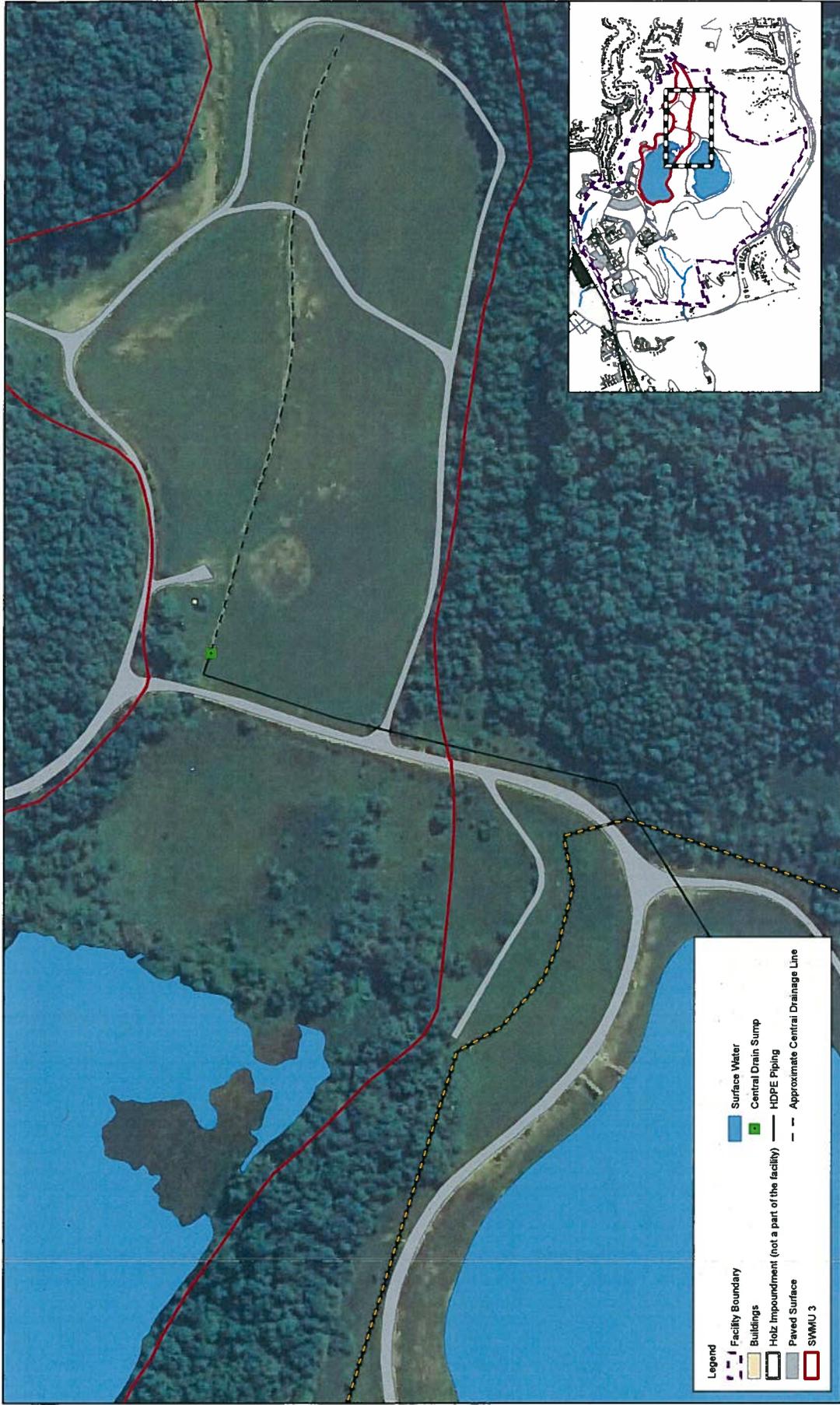


Figure 6  
 Central Drain Sump and Associated Piping  
 Statement of Basis  
 UCC Technology Park  
 South Charleston, West Virginia

**Administrative Record Table**  
*Union Carbide Corporation Technology Park*  
*South Charleston, West Virginia*

Document Number	Document Title	Brief Description	Author	Date
1	RCRA Facility Assessment Report	In 1985, a corrective action permit was issued to Union Carbide Corporation (UCC) by the United States Environmental Protection Agency (USEPA). In accordance with the permit, an Resource Conservation and Recovery Act (RCRA) facility assessment (RFA) was conducted in 1987, during which 62 solid waste management units (SWMUs) were identified at the facility. SWMUs were identified based on information gathered from state and regional files and from observations made during the visual site inspection (VSI). Information gathered during the RFA was documented in this report, which included SWMU descriptions, dates of start-up and closure, waste managed, release controls, and any release information.	A.T. Kearney	October 1987
2	Solid waste Management Unit Descriptions and Investigation/Corrective Action Undertaken	This document discusses the facility, the regulatory history, and voluntary corrective actions undertaken. The document also describes all 70 SWMUs identified by the regulatory agencies and UCC, including the eight additional SWMUs UCC identified in 1993 in response to a USEPA information request. The 70 SWMUs were evaluated and placed into the following categories: Category A (High Priority); Category B (Low Priority); Category C (No Further Action [NFA]); and Category D (areas that do not meet the definition of an SWMU).	Union Carbide Corporation	March 1998
3	Technical Center Facility Lead Agreement	This letter documents UCC's decision to participate in the USEPA Facility Lead Program.	USEPA	December 1999
4	RFI Report	This report was prepared to document the RCRA facility investigation (RFI) that was conducted for the high priority (e.g., Category A) SWMUs. The RFI consisted of a historical activities review, which eliminated two high priority SWMUs from further consideration, and field investigation activities at the remaining four high priority SWMUs. The investigation activities consisted of soil, groundwater, surface water, sediment, and waste material sampling. Exposure potential was acknowledged in two areas (Ward A/B Landfills and groundwater).	Key Environmental, Inc.	June 2001
5	Environmental Indicator (EI) RCRIS code (CA725), Current Human Exposures Under Control	This document provides an evaluation of potential human exposures above risk-based levels for the facility. Complete pathways were identified for facility workers and construction workers for impacted surface/subsurface soil and groundwater. These human health exposure routes were identified as being under control.	USEPA	May 2003
6	RCRA Facility Investigation Workplan for Solid Waste Management Units	This workplan discusses investigation activities proposed for 11 SWMUs formerly categorized as B, C, or D. In addition, the workplan also discusses a proposed ecological survey for Ward A/B Landfills to further evaluate risk to ecological receptors.	CH2M HILL	May 2004

**Administrative Record Table**  
*Union Carbide Corporation Technology Park*  
*South Charleston, West Virginia*

Document Number	Document Title	Brief Description	Author	Date
7	RCRA Facility Investigation for Solid Waste Management Units	This report presents the findings from the investigation activities conducted at 11 SWMUs formerly categorized as B, C, or D. The investigation activities consisted of soil, groundwater, surface water, and sediment sampling. Potential human health and ecological risks associated with these SWMUs were assessed in this report based on the analytical results.	CH2M HILL	January 2005
8	Environmental Indicator (EI) RCRIS code (CA750), Migration of Contaminated Groundwater Under Control	This document identified that contaminated groundwater that originates from the landfills has been delineated and the contamination appears to be stable.	USEPA	April 2005
9	Ecological Risk Assessment Ward A and B Landfills (Solid Waste Management Units 3 and 4)	This report presents an evaluation of potential ecological risks for Ward A and B Landfills. The report concluded that there are no unacceptable risks to ecological receptors in Ward B Landfill; however, potential risks were identified associated with the discharge point of the Ward B central drain line. The report also concluded that there are potential unacceptable risks to ecological receptors in Ward A Landfill.	CH2M HILL	April 2006
10	Responses to Comments for the Union Carbide Corporation Ecological Risk Assessment Ward A and B Landfills	This document presents UCC's responses to the comments from USEPA on the Ecological Risk Assessment Ward A and B Landfills (Document Number 9).	CH2M HILL	January 2007
11	Summary of Ecological Risk Evaluations for RCRA SWMUs 5 and 70	This memorandum summarizes the ecological evaluation that was conducted for SWMUs 5 and 70 and the tributary to Davis Creek downgradient of SWMUs 5 and 70. The ecological risks evaluation concluded that the potential ecological risks fall within the acceptable range.	CH2M HILL	November 2007
12	Current Conditions Report	This report was prepared to (1) identify all facility investigation and corrective action work completed to date (2) demonstrate that the current knowledge of the facility operations, waste management practices, and site conditions is sufficient to identify the scope of remaining corrective actions (3) summarize the status of the EIs under current site conditions.	CH2M HILL	March 2008
13	Technology Park Groundwater Screening-Level Assessment	This memorandum presents the methods and results of a screening-level assessment for groundwater downgradient of the facility. The assessment concluded that several constituents exceeded the USEPA Region 3 tap water risk-based concentrations but the groundwater does not pose unacceptable human health risks for the hypothetical future construction worker.	CH2M HILL	February 2009

**Administrative Record Table**  
*Union Carbide Corporation Technology Park*  
*South Charleston, West Virginia*

Document Number	Document Title	Brief Description	Author	Date
14	Human Health Risk Assessment for Ward A Pond, Ward Branch, and Vapor Intrusion	This report documents the soil gas and/or indoor air samples collected for Buildings 771, 2000, 6000 and the undeveloped area west of Lower Ward Landfill and assesses the human health risk for potential human exposures. This report also evaluated the human health risk for surface water, sediment, and surface soil collected at Ward A Landfill and Ward Branch as part of the ecological risk assessment. The report concluded that for current and likely future land use, exposure to media at Ward A Landfill and Ward Branch and potential exposures related to indoor air at Buildings 771, 2000, and 6000 would not result in unacceptable human health risks. The report also concluded that no further evaluation of the area west of the Lower Ward Landfill is required.	CH2M HILL	November 2009
15	Buildings 706 and 707 Area Soil Investigation, Removal Action, and Vapor Intrusion Human Health Risk Assessment	This report documents the results from the soil investigation and removal actions for the drainage ditch south of Building 707 and evaluates any unacceptable human health risks at Buildings 706 and 707 from potential vapor intrusion. The results indicate that current and future human health exposure associated with vapor intrusion into Buildings 706 and 707 from volatile organic compounds does not pose unacceptable human health risks.	CH2M HILL	December 2009
16	Groundwater Monitoring Plan	This plan describes the groundwater monitoring program for the facility.	CH2M HILL	December 2009
17	Screening Level Ecological Risk Assessment for Ward Branch and Baseline Ecological Risk Assessment for Ward A Pond	This report presents a baseline ecological risk assessment for Ward A Pond and a screening level ecological risk assessment for Ward Branch. The report concluded that there is limited potential for adverse effects to ecological receptors from the identified chemicals of potential concern.	CH2M HILL	January 2010
18	Corrective Measures Proposal	This document presents the proposed final corrective measures for the facility along with the supporting information (including additional soil and groundwater data) necessary for USEPA to approve the final corrective measures and make corrective action complete decisions for the facility.	CH2M HILL	March 2010
19	Ward Hollow Sustainability Evaluation	This document identifies and calculates sustainability metrics for the four alternatives that were considered in the corrective measures proposal for the Ward Hollow groundwater contamination.	CH2M HILL	March 2010