MODULE IV
FACILITY WIDE RCRA CORRECTIVE ACTION

The Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) Program requires investigation and cleanup of releases of hazardous and hazardous waste constituents at and from any solid waste management unit at current and former RCRA hazardous waste treatment, storage, and disposal (TSD) facilities as necessary to protect human health and the environment.

On January 22, 1991, the United States Environmental Protection Agency (EPA) issued a RCRA CA Permit to the Facility to proceed with site cleanup. The RCRA CA Permit required the Facility to conduct a RCRA Facility Investigation (RFI) to evaluate the nature and extent of the releases of hazardous waste and hazardous waste constituents from any solid waste management unit or area of concern. ~~The~~Additionally, the 1991 CA Permit ~~also~~ required the Facility to determine if corrective measures were/are necessary at any SWMU or AOC.

The EPA-issued RCRA CA Permit had an expiration date of January 21, 2001; however, on November 14, 2002, EPA issued a continuance of the Facility's RCRA CA Permit. The November 2002 continuance letter stated, "*the corrective action permit issued by EPA and which was effective on January 22, 1991, will remain fully effective and enforceable until the effective date of a new corrective action permit issued by EPA".*

The State of West Virginia's received authorization to implement corrective action at hazardous waste sites through the State's Corrective Action Program on December 15, 2003. As a result, EPA has requested that WVDEP incorporate the requirements of the Facility's 1991 CA Permit into a Permit Module for the Facility's existing Hazardous Waste Management Permit.

IV-A REPORTS NOTIFICATIONS AND SUBMISSIONS

1. For the purposes of RCRA CA, all work plans, reports, notifications or other submissions required by **Module IV** shall be sent by electronic mail, certified mail, certified carrier, or hand-delivered as follows:

   One Copy To:
   RCRA CA Project Manager
   WVDEP - Office of Environmental Remediation
   601 57th Street
   Charleston, WV 25301

   One Copy To:
   RCRA CA Program Manager
   WVDEP - Office of Environmental Remediation
   601 57th Street
   Charleston, WV 25301

One Copy To:
EPA Project Manager
USEPA Region III
Office of Remediation
1650 Arch Street
Philadelphia, PA 19103-2029
(3LC20)

2. Reporting requirements not required by **Module IV** shall be submitted in accordance with Section I-F-17 Submittal of Reports or Other Information.

IV-B CORRECTIVE ACTION (CA) FOR CONTINUING RELEASES; PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

1. Section 3004(u) of RCRA, 42 U.S.C. § 6924(u), and regulations codified at 40 CFR §264.101, provide that all permits issued after November 8, 1984 must require CA as necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any solid waste management unit (SWMU) regardless of when waste was placed in the unit.

2. CA requires investigation and cleanup of releases of hazardous constituents and hazardous waste that pose an unacceptable threat at current and former RCRA hazardous waste treatment, storage, and disposal (TSD) facilities. The objectives of CA are to evaluate the nature and extent of the releases of hazardous waste constituents; to evaluate facility characteristics; and, to identify, develop, and implement appropriate corrective measures to protect human health and the environment.

3. Under Section 3004(v) of RCRA, 42 U.S.C. § 6924(v), and 40 CFR §264.101(c), CA at a permitted facility may be required beyond the facility boundary, where necessary, to protect human health and the environment, unless the Facility demonstrates that, despite its best efforts, the Facility was unable to obtain the necessary permission to undertake such action.

4. As necessary, the Permittee shall prepare facility-specific scopes of work and reports relating to IMs, RFI, CMS and any Risk Screening and Risk Assessment in accordance with the relevant attachments.

IV-C SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

1. **Table 1**, at the end of this Module, provides the number, name and description of the 23 solid waste management units (SWMUs) and four areas of concern (AOCs) identified at the Bayer CropScience Facility.

2. SWMUs 2 and 6, 7 and 20, 16 and 17, as well as, 18 and 20 are listed together in **Table 1** based on their proximately to each other.

IV-D INTERIM MEASURES

1. The purpose of Interim Measures (IMs) is to identify and correct any actual or potential releases of hazardous waste or hazardous waste constituents from solid waste management units, and other sources or areas at the facility that may present an endangerment to human health or the environment. The following describes the IMs that have been completed or are ongoing at the Bayer CropScience facility.

   a. ENB and SEVIN® Areas
   Delineation and remediation work was performed at five specific areas from 1996 through 2003. These five areas included three locations in the northwest portion of the facility designated as the ENB North, ENB Central, and ENB South areas (targeting mainly PCE, carbon tetrachloride, and chloroform) and two locations in or near the SEVIN® area (targeting benzene, chlorobenzene, toluene, and chloroform) in the east central part of the facility ~~(Figure 5-1). The results of this high-priority area remediation were summarized in the *Summary of Site Remediation* report (Key 2006).~~.

   Remediation at the ENB areas was initiated during the first quarter of 1996 with the installation and startup of an AS/SVE system at the ENB Central location. ENB remediation areas are not located within a SWMU. Two additional AS/SVE systems were installed at the ENB South and ENB North areas from December 1996 through May 1997. In addition, two groundwater extraction wells were installed in the ENB North area, and pumped during the fourth quarter of 1999. The pumping was discontinued after it was determined that continued operation did not significantly affect groundwater or off-gas vapor concentrations. In 2002 and 2003, chemical oxidation using a Fenton's reagent approach was pilot tested for applicability and a soy oil-based co-metabolism was applied to the ENB North and ENB Central areas. By the end of the third quarter of 2003, analytical data demonstrated significant reductions, or elimination, of target compounds in groundwater. After receiving concurrence from the EPA, continued operation of the systems was terminated in late 2003. Sampling at the ENB North area several months after the remediation system was turned off showed that no or little rebound had occurred subsequent to turning off the system. ~~Initial remediation at the SEVIN® Unit consisted of an AS/SVE system installed and started during the first and second quarters of 1997.~~

Initial remediation at the SEVIN® Unit consisted of an AS/SVE system installed and started during the first and second quarters of 1997. For approximately 2 years after system installation, only the SVE portion of the system was operated, and only at partial capacity, because of the high concentration of toluene in the extracted vapors. A leaking toluene line was identified as a source of these elevated levels of toluene and was repaired. Sparging at the SEVIN® Unit was then initiated in September 2000. In December 2000, the SEVIN® area was expanded to cover more of the toluene impact area~~, as determined through additional groundwater sampling performed throughout the vicinity in 1999 (UCC, 1999).~~

During the delineation of the SEVIN® area, toluene concentrations consistent with high-priority SWMU designation were found to exist in a separate portion of the SEVIN® Unit known as the former NCF Tank area. As a result, a separate AS/SVE system was installed in July 2000 to treat this area. Based on groundwater concentration data, remediation at both the SEVIN® and NCF areas was complete in the second quarter of 2002. Both systems continued to operate into the fourth quarter of 2002 and then were turned off. Both the SEVIN® area and NCF remediation systems are located within SWMU-7.

b. SWMU 1 (Former UCAR Landfill)

Excavation of surficial tar-like ooze was completed on both the east and west side of the Former UCAR Landfill to approximately 1 foot bgs. Approximately 80 tons of excavated material was removed. The area was backfilled with limestone base material and then covered with approximately 4 inches of gravel. Access to this SWMU and the unit is inspected weekly and tar is removed, as necessary.

c. High Purity Hydrocarbon (HPH) Area

Investigation activities in a former bulk storage area adjacent to the Kanawha River occurred in 2009 to find and delineate the source of elevated benzene concentrations in groundwater. Four above ground storage tanks formerly occupied the area and were reportedly used to store process residue waste, HPH fuel oil, and possibly other constituents historically manufactured at the facility. The tanks were in service for over 50 years before they were removed sometime between 2004 and 2008. Based on the findings of the investigation, a relatively small area of volatile organic compound impact was identified in soil within the former tank farm. The HPH remediation area is not within a SWMU.

AS/SVE was selected as the preferred remediation technology for the site. However, perched groundwater zones present within the target remediation area required that water be removed from SVE

wells to dewater the zones and expose previously saturated soil to vapor to facilitate SVE operations. The modification resulted in the SVE wells essentially operating as dual-phase extraction wells.
The AS/SVE system remedial construction activities were completed in three phases including 1) soil fracturing and well installation (June 2010); 2) civil construction (October 2010 to March 2011) and 3) system commissioning (March and April 2011). Remediation of the HPH area is ongoing (as of September 2013).

2. The decision for an IM can be made by WVDEP, EPA or the Permittee, to expedite risk reduction by controlling, minimizing, or eliminating ongoing threats to human health or the environment. If it is determined that IMs are necessary, the Permittee be will notified of this determination and the reasons therefore in writing.

3. The Permittee may voluntarily submit an The IM proposal or an IM Proposal may be requested by WVDEP. If submitted, the IM proposal, either requested or voluntarily submitted, shall include a schedule for performance of such interim measures. The Agencies shall review the IM proposal and determine whether such a proposal will be considered for approval and whether such interim measures are of such scope that they require implementation of the public notice requirements.

Commented [gad1]: Purpose of this edit is allow flexibility in the submittal of IM proposal for agency review. This will allow UCC to proceed voluntarily.

IV-E RCRA FACILITY INVESTIGATION

1. A Verification Investigation of the Facility was conducted in 1992, a RCRA Facility Investigation (Stage II) was conducted in 1994/1995, and a RCRA Facility Investigation (Stage III) was conducted in 2000. Additional sampling to supplement the RFI (Stage III) was conducted in 2003/2004 and 2007/2008.

2. For any additional required RFI phase or phases, the Permittee will complete the RFI in accordance with an approved RFI Work Plan.

Commented [gad2]: Based on clarification from Cathy, we understand this to mean the RFI is complete and this does not pertain to additional data gathering for implementing interim actions.

3. AdditionallyFor any additional RFI phase or phases, the Permittee shall submit bi-monthly progress reports to the Project Manager that shall include, at a minimum: activities completed within the reporting period, any deviations from the RFI Plan, and, a schedule of activities.

4.2. TheAdditionally, the Permittee shall submit a RFI Report, or Reports, for additional RFI investigation(s) which shall include an analysis, summary and results of all investigations performed pursuant to the RFI Work Plan. The RFI Report shall also include, and a discussion of whether or not an

~~the feasibility of implementing~~ interim measure is necessary~~s~~ and, if so, whether or not the interim measure should be implemented immediately.

Commented [gad3]: Want to clarify that just because an investigation is conducted that we do not need to justify the need and an immediate IM since as no action may be necessary at all.

IV-F CORRECTIVE MEASURES STUDY

1. The ~~p~~Permittee will submit a Corrective Measures Proposal (CMP) to address the need for corrective actions associated with the SWMUs and AOCs identified in the RFI completed and referenced in section IV-E.1. The CMP will be submitted by 2015. The CMP will develop and evaluate corrective action alternative(s), provide information on the effectiveness of interim measures implemented at the Facility, and recommend final corrective measure(s) at the Facility for approval by WVDEP.

Commented [gad4]: Purpose of this section is to recognize that we will be submitting a CMP as it appears that the CA module will precede its completion.

~~1. The purpose of this~~a ~~Corrective Measures Study (CMS) is to develop and evaluate the corrective action alternative(s) and to recommend the corrective measure(s) be taken at the Facility.~~

2. If the Project Manager and/or EPA determines, on the basis of the an additional RFI or any other information, that corrective measures for releases of hazardous waste or hazardous constituents are necessary to protect human health or the environment, the Project Manager will advise the Permittee of this determination, and the reasons therefore, in writing.

3. If requested by the Project Manager and/or EPA, t~~T~~he Permittee shall submit to the Project Manager for approval a Corrective Measures Study (CMS) Work Plan within ninety days of receipt of notification of such determination. The CMS Work Plan shall include a schedule for expeditious performance of the study. Requirements for a CMS can be found at http://www.epa.gov/reg3wcmd/ca/ca_resources.htm.

IV-G CORRECTIVE MEASURES IMPLEMENTATION

1. Corrective Measures ~~Remedy Selection~~ Implementation

   ~~a. Based on reports and information submitted by the Permittee during the RFI, CMS, and other relevant information, the Project Manager may require the Permittee to evaluate further one or more additional remedies or develop particular elements of one or more proposed remedies.~~

Commented [a5]: This was redundant; stated in previous section.

~~2. Corrective Measures Implementation~~

a. a. Within ninety (90) days of receipt of the written approval of the Corrective Measures Proposal or Corrective Measures Remedy, the Permittee shall submit a Corrective Measure Implementation (CMI) Work Plan for approval for any remedies that have not been implemented. Including, if applicable, provisions for the Institutional Controls implementation and assurance that establish, document and reports activities associated with implementing and ensuring the ICs remain in place and effective. If requested by the Project Manager, tThe Work Plan shall include a schedule for submission of the CMI Design Report and CMI Final Design Report. Upon approval of the CMI Work Plan, the Permittee shall submit the Corrective Measure Design Reports to the Project Managerand the CMI Final Report in accordance with the approved schedule.

Commented [gad6]: Typically we have not needed to submit this because the work is complete.

Commented [a7]: EPA requested IC language

b. The CMI Final Design Report shall be submitted to the Project Manager in accordance with the requirements of 40 CFR § 270.42.
b. Upon completion of the public notice and public meeting requirements and upon the Project Manager's approval of the CMI Final Design Report, the Permittee shall develop and implement construction in accordance with approved procedures, specifications, and schedules.

c. Upon completion of construction and after an initial period of monitoring the performance of the corrective measure(s), the Permittee shall prepare and submit copies of the final CMI Report to the Agencies, which delineates the implemented corrective measures, design, operation and maintenance, and performance of the constructed system(s), unless this information was provided prior to or included with the CMP or CMS. Final "as built" plans and specifications of the corrective measures systems shall be certified by a Professional Engineer and shall be submitted to the Agencies with the final CMI Report.

IV-H EVALUATION OF THE SELECTED REMEDY

1. Commencing one year from the submittal date of the final CMI Report, the Permittee shall submit an annual progress report on the remedy performance, including any Institutional Controls. If the Project Manager determines that the selected remedy will not comply with the media clean-up requirements, the Project Manager may require the Permittee to perform additional studies and/or perform modifications to the existing Corrective Action remedy.

IV-I EMERGENCY RESPONSE; RELEASE REPORTING

1. If at any time, the Permittee discovers that a release of hazardous waste or

hazardous constituents from a SWMU at the Facility is presenting or may present an imminent and substantial endangerment to human health or the environment, the Permittee shall notify the WVDEP as soon as practicable of the source, nature, extent, location and amount of such release, the endangerment posed by such release and the actions taken and/or to be taken, to the extent known, to address such release.

2. Within five days of discovery, the Permittee shall notify WVDEP, in writing, of the nature, source, extent, and location of such release of hazardous waste or hazardous constituents from the SWMU.

3. If, based on the information submitted a release has not been adequately remediated to be protective of human health and the environment, WVDEP may require the SWMU and/or AOC to be included in an RFI or ~~may require~~an IM.

~~3.~~2. Nothing in this Permit shall limit either WVDEP's authority to undertake or require any person to undertake response action or corrective action under any law, including but not limited to, Sections 104 or 106 of CERCLA, 42 USC § 9604 or 9606, and Section 7003 of RCRA, 42 USC § 6973. Nothing in this Permit shall relieve the Permittee of any obligation it may have under any law, including, but not limited to, Section 103 of CERCLA, to report releases of hazardous waste, hazardous constituents or hazardous substances to, at or from the Facility.

IV-J GUIDANCE DOCUMENTS

1. All work to be performed at the Facility pursuant to this Permit shall be in general accordance with applicable EPA RCRA corrective action guidance available at http://www.epa.gov/reg3wcmd/ca/ca_resources.htm.

IV-K NEWLY DISCOVERED SOLID WASTE MANAGEMENT UNIT (SWMU) ASSESSMENT

1. The Permittee shall notify the Project Manager, in writing, of any newly identified SWMU at the Facility, no later than thirty days after the date of discovery. The notification shall include, but is not limited to, the following known information:

   a. A description of the SWMUs type, function, dates of operation, location (including a map), design criteria, dimensions, materials of construction, capacity, ancillary systems (e.g., piping), release controls, alterations made to the unit, engineering drawings, and all closure and post-closure information available, particularly whether wastes were left in place.

b. A description of the composition and quantities of solid wastes processed by the units with emphasis on hazardous wastes and hazardous constituents.

c. A description of any release (or suspected release) of hazardous waste or hazardous constituents originating from the unit. Include information on the date of release, type of hazardous waste or hazardous constituents, quantity released, nature of the release, extent of release migration, and cause of release (e.g., overflow, broken pipe, tank leak, etc.). Also, provide any available data that quantifies the nature and extent of environmental contamination, including the results of soil and/or groundwater sampling and analysis efforts. Likewise, submit any existing monitoring information that indicates releases of hazardous waste or hazardous constituents have not occurred or is not occurring.

2. Upon receipt of the notification of any newly identified SWMU, the Project Manager will determine the need for corrective action at such SWMU. If corrective action is necessary to protect human health or the environment, the Project Manager will determine whether an RFI will be performed and the need for any IMs.

~~4.~~3. In lieu of a separate RFI, the Permittee may propose either to incorporate any newly identified SWMU into an ongoing RFI or to submit a proposal for the performance of corrective measures at such newly identified SWMU. Any such proposal shall be submitted to the Project Manager along with notification of the discovery of the SWMU(s). Incorporation of any newly identified SWMU(s) into an ongoing RFI shall be through the submission of an RFI Work Plan Addendum by the Permittee. Any such RFI Work Plan Addendum shall receive approval by the Project Manager prior to initiation of the related RFI work.

IV-L FINANCIAL ASSURANCE

Commented [a8]: All changes in this section required by EPA.

1. All Financial Assurance cost estimates shall be consistent with the requirements of 40 CFR §264.142 and §264.44. For the *Interim Guidance on Financial Responsibility for Facilities Subject to RCRA Corrective Action*, dated September 30, 2003, go to EPA website: http://www.epa.gov/compliance/resources/policies/cleanup/rcra/interim-fin-assur-cor-act.pdf.

2. Initial Cost Estimate~~ for Final Remedy~~: Within ninety calendar days of ~~receipt~~the effective date of ~~the Project Manager's written approval of the Corrective Measures Remedy~~this Permit, the Permittee shall submit an initial cost estimate~~,~~ (Cost Estimate), in current dollars, ~~for completing the approved remedy.~~to perform the work required under this Module. The ~~initial estimate~~

~~may be based on the CMS, the approved remedy, or any~~Cost Estimate must account for the costs of all foreseeable work, including all investigation and reports, construction work, monitoring, and other ~~available information. The cost estimate for completing the approved remedy shall be updated pursuant to the development of more detailed information (i.e., Corrective Measure Design) and any modifications to the approved remedy~~long term care work, etc.

3. Annual Cost Estimate Updates ~~for Final Remedy~~. Within sixty days prior to the anniversary date of the establishment of the financial instrument for the ~~approved final remedy~~work required under this Module, the Permittee shall submit to the Project Manager updated cost estimates, adjusted for inflation, for completing the approved remedy. If the Permittee is using a financial test or corporate guarantee as the financial instrument, the cost estimate must be updated for inflation within 30 days after the close of the Permittee's fiscal year and before submission of updated information to the Project Manager.

4. Financial Assurance Demonstration: Within thirty calendar days of approval of the initial cost estimate for ~~financial assurance of Interim Measures and Final Remedy~~the work required under this Module, and annually thereafter, the Permittee shall demonstrate compliance with financial assurance to Project Manager in accordance with 40 CFR § 264.143 for completing the Work in accordance with 40 CFR § 264.101(b). Within thirty calendar days of approval of any revised cost estimate, the Permittee shall demonstrate to the Project Manager financial assurance for the updated cost estimates.

Commented [KM9]: We understand this language is being standardized by WVDEP.

IV-M RECORDKEEPING

1. Upon completion of closure of any current or future SWMU, the Permittee shall maintain in the Facility operating record, documentation of the closure measures taken.

IV-N ACCESS FOR CORRECTIVE ACTION OVERSIGHT

1. The WVDEP and its authorized representatives shall have access to the Facility at all reasonable times for monitoring compliance with the provisions of this Permit. Furthermore, the Permittee shall use its best efforts to obtain access to property beyond the boundaries of the Facility at which corrective action is required by this Permit for all parties associated with the corrective action activities.

IV-O COMPLETION OF REMEDY

1. Within ten days of receipt of notification by the Project Manager that the remedy is complete, the Permittee shall submit a written certification to WVDEP stating that the remedy has been completed in accordance with

the requirements of this Permit Modification. The certification must be signed by the Permittee. In cases where no other Permit Conditions remain, the Permit may be modified not only to reflect the completion determination, but also to change the expiration date of the permit to allow earlier permit expiration in accordance with 40 CFR Parts 124, 270.41, and 270.42, as applicable.

TABLE 1
Solid Waste Management Units/Areas of Concern

Number	Name	Description
SWMU 1	Former UCAR Landfill	The former 1-acre UCAR landfill, originally occupied by the toluene diisocyanate (TDI) unit, was used in the 1940s and 1950s for disposal of oil, tarry materials, and possibly soluble hydrocarbons from a gas cracking unit. The unit is now a gravel-covered, level area crossed by rail lines and used for vehicle traffic.
SWMU 2 & 6	No. 2 Ash Pond and Past No. 2 Fly Ash Landfill	The No. 2 Ash Pond was built on top of a section of the 4-acre No. 2 Fly Ash Landfill. A 2-foot thick grass-covered clay cap covers the landfill. The pond provides solids separation for coal ash fines prior to discharge to an NPDES outfall. Landfill materials include cinders, coal, glass, and black organic oil and sludge mixed with ordinary gravel and sand.
SWMU 3	Past Landfill/Coal Pile	This landfill was used to dispose of general plant trash. After 1968, the landfill contents reportedly were removed and sent to the Goff Mountain Landfill. No potentially hazardous wastes or constituents were reportedly disposed of in the landfill. The landfill is approximately 100 feet by 150 feet and 17 feet deep.
SWMU 4	Past Landfill/Syngas Unit	TDI, toluene diamine, and other unit wastes may have been disposed of in a 100-foot by 50-foot by 10-foot-deep landfill. Much of the waste material is believed to have been removed when the site was prepared for construction of the Syngas Unit. Located within the boundaries of the Praxair unit that is currently out of service and is enclosed by chain link fencing
SWMU 5	No. 1 Ash Pond	The pond was 110 feet by 160 feet and 10 feet deep, with a listed volume of 5,000 cubic yards and was in service from 1942 to 1985 to collect bottom ash (clinkers) from the #1 Powerhouse. Although periodically cleared of accumulated solids during operation, some residual amounts of these materials, designated non-hazardous in 1979 by the EPA Toxicity Test, may have remained. All other material placed in the pond was designated "clean" by analysis
SWMU 7 & 20	SEVIN® Unit and Southside Loading Rack/SEVIN® Unit	SEVIN® Unit has been in operation since 1960. The Southside Loading Rack (SWMU 20) is composed of a 20-foot by 40-foot asphalt-covered concrete and/or asphalt residue transfer station for tank trucks. The SEVIN® Unit and Southside Loading Rack were two of six SWMUs within the facility originally designated as a high-priority
SWMU 8	Methanol Storage Tank 1518 / Glycol Unit	This unit was a 70,000-gallon steel tank that held water-methanol mixtures prior to refining. The area where the steel tank was located is currently an open grass covered area surrounded by infrastructure.
SWMU 9	Past Residue Storage Tanks 1037 & 1038 / Naphthol and Acetone	These 26,000-gallon aluminum tanks, which were removed in 1990. The tanks were mounted horizontally in concrete saddles over gravel. The gravel area is still present.
SWMU 10	Byproduct Fuels Tank 1885 – LARVIN® Unit	This unit consists of one 24,000-gallon tank that receives waste flow from the LARVIN® process area for subsequent disposal at the steam plant. The tank is mounted on a concrete foundation and is surrounded by a concrete dike. Tank 1885 is still present and in service.
SWMU 11	Chemfix Area	The Chemfix area is approximately 6 acres in size and was used for disposal of sludge from the water treatment plant. Most sludge was "fixed" into a solid form with the addition of kiln dust, cement, and/or other material and then the area was capped. A portion of sludge was not properly "fixed" prior to capping.

Number	Name	Description
SWMU 13	Waste HEC Solution Storage	This unit consisted of a 10,000-gallon stainless steel hydroxyethyl cellulose (HEC) storage tank located adjacent to former Building 87. The tank rested on a concrete foundation and was surrounded by a concrete dike. Waste recovery operations took place on the second floor of Building 86. The floor of the building is constructed of concrete. The tank, foundation, pavement, dike, as well as, Building 87 have been removed. Operations in Building 86 have been discontinued. Areas around Building 86 are fenced, and mix of concrete and gravel.
SWMU 14	Tank Station 106/Plant Laboratory	This unit consisted of a portable steel tank mounted horizontally on saddles. The tank was located in an asphalt-paved area behind the plant laboratory loading dock. The tank has since been removed. Open asphalted area, bordered by parking lots.
SWMU 15	Eastside Tank Car/Truck Cleaning Rack	Primarily, solvent materials were manufactured and shipped in the area served by the eastside rack. The tank car cleaning area consists of four parallel sections of track through a gravel-covered area. Water is captured by metal-grated, concrete channels where a sump sends water to the process sewer. Tank truck cleaning is done on an asphalt pad immediately west of the railroad tracks. This is a tank cleaning area currently in service.
SWMU 16 & 17	Chemical Cleaning Building and Burn Area	SWMU 16 consists of the Chemical Cleaning Building (334), which is used for miscellaneous cleaning operations using solvents, including chlorinated solvents. SWMU 17 consists of a gravel area that had been used for burning flammable residues from metal parts and other materials. SWMUs 16 and 17 were combined because of their proximity to one another and similar constituent issues. Building 334 is in service and the area designated as SWMU 17 is an open area covered by gravel and asphalt.
SWMU 18 & 22	1700 Robb Station/ENB Unit and 1600 Robb Station/ENB Unit	SWMU 18 formerly consisted of a loading station where fluorocarbons were transferred from an overhead pipe rack to containers or trucks. Unit products (chlorinated hydrocarbons) were sampled or transferred through a series of spigots at the station. The loading lines were located over a concrete loading pad that was installed in early 1988. SWMU 22 was a loading and unloading station from chemical transfer lines to tank trucks. Both SWMU 18 and 22 have since been demolished and removed.
SWMU 19	Westside Landfill	The Westside Landfill was likely utilized between 1977 and 1992. Demolition wastes, primarily old metal equipment, plastic items, and dirt piles, have been placed on both sides of the entrance road to the current tenant access road. The entire area is approximately 24 acres in size and was fenced in the early 1990s to eliminate further use for disposal. Open area over-grown with vegetation, located between the two sections of the facility.
SWMU 21	Polyols Tank Car Rack	This unit has been operating as a loading and unloading station since the early 1960s for both tank trucks and railroad tank cars. The area around the rack is constructed of gravel, soil, asphalt, and concrete. Surface materials that had been affected by operations were removed in 1990. This area is a railroad tank car loading area that is not currently in service.
SWMU 23	Ethylene Oxide/BEHP Loading Rack	This rack was used to load ethylene oxide and bis(2-ethylhexyl)phthalate into tank cars for 50 years, from approximately the early 1940s through 1991. In 1991, the loading rack was demolished, and the gravel and dirt base was removed. This unit is now an open area covered in gravel and demolition rubble.
AOC 1	Construction Blasting Grit Area	Blasting grit was formerly stored in and adjacent to the east side of the construction shed located in the northeast corner of the facility. The grit was used to sandblast steel tanks and pipes and was temporarily stored at this location. This unit is now an open area covered in gravel

Number	Name	Description
AOC 2	Naphthalene Tank	When this tank was demolished in 1995, staining was observed and solidified naphthalene was present in the gravel within the concrete tank rings. Approximately 290 cubic yards of soil and gravel were excavated and removed. This unit is now an open area, with secondary containment structures still present.
AOC 3	Building 111 Blasting Grit	This AOC consists of a blasting grit storage area located in and adjacent to the south side of Building 111. This area is still in use.
AOC 4	LARVIN®	The LARVIN® structure is located south of Building 178. A unit explosion occurred in this structure in August 1993. Possible releases from the explosion and from emergency activities may have occurred during that time.

TABLE 2
Timeline of RCRA Corrective Actions

Date	Activity
November 1984	UCC submitted an application to USEPA and WVDNR for a permit to operate hazardous waste management units (REMCOR 1992).
June 1985	As part of the permitting process, UCC submitted an initial list of potential SWMUs to USEPA (REMCOR 1992).
September 1986	The potential SWMU list was modified by UCC and resubmitted to USEPA. In addition, a USEPA contractor performed a RCRA facility assessment to evaluate the status of the SWMUs (REMCOR 1992).
July 1988	Rhone-Poulenc provided USEPA information concerning eight additional SWMUs (REMCOR 1992). USEPA issued a preliminary RCRA permit.
August 1988	A revised permit to operate hazardous waste management units was submitted to USEPA and WVDNR (REMCOR 1992).
November 1988	USEPA and WVDNR issued a 1-year conditional operating permit (REMCOR 1992).
February 1990	USEPA and WVDNR issued a 10-year operating permit (REMCOR 1992).
December 1990	A revised final permit was issued to Rhone-Poulenc following the resolution of certain permit conditions. The permit was effective January 22, 1991, to January 21, 2001 (REMCOR 1992).
August 1991	Rhone-Poulenc submitted a finalized verification investigation work plan (VIWP) that addressed 18 SWMUs (REMCOR 1992).
September 1991	Rhone-Poulenc submitted a revised, finalized VIWP to USEPA that addresses five additional SWMUs, for a total of 23 SWMUs (REMCOR 1992).
November 1991	USEPA issued Rhone-Poulenc tentative verbal approval of the VIWP (REMCOR 1992).
December 1991	USEPA issued official written approval of the VIWP (REMCOR 1992).
July 1992	Phone-Poulenc submitted results of the verification investigation (VI) to USEPA. Seventeen "low priority SWMUs" were identified in the VI report. Additional field investigation at the remaining six SWMUs was proposed (REMCOR 1992).
August 1994	Rhone-Poulenc submitted an RCRA facility investigation (RFI) work plan to USEPA using a focused investigation and remediation approach. The work plan focused on two high-priority areas encompassing four SWMUs (ENB and SEVIN® areas and SWMUs 7, 18, 20 and 22, respectively; UCC 1995).
July 1995	An RFI (Stage II) report was submitted to USEPA. The lateral extent of contamination in the ENB and SEVIN® areas was determined and remediation methods were recommended (UCC 1995).
November 1995	Design and procurement for the initial high-priority AS/SVE remediation system at the ENB Central area was completed (Key Environmental 2006).
January 1996	Installation and initial pilot testing at ENB Central was performed (Key Environmental 2006).
February 1996	Full-scale operation of the ENB Central remediation system was initiated (Key Environmental 2006).
November 1996	System design and equipment procurement for AS/SVE systems at the ENB South, ENB North, and SEVIN® Unit were completed (Key Environmental 2006).
April through June 1997	Installation and startup of the AS/SVE systems at the ENB South, ENB North, and SEVIN® Unit were performed (Key Environmental 2006).
October 1998 and June 1999	Additional ENB, SEVIN®, and NCF area investigation was conducted to evaluate the lateral and vertical extent of high-priority areas within the facility (Key Environmental 2006).
September through December 1999	Groundwater extraction wells were installed and pumped at the ENB North area (Key Environmental 2006).
May 2000	USEPA approved an RFI (Stage III) work plan to investigate 16 low-priority SWMUs and four new AOCs (UCC 2001).
July 2000	NCF area remediation system was installed and operation was initiated (Key Environmental 2006).

Date	Activity
December 2000	The SEVIN® Unit remediation system was extended to the full extent of high-priority impact areas (Key Environmental 2006).
February 2001	An RFI (Stage III) report was submitted to USEPA. Three SWMUs, including SWMUs 8, 10, and 14, had no contamination and were dropped from consideration. Of the remaining 16 low-priority SWMUs and four AOCs, it was recommended that 10 require no further action and 10 require an additional round of investigation (UCC 2001). Based on the RFI findings and USEPA Region 3 comments, five SWMUs/AOCs required no further action (KEMRON 2003).
May 2002	A chemical oxidation pilot test was conducted at the ENB Central area, and an aerobic co-metabolism pilot test was conducted at ENB North (Key Environmental 2006).
October 2002	Full-scale co-metabolism remediation technology was applied at the ENB North area (Key Environmental 2006).
November 2002	Remediation at SEVIN® and NCF areas was determined to be complete, and the systems turned off (Key Environmental 2006).
March 2003	Full-scale co-metabolism remediation technology was applied at the ENB Central area (Key Environmental 2006).
June 2003	An RFI Stage III additional investigation report, which focused on 14 low-priority SWMUs and AOCs, was submitted to USEPA. Based on results of the investigation, five additional SWMUs/AOCs required no further action. Additional investigation was recommended at seven SWMUs and AOCs, along the river, and at the southeaster site boundary (KEMRON 2003).
July 2003	Active remediation and monitoring at the facility concluded (Key Environmental 2006).
September 2003	The facility received a "YE" environmental indicator determination for current risk to human health from USEPA, which means that current human exposures are under control at the facility (USEPA 2003).
April 2005	A supplemental RFI report was submitted to USEPA, which integrated historical data with results from additional groundwater sampling from select wells and eight surface water samples. The report also included a human health and ecological risk assessment (CH2M HILL 2005).
November 2005	Groundwater was resampled from selected monitoring wells in all five high-priority remediation areas (Key Environmental 2006).
2005	The facility received a "YE" environmental indicator determination for migration of contaminated groundwater from USEPA, which means that migration of contaminated groundwater is under control at the facility (USEPA 1999).
October 2006	Additional field investigation at the site was conducted and included 15 MIP borings, confirmatory soil and groundwater sample collection at the MIP locations, groundwater sampling for MNA and COC parameters, and field reconnaissance of potential seeps from the facility to the Kanawha River.
November – December 2007	A Phase I data needs investigation was conducted to address outstanding data gaps at the site. Activities completed included 15 MIP borings, groundwater grab sampling at MIP and other locations, and monitoring well installations at six locations.
January 2008	An update was provided to USEPA on field activities conducted in November and December 2007.
February – April 2008	A Phase II data needs investigation was conducted to address additional data gaps at the site identified during the Phase I data needs investigation. Activities completed included 15 MIP borings, groundwater grab sampling at MIP and other locations, monitoring well installations at six locations, and groundwater sampling for MNA and COC parameters at 21 wells.
May 2008	An update was provided to USEPA on field activities conducted in February, March, and April 2008.
September 2008	Reviewed end goals and strategy with USEPA. Also reviewed proposed scope of work for October and November 2008 field activities.
October – November 2008	A Phase III data needs investigation was conducted to address data gaps with respect to a site-wide approach to groundwater characterization and long-term monitoring. Activities completed included groundwater grab sampling, soil sampling at suspected source areas, monitoring well installations at 16 locations, and groundwater sampling for COCs at 45 wells and MNA parameters at four wells.
March 2009	Provided update to the USEPA and obtained approval to monitor groundwater quarterly in 2009 to establish baseline and supplement time-series data.

Date	Activity
2009 - 2010	An investigation into the source and mobility of DNAPL found in monitoring well VW-8A adjacent to SWMU 2/6 was performed in September 2009. It was determined that the source of the DNAPL was the nearby SWMU 2/6 area and that the DNAPL was not mobile.
2009 - present	A groundwater and soil investigation was completed at the TW-63A/B area and an air sparging and soil vapor extraction system installed. Pore-water sampling in 2012 indicated that constituents of concern were not migrating to the Kanawha River above screening levels with the exception of one sample result. The criteria used to determine when the system can be shut down is currently being evaluated.
2009 -present	Groundwater and soil investigations were completed in the Tank 1010 area (2009, 2010, 2011 and 2012). A remedy design in the Tank 1010 area was initiated in 2012; however, pore water sampling results indicated that constituents of concerns were not discharging to the adjacent Kanawha River. Remediation efforts will now focus on evaluating alternatives to reduce mass in the source area and improve conditions in the aquifer.
2010-2011	A focused groundwater investigation was completed at the western property boundary to assess if concentrations of 1,4-dioxane above applicable screening levels were migrating offsite. Land use controls were recommended to the offsite land owner to the west.
2011 - present	Site wide groundwater monitoring was migrated to an annual, statistics-based Performance Monitoring Plan. This long-term monitoring process will systematically identify changes in groundwater conditions and areas where additional interim measures may help support the final remedy for the facility.
2011 - present	Three phases of investigation have taken place since 2011 to determine the source of VOC impacts in groundwater within the central portion of site. The first (November 2011) took place south of SWMU 18 and 22 where construction activities were planned. Upon further research into historic activities in the area, it was determined that the area was the former footprint of the Fluorocarbon production unit. Additional research was performed in 2012 to determine if other historic operations occurred in the area that may have also contributed to elevated VOCs. A second investigation (July 2012) was performed over a larger area that included membrane interface probe (MIP) and soil and groundwater sampling. The results of the 2011 and 2012 investigations indicated that the source of wide-spread VOC impacts to groundwater were likely associated with the former Fluorocarbon production unit and the associated raw material transfer and product packaging areas. Based on the results of the November 2011 and July 2012 investigations, a third investigation was initiated in March 2013 to further refine the potential source areas identified in 2011 and 2012 and collect data to support remedy design.
May 2012 - present	A focused groundwater investigation was completed at the southeastern property boundary to assess if concentrations above applicable screening levels were migrating offsite. Results are being evaluated.