# SIXTH FIVE-YEAR REVIEW REPORT FOR ALLIED CHEMICAL & IRONTON COKE SUPERFUND SITE LAWRENCE COUNTY, OHIO

**Prepared by**

**U.S. Environmental Protection Agency**
**Region 5**
**Chicago, Illinois**

9/10/2024

X Douglas Ballotti

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Signed by: DOUGLAS BALLOTTI

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## LIST OF ABBREVIATIONS & ACRONYMS

| | |
|---|---|
| AOC | Administrative Order on Consent |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COCs | Contaminants of Concern |
| CPLA | Coke Plant Lagoon Area |
| DNAPL | Dense Non-Aqueous Phase Liquid |
| EPA | United States Environmental Protection Agency |
| ESD | Explanation of Significant Differences |
| FS | Feasibility Study |
| FSA | Feasibility Study Addendum |
| FYR | Five-Year Review |
| GCL | Geosynthetic Clay Liner |
| GDA | Goldcamp Disposal Area |
| HDPE | High Density Polyethylene |
| ICs | Institutional Controls |
| IP | Induced Polarization |
| ICIAP | Institutional Control Implementation Action Plan |
| LLDPE | Low-Density Polyethylene |
| LSA | Lower Save-All |
| LTS | Long-Term Stewardship |
| µg/L | Micrograms Per Liter |
| NAPS | Non-Aqueous Phase Substances |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NPDES | National Pollution Discharge Elimination System |
| NPL | National Priorities List |
| O&M | Operation and Maintenance |
| OEPA | Ohio Environmental Protection Agency |
| OU | Operable Unit |
| PAH | Polynuclear Aromatic Hydrocarbon |
| PFAS | Per- and Perfluoroalkyl Substances |
| PRP | Potentially Responsible Party |
| PVC | Polyvinyl Chloride |
| RAO | Remedial Action Objectives |
| RCP | Reinforced Concrete Pipe |
| RD/RA | Remedial Design/Remedial Action |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| SGF | Solar Generating Facility |
| Site | Allied Chemical & Ironton Coke Superfund Site |
| TBC | To be Considered |

| | |
|---|---|
| UAO | Unilateral Administrative Order |
| UU/UE | Unlimited Use and Unrestricted Exposure |
| VIBI | Vegetation Index of Biotic Integrity |
| WWTP | Wastewater Treatment Plant |

## I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the Allied Chemical & Ironton Coke Superfund Site (Site). The triggering action for this statutory FYR was the signing of the previous FYR on 09/10/2019. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of three operable units (OUs): Goldcamp Disposal Area (GDA or OU1), Coke Plant/Lagoon Area (CPLA or OU2) and the Tar Plant (OU3). Remedies at all three OUs have been implemented and will be addressed in this FYR.

The Allied Chemical Ironton Coke Site Superfund Site FYR was led by Syed Quadri, Remedial Project Manager (RPM) for the EPA. Participants included David Wilson, Hydrogeologist for the EPA and Austin Tweedy of the Ohio Environmental Protection Agency (OEPA). OEPA and Honeywell Corporation, the Potentially Responsible Party (PRP) were notified of the initiation of the FYR. The review began on September 25, 2023.

### Site Background

The Site encompasses approximately 129 acres, including portions of the adjacent Ice Creek. The GDA is a 10-acre former sand and gravel pit that was used for disposal of Tar Plant waste and foundry sand. The CPLA is 91 acres and contained the former coke plant and five lagoon areas. CPLA is bordered on the south and east by Ice Creek. Near the southern end of Ice Creek, at the point where it empties into the Ohio River, lies the Village of Coal Grove. The former Tar Plant is 28 acres and consists of two parcels, the Main Parcel and the River Parcel, which are separated by an active railroad track. The Main Parcel contained the former Tar Plant Facility and is 16 acres. The River Parcel is 12 acres, seven acres of which are located in the Ohio River. Please refer to Figure 1 (Appendix B) for a Site Location Map. The Ohio River lies approximately 500 feet west of the former Tar Plant. Portions of the CPLA are within the 100-year flood plain. Much of the Site area is covered by a fill that overlies the native soils.

The Site is located in the southeastern section of Ironton and is surrounded by other industries, businesses, private residences, and waterways. The residential areas are northwest and along the southern edge of the Site. In addition to private homes, there is one elementary school and baseball diamonds along the northern boundary of the Site, and seven other schools within two miles of the Site.

The Village of Coal Grove's primary drinking water source is the Coal Grove well field. This well field is only 2,000 feet south of the Coke Plant area. In March 1988, volatile organic compounds (primarily trichloroethylene) were detected in one of these wells. This contamination was linked to another facility, the Tri-State Tank Cleaning facility.

Ironton extracts 1 to 2 million gallons per day from the Ohio River to meet its drinking water needs. Ironton's water intake is approximately 2 miles down-river from the Site. The Ohio River is also used by Honeywell for the discharge of treated groundwater and storm water associated with ongoing groundwater remedial actions. This discharge is allowed under a National Pollution Discharge Elimination System (NPDES) permit issued by OEPA.

## FIVE-YEAR REVIEW SUMMARY FORM

| **SITE IDENTIFICATION** | | |
|---|---|---|
| **Site Name:** Allied Chemical Ironton Coke Site | | |
| **EPA ID:** OHD043730217 | | |
| **Region:** 5 | **State:** OH | **City/County:** City of Ironton/Lawrence County |
| **SITE STATUS** | | |
| **NPL Status:** Final | | |
| **Multiple OUs?**<br>Yes | **Has the site achieved construction completion?**<br>Yes | |
| **REVIEW STATUS** | | |
| **Lead agency:** EPA<br>***[If "Other Federal Agency", enter Agency name]*:** | | |
| **Author name (Federal or State Project Manager):** Syed M. Quadri | | |
| **Author affiliation:** EPA | | |
| **Review period:** 9/25/2023 - 5/28/2024 | | |
| **Date of site inspection:** 12/12/2023 | | |
| **Type of review:** Statutory | | |
| **Review number:** 6 | | |
| **Triggering action date:** 9/10/2019 | | |
| **Due date *(five years after triggering action date)*:** 9/10/2024 | | |

## II. RESPONSE ACTION SUMMARY

### Basis for Taking Action

Numerous investigations and response activities have been conducted at various phases and parts of the Site since it was placed on the National Priority List (NPL) in 1983. These original investigations indicated the existence of groundwater contamination and its off-site migration, potentially posing a threat to human health and the environment. Various remedial investigations (RI) and feasibility studies (FS) were subsequently initiated by the EPA. The 4-acre GDA is a former sand and gravel pit, approximately 40 feet beneath the ground surface, which was used for the disposal of hazardous substances from the Tar Plant and the nearby coke plant. The groundwater contaminants of concern (COCs) are benzene, phenolics, naphthalene, polynuclear aromatic hydrocarbons (PAHs), cyanide, ammonia, sulfide and chloride. The only primary exposure pathway to human health was determined to be from present and future use of contaminated groundwater. It was determined that there is no risk from GDA to the public health from the air pathway or the recreational uses of the Ohio River.

The CPLA consists of the area occupied by the former Coke Plant batteries and processing facilities, the five lagoons, the groundwater beneath the Tar Plant area, and portions of Ice Creek (contaminated sediments). The Coke Plant and the Tar Plant included contaminated soil as a result of spillage from the operation of the Coke Plant and its related processing facilities. The Coke Plant COCs in groundwater, surface water, soil and lagoon sediments included: ammonia, cyanide, phenolics, sulphate and naphthalene, benzo(a)anthracene, benzo(a)pyrene, chrysene, and dibenzo(a,h) anthracene and benzene. Based on the risk assessment, it was determined that the exposure pathways were via the ingestion of contaminated site soils and wastes by humans and ingestion of contaminated groundwater. The COCs for the sediments of Ice Creek were phenolics and PAHs in the form of naphthalene, ammonia and cyanide. Based on the sample collection investigation of tumor occurrences in Ice Creek fish populations, it was determined that the concentrations of site-related contaminants present in the Ice Creek sediments does not have an adverse impact to fish. The COCs for Lagoons 1 through 4 were PAHs, ammonia, cyanide, phenolics, sulphate, benzene and arsenic. The COC for Lagoon 5 was very high concentrations of PAHs. Based on the Lagoon Materials Delineation program, which was performed to convert the lagoon areas 1-4 to a wetland ecosystem and a consequent reconnaissance ecological risk assessment it was concluded that the residual levels of PAHs in the lagoon area will not significantly impact the establishment of the wetland ecosystem for both the aquatic and vegetative communities.

### Response Actions

- Based on an Administrative Order on Consent (EPA, 1987) signed in March 1987 by EPA, OEPA and Allied a removal action was conducted for the removal of tanks and their contents located on the coke plant portion of the site.

- Following the completion of the GDA RI (Allied, 1986 and FS (EPA, 1988) in August 1988, the GDA Record of Decision (ROD) (EPA, 1988) was finalized on September 29, 1988, and a

Unilateral Administrative Order (UAO) (EPA, 1989) was completed on March 9, 1989, for the performance of the GDA Remedial Design and Remedial Action (RD/RA).

- During the FS, the discovery of non-aqueous phase substances (NAPS) near the bedrock below the GDA required (as per the ROD) that a supplemental NAPS RI/FS be performed to determine if the original ROD remedy would still be effective. The results of this supplemental investigation showed the original remedy to be protective, with requirements added for the expansion of the planned groundwater treatment system.

- The FS for the CPLA OU2 (Allied, 1990) was completed in July 1990. Prior to this, a UAO (EPA, 1987) was issued to Allied in March 1987 outlining the requirements for decontamination and demolition of the Coke Plant processing facilities. The bulk of this demolition work was subsequently performed by Allied during the late 1980s and early 1990s, prior to the start of remedial action construction activities. The CPLA ROD (EPA, 1990) was signed on December 28, 1990, followed by the issuance of a UAO (EPA, 1991) on July 1, 1991, for the performance of the CPLA RD (Honeywell, 1995)/RA (Honeywell 2002).

- Three subsequent ROD Amendments dated July 31, 1995 (EPA, 1995); September 4, 1997 (EPA 1997); and September 30, 1998 (EPA, 1998) provided modifications to the original CPLA ROD.

- Operations ceased and the Tar Plant was closed in December 2000. Contaminated groundwater had already been addressed by the groundwater pump and treatment system installed for the OU2 remedy. Contaminated soil beneath the former Tar Plant structures remained to be addressed under OU3. EPA and Honeywell International Inc. agreed to an Administrative Order on Consent (AOC) (EPA, 2003) on August 22, 2003, for Honeywell to perform an RI/FS (Honeywell, 2005) at the Tar Plant.

- The final RI report (Honeywell, 2007) for the Tar Plant was approved by the EPA in March 2007. The FS and the Feasibility Study Addendum (FSA) (Honeywell, 2007) were finalized in June 2007.

On September 20, 2007, the EPA finalized a ROD (EPA, 2007) for the cleanup at the former Tar Plant area. The OU3 remedy included a combination of sediment cap and dredging at the Ohio River, and a cap at the River Parcel and the Main Parcel of the Tar Plant. However, based on the OU3 Remedial Design study (Honeywell, 2013) completed in 2013, the dredging at the Ohio River was determined to be technically impracticable due to significant slope stability risks for the active railroad tracks along the riverbank. It was also determined to be cost prohibitive due to the extent of dredging involved. An Explanation of Significant Differences (ESD) (EPA, 2015) was completed to document this change to a capping only remedy on March 6, 2015. The cleanup levels for all the different media/OUs selected in the Decision Documents are provided in Appendix C, Attachment 4.

| OU | Remedial Action Objectives | Remedy Decision Date | Remedy Requirements |
|---|---|---|---|
| OU1 | While the ROD did not explicitly state the remedial action objectives (RAOs) to be attained by the remedy, the inferred objectives of the remedy are as follow: Containment and isolation of waste disposal area of source to the imminent threat and to minimize the continued spread of the contaminated groundwater plume. Groundwater contamination to be mitigated through extraction and treatment. | ROD September 29, 1988 | • Construction of a low permeability slurry wall encircling the GDA;<br>• Pumping to create an inward groundwater gradient within the slurry wall boundaries;<br>• Installation of a multi-media RCRA-compliant cap over the surface of the GDA;<br>• Treatment of groundwater extracted from inside and outside of the slurry wall at a new on-site treatment facility;<br>• Municipal water hook-up for in-plant potable and sanitary uses at Ironton Iron Inc.;<br>• Monitoring Site groundwater;<br>• Securing the Site from unauthorized personnel and implementation of deed restrictions; and<br>• NAPS investigation and implementation of the EPA approved remedy, if different than the present containment alternative. |
| OU2 | While the ROD did not explicitly state the RAOs to be attained by the remedy, the inferred objectives of the remedy are as follow: Implement a remedy to address groundwater and soil contamination through treatment and institutional controls. | ROD December 28, 1990<br><br>Three ROD amendments in July 31,1995; September 4, 1997; and September 30, 1998 | • Incineration of approximately 122,000 cubic yards of lagoon waste materials, and onsite reuse of the waste heat generated during incineration (Waste Fuel Recovery);<br>• *In-situ* bioremediation of approximately 457,000 cubic yards of lagoon waste material;<br>• Prepared-pad surface bioremediation of approximately 40,000 cubic yards of contaminated soil materials;<br>• Pumping and on-site treatment of groundwater;<br>• Monitoring of groundwater down gradient of Ice Creek and preparation of a contingency plan;<br>• Fencing, security, and deed restrictions; and<br>• Evaluation of the effectiveness of in-situ bioremediation, with a contingency for development of an alternative remedial action for Lagoons 1 through 4.<br><br>Additionally, the three ROD amendments required the following remedy modifications: |

| OU | Remedial Action Objectives | Remedy Decision Date | Remedy Requirements |
|---|---|---|---|
| | | | • Revised clean-up standards for benzo(a)pyrene and dibenz(a,h)anthracene in groundwater for the OUs 1 and 2;<br>• Excavation and storage on-site for eventual treatment or placement into the lagoon area of 135,000 cubic yards of soils found to be contaminated with low levels of PAHs during the design phase;<br>• Replaced prepared-pad bioremediation of 40,000 cubic yards of soil with off-site disposal in an approved landfill;<br>• Replaced in-situ bioremediation of 457,000 cubic yards of soil in Lagoons 1 through 4 with hot spot excavation and wetland development; and<br>• Replaced incineration of Lagoon 5 materials with recycling, treatment, and/or disposal of the KO87 listed waste in an approved off-site hazardous waste facility and the use of the remaining material, excluding debris, as an alternative fuel. |
| OU3 | RAOs for soil include:<br>• Prevent human ingestion/direct contact with soils containing PAHs that exceed applicable NCP and Ohio EPA management criteria for applicable exposure scenarios;<br>•<br>• Prevent exposure of terrestrial invertebrates to PAHs at concentrations harmful to them;<br>• Prevent exposure of worm-eating birds to PAHs in terrestrial invertebrates at | ROD<br>September 20, 2007<br><br>ESD<br>March 6, 2015 | The remedies selected in the OU3 ROD pertained to soil, sediment and vapor intrusion. The remedy for soil required:<br><br>• Construction of a solid waste cap (or cover) over all contaminated portions of the Tar Plant (16 acres Main Plant parcel and 7-acre River Parcel);<br>• Institutional controls (ICs) to protect the integrity of the cap; and<br>• ICs requiring health and safety measures to be implemented during any subsurface construction activities. |

| OU | Remedial Action Objectives | Remedy Decision Date | Remedy Requirements |
|---|---|---|---|
| | concentrations harmful to populations of worm-eating birds;<br>• Prevent exposure of predatory birds to PAHs at concentrations harmful to populations of predatory birds; and<br>• Reduce, to the extent practical, the leaching of contaminants in soil that may contribute to groundwater contamination<br><br>RAOs for sediment include:<br><br>• Prevent human direct contact with sediment containing PAHs that exceed applicable NCP and Ohio EPA criteria for future exposure scenarios; and<br>• Prevent benthic invertebrates from direct contact with sediment containing PAHs<br><br>RAOs for Vapor Intrusion include: | | The remedy for sediment selected in the OU3 ROD required:<br><br>• Removal of contaminated sediment using dredging techniques appropriate for the sediment and river conditions at the time of the work implementation;<br>• Implementation of turbidity control measures to ensure minimization of the migration of suspended solids;<br>• Evaluation of water from the de-watering of excavated sediment during RD;<br>• Disposal of sediment following dewatering in an off-site approved landfill; and<br>• Installation of an *in-situ* cap with either earthen materials (sand, gravel and/or cobbles), engineered materials (geosynthetics or marine mattresses) or a combination of these materials to be determined during the design phase.<br><br>The 2015 ESD requires a capping-only remedy for the Ohio sediments instead of capping and dredging remedy required in the 2007 ROD. |

| OU | Remedial Action Objectives | Remedy Decision Date | Remedy Requirements |
|---|---|---|---|
| | • Prevent inhalation of vapors in indoor air in possible future buildings in excess of NCP and Ohio EPA risk criteria. Risks currently are driven by benzene; and<br>• Prevent inhalation of vapors by construction workers during any future grading and/or excavation activities. Risks currently are driven by benzene, toluene, and naphthalene. | | The remedy for vapor intrusion selected in the OU3 ROD required:<br>• An IC Implementation plan.<br>• ICs requiring the use of vapor barriers and/or sub-slab ventilation systems in any new construction buildings on the Tar Plant Property. |

**Status of Implementation**

Summary of OU1 Construction Activities:

Remedial construction activities at the GDA began in July 1993 after completion of the RD. Construction of the perimeter barrier was accomplished between 1993 and 1994. The wells were constructed in 1994 and the cap, groundwater extraction system, and other general construction activities occurred between 1994 and 1995. In addition, during the early stages of the RA, an alternative water supply was provided to Ironton Iron Inc. Work included construction of a soil-bentonite perimeter barrier (slurry wall) to enclose the capped GDA wastes.

A permanent cap was constructed over the Site, which incorporated a geosynthetic clay liner to minimize future exposure of the buried waste and minimize infiltration. The cap included a passive gas venting system with capabilities for adding an emissions control system in the future, if needed.

Groundwater pumping wells were installed inside the slurry wall (PW-3 and PW-4) to maintain an inward hydraulic gradient. Groundwater pumped from inside the GDA slurry wall is being treated in the on-site Wastewater Treatment Plant (WWTP). Groundwater pumping wells were also installed outside the slurry wall (PW-1 and PW-2) to intercept and withdraw contaminated groundwater.

Groundwater pumped from outside the GDA slurry wall is treated in the on-site WWTP and discharged in compliance with the NPDES permit. Perimeter security fence was constructed around OU1 to

prohibit trespassing. Final inspection (EPA, 1995) of the OU1 remedy was conducted on August 2, 1995.

Summary of OU2 Construction Activities

EPA and Allied entered into an AOC (EPA, 1987) in March 1987 requiring Allied to dismantle and decontaminate the Coke Plant processing facilities. Although actual construction activities in support of the Bioremediation and Groundwater components were initiated in early 1996, preliminary Site preparation and characterization work was performed by Honeywell during 1994-1995, in parallel with the finalization of the OU2 design. Additionally, construction of the CPLA Stormwater Collection/Management System was completed in 1995 following the March 1995 issuance of the CPLA Stormwater Pollution Prevention Plan (Honeywell, 1995).

Construction of the in-situ bioremediation system began in July 1996. Due to difficulties with the excavation process, EPA amended the ROD (EPA, 1998) in September 1998 (Amendment 3) to reflect the change in the lagoon area remedy. The construction of the erosion control measures was completed in 2002. The annual monitoring program was conducted from July 2002 - 2013.

OEPA's Vegetation Index of Biotic Integrity (VIBI) Assessment field work was performed at the OU2 lagoons in August 2014 to determine the re-establishment of the wetland/floodplain community. The VIBI Assessment Report (Honeywell, 2014) was submitted in November 2014. The VIBI results suggested that the re-establishment of vegetation was progressing well, however, there was a need for some remedial work in emergent areas. Consequently, first and second invasive control applications were applied in July 2015 and July 2016, respectively. In addition, soil amendments and planting activities were conducted in April 2016. More soil amendments were implemented and another VIBI assessment was completed in August 2019. The 2020 OU2 VIBI Assessment Report (Honeywell, 2020) concluded that the VIBI score has significantly improved, and the lagoon area continues to function as designed as a natural wetland community and floodwater storage of the Ice Creek and Ohio River.

Summary of OU3 Construction Activities

Construction activities on the River Parcel took place from February 2014 through November 2014. The Site was prepared for project construction activities with temporary measures including the installation of erosion and sedimentation controls, construction entrances, decontamination pads, material staging pads, and site access roads in accordance with best management practices.

The Lower Save-All (LSA) was a concrete oil-water separator type structure located on the River Parcel at the top of the riverbank. A total of eight monitoring wells were abandoned on site by pressure grouting. Protective casings were removed and polyvinyl chloride (PVC) well casings were pulled. Wells were sealed by grouting to within 1 foot of the final subgrade elevation.

Once storm water from the Main Parcel was prevented from entering the LSA, the existing outfall structures (Outfall 001 and Outfall 002) were modified to allow for the future direct discharge of storm water from the Main Parcel storm sewer system to the Ohio River. The existing outfall structures included existing manholes (EMH1 and EMH2) and reinforced concrete pipe (RCP) that went

underneath the Norfolk Southern railroad tracks.

Both existing outfall structures contained abandoned process piping, and Outfall 001 had characteristically hazardous tar along the bottom of the RCP. Four new manholes were installed on the River Parcel, along with new 30-inch diameter high density polyethylene (HDPE) piping, which was installed through the existing RCP.

The WWTP outfall, designated as Outfall 001 under NPDES permit number 01F00014LD, was relocated from discharge in the Ohio River near the former LSA structure to discharge at the south property boundary.

The length of the riverbank at the soil and sediment interface was stabilized by the installation of Polymeric Marine Mattresses and rip rap mixed with soil and planted with live stakes.

Three separate subaqueous sediment caps were installed in accordance with the specifications and design drawings to cover a total of 2.3 acres. Prior to placement of the sediment caps, buttress material with a gravel toe berm was placed in portions of the capping area where the existing slopes were over-steepened to maintain a stable slope. Cap placement was generally sequenced by placing material from the bottom of the slope to the top of the slope and from upstream to downstream. A baseline multi-beam bathymetric survey was conducted prior to capping activities. Verification multi-beam bathymetric surveys occurred following the placement of each layer of the cap to check for material thicknesses.

A soil cover was installed on the upland portion of the River Parcel to prevent direct contact with affected soils by humans and potential ecological receptors. Construction was completed in phases to minimize the amount of soil exposed at one time. A gravel access road and gate were installed in a relatively flat area near the top of slope just above the 10-year flood elevation (approximate elevation of 535 feet).

Main Parcel Construction Activities

Construction activities on the Main Parcel were conducted between March 2015 and December 2015. Due to the construction at the Main Parcel, temporary office trailers, parking, and equipment staging was established on GDA, located adjacent to the Site.

A total of 51 monitoring wells and one pumping well were abandoned by pressure grouting. Protective casings were removed and PVC well casings were pulled. Wells were sealed by grouting to within 1 foot of the final subgrade elevation.

Concrete removed from demolition and excavation activities was stockpiled and separated from other waste materials, such as rebar. Oversized concrete was downsized to approximately 12- inches in diameter, mixed with soil and spread out under the cover system to avoid large void spaces which could settle in the future.

The geosynthetic clay liner (GCL) and low-density polyethylene (LLDPE) liner were installed in phases,

starting at the crown of the cover and proceeding northwest. A storm sewer system was installed around the perimeter of the Main Parcel with two main lines of the system traversing across the Site for eventual discharge to the Ohio River.

A gas venting system was installed beneath the cover system on the Main Parcel to prevent the unlikely buildup of gas. Soil gas monitoring probes were installed around the perimeter of the Site on an approximate 400 foot spacing with screens set at approximately 10 feet, 25 feet, and 40 feet below grade.

The GCL and LLDPE were installed in phases, starting at the crown of the cover and proceeding northwest. Only enough GCL was installed in a day that could be covered by the LLDPE liner. Installation of the CGL and LLDPE took place between August and October 2015.

On August 24, 2020, the EPA removed portions of the site from the NPL. This Partial Deletion for the Allied Site (EPA, 2020) from the NPL pertains to the soil (land) portion of the Goldcamp Disposal Area (OU1); the soil (land) and lagoon portion of the Coke Plant/Lagoon Area (OU2), except for the OU2 ROD Soils Area 2 located within the bermed area of the East Tank Farm; and all of the Tar Plant area (OU3), which addresses contaminated soil and sediment at the Tar Plant and in the adjacent Ohio River. The OU2 ROD Soils Area 2 located within the bermed area of the East Tank Farm contains components of the groundwater treatment system and will not be remediated until after the groundwater cleanup is complete. The contaminated groundwater at the Site, which is present below all three OUs but is being addressed as part of the OU1 and OU2 cleanup remedies, is undergoing a long-term cleanup and is not considered for deletion. The OU2 ROD Soils Area 2 and the groundwater portions of the Site (i.e., the groundwater portion of OU1 and OU2, which includes the contaminated groundwater below OU3) will remain on the NPL.

**Institutional Controls**

ICs are required by the 1988, 1990 and 2007 RODs. They serve as a protectiveness measure to be used in concert with the containment and active treatment methods to restrict property use, maintain the integrity of the remedy, and assure the long-term protectiveness for areas which do not allow for UU/UE. The 1989 and 1991 UAOs and 2010 CD made the ICs a binding requirement on the Allied Settling Defendants. A summary of the implemented ICs for the Site is listed in the ICs Summary Table below.

**Table 2: ICs Summary Table**

| Media, engineered controls, and areas that do not support UU/UE based on current conditions | ICs Needed | ICs Called for in the Decision Documents | Impacted Parcel(s) | IC Objective | Title of IC Instrument Implemented and Date (or planned) |
|---|---|---|---|---|---|
| ***OU1 Goldcamp Disposal Area (OU1) Property (On Site)*** – Part of containment area consisting of approximately 8.5 acres of Landfill Cap/Slurry Wall (see Figure 2, ID # 18) | Yes | Yes | 36-042-0100.001 | -Isolation and containment of the waste pit and non-aqueous phase substance/prohibit consumption of groundwater/prevent residential exposure.<br>-Prohibit activities interfering with the remedy (slurry wall and cap, groundwater extraction and treatment)<br>-No residential activities/no consumptive or other use of groundwater | Environmental Covenant recorded with the Lawrence County Recorder's office on September 14, 2018. |
| ***OU1 Goldcamp Disposal Area (OU1) Property (On Site)*** – Approximately1.5 acres of Area of Contamination with Groundwater outside OU1 Landfill Cap/ Slurry Wall (see Figure 2, ID # 22 & 23) | Yes | Yes | 36-042-0100.002 & 36-042-0100.003 | Commercial/Industrial Activities Uses only.<br>-Prohibit consumption of groundwater<br>-Prohibit food chain products manufacturing, processing and warehousing.<br>-Prohibit residential and other activities including schools, hospitals, assisted living, day care facilities, food stores, restaurants, indoor and outdoor entertainment and recreational facilities. | Environmental Covenant recorded with the Lawrence County Recorder's office on September 14, 2018. |

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| ***Coke Plant Lagoon Area (OU2) Property (On Site)*** – Approximately 95 acres of 9 (see Figure 2, ID # 1 through 17) | Yes | Yes | 29-050-0200.000; 36-042-0300.000; 36-042-0300.001; 36-042-0300.008; 36-042-0300.012; 36-042-0300.006; 36-042-0300.009 36-042-0300.003; 36-042-0300.005; 36-042-0300.010; 36-042-0300.016; 36-042-0300.015; 36-042-0300.013; 36-042-0300.014; 36-042-0300.002; 36-042-0300.004 & 36-042-0300.011 | -Prohibit consumption of groundwater<br>-Prohibit residential/recreation exposure<br>-Prohibit future use that is incompatible with remedial actions in place including residential use<br>-Prohibit interference with remedy<br>-Ensure proper maintenance. | Environmental Deed Restrictions shown on a survey plat recorded with the Lawerence County (Ohio) Recorder Office on August 22, 2002, in Plat Book 10/Page 181 |
| ***Tar Plant Area – Main Parcel (OU3) Property (On Site)*** – Approximately 16 acres Landfill Cap (see Figure 2, ID # 19) | Yes | Yes | 36-042-0100.000 | - Prohibit residential use. Can be used solely for commercial/industrial activities.<br>-Prohibit future use that is incompatible with remedial actions in place<br>-Prohibit interference with remedy. | Environmental Covenant recorded with the Lawrence County Recorder's office on September 14, 2018. |

| | | | | | |
|---|---|---|---|---|---|
| ***Tar Plant Area – River Parcel (OU3) Property Consisting of Coastal Land and Capped Area of Sediments (On Site)*** – Approximately 12 acres of Landfill Cap and Sediment Cap (see Figure 2, ID # 20) | Yes | Yes | 36-042-0100.000 | -Prohibit activities interfering with the remedy (soil cover/riverbank restoration and sediment cap)<br>-To be used solely for commercial/industrial activities use only and prohibit usage for residential activities.<br>-Prohibit consumption of groundwater. | Environmental Covenant recorded with the Lawrence County Recorder's office on September 14, 2018. |
| ***Off-Site Property Sediment Cap at the Ohio River – (OU3))*** – Approximately 0.19 Acre Sediment Cap (see Figure 2, ID # 21) | Yes | Yes | 36-042-0100.003 | -Prohibit any activity that would interfere with or adversely affect the integrity of the remedial action<br>-Prohibit any drilling, dredging, and/or vessel anchoring on the property. | Environmental Covenant recorded with the Lawrence County Recorder's office on September 26, 2018. |
| ***Groundwater impacted by Site*** | Yes | Yes | All Site Parcels | -Prohibit installation of drinking water wells | City of Ironton Municipal Code 104.35.2013 (City Ordinance Prohibiting Installation of Drinking Water Wells) |

Notes: The Owner Settling Defendants include Honeywell International, Inc. Other owners, who are not considered as Settling Defendants are identified on Figure 2, (Appendix B) Site Layout Map.

A map showing the area in which the ICs apply is included in Figure 2 (Appendix B).

Status of ICs and Follow-up Actions Required: All institutional or other controls required in the ROD or identified as part of the response action to help ensure long-term protection are in place and effective. Honeywell's contractor has prepared an Institutional Control Implementation Action Plan (ICIAP) (EPA, , which was finalized in April 2019. The Updated ICIAP was revised and finalized in February 2020. The Updated ICIAP provides complete inspections, reports, and maintenance activities so that it can be 2019) used to demonstrate that the required institutional controls for the site are maintained and monitored on a regular basis. Based on the updated ICIAP, a site-wide Operations Maintenance and Monitoring (OM&M) Manual (Honeywell, 2022) was updated and revised in July 2022 to provide operator's IC guidance for inspections, reports, maintenance activities, upkeep of security fencing and signage at the perimeters of OU1, OU2 and OU3. This OM&M Manual also includes procedures for

quarterly groundwater monitoring, monthly collection of Site-Side groundwater levels, mowing and grounds keeping and continued compliance with Ohio EPA NPDES Permit for effluent discharge. If it is determined that additional ICs are needed, EPA will be immediately notified.

Current Compliance: Based on the FYR Site inspection, EPA is not aware of Site or media uses which are inconsistent with the stated objectives to be achieved by the ICs. All ICs are effectively in place, and the remedy appears to be functioning as intended.

Long-Term Stewardship (LTS): Since compliance with ICs is necessary to assure the protectiveness of the remedy, planning for LTS is required to ensure that the ICs are maintained, monitored and enforced so that the remedy continues to function as intended. As discussed above, the Updated ICIAP provides complete inspections, reports, and maintenance activities so that it can be used to demonstrate that the required ICs for the site are maintained and monitored on a regular basis. An annual report is submitted to EPA to demonstrate that the Site is inspected to ensure no inconsistent uses have occurred; that ICs remain in place and are effective; and that any necessary contingency actions have been executed. Results of IC reviews are provided to EPA in an annual ICs report and with a certification that the ICs remain in-place and are effective.

**Systems Operations/Operation & Maintenance**

O&M is performed by the PRP under EPA oversight at the following areas within the Site:

- Groundwater monitoring for OU1 (GDA) and OU2 (CPLA) and Ice Creek.
- O&M activities for OU3 (Tar Plant River Parcel and Main Parcel).

The GDA groundwater monitoring is performed in accordance with the GDA Remedial Action Monitoring Plan (April 1994), while the CPLA groundwater monitoring and Ice Creek monitoring is done in accordance with the general protocols outlined in the CPLA Groundwater Compliance Sampling and Analysis Plan (December 1995). The O&M for OU1, OU2 and OU3 (Tar Plant River Parcel and Main Parcel) activities such as operating, maintaining, and monitoring are performed in accordance with the "Operation, Maintenance and Monitoring Manual" (June 21, 2021).

The O&M program includes comprehensive groundwater monitoring, potentiometric monitoring, chemical analysis, NPDES discharge monitoring, site inspection and any necessary repairs. The groundwater monitoring program includes monitoring of groundwater levels to assess containment of the GDA waste as well as the site-wide hydraulic control, and monitoring for the presence of non-aqueous phase substances (NAPS)/dense non-aqueous phase liquids (DNAPL) groundwater levels. This manual also provides information associated with the Site's net-metered Solar Generating Facility (SGF) installed in late 2021.

In July 2023, Honeywell requested EPA to add WSP Global Inc. (Parsons) as a new Supervising Contractor to implement the Operation Maintenance and Monitoring activities at the Site. This request indicated that Parsons will be Honeywell's first point of contact for issues related to performance of the O&M and monitoring Plans. This request, however, does not modify, amend or otherwise alter the terms and conditions of any obligations or liabilities that Honeywell has, or will assume in the future, to

the EPA or the United States. Pursuant to Paragraph 10 of the 2010 Consent Decree, on August 22, 2023, the EPA issued authorization to proceed on Honeywell's request to designate Parsons as the Supervising Contractor for implementation of the O&M and monitoring plans.

## III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

**Table 3: Protectiveness Determinations/Statements from the 2019 FYR**

| OU # | Protectiveness Determination | Protectiveness Statement |
|---|---|---|
| 1 | Short-term Protective | The OU1 remedy currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU1 area have been addressed through containment and isolation of the Goldcamp Disposal Area to minimize the continued spread of the contaminated groundwater plume along with groundwater extraction and treatment. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Complete and implement the ICIAP, and LTS procedures from the approved ICIAP must be incorporated by amending the O&M plan for OU1. |
| 2 | Short-term Protective | The OU2 remedy currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU2 area have been addressed through incineration and in-situ bioremediation of waste material along with on-site groundwater extraction and treatment. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Complete and implement the ICIAP, and LTS procedures from the approved ICIAP must be incorporated by amending the O&M plan for OU2. |
| 3 | Short-term Protective | The OU3 remedy currently protects human health and the environment. Exposure pathways that |

| | | |
|---|---|---|
| | | could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU3 area have been addressed through the construction of caps over all the contaminated portions of the OU3 areas. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Complete and implement the ICIAP, and LTS procedures from the approved ICIAP must be incorporated by amending the O&M plan for OU3. |
| Sitewide | Short-term Protective | The remedy at the Site currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedies are operating as expected. Sitewide threats have been addressed through waste containment (using slurry wall and caps), isolation, incineration, in-situ bioremediation, and on-site groundwater extraction and treatment. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Complete and implement the ICIAP, and LTS procedures from the approved ICIAP must be incorporated by amending the O&M plans for OUs 1, 2 and 3. |

**Table 4: Status of Recommendations from the 2019 FYR**

| OU # | Issue | Recommendations | Current Status | Current Implementation Status Description | Completion Date (if applicable) |
|---|---|---|---|---|---|
| 1, 2 & 3 | A review of Site ICs is needed to assure that the remedy continues to function as intended and to ensure that effective procedures are in place for long-term stewardship of the Site. Procedures should be developed and implemented to ensure that implemented ICs | Complete and Implement the ICIAP | Completed | The ICIAP was completed and finalized on March 11, 2019. It was updated and revised on March 5, 2020. | March 11, 2019 |

| | | | | | |
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| | are effective and properly maintained, monitored, and enforced. | | | | |
| 1, 2 & 3 | Procedures are not in place to ensure LTS of ICs at the Site. | LTS procedures from the approved ICIAP must be incorporated by amending the O&M plans for OUs 1, 2, and 3. | Completed | The OM&M Manual was updated to incorporate LTS procedures and finalized July 2022. | July 21, 2022 |

## IV. FIVE-YEAR REVIEW PROCESS

### Community Notification, Involvement & Site Interviews

A public notice regarding the FYR process was published in the EPA Public Notice website and on the EPA Allied Chemical & Ironton Coke Site webpage (www.epa.gov/superfund/allied-chemical-ironton) for public review on February 8, 2024 (see Appendix C, Attachment 1). The public notice notified the community about the public comment period (February 8, 2024, through August 10, 2024) and provided an opportunity to submit comments. No public comments regarding the FYR were received. The results of the completed sixth FYR Report and background data will be available on the EPA Allied Chemical & Ironton Coke Site webpage for public viewing, and a notice of the FYR completion will be sent to the Site information repository located at Briggs Lawrence County Public Library, 321 S. 4th St., Ironton, Ohio.

During the FYR process, EPA's Community Involvement Coordinator for the Site accompanied the RPM on a Site tour and Site inspection on December 12, 2023. Community interviews were not conducted for this FYR due to the low number of public inquiries and questions that the EPA received about the Site in the year prior to the FYR and throughout the FYR process. During the FYR process, questions and other correspondence were exchanged during the Site inspection, by electronic mail and telephone calls with OEPA and the contractor performing the Site work for the PRPs. The purpose of correspondence and discussions were to document the status of the Site along with any perceived problems or successes with the implemented remedy.

### Data Review

This FYR report summarizes the monitoring data collected during this FYR period for the GDA and CPLA OUs 1, 2 and 3 for the Site. Groundwater monitoring has been occurring at the Site since 1994. Groundwater monitoring program parameters for GDA include benzene, benzo(a)pyrene, naphthalene, phenolics, ammonia and cyanide. For CPLA/Ice Creek, the groundwater monitoring parameters include

benzene, PAHc (combined totals of benzo(a)pyrene and dibenzo(a,h)anthracene, naphthalene, phenolics, arsenic, ammonia, cyanide and nitrate.

**GDA GROUNDWATER CONTAINMENT PROGRAM EVALUATION**

Monthly groundwater elevation measurements are obtained from the following 35 wells: Six groundwater monitoring wells located within the GDA containment wall: Five groundwater monitoring wells (MW-19, OW-4, OW-5, OW-6, and OW-8) and one inactive groundwater extraction well (PW-3). Twenty-six groundwater monitoring wells located outside the containment wall, both on and off the GDA site: two inactive groundwater extraction wells (PW-1 and PW-2); 16 groundwater monitoring wells that consist of: MW-2, MW-3, MW-9, MW-12, MW-20, MW-21, MW-22; OW-1, OW-3 and OW-7; RW-1, RW-2 and RW-3; and FPW-1; II MW located off-site MW-29 located on the Ergon Facility site. Four NAPS monitoring wells (NMW-1A, NMW-1B, NMW-2, and NMW-3); two inactive former production wells (IIC-2 and IIC-7); two piezometers located adjacent to the two active extraction wells (PZ-1A and 2A).

**CPLA GROUNDWATER CONTAINMENT PROGRAM EVALUATION**

The CPLA groundwater hydraulic control evaluation program consists of monthly measurements of groundwater levels within the following 44 monitoring wells: 20 wells located within the CPLA area: 15 monitoring wells (C-1, C-2, C-3, C-4, C-5, C-6, C-7, and C-8; and MW-4, MW-15, MW-16, MW-23, MW-28, MW-46S and MW-46D); four piezometers (PZ-2401, PZ-2425, PZ-2427, and PZ-2428); one inactive extraction well (WE-2426). Ten wells located within the Tar Plant area: One inactive extraction well (WE-617), four monitoring wells (MW-17, MW-52S, MW-53S, and MW-57S); two piezometers (PZ-5 and PZ-6) and three active extraction wells (PW-5, PW-6 and WE-618). Ten monitoring wells located off-site of the CPLA and Tar Plant areas (MW-11, MW-13, MW-14, MW-25, MW-26, MW-27, MW-61S, MW-62S, MW-63S and MW-64S); Four active groundwater extraction wells (WE-2401, WE -2425, WE -2427 and WE -2428).

**NAPS MONITORING**

During the groundwater level measurement program, six monitoring wells located on GDA or immediately west-northwest of GDA were checked for the presence of NAPS or free product. These monitoring wells are OW-7, FPW-1, NMW-1A, NMW-1B, NMW-2, and NMW-3 (see Figures 4 through 9). No NAPS were observed in these monitoring wells during this FYR period. It should be noted that NAPS were not observed in these wells since 2012.

**GROUNDWATER CONTAINMENT PROGRAM EVALUATION**

GDA's containment area and the groundwaters of the CPLA are adjacent to each other, and all the groundwater monitoring presents one groundwater contour map that depicts one continuous area of capture for both the GDA and the CPLA. Historically the Site groundwater extraction pumping rates were typically maintained above 330 gallons per minute (gpm), however the rates lowered to 250 gpm over the years and currently the pumping rate is down below 200 gpm. The total Site-wide

groundwater pumping rate on April 5, 2023, was approximately 194 gpm. Historically when the pumping rates exceeded 300 gpm, the designated area of capture appeared to be sufficiently large enough to be able to capture the contaminant plume target area. The pumping rate has a direct effect on the extent of capture. The current reduced rate of pumping does not appear sufficient to capture the current contaminant target area. There are several wells with contaminant exceedances that no longer appeared to be within capture zones. See Figure 3 (Appendix B). However, historically these locations appeared to be captured. Also, it is most likely that due to reduced rates of pumping and loss of capture, there are several wells which previously had achieved Groundwater Cleanup-Goals, that now indicate exceedances of Cleanup-Goals or increases in contaminant concentrations. The PRP is planning to install an additional extraction well (PW-7) in the southwest portion of the eastern parcel of the OU-3. This will affect the capture zone and the COC impacted groundwater migrating off-site. The work plan for this extraction well is being reviewed by EPA and OEPA. Although there are no downgradient private wells in the immediate vicinity of Site and there are no human health protectiveness issues in the short term, the continued lack of hydraulic containment in the long term will need to be evaluated.

Because of years of groundwater pumping and treatment in the GDA, Well FPW-1 had achieved the GDA Groundwater Clean-Up Goals for ammonia, naphthalene, benzene, and PAHc by year 2005. The Clean-Up Goals were maintained for seven years until year 2012. After 2012 the rates of groundwater extracted was reduced, and Well FPW-1 started again to exceed the Groundwater Clean-Up Goals for ammonia, naphthalene, benzene, and carcinogenic PAH (PAHc). The well adjacent to FPW-1, Well OW-7 has had a significant number of exceedances of benzo(a)pyrene that has a 0.2 micrograms per liter (µg/L) GDA Clean-Up Goal. Although the Site's capture zone as depicted in the Quarterly Groundwater Monitoring Reports may have historically extended to Well FPW-1 and OW-7's location (2010 and prior), the well's location is outside of the current area of hydraulic capture. See Figure 3 (Appendix B). Contaminated groundwater leaving the Site is not being captured. Each contaminant with exceedances at Well FPW-1 is discussed below (see Figures 4-9 in Appendix B).

**Ammonia:** In the past five years 2017-2023 Well FPW-1 has had at least 11 exceedances of the 0.5 mg/L ammonia GDA Clean-Up Goal. Prior to year 2012 (2005 until 2012,) there were no exceedances of the ammonia GDA Clean-Up Goal.

**Naphthalene:** In the past five years 2017-2023 Well FPW-1 has had at least 11 exceedances of the 690 µg/L naphthalene GDA Clean-Up Goal. Prior to year 2012 (2005 until 2012,) there were no exceedances of the naphthalene GDA Clean-Up Goal.

**Benzene:** In the past five years 2017-2023 Well FPW-1 has had at least nine exceedances of the 5 µg/L benzene GDA Clean-Up Goal. Prior to year 2012 (2005 until 2012,) there were 10 exceedances of the benzene GDA Clean-Up Goal.

**PAHc:** In the past five years 2017-2023 Well FPW-1 has had at least nine exceedances of the 0.5 µg/L PAHc GDA Clean-Up Goal. Prior to year 2012 (2008 until 2012,) there were no exceedances of the 0.5 µg/L PAHc GDA Clean-Up Goal.

The CPLA well MW-11 has had four recent CPLA Clean-Up Goal exceedances for arsenic in the past five years 2017-2023. Starting around year 2016 there appears to be a significant increase in arsenic concentrations. Prior to year 2020, there had not been an exceedance of the CPLA Clean-Up Goal of 50 µg/L for arsenic. Although the depicted capture zone may have historically extended to Well MW-11's location (2010 and prior), the well's location appears to be outside of the current area of hydraulic capture. See Figure 3 (Appendix B). Arsenic impacted groundwater leaving the Site is not being captured.

For the past five years (2017 to 2023), the CPLA well MW-23 has had 10 groundwater benzene exceedances of the 5 µg/L CPLA Clean-Up Goal. Historically this well had a continuous decreasing concentration trend for Benzene from 1997 to 2017. However, since 2018 the benzene concentration trend has not been decreasing. Although the capture zone may have historically (2010 and prior) extended to Well MW-23's location, the well's location appears to be outside of the current area of hydraulic capture. See Figure 3. Benzene impacted groundwater leaving the site is not being captured.

**GROUNDWATER SAMPLING DATA ANALYSIS**

Groundwater analytical sampling data is used to help determine the effectiveness of the groundwater capture system. Currently there are only a limited number of wells within the groundwater sampling program that are located along the long groundwater divide line that depicts the downgradient extent of hydraulic capture. See Figure 3 (Appendix B). This limits the use of groundwater contaminant monitoring data to use multiple lines of evidence to assess the effectiveness of the groundwater capture system. There are, however, many existing groundwater monitoring wells that are being measured for groundwater elevations that are located along the line of the extent of hydraulic capture. Because of the apparent lack of hydraulic containment of contaminated groundwater along the Ohio river from the GDA OU1, across the northwestern edge of the Tar Plant and southeast side of the CLPA OU2, these additional monitoring wells can be used to help determine the effectiveness of the groundwater capture system.

**DNAPL Recovery Conceptual Site Model**

The DNAPL Recovery program has been able to extract over 33,000 gallons of DNAPL. However, the 2007 RI geophysical investigation found within an approximant 121,000 square foot center source area footprint, that the depth of DNAPL ranged from 4.25 feet to 1 foot, with a few locations showing trace amounts. Ten locations out of twelve locations, had DNAPL at least one foot thick and seven locations had DNAPL thickness of more than two-feet thick. Based on the 33,000 gallons of DNAPL pumped out over 22 years, the system has removed less that 0.5 of an inch of pooled DNAPL. Compared to the remaining DNAPL source at Allied, both at the Tar Plant as well as at the GDA, very little DNAPL has been removed to date. The Conceptual Site Model concerning the location, the amount, and any transport of DNAPL needs to be updated because of existing data gaps.

Most of the DNAPL removed to date comes from wells northwest of the area that have been explicitly studies for DNAPLs. Missing from DNAPL analysis was DNAPL from well WE-618 and PW-1A. Well WE-618, a Tar Plant Well, has turned out to be the most significant source of DNAPL. Almost half of all DNAPL pumped from Allied to date, comes from well WE-618. A third of all DNAPL pumped from Allied

to date, comes from the northwest end of the GDA well PW-1A. Therefore, the two locations where three quarters of the 32,962 gallons of NAPL pumped to date have had limited DNAPL studies.

The 2012 Final Pre-Design Report (Honeywell, 2012) included a limited Tar and Sheen Assessment that delineated the vertical distribution of contamination. It predicted that tar and sheen occurred within the three to five-foot layer of cobbles along much of the bedrock surface underneath the Ohio River. Four concurrent cross sections across the river showed significant Tar within the cobble zone extending from the Tar Plant to under the Ohio River at the northwestern end of the Tar Plant assessment area. These four concurrent cross sections (labeled C-C" to F-F") clearly show a contaminant pathway from the number of mapped DNALP pools under the Tar Plant migrating under the Ohio River. The significant pumpable DNAPL area adjacent to the GDA was not included in limited Tar and Sheen Assessment.

Bedrock Surface Topography: Long narrow depressions in the top of bedrock surface may provide pathways for DNAPL to flow under the Ohio River. The aerial extent of DNAPL pools on the bedrock surface appears likely to be much greater than shown in the 2007 RI. However, the geological processes that carved the bedrock depressions were not incorporated into the geostatistical method used to depict the bedrock surface topography. Long narrow low elevation pathways are likely associated with the significant buried channel system cut into bedrock under the present-day Ice Creek likely connect the many depressions and extend under the Ohio River.

Possible contaminant pathway in bedrock: The Conceptual Site Model assertion of an impenetrable bedrock surface providing a vertical migrations barrier for DNAPLs, and dissolved contaminants, preventing any contaminant flow and transport through the bedrock needs to be updated due to existing data gaps. Only general textbook descriptions concerning bedrock characteristics were provided in the 2007 RI. There was no Site-specific bedrock well boring information depicting the extent of possible groundwater transport within the bedrock sandstone and shale formations There was no Site-specific data on the occurrences and extent of bedrock joints, fractures, openings along bedding planes, and other secondary porosities. There were no hydraulic conductivity measurements throughout the vertical extent of bedrock. There were no groundwater monitoring wells installed. There were, however, several Site-specific geologic technical descriptors of the top of bedrock that included very broken, moderately weathered, thinly bedded, very soft, and complete loss of drilling fluid. These geotechnical bedrock descriptors are often associated with zones of increased hydraulic conductivity.

Groundwater in the bedrock formations occurs primarily in joints, openings along bedding planes, and other secondary openings. The 2007 RI geophysical investigation stated as interpretation of the Induced Polarization (IP) data suggests the potential geophysical IP anomalies in the bedrock that may indicate contaminated groundwater has migrated over 100 feet into the bedrock formation, and the Resistivity Results suggested that there are low resistivity/high permeability zones deep into the bedrock formation that were suspected to be the primary contaminant conduits. This geophysical finding of DNAPLs potentially migrating within bedrock was never followed up with further investigation of possible contaminant flow and transport within the bedrock. An Other Finding has been included in the FYR to further evaluate the site conceptual model and determine if bedrock underlying the site needs additional investigation.

**Site Inspection**

The inspection of the Site for the FYR was conducted on 12/12/2023. In attendance were Syed Quadri, EPA; Adrian Palomeque, EPA; Austin Tweedy, OEPA; Peter Scharfschwerdt, Parsons; Paul Roth, Parsons; and Patrick Holmes, Parsons. The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access, the integrity of the landfill cap, and general conditions of the Site.

A walk was taken around the surface of the GDA landfill, Main Parcel and the River Parcel. A drive through was done for the CPLA and lagoon areas. The following statements summarize the main topics covered during the inspection:

- No concerns or issues were observed at the GDA and the Tar Plant Main Parcel/River Parcel Landfill cover/containment cap. They appeared to be in good physical condition. This is reflective of monthly reports and a previous Site inspection conducted by OEPA and EPA.
- Site fencing was intact and appeared to be in good condition. Signs were in good condition. It was noted during the Site inspection that there was a need for a sign on the River Parcel area notifying that "No Swimming, Fishing, or Boating" was allowed. This sign was subsequently posted at the River Parcel embankment and a photo of the posted sign was sent through an email from Peter Scharfschwerdt to Syed Quadri on January 26, 2024 (See Photo in Appendix C – River Parcel Signs).
- Extraction wells including leachate extraction wells and monitoring wells are properly secured and locked and appeared to be in good condition. An additional extraction well is planned to be installed in the southwestern portion of the eastern parcel of OU3. The location of this potential extraction well was identified during Site inspection. It was discussed during the inspection that the proposed extraction well should provide minimal or no disturbance to the OU3 cover/containment cap.
- Updated hard copies of the OM&M Manuals, as-built drawings and maintenance logs, waste disposal (hazardous waste) and discharge records are readily available at the groundwater treatment plant office.
- Access roads are adequate, and gates are properly secured/locked.
- Site fencing was intact and appeared to be in good condition. Signs were in good condition.
- The Solar Panels located on OU3 Tar Plant was closely inspected. It was evident that the non-penetrating solar array racking system does not provide any disturbance to the cover/containment cap. The solar array is running at about 70% capacity while Parsons is continuing to troubleshoot and optimize the system. The production logs for 2022 and 2023 are provided in Figure 11 (Appendix B).
- The WWTP operations appear to be clean, neat, and orderly.
- Previously one of the former lagoons (Lagoon 2 and parts of Lagoon 4), now wetlands, had an issue with developing proper vegetation due to the presence of invasive species (purple loosestrife and Johnson Grass) requiring control. Honeywell contracted a company to mitigate purple loosestrife and Johnson Grass populations through spot spraying individual plants over the course of the last five years. This mitigation was successful. The testing performed indicated that both invasive species were successfully mitigated, and OEPA issued Honeywell a No

Further Action (NFA) letter. Purple Loosestrife and Johnson Grass are almost completely eliminated.

- Overall, the Site is operationally well maintained and has no major issues to affect remedy performance.

**V. TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents? **Yes**

**Question A Summary:**

**Remedial Action Performance:** The remedy selected in the OU1, OU2 and OU3 RODs, ROD Amendments and ESDs has been implemented and remains functional, operational and effective. In addition, Institutional Controls (ICs) are in place to serve as an additional layer of protection to ensure that the remedial actions remain effective in protecting human health and the environment. However, due to the reduction of groundwater extraction pumping rates below 200 gpm, the groundwater hydraulic containment area has been reduced. This may have contributed to increasing COC trends in monitoring wells and the COC impacted groundwater migrating off-site. However, the COC impacted groundwater does not provide exposure and risk to human receptors because no one is drinking the groundwater due to ICs in place. An additional extraction well (PW-7) appropriately located will enhance the extraction pumping well to historical capacity of around 300 gpm. This will provide a positive impact to the Site groundwater by enlarging the hydraulic containment area and will help to reduce the COC trends in the offsite monitoring wells. With the extraction well pumping rate enhancement along with the continued maintenance and monitoring of the site landfill cap, groundwater monitoring wells, and the site fence, the remedy will ensure that the Site remains protective. However, there are no downgradient drinking water wells in the immediate vicinity which ensure exposures to site contaminants are not occurring, in addition, ICs are in place to prevent drilling and installation of drinking water wells.

**System Operations/O&M**: Current annual O&M costs for 2023 are $1.43 M compared to the O&M cost of $ 1.27 M in 2019. The O&M costs trend within the last five years appears to be upward. See Appendix C, Attachment 2 for PRP O&M Costs for the last five years.

**Opportunities for Optimization:** O&M is performed by the PRP in accordance with the OU1, OU2 and OU3 OM&M Manual. Parsons will be responsible for potential improvements and optimization to the OM&M Manual.

**Early Indicators of Potential Remedy Failure:** There appear to be no early indicators of potential remedy failure for any of the three OUs.

**Implementation of Institutional Controls and Other Measures:** All institutional or other controls required by the decision documents have been put in place and are considered to be

effective. The ICIAP was finalized for the Site. In addition, LTS procedures have been incorporated into the amended O&M plan and are being implemented.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

**Yes,** except as noted below, the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection are still valid.

**Question B Summary:**

There have been no changes in Standards, Toxicity and Other Contaminant Characteristics, Risk Assessment methods and no changes in Exposure pathway since the last FYR except as noted below: 1) arsenic detections above MCL in groundwater, for which the MCL was changed from 50 ppb to 10 ppb; 2) the reduction of groundwater extraction pumping rates below 200 gpm which resulted in the groundwater hydraulic containment area being reduced. This may have contributed to increasing COC trends in monitoring wells and the COC impacted groundwater migrating off-site; and 3) the geophysical finding of possible contaminant flow and transport of DNAPLs potentially migrating within bedrock. Arsenic and COC exceedances in the groundwater will not impact human health as there are no drinking water wells and no human receptors are currently drinking the groundwater. Similarly, there is likely no impact to ecological receptors. Furthermore, the contaminant flow and transport of DNAPLs potentially migrating within bedrock underlying the site does not impact human health but warrants additional investigation and update of the CSM. This investigation should also include a groundwater assessment for COCs and arsenic exceedances. All standards outlined in the 1988, 1990 and 2007 RODs (and their amendments and ESDs) are still valid except for arsenic at the Site. The remedies for OU1, OU2 and OU3 are progressing as expected. Although it is not clear whether historically the emergent contaminants Per- and Perfluoroalkyl Substances (PFAS) were ever used at the Site, it must be determined with analysis that PFAS is not a compound of concern at the Site.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy? No

**Question C Summary**: There have been no impacts to the Site from natural disasters since the last FYR. In addition, there have been no Site changes or vulnerabilities that may be related to climate change impacts not apparent during remedy selection, remedy implementation or O&M.

**VI. ISSUES/RECOMMENDATIONS**

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|---|---|
| **OU(s): 2** | **Issue Category: Operations and Maintenance** |
| | **Issue:** Historically the Site groundwater extraction pumping rates were typically maintained above 330 gallons per minute (gpm), however more recently the extraction pumping rates have been lowered to less than 200 gpm. This has resulted in several wells with contaminant exceedances of |

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|---|---|---|---|---|
| | cleanup goals or have increasing contaminant concentrations. Potentially contaminated groundwater leaving the site is not being captured. | | | |
| | **Recommendation:** An additional extraction well should be installed to enhance the extraction pumping well to historical capacity of around 300 gpm. This will have a positive impact to the Site groundwater by enlarging the hydraulic containment area and will reduce the COC trends in the offsite monitoring wells. | | | |
| **Affect Current Protectiveness** | **Affect Future Protectiveness** | **Party Responsible** | **Oversight Party** | **Milestone Date** |
| No | Yes | PRP | EPA | 9/9/2025 |

| | | | | |
|---|---|---|---|---|
| **OU(s): 2** | **Issue Category: Operations and Maintenance** | | | |
| | **Issue:** The DNAPL Recovery Program is not extracting as much DNAPL as expected. DNAPLs potentially migrating within bedrock was never followed up with further investigation of possible contaminant flow and transport within the bedrock. | | | |
| | **Recommendation:** Additional DNAPL extraction wells appear to be necessary to remove the extensive DNAPL contaminant mass both at the Tar Plant as well as at the GDA. | | | |
| **Affect Current Protectiveness** | **Affect Future Protectiveness** | **Party Responsible** | **Oversight Party** | **Milestone Date** |
| No | Yes | PRP | EPA | 9/9/2025 |

| | | | | |
|---|---|---|---|---|
| **OU(s): 1, 2** | **Issue Category: Other**<br>**Emerging Contaminants** | | | |
| | **Issue:** It is unknown whether emerging contaminants PFAS may be present at the Site. | | | |

| | **Recommendation:** Sample groundwater to determine whether PFAS are present. | | | |
|---|---|---|---|---|
| **Affect Current Protectiveness** | **Affect Future Protectiveness** | **Party Responsible** | **Oversight Party** | **Milestone Date** |
| No | Yes | PRP | EPA | 9/9/2025 |

**OTHER FINDINGS**

In addition, the following are recommendations that were identified during the FYR and (may improve performance of the remedy, reduce costs, improve management of O&M, accelerate site close out, conserve energy, promote sustainability, etc.), but do not affect current nor future protectiveness:

- A report that completely documents the methods used to create groundwater elevation contour maps, and groundwater flow gradients and how hydraulic capture is determined needs to be submitted and review by EPA. Each quarterly Groundwater Monitoring Report also needs to include the name and short description of the method used, and all the all the parameters that were used, to create groundwater elevation contour maps, and groundwater flow gradients and how hydraulic capture is determined in the quarterly report.
- Each new groundwater monitoring report submitted to EPA needs to both graph historic concentration and determine statistically significant contaminant concentration trend analysis for all wells with contaminant concentration that have had an exceedance of Site Clean-Up Goals. In addition, statistical analysis is needed for all wells and site contaminants that are below exceedance levels of Site Clean-Up Goals but have visual evidence of increasing contaminant concentration. The timeframe to analyze should be limited to the last five years of data to determine current attainment progress. The methods should include the Mann-Kendall trend test and the Sen slope analysis at the 80% level of confidence to robustly detect unexpected increasing trends and slopes.
- It is also recommended that the current data be compared to a historic baseline range to confirm that current data is lower in contaminant concentration than the historic baseline range. A way to determine the current data is to calculate the upper confidence limit (UCL) of the last four concentration measurements. A way to determine an historic baseline range is to determine the upper and lower confidence limit (UCL and LCL) of the prior five-year time frame (year 10 through 5 of the past 10 years.) If the current UCL value is below the historic LCL progress is being made. If the current UCL is between the historic LCL and UCL, then no significant progress is occurring. If the current UCL is above the historic UCL that current conditions are getting worse.
- The Conceptual Site Model needs to be updated because of existing geotechnical data, geophysical data and significant data gaps concerning the location, the amount, and any transport of DNAPLs on the top of bedrock as discussed above in the Data Review Section.

- The following wells located outside or near the edge of the extent of contaminant containment will need to be monitored for at least four quarters. If any of these wells are found to have contaminant concentration exceedances, they should be included in the monitoring program and if the locations are not within the area of capture, the pumping rates should be adjusted to expand the area of capture to include that area.

  Wells for additional sampling include: T-13S, T-13D, WE-618, WE-61B, MW-52S, MW-52D, MW-53S, MW-53D, MW-64S, MW-63S, MW-62S, MW-62D, MW-61S, MW-13, MW-26, C-3, C-4, MW-46S, MW46D, WE-2426, MW-4, PZ-2428, C-1, MW-15, C-2, MW-16, NW-18.

**VII. PROTECTIVENESS STATEMENT**

| **Protectiveness Statement(s)** | |
|---|---|
| *Operable Unit:*<br>1 | *Protectiveness Determination:*<br>Short-term Protective |
| *Protectiveness Statement:* The OU1 remedy currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU1 area have been addressed through containment and isolation of the Goldcamp Disposal Area to minimize the continued spread of the contaminated groundwater plume along with groundwater extraction and treatment. Completed and implemented the ICIAP. LTS procedures from the approved ICIAP were incorporated by amending the O&M plan for OU3. However, in order for the remedy to be protective in the long-term, the following action should be taken to ensure protectiveness: Sample groundwater to determine whether PFAS are present. | |

| **Protectiveness Statement(s)** | |
|---|---|
| *Operable Unit:*<br>2 | *Protectiveness Determination:*<br>Short-term Protective |
| *Protectiveness Statement:* The OU2 remedy currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU2 area have been addressed through incineration and in-situ bioremediation of waste material, and on-site groundwater extraction and treatment. However, in order for the remedy to be protective in the long-term, the following actions should be taken to ensure protectiveness: An additional extraction well should be installed to enhance the extraction pumping well to historical capacity of around 300 gpm; Additional DNAPL extraction wells should be installed to | |

remove the extensive DNAPL contaminant mass in the OU2 groundwater; and Sample groundwater to determine whether PFAS are present.

| Protectiveness Statement(s) | |
|---|---|
| *Operable Unit:*<br>3 | *Protectiveness Determination:*<br>Protective |
| *Protectiveness Statement:* The OU3 remedy is protective of human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedy is operating as expected. Threats in the OU3 area have been addressed through the construction of caps over all the contaminated portions of the OU3 areas. Completed and implemented the ICIAP. LTS procedures from the approved ICIAP were incorporated by amending the O&M plan for OU3. | |

| Sitewide Protectiveness Statement |
|---|
| *Protectiveness Determination:*<br>Short-term Protective |
| *Protectiveness Statement:*<br>The remedy at the Site currently protects human health and the environment. Exposure pathways that could result in acceptable risks are being controlled and the remedies are operating as expected. Sitewide threats have been addressed through waste containment (using slurry wall and caps), isolation, incineration, in-situ bioremediation, and on-site groundwater extraction and treatment. The ICIAP and LTS procedure from the approved ICIAP have been incorporated by amending the O&M plans for OUs 1, 2 and 3. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: An additional extraction well should be installed to enhance the extraction pumping well to historical capacity of around 300 gpm; Additional DNAPL extraction wells should be installed to remove the extensive DNAPL contaminant mass in the OU2 groundwater; and Sample groundwater to determine whether PFAS are present. |

## VIII. NEXT REVIEW

The next FYR report for the Allied Chemical Ironton Coke Superfund Site is required five years from the completion date of this review.

# Appendix A
# References


The Administrative Order on Consent was issued by USEPA Region 5 in March 1987

The Remedial Investigation and Feasibility Study for OU1 (August 1988)

The Record of Decision for OU1 was issued by USEPA Region 5 in September 1988 (USEPA Records Center No. 80321)

The Administrative Order was issued by USEPA Region 5 in March 1989. (USEPA, 1989)

The Record of Decision for OU2 (CPLA ROD) was issued by USEPA Region 5 on December 28, 1990 (USEPA Records Center No. 79302)

GDA Remedial Investigation, July 1986

GDA Feasibility Study, August 1988

The FS for the CPLA OU2 (July 1990)

The Unilateral Administrative Order for OU2 was issued by USEPA Region 5 on July 1, 1991. (USEPA, 1991)

GDA Remedial Action Monitoring Plan (April 1994)

The Record of Decision for OU2 was amended by USEPA Region 5 in July 155 (USEPA, 1995, Records Center No. 79746)

The CPLA Groundwater Compliance Sampling and Analysis Plan (December 1995)

Final Inspection of the OU1 Remedy (August 2, 1995)

CPLA Stormwater Pollution Prevention Plan (March 1995)

The Record of Decision for OU2 was amended by USEPA Region 5 in July 1995

The Record of Decision for OU2 was amended by USEPA Region 5 in September 1997 (USEPA, 1997, Records Center No. 79749)

The Record of Decision for OU2 was amended by USEPA Region 5 in September 1998 (USEPA, 1998. Records Center No. 79761).

The CPLA Remedial Design, December 1995

The CPLA Remedial Action Completion Report, October 2002

An Administrative Order for Consent for OU3 (Tar Plant) was issued by USEPA Region on August 23, 2003

RI Report for the OU3 (March 2007)

FS Report for the OU3 (June 2007)

The Record of Decision for OU3 was issued by USEPA Region 5 in September 2007 (USEPA, 2007, Records Center No. 279397)

The OU3 Remedial Design Report (July 2013)

2007 RI Geophysical Investigation

The Explanation of Significant Differences (ESD) for the Allied Chemical Ironton Coke Superfund Site was issued by USEPA Region 5 in March 2015. (USEPA, 2015)

2019 Five Year Review Report for Allied Chemical Ironton Coke Site

2014 Five Year Review Report for Allied Chemical Ironton Coke Site

Vegetation Index of Biotic Integrity (VIBI) Assessment Report (November 2014)

Vegetation Index of Biotic Integrity (VIBI) Assessment Report (January 2020)

2012 Final Pre-Design Report

Final Remedial Action Completion Report, Allied Chemical Ironton Coke, Operable Unit 3, Tar Plant, AMEC Foster Wheeler, Anchor QEA, Honeywell International Inc, March 2016

Quarterly Groundwater Monitoring Reports for the Ironton Coke Plant Site (prepared by AMEC), 2019, 2020, 2021, 2022 and 2023.

Institutional Control Implementation Action Plan (ICIAP, April 2019)

Institutional Control Implementation Action Plan (ICIAP, February 2020)

Partial Site Deletion for Allied Chemical Ironton Coke Site (August 24, 2020)

Operations, Maintenance and Monitoring Manual (Updated and Revised July 2022)

Monthly Progress Reports, Allied Chemical Ironton Coke Facility, Operable Units 1&2, Gold Camp Dump (GDA) and Coke Plant\Lagoon Area (CPLA), 2019, 2020, 2021, 2022 and 2023.

Sitewide Ready for Anticipated USE (SWRAU) GPRA Measure, USEPA, October 2, 2018.

**APPENDIX B**

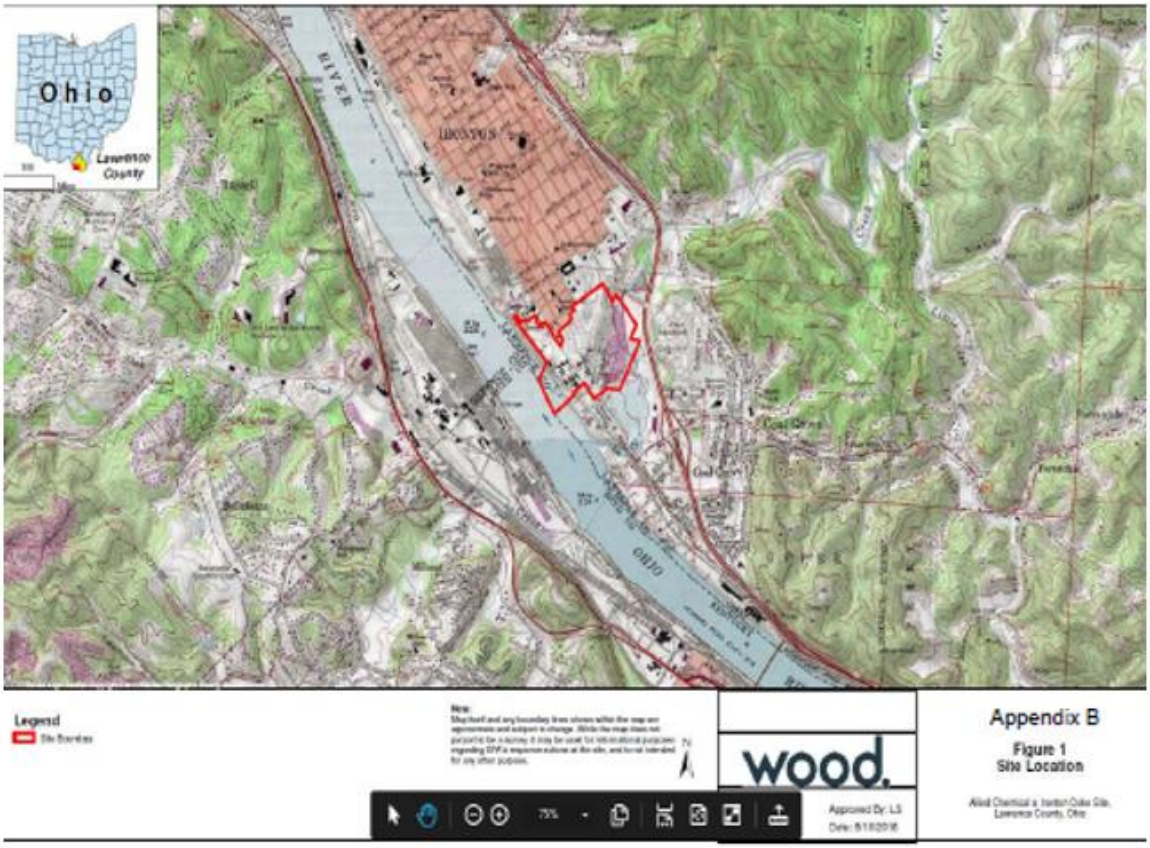



**Figure 1 – Site Location Map**

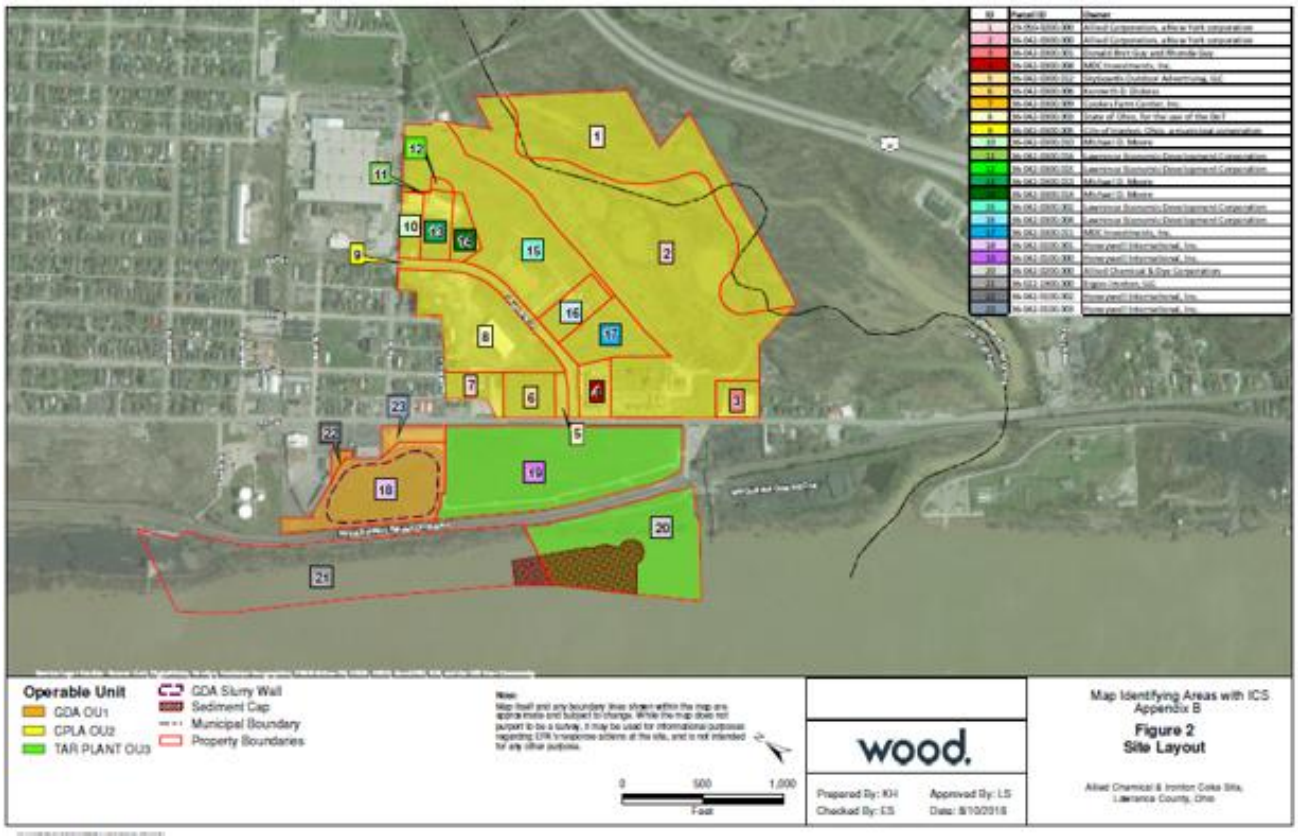



**Figure 2 – A Map Showing the Area in Which ICS Apply**

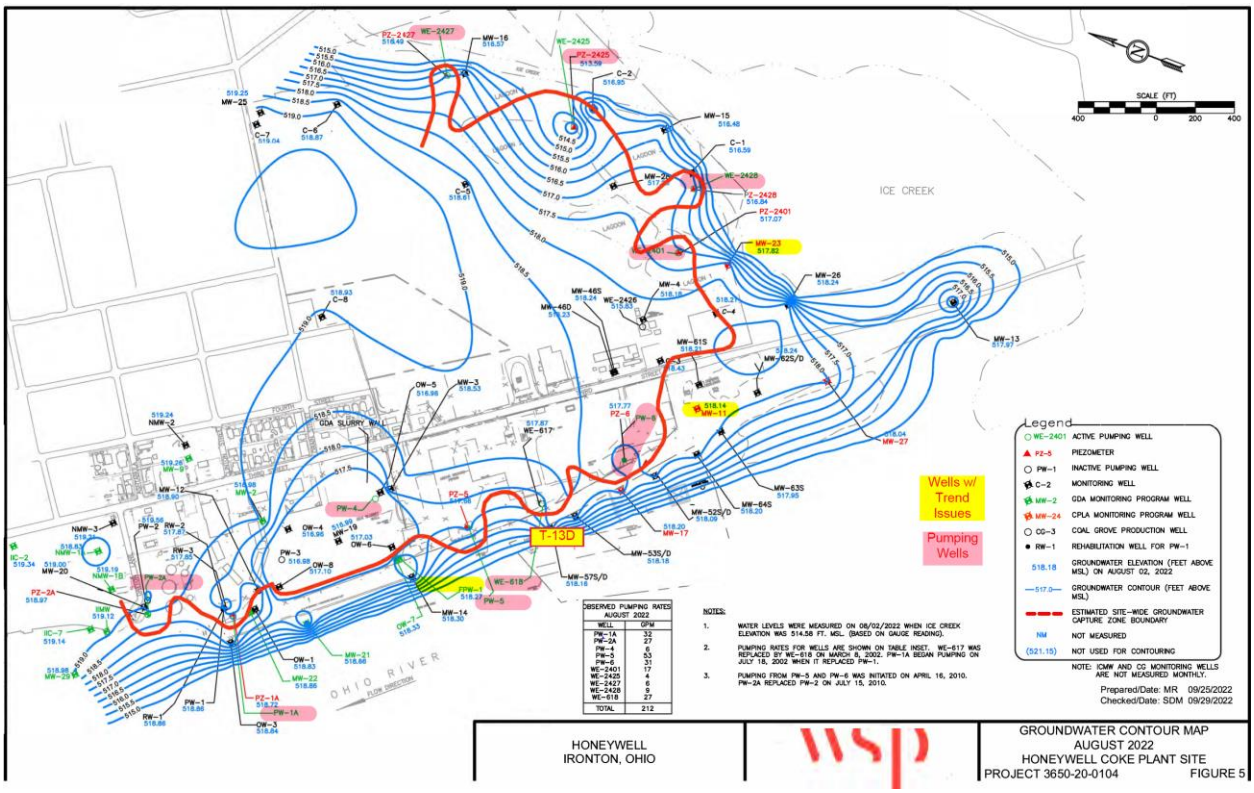



**Figure 3**
**Location of Monitoring Wells with Clean-Up Goal Exceedances, Increasing Contaminant Concentrations and all Site Pumping Wells**

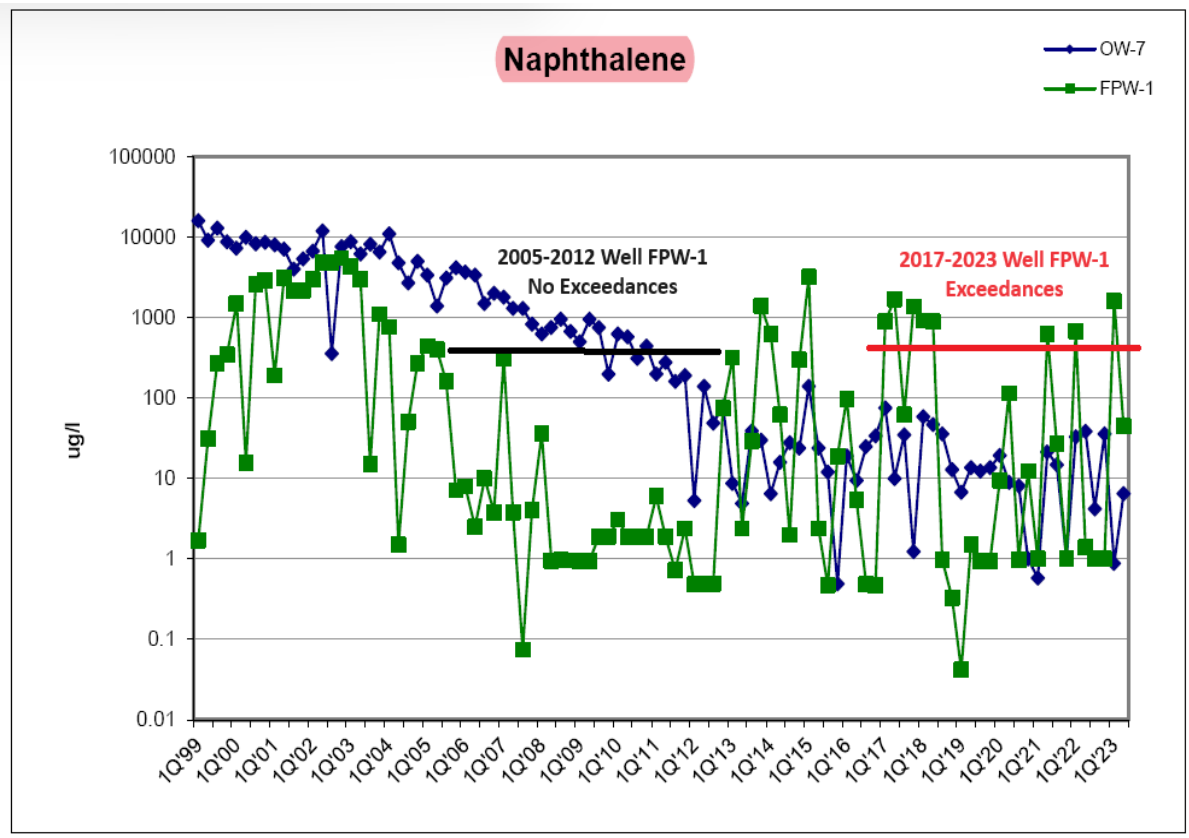



**Figure 4 – Napthalene Data**

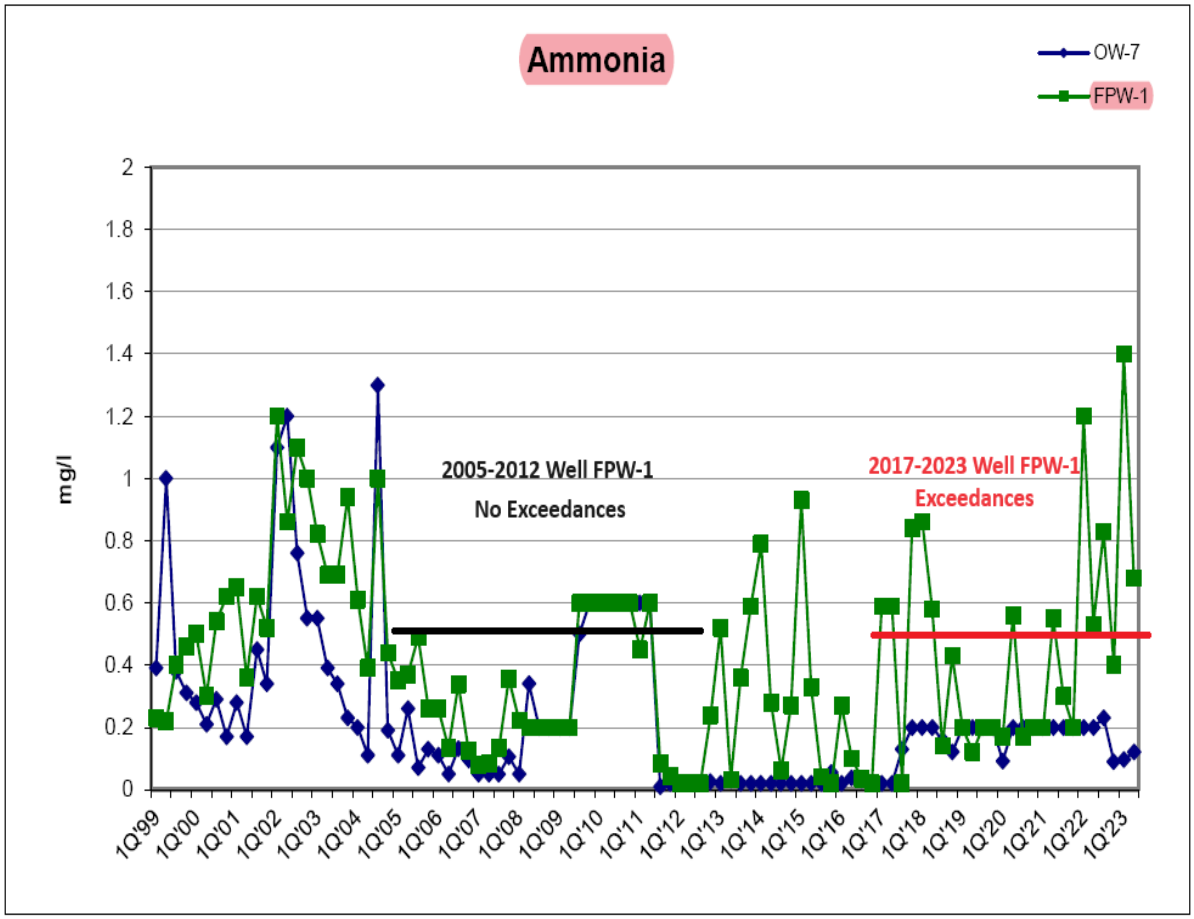



**Figure 5 – Ammonia**

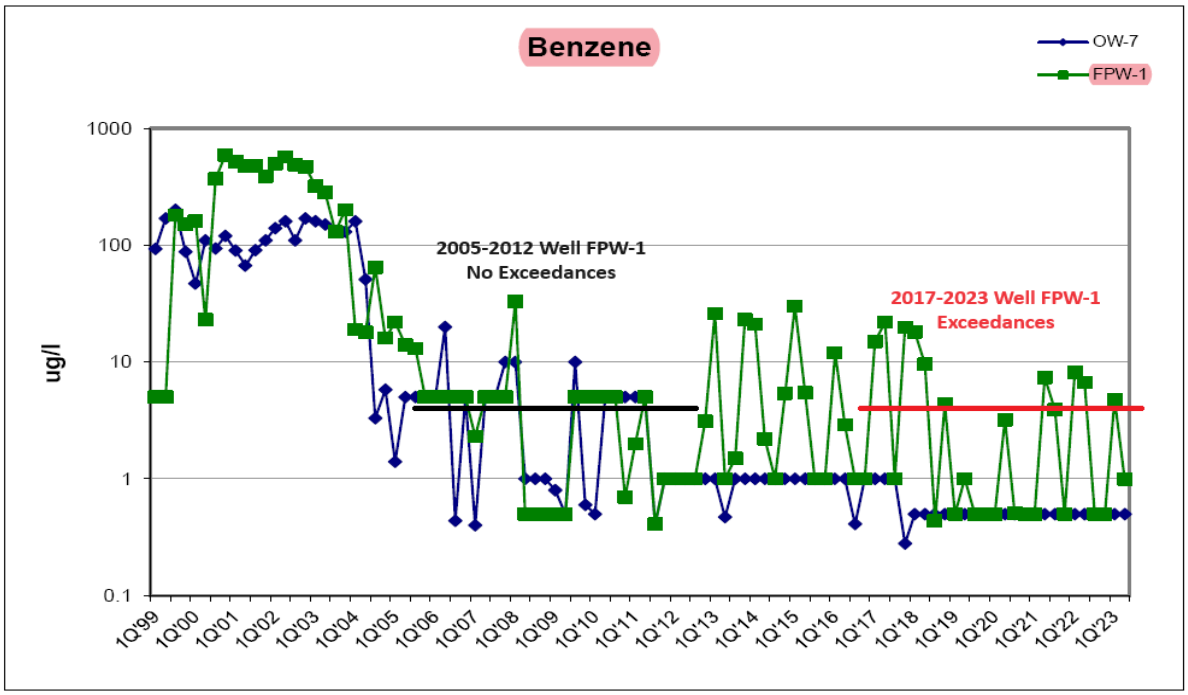



**Figure 6 – Benzene**

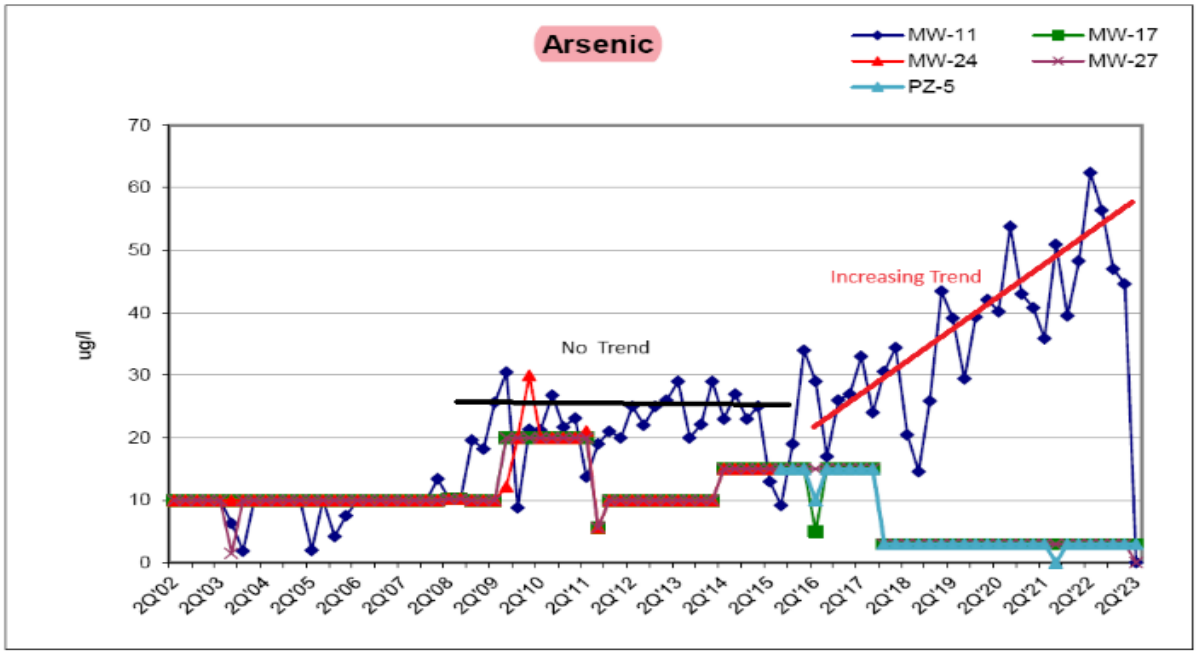



**Figure 7 – Arsenic**

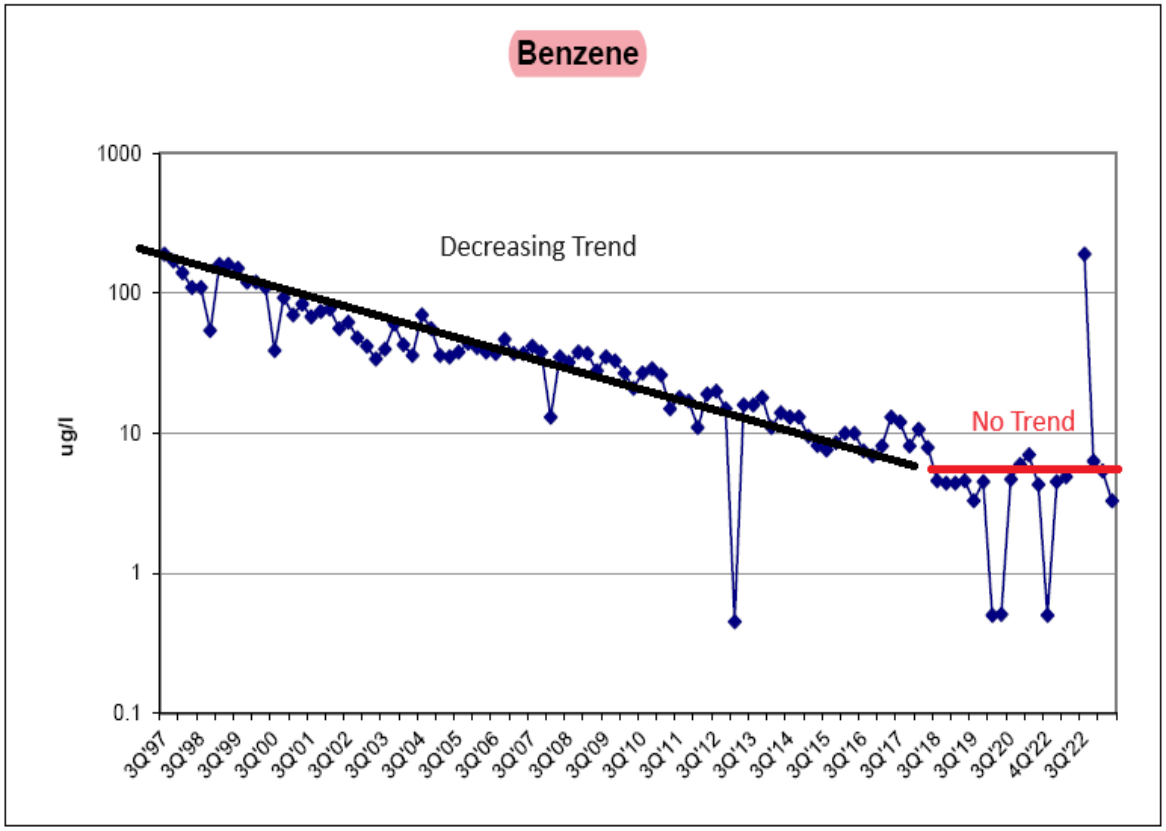



**Figure 8 – Benzene Data Trend**

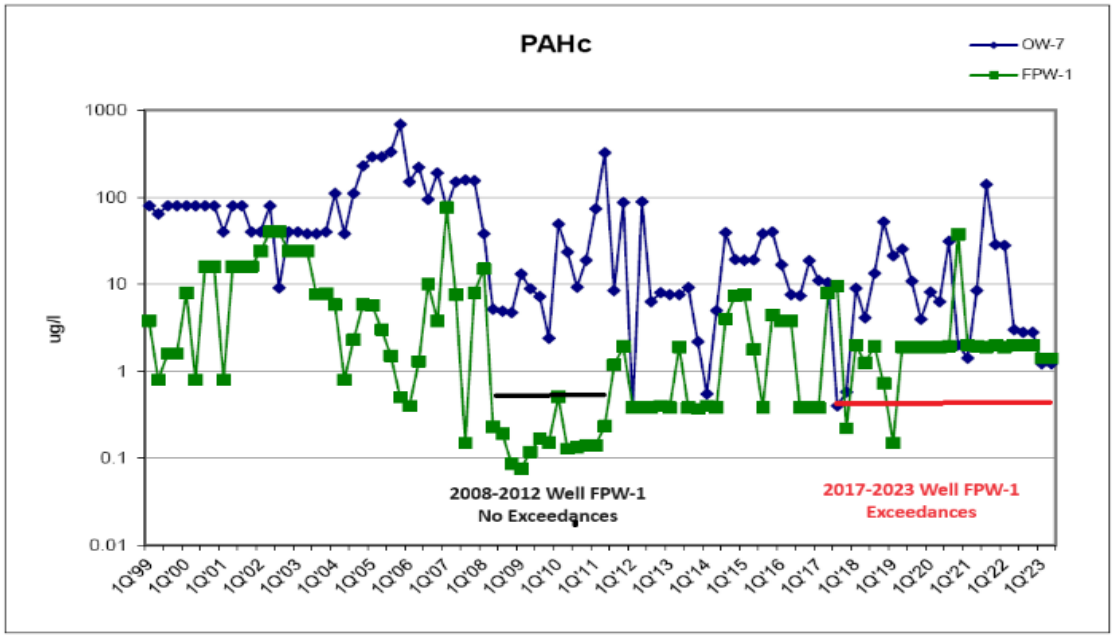



**Figure 9 – PAHc**

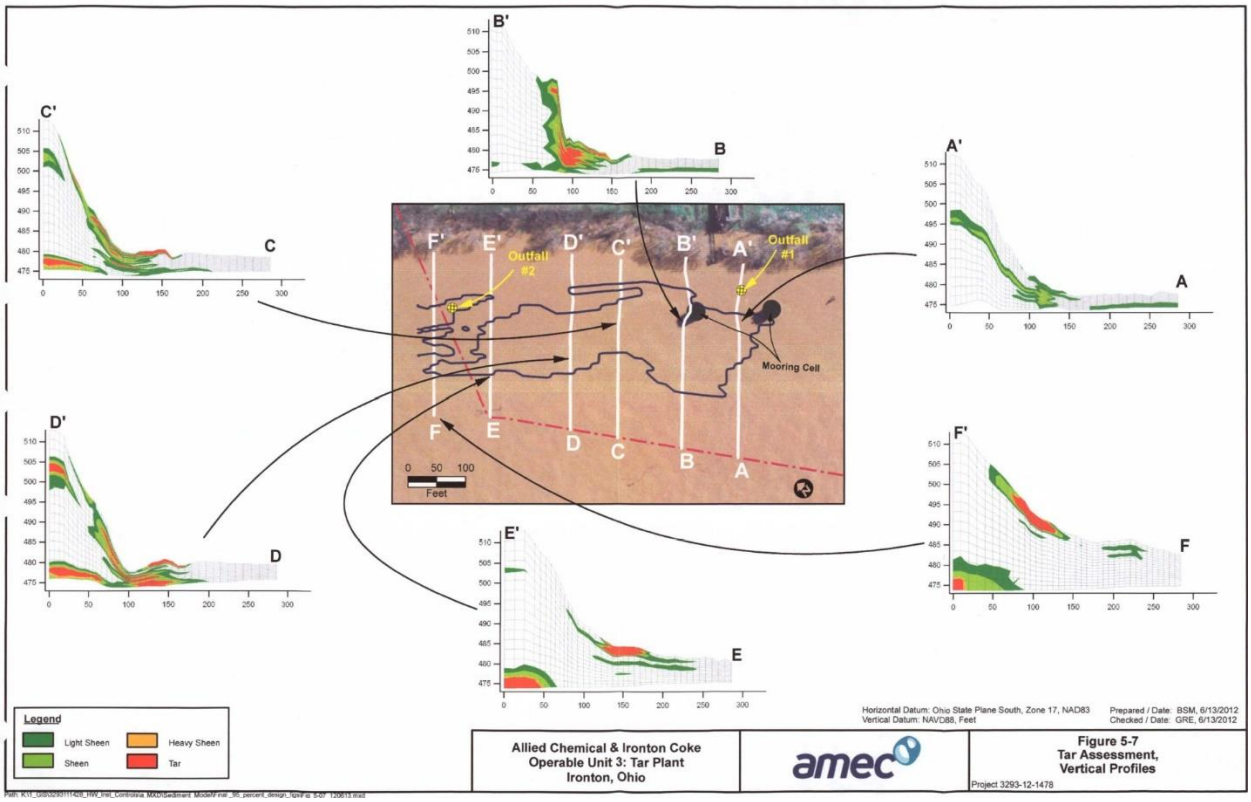



**Figure 10 - Tar Assessment & Vertical Profiles**

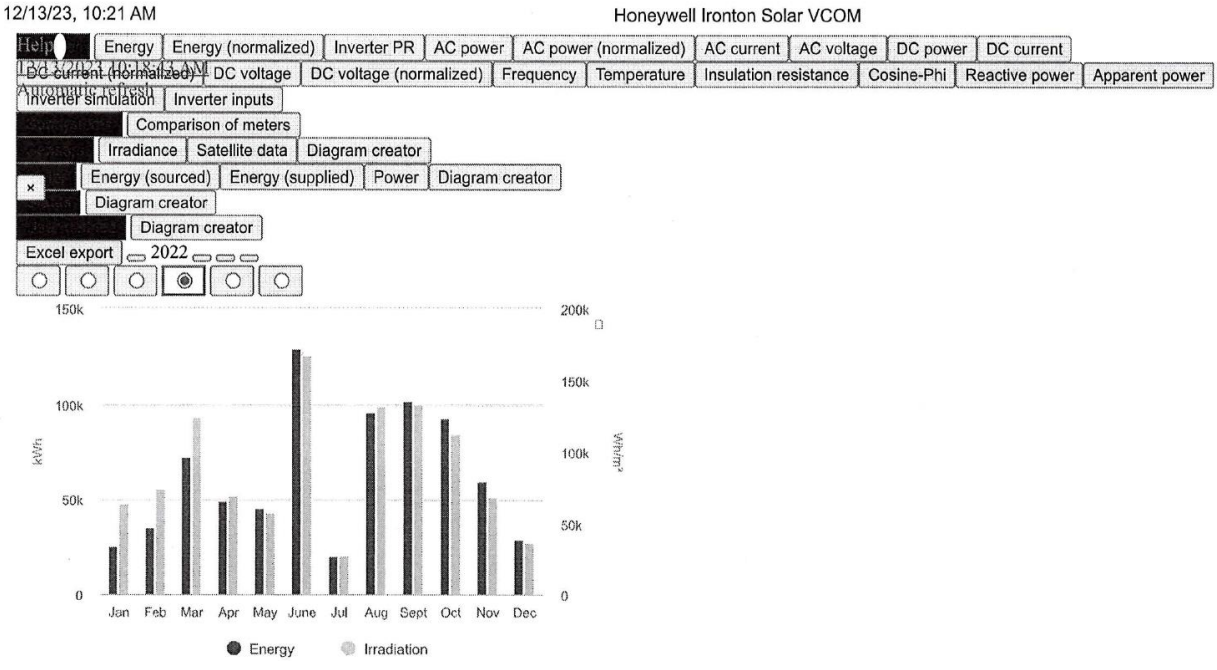
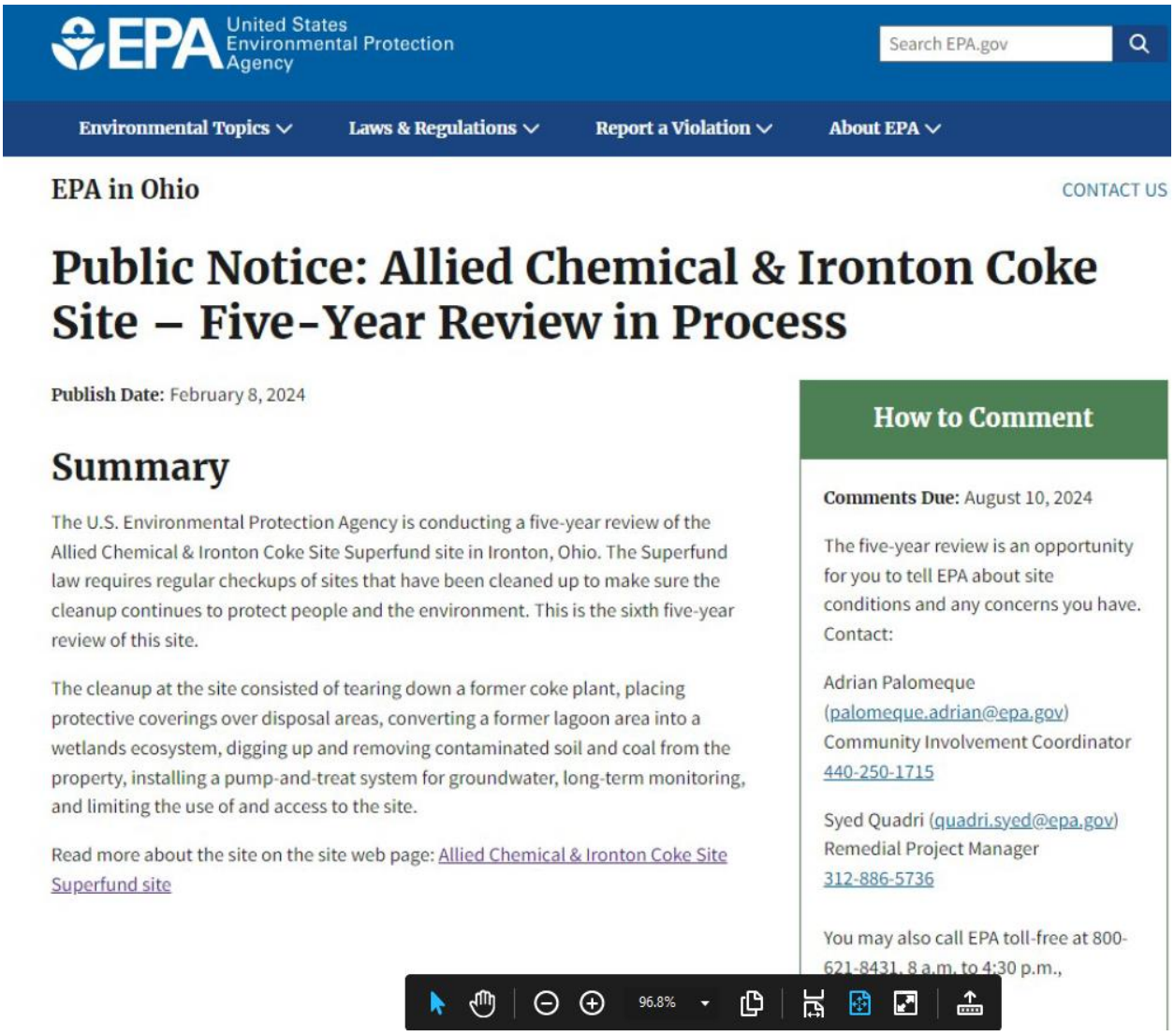



**Figure 11 – Solar Production Logs for Years 2022 through 202**

**Appendix C**



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# Public Notice: Allied Chemical & Ironton Coke Site – Five-Year Review in Process

**Publish Date:** February 8, 2024

## Summary

The U.S. Environmental Protection Agency is conducting a five-year review of the Allied Chemical & Ironton Coke Site Superfund site in Ironton, Ohio. The Superfund law requires regular checkups of sites that have been cleaned up to make sure the cleanup continues to protect people and the environment. This is the sixth five-year review of this site.

The cleanup at the site consisted of tearing down a former coke plant, placing protective coverings over disposal areas, converting a former lagoon area into a wetlands ecosystem, digging up and removing contaminated soil and coal from the property, installing a pump-and-treat system for groundwater, long-term monitoring, and limiting the use of and access to the site.

Read more about the site on the site web page: Allied Chemical & Ironton Coke Site Superfund site

## How to Comment

**Comments Due:** August 10, 2024

The five-year review is an opportunity for you to tell EPA about site conditions and any concerns you have. Contact:

Adrian Palomeque (palomeque.adrian@epa.gov)
Community Involvement Coordinator
440-250-1715

Syed Quadri (quadri.syed@epa.gov)
Remedial Project Manager
312-886-5736

You may also call EPA toll-free at 800-621-8431, 8 a.m. to 4:30 p.m.,

96.8%

**Attachment 1 – Public Notification for the 2024 Five Year Review**

| Cost Item | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| On-Site Labor | $ 310,000 | $ 310,000 | $ 305,000 | $ 305,000 | $ 452,000 |
| Off-Site Labor | $ 210,000 | $ 210,000 | $ 230,000 | $ 230,000 | $ 276,000 |
| Utilities | $ 194,000 | $ 110,000 | $ 97,000 | $ 66,000 | $ 95,000 |
| Access Fees | $ 13,000 | $ 12,000 | $ 19,000 | $ 16,000 | $ 23,000 |
| WWTP Carbon, Chemicals, Equipment and Supplies | $ 335,000 | $ 360,000 | $ 385,000 | $ 455,000 | $ 406,000 |
| Filter Cake and DNAPL | $ 90,000 | $ 50,000 | $ 67,000 | $ 104,000 | $ 97,100 |
| Wetlands VIBI | $ 25,000 | $ - | $ - | $ - | $ - |
| Laboratory Analytical Services | $ 70,000 | $ 70,000 | $ 81,000 | $ 73,000 | $ 60,000 |
| Taxes | $ 30,000 | $ 30,000 | $ 32,000 | $ 33,000 | $ 39,000 |
| Annual Totals (rounded) | $ 1,277,000 | $ 1,152,000 | $ 1,216,000 | $ 1,282,000 | $ 1,433,419 |

**Attachment 2 – Honeywell Operation, Maintenance and Monitoring Cost During the Current FYR**


**River Parcel Sign**

Appendix C

CPLA – Wastewater Treatment Area

Attachment 4

**OU1 ROD**

TABLE 7

U.S. ENVIRONMENTAL PROTECTION AGENCY
GROUND WATER STANDARDS

| PARAMETER | TREATMENT LEVELS |
|---|---|
| Ammonia | 0.50 mg/ℓ[a] |
| Chloride | 250 mg/ℓ[b] |
| Total Cyanide | 0.2 mg/ℓ[c] |
| Phenolics | 0.3 - 3.5 mg/ℓ[d] |
| Benzene | 0.005 mg/ℓ[e] |
| Naphthalene | 0.69 mg/ℓ[f] |
| Benzo-a-pyrene | 0.005 ug/ℓ[g] |

[a] "mg/ℓ" equals milligrams per liter or parts per million. The indicated value is a U.S. EPA estimated permissible ambient goal based on human health effects. The estimated permissible ambient goal based on ecological effects is 0.01 mg/ℓ. These goals are not regulatory standards.

[b] The indicated value is a U.S. EPA Secondary Drinking Water Standard (SDWS). This value is based on aesthetic water quality, not health standards, relating to public acceptance of drinking water. SDWS are not federally enforceable but are intended to serve as guidelines to the states.

[c] The indicated value is a U.S. EPA toxic pollutants water quality criteria for the maximum protection of human health.

[d] As indicated, 0.3 mg/ℓ is the aesthetic water quality level for controlling undesirable taste and odor, while 3.5 mg/ℓ is the criteria established for the protection of human health.

[e] The proposed value in Federal Register, Volume 50, No. 219, November 13, 1985, Safe Drinking Water Act (SDWA), Maximum Contaminant Level (MCL) is 0.005 mg/ℓ.

[f] The indicated value is a U.S. EPA estimated permissible ambient goal based on health effects. The estimated permissible ambient goal based on ecological effects is 0.05 mg/ℓ. These goals are not regulatory standards.

[g] "ug/ℓ" equals micrograms per liter or parts per billion. This value represents the current instrument detection limit. The actual $10^{-6}$ cancer risk level is 0.0031 µg/ℓ.

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Table 1

Allied Chemical and Ironton Coke
Superfund Site
Operable Unit 2
Coke Plant/Lagoons Area

Groundwater Cleanup Levels

| PARAMETER | CONCENTRATION |
|---|---|
| Ammonia | 30 mg/l |
| Nitrate | 10 mg/l |
| Total Cyanide | 0.2 mg/l |
| Phenolics | 4.0 mg/l |
| Benzene | 0.005 mg/l |
| Naphthalene | 0.3 mg/l |
| Total Carcinogenic PAHs | 0.005 ug/l |
| Arsenic | 0.05 mg/l |

Note- Total Carcinogenic PAHs in groundwater, for the purposes of this Record of Decision, is defined as the sum of the concentrations of Benzo(a)pyrene and Dibenzo(a,h)anthracene.

These values are based upon the site-specific risk assessment, MCLs, and Health Advisories.

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Table 2

Allied Chemical and Ironton Coke

Soil/Waste Cleanup Levels

| PARAMETER | CONCENTRATION |
|---|---|
| Total Carcinogenic PAHs | .97 mg/kg |
| Arsenic | .56 mg/kg |

Note- Total Carcinogenic PAHs in soil/waste is defined, for the purposes of this Record of Decision, as the total of the concentrations of Benz(a)anthracene, Benzo(a)pyrene, Chrysene, and Dibenz(a,h)anthracene.

These values are based upon the site-specific risk assessment, assuming ingestion of contaminated soils/wastes by hypothetical future on-site residents, and represent the concentrations posing a $10^{-6}$ level of cancer risk to these individuals. In addition, to demonstrate compliance with a $10^{-6}$ risk level, the cumulative risk level must be shown not to exceed a $10^{-6}$ level of cancer risk to these individuals.

**Table 3**

**Allied Chemical and Ironton Coke**

**Soil/Waste Cleanup Levels For Protection of Groundwater**

| PARAMETER | CONCENTRATION |
|---|---|
| Total Carcinogenic PAHs | 1.4 mg/kg of organic carbon |
| Benzene | 0.485 mg/kg of organic carbon |
| Napthalene | 650 mg/kg of organic carbon |

Note- These values are based upon partition coefficient calculations, in which the concentration of a particular contaminant in the groundwater is projected based upon laboratory octanol/water partition coefficients. Actual soil cleanup levels must be corrected for the actual concentration of organic carbon remaining in the soils/wastes after treatment.

Since no partition coefficients are currently available for cyanide and arsenic, leach tests will be performed on the treated waste materials in order to determine the concentrations of cyanide and arsenic which will be protective of the groundwater. These leach tests may also be used to determine the actual field partition coefficients on treated wastes for the above contaminants.

The values in this table assume no dilution takes place. These numbers may be modified in the future based upon a field demonstration of the actual amount of dilution which takes place on the site.

## OU-3 ROD

**Table 30: Cleanup Levels for Chemicals of Concern at the Allied Chemical and Ironton Coke Tar Plant (OU3) Site**

| Environmental Media | Site Area | COC | Cleanup Level | Basis for Cleanup Level | Risk at Cleanup Level |
|---|---|---|---|---|---|
| Soil | Main Parcel | benzo(a)pyrene | 160 $\mu$g/kg | human health risk assessment | Cancer risk = 1 x $10^{-6}$ |
| | River Parcel | benzo(a)pyrene | 160 $\mu$g/kg | human health risk assessment | Cancer risk = 1 x $10^{-6}$ |
| Sediment | Ohio River | total PAHs | $\sum$ESBTU = 10.0 or less | screening ecological risk assessment | toxicity to benthos equal to or less than upstream toxicity |