

**UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION III**

**FINAL DECISION AND RESPONSE TO COMMENTS  
CYTEC INDUSTRIES INC.**

**PURPOSE**

The United States Environmental Protection Agency (EPA) is issuing this Final Decision and Response to Comments (FDRTC or Final Decision) selecting the Final Remedy for the Cytec Industries Inc. located at the Havre De Grace, Maryland (hereinafter referred to as the Facility). The Final Decision is issued pursuant to the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. Sections 6901, et seq.

On September 27, 1991, EPA issued American Cyanamid a Corrective Action Permit (MDD 003 075 942) (1991 Permit). The 1991 Permit required that American Cyanamid conduct environmental investigations at the Facility. In 1993, American Cyanamid spun off its chemical operations to create Cytec Industries, Inc. which included the Facility in Havre de Grace, Maryland.

On September 18, 2012, EPA issued a Statement of Basis (SB) in which it described the information gathered during environmental investigations at the Facility and proposed a Final Remedy for the Facility. Concurrent with the SB, EPA issued a Draft RCRA Corrective Action Permit (CA Permit) requiring implementation of the Final Remedy. The SB is hereby incorporated into this Final Decision by reference and made a part hereof as Attachment AA.

This FDRTC selects the remedy that EPA evaluated under the 1991 Permit. Consistent with the public participation provisions under RCRA, EPA solicited public comment on its proposed Final Remedy and Draft CA Permit. On September 19, 2012, notice of the Statement of Basis was published on the EPA website:

[<http://www.epa.gov/reg3wcmd/ca/md/webpages/mdd003075942.html>] and in the Maryland Daily Record newspaper. The forty-five (45) day comment period ended on November 5, 2012.

Since EPA did not receive any comments on the SB during the public comment period, EPA has determined it is not necessary to modify the proposed Final Remedy set forth in the SB; thus, the remedy proposed in the SB is the Final Remedy selected by EPA for the Facility.

**Final Decision**

EPA's Final Remedy for the Facility consists of the following:

- Groundwater extraction and treatment;
- Maintenance and monitoring, including groundwater; and

**ATTACHMENT A**

**FINAL DECISION AND  
RESPONSE TO COMMENTS**

- Compliance with and maintenance of institutional controls.

## DECLARATION

Based on the Administrative Record compiled for the corrective action at the Cytec Industries Inc. facility, I have determined that the remedy selected in this Final Decision and Response to Comments, which incorporates the September 18, 2012 Statement of Basis, is protective of human health and the environment.

Date: 12/5/12



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Abraham Ferdas, Director  
Land and Chemicals Division  
U.S. Environmental Protection Agency, Region III

Attachment AA: Statement of Basis (September 18, 2012)



**ATTACHMENT AA**  
**STATEMENT OF BASIS**





UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
STATEMENT OF BASIS  
CYTEC FACILITY  
HAVRE DE GRACE, MARYLAND  
EPA ID NO. MDD 003 075 942

## **I. INTRODUCTION**

The United States Environmental Protection Agency (EPA) has prepared this Statement of Basis (SB) to solicit public comment on its proposed remedy for Corrective Action Units at the Cytec Industries Inc.'s (Cytec) Engineered Materials Facility (Facility or Site), located in Havre de Grace, Maryland. The Corrective Action Units consist of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). EPA's proposed remedy consists of expansion of the existing groundwater extraction system and operation and maintenance of the expanded groundwater extraction system, monitoring wells and recovery wells. Furthermore, EPA is proposing the compliance with and maintenance of institutional controls that restrict certain land and groundwater uses at the Facility. This SB highlights key information relied upon by EPA in making its proposed remedy decision.

The Facility is subject to EPA's Corrective Action Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, 42 U.S.C. §§ 6901 *et seq.* (Corrective Action Program). The Corrective Action Program is designed to ensure that certain facilities subject to RCRA have investigated and cleaned up any releases of hazardous waste and hazardous constituents that have occurred at their property. Maryland is not authorized for the Corrective Action Program under Section 3006 of RCRA, 42 U.S.C. §6926; therefore, EPA retains authority in the State of Maryland for the Corrective Action Program.

This document summarizes the information that can be found in the work plans and reports submitted by Cytec to EPA during the Verification Investigation (VI), RCRA Facility Investigation (RFI), and Corrective Measures Study (CMS) activities undertaken by Cytec. This document also explains the rationale for EPA's proposed remedy for the Facility. The Administrative Record (AR) for the Facility contains all documents, including data and quality assurance information, on which EPA's proposed decision is based. See Section VI, Public Participation, below, for information on how you may review the AR.

Concurrently with this SB, EPA is soliciting comments on a draft Corrective Action Permit (Permit). The draft Permit incorporates the remedy proposed in this SB. The components of EPA's proposed final remedy as described in this SB are contained in the draft Permit, and will be enforceable thereunder once the Permit is finalized.

EPA will make a decision on the draft Corrective Action Permit after considering the information submitted during the public comment period. If there are no comments which result in a change to the draft permit, the final Corrective Action Permit will be signed and will become effective upon EPA's signature. Otherwise, the final Permit will become effective forty-five (45) days after the service of notice of the Final Decision or upon conclusion of any appeals filed. The SB will be incorporated into the final CA Permit and made a part thereof.



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Information on the Corrective Action Program as well as a fact sheet for the Facility can be found by navigating <http://www.epa.gov/reg3wcmd/correctiveaction.htm>.

## **II. FACILITY DESCRIPTION AND BACKGROUND**

The Facility occupies an approximately 27-acre parcel located at 1300 Revolution Street in Havre de Grace, Maryland (Attachment 1, Figure 1). The Facility began operations in 1962 as American Cyanamid which manufactured structural adhesives for the aerospace industry. Between 1981 and 1992, a portion of the Facility was used to manufacture honeycomb core used in conjunction with adhesives to form fuselage and wing components of aircraft. In 1993, American Cyanamid spun off its chemical operations to create Cytec Industries, Inc. which included the Facility in Havre de Grace, Maryland. Currently Cytec Industries, Inc. produces specialty bonding adhesives, including modified epoxy adhesives, adhesive primers, high-temperature resin systems, and thermoplastic materials (e.g., graphite, declar) for the aerospace industry.

The Facility is bisected by the Norfolk Southern Railroad and an intermittent stream (a branch of Lilley Run) (Attachment 1, Figure 2). The adhesive production building is located on the western portion of the Facility. A warehouse occupies the eastern half of the Facility. The area surrounding the Facility includes a mixture of light industrial and high-density residential properties. No structures are present on the area to the east of the Facility. The local publicly owned treatment works is located immediately southeast of the Facility boundary.

According to Facility personnel, 1,2-dichloroethane (1,2-DCA) was used as a raw material and for cleaning at the Facility from approximately 1967 through July 1990. A 6,000-gallon underground storage tank (UST) at the UST tank farm located at the southern corner of the adhesives production building was used to store 1,2-DCA and was removed in December 1991. Methylene chloride (MCL) was used at the Facility as a raw material and for cleaning from approximately 1967 through 2003. MCL was stored in a 6,000-gallon UST that was removed in December 1991; in a 3,000-gallon aboveground storage tank (AST) from September 1992 through December 1993; and in 55-gallon drums until its use at the Facility was discontinued in 2003.

## **III. SUMMARY OF ENVIRONMENTAL INVESTIGATIONS**

On April 1991, EPA prepared a Final RCRA Facility Assessment (RFA) Report. The RFA Report identified areas with the potential for a release to soil, groundwater, and surface water. The RFA Report recommended that certain areas be investigated further. The areas identified were the printline acid accumulation area, the outside sump, waste oil accumulation area, honeycomb core building, adhesives building sanitary sewer, Dowanol EE underground tank line leak, and the MEK underground tank leak. Based on the results of the RFA, on September 27, 1991, EPA issued American Cyanamid a Corrective Action Permit (MDD 003 075 942) (1991 Permit). The 1991 Permit required that American Cyanamid conduct environmental investigations at the Facility. The

specific Areas of Concern (AOCs) and SWMUs identified in the 1991 Permit include: SWMU 6-Spent Acid Truck Loading Pad, SWMU 7-RCRA Spent Acid Tank Facility, SWMU 10-Outside Sump, SWMU 18-Waste Oil Accumulation Area, AOC-1-Underground Storage Tanks (UST) Area, AOC-2-Adhesives Building Sanitary Sewer, and AOC-3-Honeycomb Core Building Sanitary Sewer (See Figure 2). Since 1991, Cytec has performed and completed numerous investigations at the Facility. All stages of the corrective action process for the SWMUs and AOCs identified in the 1991 Permit are completed. The predominant contaminant of concern (COC) in groundwater at the Facility is 1,2-DCA. Other compounds detected above screening criteria in groundwater are: chloroethane, chloroform, MCL, TCE, and vinyl chloride. The investigations performed at the Facility are summarized below.

**A. AOC-1 Underground Storage Tank Area**

*The Verification Sampling Report, Area of Concern No. 1 Underground Storage Tank Area* addresses the former UST area (AOC-1). Five 6,000-gallon USTs were registered with the Maryland Department of Environment (MDE) and were last known to contain methyl ethyl ketone (MEK), 2-ethoxyethanol (EE), methanol (MEOH), ethylene dichloride (EDC), and MCL. In December 1991, Cytec took these five USTs permanently out of service. Soil samples were analyzed from three exploratory borings and five monitoring wells during 1991 (see Figure 3).

MW-1A well groundwater had 12 ug/l of methylene chloride. MW-2 well groundwater had 1,800 ug/l of methylene chloride. MW-3 well groundwater had 2,200 ug/l of methylene chloride and 37 ug/l of vinyl chloride. MW-4 well groundwater had 49,000 ug/l of methylene chloride. The Maximum Contaminant Level for methylene chloride is 5 ug/l and vinyl chloride is 2 ug/l. These applicable Maximum Contaminant Levels for methylene chloride and vinyl chloride are codified at 40 CFR Part 141 and promulgated pursuant to the Safe Drinking Water Act, Section 42 U.S.C. § 300f et seq.

UST Area soil samples collected from the vadose zone (from the surface to groundwater) did not detect any COCs.

**B. AOC-2, AOC-3, SWMUs 6, 7, 10, and 18**

*The Verification Sampling Report, SWMUs No. 6, 7, 10, 18, and AOCs No. 2 and 3* presents the investigative findings for AOC-2, AOC-3, and SWMUs 6, 7, 10, and 18. Soil boring samples from SWMU 18 were analyzed for several constituents (VOCs, Semi-VOCs, and PCBs) commonly found in fuels and oils. Soil boring and groundwater samples from the remainder of the SWMUs and AOCs were analyzed for hexavalent, trivalent, and total chromium. Cytec concluded that there was no contamination present above Heath Based Numbers (HBNs) in either the four SWMUs or the two AOCs, and therefore no further investigation was recommended.

### C. Facility Wide Soils

A Phase II Soil Investigation was conducted to characterize the potential presence of COCs in on-site soils that may be acting as ongoing sources of groundwater impacts. The investigation was prompted by the detection of elevated groundwater concentrations of COCs in fence line groundwater monitoring wells MW-12D with the highest detected concentration at the well of 8,400 ug/l 1,2 DCA and MW-13D with the highest detected concentration at the well of 12,000 ug/l 1,2 DCA (Figure 3). These concentrations are not attributable to AOC-1. Because these impacts were not attributable to any documented releases, the soil investigation focused on subsurface structures, such as piping, where potential impacts could have gone unobserved. In addition, soil adjacent to the drum storage area was investigated based on its proximity to the area of greatest COC impact to groundwater. As presented in the *Phase II RFI Report Addendum*, Table 1, 1,2-DCA was detected at .42 milligram per kilogram (mg/kg) in vadose zone soil samples at SB-2 (3.5 to 4 feet below ground surface (bgs)), which is located approximately 100 feet from the southeast edge of the adhesives building. Methylene chloride was detected at 2 mg/kg in SB-6 (at 6 to 7 feet bgs) and SB-8 (at 7.5 to 8 feet bgs) at .58 mg/kg, which are located approximately 15 feet from the southwest and northwest edges of the adhesives building, respectively.

During activities completed as part of the Phase III RFI, soil samples were collected from the newly installed monitoring well locations on-site (MW-5D, MW-6D, MW-24, MW-25, and MW-26) and off-site (MW-27) (see Figure 3). As presented in attached Table 1, none of the vadose zone soil samples contained COCs.

Soil samples were collected from one on-site location (MW-25I) and two off-site locations (MW-14I and MW-15I) (see Figure 3) during the Phase IV RFI. As presented in attached Table 1, none of the vadose zone soil samples contained COCs above their respective Soil Screening Levels (SSLs).

Vadose zone soil impacts are limited to three locations, all approximately 100 feet from the adhesives Facility building and at depths ranging from 3.5 feet bgs to 8 feet bgs. The low-level concentrations in this area do not represent potential sources of impact to groundwater and are also below the respective residential and industrial Screening Levels (SLs) for direct exposure scenario. Thus the soils do not present and unacceptable risk to human health and the environment.

### D. Facility Wide Groundwater

The *Phase I RCRA Facility Investigation Report* describes the results of the EPA-approved RCRA Facility Investigation Work Plan, dated August 17, 1994. The Phase I RFI focused on assessing the impact of past activities at AOC-1 and investigating both quality and flow for overburden groundwater downgradient of AOC-1. Results of the Phase I RFI identified the following COCs for groundwater: 1,2-DCA, carbon disulfide, chloroform, MCL, trichloroethene (TCE), tetrachloroethene (PCE), 1,1,2-trichloroethane (TCA), and vinyl chloride. The highest concentrations of these COCs were detected

adjacent to the former AOC-1 source area. 1,2-DCA was detected at concentrations ranging from 29 to 52,000 ug/l. MCL was detected at concentrations ranging from 100 to 26,000 ug/l.

In 1998, the Facility conducted Phase II RFI activities to define the nature and the horizontal and vertical extents of groundwater contaminant migration beneath and adjacent to the Facility. Groundwater quality was evaluated through the collection of overburden groundwater samples from twenty-four (24) permanent monitoring wells (See Figure 3) and thirty-six (36) temporary Geoprobe® points. Samples of groundwater showed 1,2-DCA and MCL as the principal COCs in groundwater. The other COCs concentrations are several orders of magnitude lower than 1,2-DCA and MCL. The highest concentration of 1,2-DCA was found at MW-3 at 44,000 ug/l. MCL was detected in MW-4 at 490 ug/l. The groundwater sampling results from the deeper locations did not find the boundaries of the 1,2-DCA plume. The results of the Phase II RFI suggested a need for further delineation of COCs, particularly 1,2-DCA in deeper overburden groundwater at off-site locations, downgradient and to the east (*Phase II RCRA Facility Investigation Report*, BBL 1998).

A bedrock groundwater investigation which comprised the Phase II RFI Addendum involved the installation of three shallow bedrock boreholes, packer testing, installation of bedrock monitoring wells, and groundwater sampling (See Figure 3). Based on the findings of the bedrock groundwater investigation, the *Phase II RCRA Facility Investigation Addendum* concluded that the focus of the Facility stabilization and remediation should remain on the deep overburden beneath and to the east of the Facility. The concentrations of COCs were highest in the overburden and decreased in the bedrock the deeper the samples were taken. The highest concentration of 1,2-DCA in the bedrock was 5,600 ug/l and was located under the former UST area (MWBR-1).

A Phase III RFI was completed during 2006 to provide additional data to evaluate the possibility of a separate source of COCs in deeper overburden groundwater near monitoring well MW-13 and at the off-site area north of the Facility near monitoring well MW-18 to address the conclusions reached from the Phase II RFI (See Figure 3). The Phase III investigation activities included the installation of six on-site monitoring wells and one off-site monitoring well; collection of soil samples from the new monitoring well locations; and collection of groundwater samples from all newly installed wells and select existing monitoring wells. The investigation results confirmed that impacts of COCs in on-site soils are limited. None of the sample results had COCs above SLs or SSLs. Groundwater analytical results also confirmed that 1,2-DCA is the principal COC in deeper overburden groundwater both on and off-site. The highest concentration of 1,2-DCA was from an off-site well MW-27 at 12,000 ug/l. The second highest concentration of 1,2-DCA was an on-site well MW-6 which had a concentration of 9,000 ug/l of 1,2-DCA.

A Phase IV RFI report was completed during 2007 to fill in gaps in the understanding of contaminated groundwater in the intermediate and deeper portions of the groundwater (lower Talbot) and if pumping from one zone would affect the other. The Phase IV investigation revealed that the overburden (soils over bedrock) has three layers. The shallow overburden formation (upper Talbot) is made of 10 to 20 feet deep of silty soil. The intermediate overburden consists of sand and gravel. The deeper layer also consists of sand and gravel. The intermediate and deeper zones are separated by a silty clay layer. The Phase IV RFI report concluded that 1,2-DCA is the predominant COC in groundwater at the Facility. The highest COC concentrations were observed within the intermediate overburden groundwater beneath the northern portion of the adhesives Facility building and neighboring properties northeast and downgradient from the Facility boundary. In October 2008, EPA approved the Final Phase IV RFI Report which triggered the commencement of the development of a Corrective Measures Study (CMS) Work Plan.

On May 3, 2011, the Facility also conducted groundwater sampling to characterize current conditions at the Facility. The sampling focused on contamination in three water bearing zones: Shallow Overburden, Intermediate Overburden and Deep Overburden. The Shallow Overburden is 33.76 to 43.58 feet above mean sea level. The Intermediate Overburden is 22.29 to 40.73 feet above mean sea level. Deep Overburden is -.86 to 37.02 feet above mean sea level.

#### Shallow Overburden Zone

The sampling results did not detect any COCs in the Shallow Overburden zone above the Maximum Contaminant Levels or Risk Based Concentrations (RBCs).

#### Intermediate and Deep Overburden Zones

The following COCs were detected above Maximum Contaminant Levels and RBCs in intermediate and deep overburden zone groundwater in May 2011:

- 1,1,2-Trichloroethane was detected above the Maximum Contaminant Level of 5 ug/L in one of the 30 samples at a concentration of 5.4 ug/L (MW-25).
- 1,2-Dichloroethane was detected above the Maximum Contaminant Level of 5 ug/L in 19 of the 30 samples collected at concentrations ranging from 42 ug/L (MW-14I) to 1,300,000 ug/L (DDC Well).
- Methylene chloride was detected above the Maximum Contaminant Level of 5 ug/L in seven of the 30 samples collected at concentrations ranging from 8 ug/L (MW-23) to 2,900,000 ug/L (DDC Well).
- Trichloroethene was detected above the Maximum Contaminant Level of 5 ug/L in eight of the 30 samples collected at concentration ranging from 5.9 ug/L (MW-16) to 160 ug/L (MW-26).
- Vinyl chloride was detected above the Maximum Contaminant Level of 2 ug/L in three of the 30 samples collected at concentrations ranging from 4.9 ug/L (MW-26) to 8.3 ug/L (MW-16).

#### Bedrock Zone

The following COCs were detected above Maximum Contaminant Levels and Risk Based Criteria (RBCs) in samples collected from the bedrock zone groundwater in May 2011:

- 1,2-Dichloroethane was detected above the Maximum Contaminant Level of 5 ug/L in two of the four samples collected at concentrations ranging from 350 ug/L (MWBR-4) to 1,400 ug/L (MWBR-1).
- Methylene chloride was detected above the Maximum Contaminant Level of 5 ug/L in two of the four samples collected at concentrations ranging from 12 ug/L (MWBR-4) to 17 ug/L (MWBR-3).
- Trichloroethene was detected above the Maximum Contaminant Level of 5 ug/L in one of the four samples collected at a concentration of 91 ug/L (MWBR-1).
- Vinyl chloride was detected above the Maximum Contaminant Level of 2 ug/L in one of the four samples collected at a concentration of 310 ug/L (MWBR-4).

The predominant COC in groundwater at the Facility is 1,2-DCA. Other compounds detected above screening criteria in groundwater are: chloroethane, chloroform, MCL, TCE, and vinyl chloride. Impacts to groundwater appear on-site beneath operational areas and extend off the Facility to the northeast. Only limited groundwater contamination has been identified in shallow groundwater at the Facility; the majority of COCs have been detected at greater depths. The contamination has migrated from the source to the intermediate overburden. The highest detected concentrations of COCs observed in the most recent round of groundwater sampling are present east of the Adhesive Production Building. There are no known historic or current uses of chloroethane, chloroform, TCE, and vinyl chloride.

#### **D. Interim Measures**

Concurrent with the implementation of the RFI, Cytec has completed a preliminary evaluation of applicable remedial alternatives and pilot studies to contain chlorinated volatile organic carbon impacts in Facility groundwater and implemented various interim remedial measures of their own accord. Cytec used previous studies to assist with the location and type of appropriate remedial systems for groundwater. An evaluation of the geology, hydrology and extend of the contamination was conducted.

In the fall of 1996, Cytec selected the Direct Drive Convection (DDC) groundwater remediation system for a pilot study. The DDC system is an in-situ groundwater remediation system involving in-well air sparging. Details of this system and its installation and results are presented in the Phase II RCRA RFI Report which is included in the AR. Following the completion of an initial 12-week pilot program, Cytec extended the operation of the DDC system for continued remediation of the lower Talbot groundwater beneath the southeast end of the Facility. From the completion of the 12-week pilot program and through its continuous operation from December 1996 through July 1999, an estimated (based on analysis of exhaust air samples) 70 pounds of 1,2-DCA

and 118 pounds of methylene chloride had been removed from the lower Talbot by the DDC system.

The results of the in-situ air-stripping system pilot test indicated that such systems do not provide sufficient treatment and stabilization of groundwater impacts. Therefore, in 2001, a remediation system involving only groundwater extraction was implemented at the Facility.

In 2001, Cytec installed a groundwater extraction system at MW-10D which is screened within a high-permeability zone. MW-10D is located in the area of the overburden aquifer with the highest contamination. MW-10D is also located at the down gradient edge of the Facility and serves to control migration of impacted groundwater off-site. Groundwater is extracted from monitoring well MW-10D and pumped approximately 2,500 feet from the Facility to the City of Havre de Grace Publicly Operated Treatment Works (POTW) through a dedicated, double-contained pipeline. As a requirement of Cytec's National Pollutant Discharge Elimination System (NPDES) permit to discharge industrial wastewater from the Facility to the City POTW, Cytec must provide monthly compliance reports to the POTW that describe recorded daily flow data, measured weekly pH data, and annual effluent sample results. Effluent limitations required by Cytec's NPDES permit include maintaining a pH greater than 5.0 standard units and discharging no more than 15,000 gallons per day or 500 gallons in any 30-minute period. The groundwater extraction system is designed to operate at an average flow rate of 7.5 gallons per minute to the POTW, and typically pumps approximately 250,000 gallons of extracted groundwater to the POTW each month.

#### **IV. PROPOSED REMEDY.**

EPA's proposed remedy for the Facility consists of the following components:

##### **A. Soils**

Based on the available information, there are currently no unacceptable risks to human health and the environment via the soil for the present and anticipated use of the Facility property (industrial use). However, residual soil contamination remains at the Facility, thus the proposed remedy for soils is institutional controls (See Section C) to restrict the Facility to non-residential use, to protect the integrity of the groundwater portion of the remedy (See Section B below) thereby enhancing the overall protectiveness of the remedy.

##### **B. Groundwater - Long Term Monitoring**

The proposed remedy for the groundwater is the combination of groundwater use restrictions (See Section C below), enhancement of the existing groundwater extraction system through installation of two additional on-site wells, and the implementation of a groundwater monitoring program until groundwater clean-up standards are met. Based on the data collected during the RFI and a subsequent round of groundwater sampling that the Facility conducted on May 3, 2011 to characterize current conditions at the

Facility, the groundwater plume appears to be stable (not migrating), and concentrations of constituents of concern are either stable or declining over time. Groundwater is not used on the Facility for drinking water, and there are no known downgradient users of off-site groundwater between the Facility boundary and the Chesapeake Bay.

### **C. Institutional Controls**

Institutional Controls (ICs) are generally non-engineered instruments such as administrative and/or legal controls that minimize the potential for human exposure to contamination and/or protect the integrity of a remedy. Under EPA's proposed remedy, some concentrations of contaminants remain in the soils and groundwater at the Facility above levels appropriate for residential uses. As a result, the proposed remedy will require the Facility to implement ICs in order to restrict use of Facility property and groundwater to prevent human exposure to contaminants while such contaminants remain in place.

These ICs may be implemented through State of Maryland Well Construction Regulations, Article Title 9, Subtitle 13, Annotated Code of Maryland; Code of Maryland Regulation (COMAR), Title 26, Subtitle 4, Chapter 4, COMAR 26.04.04 (Regulations) local ordinances and local zoning requirements, and through site-specific institutional controls required by Permit Conditions. The ICs will restrict land use to non-residential uses and prohibit the use of groundwater as a source of potable water

The ICs shall contain the following land and groundwater use restrictions:

1. Groundwater at the Facility shall not be used for any purpose other than industrial usage and to conduct the operation, maintenance, and monitoring activities required by EPA unless it is demonstrated to EPA that, (1) such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected final remedy and (2) EPA provides prior written approval for such use;
2. No new wells shall be installed on Facility property unless EPA provides prior written approval to install such wells;
3. The Facility property shall not be used for residential purposes unless it is demonstrated to EPA that such use will not pose a threat to human health or the environment or adversely affect or interfere with the selected remedy, and EPA provides prior written approval for such use;

### **D. Reporting**

EPA's proposed remedy includes the following reporting requirements:

Compliance with and effectiveness of institutional controls and engineering controls implemented at the Facility shall be evaluated every three (3) years. The evaluation will



include, but not be limited to, a review of groundwater data from the Facility, review of groundwater and land uses within 1 mile of the Facility property boundary, and zoning maps or planning documents that may affect future land use in the impacted area. A report documenting the findings of the evaluation shall be provided to EPA.

## **V. EVALUATION OF EPA'S PROPOSED REMEDY DECISION**

This section provides a description of the criteria EPA uses to evaluate proposed remedies consistent with EPA guidance under the CA Program. The criteria are applied in two phases. In the first phase, EPA evaluates three decision threshold criteria as general goals. In the second phase, for those remedies which meet the threshold criteria, EPA then evaluates seven balancing criteria to determine which proposed decision alternative provides the best relative combination of attributes.

### **A. Threshold Criteria**

- 1. Protect Human Health and the Environment** - EPA's proposed remedy protects human health and the environment by eliminating, reducing, and/or controlling unacceptable risk through the remediation of contaminated groundwater and the implementation of institutional controls to prevent potential current and future human exposure. The existing State of Maryland well construction regulations will aid in minimizing exposure to contaminated groundwater by restricting the installation of wells in contaminated water sources. The proposed ICs restrict the use of and exposure to contaminated groundwater at the Facility. With respect to future uses, the proposed remedy requires groundwater use restrictions to minimize the potential for human exposure to contamination and protect the integrity of the remedy.
- 2. Achieve Media Cleanup Objectives** - The media cleanup objectives of the proposed remedy are as follows: groundwater should meet EPA's Maximum Contaminant Levels and SLs as applicable for contaminants of concern and soil should remain below SSLs and SLs for industrial use. EPA's proposed remedies meet the appropriate cleanup objectives based on assumptions regarding current and reasonably anticipated land and groundwater use(s). Soils at the Facility already meet media cleanup objectives for industrial use and the anticipated future land use for the Facility is industrial. Operation of an expanded on-site groundwater extraction system would maintain hydraulic control of impacted groundwater. Groundwater cleanup goals will be achieved more quickly with enhancement of this system, as additional groundwater would be extracted from throughout the 1,2-DCA plume area.
- 3. Remediating the Source of Releases** - In its RCRA remedy decisions, EPA seeks to eliminate and/or reduce further releases of hazardous wastes or hazardous constituents that may pose a threat to human health and the environment. Operation of an expanded groundwater extraction system

would continue to maintain hydraulic control and provide additional remediation of the impacted groundwater, as contaminated groundwater would be recovered directly from the 1,2-DCA source area. At SMWUs and AOCs where contamination is left in place, i.e., sources which are undergoing remediation, institution controls will be implemented to restrict residential use.

**B. Balancing/Evaluation Criteria**

1. **Long-Term Effectiveness** - EPA's proposed decision requires the compliance with and maintenance of land use and groundwater use restrictions referred to herein as Institutional Controls (ICs) at the Facility. The proposed ICs which EPA anticipates will be implemented through a permit will maintain protection of human health and the environment over time by controlling exposure to the hazardous constituents remaining in groundwater and protecting the integrity of the remedy. EPA has also proposed long-term effectiveness will also be assured by the operation and maintenance of an expanded groundwater extraction system. The system will allow for hydraulic control of impacted groundwater.
2. **Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents** - Operation of an expanded groundwater extraction system will reduce the volume of COCs migrating from the 1,2-DCA source areas, at the Facility, and neighboring areas thereby reducing mobility. The reduction in the mobility of COCs will reduce the potential risk associated with migration of groundwater impacts (reducing the toxicity) by maintaining hydraulic control. The system will remove COCs from the subsurface through groundwater extraction (reducing the volume), and the extracted water will be discharged to the POTW, where it will receive treatment, destroying the COCs (also reducing the toxicity).
3. **Short-Term Effectiveness** - Installation of equipment to expand the groundwater stabilization system will pose minimal impact to nearby receptors. Minor truck traffic to deliver supplies and conduct drilling will be required; however, all work will be completed on the Facility. In addition, EPA anticipates that the land use and groundwater use restrictions will be fully implemented shortly after the issuance of the Final Decision and Response to Comments.
4. **Implementability** - The two components of EPA's proposed remedy are readily implementable. EPA proposes to implement the institutional controls through a permit and the existing groundwater stabilization will be upgraded with readily available equipment to handle the proposed increase in flow and provide more efficient system operation.

5. **Cost** - The estimated capital cost of the remedy is \$237,000. The additional Operation and Maintenance cost (inclusive of long-term monitoring) for this alternative ranges from \$76,000 to \$106,000. The total present worth cost estimate for this alternative is approximately \$1,255,000.
6. **Community Acceptance** - EPA will evaluate the community's acceptance of the proposed remedy during the public comment period and will be described in the Final Decision and Response to Comments.
7. **State/Support Agency Acceptance** - EPA will evaluate the State of Maryland's acceptance of the proposed remedy based on comments received from MDE during the public comment period and will describe the State's position in the Final Decision and Response to Comments.

## **VI. PUBLIC PARTICIPATION**

Written comments on this SB and the Draft Corrective Action Permit will be accepted during the forty-five (45) day public comment period. A final permit decision regarding the remedy proposed for the Facility will not be made until the public comment period has closed and all comments have been evaluated and addressed. Based on new information or comments from the public, EPA may modify the proposed remedy and/or the Draft Corrective Action Permit.

Following review of the comments, EPA will respond to comments and finalize the remedy and the Permit. The proposed remedy in this SB is a preliminary determination and should another remedy be selected based upon public comment or new information, any significant differences from this SB could cause a reopening of the public comment period and the reissuance of a revised SB.

The public comment period will last forty-five (45) calendar days from the date of the public notice in order to provide an opportunity for public comment and involvement during the evaluation of this proposal. This SB provides only a summary description of the investigations and activities performed at this Facility. EPA encourages the public to review the documents in the AR to gain a more comprehensive understanding of the activities that have been conducted at the Facility and the proposals under consideration. The AR contains all information considered by EPA in reaching this proposed decision. It is available for public review during normal business hours at:

U.S. Environmental Protection Agency Region 3  
1650 Arch Street  
Philadelphia, PA 19103-2029  
Contact: Leonard Hotham  
Remedial Project Manager  
Office of Remediation (3LC20)  
Phone: (215) 814-5778  
Email: [hotham.leonard@epa.gov](mailto:hotham.leonard@epa.gov)

Written comments must be postmarked within forty-five (45) calendar days of the public notice. EPA will address all comments received during the public comment period in the Final Permit and Response to Comments.

If requested, during the forty-five (45) day public comment period, EPA will hold a public hearing to accept oral comments on the proposed remedies and the alternatives. Comments made at the hearing will be transcribed, and a copy of the transcript will be added to the AR. Any interested person may request a public hearing or additional information by mailing or e-mailing to the above address.

Date: 9/18/12



Abraham Ferdas, Director  
Land and Chemicals Division  
US EPA, Region III

**Attachments**

Figure 1: Location Map

Figure 2: SWMUs and AOC location map

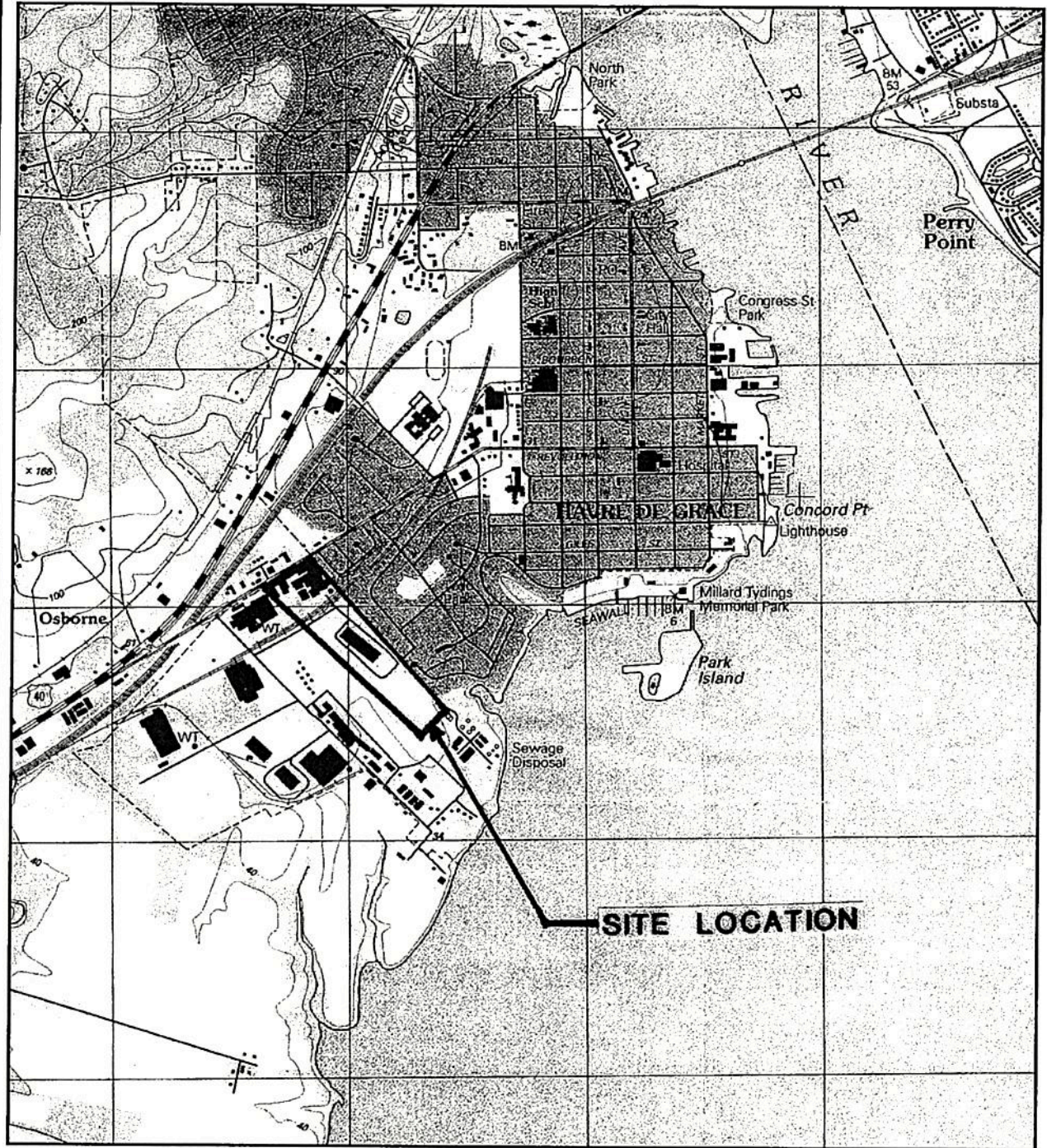
Figure 3: Monitoring Wells Location Map

Table 1: Summary of Site-Wide Soil Results

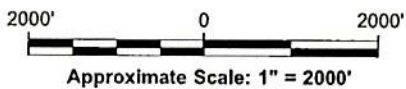
Administrative Record Index

**Figure 1**





REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., HAVRE DE GRACE, MD, 1992.



Area Location

CYTEC ENGINEERED MATERIALS INC.  
 HAVRE DE GRACE, MARYLAND  
**CORRECTIVE MEASURES STUDY REPORT**

**SITE LOCATION MAP**

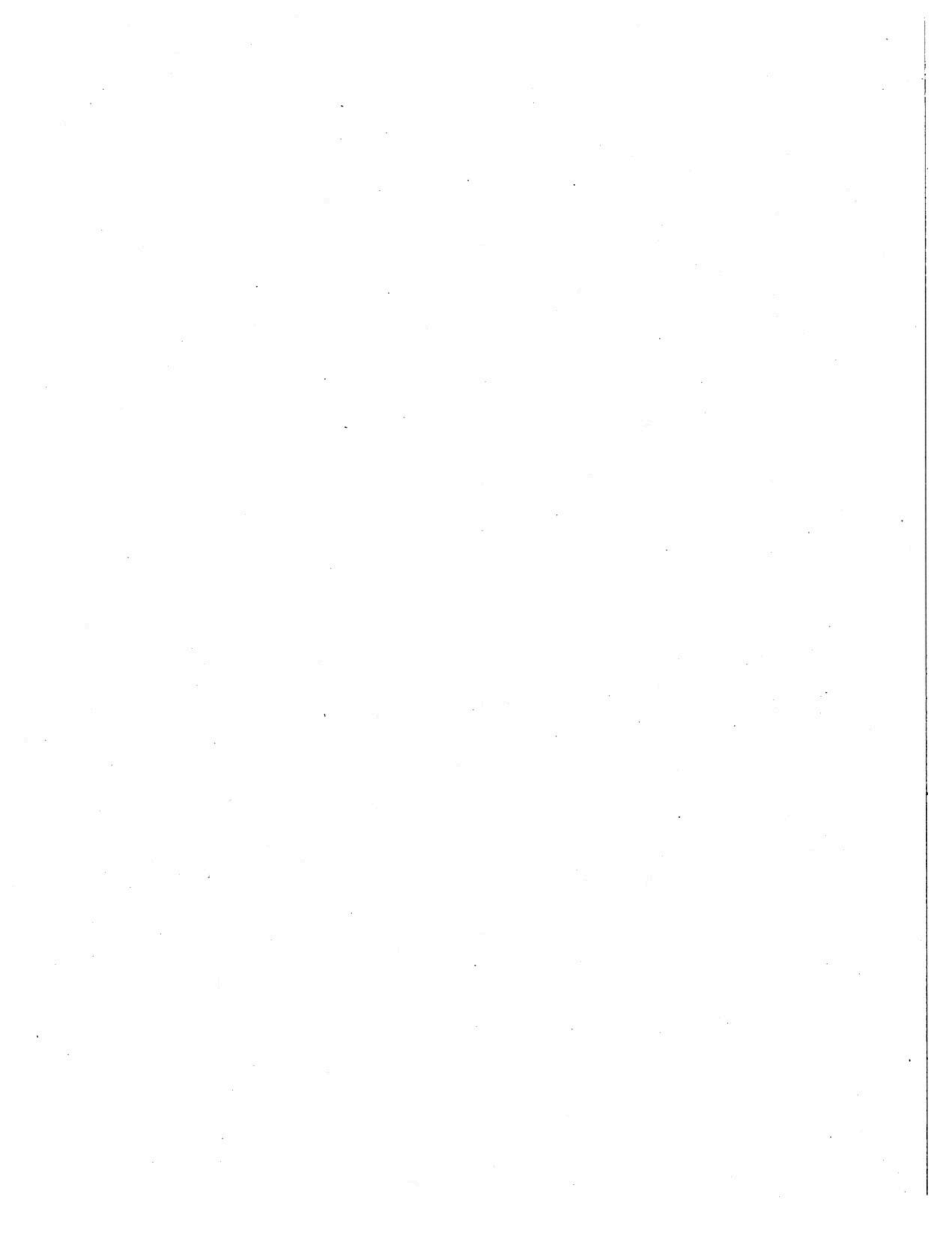


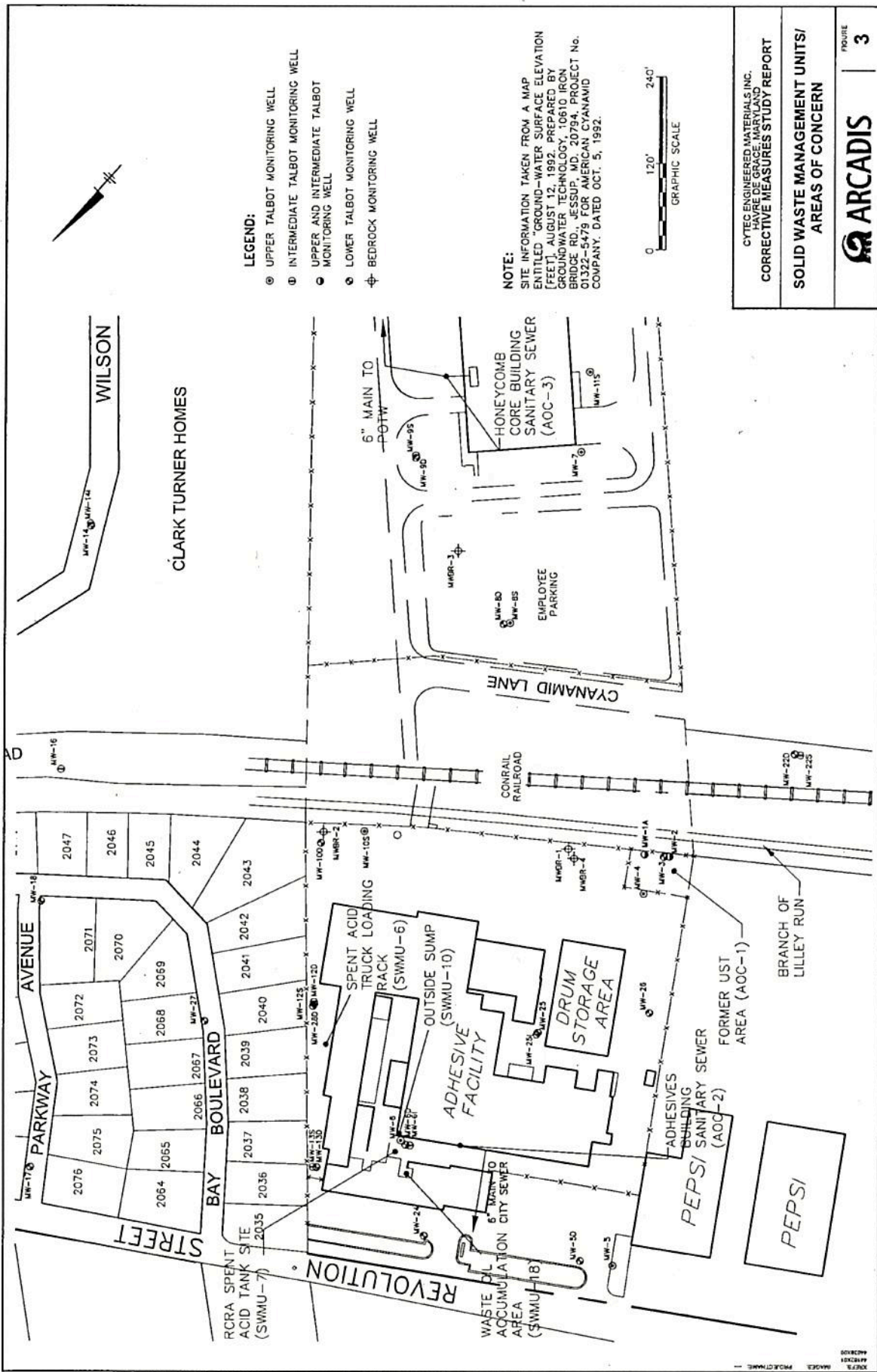
FIGURE  
**1**





**Figure 2**





**LEGEND:**

- UPPER TALBOT MONITORING WELL
- ⊖ INTERMEDIATE TALBOT MONITORING WELL
- UPPER AND INTERMEDIATE TALBOT MONITORING WELL
- ⊙ LOWER TALBOT MONITORING WELL
- ⊕ BEDROCK MONITORING WELL

**NOTE:**

SITE INFORMATION TAKEN FROM A MAP ENTITLED "GROUND-WATER SURFACE ELEVATION [FEET], AUGUST 12, 1992. PREPARED BY GROUNDWATER TECHNOLOGY, 10610 IRON BRIDGE RD., JESSUP, MD. 20794, PROJECT No. 01332-5479 FOR AMERICAN CYANAMID COMPANY. DATED OCT. 5, 1992.



CYTEC ENGINEERED MATERIALS INC.  
HAVRE DE GRACE, MARYLAND  
**CORRECTIVE MEASURES STUDY REPORT**

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**SOLID WASTE MANAGEMENT UNITS/  
AREAS OF CONCERN**

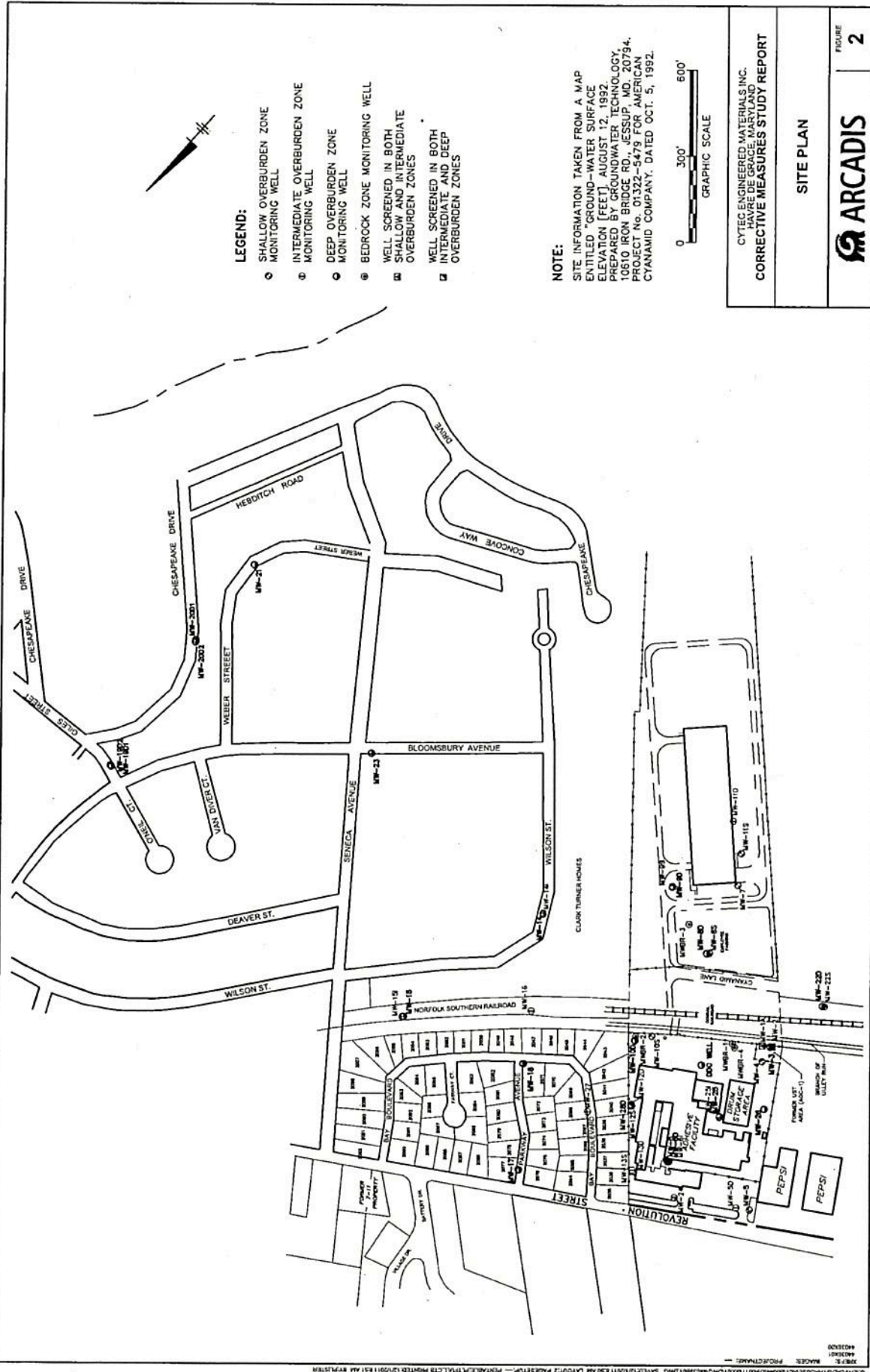
---

**ARCADIS** | FIGURE 3



**Figure 3**





**LEGEND:**

- SHALLOW OVERBURDEN ZONE MONITORING WELL
- ⊙ INTERMEDIATE OVERBURDEN ZONE MONITORING WELL
- DEEP OVERBURDEN ZONE MONITORING WELL
- ⊗ BEDROCK ZONE MONITORING WELL
- ⊠ WELL SCREENED IN BOTH SHALLOW AND INTERMEDIATE OVERBURDEN ZONES
- ⊡ WELL SCREENED IN BOTH INTERMEDIATE AND DEEP OVERBURDEN ZONES

**NOTE:**

SITE INFORMATION TAKEN FROM A MAP ENTITLED "GROUND-WATER SURFACE ELEVATION (FEET) AUGUST 12, 1992 PREPARED BY GROUNDWATER TECHNOLOGY 10510 IRON BRIDGE ROAD, JESSUP, MD 20794. PROJECT No. 01322-5479 FOR AMERICAN CYANAMID COMPANY, DATED OCT. 5, 1992.



|   |                    |
|---|--------------------|
| CYTEC ENGINEERED MATERIALS INC.<br>HAVRE DE GRACE, MARYLAND |                    |
| CORRECTIVE MEASURES STUDY REPORT                            |                    |
| SITE PLAN   |                    |
| <b>ARCADIS</b>  | FIGURE<br><b>2</b> |

DATE: 10/15/92  
 DRAWN: J. J. HARRIS  
 CHECKED: J. J. HARRIS  
 PROJECT: CORRECTIVE MEASURES STUDY REPORT  
 CLIENT: CYTEC ENGINEERED MATERIALS INC.  
 LOCATION: HAVRE DE GRACE, MARYLAND  
 SHEET: 2 OF 2





**Table 1**

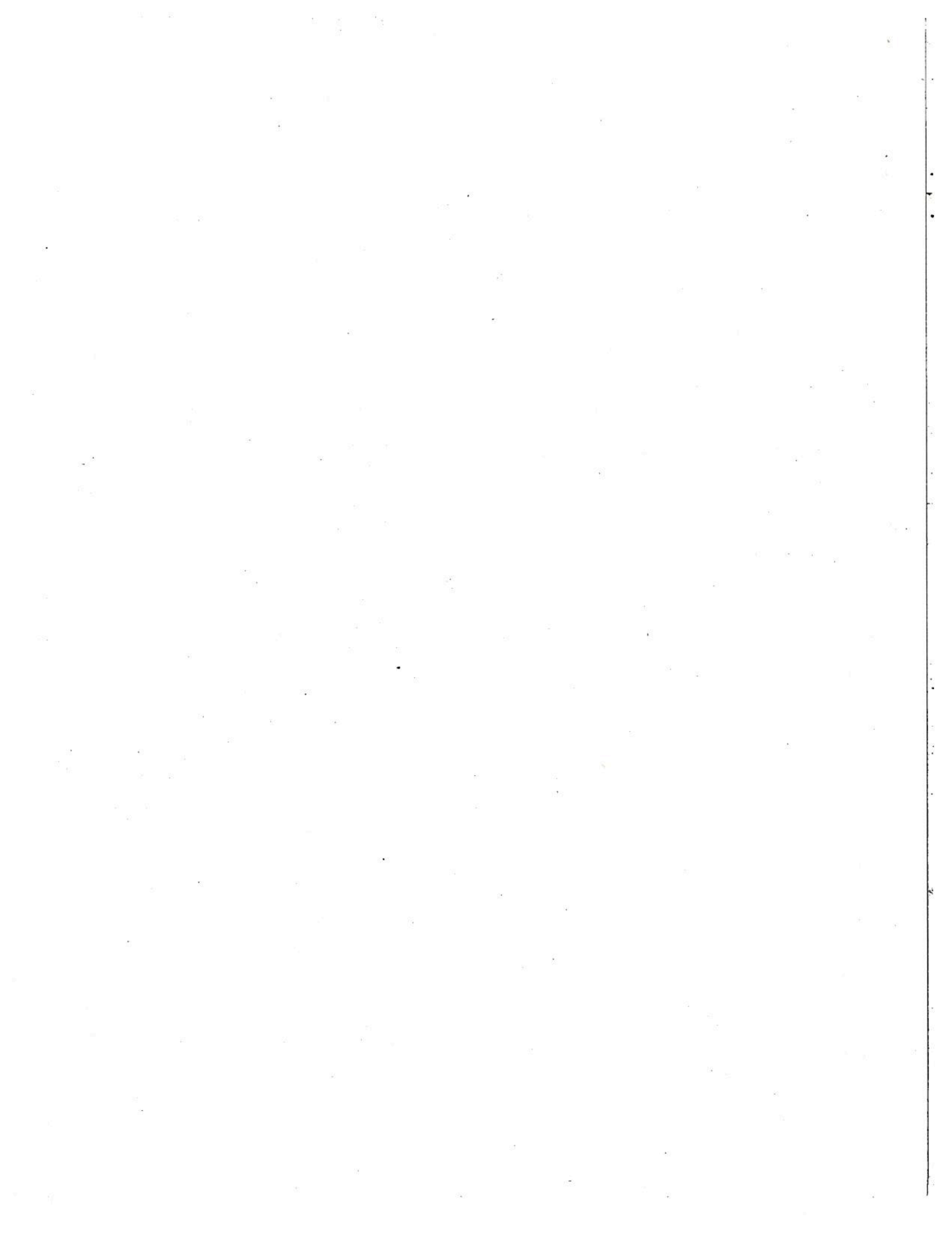


Table 2  
 Summary of Vadose Zone Soil Sampling Results - Detected Constituents  
 Cytec Industries Inc.  
 Havre de Grace, Maryland  
 Corrective Measures Study Report

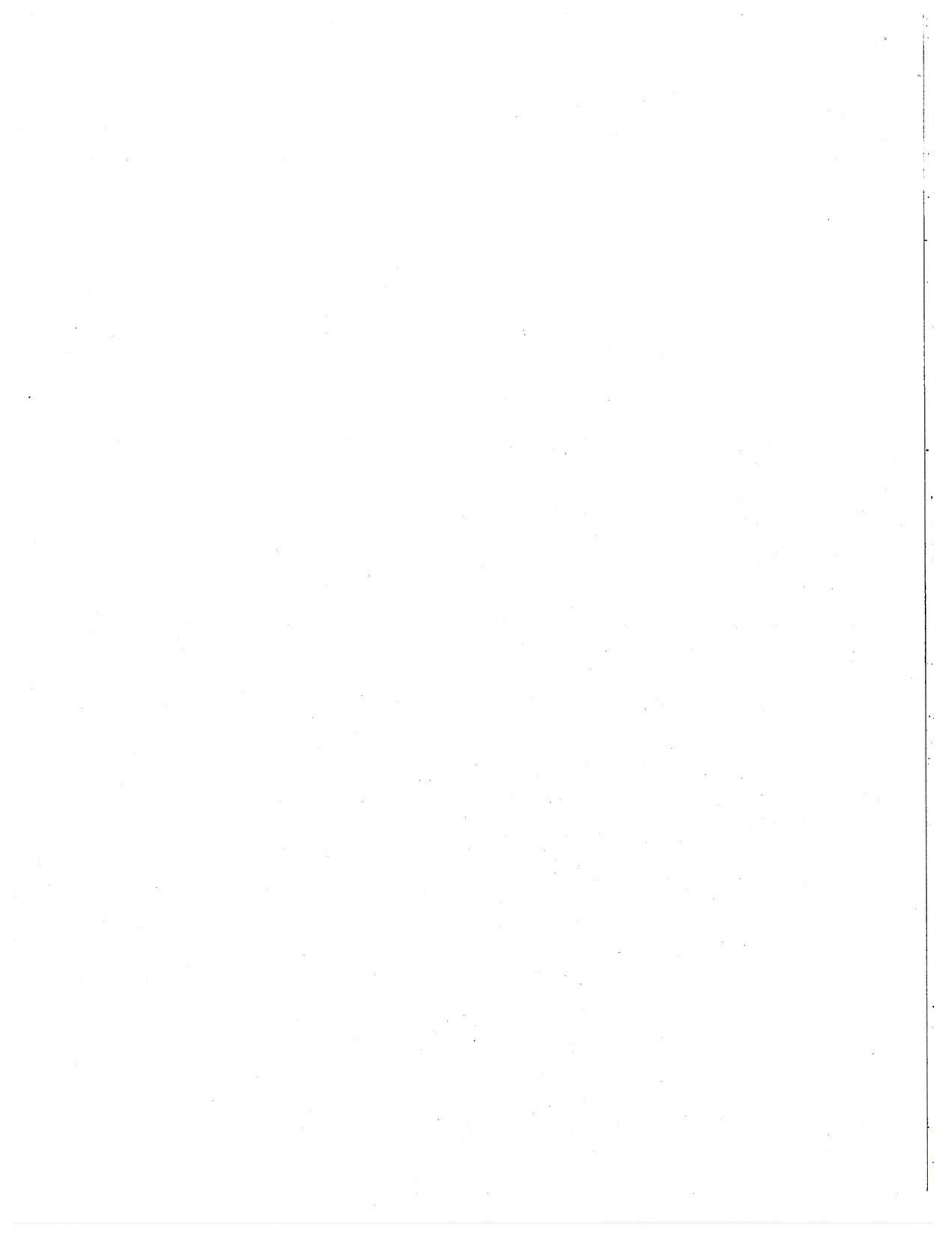
| Sample Location ID<br>Sample Depth (ftags)<br>Data Collector | Phase II RFI Addendum  |                            |                             |                             |                           |                               |                           |                           |                           |                           |                            |
|--|------------------------|----------------------------|-----------------------------|-----------------------------|---------------------------|-------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|
|  | VI<br>MW-5<br>0.7/0.92 | SB1(10)<br>1.5<br>0.6/1.98 | SB2(3.5)<br>3.5<br>0.6/1.98 | SB3(6.5)<br>6.5<br>0.8/2.98 | SB4(10)<br>10<br>0.8/3.98 | SB5(16.5)<br>16.5<br>0.8/3.98 | SB6(23)<br>23<br>0.8/3.98 | SB7(30)<br>30<br>0.8/3.98 | SB8(37)<br>37<br>0.8/3.98 | SB9(44)<br>44<br>0.8/3.98 | SB10(51)<br>51<br>0.8/3.98 |
| <b>Detected Volatile Organics</b>                            |                        |                            |                             |                             |                           |                               |                           |                           |                           |                           |                            |
| 1,1,2-Trichloroethane  | 0.000082               | 0.47 U                     | 600 U                       | 0.76 U                      | 0.51 U                    | 0.52 U                        | 0.52 U                    | 0.49 U                    | 0.50 U                    | 0.47 U                    | 0.47 U                     |
| 1,2-Dichloroethane   | 0.000044               | 0.72 U                     | 0.47 U                      | 0.76 U                      | 0.51 U                    | 0.52 U                        | 0.52 U                    | 0.49 U                    | 0.50 U                    | 0.47 U                    | 0.47 U                     |
| Acetone  | 4.4                    | 1.4 U                      | NA                          | NA                          | NA                        | NA                            | NA                        | NA                        | NA                        | NA                        | NA                         |
| Bromofluorobenzene   | --                     | NA                         | 5.2                         | 7.5                         | 5.2                       | 4.9                           | 5.3                       | 4.8                       | NA                        | 4.4                       | 4.4                        |
| Chloroform   | 0.000055               | 0.47 U                     | 0.60 U                      | 0.76 U                      | 0.51 U                    | 0.52 U                        | 0.52 U                    | 0.49 U                    | 0.50 U                    | 0.47 U                    | 0.47 U                     |
| Methylene Chloride   | 0.00012                | 0.47 U                     | 0.60 U                      | 0.76 U                      | 0.51 U                    | 0.52 U                        | 0.52 U                    | 0.49 U                    | 0.50 U                    | 0.47 U                    | 0.47 U                     |
| Trichloroethene  | 0.000061               | 0.47 U                     | 0.60 U                      | 0.76 U                      | 0.51 U                    | 0.52 U                        | 0.52 U                    | 0.49 U                    | 0.50 U                    | 0.47 U                    | 0.47 U                     |

| Sample Location ID<br>Sample Depth (ftags)<br>Data Collector | Phase III RFI     |                          |                          |                          |                         |                  |                         |                         |                         |                         |                         |
|--|-------------------|--------------------------|--------------------------|--------------------------|-------------------------|------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|  | MW-5D<br>0.7/0.92 | MW-5D<br>1.5<br>0.7/2.06 | MW-5D<br>3.5<br>1.0/3.12 | MW-5D<br>6.5<br>1.0/3.12 | MW-5D<br>10<br>1.0/3.12 | MW-24<br>17/20.6 | MW-25<br>23<br>1.0/3.12 | MW-25<br>30<br>1.0/3.12 | MW-25<br>37<br>1.0/3.12 | MW-25<br>44<br>1.0/3.12 | MW-27<br>51<br>1.0/3.12 |
| <b>Detected Volatile Organics</b>                            |                   |                          |                          |                          |                         |                  |                         |                         |                         |                         |                         |
| 1,1,2-Trichloroethane  | 0.000082          | 0.0027 U                 | 0.0027 U                 | 0.0027 U                 | 0.0027 U                | 0.0026 U         | 0.0030 U                | 0.0033 U                | 0.0030 U                | 0.0028 U                | 0.0028 U                |
| 1,2-Dichloroethane   | 0.000044          | 0.0018 U                 | 0.0018 U                 | 0.0018 U                 | 0.0018 U                | 0.0017 U         | 0.0020 U                | 0.0022 U                | 0.0020 U                | 0.0019 U                | 0.0019 U                |
| Acetone  | 4.4               | NA                       | NA                       | NA                       | NA                      | NA               | 0.023                   | 0.0055 U                | NA                      | NA                      | 0.0047 U                |
| Bromofluorobenzene   | --                | NA                       | NA                       | NA                       | NA                      | NA               | NA                      | NA                      | NA                      | NA                      | NA                      |
| Chloroform   | 0.000055          | 0.0045 U                 | 0.0046 U                 | 0.0048 U                 | 0.0044 U                | 0.0050 U         | 0.0044 U                | 0.0055 U                | 0.0050 U                | 0.0047 U                | 0.0047 U                |
| Methylene Chloride   | 0.00012           | 0.0027 U                 | 0.0027 U                 | 0.0028 U                 | 0.0027 U                | 0.0025 U         | 0.0030 U                | 0.0033 U                | 0.0030 U                | 0.0028 U                | 0.0028 U                |
| Trichloroethene  | 0.000061          | 0.00090 U                | 0.00090 U                | 0.0010 U                 | 0.00090 U               | 0.0010 U         | 0.00090 U               | 0.0011 U                | 0.0010 U                | 0.00090 U               | 0.00090 U               |

| Sample Location ID<br>Sample Depth (ftags)<br>Data Collector | Phase IV RFI      |                          |
|--|-------------------|--------------------------|
|  | MW-51<br>0.7/0.92 | MW-251<br>51<br>1.0/3.12 |
| <b>Detected Volatile Organics</b>                            |                   |                          |
| 1,1,2-Trichloroethane  | 0.000082          | 0.0032 U                 |
| 1,2-Dichloroethane   | 0.000044          | 0.0022 U                 |
| Acetone  | 4.4               | NA                       |
| Bromofluorobenzene   | --                | NA                       |
| Chloroform   | 0.000055          | 0.0047 U                 |
| Methylene Chloride   | 0.00012           | 0.0032 U                 |
| Trichloroethene  | 0.000061          | 0.0011 U                 |

Notes:  
 SSL - USEPA Region 3 Risk-Based Soil Screening Levels (SSLs) for Protection of Groundwater (September 2008).  
 Bolded and shaded results indicate exceedance of the SSL.  
 U - Compound not detected above reported sample quantitation limit.

- 1. - The compound was identified; however, the associated numerical value is an estimated concentration.
- 1. VI - Verification Sampling Report, Area of Concern No. 1 Underground Storage Tank Area (Groundwater Technology, Inc., 1992).
- 2. Phase II RFI Addendum - Phase II RCRA Facility Investigation Report (RFI) Addendum (BBL, 1999).
- 3. Phase III RFI - Phase III (ARCADIS BBL, 2007).
- 4. Phase IV RFI - Phase IV (ARCADIS, 2008).



**Administrative Record for Cytec**

1. Final Phase II RCRA Facility Assessment (RFA) (1990-1991)
2. Corrective Action Permit (MDD 003 075 942) (September 27, 1991)
3. Verification Sampling Report Area of Concern No. I Underground Storage Tank Area, Groundwater Technology, Inc. [GTI] (October 5, 1992)
4. The Verification Sampling Report, SWMUs No. 6, 7, 10, 18, and AOCs No. 2 and 3 (GTI, October 6, 1992)
5. The Phase I RCRA Facility Investigation Report (BBL, 1995)
6. Phase II RCRA Facility Investigation Report, (BBL, April 1998, Revised January 1999)
7. Phase II RCRA Facility Investigation Addendum (BBL, September 1999)
8. Phase III RFI Report, ARCADIS-BBL, (2007)
9. Final Phase IV RCRA RFI Report (October 22, 2008)
10. Corrective Measures Study (January 2012)

