Five-Year Review Report

Second Five-Year Review Report

CryoChem Superfund Site

Boyertown, Pennsylvania

September 2008

PREPARED BY:

U. S. Environmental Protection Agency
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Date:

9/30/08

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List of 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
COC	Contaminants of Concern
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
FFS	Focused Feasibility Study
MCL	Maximum Contaminant Level
MSC	Medium-Specific Concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
ppb	part per billion
ppm	part per million
PRP	Potentially Responsible Party
RA	Remedial Action
RBC	Risk Based Concentration
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
SSC	State Superfund Contract
TAL	Target Analyte List
TBC	To Be Considered
UAO	Unilateral Administrative Order
UV	Ultraviolet
VOC	Volatile Organic Compounds

Executive Summary

The CryoChem Superfund Site, located in Berks County, Pennsylvania is divided into three operable units (OUs). The selected remedy for OU-1 (Drinking Water Supply) includes the installation, operation and maintenance of dual activated-carbon adsorption units at residences affected by site-related contaminants. The selected remedy for OU-2 (Area-Wide Groundwater) includes the installation of nine groundwater extraction wells and the construction of a groundwater treatment system which consists of air stripping and vapor phase carbon for the removal of Site-related contaminants. Treated groundwater is discharged to a stream adjacent to the treatment plant. The selected remedy for OU-3 (Site Soils), soil vapor extraction, was never implemented because subsequent sampling confirmed that the contamination was below the clean-up levels established in the ROD. The Site achieved construction completion status when the Preliminary Closeout Report (PCOR) was signed on September 22, 1998.

EPA has issued three Explanations of Significant Difference (ESD) for the Site. The first ESD was issued in September 1994 documenting the continued use of the dual activated-carbon adsorption units at affected properties as an interim action for OU-1. Initially, an alternate water supply was to be provided for the home and business owners that were affected by the contaminated groundwater plume, but a majority of affected residents resisted this alternative. The second ESD was issued in September 1998 and documented a change in the selected remedy for OU-3 from treating contaminated soil utilizing soil vapor extraction technology to No Further Action. EPA issued the third ESD in August 2004. The ESD documented the selection of the dual activated-carbon adsorption units as the final remedy for OU-1. The ESD also changed the cleanup level for 1,1-dichloroethane (DCA) for OU-1 and OU-2 and added 1,4-dioxane to the OU-1 and OU-2 groundwater monitoring programs.

The trigger for this second Five-Year Review was the date of the first Five-Year Review, September 29, 2003. As of this second Five-Year Review, EPA has determined that the remedial actions taken at the Site are operating and functioning as intended by the decision documents. The immediate threats have been addressed through the installation of the dual activated-carbon adsorption units on the residential wells and the groundwater extraction and treatment system.

The remedial actions for OU-1 and OU-3 are protective. The dual activated-carbon treatment systems that have been installed at residences affected by the contaminated groundwater plume (OU-1) and the routine monitoring program ensure that no additional exposures will occur. Further, the groundwater pump and treat system installed as part of OU-2 has been effective in significantly reducing the level of contaminants in the groundwater. EPA will evaluate the need for institutional controls as an additional means of preventing exposure to contaminants. The remedy selected for Site soils (OU-3), soil vapor extraction, was never implemented because subsequent sampling confirmed that contamination was below the clean-up levels selected in the ROD.

While the OU-2 groundwater remedy is continuing to operate, a determination regarding the short-term protectiveness of the remedy is being deferred until after a vapor intrusion evaluation is performed and the need for institutional controls is evaluated. The time required to perform these evaluations is approximately two years. After EPA and PADEP have reviewed the information, EPA will make a short-term protectiveness determination regarding the groundwater. The remedial action associated with the OU-2 groundwater remedy is expected to be protective in the long-term once clean-up standards have been met.

Government Performance Review Act (GPRA) Measure Review

As part of this Five-Year Review, the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

Environmental Indicators

Human Health: Current Human Exposure Controlled and Protective Remedy In-Place
Groundwater Migration: Groundwater Migration Under Control

As a result of this Five-Year Review, EPA plans to change the Human Health Environmental Indicator to: Insufficient Data to Determine Human Exposure Control Status

Site-wide Ready for Anticipated Use (RAU)

The site is planned for Site-wide RAU on September 30, 2010.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: CryoChem, Incorporated Superfund Site		
EPA ID: PAD002360444		
EPA Region III	**State:** Pennsylvania	**City/County:** Boyertown/Berks County

SITE STATUS	
NPL status: X Final _ Deleted _ Other (specify)	
Remediation status: _Under Construction **X** Operating **X** Complete	
Multiple OUs?* X YES_NO	**Construction completion date:** 09/22/1998
Has site been put into reuse? __YES__X_NO	

REVIEW STATUS	
Lead agency: X EPA State Tribe Other Federal Agency	
Author name: Timothy M. Gallagher	
Author title: Remedial Project Manager	**Author Affiliation:** U. S. EPA - Region 3
Review period: 12/13/2007 to 9/2008	
Date(s) of site inspection: 6/10/2008 & 6/27/ 2008	
Type of review: X Post-SARA __ Pre-SARA __ NPL-Removal only __ Non-NPL Remedial Action Site __ NPL State/Tribe-lead	
Review number: _ 1 (first) **X** 2 (second) _ 3 (third) Other	
Triggering action: Previous Five-Year Review Report	
Triggering action date (from WasteLAN): 09/29/2003	
Due date (five years after triggering action date): 09/29/2008	

Five-Year Review Summary Form, cont'd.

Issues:

1. State Superfund Contract
2. Vapor Intrusion
3. Institutional Controls

Recommendations and Follow-up Actions:

1. Preparation of an SSC to delineate O&M responsibility
2. Perform a Vapor Intrusion evaluation
3. Evaluate need for Institutional Controls

Protectiveness Statement(s):

The remedial actions for OU-1 and OU-3 are protective. The dual activated-carbon treatment systems that have been installed at residences affected by the contaminated groundwater plume (OU-1) and the routine monitoring program ensure that no additional exposures will occur. Further, the groundwater pump and treat system installed as part of OU-2 has been effective in significantly reducing the level of contaminants in the groundwater. EPA will evaluate the need for institutional controls as an additional means of preventing exposure to contaminants. The remedy selected for Site soils (OU-3), soil vapor extraction, was never implemented because subsequent sampling confirmed that contamination was below the clean-up levels selected in the ROD.

While the OU-2 groundwater remedy is continuing to operate, a determination regarding the short-term protectiveness of the remedy is being deferred until after a vapor intrusion evaluation is performed and the need for institutional controls is evaluated. The time required to perform these evaluations is approximately two years. After EPA and PADEP have reviewed the information, EPA will make a short-term protectiveness determination regarding the groundwater. The remedial action associated with the OU-2 groundwater remedy is expected to be protective in the long-term once clean-up standards have been met.

Other Comments:

Nothing noted.

I. INTRODUCTION

The purpose of the Five-Year Review is to determine whether a remedy is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The U.S. Environmental Protection Agency (the "Agency" or "EPA") is preparing this Five-Year Review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The EPA, Region III, has conducted this second Five-Year Review of the remedial actions implemented at the CryoChem Superfund Site ("the Site") located in Boyertown, Pennsylvania. The triggering action for this review is the date of the first Five-Year Review, September 29, 2003, as shown in the EPA's WasteLAN database. This review was conducted for the entire Site from December 2007 through September 2008 by the Remedial Project Manager with assistance from the U.S. Army Corps of Engineers and EA Engineering, the EPA site contractor. This report documents the results of the review.

This Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II. SITE CHRONOLOGY

Table 1 - Chronology of Site Events

Event	Date
CryoChem, Inc., previously named CryoChem Engineering and Fabrication, Incorporated, begins operations at the site.	1962
CryoChem used a material containing the solvent 1,1,1-trichloroethane (1,1,1-TCA) to remove a crack-seeking dye from finished metal products. Excess solvent was collected in shop drains and ultimately discharged into nearby surface waters. An unspecified quantity of 1,1,1-TCA was spilled into the shop drain near the dye wiping process sometime during the early 1980s.	1973 to 1983
Pennsylvania Department of Environmental Resources (PADER) sampled nine residential wells located near the CryoChem facility and detected the presence of chlorinated solvents, including 1,1,1-TCA.	1981
PADER inspects the CryoChem facility and determines an uncontained drum storage area is located approximately 10 feet from where the 1,1,1-TCA spill occurred. Aqueous samples collected during the site visit reveal high levels of 1,1,1-TCA.	1982
PADER finds CryoChem, Inc. in violation of the Clean Streams Act for discharging industrial wastes without a permit.	1983
Gilbert Associates, Inc., consultants to CryoChem, Inc. submit a report to PADER identifying low levels of chlorinated solvents in site groundwater and surface water.	May 1983
EPA samples groundwater, surface water, sediments and residential wells in the vicinity of the site. Various chlorinated organic compounds are identified.	December 1983
EPA proposes the CryoChem Site for the National Priorities List (NPL).	June 10, 1986
EPA installs treatment units on residential wells at 13 properties as part of a Removal Response Action.	September 1987
EPA signs a Consent Order with CryoChem PRPs to conduct an RI/FS.	February 1988
The CryoChem Site is placed on the NPL.	October 4, 1989
EPA completes a Focused Feasibility Study (FFS) for OU-1 to evaluate remedial alternatives for providing an alternate drinking water supply for residential wells. Based on the FFS, EPA installs treatment units on seven additional properties.	September 26, 1989
EPA issues the Record of Decision (ROD) for OU-1 which outlines continued O&M of residential treatment systems and development of a permanent clean water supply.	September 29, 1989
JACA Corporation submits the Final RI/FS report for the CryoChem site on behalf of the PRPs.	June 1990
EPA issues the ROD for OU-2 which outlines the design and installation of the groundwater extraction and treatment system.	September 28, 1990

Event	Date
EPA issues the ROD for OU-3 which outlines the utilization of soil vapor extraction to remove soil contaminants.	September 30, 1991
EPA issues the Explanation of Significant Difference (ESD) for OU-1 which outlines an interim action change in the selected remedy from the development and construction of an alternate water supply to continued use of dual activated-carbon units at homes and business affected by Site-related groundwater contaminants.	September 22, 1994
EPA issues Technical Memorandum for OU-1 which outlines monitoring and maintenance changes to the ESD Scope of Work.	September 20, 1996
Unilateral Administrative Order issued for implementation of the OU-1 ROD, as modified by the September 1994 OU-1 ESD and the September 1996 OU-1 Technical Memorandum.	September 30, 1996
CH2M Hill submits the Remedial Action Report documenting the completion of construction of the OU-2 groundwater extraction and treatment system. OU-2 determined to be "operational and functional".	May 30, 1998
EPA issues ESD for OU-3 which outlines the change in the selected remedy from soil vapor extraction to No Further Action.	September 22, 1998
Preliminary Closeout Report (PCOR) is signed.	September 22, 1998
Consent Decree issued for reimbursement of response costs.	December 3, 2002
First Five-Year Review for the Site is issued.	September 29, 2003
EPA issues an ESD for OU-1 to document the following for OU-1: 1) Recognition of the carbon treatment units as the final remedy; 2) Change the cleanup level for 1,1-DCA; and 3) Include 1,4-dioxane in the groundwater monitoring program. The ESD also documents the following for OU-2: 1) Change the cleanup level for 1,1-DCA and 2) Include 1,4-dioxane in the groundwater monitoring program.	August 3, 2004
Submission of the Geo-Trans Groundwater Modeling Report	September 15, 2006
Completion of the OU-2 Long Term Remedial Action and transfer of O&M responsibility to PADEP.	May 29, 2008

III. Background

Physical Characteristics

The Site is located within the village of Worman, along route 562 (Boyertown Pike) in the Townships of Earl and Douglass in Berks County, Pennsylvania, approximately 3 miles west of the city of Boyertown (Figure 3). Although the entire Site encompasses approximately 19 acres, the area of concern is mainly confined to the southern four acres that include the former CryoChem facility, a metals fabrication building, an office building, several warehouses and numerous adjacent residential properties.

Land and Resource Use

Currently, the 19-acre Site is being leased and operated by Apex Industries for metal fabrication. Surrounding the Site are residential properties and farmland. A gas station with a convenience store, U.S. Gas (formerly Mike's Fancy Auto Shop), is located across Route 562 from the Site. Immediately west of the Site, C. S. Garber Drilling owns and operates an office and equipment yard. Other light industry and a small restaurant are also located east and west of the Site along Route 562.

History of Contamination

Beginning in the early 1960s, CryoChem manufactured metal products, primarily pressure vessels at the Site. Prior to 1982, CryoChem used an organic solvent containing at least 93.5% 1,1,1-trichloroethane (TCA) to remove a dye that was applied to welded connections to check the integrity of the weld. Spilled solvent is suspected to have collected in the shop drain system that discharged into on-Site surface waters that led to the Ironstone and Manatawny Creeks. In addition, spilled solvent was also discarded at the rear of the fabrication building resulting in a limited area of soil contamination and, subsequently, groundwater contamination. Contamination in groundwater at the Site consists primarily of volatile organic compounds (VOCs). A series of environmental samples collected between 1981 and 1987 by the Pennsylvania Department of Environmental Resources (PADER), EPA, and other parties revealed numerous VOCs in an on-Site production well and in nearby residential wells. VOCs were also detected in on-Site surface waters that flow into Ironstone Creek and, eventually, into Manatawny Creek.

Initial Response

On June 10, 1986, EPA proposed that the Site be added to the National Priorities List (NPL) based upon its Hazard Ranking System score of 28.58. The Site was added to the NPL on October 4, 1989.

In February 1988, EPA entered into a Consent Agreement with CryoChem, Inc. and eight other potentially responsible parties (PRPs) for the Site. Under the Consent Agreement,

the PRPs conducted a Remedial Investigation (RI) to determine the nature, extent and source(s) of contamination at the Site and surrounding property. A complete discussion of the results of the RI is found in the June 1990 Final Remedial Investigation Report for the Site (JACA Corporation, 1990). The RI concluded that the Site was a source of trichloroethene (TCE) and TCA contamination in the groundwater, among other volatile organic compounds. In addition, because 1,1-dichloroethene (DCE) and 1,1-dichloroethane (DCA) are potential degradation products of TCA, the Site may also be the source of DCE and DCA which are both found in the groundwater beneath and immediately downgradient of the Site. Groundwater samples collected from wells upgradient of the Site showed elevated levels of TCE which indicates that another source or sources of TCE contamination are most likely present. The Feasibility Study, which compares the various alternatives for remediation of the site, was completed in June 1990.

Basis for Taking Remedial Action

Hazardous substances have been detected at the site in groundwater, surface water and soil, as follows:

Groundwater
Tetrachloroethene (PCE), TCA, DCA, DCE, TCE

Surface Water
TCA, DCA, DCE

Soil
PCE

Based on the data from the RI, EPA determined that exposure to the contaminated groundwater and surface water at the Site may present an imminent and substantial endangerment to public health, welfare and the environment. EPA considered the following exposure pathways: groundwater ingestion, inhalation of contaminants volatilized from household use of groundwater, surface water ingestion, dermal absorption of contaminants while swimming in surface waters, ingestion of contaminants from eating fish, ingestion of soil by children trespassing on the site, dermal contact of soil by CryoChem workers, and inhalation of soil contaminants by CryoChem workers. The concentrations of contaminants in groundwater at the Site were above the Maximum Contaminant Levels (MCLs), which are enforceable drinking water standards promulgated at 40 C.F.R. Part 141 pursuant to Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. Section 300g-1.

IV. Remedial Actions

Remedy Selection

Remedial Action Objectives - The remedial action objectives which were developed

for the Site and specified in the RODs are listed below:

- Protect public health, welfare, or environment.
- Prevent further, off-Site migration of contaminants in ground water and surface water.
- Prevent contaminant migration into unaffected areas.
- Restore the aquifer to beneficial use, if practical.
- Supply clean water, that meets federal and state standards, to residents living near the Site.

EPA issued three separate Records of Decision (ROD) for the Site, each addressing a separate Operable Unit (OU). EPA also issued four Explanations of Significant Difference (ESD)s for the Site. The following provides a summary of each ROD and ESD:

September 29, 1989 ROD; OU-1, Drinking Water Supply

The potentially responsible parties (PRPs) for the Site conducted a Remedial Investigation/Feasibility Study (RI/FS) under the supervision of EPA pursuant to an Administrative Order by Consent signed by the PRPs and EPA in 1988. The RI/FS was completed in June 1990 and consisted of investigations and studies which characterized the type and extent of contamination released at or from the Site and proposed remedial alternatives to address the contamination problems.

The RI identified a plume of groundwater extending from the Site to several springs located nearly 2,500 feet southeast of the Site. The plume is contaminated by TCA, DCA, PCE, TCE, and DCE. Nearby residential wells and on-site production wells are also contaminated with these substances or are threatened by this contaminated plume.

In the spring of 1989, EPA conducted a Focused Feasibility Study (FFS) for OU-1 to evaluate remedial alternatives for providing an alternate supply of clean drinking water to homes affected by or potentially affected by releases of hazardous substances from the Site. The FFS evaluated a total of 33 homes and businesses that are affected or potentially affected by the Site.

A Proposed Plan for OU-1, which describes EPA's preferred alternative for supplying clean drinking water, was released to the public on July 14, 1989.

On September 29, 1989, EPA issued the OU-1 ROD. The ROD identified PCE, TCE, DCE, TCA and DCA as Contaminants of Concern (COC) posing the greatest risk to groundwater users near the Site. The ROD outlined EPA's selected remedy for OU-1 which included the following major components: (1) Continued operation and maintenance, until a permanent clean water supply is developed, of dual activated-carbon units installed at 13 homes affected by the Site; (2) Installation and maintenance, until a permanent clean water supply is developed, of dual activated-carbon units at homes affected by contamination from

the site that are not currently equipped with carbon units; (3) Periodic chemical sampling of 13 currently unaffected homes and businesses which could potentially become affected by contamination from the site due to their location near the site; (4) Installation, operation, and maintenance of dual activated-carbon units at residential wells which become affected by contamination from the Site; (5) Development and construction of a new clean water supply well and distribution system to provide clean water to affected and potentially affected homes and businesses. The new water supply well will include treatment units if necessary; and (6) Operation of a new, clean water supply well and distribution system to provide clean water to affected homes and businesses.

First Explanation of Significant Difference (OU-1)

EPA issued an ESD, for OU-1 on September 22, 1994. The ESD documented the change from the development and construction of an alternate water supply to the continued use of carbon treatment units. In error, the ESD called the installation of dual activated-carbon treatment units an interim remedy when, in fact, it was to be the final remedy for this OU.

Second Explanation of Significant Difference (OU-1)

A second ESD was issued for OU-1 on August 3, 2004 that documented the change in the term "interim remedy" as used in the initial September 22, 1994 ESD to "final remedy" for OU-1. This ESD also documented the change in the cleanup level for DCA from a background level of 0.38 parts per billion (ppb) to 27 ppb. It also identified 1,4-dioxane (a contaminant associated with TCA) as a COC to be included in the OU-1 monitoring program.

September 28, 1990 ROD; OU-2, Area-Wide Groundwater

A 1988 RI/FS, conducted under the supervision of EPA, pursuant to an Administrative Order by Consent signed by the PRPs and EPA in 1988, was completed in June 1990. The RI/FS consisted of investigations and studies which characterized the nature, type and extent of contamination released at or from the Site and evaluated remedial alternatives to address the contamination problems.

The RI identified a plume of groundwater extending from the Site to several springs located nearly 2,500 feet southeast of the Site. The plume is contaminated by TCA, DCA, PCE, TCE, and DCE. Nearby residential wells and on-site production wells are also contaminated with these substances or are threatened by this contaminated plume.

The OU-2 ROD, issued on September 28, 1990, addresses the groundwater contamination which is the principal threat posed by the Site. The major components of the selected remedy are: (1) Completion of a groundwater remedial design study to determine the most efficient design for a groundwater treatment system; (2) Installation, operation, and maintenance of groundwater extraction wells to remove contaminated groundwater from beneath the Site and to prevent contaminants from migrating to currently unaffected areas; (3) Installation, operation, and maintenance of air stripping towers to treat contaminated groundwater to applicable levels; (4) Installation, operation, and maintenance of a pipeline from the air stripping towers to surface water near the Site to discharge treated groundwater;

and (5) Periodic groundwater monitoring to ensure that the remedy is effective.

Explanation of Significant Difference (OU-2)

An ESD was issued for OU-2 on August 3, 2004 that documented the change in the cleanup level for DCA from a background level of 0.38 parts per billion (ppb) to 27 ppb. It also identified 1,4-dioxane (a contaminant associated with site contaminant TCA) as a COC to be included in the groundwater monitoring program.

September 30, 1991 ROD; OU-3, Site Soils

The OU-3 ROD addresses soil contamination at the Site. The major components of the selected remedy are: (1) Sampling of the suspected contaminated area (and two additional areas) to better define the extent of the contamination; (2) Utilization of soil vapor extraction (SVE) to remove the contamination from the soil; and (3) Confirmation sampling.

Explanation of Significant Difference (OU-3)

An Explanation of Significant Difference was issued for OU-3 on September 22, 1998 documenting EPA's No Further Action determination. The 1991 ROD required the use of SVE to remove elevated levels of site-related contaminants detected in soils located behind the CryoChem fabrication building. However, based on subsequent soil investigations completed in 1992 and 1995 and a soil gas survey conducted in May 1996, all measured levels of contaminants were below treatment standards. Therefore EPA changed the remedial action for OU-3 to No Further Action.

Remedy Implementation

Operable Unit 1 – Drinking Water

In September 1987, EPA performed a removal response action, pursuant to CERCLA § 104(a) and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300. As part of this removal response action, EPA installed dual activated-carbon units at twelve residences and one business affected or potentially affected by contaminated groundwater (Figure 4). Additional filter units were subsequently installed by EPA in seven potentially affected homes.

The OU-1 ROD was signed on September 29, 1989, which required the installation and operation of a new water supply well and distribution system in addition to the continued use of the dual activated-carbon filters. The remedy was altered in a September 1994 ESD that required the continued use of the residential treatment units in lieu of the installation of a permanent water supply system.

On September 30, 1996, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, EPA issued a Unilateral Administrative Order to G.S. Garber and Sons, Inc. ordering it to assume responsibility for the implementation of the OU-1 ROD, as modified by the OU-1 ESD and the September 20, 1996 Technical Memorandum, which modifies the Statement of Work contained in the September 1994 ESD. As a result of the Order, G.S. Garber and Sons retained

a contractor (ERI) to perform the required work.

The residential treatment systems are installed in-line on the well supply piping and consist of the following: ultraviolet lamps for control of bacteria followed by dual activated-carbon adsorbers, (sized as appropriate for the individual residence well pump). Depending on the water quality at the individual residence, water softeners and/or sediment filter may also be installed. (Figure 1)

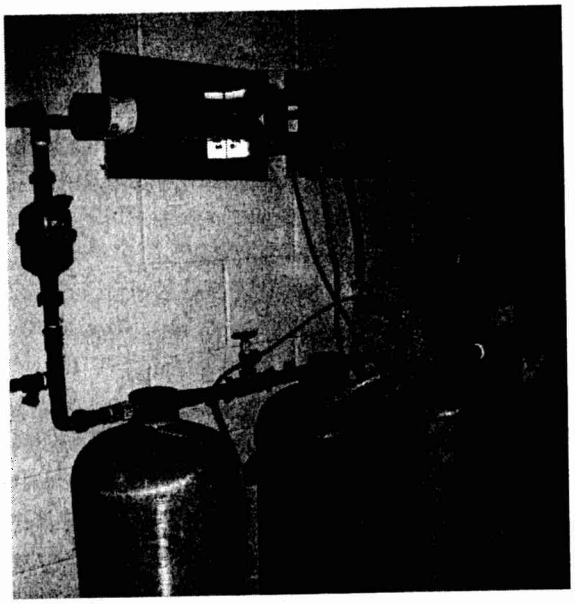


Figure 1 – Typical Residential Treatment System

Currently, twelve of the original twenty properties are equipped with the treatment systems. The eight homes that were removed from the monitoring program met the following requirements described in the September 29, 1989 ROD:

"If the results from two consecutive years of sampling of untreated well water (a minimum of three sampling events), as reviewed in accordance with Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), show that the water contains substances within the Maximum Contaminant Levels (MCLs), then that water shall be considered to be within limits considered safe. EPA shall remove the carbon filtration units, reconnect the well, and assure the well is functioning. EPA will use residential wells in conjunction with the monitoring of the OU-2 response in the Five-Year review of the site."

As outlined in the ROD, the primary objective of the remedial action is to supply clean water to residents living near the Site. The supply must meet federal and state standards and must be able to satisfy present and future water needs. Treatment by the carbon units shall continue until EPA, in consultation with PADEP, determines that the quality of water received by particular residential wells is within limits considered safe. MCLs and/or Medium Specific Concentrations (MSC) have been identified by EPA as the criteria for determination of well water treatment.

Sampling of the groundwater at the affected properties is conducted by EPA's contractor on a semi-annual basis. Water samples are collected from three locations: the well (untreated), the mid-point of the two carbon filters, and at the tap. Samples are analyzed for low level VOCs and 1,4-dioxane. Subsequent to each sampling event, a letter is provided to each of the property owners with an explanation of the validated results of the sample analysis. An example of the table that is included in the letter to each of the property owners is provided below in Table 2.

Table 2 – Residential Well Water Sample Results Table

Compound	MCL OR MSC (ug/L)	Wellhead (ug/L)	Midpoint (ug/L)	Tap Water(ug/L)
1,1-DCA	27 (1)	X	X	X
1,1-DCE	7	X	X	X
1,1,1-TCA	200	X	X	X
TCE	5	X	X	X
PCE	5 (2)	X	X	X
VINYL CHLORIDE	2	X	X	X
1,4-DIOXANE	5.6 (3)	X	X	X

(1) The current MSC criteria for 1,1-DCA, 27 ug/L, took effect on August 3, 2004.

(2) The current MCL for PCE took effect on July 30, 1992.

(3) The inclusion of 1,4-dioxane took effect on August 3, 2004.

X – Actual validated sample result.

EPA's Bottled Water Supply Program

At the current time, the EPA supplies bottled water to three homes that are also included in the residential treatment program. To protect human health against 1,4 dioxane, a 1 x 10E-6 risk for a 30-year exposure was used to establish the 5.6 ug/L MSC cleanup level in the residential well groundwater. To ensure that any properties with health risks posed by 1,4-dioxane contamination received bottled water, EPA implemented the following decision tree in June 2006:

- Any unqualified exceedances of the 5.6 ug/L MSC in either the well port, mid port or tap port will initiate bottled water being supplied or the continuance of the supply.
- Any qualified results exceeding the 5.6 ug/L MSC shall require resampling at all sampling ports within 2 days of the final results.
- Any unqualified values that exhibit results below the 5.6 ug/L MSC for three consecutive sampling events in no less than two years shall stop the delivery of bottled water at that location.

Operable Unit 2 - Groundwater

In June 1990, pursuant to a 1988 Administrative Order on Consent, CryoChem, C.S. Garber and Sons, Inc., et al, completed a RI/FS for the Site. EPA conducted the pre-design investigation to characterize the nature and extent of groundwater contamination in the overburden and bedrock aquifers located beneath and in the immediate vicinity of the site.

EPA issued the OU-2 ROD on September 28, 1990.

The pre-design investigation resulted in the following conclusions that, once implemented, would serve to achieve the Site cleanup goals: (1) air stripping followed by vapor phase carbon adsorption of the site-related VOCs in the air stripper off-gas, was the proposed remediation system; (2) a groundwater extraction system consisting of extraction wells with intersecting zones of influence placed along the downgradient boundary of the site would prevent offsite migration of contaminants; (3) an air stripper to treat the groundwater to applicable discharge levels; (4) treated groundwater to be discharged to a surface water stream located on-site; and (5) requirement of a groundwater monitoring plan to provide data to determine the effectiveness of the remedy.

In September 1995, EPA installed nine 8" diameter groundwater extraction wells along the eastern and southeastern perimeter of the Site (Figure 3) to capture the contaminated groundwater plume which generally runs in a northwest to southeast direction beneath the Site. The extraction wells were installed into the bedrock aquifer at depths ranging from 250 to 350 feet and screened at depths ranging form 20 to 350 feet. Concrete access vaults were installed at grade around each of the extraction wells. The vaults allow access to Site personnel for data gathering (i.e. flow rate and water level) and O & M. PVC pipelines convey extracted groundwater to the groundwater treatment plant air stripper. Traffic-rated metal junction boxes have been installed to accommodate changes in conveyance pipeline direction. Four extraction monitoring wells were also installed in September 1995. These wells were installed, at depths ranging from 244 to 295 feet, to monitor the water level information related to the extraction wells. The wells are equipped with a transducer which provides water level data on a continuous basis.

A groundwater treatment system building was constructed to house the process equipment (Figure 2). Extracted groundwater is pumped through a low profile air stripping unit equipped with four internal plates (trays). A countercurrent flow is established whereby the groundwater flows downward through the trays while air flows upward. Air stripper emissions are pulled by a blower, through an in-line exhaust heater (to adjust the relative humidity of the off-gas) then through dual activated-carbon adsorption units before discharge to the atmosphere. Treated groundwater flows by gravity through an underground concrete tank and discharges into an adjacent on-site stream.

The prefabricated metal 28' x 36' building sits atop a 15" concrete slab and contains the treatment equipment, a programmable logic controller and a small office space. A 3' x 3' sump area and 6" concrete curb, installed around the interior perimeter of the building, serve as a secondary containment system.

The system was initially started in May 1998. Due to a number of operating problems the treatment system was shut down from February 27, 1999 to April 18, 2000 when operations resumed. Since that time the plant has been running continuously with only minor, temporary interruptions (i.e. power outages, surges, etc.).

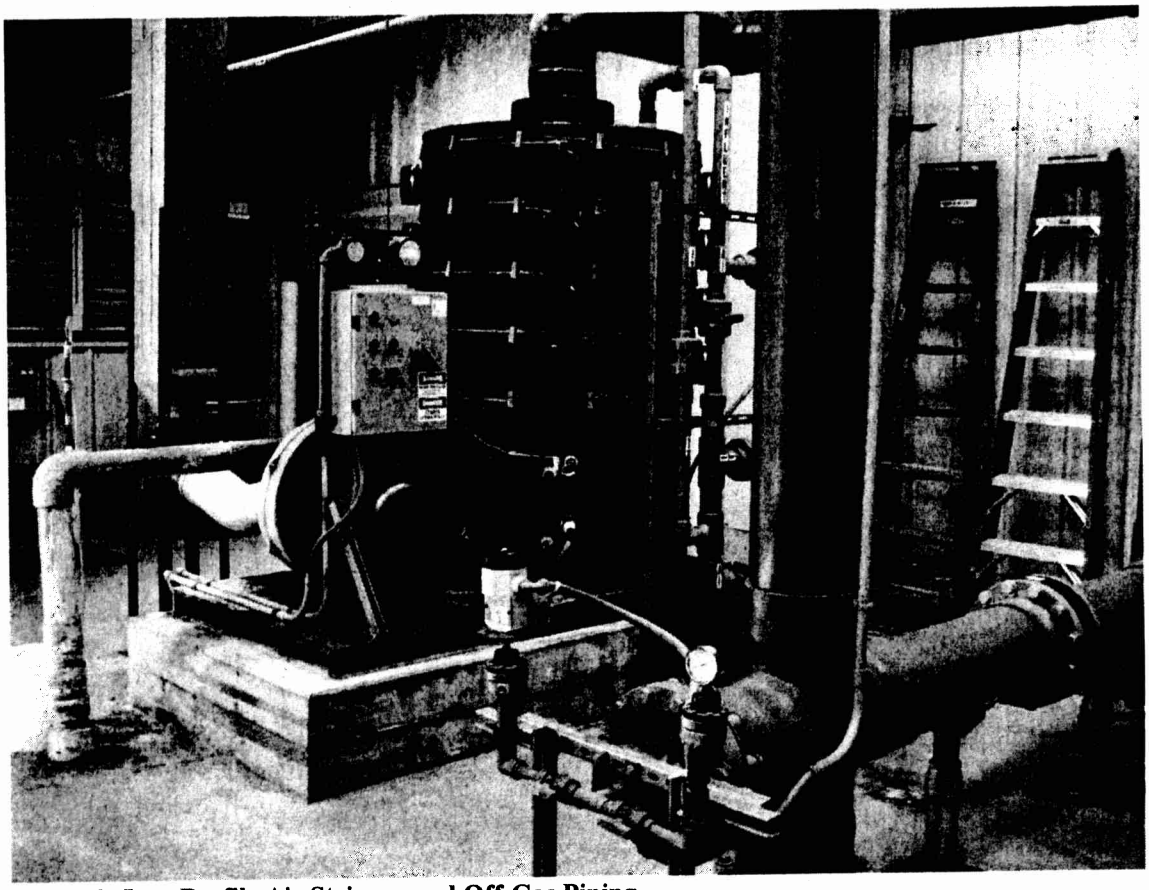


Figure 2 -Low Profile Air Stripper and Off-Gas Piping

The initial design flow selected for each of the extraction wells was 7 gallons per minute (gpm) or approximately 65 gpm, total from the nine extraction wells. However, results from pumping tests conducted in 1995 during the design investigation indicated maximum yields of 5 gpm from each the extraction wells, resulting in a total expected maximum yield of 45 gpm. Currently, the system pumps between 46 and 56 gpm total. The system was constructed to process a maximum design flow of 100 gpm to provide excess capacity should additional extraction wells be needed in the future or to accommodate higher pumping rates. The system operates 24 hours per day, seven days a week, on a continuous flow-through basis. Four adjacent monitoring wells are used to measure water levels to evaluate the effectiveness of the capture zone and to monitor impact on nearby residential water well levels.

From April 2000 to May 2008 over 153 million gallons of groundwater have been pumped and treated by the OU-2 treatment system. Based on the calculated average influent and effluent concentrations, approximately 27.5 pounds of the Site COCs have been removed from the aquifer since system start-up.

Operable Unit 3 – Site Soils

EPA made a No Further Action determination for this OU as documented in the September 22, 1998 ESD.

System Operation/Operation & Maintenance

O & M activities for the residential carbon filtration systems (OU-1) include: semi-annual sampling, periodic media replacement for the sediment and carbon filter units, quarterly supply of softener salt, annual ultraviolet (UV) bulb replacement and non-routine maintenance and repairs.

O & M activities for the groundwater treatment system (OU-2) include: monthly system influent and effluent sampling, monthly extraction and monitoring well vault inspection, semi-annual vapor phase carbon sampling and, if necessary, replacement, and inspection and cleaning of the air stripper trays.

The originally estimated annual O&M cost for OU-1 was $35,000.00 (taken from Table 9A of the OU-1 ROD). The originally estimated annual O&M cost for OU-2 was $75,200.00 (taken from Table 23 of the OU-2 ROD). The current total annual O&M cost for OU-1 & OU-2, combined is approximately $190,000 (taken from current Remedial Action Contract information).

Table 3 – Total System Operation O&M Costs (OU-1 & OU-2), 10/04 - 6/08

Dates		Total Cost Rounded to the Nearest $1,000.00
From	To	
October 2004	September 2005	$193,000
September 2005	August 2006	$198,000
August 2006	September 2007	$201,000
September 2007	June 2008	$189,000

The ten-year duration of the Long Term Remedial Action associated with the Site groundwater treatment (OU-2) was completed on May 29, 2008. A Site inspection was held with PADEP officials and all further Site O&M responsibilities were transferred to PADEP. This transfer of responsibility was performed in accordance with the State Superfund Contract (SSC) for OU-2, dated May 1992 and amended on August 20, 2002.

A SSC for the residential treatment systems (OU-1) does not exist, possibly due to the fact that the initial remedy required the installation of a permanent, clean water supply to affected residents, thus eliminating the need for O&M of the remedy.

V. Progress Since the Last Five-Year Review

This is the second Five-Year Review for the Site and the second review performed under EPA's Comprehensive Five-Year Review Guidance (June 2001). Table 4 summarizes the progress at the Site since the last Five-Year Review. The issues and recommendations in Table 4 were generated from the first Five-Year Review Report for the Site (September 2003).

The statement on protectiveness from the first Five-Year Review declared that "the remedial actions at OU-1, OU-2, and OU-3 are protective and therefore the Site remedy is protective of human health and the environment".

Table 4 - Actions Taken Since the Last Five-Year Review

Issues	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken/Outcome	Date of Action
1. DCA cleanup level below RBC	Change DCA action level	EPA	9/30/04	ESD issued to change cleanup levels	August 3, 2004
2. Gasoline plume effect on treatment system	Install MTBE-specific carbon at affected residences	EPA/PADEP	6/30/04	MTBE-specific Carbon filters installed by PADEP	2004 - 2005
3. Limited information on effect of seasonal GW levels on extraction system	Collect quarterly site-wide water levels for 2 years and prepare potentiometric surface maps	EPA	Initiate 10/03; Complete 10/05	OU-2 monitoring plan to assess effect outlined in a Sampling and Analysis Plan (SAP).	June 2003
4. Effect of gasoline plume extraction system on OU-2 capture zone	Develop work plan to evaluate the effect of the plume on the extraction system	EPA	3/31/04	GW modeling completed to assess the gasoline pumping system's effect on OU-2	September 2006
5. 1,4-dioxane detected in several wells above the RBC	Monitor influent and effluent on monthly basis and add to annual sampling list	EPA	Initiate 10/03; Complete 9/05	ESD added 1,4-dioxane as a Site COC	August 3, 2004
6. No routine monitoring of up and down gradient wells	Develop OU-2 monitoring plan that includes the well sampling	EPA	3/01/04	OU-2 well monitoring plan developed in the June 2003 SAP	June 2003
7. Extraction System Evaluation	Develop work plan for evaluating extraction system and individual well capture zones	EPA	9/30/04	Work plan developed	June-August 2006

VI. Five-Year Review Process

Administrative Components

PADEP, Earl Township and Douglass Township personnel were notified of the initiation of the Five-Year Review by letter in June 2008. The Five-Year Review team was led by Tim Gallagher, EPA Remedial Project Manager (RPM) and included Mindi Snoparsky, EPA Hydrogeologist, Dawn Ioven, EPA Toxicologist, Sheila Briggs-Steutteville, Office of Regional Counsel, Larry Piazza, U. S. Army Corps of Engineers (USACE), and a representative from EA, EPA's RAC contractor.

Tim Gallagher established the review schedule, the components of which included the following:

- Community involvement
- Document review
- Data review
- Site inspection
- Five-Year Review report development

Community Involvement

Notice of this Five-Year Review and solicitation of comments was published in a local newspaper, the Reading Eagle, on May 21, 2008, by EPA Community Involvement Coordinator, Francisco Cruz.

Following signature of this Five-Year Review report a notice will be sent to the Reading Eagle announcing that the Five-Year Review report for the Site is complete. The results of the review and the report will be made available to the public at the Earl and Douglass Township Buildings.

Document Review

This Five-Year Review consisted of a review of relevant documents including:

- September 29, 1989 Operable Unit–1, Residential Drinking Water ROD
- September 28, 1990 Operable Unit–2, Groundwater ROD
- September 30, 1991 Operable Unit–3, Site Soils ROD
- September 22, 1994 OU-1 ESD regarding the continued use of residential carbon systems
- September 30, 1996 Unilateral Administrative Order
- September 22, 1998 "No Further Action" ESD for OU-3
- August 3, 2004 OU-1 and OU-2 ESD
- December 3, 2002 Consent Decree for reimbursement of past costs, Civil Action No. 02-7465

- Sampling and Analysis Plan for Long-Term Remedial Action of Drinking Water Supply (OU-1) and Area-Wide Groundwater (OU-2), June 2003, Tetra Tech, NUS
- August 31, 2006 Update of Groundwater Flow Model, GeoTrans
- Residential Well Water Monitoring Reports, 2004-2007
- Long-Term Remedial Action Annual Performance Monitoring Reports, 2003 – 2008
- Previous 2003 Five-Year Review

Data Review

Operable Unit 1, Residential Drinking Water

Overall, site-related VOC concentrations in the untreated well water have decreased significantly since routine sampling was initiated in 1987. Detailed discussions of analytical results for each site-related Contaminant of Concern (COC) for the past two sampling events (October 2007 and April 2008) are presented below (Note that privacy concerns require the use of Well Box Numbers in place of actual residential addresses).

1,1-DCE (DCE)
There were slight exceedances of the action level (7 ug/L) for DCE in the untreated (raw) water samples collected from Well Box Numbers (Boxes) 72, 73, 88, 89, and 188 during the October 2007 and April 2008 sampling events. The levels of DCE detected in the raw water from the 12 properties ranged from 2.2 ug/L to 20.2 ug/L. Some lower concentrations of DCE, ranging from approximately 0.5 ug/L to 1.9 ug/L, were detected in the midpoint water samples collected from Boxes 72, 102 and 103. DCE was not detected in any of the tap water samples.

1,1-DCA (DCA)
None of the results from the twelve properties sampled during the October 2007 and April 2008 sampling events contained DCA in either the raw or treated water at levels exceeding the action level of 27 ug/L. However, small amounts of DCA were detected in all raw well water samples and some of the midpoint samples. DCA was not detected in any of the tap water samples.

1,1,1-TCA (TCA)
Similar to the 1,1-DCA sample results, none of the twelve properties that were sampled in October 2007 and April 2008 detected TCA in treated or untreated well water at levels exceeding its action level of 200 ug/L. However, small amounts were detected in the majority of raw well water and some of the midpoint samples. TCA was not detected in any of the tap water samples.

TCE
Small amounts (less than 2 ug/L) of TCE were detected in raw well water samples collected from ten of the twelve properties sampled in October 2007 and April 2008. No TCE was detected in midpoint or tap water samples collected from any of the properties.

PCE
PCE was detected in nine of the twelve raw well water samples collected from the properties during the October 2007 and April 2008 sampling events. PCE levels in the raw well water ranged from non-detect (ND) to 1.0 ug/L. No PCE was detected in midpoint or tap water samples collected from these properties.

Vinyl Chloride
Vinyl chloride was not detected in any of the raw, mid, or tap water samples collected from the twelve properties sampled in October 2007 and April 2008. Vinyl chloride is a potential long-term breakdown product of TCE and TCA.

1,4-Dioxane
Raw well water samples from all twelve properties showed levels of 1,4-dioxane ranging from 1.1 ug/L to 9.6 ug/L during the October 2007 sampling event (only two of the twelve properties showed 1,4-dioxane in the raw water during the April 2008 event). Analytical data indicates that raw water samples from Boxes 73 and 188 in October 2007 exhibited concentrations exceeding the action level of 5.6 ug/L. The highest level in the tap water samples was detected in the Well Box 74 sample at 5.6 ug/L. No exceedances were detected in the midpoint or tap sample at any of the twelve properties.

Methyl Tert-Butyl Ether (MTBE)
MTBE is not one of the Site-related COCs. MTBE is believed to originate from a previous gasoline release on the property identified as Well Box 188, which is the former site of Mike's Fancy Auto Shop (now US Gas). The remediation of the gasoline spill is being addressed by PADEP and PADEP is providing bottled water to the current owner of the property. However, in order to assess the impact of the release on the nearby residential wells, MTBE has been added to the analyte list for the semi-annual sampling events. Only Well Box 188 has contained MTBE within the raw water at levels above the Medium-Specific Concentration (MSC) (20 ug/L).

Operable Unit 2, Groundwater

In accordance with the NPDES permit for the groundwater treatment system, three influent and four effluent water samples are collected and analyzed quarterly for the site COCs. Analytical results are reported to both the EPA and the PADEP. (Figures 8 through 13 show the average concentration of the Site COCs in the influent stream from the system start-up to the most recent sampling effort).

During the most recent Site-wide annual groundwater and surface water monitoring event, conducted in May 2008, nine extraction wells (EW-1 through EW-9), four extraction monitoring wells (MW-1 through MW-4), twenty-five monitoring wells (RI, CC and QH nomenclatures), one plant production well (CP-2) and six surface water (SW nomenclature) locations were sampled. The samples were collected from each well and surface water

location using the sample methodology outlined in the Site-specific June 2003 Sampling and Analysis Plan. Samples were analyzed for TCL VOCs and 1,4-dioxane.

Results of the Site-specific COCs in the groundwater and surface water samples that were collected from each of the sampling locations indicate that 1,1-DCE is the dominant contaminant at the site. The distribution of PCE, TCE, TCA, and 1,1-DCA concentrations in groundwater indicate that these contaminants have stabilized over the past five years. Concentrations of 1,1-DCE in the influent appear to be increasing since mid-2005. The action level for 1,1-DCE (7.0 ug/L) has been exceeded, with concentrations varying from 8.6 ug/L to 17.0 ug/L, in three influent samples collected over the past year.

Except for 1,4-dioxane, no Site-specific COCs, were detected at or above the detection level of 0.5 ug/L for VOCs in the treatment system effluent samples over the prior three sampling events (See Table 5). This indicates that the remediation system is successfully treating the VOCs in the collected groundwater although the 1,4-dioxane is not amenable to the existing treatment system components.

Table 5 – Average Contaminant Concentration in Influent and Effluent, 10/2007–5/2008

Analyte	Action Level (ppb)	OCT07 – DEC07		JAN08 – MAR08		APR08 – MAY08	
		Influent	Effluent	Influent	Effluent	Influent	Effluent
DCA	27	1.7	ND	1.3	ND	1.2	ND
DCE	7	17.0	ND	8.6	ND	9.9	ND
TCA	200	7.1	ND	3.8	ND	4.2	ND
TCE	5	0.5	ND	0.4	ND	0.3	ND
PCE	5	0.5	ND	0.3	ND	0.3	ND
VC	2	ND	ND	ND	ND	ND	ND
1,4-dioxane	5.6	3.9	4.1	1.8	2.0	5.0	7.3

Table 5 lists one exceedance of the MSC for 1,4-dioxane (7.3 ppb during the May 2008 sampling event) in the treatment plant effluent water. This value represents the only exceedance of the regulatory level in the treatment system effluent since monitoring for 1,4-dioxane was initiated, per the September 2004 ESD. EPA and PADEP will continue to monitor groundwater effluent values, paying particular attention to 1,4-dioxane.

In September 2007, EPA's contractor, Tetra Tech, presented the results of their updated groundwater modeling report. The report concluded that at the "current" pumping rate (54.82 gpm in September 2007) the extraction well capture zone extended to the SE corner of the US Gas Station, located across route 562 from the Site. Because the capture zone extends downgradient of the extraction wells and includes an area where some residential wells are located, it is possible that some Site contamination impacts those residential wells because some of the flowpaths pass the extraction wells, impact the residential wells and are pulled back towards the Site.

The report also indicated that gasoline from a groundwater contamination plume

originating under the US Gas Station, was within the OU-2 capture zone and was being pulled towards the treatment system (evidenced by the presence of MTBE in one extraction well and two residential wells located between the Site and the Gas Station). Tetra Tech proposed a lowering of the pumping rates from EW-3 and EW-5 to address this issue. EPA approved the lower pumping rates in September 2007, resulting in lower concentrations in the April 2008 sampling event.

The report further stated that "as long as there is a continuing source at the (Site), residential wells located within the capture zone may continue to be contaminated, even though they are downgradient of the extraction wells. Only residential wells beyond the capture zone would be expected to cleanup after time."

Surface Water Data

Surface water samples are collected annually from eight locations (Figure 5) around the site (unless the location is "dry" at the time of sampling). Table 6 summarizes the past three years of surface water sampling data, presenting the highest value reported and the date of the sampling event. As indicated in the table, contaminants were only detected at three of the eight sampling locations over the past three years.

Table 6 – Surface Water Contaminant Concentration* Summary, 2006-2008

Sample Location	DCA	DCE	TCA	TCE
SW-3	ND/NS	ND/NS	0.86 (4/2006)	ND/NS
SW-4	ND/NS	ND/NS	ND/NS	0.17 (4/2006)
SW-7	0.58 (10/2004)	0.72 (5/2007)	1.2 (5/2007)	0.17 (4/2006)

*Values reported in ppb
ND/NS – Non-Detect or Not Sampled

Air Monitoring Data

Sampling of the vapor phase carbon units, located downstream of the groundwater treatment plant air stripper, is performed on a semi-annual basis. Samples are collected at the lead tank inflow, the lag tank inflow and at the lag tank outflow and submitted to EPA-designated laboratories for analysis of the Site-related COCs using Method TO-15 from the Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air.

1,1-DCE has been detected at levels up to 41.5 micrograms per cubic meter in the lead tank influent and up to 29 micrograms per cubic meter in the lag tank effluent over the past two years. When breakthrough of any noted compound is observed, the lead and lag vapor phase carbon tanks are switched and the lag tank is scheduled for a carbon replacement.

Site Inspection

An initial inspection of the Site was conducted on June 10, 2008 by Tim Gallagher. A second Site inspection was conducted on June 27, 2008. The second inspection was attended

by Mr. Gallagher and Mr. Larry Piazza, USACE. The Five-Year Review Site Inspection Checklist is included as Attachment 1.

The purpose of the inspections was to assess the protectiveness of the remedies, including the operation of the residential point source treatment systems, the operation of the groundwater treatment system, and the integrity of the extraction and monitoring wells.

No significant issues were identified regarding the residential treatment systems, the groundwater treatment system or the extraction and monitoring wells.

Interviews

Both, the Earl Township Supervisor, Bill Moyer, and the Douglass Township Manager, Toni Hemerka, were contacted for this Five-Year Review. Mr. Moyer, through his staff, indicated that he was unaware of any outstanding issues, complaints, or any other problems associated with the Site. Ms. Hemerka echoed Mr. Moyer's sentiments.

Two homeowners were contacted to discuss any problems or issues related to their treatment systems. Both residents indicated that they were satisfied with the operation of the dual activated-carbon treatment systems.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision document?

Based on a review of the decision documents, surface and groundwater analytical data, monthly O&M reports, and the Site inspections, the remedial actions appear to be functioning as intended. The residential treatment systems prevent direct contact with, or ingestion of contaminants in groundwater, and the groundwater extraction and treatment system is effectively containing the contaminated groundwater plume and removing contaminants through treatment, thus achieving the objective of minimizing the migration of contaminants. (Figures 6 and 7 depict the 1,1-DCE plume in consecutive years; 2007-2008).

Institutional controls are currently not required by the RODs and no institutional controls have been implemented. However, the regular monitoring, maintenance, and site inspections confirm that contaminated groundwater is not being consumed.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedial actions or would suggest that the selected remedies for OU-1 and OU-2 are not protective. Applicable or relevant and appropriate public health or environmental standards are identified in the RODs. Many of these standards were met during construction of the remedy and the remaining standards are being achieved through the operation and maintenance of the Site.

Changes in Standards and To Be Considereds (TBCs)

The remedial actions remain protective. The applicable or relevant and appropriate requirements (ARARs) and the TBCs that were included in the RODs for this Site have been met and continue to be met through O&M. The ARARs and TBCs include: The Safe Drinking Water Act, 42 U.S.C. §§ 300(f) et seq., PA Safe Drinking Water Act, 25 PA Code §§ 109 et seq. and the Air Pollution Control Act 25 PA Code §§ 127.1 et seq.

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

Since the last Five-Year Review, EPA has identified vapor intrusion as a new pathway to be evaluated for sites with VOC contamination. Because contamination of local groundwater persists and there are residences located atop and downgradient of the contaminated groundwater plume, an assessment of potential vapor intrusion is recommended.

Other than consideration of vapor intrusion issues, there have been no changes in exposure pathways, toxicity or other contaminant characteristics since the last Five-Year Review.

Continued operation and maintenance of the residential treatment systems in conjunction with the continued operation of the groundwater extraction and treatment system has significantly reduced exposure to the nearby residential and environmental communities.

Question C: Has any other information come to light that calls into question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedial actions selected in the RODs. However, an evaluation to determine whether or not vapor intrusion is an issue at the Site should be performed.

TECHNICAL ASSESSMENT SUMMARY

According to the data reviewed and the results of the Site inspection, the remedial actions are functioning as intended. The approved Operation and Maintenance Plans appear to be effective in maintaining all the elements of the selected remedies. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedies. Other than the possible vapor intrusion issue, there is no other information that calls into question the protectiveness of the selected remedy.

VIII. ISSUES

Table 7 - Issues

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Absence of an SSC for OU-1	N	N
2. Vapor Intrusion	Y	Y
3. Institutional Controls	N	Y

IX. RECOMMENDATIONS and FOLLOW-UP ACTIONS

Table 8 – Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-Up Actions	Party Respons-ible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
1. SSC for OU-1	Preparation of an SSC to delineate O&M responsibility	EPA, PADEP	EPA	9/2009	N	N
2. Vapor Intrusion	Perform a vapor intrusion evaluation	EPA	EPA, PADEP	6/2010	Y	Y
3. Institutional Controls	Evaluate the need for Institutional Controls	EPA	EPA	9/2010	N	Y

X. PROTECTIVENESS STATEMENT

The remedial actions for OU-1 and OU-3 are protective. The dual activated-carbon treatment systems that have been installed at residences affected by the contaminated groundwater plume (OU-1) and the routine monitoring program ensure that no additional exposures will occur. Further, the groundwater pump and treat system installed as part of OU-2 has been effective in significantly reducing the level of contaminants in the groundwater. EPA will evaluate the need for institutional controls as an additional means of preventing exposure to contaminants. The remedy selected for Site soils (OU-3), soil vapor extraction, was never implemented because subsequent sampling confirmed that contamination was below the clean-up levels selected in the ROD.

While the OU-2 groundwater remedy is continuing to operate, a determination regarding the short-term protectiveness of the remedy is being deferred until after a vapor intrusion evaluation is performed and the need for institutional controls is evaluated. The time required to perform these evaluations is approximately two years. After EPA and PADEP have reviewed the information, EPA will make a short-term protectiveness determination regarding the groundwater. The remedial action associated with the OU-2 groundwater remedy is expected to be protective in the long-term once clean-up standards have been met.

XI. NEXT REVIEW

Once the vapor intrusion evaluation is complete, an addendum to this five-year review will be provided with a final protectiveness determination. The next Five-Year Review will be completed no later than five years from the signature date of this Five-Year Review.

FIGURES

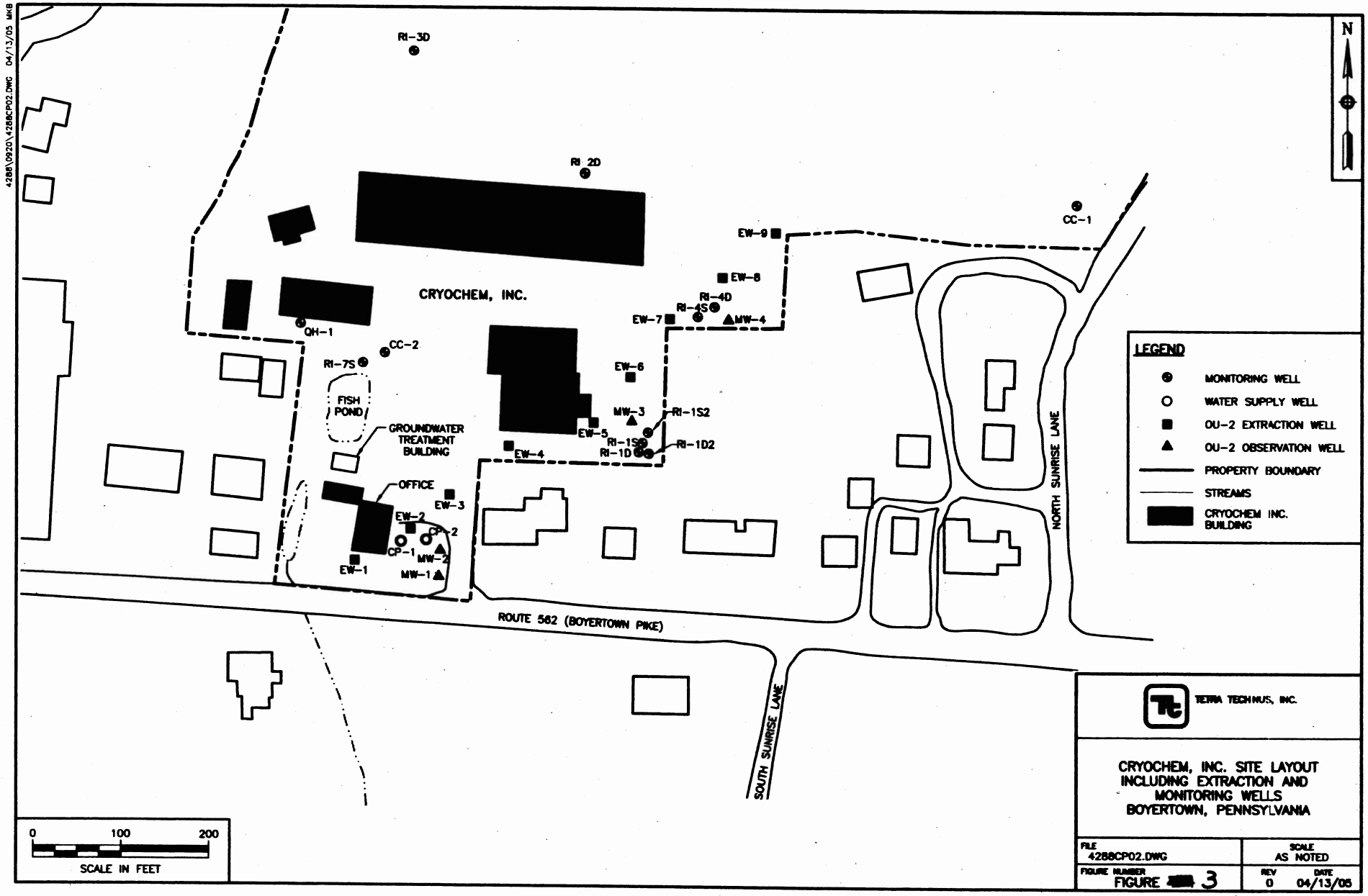


FIGURE 3-SITE LAYOUT

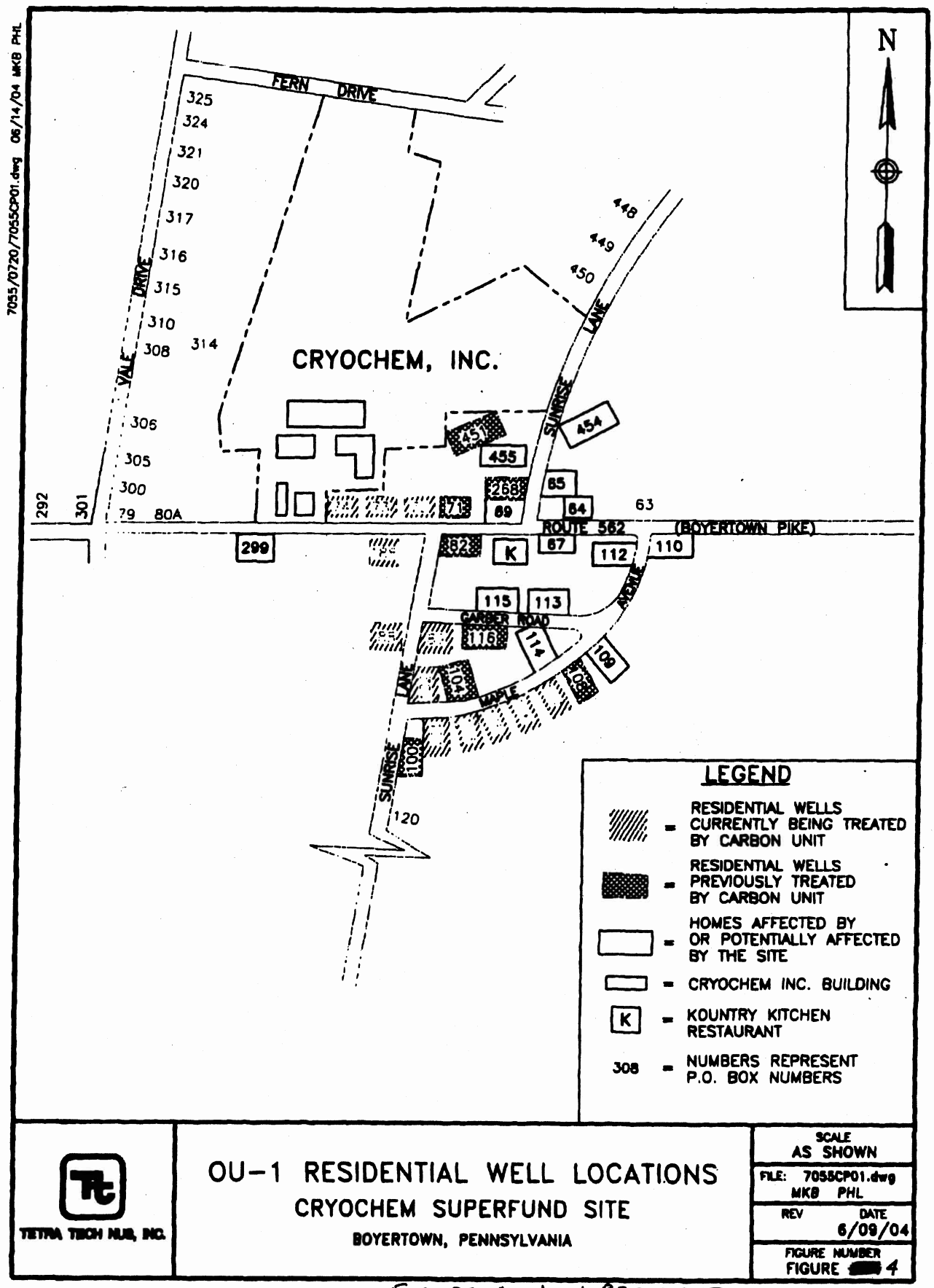


FIGURE 4 - OU-1 RESIDENTIAL WELL LOCATIONS

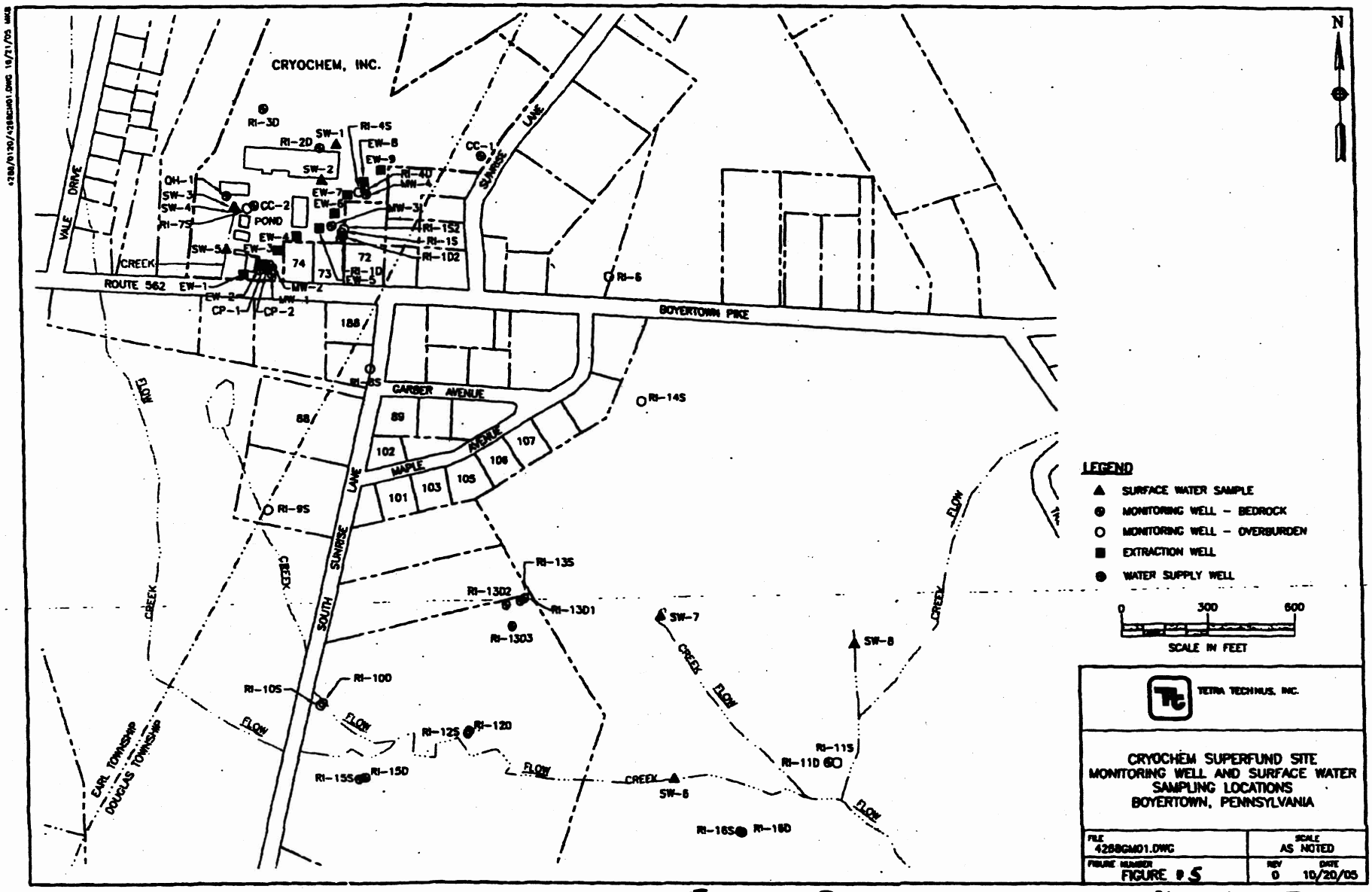


FIGURE 5 - SURFACE WATER SAMPLING LOCATIONS

PRE ORIGINAL

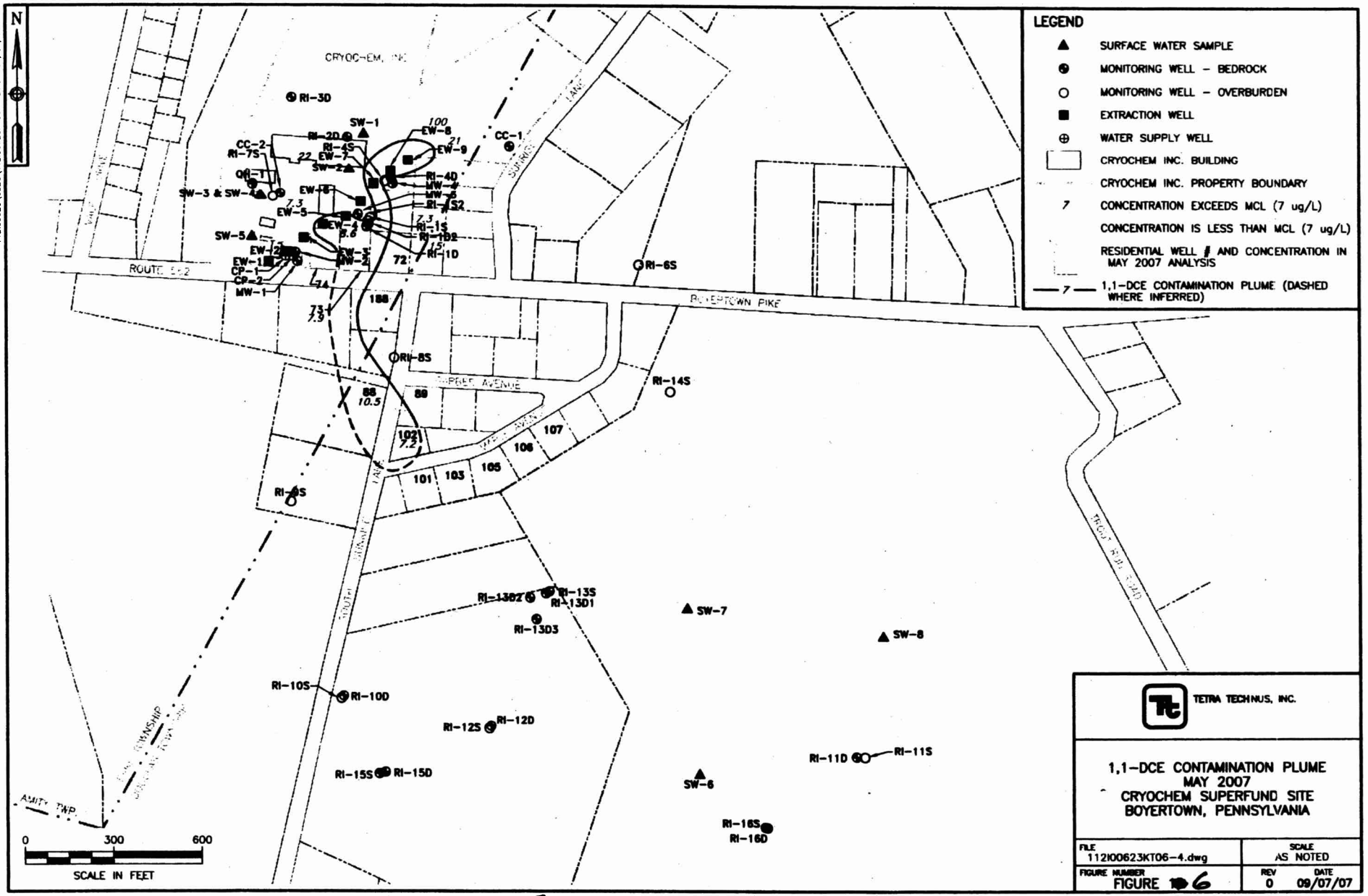


FIGURE 6 - 1,1-DCE CONTAMINATION PLUME MAY 2007

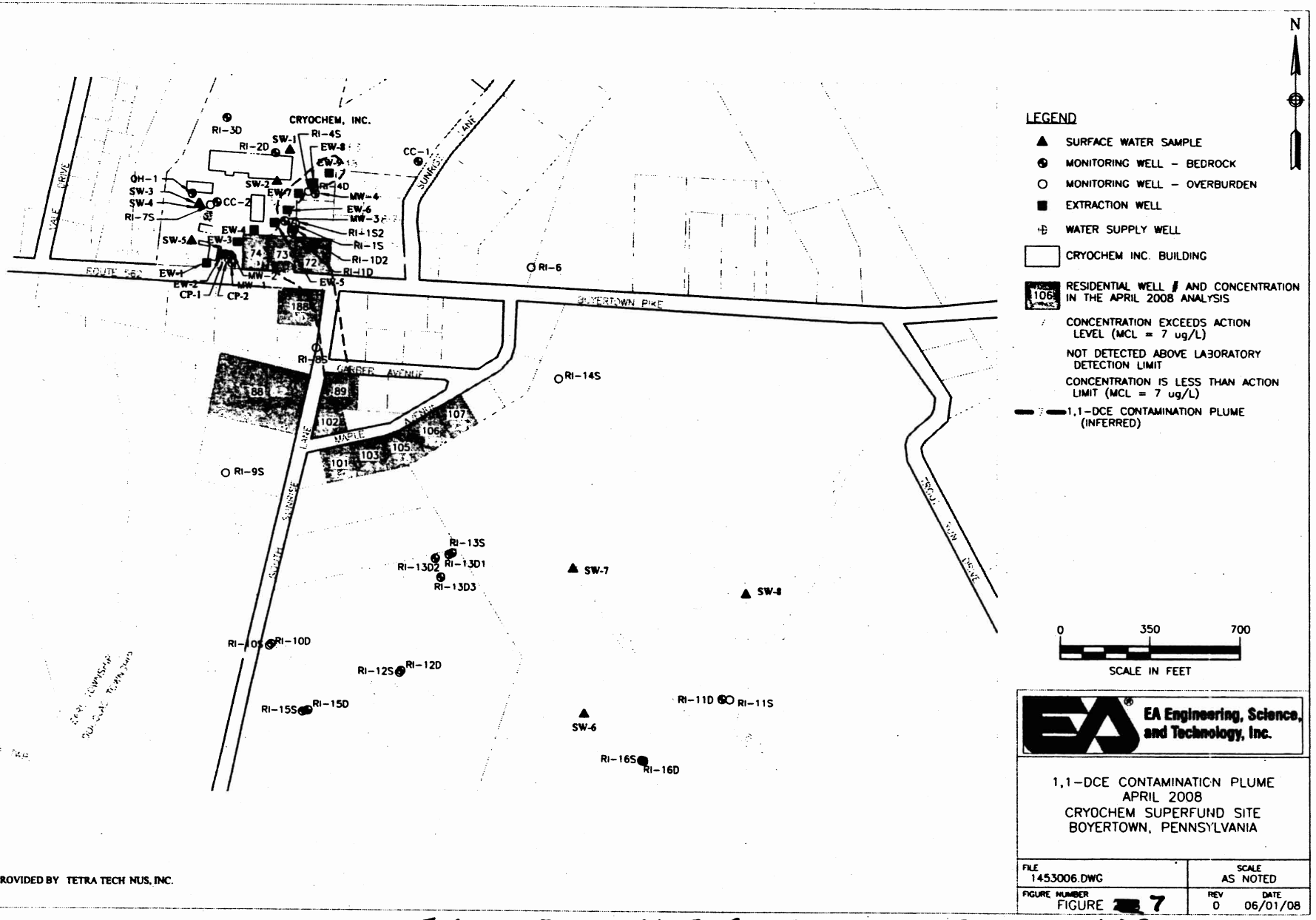
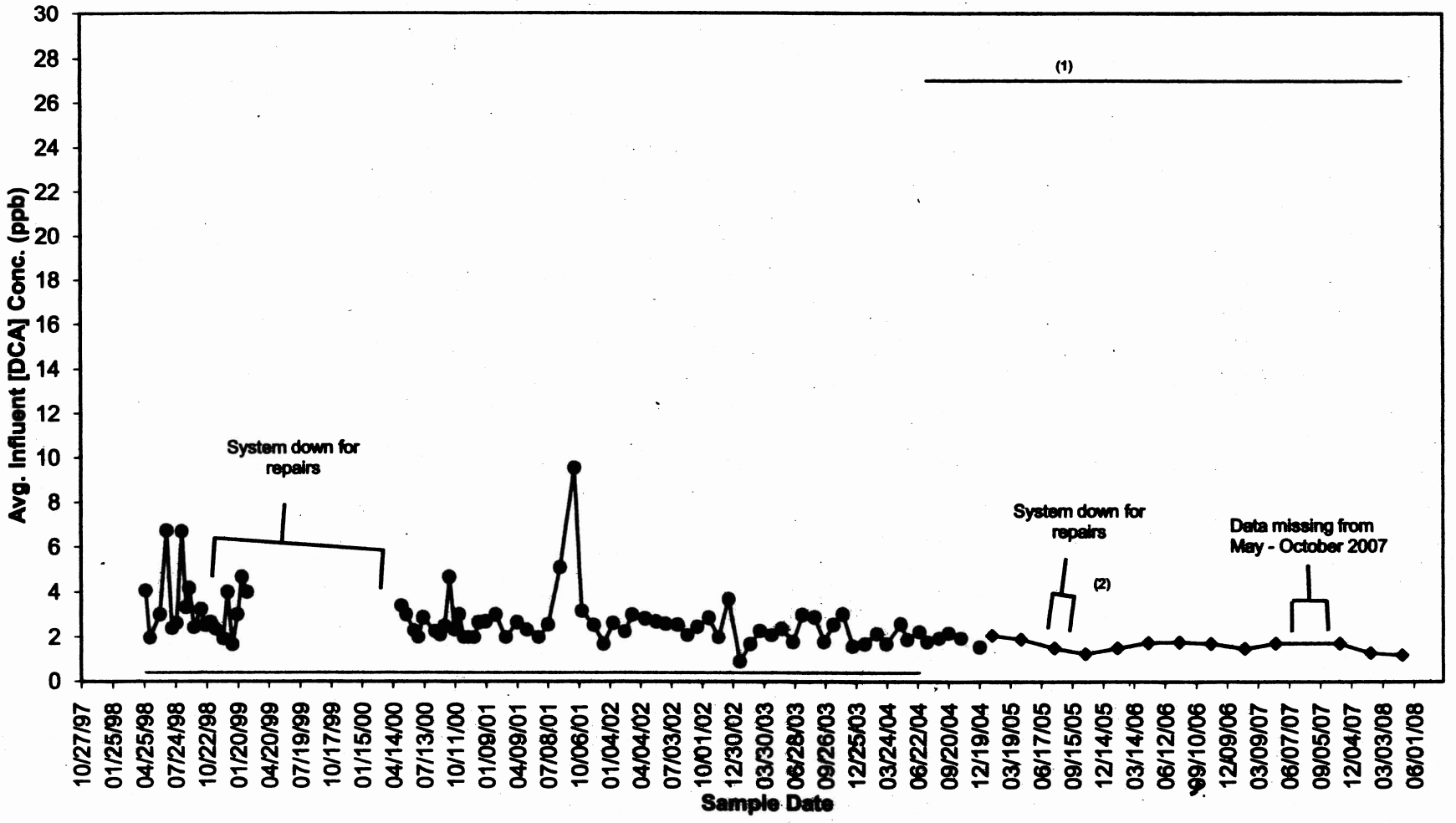


FIGURE 7 - 1,1-DCE CONTAMINATION PLUME APRIL 2008

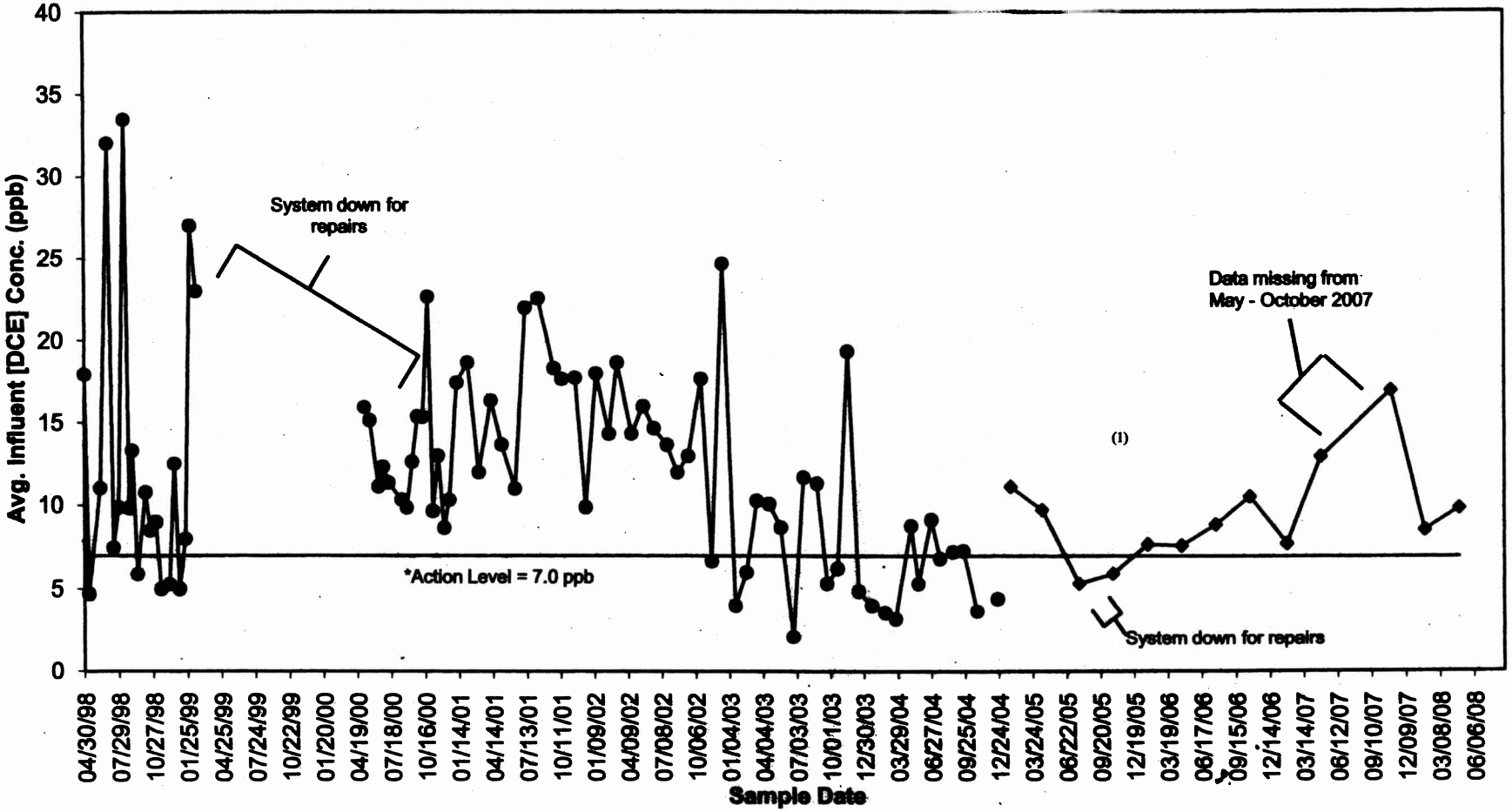
FIGURE 8
AVERAGE CONCENTRATION OF 1,1-DCA
GROUNDWATER TREATMENT SYSTEM INFLUENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



(1) New Action Level of 27 ppb as of August 2004. Old Action Level was 0.38 ppb.
(2) Sampling frequency was reduced from monthly to quarterly effective January 2005.

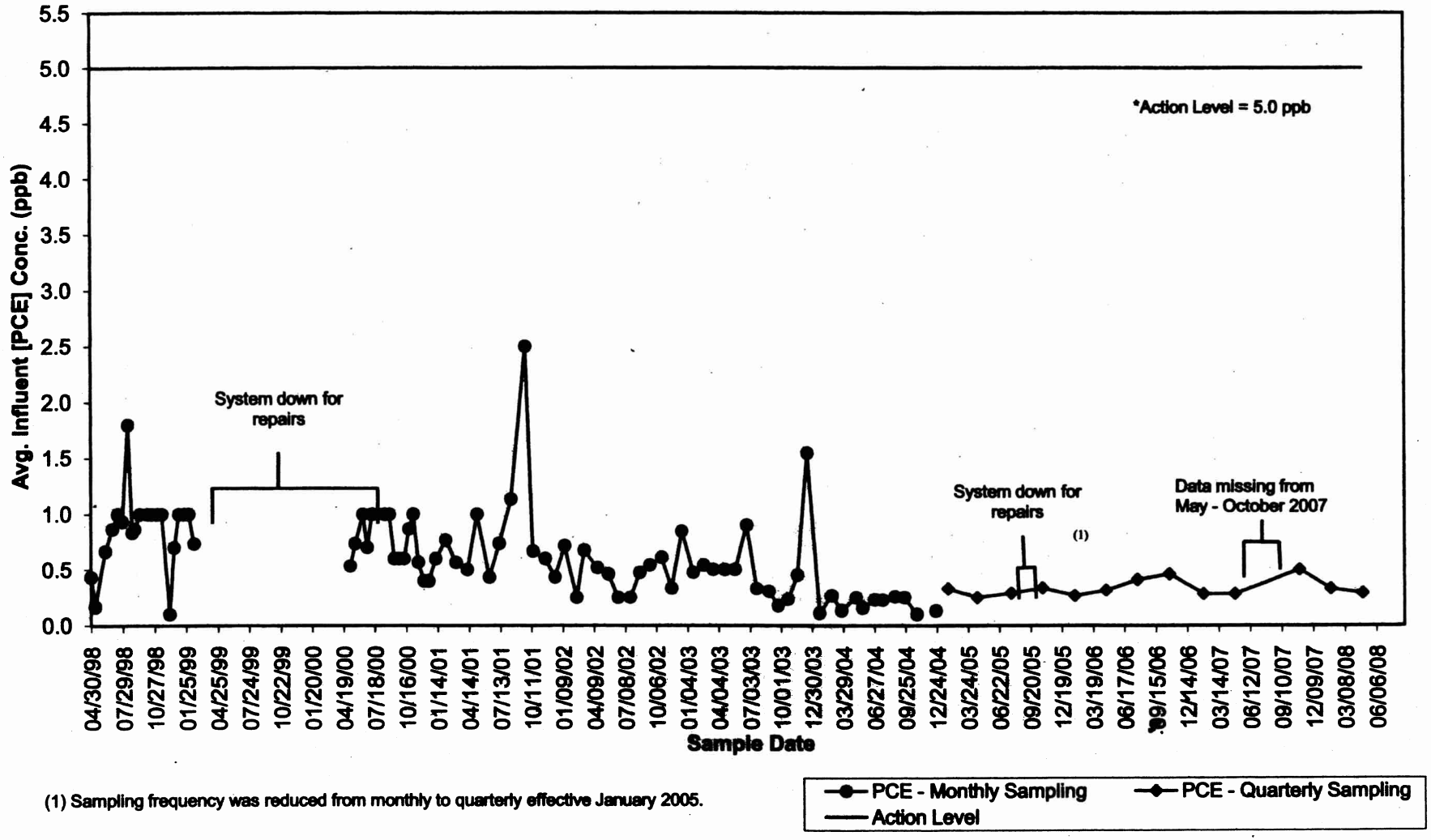
DCA - Monthly Sampling
DCA - Quarterly Sampling
Original Action Level
New Action Level

FIGURE 9
AVERAGE CONCENTRATION OF 1,1-D
GROUNDWATER TREATMENT SYSTEM E ENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



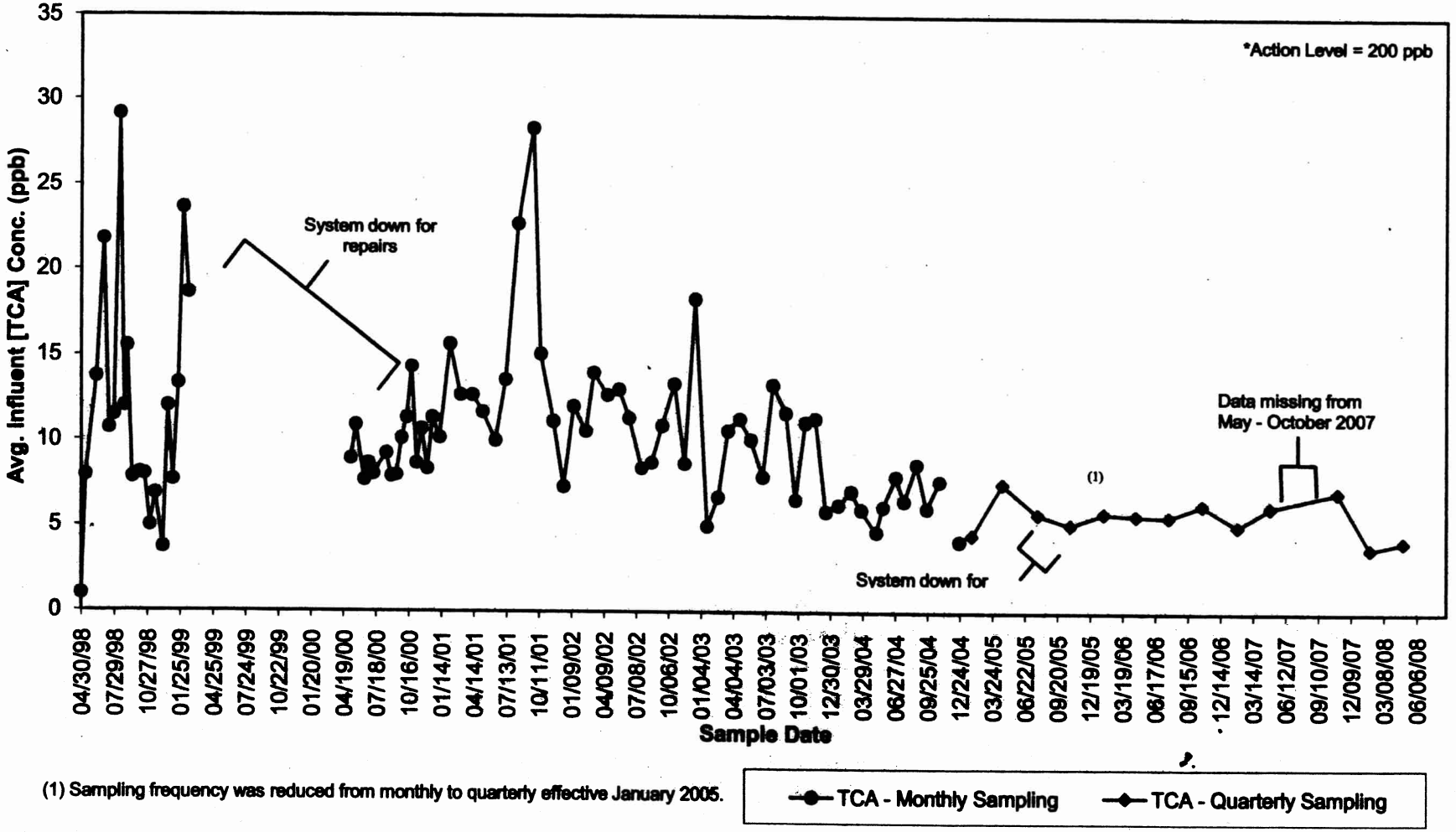
(1) Sampling frequency was reduced from monthly to quarterly effective January 2005.

FIGURE 10
AVERAGE CONCENTRATION OF PCE
GROUNDWATER TREATMENT SYSTEM INFLUENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



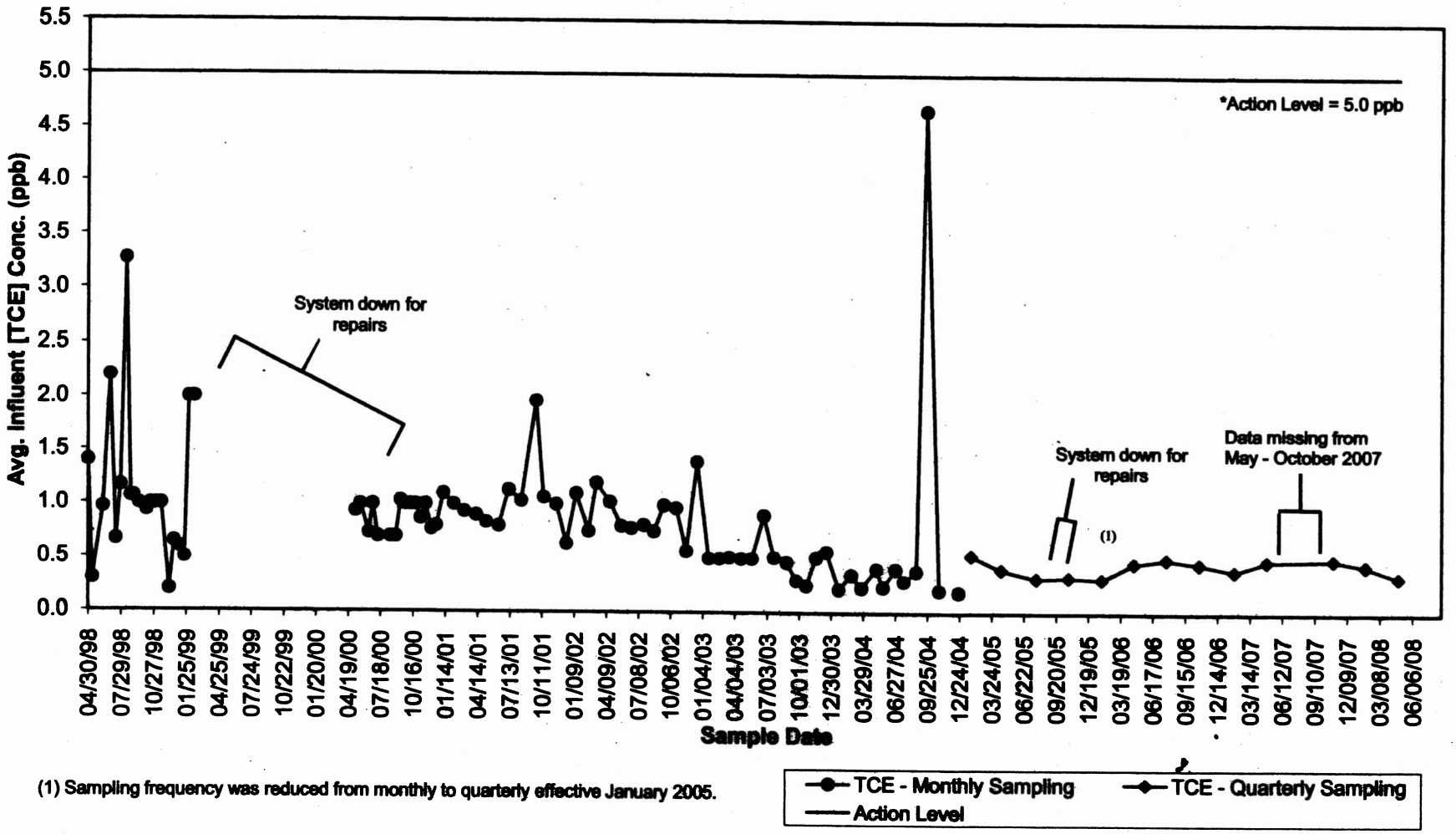
(1) Sampling frequency was reduced from monthly to quarterly effective January 2005.

FIGURE 11
AVERAGE CONCENTRATION OF 1,1,1-TCA
GROUNDWATER TREATMENT SYSTEM INFLUENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



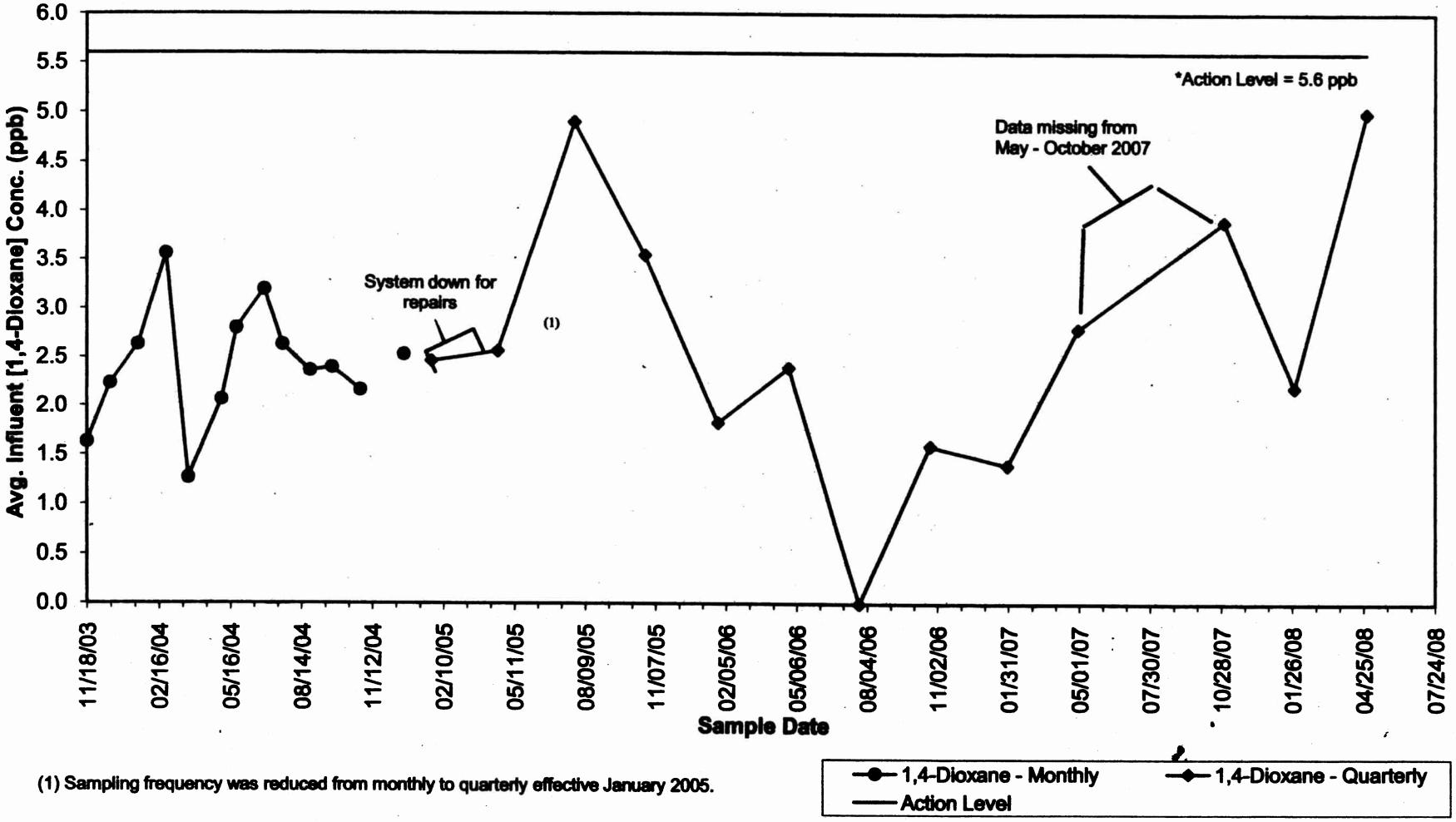
(1) Sampling frequency was reduced from monthly to quarterly effective January 2005.

FIGURE / 2
AVERAGE CONCENTRATION OF TCE
GROUNDWATER TREATMENT SYSTEM INFLUENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



(1) Sampling frequency was reduced from monthly to quarterly effective January 2005.

FIGURE 13
AVERAGE CONCENTRATION OF 1,4-DIOXANE
GROUNDWATER TREATMENT SYSTEM INFLUENT
CRYOCHEM SUPERFUND SITE
BOYERTOWN, PENNSYLVANIA



(1) Sampling frequency was reduced from monthly to quarterly effective January 2005.

ATTACHMENTS

ATTACHMENT 1: FIVE-YEAR REVIEW

SITE INSPECTION CHECKLIST

I. SITE INFORMATION	
Site name: CRYOCHEM, INC. SF SITE	**Date of inspection:** 6/27/08
Location and Region: BOYERTOWN REGION III	**EPA ID:** PAD002360444
Agency, office, or company leading the five-year review: USEPA	**Weather/temperature:** PARTIAL OVERCAST, 84°

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- Institutional controls
- (Groundwater pump and treatment)
- Surface water collection and treatment
- Monitored natural attenuation
- (Groundwater containment)
- Vertical barrier walls
- Other RESIDENTIAL TREATMENT UNITS (CARBON FILTERS, UV BULBS, H2O SOFTENER)

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** JOHN Butillo (Name) SR. ENGINEER (Title) 6/27/08 (Date)
   Interviewed at site at office (by phone) Phone no. _____
   Problems, suggestions; Report attached
   MR Butillo noted that he was not aware of any problems/issues with the GWTP.

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — Readily available — Up to date — N/A
   - As-built drawings — Readily available — Up to date — N/A
   - Maintenance logs — Readily available — Up to date — N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   - Contingency plan/emergency response plan — Readily available — Up to date — N/A

   Remarks _____

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A

   Remarks _____

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — N/A
   - Effluent discharge — Readily available — Up to date — N/A
   - Waste disposal, POTW — Readily available — Up to date — N/A
   - Other permits _____ — Readily available — Up to date — N/A

   Remarks _____

5. **Gas Generation Records** — Readily available — Up to date — N/A

   Remarks _____

6. **Settlement Monument Records** — Readily available — Up to date — N/A

   Remarks _____

7. **Groundwater Monitoring Records** — Readily available — Up to date — N/A

   Remarks _____

8. **Leachate Extraction Records** — Readily available — Up to date — N/A

   Remarks _____

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — N/A
   - Water (effluent) — Readily available — Up to date — N/A

   Remarks _____

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A

    Remarks O&M is performed on a monthly basis. Monthly O&M records are available.

IV. O&M COSTS

1. **O&M Organization**
   State in-house — (Contractor for State) - OU-2
   PRP in-house — Contractor for PRP
   Federal Facility in-house — Contractor for Federal Facility
   Other Contractor for EPA - OU-1

2. **O&M Cost Records**
   (Readily available) (Up to date)
   (Funding mechanism/agreement in place)
   Original O&M cost estimate _____ Breakdown attached

   Total annual cost by year for review period if available

From 10/04 (Date)	To 9/05 (Date)	$193,073 (Total cost)	Breakdown attached
From 9/05 (Date)	To 8/06 (Date)	$198,565 (Total cost)	Breakdown attached
From 8/06 (Date)	To 9/07 (Date)	$201,000 (Total cost)	Breakdown attached
From 9/07 (Date)	To 6/08 (Date)	$189,000 (Total cost)	Breakdown attached
From _____ (Date)	To _____ (Date)	_____ (Total cost)	Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

Applicable (N/A)

A. Fencing

1. **Fencing damaged** Location shown on site map Gates secured (N/A)
   Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
   Remarks ~~GWTP is marked annually.~~ TMG

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes — No — (N/A)
Site conditions imply ICs not being fully enforced — Yes — No — (N/A)

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date — Yes — No — N/A
Reports are verified by the lead agency — Yes — No — N/A

Specific requirements in deed or decision documents have been met — Yes — No — N/A
Violations have been reported — Yes — No — N/A
Other problems or suggestions: Report attached
ICs not yet implemented at the site.

2. **Adequacy** — ICs are adequate — ICs are inadequate — (N/A)
Remarks _____

D. General

1. **Vandalism/trespassing** — Location shown on site map — (No vandalism evident)
Remarks _____

2. **Land use changes on site** (N/A)
Remarks _____

3. **Land use changes off site** (N/A)
Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads — Applicable — N/A

1. **Roads damaged** — Location shown on site map — Roads adequate — (N/A)
Remarks _____

B. Other Site Conditions

Remarks_____

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8.	**Wet Areas/Water Damage**	Wet areas/water damage not evident	
	Wet areas	Location shown on site map	Areal extent_____
	Ponding	Location shown on site map	Areal extent_____
	Seeps	Location shown on site map	Areal extent_____
	Soft subgrade	Location shown on site map	Areal extent_____
	Remarks_____		
9.	**Slope Instability**	Slides	Location shown on site map / No evidence of slope instability
	Areal extent_____		
	Remarks_____		

B. Benches Applicable N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1.	**Flows Bypass Bench**	Location shown on site map	N/A or okay
	Remarks_____		
2.	**Bench Breached**	Location shown on site map	N/A or okay
	Remarks_____		
3.	**Bench Overtopped**	Location shown on site map	N/A or okay
	Remarks_____		

C. Letdown Channels Applicable N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1.	**Settlement**	Location shown on site map	No evidence of settlement
	Areal extent_____	Depth_____	
	Remarks_____		
2.	**Material Degradation**	Location shown on site map	No evidence of degradation
	Material type_____	Areal extent_____	
	Remarks_____		
3.	**Erosion**	Location shown on site map	No evidence of erosion
	Areal extent_____	Depth_____	
	Remarks_____		

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES (Applicable) N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating (Needs Maintenance) N/A
   Remarks THREE FLOW METERS (RW-2, RW-4 & RW-9) DO NOT SHOW FLOW. CONSISTENT W/ THE CONTROL PANEL INDICATIONS.

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   (Good condition) Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   (Readily available) Good condition Requires upgrade Needs to be provided
   Remarks

B. Surface Water Collection Structures, Pumps, and Pipelines (Applicable) (N/A)

1. **Collection Structures, Pumps, and Electrical**
   (Good condition) Needs Maintenance
   Remarks GWTP DISCHARGE PIPE TO SURFACE H_2O.

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks

3. **Spare Parts and Equipment**
   (Readily available) (Good condition) Requires upgrade Needs to be provided
   Remarks

C. Treatment System (Applicable) N/A

1. **Treatment Train** (Check components that apply)
   Metals removal — Oil/water separation — Bioremediation
   (Air stripping) — Carbon adsorbers
   (Filters) VAPOR PHASE CARBON FILTERS (LEAD/LAG)
   Additive (*e.g.*, chelation agent, flocculent)_____
   Others_____
   Good condition — Needs Maintenance
   (Sampling ports properly marked and functional)
   (Sampling/maintenance log displayed and up to date)
   (Equipment properly identified)
   Quantity of groundwater treated annually APP. 15 MM gallons
   Quantity of surface water treated annually N/A
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A (Good condition) Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A (Good condition) Proper secondary containment Needs Maintenance
   Remarks SOME H2O W/IN THE VAULTS - ALL VAULTS ARE EMPTY BOTTOM FOR DRAINAGE.

4. **Discharge Structure and Appurtenances**
   N/A (Good condition) Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   N/A (Good condition (esp. roof and doorways)) Needs repair
   Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   (Properly secured/locked) (Functioning) (Routinely sampled) (Good condition) N/A
   (All required wells located) Needs Maintenance
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   (Is routinely submitted on time) Is of acceptable quality

2. Monitoring data suggests:
   (Groundwater plume is effectively contained) (Contaminant concentrations are declining)

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   (Properly secured/locked) (Functioning) (Routinely sampled) (Good condition)
   All required wells located Needs Maintenance N/A
   Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

BASED ON ANALYTICAL RESULTS

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M activities associated w/OU-1 have been effective in maintaining residential groundwater levels below the performance stds.

OU-2 O&M activities

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

For the most part, both the residential treatment systems & the GWTP have proved to be reliable in maintaining the effectiveness of the remedy with only minor disruptions in service (i.e. a temporary shutdown (< 12 hours) of the GWTP due to a power outage).

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

No suggestions/proposals have been forwarded by either the PADEP's or the EPA's O&M contractors at this time.