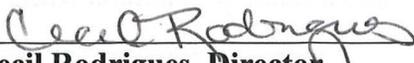


**THIRD FIVE-YEAR REVIEW REPORT FOR
CENTRE COUNTY KEPONE SUPERFUND SITE
CENTRE COUNTY, PENNSYLVANIA**



September 2014

**Prepared By:
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Region 3
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9/22/2014
Date

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LIST OF ABBREVIATIONS

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
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
FWDD	Freshwater Drainage Ditch
FYR	Five-Year Review
GPRA	Government Performance and Results Act
IC	Institutional Control
HHRA	Human Health Risk Assessment
MCL	Maximum Contaminant Level
mg/kg	milligram per kilogram
NA	Not Applicable
NE	Not Established
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PCE	Tetrachloroethene
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROC	RÜTGERS Organics Corporation
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	Soil Vapor Extraction
SWRAU	Sitewide Ready for Anticipated Use
TBD	To Be Determined
TCE	Trichloroethene
µg/kg	microgram per kilogram
µg/L	microgram per liter
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

The 35-acre Centre County Kepone Superfund Site (the Site) is located in State College, Centre County, Pennsylvania. Waste disposal practices at the former RUETGERS Organics Corporation (ROC) chemical manufacturing plant contaminated ground water, soil, sediment, surface water and fish tissue with volatile organic compounds (VOCs), mirex or kepone. The United States Environmental Protection Agency (EPA) issued a Record of Decision (ROD) in 1995, a ROD Amendment in 2001, and a second ROD in 2009. The Site consists of four operable units (OUs).

The OU1 cleanup included ground water extraction and treatment, excavation of contaminated soils and sediments, surface water drainage system improvements, additional monitoring and institutional controls. For OU2, which addresses the Former Spray Field Area and other areas, cleanup included soil excavation and disposal, installation of a soil cover and pavement/building cover, implementation of institutional controls, and mitigation measures for vapor intrusion, if warranted. The OU3 remedy consisted of soil excavation in the Process Area, Former Drum Staging Area, and Designated Outdoor Storage Area. The OU4 remedy consisted of soil vapor extraction. The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 28, 2009.

The remedy at OU1 is protective of human health and the environment in the short-term. All exposure pathways that could result in unacceptable risks are being controlled. The groundwater remedy for OU1 is generally functioning as intended by the decision documents, but there are areas where elevated concentrations remain. Additional data is being collected to refine the current understanding of contaminant distribution and remedy effectiveness.

A vapor intrusion (VI) study for off-property residences and businesses in the area of the groundwater plume concluded that there are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site-related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway was confirmed for a commercial property located east of College Avenue adjacent to the Site but had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. Annual evaluations will be performed for the commercial property to assess whether there are changes in building conditions or indoor air levels. In order for the OU1 remedy to be protective in the long term, institutional controls should be implemented to prohibit installation of public or private wells in the plume downgradient of the ROC property.

The remedy at OU2 is protective of human health and the environment. Contaminated sediments from the upper and lower freshwater drainage ditch, Thornton Spring, and Thornton Spring drainage channel were removed and disposed off-site. Impacted soils from the Former Spray Field Area were consolidated on the Remediation Parcel and capped with a soil cover. No exposure pathways are complete.

The remedy at OU3 is protective of human health and the environment. Contaminated soils were excavated and disposed off-site.

The remedy at OU4 is protective of human health and the environment because the soil vapor extraction system is operating as designed. No exposure pathways are complete. Additional evaluation should be considered to determine if soil concentrations meet cleanup goals.

Government Performance and Results Act (GPRA) Measure Review

As part of this FYR, GPRA measures and their current status were reviewed.

Environmental Indicators

Human Health: Current human exposure is controlled.

Ground Water Migration: There are insufficient data to determine migration control status.

Sitewide Ready for Anticipated Use (SWRAU)

The Site has not achieved SWRAU.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Centre County Kepone		
EPA ID: PAD000436261		
Region: 3	State: PA	City/County: State College/Centre County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? No	
REVIEW STATUS		
Lead agency: EPA If "Other Federal Agency" selected above, enter Agency name: Click here to enter text.		
Author name: Frank Klanchar, with additional support provided by Skeo Solutions		
Author affiliation: EPA Region 3, with additional support provided by Skeo Solutions		
Review period: January 2014 – September 2014		
Date of site inspection: March 25, 2014		
Type of review: Statutory		
Review number: 3		
Triggering action date: 09/28/2009		
Due date (five years after triggering action date): 09/28/2014		

FIVE-YEAR REVIEW SUMMARY FORM (CONTINUED)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:

OU2, OU3, OU4

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1	Issue Category: Monitoring			
	Issue: A complete VI pathway exists for an adjacent commercial property located east of College Avenue but had no unacceptable risks. The presence of a shallow groundwater plume from the Site toward the commercial property has not been fully delineated.			
	Recommendation: Conduct additional evaluation of the shallow aquifer to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	PRP	EPA/State	09/28/2016

OU(s): OU1	Issue Category: Institutional Controls			
	Issue: There are no institutional controls to prohibit installation of a private or public well in the ground water plume downgradient of the ROC property within the Area of Attainment.			
	Recommendation: Implement institutional controls to prohibit installation of public or private wells in the plume downgradient of the ROC property.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	PRP	EPA/State	09/28/2016

Protectiveness Statement(s)

<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> 09/28/2016
<i>Protectiveness Statement:</i> The remedy at OU1 is protective of human health and the environment in the short-term. All exposure pathways that could result in unacceptable risks are being controlled. The groundwater remedy for OU1 is generally functioning as intended by the decision documents,		

but there are areas where elevated concentrations remain. Additional data is being collected to refine the current understanding of contaminant distribution and remedy effectiveness.

A vapor intrusion (VI) study for off-property residences and businesses in the area of the groundwater plume concluded that there are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site-related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway was confirmed for a commercial property located east of College Avenue adjacent to the Site but had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. Annual evaluations will be performed for the commercial property to assess whether there are changes in building conditions or indoor air levels. In order for the OU1 remedy to be protective in the long term, institutional controls should be implemented to prohibit installation of public or private wells in the plume downgradient of the ROC property.

<i>Operable Unit:</i> OU2	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter date.
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Protectiveness Statement:
The remedy at OU2 is protective of human health and the environment. Contaminated sediments from the upper and lower freshwater drainage ditch, Thornton Spring, and Thornton Spring drainage channel were removed and disposed off-site. Impacted soils from the Former Spray Field Area were consolidated on the Remediation Parcel and capped with a soil cover. No exposure pathways are complete.

<i>Operable Unit:</i> OU3	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter date.
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Protectiveness Statement:
The remedy at OU3 is protective of human health and the environment. Contaminated soils were excavated and disposed off-site.

<i>Operable Unit:</i> OU4	<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter date.
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Protectiveness Statement:
The remedy at OU4 is protective of human health and the environment because the soil vapor extraction system is operating as designed. No exposure pathways are complete. Additional evaluation should be considered to determine if soil concentrations meet cleanup goals.

Third Five-Year Review Report for Centre County Kepone Superfund Site

1.0 Introduction

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. FYR reports document FYR methods, findings and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 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 5 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.

EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which 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 initiation of the selected remedial action.

EPA Region 3 with contractor support from Skeo Solutions conducted the FYR and prepared this report regarding the remedy implemented at the Centre County Kepone Superfund site (the Site) in State College, Centre County, Pennsylvania. The review period for this FYR was from January 2014 to August 2014. EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The Pennsylvania Department of Environmental Protection (PADEP), as the support agency representing the Commonwealth of Pennsylvania, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this statutory review was the signing of the previous FYR on September 28, 2009. The FYR is required because hazardous

substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of four operable units (OUs). This FYR report addresses all site OUs.

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Site operators disposed of organic chemical waste into earthen lagoons	Early 1960s to 1963
Site operators replaced the earthen lagoons with asphalt and concrete lagoons for waste treatment; operators sprayed treated wastewater on an open grassy area of the Site	1963 to 1969
Pennsylvania Department of Environmental Resources (PADER) ordered in-situ treatment (Chemfix™) of the wastewater and sludge in the lagoons	May 1972
PADER issued an Administrative Order to investigate environmental impacts at the Site and to abate discharges of industrial wastes	November 1977
PADER issued a Supplemental Order to remove and dispose of contaminated soil and solid waste materials, to restore the contaminated ground water and to conduct ground water monitoring	June 1981
RÜTGERS Organics Corporation (ROC) completed construction of an on-site ground water treatment facility; operations commenced	November 1982
EPA placed the Site on the National Priorities List (NPL)	September 8, 1983
EPA and ROC entered into an Administrative Order on Consent (AOC), which required ROC to conduct a remedial investigation (RI) and feasibility study (FS)	November 7, 1988
ROC completed the RI/FS for OU1; EPA issued the Record of Decision (ROD) for OU1	April 21, 1995
EPA issued a Unilateral Administrative Order to Occidental Chemical Corporation, another PRP for the site	March 10, 1997
ROC entered into a Consent Decree with EPA to implement the OU1 remedy	April 16, 1997
EPA issued an AOC with Nittany Commons for removal of FWDD sediments on the former Abramson auto salvage yard	January 7, 1998
Nittany Commons completed the removal action	December 4, 1998
ROC completed a focused FS report for soil vapor extraction (SVE)	February 1999
EPA approved the Final Design Report for construction of the OU1 remedy	July 9, 1999
ROC began on-site construction of the OU1 remedy	August 16, 1999
ROC completed physical construction of the OU1 remedy; ground water extraction and treatment began	March 2000
EPA issued the OU1 ROD Amendment	March 8, 2001
EPA approved the Final Design report for soil excavation (OU3)	October 4, 2001
ROC began construction for the OU3 remedy	October 8, 2001
EPA approved the Remedial Action (RA) report for the ground water remedy (OU1)	November 16, 2001
EPA approved the Final Design report for the SVE system (OU4)	July 2, 2002
ROC began construction for the SVE system (OU4)	August 5, 2002
Occidental Chemical Corporation enters into Consent Decree settlement	October 1, 2002
ROC completed the OU4 SVE system construction and operations began	February 2003
Chemical manufacturing operations at the Site ceased	March 2004

Event	Date
EPA approved the RA report for SVE (OU4)	April 29, 2004
EPA completed the first FYR	September 10, 2004
EPA approved the RA report for the OU3 remedy	September 29, 2004
EPA deleted a portion of the Site, the Administration Parcel, from the NPL (OU1)	November 26, 2004
ROC and EPA entered into an Administrative Settlement and Order on Consent for a sediment removal action (OU2)	May 2, 2007
ROC completed a removal action for sediments in the lower freshwater drainage ditch (FWDD) and Thornton Spring channel	June 2008
EPA approved the OU2 FS	December 22, 2008
EPA approved the sediment removal action report	January 20, 2009
ROC completed the RI/FS for OU2; EPA issued the OU2 ROD	July 24, 2009
EPA completed the second FYR	September 28, 2009
ROC completed a vapor intrusion report for evaluation of on-property vapor intrusion potential (OU1)	May 19, 2010
EPA issued AOC for OU2 remedial design	September 24, 2010
ROC completed a work plan for additional vapor intrusion study, which included assessment of off-property areas (OU1)	December 9, 2010
A Consent Decree for OU2 remedial design/remedial action activities was entered with the court	March 8, 2011
EPA approved the remedial design for OU2	June 24, 2011
ROC completed the final RA for OU2	September 26, 2011
EPA approved modifications to the remedial system, which included replacement of the air stripper, construction of a new stack and discontinuation of air emission controls	August 1, 2013
ROC completed vapor intrusion investigation reports for off-property residential areas and off-property commercial areas	June 24, 2014 July 21, 2014

3.0 Background

3.1 Physical Characteristics

Located in Centre County, State College, Pennsylvania, the Site includes about 35 acres owned or formerly owned by RÜTGERS Organics Corporation (ROC) and a portion of the Spring Creek watershed, including Thornton Spring (Figure 1). The ROC property housed a chemical manufacturing plant, which closed in 2004. Appendix F shows the locations of historic site features, including the Former Drum Storage Area, Tank Farm Area and Designated Outdoor Storage Area. Several buildings, building foundations and ancillary facilities associated with the former plant occupy the northern portion of the Site (Figure 2). The southern and southwest portions of the ROC property includes open fields, the OU2 soil consolidation unit, and a stormwater retention basin.

In 2008, ROC divided their property into two parcels, the Remediation Parcel and the Redevelopment Parcel. The Remediation Parcel is retained by ROC to perform the long-term ongoing remedial activities (groundwater and soil vapor extraction systems) required by decision documents and the Consent Decree. The Remediation Parcel is 14.035 acres and consists primarily of former manufacturing areas on the western portion of the Site. The Redevelopment Parcel is located on the eastern portion of the Site and is 19.106 acres. The Redevelopment

Parcel was sold by ROC in 2011 following completion of the OU2 remedial action and was subsequently subdivided into three parcels (see Table 2).

Table 2: Tax Parcels for the Site

Parcel	Property Owner ¹	Acres
Remediation Parcel		
19-004-024	ROC	14.035
Redevelopment Parcel		
19-004-024C	Struble Road Limited Partnership (Lot 2R)	14.934
19-004-024E	C. Wayne Co., L.P. (Lot 2A)	1.731
19-004-024F	J&J Realty at State College, LLC (Lot 2B)	2.441
<i>Notes:</i> Owners are current as of April 2012, when environmental covenants were recorded for the Redevelopment parcels.		

A freshwater drainage ditch (FWDD) runs along the western boundary of the Site, crosses under Route 26, and enters Spring Creek. Stream flow in the FWDD is dependent on stormwater runoff and discharges from the Site’s ground water treatment plant.

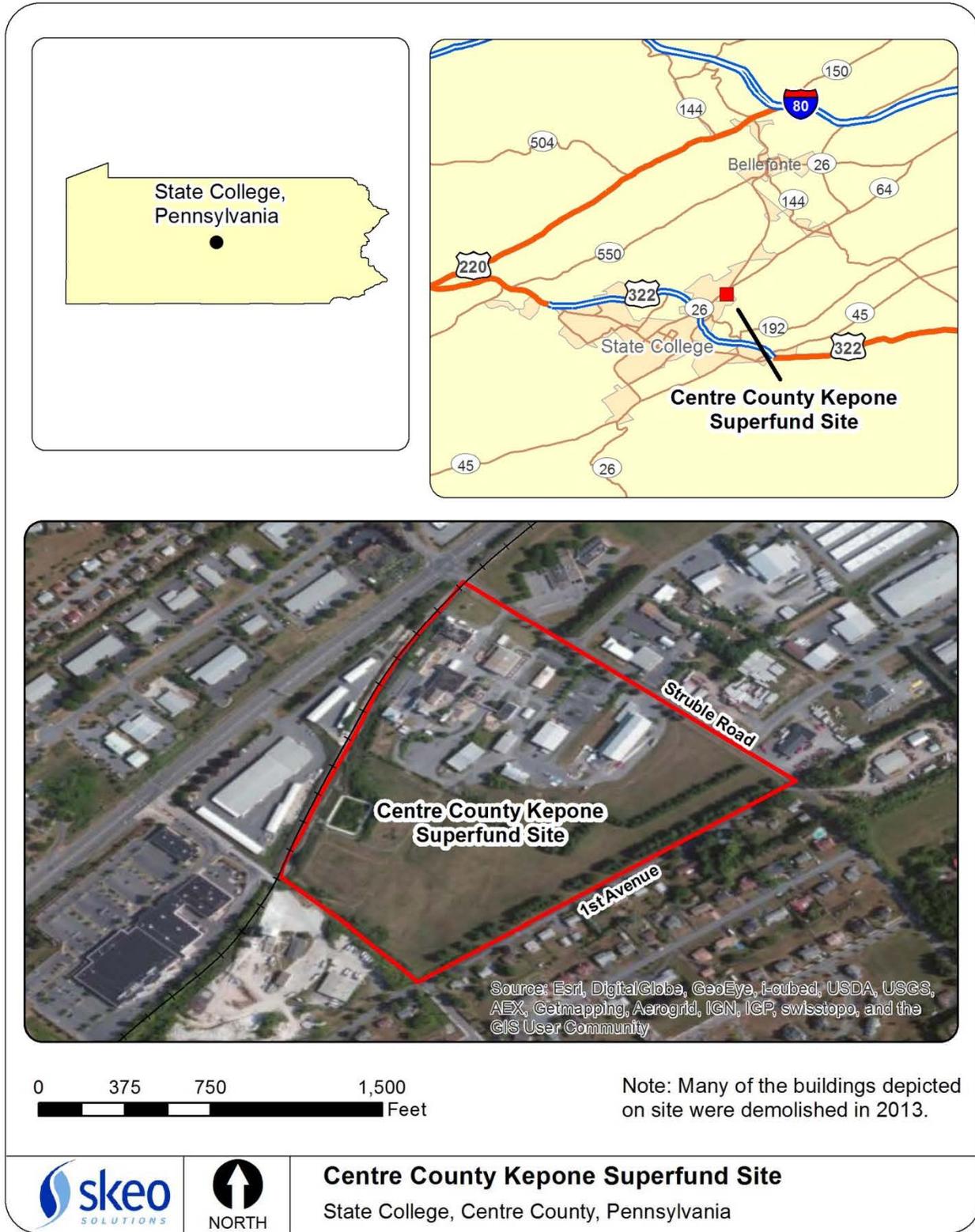
The geologic units underlying the Site include the Loysburg Group and the Bellefonte dolomite. Limestone at the Site has solution features typical of karst terrain. Ground water in the bedrock aquifer generally flows toward the southwest and emerges as surface water at Thornton Spring, located about one-half mile from the Site. Thornton Spring flows approximately 300 feet before emptying into Spring Creek. Shallow ground water flow at the Site is to the west. The remedial investigation (RI) reports provide further detail on site geology and hydrogeology.

3.2 Land and Resource Use

From 1958 to 2004, a chemical manufacturing plant operated at the Site. Following closure of the plant, it was formally decommissioned under the Commonwealth of Pennsylvania’s Act 2 regulations with oversight by PADEP. ROC completed demolition of the empty former manufacturing buildings in fall 2013. The ground water treatment plant, storage buildings, soil vapor extraction (SVE) system and building foundations remain on site. The Redevelopment Parcel currently houses two businesses, a roofing contractor and a cheerleading studio, in former ROC buildings.

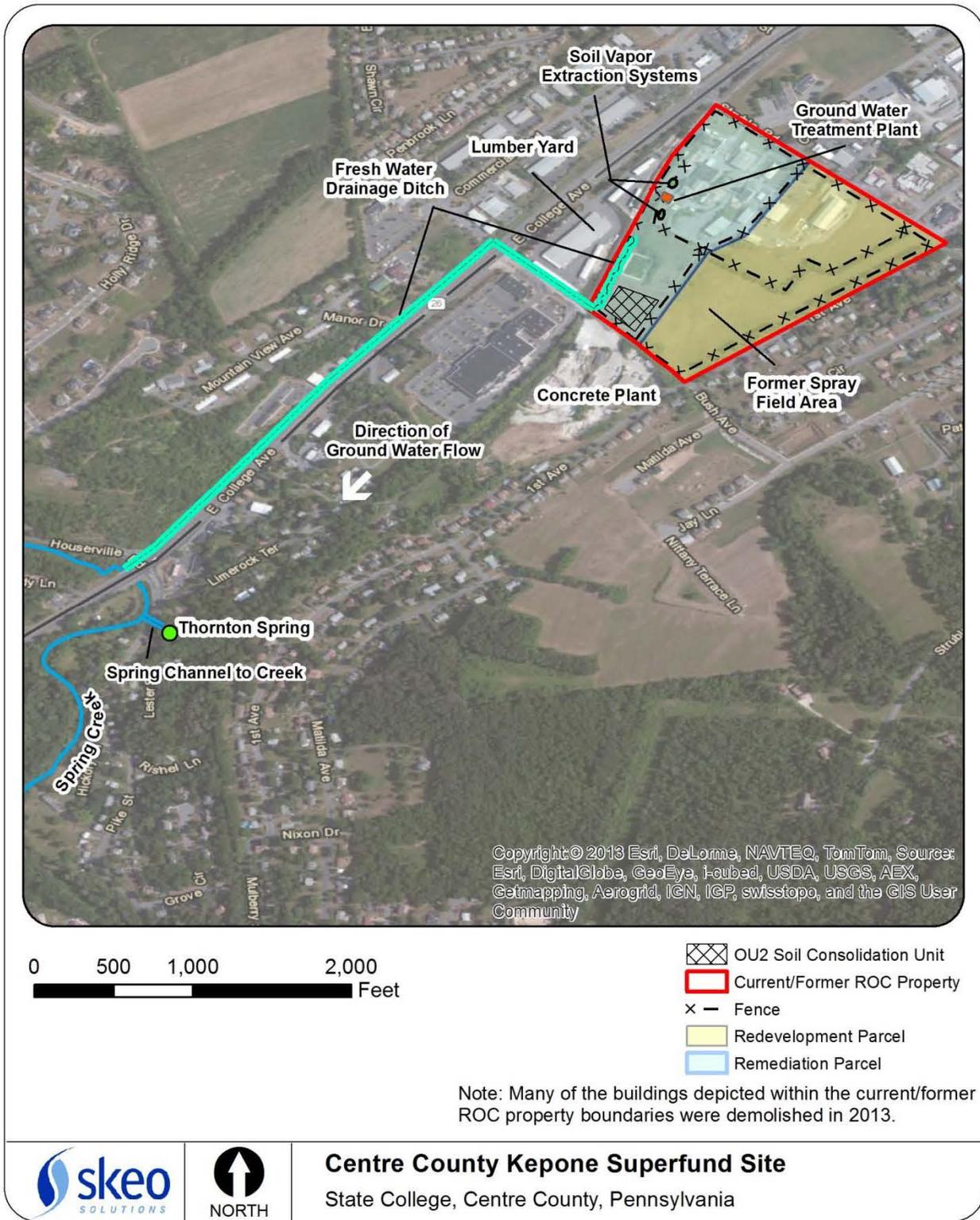
Land uses near the Site are mixed industrial/commercial with some residential. A restaurant, garden center, lumber yard, and concrete plant are located within 300 feet of the Site. Several residences are located along the southeast border of the Site on First Avenue. Additional residences, including a newly constructed multi-family housing complex, are located less than a quarter mile southwest of the Site on Limerock Terrace. The College Township Water Authority provides potable water to businesses and residents in the area. Future land use at and near the Site is not anticipated to change.

Figure 1: Site Location Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

3.3 History of Contamination

Nease Chemical Company, Inc. (Nease) began chemical manufacturing at the Site in 1958. The facility manufactured products and intermediates utilized in the soap and detergent industry, the agricultural chemical industry, and in pharmaceutical products, metal plating and plastics. The facility also manufactured two pesticides, kepone (chlordecone) and mirex (dodecachloropentacyclodecane). The primary organic raw materials the plant used in its manufacturing process included benzene, methanol, tetrachloroethene (PCE), tetrachloroethane, toluene, and xylene.

In the early 1960s, site operators disposed of process wastes in earthen lagoons. By 1963, operators replaced the earthen lagoons with concrete and asphalt lagoons. Operators sprayed treated water from the lagoons on an open grassy area at the southern end of the Site (identified as the Former Spray Field Area, Figure 2). Beginning in April 1972, operators disposed of all waste materials at off-site facilities. ROC acquired the property in 1977.

3.4 Initial Response

In June 1960, the Pennsylvania Department of Health (later renamed the Pennsylvania Department of Environmental Resources, or PADER) conducted a site inspection in response to a chemical odor near Thornton Spring. The Department of Health identified the lagoons as the source of the odor and ordered Nease to construct a concrete lagoon and macadamize an earthen lagoon with asphalt. Nease complied. In 1969, PADER determined that water from the spray field was affecting Thornton Spring. PADER recommended that use of the spray field be discontinued and that the facility prevent further discharges to Thornton Spring. Nease complied with the recommendations.

In response to a PADER order in May 1972, Nease treated the wastewater and sludge in the concrete and earthen lagoons using a process called Chemfix™ to stabilize and solidify the material. Nease also disposed of the contents of the asphalt impoundment and backfilled the asphalt and earthen impoundments. In November 1977, PADER issued an Administrative Order to investigate environmental impacts at the Site and to abate discharges of industrial wastes. After acquiring the property, ROC constructed an on-site ground water treatment facility in October 1982 and began operating the facility in November 1982.

EPA proposed the Site for inclusion on the National Priorities List (NPL) on December 1, 1982, and placed it on the NPL on September 8, 1983. In May 1986, EPA took over as lead agency for the Site. ROC and EPA entered into an Administrative Order on Consent (AOC) on November 7, 1988, requiring ROC to conduct an RI and feasibility study (FS) for the Site.

3.5 Basis for Taking Action

The RI identified 29 chemicals, including various volatile organic compounds (VOCs), mirex and kepone in the environmental media sampled. A 1993 baseline human health risk assessment (HHRA) identified unacceptable carcinogenic risks and noncarcinogenic hazard from exposure

to ground water for a future off-site resident, ingestion of fish by a future recreational visitor, and exposure to on-site soil and ground water for a future on-site resident.

The 1993 HHRA determined that the Former Spray Field Area soils did not pose an unacceptable risk to site workers or trespassers. Because EPA risk assessment guidelines changed, risks were recalculated for the industrial worker and construction worker during the 2007 OU2 investigation. For each receptor, both the overall cancer risks and hazard index values were well below EPA's acceptable cancer risk range (1×10^{-4} to 1×10^{-6}) and non-cancer threshold.

An ecological risk assessment conducted for the Site in 1993 predicted ecological risk for all areas except the Former Spray Field Area and Spring Creek and its riparian area. A 2009 update to the ecological risk assessment for OU2 indicated that chemicals in some portions of the Former Spray Field Area exceeded ecological soil screening levels and the ecological risk assessment indicated that upper trophic level receptors were likely experiencing unacceptable risk due to bioaccumulation.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site. Final selection was made based on an evaluation of each alternative against nine evaluation criteria specified in Section 300.430(e)(9)(iii) of the NCP.

4.1 Remedy Selection

EPA established four OUs for site cleanup:

- OU1: Ground water and surface water, soils (excluding the Former Spray Field Area), sediments on the ROC property and in Spring Creek, vapor intrusion.
- OU2: Soils in the Former Spray Field Area and riparian areas of Spring Creek; sediments from the lower FWDD, Thornton Spring outlet and drainage channel, and depositional areas of Spring Creek downstream of Benner Fish Hatchery.
- OU3: Excavation of soils in the Process Area, Former Drum Staging Area and Designated Outdoor Storage Area.
- OU4: SVE to address VOC-contaminated soil.

OU1, OU3, and OU4

EPA selected the OU1 remedy in the Site's April 21, 1995 Record of Decision (ROD). The ROD defined the following remedial action objectives (RAOs) for OU1. The RAOs related to subsurface soil also apply to OU3 and OU4.

- Remediate contaminants of concern (COCs) on site and mitigate off-site migration of COCs.
- Restore ground water quality within the attainment area.

- Reduce COCs in Thornton Spring surface water to comply with ARARs.
- Mitigate leaching of COCs from subsurface soil to be protective of ground water.
- Protect environmental receptors.
- Control the quality of water entering the FWDD by reducing contamination to acceptable levels based on environmental risks and ARARs.
- Control the COCs entering Spring Creek (Thornton Spring surface water and ground water discharges from the Site) by reducing contamination to acceptable levels based on ARARs.
- Reduce the bioavailability of mirex and kepone detected in Spring Creek sediments such that fish tissue levels of mirex and kepone do not exceed Food and Drug Administration action levels.

The remedy for OU1 included the following major components. Remedy components related to subsurface soil were later subdivided and addressed as OU3 and OU4.

- Extraction and treatment of contaminated ground water with discharge to the FWDD.
- Long-term ground water monitoring.
- Excavation and off-site disposal of on-property contaminated soils.
- Improvements to the surface water drainage system in the plant production area.
- Engineering controls and enhanced hazardous materials management practices to protect surface water drainage.
- Monitoring of surface water discharge from the Site.
- Excavation and off-site disposal of contaminated sediments from on-property portions of the FWDD.
- Fencing of the ROC property and Thornton Spring area.
- Deed restrictions.
- Spring Creek fish tissue and sediment monitoring.
- Surficial soil sampling of the Former Spray Field Area and evaluation of associated environmental risks.
- Riparian-area sampling along Spring Creek; additional sediment sampling of the Thornton Spring drainage channel, the off-property FWDD, and Spring Creek downstream of Benner Fish Hatchery; and evaluation of associated environmental risks.

On March 8, 2001, EPA issued a ROD Amendment that addressed changes to the 1995 ROD for OU1. The ROD Amendment included the following major components:

- In-situ treatment by SVE to remove VOCs in soils from the Former Drum Staging Area, the Designated Outdoor Storage Area, the Tank Farm/Building #1 Area, and areas near buildings and process areas.
- Use of hydraulic fracturing enhancement of SVE in overburden soils.
- Use of multi-phase extraction (soil vapor and water) to address perched water.
- On-site treatment of extracted VOCs using an air pollution control device.
- Construction of low-permeability covers (asphalt or concrete) in SVE areas to reduce short circuiting of air flow and limit infiltration of precipitation.
- Excavation of contaminated soil in areas of shallow bedrock (depth to bedrock less than six feet) and areas where mirex or kepone exceed cleanup standards.

- Designation of a Corrective Action Management Unit/Staging Pile on site to manage excavated soils.
- Designation of refined cleanup standards for soil and ground water based on updated state and federal methodologies.

For tracking purposes, EPA identified the soil excavation component of the amended remedy as OU3 and the SVE component of the amended remedy as OU4.

OU2

On July 24, 2009, EPA issued a ROD for OU2. As a result of OU2 field investigations and a sediment removal action performed under a 2007 Administrative Settlement and Order on Consent, the Former Spray Field Area surface soils were the only part of OU2 that required further action. The 2009 ROD defined the following RAOs for OU2:

- Mitigate exposure by ecological receptors to mirex, photomirex, and kepone in surface soils.
- Reduce potential for off-site migration of contaminated surface soil.

The remedy for OU2 included the following major components:

- A soil cover for surface soils above the Preliminary Remediation Goal (PRG) of 190 parts per billion for kepone within the Remediation Parcel portion of the Former Spray Field Area.
- Any combination of a soil cover, pavement/building cover, or excavation/disposal and replacement with clean soil for surface soils above the PRG within the Redevelopment Parcel portion of the Former Spray Field Area.
- Security fencing between the Redevelopment Parcel and Remediation Parcel.
- Institutional controls to prevent disturbance of surface soils above the PRG that are capped (soil, asphalt or building cover) and to protect the continued stability and integrity of the remedy.
- Mitigation measures for vapor intrusion for any existing or planned structure/building within the area of VOC contamination and occupied by persons, if warranted by the results of the vapor intrusion study being performed under OU1.

Ground Water, Soil, and Surface Water Cleanup Levels

The 1995 ROD established ground water, soil, and surface water cleanup levels for the Site. The 2001 ROD Amendment refined the ground water and soil cleanup levels (Table 3). The ground water cleanup levels apply to the “Area of Attainment,” which is defined in the 1995 ROD as the downgradient property boundary of ROC, the ground water contamination beyond the ROC property, and Thornton Spring. Soil cleanup levels listed in Table 3 apply to areas addressed by the SVE system. The 2009 OU2 ROD also established a soil cleanup level of 190 micrograms per kilogram ($\mu\text{g}/\text{kg}$) for kepone in the Former Spray Field Area. The 2001 ROD Amendment specified that the Pennsylvania Water Quality Standards for aquatic life apply at Thornton Spring. Specific cleanup values were not included in the 2001 ROD Amendment.

Table 3: 2001 ROD Amendment Ground Water and Soil Cleanup Levels

Chemical	Ground Water Cleanup Level in ROD (µg/L)	Soil Cleanup Level ⁴ (mg/kg)
Acetone	610 ³	124
Benzene	5 ¹	1.22
2-Butanone (methyl ethyl ketone)	1,900 ³	807
Carbon Disulfide	1,000 ³	4,966
Chlorobenzene	110 ³	97
Chloroform	100 ¹	24
1,2-Dichlorobenzene	600 ¹	NE
1,1-Dichloroethane	810 ¹	NE
1,2-Dichloroethane	5 ¹	NE
1,1-Dichloroethene	7 ¹	NE
1,2-Dichloroethene	70 ¹	14/20 ⁵
1,2-Dichloropropane	5 ¹	1
Ethylbenzene	700 ¹	624
Kepone	TBD	72.737 ⁶
Methylene Chloride	4.1 ³	0.38
Mirex	TBD	570,000
1,1,2,2-Tetrachloroethane	0.05 ³	1.05
PCE	5 ¹	6.06
Tetrahydrofuran	8.8 ³	NE
Toluene	1,000 ¹	531
1,1,1-Trichloroethane	200 ¹	NE
1,1,2-Trichloroethane	5 ¹ /3 ²	1.58
Trichloroethene (TCE)	5 ¹	1.92
Vinyl Chloride	2 ¹	0.10
Xylenes	10,000 ¹	14,111

Notes:
 1 - Cleanup goal is federal maximum contaminant level (MCL).
 2 - Cleanup goal is federal maximum contaminant level goal (MCLG).
 3 - Cleanup goal is risk-based concentration corresponding to a hazard quotient of 1 or 1x10⁻⁶ cancer risk.
 4 - Soil to ground water medium specific concentrations, based on Pennsylvania Act 2 methodology; apply to areas addressed by the SVE system.
 5 - 14 mg/kg is soil cleanup goal for cis-1,2-DCE; 20 mg/kg is soil cleanup goal for trans-1,2-DCE.
 6 - Summers model calculation for subsurface soils as contained in the FS, dated October 1993.

µg/L – micrograms per liter
 mg/kg – milligrams per liter
 TBD – To be determined, as listed in the 2001 ROD Amendment
 NE – Not established

4.2 Remedy Implementation

OU1

In a Consent Decree finalized in April 1997, ROC agreed to perform the remedial design/remedial action (RD/RA) for the selected remedy. Deed restrictions for the original ROC property (which at the time, included both the Remediation and Redevelopment Parcels) were recorded with Centre County on December 24, 1996. The deed restrictions prohibit use of the property for residential, commercial or agricultural purposes and the use of on-site ground water for domestic purposes.

EPA approved the Final Design Report for construction of the OU1 ground water remedy in July 1999. Operation of the ground water treatment plant began in March 2000. The ground water treatment plant includes an influent tank, bag filters to remove particulates, an air stripper to remove VOCs and two carbon adsorption units for polish and to remove mirex and kepone. The system discharges treated water to the on-site FWDD in accordance with water quality effluent limitations specified in a National Pollutant Discharge Elimination System (NPDES) equivalency permit issued by PADEP. A regenerative thermal oxidizer treated the air stripper off-gas.

Also completed during the construction period were the excavation and lining of the FWDD and the required upgrades to engineering controls and the surface water and stormwater collection system. ROC completed the Interim RA report for OU1, which EPA approved on November 16, 2001.

In March 2001, EPA issued a ROD Amendment for the OU1 remedy. The ROD Amendment reduced the scope for soil excavation and required that remaining soil be remediated with enhanced SVE. The ROD Amendment also modified the cleanup standards for soil. To ease reporting requirements, EPA designated the soil excavation component of the remedy as OU3 and the SVE component of the remedy as OU4.

Ground water and surface water cleanup goals were not finalized for mirex and kepone due to a lack of toxicity data and precise analytical methods. The current surface water standard for mirex is 1 nanogram per liter, which is below laboratory detection limits. Although mirex and kepone have not been detected at the NPDES outfall or at Thornton Spring, kepone is periodically detected in the treatment system influent.

The OU2 ROD specified that evaluation of vapor intrusion would be performed under OU1. In December 2009, ROC initiated an on-site vapor intrusion (VI) study; ROC initiated a VI study for off-site properties in 2012 and 2014. As a result of the VI investigations, ROC voluntarily installed a VI mitigation system at an off-property location on Limerock Terrace. A complete VI pathway was confirmed for an adjacent commercial property but it had no unacceptable risks. ROC will conduct annual evaluations of the adjacent commercial property to assess whether there are changes in building conditions or indoor air levels. The evaluation will include building inspections and air sampling. The annual evaluations will continue until it is demonstrated to EPA that contaminant levels remain at protective levels.

OU2

ROC and EPA entered into an AOC in May 2007 for removal of fine-grained sediments in the lower FWDD and Thornton Spring drainage channel. ROC removed 116 tons of material from the FWDD and Thornton Spring drainage channel and transferred the material off-site for disposal at an approved landfill. ROC completed remedial activities on June 25, 2008. EPA approved a RA Report for the OU2 sediment removal in January 2009.

Former Spray Field Area surface soils were the only part of OU2 that required further action. EPA issued the OU2 ROD on July 24, 2009. ROC signed a final AOC for remedial design on

September 29, 2010. ROC prepared a remedial design report, approved by EPA in June 2011, which modified the remedy specified in the ROD by allowing for consolidation of soils removed from the Redevelopment Parcel, followed by the placement of soil cover over the consolidated soil area. Implementation of the remedy began in June 2011 and was complete in August 2011. EPA approved the RA report for OU2 in September 2011.

In April 2012, Centre County recorded environmental covenants for three parcels within the Redevelopment Parcel. ROC also installed fencing between the Remediation Parcel and the Redevelopment Parcel.

OU3

EPA approved the Final Design report for OU3 soil excavation in September 2001. ROC excavated about 200 tons of mirex and kepone contaminated soil in 2001 and 2002. EPA approved the RA report for OU3 on September 29, 2004.

OU4

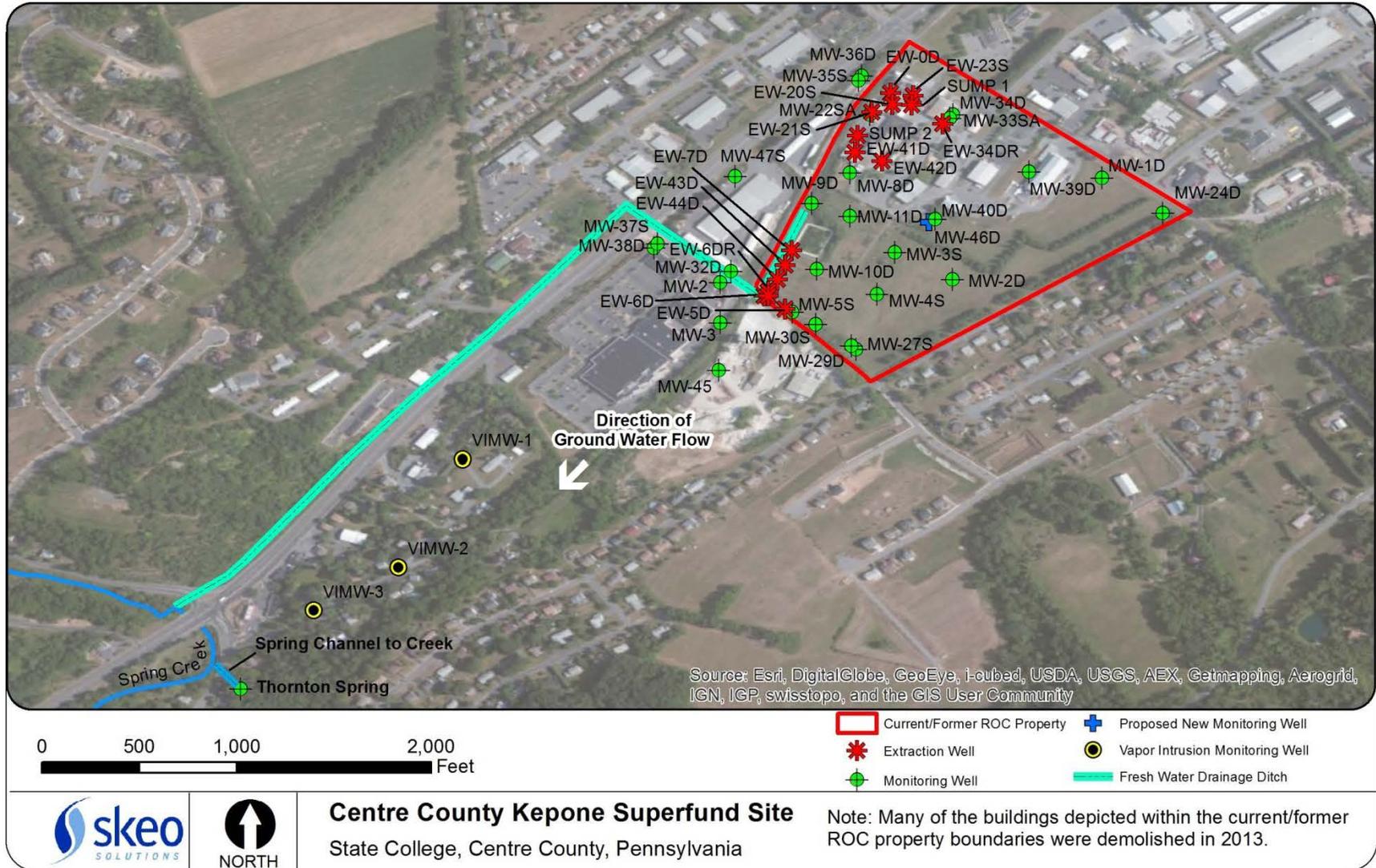
EPA approved the Final Design report for construction of the SVE system in July 2002. Construction of the SVE system began in August 2002 and ended in February 2003. The SVE system includes two blower units, B-90A and B-90B, which apply a vacuum to the subsurface via a network of wells. Blower B-90A applies a vacuum to the Former Drum Staging Area SVE wells and the Designated Outdoor Storage Area SVE wells and blower B-90B applies a vacuum to the Tank Farm and Process Areas SVE wells. Operation of the SVE system commenced in February 2003. EPA approved the Interim RA report for OU4 on April 29, 2004. The Interim RA Report provided documentation that the construction activities required by the 2001 ROD Amendment were completed. EPA approved discontinuation of air treatment in August 2013.

4.3 Operation and Maintenance (O&M)

ROC is responsible for long-term O&M at the Site. O&M Plans are in place for OU1, OU2, and OU4. The O&M Plans cover procedures and schedules for sampling and monitoring of sources, intermediate streams and effluents; equipment maintenance; disposal of spent carbon and bag filters; and OU2 soil cover inspections and maintenance. Figure 3 shows the locations of routinely monitored wells. ROC mows the OU2 vegetative cover twice a year. ROC's NPDES permit equivalency requires sampling of treated effluent. ROC documents results of site operations and sampling in monthly progress reports that are submitted to EPA and PADEP.

Recent modifications to the ground water treatment system include discontinuation of air treatment (August 2013) and installation of a new air stripper (February 2014). Recent modifications to the SVE system include shut down of blower B-90A due to low recovery rates (2009), initiation of a pulsed operating schedule (July 2010), and discontinuation of air treatment (August 2013).

Figure 3: Well Locations



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

In 2013, ROC conducted a well survey to determine the integrity of off-site well MW-3. ROC determined that MW-3 could be sampled and has proposed to redevelop and sample this well in 2014. In addition, ROC will also install a new deep well (MW-46D) to delineate the vertical extent of contamination at the Site.

ROC is responsible for all O&M costs. The 1995 ROD estimated annual O&M costs for the ground water remedy to be \$491,000. ROC has not shared O&M expenses with EPA. O&M costs at the Site include expenses related to general labor and contracting, analytical costs, O&M parts and utilities, and disposal of materials

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the second FYR for the Site stated:

The Site-wide remedy at the Centre County Kepone Superfund Site cannot be determined to be protective of human health and the environment at this time because VOCs in the groundwater plume area may represent a pathway for vapor intrusion into buildings. The vapor intrusion pathway will have to be evaluated for the Site, including those homes and businesses within the downgradient plume area. However, all other exposure pathways that could result in unacceptable risks are being controlled. Current data indicates that the OU1 and OU4 remedies are functioning as required to achieve groundwater cleanup goals. Sampling and monitoring of groundwater is expected to continue until cleanup goals are met. The remedy for OU3 is complete and fully protective of human health and the environment. The remedy for OU2 has not yet been implemented as the OU2 ROD was recently issued by EPA in July 2009.

While deed restrictions are in place for the ROC property to prohibit: (1) use of the property for residential, commercial, or agricultural purposes; and (2) the use of on-Site groundwater for domestic purposes, including drinking water, additional institutional controls are needed to prohibit well drilling in the area of the groundwater plume beyond the ROC property. These additional institutional controls are required to achieve long-term protectiveness.

As a result of the need to conduct a vapor intrusion assessment, the protectiveness determination for the Centre County Kepone Superfund Site is being deferred. It is expected that the vapor intrusion assessment will be completed by September 2010, at which time a protectiveness determination will be made and documented in an addendum to this Five-Year Review.

The second FYR included four issues and recommendations. This FYR summarizes each recommendation and its current status in Table 4 below.

Table 4: Progress on Recommendations from the 2009 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Conduct a vapor intrusion study for the Site.	PRP	09/2010	<p>ROC initiated an on-site vapor intrusion (VI) study in December 2009 with results reported to EPA in a May 2010 VI Report. Results of on-site sampling suggested that VI did not pose unacceptable risk. ROC initiated a VI assessment for six off-property locations in 2012. ROC identified potential future VI concerns at two off-property locations and recommended additional investigation for these properties. ROC identified a VI pathway as potentially complete at a third off-property location (Limerock Terrace). Although risks associated with the VI pathway were within EPA’s acceptable risk range, ROC offered and installed a mitigation system at the Limerock Terrace property. ROC conducted additional vapor intrusion investigations in 2014. Sampling results concluded that there are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site-related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway is present for a commercial property located east of College Avenue adjacent to the Site but it had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. ROC will conduct annual evaluations of the adjacent commercial property to assess whether there are changes in building conditions or indoor air levels. The evaluation will include building inspections and air sampling. The annual evaluations will continue until it is demonstrated to EPA that contaminant levels remain at protective levels.</p>	August 2014
Include a capture zone analysis of the ground water extraction system during the vapor intrusion study.	PRP	09/2010	<p>ROC evaluated capture zones and conducted pumping tests in July and August 2009, with results presented in the November 2011 biennial report. Additionally, ROC prepared an Enhanced Groundwater Monitoring Plan and Potential Long-Term Remediation Strategy report in June 2013. Monitoring well MW-3 will be redeveloped and sampled, and a new deep well (MW-46D) is planned to be installed in 2014. The evaluation is ongoing.</p>	Ongoing

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Issue a decision document for an institutional control that prohibits the installation of private or public wells in the ground water plume downgradient of ROC's property.	EPA, PADEP	09/2011	EPA determined that a decision document was not needed for institutional controls. However, EPA is currently evaluating potential mechanisms to implement institutional controls for downgradient properties. The boundaries for the IC will be defined following additional groundwater investigations.	Ongoing
Conduct limited sampling in the area between Building #3 and the dike area and take appropriate action, as necessary.	PRP	09/2011	The PRP conducted limited soil sampling near Building #3. COCs were not detected. EPA and PADEP did not require further action.	3/23/2011

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 3 initiated the FYR in February 2014 and scheduled its completion for September 2014. EPA's remedial project manager (RPM) Frank Klanchar led the EPA site review team, which also included EPA site attorney Bonnie Pugh, EPA community involvement coordinator (CIC) Alexander Mandell, and contractor support provided to EPA by Skeo Solutions. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR report development and review.

6.2 Community Involvement

In February 2014, EPA published a public notice in the *Centre Daily Times* newspaper announcing the commencement of the FYR process for the Site, providing contact information for EPA RPM Frank Klanchar and CIC Alexander Mandell and inviting community participation. The press notice is available in Appendix B. No one contacted EPA as a result of the advertisement.

EPA will make the final FYR report available to the public and online at <http://www.epa.gov/reg3hscd/npl/PAD000436261.htm>. EPA will place copies of the document

in the designated site repository located at Schlow Memorial Library, 100 East Beaver Avenue, State College, Pennsylvania 16801.

6.3 Document Review

This FYR included a review of relevant, site-related documents, including the RODs, ROD Amendment, biennial and monthly reports, and recent monitoring data. Appendix A presents a complete list of the documents reviewed.

ARARs Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain “a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment.” The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate.

Ground Water ARARs

According to the 1995 ROD, the ARARs for the Site’s ground water COCs were the National Primary Drinking Water Standards (40 CFR Part 141) or the background concentration, whichever was more stringent. At the time of the 1995 ROD signature, under Section 264 (i) and (j) and 264.100(a)(9) of Title 25 of the Pennsylvania Code, the Commonwealth required ground water to be cleaned up to “background” levels. However, EPA amended the remedy in a 2001 ROD Amendment and established the federal maximum contaminant levels (MCLs) as the Site’s final ground water ARARs. This review compared current federal MCLs to the 2001 ARARs for the Site’s ground water COCs. The ARARs associated with the Site’s ground water have not changed since 2001 (Table 5).

Table 5: Previous and Current ARARs for Ground Water COCs

COCs ^a	ARARs Established in the 2001 ROD Amendment (µg/L)	Current ARARs as of 2014 ^b (µg/L)	ARARs Change
Acetone	NA ^c	NA	NA
Benzene	5	5	None
2-Butanone (methyl ethyl ketone)	NA ^c	NA	NA
Carbon Disulfide	NA ^c	NA	NA
Chlorobenzene	NA ^c	100	NA
Chloroform	100	NA	NA
1,2-Dichlorobenzene	600	600	None
1,1-Dichloroethane	810	NA	NA
1,2-Dichloroethane	5	5	None
1,1-Dichloroethene	7	7	None
Cis-1,2-dichloroethene	70	70	None
1,2-Dichloropropane	5	5	None
Ethylbenzene	700	700	None
Kepone	NA ^c	NA	NA
Methylene Chloride	NA ^c	NA	NA

COCs ^a	ARARs Established in the 2001 ROD Amendment (µg/L)	Current ARARs as of 2014 ^b (µg/L)	ARARs Change
Mirex	NA ^c	NA	NA
1,1,2,2-Tetrachloroethane	NA ^c	NA	NA
PCE	5	5	None
Tetrahydrofuran	NA ^c	NA	NA
Toluene	1,000	1,000	None
1,1,1-Trichloroethane	200	200	None
1,1,2-Trichloroethane	5	5	None
TCE	5	5	None
Vinyl Chloride	2	2	None
Xylenes	10,000	10,000	None
a) COCs from the 2001 ROD Amendment. b) Based on federal MCL. The source for the National Primary MCLs is http://water.epa.gov/drink/contaminants/ (accessed on 03/20/2014). c) ARAR not identified in ROD or AROD. Cleanup goal based on risk. NA – Not Applicable; µg/L – microgram per liter			

Surface Water ARARs

The 1995 ROD established NPDES permit requirements and Pennsylvania Water Quality Standards for aquatic life as surface water ARARs for the Site. However, the 2001 ROD Amendment eliminated the NPDES discharge regulations for contaminants present in Thornton Spring surface water. The requirements to comply with the Pennsylvania Water Quality Standards for aquatic life still apply at Thornton Spring. Because the 2001 ROD Amendment did not list the specific values for the Pennsylvania Water Quality Standards, this FYR did not include a comparison of 2001 and 2014 standards.

Soil and Sediment ARARs

None of the Site’s decision documents established chemical-specific ARARs for soil or sediment COCs.

Institutional Control Review

Skeo Solutions staff reviewed documentation provided by EPA regarding institutional controls for the Site (Table 6). Institutional controls are currently in place for the original ROC property (consisting of both the Remediation and Redevelopment Parcels) and each of the subdivided parcels of the Redevelopment Parcel (Figure 4). As required by the 1995 ROD, deed restrictions were entered with the Centre County Recorder of Deeds on December 24, 1996, for the original ROC property. The OU2 ROD called for additional institutional controls for the Former Spray Field Area within the Remediation and Redevelopment Parcels to prevent disturbance of capped areas and to protect the stability and integrity of the OU2 remedy. A Consent Decree to implement the remedy in the OU2 ROD was filed on March 8, 2011 and included a draft Environmental Covenant for the parcels. Due to the sale of the Redevelopment Parcel in 2011, an Environmental Covenant for the Former Spray Field Area within the Remediation and Redevelopment Parcels was never executed. On April 5, 2012, three separate Environmental Covenants were recorded in Centre County for the three subdivided parcels of the

Redevelopment Parcel. In August 2014, the PRP drafted an Environmental Covenant to address institutional controls for the Remediation Parcel. This document is currently under review by EPA and PADEP. The Environmental Covenant for the Remediation Parcel is anticipated to be recorded later this year.

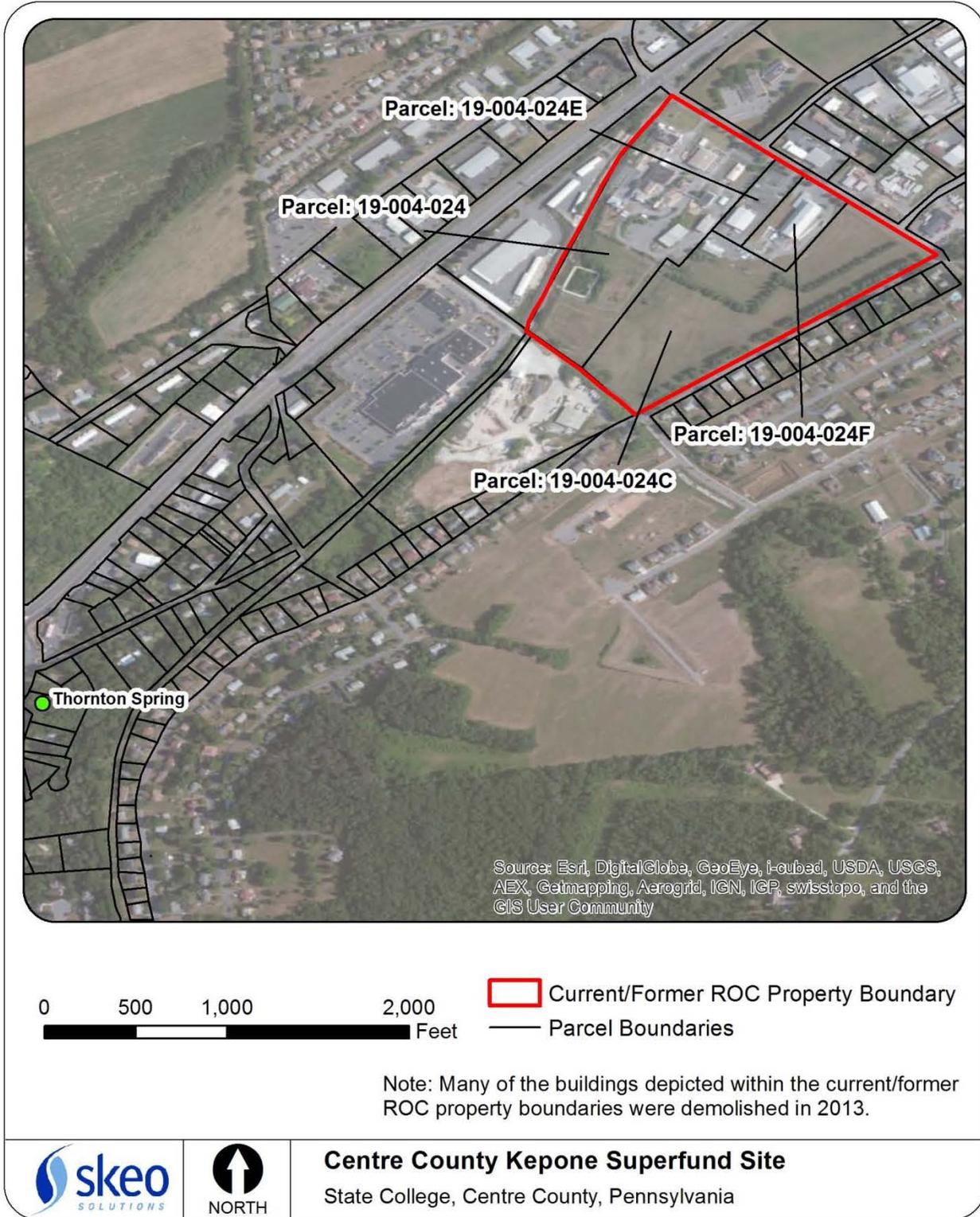
No institutional controls are in place to prohibit use of ground water in the plume downgradient of the original ROC property within the Area of Attainment.

Table 6: Institutional control (IC) Summary Table

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
Original ROC property (includes Remediation and Redevelopment Parcels) soil and groundwater	Yes	Yes, OU1 ROD	19-4/24	Prohibit use of the property for residential, non-manufacturing related commercial or agricultural purposes; prohibit use of ground water on the ROC property for domestic purposes, including drinking water.	Deed restrictions recorded 12/24/1996, Centre County, Pennsylvania;
Redevelopment Parcel (includes Former Spray Field Area) soil and groundwater	Yes	Yes, OU2 ROD	19-004-024C 19-004-024E 19-004-024F	Restrict use of the land for residential, agricultural or commercial use as determined by EPA; prohibit use of ground water for domestic or industrial purposes, including drinking water; prohibit any activity that could compromise the integrity of erosion control devices or fencing; and include incorporation of vapor intrusion considerations (assessment or mitigation) into construction of any new buildings.	Environmental Covenants, recorded 4/5/2012, Centre County, Pennsylvania (individual covenant for each parcel)
Remediation Parcel (includes Former Spray Field Area) soil and groundwater	Yes	Yes, OU2 ROD	19-4-24	Restrict use of the property for residential, commercial or agricultural purposes, as determined by EPA and ADEP; prohibit use of ground water on the ROC property for	A draft Environmental Covenant for Centre County Uniform Parcel Identification Number 19-4-24 is under review by EPA and PADEP,

Media	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Instrument in Place
				domestic and or industrial purposes, including drinking water; prohibit any excavations on the capped areas unless otherwise approved by EPA and PADEP; prohibit any installation or building structures on the capped areas of the Site, unless building structures are used in lieu of capping; prohibit any activity that could compromise the integrity of erosion control devices; prohibit modification of Site fencing; providing access to EPA and PADEP; development of the property in accordance with the ROD remedy; and in the event a building is constructed, either conduct a vapor intrusion (VI) assessment of the building or incorporate VI mitigative measures in the design of the building.	and anticipated to be recorded in 2014.
Off-property ground water	Yes	Yes	Parcels downgradient of the ROC property in the ground water contaminant plume	Restrict use of ground water to prevent interfering with the groundwater remedy	None. ICs are needed.

Figure 4: Site Parcels with Institutional Controls



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site. This map was created using maps from Weston Solutions reports.

6.4 Data Review

Ground Water Extraction and Treatment

The ground water treatment plant has treated more than 200 million gallons of ground water and removed more than 6,150 pounds of VOCs (Appendix E). The system currently removes about 10 pounds of VOCs per month. During December 2013, the ground water treatment plant processed 0.86 million gallons of water and removed 8.5 pounds of VOCs. The average influent rate ranges between 30 to 60 gallons per minute, which is well below the design flow rate of 200 gallons per minute. About 90 percent of the water extracted is from migration control wells EW-5D and EW-6DR. The extraction rates of EW-5D and EW-6DR are variable and set to maintain ground water levels within Thornton Spring. Higher rates of pumping in the past did not result in more effective system operations and Thornton Spring can be dewatered.

To monitor the performance of the ground water treatment system, ROC collects monthly samples from the influent tank and in between the granular activated carbon units and analyzes the samples for VOCs. Additionally, ROC periodically analyzes the influent tank samples for kepone and mirex. As required by ROC's NPDES permit equivalency, ROC collects a sample of treated effluent at the NPDES outfall twice a month for VOCs and once every two months for kepone and mirex. These monitoring frequencies exceed the sampling requirements specified in the 1995 ROD.

During the December 2013 sampling event, which provided the most recent data available for review, VOCs detected in the influent tank prior to treatment included benzene (11 J $\mu\text{g/L}$), chlorobenzene (20 J $\mu\text{g/L}$), ethylbenzene (210 $\mu\text{g/L}$), PCE (6.7 $\mu\text{g/L}$), toluene (180 $\mu\text{g/L}$), cis-1,2-DCE (27 $\mu\text{g/L}$), m- and p-xylene (630 $\mu\text{g/L}$) and o-xylene (94 $\mu\text{g/L}$) for a total VOC concentration of 1,179 $\mu\text{g/L}$. Total VOC concentrations in the influent tank samples have been variable during the FYR period. In 2009, total VOC concentrations in the influent were generally above 2,000 $\mu\text{g/L}$ with a peak concentration of 3,463 $\mu\text{g/L}$ reported in May 2009 (Figure A-5B, 2009-2010 Biennial Report). In 2010, total VOC concentrations in the influent ranged between 867 $\mu\text{g/L}$ in July 2010 to 2,550 $\mu\text{g/L}$ in February 2010. Similar concentration ranges were reported in 2011, 2012 and 2013. Kepone was detected in influent tank samples at 3.9 $\mu\text{g/L}$ in April 2013, but it has not been detected in the effluent samples. Mirex has not been detected in recent influent or effluent samples.

The treatment system is effective at treating extracted ground water from the Site. With one exception, effluent samples have been non-detect for COCs or have had only trace concentrations of COCs below NPDES permit equivalency effluent limitations. One violation of the effluent limitations occurred in June 2011 during a temporary shutdown for system repairs.
SVE

Since SVE operations began in February 2003, the system has removed more than 16,000 pounds of VOCs from the subsurface (Appendix D). During the 2005 and 2006 operating period, the SVE system removed about 1,100 pounds of VOCs from the soil. However, during the 2009 and 2010 operating period, removal rates declined and the SVE system removed only

about 200 pounds of VOCs from the soil; the Tank Farm/Process Area (Shed 90B) SVE system removed this entire volume.

In an effort to maximize VOC removal rates, the SVE system began operating on a pulsed schedule in August 2010. The pulsed schedule includes one week of operation followed by four weeks of inoperation. VOC removal rates continue to generally decline. Shed 90B, which operates on the pulsed schedule, removed only about 5 pounds of VOCs per month during 2013. However, 16 pounds of VOCs were removed in July 2014. Currently, shed 90A is shut down because of a very low recovery rate.

Ground Water

The 1995 ROD requires that ground water be monitored quarterly for VOCs, annually for mirex and kepone, and bi-annually for photomirex. During the past five years, detected concentrations of several COCs have exceeded ground water cleanup levels. The most prevalent COCs exceeding cleanup levels included 1,1,2,2-tetrachloroethane, benzene, cis-1,2-DCE, ethylbenzene, PCE, toluene, TCE, and vinyl chloride. Appendix E presents recently collected data, as originally presented in the Enhanced Groundwater Monitoring Plan and Potential Long-term Remediation Strategy report (2013 Ground Water Report), dated June 28, 2013.

In general, COC concentrations in ground water have declined since baseline sampling conducted in 2000, prior to initiation of pumping. Appendix E presents isoconcentration maps from baseline sampling conducted in 2000 as well as isoconcentration maps from recent sampling.

Two areas of the Site continue to have elevated concentrations of COCs: the EW-34DR Area (northeast section of main plant area) and the MW-11D/MW-10D Area (former drum staging area). The 2013 Ground Water Report noted the possible presence of residual dense non-aqueous phase liquid in these two areas. A discussion of data trends in these two areas and a summary of data from wells MW-29D, MW-32D, and MW-45D, which monitor the effectiveness of the extraction wells at controlling the migration of COCs, follow below.

EW-34DR Area

The most contaminated well during baseline sampling was EW-34DR (formerly MW-34DR), situated in the northeast section of the Site. The peak concentration of cis-1,2-DCE (42,000 µg/L) was detected in September 2007; the peak concentration of vinyl chloride (4,386 µg/L) was detected in September 2002. Most recently, cis-1,2-DCE and vinyl chloride were detected at 11,000 µg/L and 500 µg/L, respectively (September 2010). The 2013 Ground Water Report stated that the persistence and elevated concentrations of cis-1,2-DCE in this well suggest the geochemical conditions within this area may not be ideal for complete dechlorination.

Elevated concentrations of BTEX also have been observed in EW-34DR since 2000. The maximum total BTEX concentration (100,800 µg/L) was measured in 2007. The most recent total BTEX concentration in EW-34DR was 28,200 µg/L (September 2010). ROC has proposed additional investigations to collect geochemical data to support an evaluation of potential long-term remedy improvements near EW-34DR.

MW-11D/MW-10D Area

Concentrations of chlorinated compounds, including 1,1,2,2-tetrachloroethane, PCE, TCE, and cis-1,2-DCE have been detected in MW-11D and MW-10D in annual monitoring events since the baseline ground water sampling events. With the exception of cis-1,2-DCE, concentrations have decreased over time.

In MW-10D, PCE and TCE were not detected from 2007 to 2010, but both were detected again in 2011 at concentrations of 150 and 340 µg/L, respectively. Cis-1,2-DCE and vinyl chloride also were detected at concentrations of 710 µg/L and 38 µg/L, respectively (2011). The recent increase in TCE and PCE at MW-10D may be related to discontinuation of pumping from extraction wells EW-44D, EW-43D and EW-7D, located west of MW-10D.

During sampling at MW-11D in 2011, PCE was detected at a concentration of 1,500 µg/L, TCE was detected at 2,000 µg/L, and cis-1,2-DCE was detected at 17,000 µg/L. Vinyl chloride was not detected. The elevated concentration of cis-1,2-DCE and lack of vinyl chloride suggest that reductive dehalogenation processes may be incomplete at MW-11D. This potentially is a result of limited organic carbon availability (BTEX compounds have not been detected in MW-11D since 2006). ROC plans to collect additional data in 2014 to better understand geochemical conditions in this area of the Site.

Downgradient wells (MW-29D, MW-32D, and MW-45D)

ROC sampled MW-29D, MW-32D, and MW-45D quarterly for VOCs. In the data available for this review, all three wells generally had VOC concentrations below cleanup levels between 2009 and 2013. The sampling results from these wells indicate that the extraction system generally is effective in controlling contaminant migration. MW-3, which is located behind the Nittany Commons Shopping Center and is not included in routine the groundwater monitoring plan, will be redeveloped and sampled in 2014.

At EPA's request, ROC plans to install an additional deep well below the Loysburg limestone on the Redevelopment Parcel to refine the understanding of contaminant distribution and remedy effectiveness. The new deep well is anticipated to be installed in 2014.

Spring (Thornton Spring) and Surface Water (FWDD)

Results of 2009 through 2013 Thornton Spring sampling indicate total VOC concentrations of between 20 and 200 µg/L, depending on the season and ground water extraction system operations. These concentrations are substantially lower than maximum detections reported in prior years (728 µg/L in 2000, 1,019 µg/L in 2001 and 318 µg/L in 2002) and prior to system startup (11,564 µg/L in 1993). None of the individual COCs exceeded the Pennsylvania Water Quality Standards for Aquatic Life during the most recent sampling in September 2013 (Appendix E). Total VOC concentrations at Thornton Spring continue to decline overall.

Results of quarterly monitoring of the FWDD indicate that there were low-level VOC detections in 2009 and 2010, with total VOC concentrations of between 1.2 µg/L and 2.9 µg/L. Mirex, photomirex, and kepone were not detected. COCs were not detected in the FWDD between 2011 and 2013.

Soil

In December 2010, ROC collected soil samples from three borings near Building 3 to determine potential soil impacts from a tank release on the southeast side of the building. The July 2003 release was the result of an overflow of the tank, which stored acifluorfen. Analytical results for acifluorfen from all soil samples were non-detect.

Vapor Intrusion (Sub-Slab Soil Gas, Air, and Shallow Groundwater)

ROC Property or Former ROC Property

As part of the vapor intrusion investigation, ROC collected two sub-slab soil gas samples from Building 10 on the Redevelopment Parcel in December 2009 (Appendix F). PCE, toluene, and chlorobenzene were detected below commercial/industrial screening values. In August 2011, EPA re-evaluated the data under a conservative residential use scenario. Inhalation risk modeling for all three COCs indicated that carcinogenic risk falls within EPA's acceptable risk range.

Off-Property Areas

ROC initiated a vapor intrusion investigation at six off-property locations (residences and businesses) in March 2012. ROC collected sub-slab soil gas, indoor air, and ambient air samples to test for VOCs. Based on information obtained to date, vapor intrusion concerns are not present at three of the off-property locations. Sub-slab soil gas concentrations exceeded screening values at two locations, but no current indoor air issues were identified. The vapor intrusion pathway may be complete at one off-property location; however, current and future risks to building users did not exceed EPA criteria. Nonetheless, ROC voluntarily installed a vapor intrusion mitigation system at this property in August 2012.

As a second phase in the vapor intrusion investigation to provide additional lines of evidence, three off-property shallow wells were installed downgradient of the ROC property (along Limerock Terrace) in June 2012 and sampled for VOCs. All detections were below EPA's November 2013 Vapor Intrusion Screening Level (VISL) target ground water concentrations based on default residential exposures.¹ However, the detected concentrations may be underestimated because the sampling method used (bailers) has the potential to volatilize contaminants.

A supplemental vapor intrusion investigation was initiated in March 2014. The investigation included sampling four new off-property locations and an off-property commercial location that was previously sampled. ROC collected sub-slab soil gas, indoor air, and ambient air samples to test for VOCs at three of the locations. Two locations had active radon mitigation systems, and therefore only indoor air samples were collected. The three off-property shallow monitoring wells located along Limerock Terrace were resampled for VOCs. In addition, existing monitoring wells MW-35S and MW-37S located along East College Avenue were sampled, and a new monitoring well, MW-47S, was installed and sampled. MW-47S is located along East College Avenue equidistant to MW-35S and MW-37S.

¹ November 2013 VISLs were based on a residential scenario, target cancer risk of 1×10^{-6} , noncancer hazard quotient of 1 and default ground water temperature of 25 degrees Celsius.

ROC provided VI Investigation Reports summarizing the sampling results for the off-property residential and commercial areas in June and July 2014, respectively. EPA review of VI Report for the off-property residential areas confirmed that there are no Site-related vapor intrusion concerns in the residential area, that the potentially complete VI pathway at one property has been mitigated with a sub-slab depressurization system, and that no additional VI sampling is warranted. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway is present for a commercial property located east of College Avenue adjacent to the Site but had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. Also, ROC will conduct annual evaluations of the commercial property to assess whether there are changes in building conditions or indoor air levels. The evaluation will include building inspections and air sampling. The annual evaluations will continue until it is demonstrated to EPA that contaminant levels remain at protective levels.

6.5 Site Inspection

On March 25, 2014, the following participants performed the site inspection: Frank Klanchar, Alexander Mandell, Jeff Tuttle, Kathy Davies, and Bruce Pluta, EPA; Florin Gheorghiu and Heather Lin, Golder Associates; Dr. Ranier Domalski, ROC; Cheryl Sinclair, PADEP; Kathy Patnode, U.S. Fish and Wildlife Service; and Ryan Burdge and Jill Billus, Skeo Solutions.

Site inspection participants toured the Site and observed the ground water treatment plant, the SVE system, the site office, extraction wells, monitoring wells, the on-site drainage ditch and retention pond, the OU2 consolidation unit, and the Former Spray Field Area. Site inspection participants also walked the residential areas downgradient of the Site and observed Thornton Spring and Spring Creek. The ground water extraction and treatment system is in good working order, with a new air stripper installed in February 2014. The SVE system was inactive at the time of the site inspection due to the cold weather and the pulsed operation of the system. The computer that controls both systems was online and functioning properly.

An 8-foot high chain link fence provides security for the Site. The fence runs along the perimeter of the property and includes several locking gates. Vehicle access is limited to several areas along Struble Road where former delivery entrances are located. Fencing also separates the Remediation Parcel from the Redevelopment Parcel. Additional fencing surrounds the area around Thornton Spring. All fencing and gates were in good condition, properly maintained, and provide adequate protection to deter trespassers.

The ground water extraction wells, monitoring wells, and SVE wells at the Site were in good condition and operating properly. At the time of the site inspection, ground water extraction wells EW-5D and EW-6DR were the only wells operating. Site inspection participants also observed the proposed location for the new deep well on the Redevelopment Parcel.

Vegetation on the ROC property was limited to the Former Spray Field Area and the OU2 consolidation unit. Both areas were well-maintained with no signs of erosion or problems with soil cover. Dr. Ranier Domalski commented that mowing is typically performed twice a year. Dr. Domalski also noted that the majority of buildings on the Remediation Parcel were demolished in fall 2013. The site inspection participants observed the foundations of the demolished buildings.

A completed site inspection checklist is included in Appendix C. Photographs from the inspection are included in Appendix D.

On March 24, 2014, Skeo Solutions staff visited the designated site repository, Schlow Memorial Library, located at 100 East Beaver Avenue, State College, Pennsylvania 16801, as part of the site inspection. Site documents were unavailable, but will be re-sent by EPA and added to the catalog by library staff.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including current landowners, site occupants and regulatory agencies involved in site activities or aware of the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. All of the interviews took place in person between March 24 and 25, 2014. The interviews are summarized below.

During the site inspection, EPA conducted an interview with Dr. Domalski, Remediation Manager for ROC. Dr. Domalski has been associated with the Site since 1994. Dr. Domalski indicated that several former manufacturing buildings had recently been demolished at the Site. He also indicated that there have been no recent problems with the ground water extraction system and treatment plant, with the exception of the failure of the primary air stripper in 2011. Dr. Domalski also explained that the source of water for the scrubber unit had recently changed from potable water to treated effluent.

On March 24, 2014, EPA met with three College Township officials to discuss the status of remediation at the Site. EPA provided updates on recent investigations at the off-property areas downgradient of the Site and discussed the potential need for institutional controls to limit ground water use within the off-property areas overlying ground water contamination. The College Township officials greeted the potential for institutional controls favorably. They had no issues of concern with the Site.

On March 25, 2014, EPA met with a site occupant of the Redevelopment Parcel. The site occupant was aware of the Site's status as a Superfund site and had recently observed the demolition of the former manufacturing buildings. The site occupant reported no issues of concern with the Site.

On March 25, 2015, EPA met with a representative in the Environmental Services Division of the Pennsylvania Fish and Boat Commission. The representative was generally pleased with the progress of remediation at the Site. The representative noted that a catch and release regulation

currently in effect for Spring Creek is for fish management purposes only and is not related to contamination from the Site.

7.0 Technical Assessment

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

The review of documents, ARARs, risk assumptions, decision documents and the results of the site inspection indicate that the Site's remedies are functioning as intended by decision documents. A discussion of the remedy for each OU follows.

OU1

Since operations began in March 2000, the ground water extraction and treatment system has removed more than 6,150 pounds of VOCs. Based on ground water levels and spring flows, the ground water extraction system is an effective measure for hydraulic containment at the Site. Water quality of the FWDD, Thornton Spring, and Spring Creek is improving. Additionally, levels of mirex and kepone in fish tissue in Spring Creek have declined such that in 2002, the Commonwealth of Pennsylvania lifted the fishing restriction based on fish contamination. A catch and release regulation remains for fish management purposes.

Although off-site migration of COCs is generally controlled, ground water pumping is limited to extraction wells EW-5D and EW-6DR at pumping rates well below design capacity. Increasing pumping rates could lead to sinkhole formation in the karst formations and dewatering Thornton Spring. Although EW-5D and EW-6DR control the migration of COCs off site, COC concentrations in source area wells remain elevated. Additionally, the western extent of contamination in the shallow aquifer and the vertical extent of contamination beneath the Loysburg limestone/Bellefonte dolomite interface have not been evaluated fully. ROC will collect additional data to evaluate if improvements to the groundwater remedy are necessary. Additionally, ROC plans to redevelop and sample an existing monitoring well, MW-3, install a new deep monitoring well (MW-46D) on-Site to refine the understanding of contaminant distribution and remedy effectiveness. Redevelopment of MW-3 and installation of MW-46D is planned for 2014.

ROC discharges treated ground water from the ground water treatment plant to the on-site FWDD. During the third FYR period, ROC reported only one non-compliance with the NPDES permit equivalency limits for effluent. ROC implemented measures to correct the cause of the non-compliance. The ground water treatment plant is operating as designed.

The December 24, 1996 deed restriction is in place to restrict land use on the ROC property. Fencing at the ROC property also deters unauthorized access and prevents exposure to contaminated media. Additional institutional controls for downgradient properties above the ground water plume may be needed to prevent exposure to contaminated ground water.

OU2

The excavation of soil from the Former Spray Field Area, soil consolidation, and placement of a soil cover over the consolidation unit eliminated potential exposure pathways for ecological receptors and reduced the potential for off-site migration of contaminated soil. The soil cover is well-maintained with no signs of erosion. There are no long-term O&M or monitoring issues associated with the OU2 remedy. In April 2012, Environmental Covenants were recorded for three parcels within the Redevelopment Parcel as part of the OU2 remedy. Development of an Environmental Covenant to address institutional controls for the Remediation Parcel is underway and anticipated to be recorded later this year.

OU3

The excavation of contaminated soils from the Process Area, Former Drum Staging Area, and Designated Outdoor Storage Area has mitigated the leaching of COCs from subsurface soil and eliminated the exposure pathway for environmental receptors. There are no long-term O&M or monitoring issues associated with the OU3 remedy.

OU4

The 2001 ROD Amendment estimated that SVE should be able to extract and treat the majority of the VOC mass in about 2.5 years. In general, the SVE system has successfully removed VOCs in soil. Since SVE operations began in 2003, the system has removed more than 16,000 pounds of VOCs from the subsurface. However, in recent years, removal rates have declined significantly. It appears that diffusion dominated phase (steady state) of the SVE system may have prevailed. Additional operational adjustments may be needed to enhance diffusion of the VOCs in stagnant portions of the soil. Additional sampling may be necessary to determine if soil cleanup goals have been achieved. Additional data analysis is recommended to verify if the soil cleanup goals have been achieved, and if necessary, determine alternate approaches to expedite the soil remedy.

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

The exposure assumptions, toxicity data, cleanup levels and RAOs specified in the 1995 and 2009 RODs, as modified by the 2001 ROD Amendment, are still valid. The OU2 surface soil cleanup goal based on ecological exposures remains valid. No new guidance regarding exposure assumptions, species-specific toxicity values, or methods for calculating soil cleanup goals have become available.

Vapor intrusion is an exposure pathway not evaluated in the HHRAs; however, the OU2 ROD specified that evaluation of vapor intrusion potential would be performed under OU1. Vapor intrusion assessment at the Remediation and Redevelopment Parcels indicates no unacceptable risk. EPA evaluated the potential for VI for off-property areas in 2014. There are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three

shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway is present for a commercial property located east of College Avenue adjacent to the Site but it had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on properties west of the Site. Also, ROC will conduct annual evaluations of the adjacent commercial property to assess whether there are changes in building conditions or indoor air levels. The evaluation will include building inspections and air sampling. The annual evaluations will continue until it is demonstrated to EPA that contaminant levels remain at protective levels.

Land use near the Site has not changed substantially since the previous FYR, with the exception of a new multi-family housing complex less than a quarter mile southwest of the Site on Limerock Terrace. The Limerock Terrace area was included in the off-property vapor intrusion evaluation.

There have been no newly identified contaminants, sources, or unanticipated toxic by-products of the remedy. 1,4-dioxane and 1,2,3-trichloropropane are two recent emerging contaminants at Superfund sites. ROC sampled ground water, effluent, and Thornton Spring for these contaminants in December 2008. Neither of these contaminants were detected. EPA required no further investigation of these contaminants at the Site.

Other than the changes identified in the 2001 ROD Amendment, toxicity factors for COCs and other contaminant characteristics have not changed in a way that could affect the protectiveness of the remedy. No changes to ARARs were identified.

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

No other information has come to light that could call into question the protectiveness of the remedy.

7.4 Technical Assessment Summary

The ground water remedy at the Site is generally functioning as intended by the decision documents, but there are areas where elevated concentrations of COCs remain. Extraction well pumping rates are limited due to the ability of the system to dewater Thornton Spring and generate additional solids (potential sinkhole development). Additionally, geochemical conditions in ground water may be inhibiting complete degradation of COCs. ROC is evaluating opportunities for optimization of the ground water remediation system and potential residual source reduction to address these concerns. The SVE system is operating in pulse mode and VOC removal rates have decreased significantly in recent years. Diffusion dominated phase (steady state) of the SVE system may have prevailed. Additional data analysis is recommended to verify whether or not soil cleanup goals have been achieved, and if necessary, determine alternate approaches to expedite the soil cleanup.

Deed restrictions are in place for the original ROC property. Environmental Covenants are in place for the three subdivided parcels of the Redevelopment Parcel. An Environmental Covenant for the Remediation Parcel is anticipated to be recorded later this year. There are no institutional controls that would prevent the use of ground water in the plume downgradient of the original ROC property. The College Township Water Authority provides potable water to businesses and residents in the surrounding area. However, institutional controls should be implemented to prohibit a public or private well from being installed in the plume downgradient of the original ROC property.

There have been no changes to exposure assumptions, toxicity data, or RAOs that would affect the protectiveness of the remedy, except for the potential for vapor intrusion to indoor air. During this FYR period, ROC evaluated the potential for vapor intrusion to indoor air for the Remediation Parcel and Redevelopment Parcel. No unacceptable risk or hazard was identified. Additional off-property vapor intrusion investigations were completed in 2012 and 2014, and conclude that there are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway is present for a commercial property located east of College Avenue adjacent to the Site but it had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. In addition, ROC will conduct annual evaluations of the adjacent commercial property to assess whether there are changes in building conditions or indoor air levels. The evaluation will include building inspections and air sampling. The annual evaluations will continue until it is demonstrated to EPA that contaminant levels remain at protective levels.

No other information has come to light that could call into question the protectiveness of the remedy.

8.0 Issues

Table 7 summarizes the current site issues.

Table 7: Current Site Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
A complete VI pathway exists for an adjacent commercial property located east of College Avenue but had no unacceptable risks. The presence of a shallow groundwater plume from the Site toward the commercial property has not been fully delineated.	No	Yes
There are no institutional controls to prohibit installation of a private or public well in the ground water plume downgradient of the ROC property within the Area of Attainment.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 8 provides recommendations to address the current site issues.

Table 8: Recommendations to Address Current Site Issues

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
A complete VI pathway exists for an adjacent commercial property located east of College Avenue but had no unacceptable risks. The presence of a shallow groundwater plume from the Site toward the commercial property has not been fully delineated.	Conduct additional evaluation of the shallow aquifer to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site.	PRP	EPA, PADEP	09/28/2016	No	Yes
There are no institutional controls to prohibit installation of a private or public well in the ground water plume downgradient of the ROC property within the Area of Attainment.	Implement institutional controls to prohibit installation of public or private wells in the plume downgradient of the ROC property.	PRP	EPA, PADEP	09/28/2016	No	Yes

The following additional items, though not expected to affect protectiveness, warrant additional follow-up by ROC:

- COC concentrations in ground water near former source areas remain elevated. Options to enhance the ground water remedy and to reduce residual source material should continue to be evaluated.
- There is limited VOC removal by the SVE system. Additional evaluation should be conducted to determine if soil concentrations meet cleanup goals. If necessary, options for remedy optimization should be evaluated.

10.0 Protectiveness Statements

The remedy at OU1 is protective of human health and the environment in the short-term. All exposure pathways that could result in unacceptable risks are being controlled. The groundwater remedy for OU1 is generally functioning as intended by the decision documents, but there are areas where elevated concentrations remain. Additional data is being collected to refine the current understanding of contaminant distribution and remedy effectiveness.

A vapor intrusion (VI) study for off-property residences and businesses in the area of the groundwater plume concluded that there are no Site-related VI concerns in the residential area downgradient of the ROC property. The results of three shallow groundwater monitoring wells located east of College Avenue do not indicate the presence of Site-related contamination and therefore, VI for properties located west of College Avenue is unlikely. However, a complete VI pathway was confirmed for a commercial property located east of College Avenue adjacent to the Site but had no unacceptable risks. Therefore, additional evaluation of the shallow aquifer will be conducted to delineate the current extent of the shallow groundwater plume and its potential impact on commercial properties west of the Site. Annual evaluations will be performed for the commercial property to assess whether there are changes in building conditions or indoor air levels. In order for the OU1 remedy to be protective in the long term, institutional controls should be implemented to prohibit installation of public or private wells in the plume downgradient of the ROC property.

The remedy at OU2 is protective of human health and the environment. Contaminated sediments from the upper and lower freshwater drainage ditch, Thornton Spring, and Thornton Spring drainage channel were removed and disposed off-site. Impacted soils from the Former Spray Field Area were consolidated on the Remediation Parcel and capped with a soil cover. No exposure pathways are complete.

The remedy at OU3 is protective of human health and the environment. Contaminated soils were excavated and disposed off-site.

The remedy at OU4 is protective of human health and the environment because the soil vapor extraction system is operating as designed. No exposure pathways are complete. Additional evaluation should be considered to determine if soil concentrations meet cleanup goals.

11.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

1st Five-Year Review Report for Centre County Kepone Superfund Site, College Township, State College, Pennsylvania. Prepared by EPA Region 3. September 10, 2004.

Biennial Report OU-1 & OU-4, Operational Period 2009-2010, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. November 2011.

Building 3 Soil Investigation Report, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. March 23, 2011.

Centre County Kepone Superfund Site, Air Impact Assessment of VOC Emissions from Remediation Systems Response Letter to RÜTGERS Organics Corporation. Prepared by EPA Region 3. August 1, 2013.

Centre County Kepone Superfund Site, Approval of Remedial Action Report for OU-2, Former Spray Field Area (Revised September 2011). Prepared by EPA Region 3. September 26, 2011.

Centre County Kepone Superfund Site, Vapor Intrusion Evaluation for Building 10. Prepared by EPA Region 3. August 12, 2011.

Enhanced Groundwater Monitoring Plan and Potential Long-term Remediation Strategy. Prepared by Golder Associates, Inc. June 28, 2013.

Five-Year Review Report, Centre County Kepone Superfund Site, College Township, State College, Pennsylvania. Prepared by EPA Region 3. September 28, 2009.

Groundwater Treatment Plant Operation and Maintenance Manual, Rütgers Organics Corporation, State College, Pennsylvania. Prepared by US Filter. July 2000.

Monthly Progress Reports for the Centre County Kepone Site. Prepared by RÜTGERS Organics Corporation. July 2011 through January 2014.

NPDES Permit Equivalency Document. Issued by PADEP to Rütgers Organics Corporation. April 1, 2010.

Non-compliance Report, NPDES Equivalency Document, RÜTGERS Organics Corporation, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. July 27, 2011.

OU-2 Former Spray Field Area Remedial Action Report, Operable Unit 2, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. September 2011.

Record of Decision, Centre County Kepone, OU1, State College Borough, Pennsylvania. Prepared by EPA Region 3. April 21, 1995.

Record of Decision, Centre County Kepone Site, Operable Unit 2, Prepared by EPA Region 3. July 24, 2009.

Record of Decision Amendment, Centre County Kepone, OU1, State College Borough, Pennsylvania. Prepared by EPA Region 3. March 8, 2001.

Rütgers Organics Site, Recordation of Environmental Covenants. Prepared by Mette, Evans, and Woodside, Attorneys at Law. April 11, 2012.

Vapor Intrusion Investigation Status Report, Off-Property Areas, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. April 1, 2013.

Vapor Intrusion Investigation Status Report, Off-Property Areas, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. May 16, 2012.

Vapor Intrusion Investigation Status Report, Off-Property Residential Areas, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. June 24, 2014.

Vapor Intrusion Investigation Status Report, Off-Property Commercial Areas, Centre County Kepone Site, State College, Pennsylvania. Prepared by Golder Associates, Inc. July 21, 2014.

Appendix B: Public Notice

U.S. Environmental Protection Agency Reviews Cleanup at Centre County Kepone Site

The U.S. Environmental Protection Agency (EPA) is conducting the 3rd Five-Year Review of the **Centre County Kepone Superfund Site** located in State College. This review seeks to confirm that the cleanup conducted at the site, which included excavating and removing contaminated materials, and extracting and treating contaminated groundwater, is protective of public health and the environment. EPA's last formal review of the site in 2009 recommended several follow-up actions including a vapor intrusion (VI) investigation be conducted. Since then, VI testing has been performed both on-site and off-site. A summary of these activities and evaluation of the long-term protectiveness of the remedy will be included in the upcoming Five-Year Review report.

What is an EPA Five-Year Review?

EPA inspects Superfund sites every five years to ensure that cleanups conducted remain fully protective of human health and the environment. These regular reviews, which are required by federal law when contaminants remain at a site, include:

- Inspection of the site and cleanup technologies;
- Review of monitoring data, operating data, and maintenance records, and
- Determination if any new regulatory requirements have been established since EPA's original cleanup decision was finalized.

When will EPA's Five-Year Review Report be available?

The Five-Year Review report will be available at <http://epa.gov/5yr> by September 2014.

For more information

There are several ways to review information on this site. The Administrative Record (AR), which includes EPA decision documents used for selecting the cleanup remedy, is available for public review at www.epa.gov/arweb. You may also review the AR and other information at:

Schlow Memorial Library
100 East Beaver Ave.
State College, PA 16801

OR

EPA Region 3 Public Reading Room
Attn: Paul Van Reed (3HS42)
1650 Arch Street, 6th floor
Philadelphia, PA 19103
Phone: (215) 814-3157 (Call to make an appointment)

You may also contact

If you have any concerns or information about a change in current site conditions, please contact:

Alex Mandell
EPA Community Involvement Coordinator
Phone: (215) 814-5517 or (800) 553-2509
Email: mandell.alexander@epa.gov

OR

Frank Klanchar
EPA Remedial Project Manager
Phone: (215) 814-3218
Email: klanchar.frank@epa.gov

For more site information visit: <http://go.usa.gov/B3YP>

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

Agency EPA
 Contact Frank Klancher RPM 03/25/14 _____
 Name Title Date Phone No.
 Problems/suggestions Report attached: _____

Agency PADEP
 Contact Cheryl Sinclair Licensed P.G. 03/25/2014 _____
 Name Title Date Phone No.
 Problems/suggestions Report attached: _____

Agency _____
 Contact _____ _____ _____
 Name Title Date Phone No.
 Problems/suggestions Report attached: _____

Agency _____
 Contact _____ _____ _____
 Name Title Date Phone No.
 Problems/suggestions Report attached: _____

Agency _____
 Contact _____ _____ _____
 Name Title Date Phone No.
 Problems/suggestions Report attached: _____

4. **Other Interviews** (optional) Report attached: _____

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> 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	<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
		<input checked="" type="checkbox"/> Effluent discharge	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
		<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
		<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: <u>NPDES Permit Equivalency</u>				
5.	Gas Generation Records		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____				
6.	Settlement Monument Records		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____				
7.	Ground Water Monitoring Records		<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks: _____				
8.	Leachate Extraction Records		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____				
9.	Discharge Compliance Records				
	<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A	
	<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
	Remarks: _____				
10.	Daily Access/Security Logs		<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____				
IV. O&M COSTS					
1.	O&M Organization				
	<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for state			
	<input checked="" type="checkbox"/> PRP in-house	<input type="checkbox"/> Contractor for PRP			
	<input type="checkbox"/> Federal facility in-house	<input type="checkbox"/> Contractor for Federal facility			
	<input type="checkbox"/> _____				

1. Implementation and Enforcement			
Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Type of monitoring (e.g., self-reporting, drive by):	<u>self-reporting</u>		
Frequency:	<u>daily</u>		
Responsible party/agency:	<u>PRP</u>		
Contact	<u>Rainer Domalski</u>	<u>Remediation Manger, ROC</u>	<u>mm/dd/yyyy</u> _____
	Name	Title	Date Phone no.
Reporting is up to date			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Reports are verified by the lead agency			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Violations have been reported			<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Other problems or suggestions:	<input type="checkbox"/> Report attached		
2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A			
Remarks: <u>Institutional controls for original ROC property are generally adequate; additional institutional controls may be needed for off-property downgradient areas overlying the ground water plume.</u>			
D. General			
1. Vandalism/Trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident			
Remarks: _____			
2. Land Use Changes On Site <input type="checkbox"/> N/A			
Remarks: <u>Former manufacturing buildings recently demolished</u>			
3. Land Use Changes Off Site <input type="checkbox"/> N/A			
Remarks: <u>New multi-family housing development constructed downgradient of original ROC property</u>			
VI. GENERAL SITE CONDITIONS			
A. Roads <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Roads Damaged <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A			
Remarks: _____			
B. Other Site Conditions			
Remarks: _____			
VII. LANDFILL COVERS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Landfill Surface			
1. Settlement (low spots) <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident			
Aerial extent: _____		Depth: _____	
Remarks: _____			

2.	Cracks Lengths: _____ Widths: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Cracking not evident Depths: _____
3.	Erosion Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident Depth: _____
4.	Holes Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident Depth: _____
5.	Vegetative Cover <input checked="" type="checkbox"/> No signs of stress Remarks: _____	<input checked="" type="checkbox"/> Grass <input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)	<input checked="" type="checkbox"/> Cover properly established
6.	Alternative Cover (e.g., armored rock, concrete) Remarks: _____		<input checked="" type="checkbox"/> N/A
7.	Bulges Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident Height: _____
8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Aerial extent: _____ Aerial extent: _____ Aerial extent: _____ Aerial extent: _____
9.	Slope Instability <input checked="" type="checkbox"/> No evidence of slope instability Aerial extent: _____ Remarks: _____	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
2.	Bench Breached Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks: _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 (Low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	Material Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type: _____		Arial extent: _____
	Remarks: _____		
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	Undercutting	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	Obstructions	Type: _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Arial extent: _____	
	Size: _____		
	Remarks: _____		
6.	Excessive Vegetative Growth	Type: _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Arial extent: _____	
	Remarks: _____		
D. Cover Penetrations			
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
2.	Gas Monitoring Probes		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
3.	Monitoring Wells (within surface area of landfill)		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
4.	Extraction Wells Leachate		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
	Remarks: _____		
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
			<input type="checkbox"/> N/A
	Remarks: _____		

E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities	<input type="checkbox"/> Flaring <input type="checkbox"/> Good condition	<input type="checkbox"/> Thermal destruction <input type="checkbox"/> Needs maintenance <input type="checkbox"/> Collection for reuse
Remarks: _____			
2.	Gas Collection Wells, Manifolds and Piping	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance
Remarks: _____			
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____			
F. Cover Drainage Layer		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
G. Detention/Sedimentation Ponds		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation	Area extent: _____ <input type="checkbox"/> Siltation not evident	Depth: _____ <input type="checkbox"/> N/A
Remarks: _____			
2.	Erosion	Area extent: _____ <input type="checkbox"/> Erosion not evident	Depth: _____
Remarks: _____			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
4.	Dam	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
H. Retaining Walls		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations	<input type="checkbox"/> Location shown on site map Horizontal displacement: _____ Rotational displacement: _____	<input type="checkbox"/> Deformation not evident Vertical displacement: _____
Remarks: _____			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: _____			
I. Perimeter Ditches/Off-Site Discharge		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation	<input type="checkbox"/> Location shown on site map Area extent: _____	<input type="checkbox"/> Siltation not evident Depth: _____
Remarks: _____			

2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	<input type="checkbox"/> Vegetation does not impede flow		
	Area extent: _____		Type: _____
	Remarks: _____		
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks: _____		
VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	Performance Monitoring	Type of monitoring: _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency: _____		<input type="checkbox"/> Evidence of breaching
	Head differential: _____		
	Remarks: _____		
IX. GROUND WATER/SURFACE WATER REMEDIES		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Ground Water Extraction Wells, Pumps and Pipelines		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing and Electrical		
	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A
	Remarks: _____		
2.	Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances		
	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
3.	Spare Parts and Equipment		
	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		
B. Surface Water Collection Structures, Pumps and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps and Electrical		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		

3.	Spare Parts and Equipment	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade	<input type="checkbox"/> Needs to be provided
Remarks: _____					
C. Treatment System <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A					
1.	Treatment Train (check components that apply)	<input type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation	<input type="checkbox"/> Bioremediation	
		<input checked="" type="checkbox"/> Air stripping	<input checked="" type="checkbox"/> Carbon adsorbers		
		<input checked="" type="checkbox"/> Filters: _____			
		<input type="checkbox"/> Additive (e.g., chelation agent, flocculent): _____			
		<input type="checkbox"/> Others: _____			
		<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance		
		<input checked="" type="checkbox"/> Sampling ports properly marked and functional			
		<input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date			
		<input checked="" type="checkbox"/> Equipment properly identified			
		<input checked="" type="checkbox"/> Quantity of ground water treated annually: <u>10 million gallons</u>			
		<input type="checkbox"/> Quantity of surface water treated annually: _____			
Remarks: _____					
2.	Electrical Enclosures and Panels (properly rated and functional)	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____					
3.	Tanks, Vaults, Storage Vessels	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Proper secondary containment	<input type="checkbox"/> Needs maintenance
Remarks: _____					
4.	Discharge Structure and Appurtenances	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____					
5.	Treatment Building(s)	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair	
		<input type="checkbox"/> Chemicals and equipment properly stored			
Remarks: _____					
6.	Monitoring Wells (pump and treatment remedy)	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled	<input checked="" type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A	
Remarks: _____					

D. Monitoring Data	
1. Monitoring Data	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2. Monitoring Data Suggests:	<input checked="" type="checkbox"/> Ground water plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining
E. Monitored Natural Attenuation	
1. Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____
X. OTHER REMEDIES	
The SVE system components, including the two sheds which house the blower units, were in good condition. O&M manuals, as-builts, and sampling data were readily available. The SVE system was not operating at the time of the site inspection due to the pulsed operating schedule.	
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 designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). <u>The remedy for OU1 (ground water) is to prevent migration of contamination and improve quality of the FWDD, Thornton Spring and Spring Creek. The remedy is functioning as designed; however, pumping is currently limited to two migration control wells due to the potential for sinkhole development. COCs in source area wells remain elevated. ROC is currently evaluating improvements to the ground water remedy. The OU2 remedy was designed to eliminate exposure pathways between impacted soil and ecological receptors and to reduce the potential for off-site migration of contaminated soil. The OU2 remedy is effective and functioning as designed. The excavation of impacted soil from the Former Spray Field Area, consolidation of soil, and placement of a soil cover over the consolidation unit effectively eliminated potential exposures. The OU3 soil excavation remedy was designed to prevent exposure and prevent leaching of COCs to ground water. The excavation remedy is complete and functioning as designed. The OU4 remedy (SVE) was also designed to remove COCs in subsurface soil to minimize leaching to ground water. The remedy is effective and functioning as designed. More than 16,000 pounds of VOCs have been removed. VOC removal rates have declined significantly in recent years.</u>
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. <u>No issues were observed related to O&M.</u>
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. <u>No issues are anticipated.</u>
D. Opportunities for Optimization	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>Golder Associates, Inc. recently submitted an Enhanced Groundwater Monitoring Plan and Potential Long-term Remediation Strategy for the Site. Additional ground water treatment technologies being considered include in-situ chemical reduction, enhanced bioremediation, in-situ chemical oxidation, and/or monitored natural attenuation. The focus of potential in-situ treatment is on two residual "hot spots" in the EW-34DR area and MW-11D area. ROC and EPA are evaluating these options for site remediation of ground water.</u>

Appendix D: Photographs from Site Inspection



View of Site from entrance on Struble Road looking southwest



Administration Parcel, delisted from NPL, north of site beyond the fence



SVE system aboveground piping in former tank farm/process area



SVE system components within Shed 90B



Ground water treatment plant



New air stripper inside ground water treatment plant



Effluent discharge into FWDD



OU2 excavation areas in Redevelopment Parcel;
fence separates Redevelopment Parcel from Remediation Parcel



OU2 consolidation unit in southwestern portion of ROC property



FWDD along western ROC property boundary



Ground water extraction well EW-44D; lumber yard in background



Concrete plant south of ROC property



Fence surrounding Thornton Spring

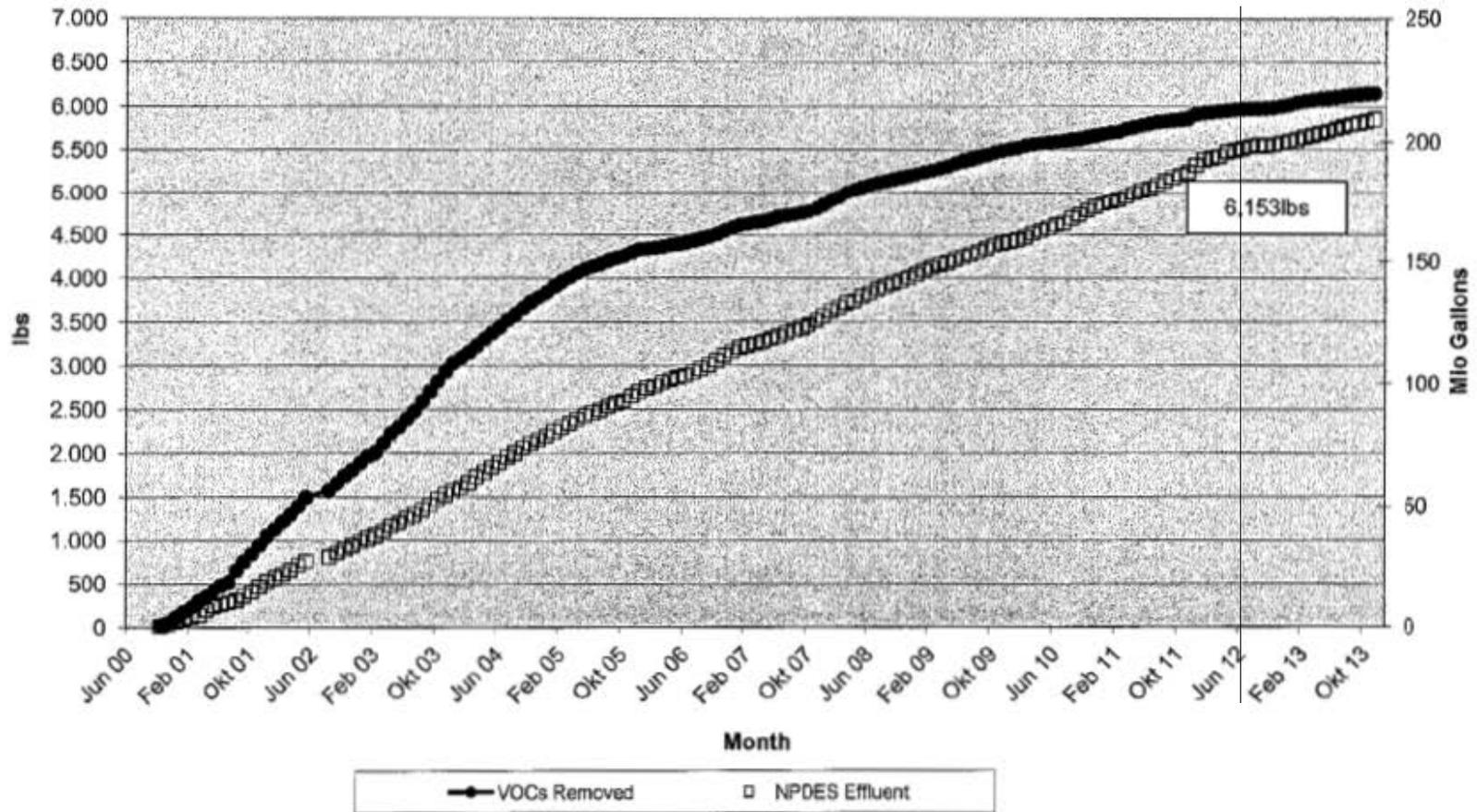


Spring Creek

Appendix E: Data Review

Centre County Kepone Site, State College, PA
 Groundwater Treatment System
 Total VOCs Removed/NPDES Effluent 2000 - 2013 (Cumulative)

FIG. 1



CENTRE COUNTY KEPONE SITE
SOIL VAPOR EXTRACTION
TOTAL LBS REMOVED/RUN TIME 2003-2012 (CUMULATIVE)

FIG. 2

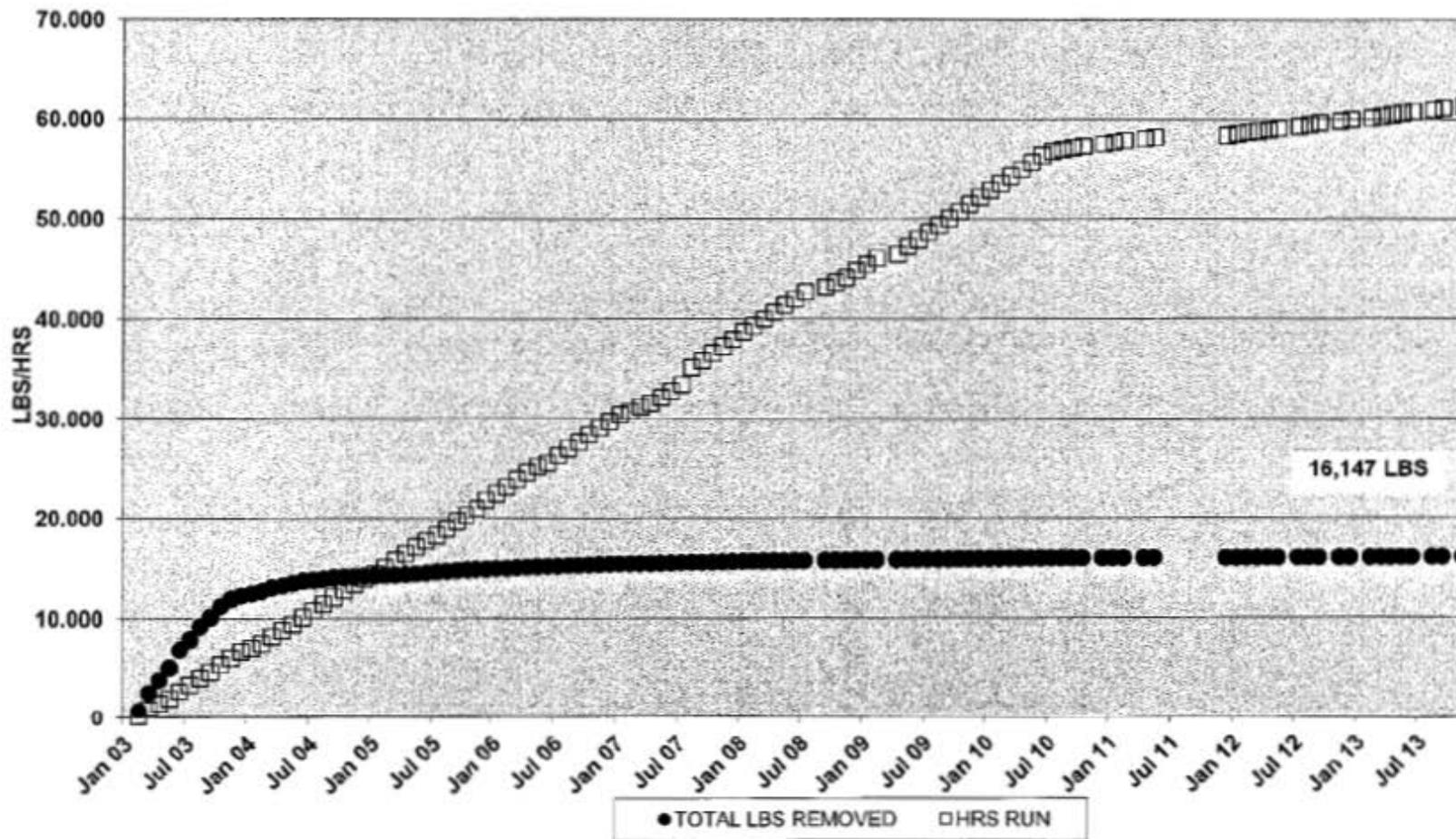
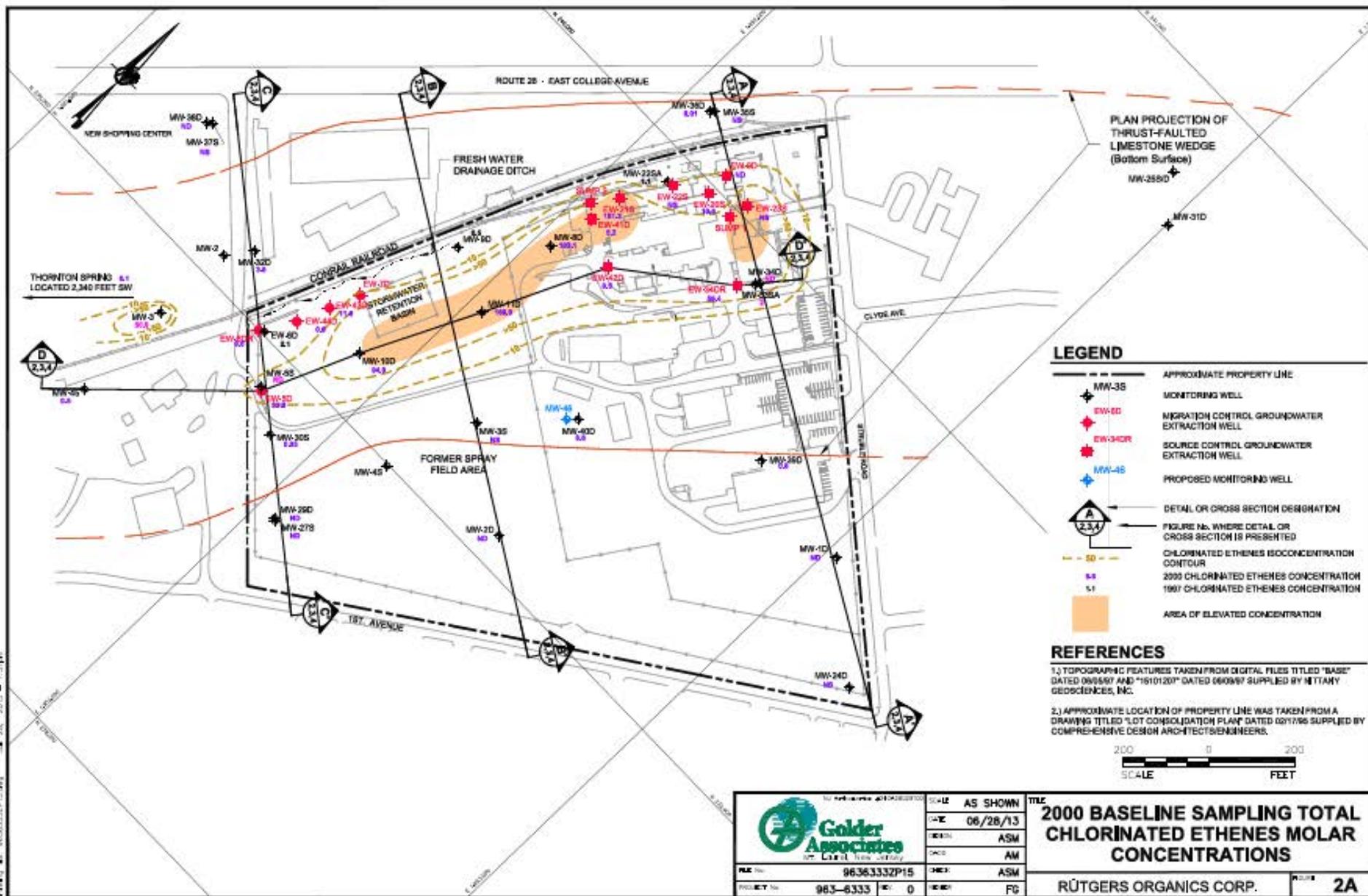


Table 3A
Recent Groundwater Sampling Results
Rutgers Organics, State College, PA

Well ID	EW-0D	MW-3S	MW-4S	EW-5D	EW-6D	EW-7D	MW-8D	MW-10D	MW-11D	EW-20S	EW-21S	MW-27S	MW-29D	MW-30S	MW-32D	EW-34DR	MW-38S	MW-39D	MW-40D	EW-41D	EW-44	EW-42	EW-43	MW-45	TS	
Date Sampled	9/23/08	9/9/09	9/9/09	9/29/11	9/29/11	9/24/02	9/29/11	9/29/11	9/25/08	9/24/02	9/6/06	9/9/09	6/26/12	9/9/09	6/26/12	9/14/10	9/9/09	9/27/11	9/27/11	10/8/04	9/14/10	9/14/10	9/28/11	6/26/12	7/24/12	
Parameter	Solubility (mg/L)	Concentration (ug/L)																								
1,1,1,2-Tetrachloroethane	1070																									
1,1,2,2-Tetrachloroethane	2800	160			15		6		770	15000	173									197						2.3
1,1,1-Trichloroethane	1300																									
1,1,2-Trichloroethane	4600										11															
1,1-Dichloroethane	5000			0.26															1.8							
1,1-Dichloroethene	2400										1								1.1							
1,2-Dichlorobenzene	140				0.78																					
1,2-Dichloroethane	8600																		0.86							
1,2-Dichloropropane	2800										2															
1,3-Dichlorobenzene	156																								0.64	
1,4-Dichlorobenzene	81																								0.79	
2-Chlorotoluene	47				1.9	18							0.47	0.45				0.41			4.1		52			
4-Methyl-2-pentanone	17000										25															
Acetone	1000000										1475															
Benzene	1800				12	8	6				398					840			1.6	36		11	61			
Carbon Disulfide	1200																									
Chlorobenzene	500				30	7.6		460			205								280		22				4.2	
Chloroform	8000																									
cis-1,2-Dichloroethene	6400	100	3.2	0.6	26	44	133		710	17000	9134				2.7	11000		8	200	76		840		0.62	8.6	
Dichloromethane	13000																									
Ethylbenzene	170				39	820	183	7.8	230		2976					1400			420		230	83	2500			
Isopropylbenzene	50				5.4	13							0.38	0.18					5		12		43	0.4		
Isopropyltoluene	23																									
m,p-Xylene	160				38	2800	128		180		12312					5200			9	9	45	99	5100			
o-Xylene	180				4.9	250	47				2685					760			4.6		22	42	590			
Styrene	310																							19		
Tetrachloroethene	210				2.3				150	1500	20					0.73	1300				75		100		2.2	
Toluene	530				28	1200	86		55		10198					20000			16		34	210	300	0.16		
trans-1,2-Dichloroethene	4500		0.61	0.28	2.1		9	7.1	68		1417					320		3.8	12	11		22			1.8	
Trichloroethene	1300				4.6			16	340	2000	21			0.17		0.99		7.9		56		35			1.4	
Vinyl chloride	8800		1.4	0.78	3.4			69	74	38	3754		0.67	0.88	0.49		500		19	360		60		0.38		
Total BTEX	N/A	0	0	0	121.9	5078	450	7.8	465	0	28569	0	0	0.5	0	0	28200	0	1.6	485.6	9	342	495	8490	0.16	0

Notes:

- 1) All concentrations are shown in units of micrograms per liter.
- 2) Blanks denote non-detected values.



LEGEND

- APPROXIMATE PROPERTY LINE
- ◆ MW-35 MONITORING WELL
- ◆ EW-40 MIGRATION CONTROL GROUNDWATER EXTRACTION WELL
- ◆ EW-34CR SOURCE CONTROL GROUNDWATER EXTRACTION WELL
- ◆ MW-46 PROPOSED MONITORING WELL
- ◆ DETAIL OR CROSS SECTION DESIGNATION
- ◆ FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- - - CHLORINATED ETHENES ISOCONCENTRATION CONTOUR
- 5.0 2000 CHLORINATED ETHENES CONCENTRATION
- 5.1 1997 CHLORINATED ETHENES CONCENTRATION
- AREA OF ELEVATED CONCENTRATION

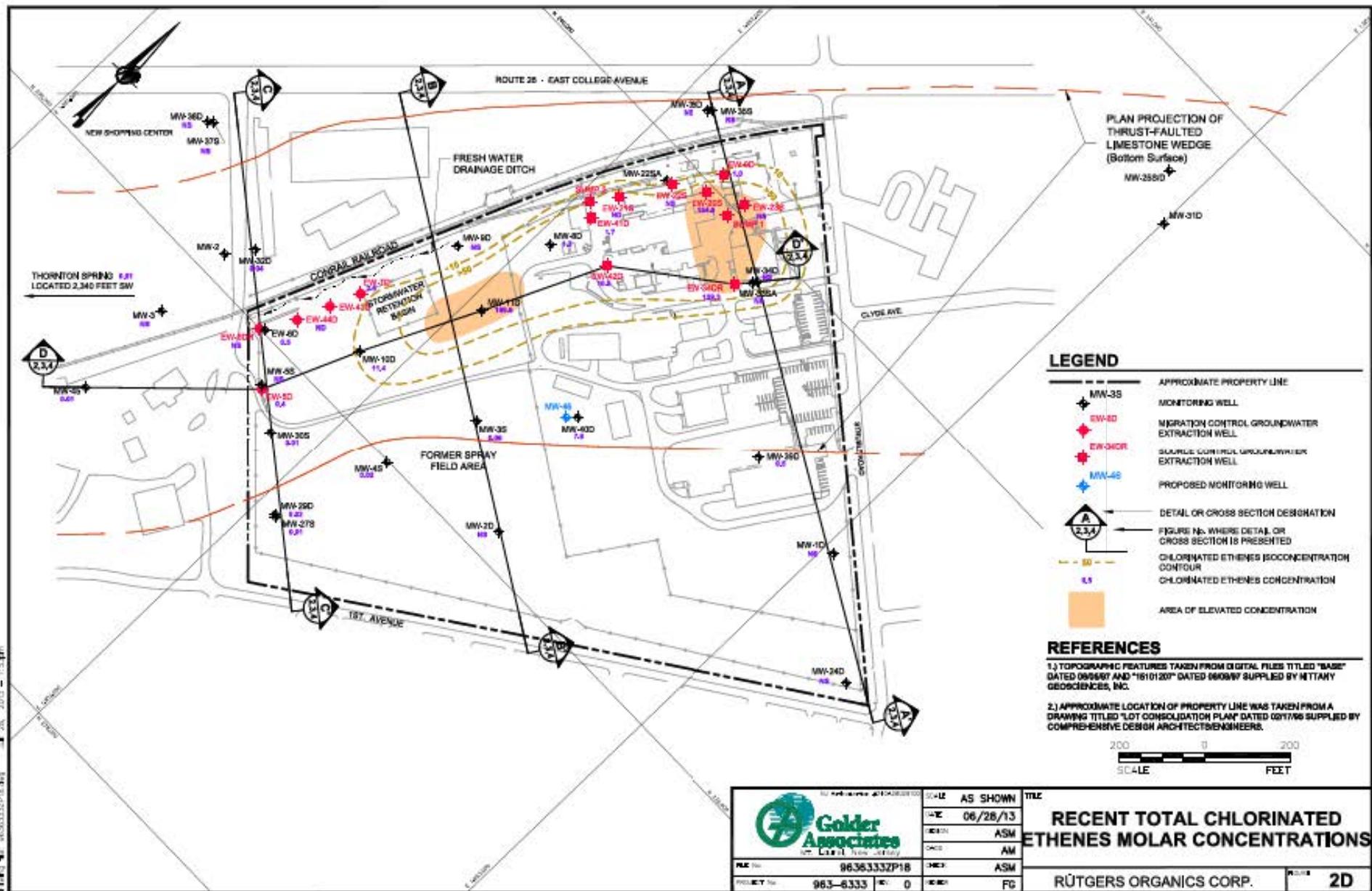
REFERENCES

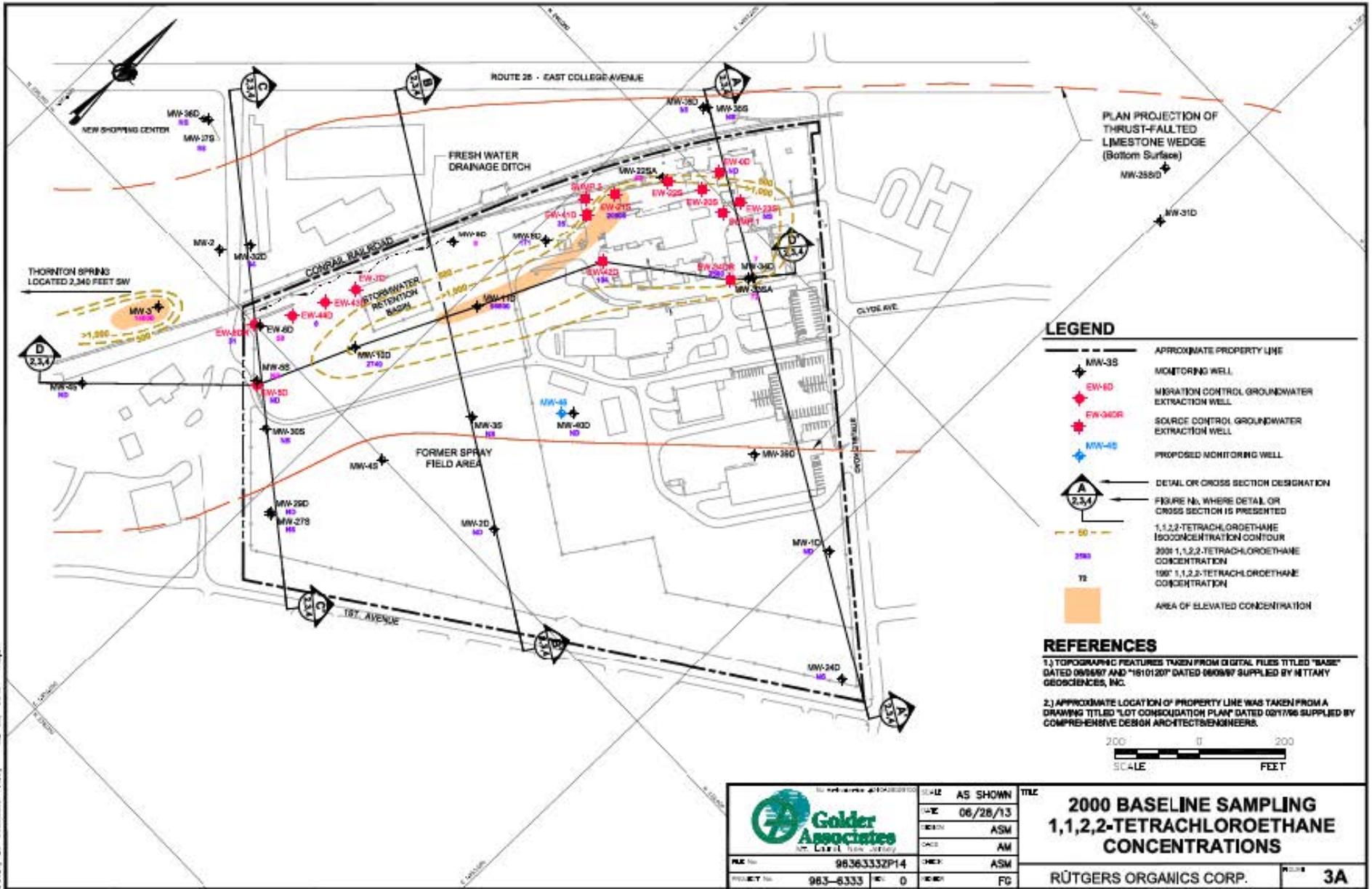
1.) TOPOGRAPHIC FEATURES TAKEN FROM DIGITAL FILES TITLED "BASE" DATED 06/05/97 AND "16101207" DATED 06/09/97 SUPPLIED BY METTARY GEOSCIENCES, INC.

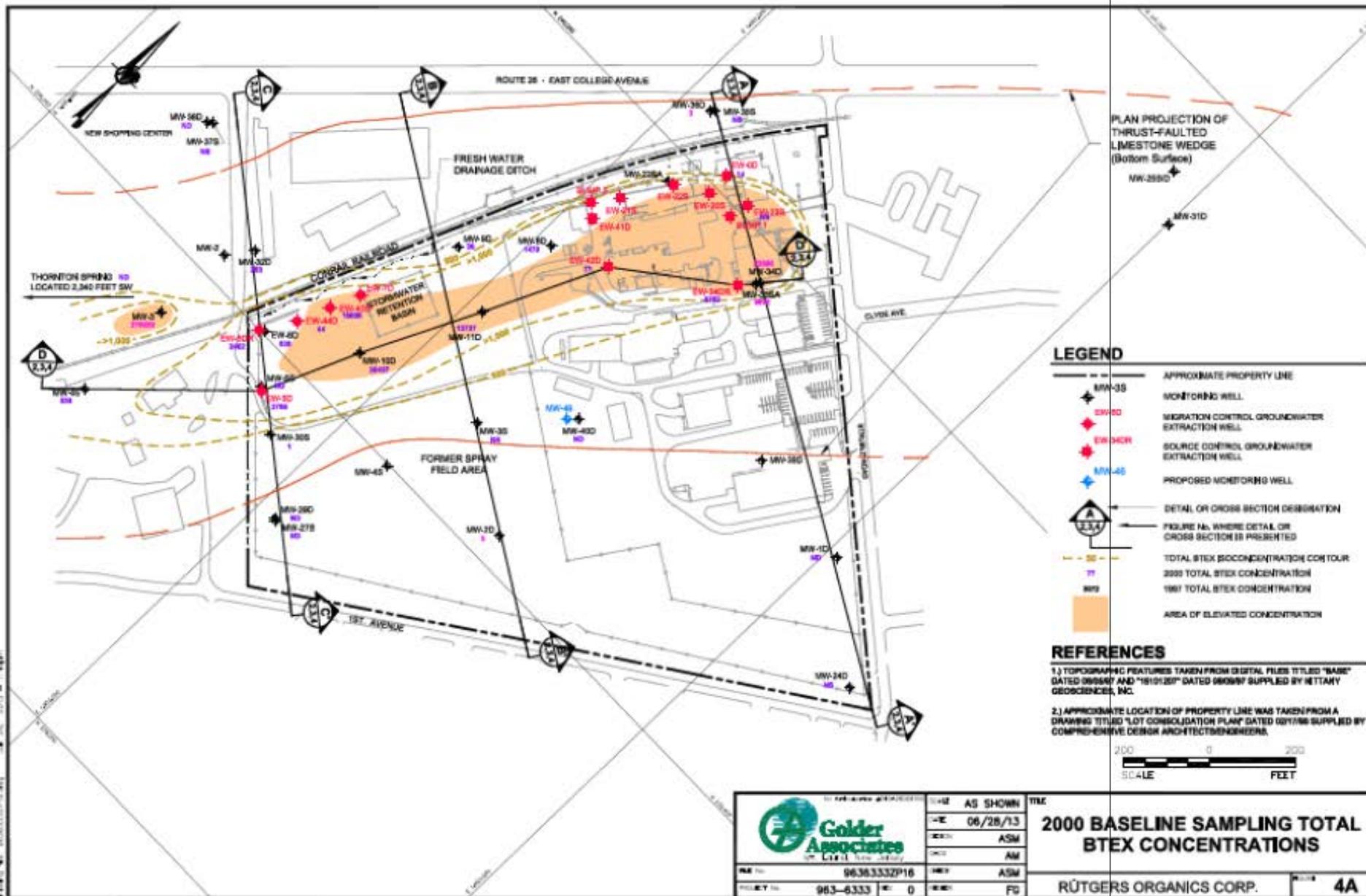
2.) APPROXIMATE LOCATION OF PROPERTY LINE WAS TAKEN FROM A DRAWING TITLED "LOT CONSOLIDATION PLAN" DATED 05/17/96 SUPPLIED BY COMPREHENSIVE DESIGN ARCHITECTS/ENGINEERS.



	DATE	AS SHOWN	TITLE 2000 BASELINE SAMPLING TOTAL CHLORINATED ETHENES MOLAR CONCENTRATIONS	RÜTGENS ORGANICS CORP.
	DATE	06/28/13		
	DESIGN	ASM		
	DRAW	AM		
	CHECK	ASM		
	DATE	FG		
FILE No.	96363332P15			
PROJECT No.	963-6333	0		







Summary of September 2013 Thornton Spring Sampling Results¹

COC	Pennsylvania Water Quality Standard, Fish and Aquatic Life ² (µg/L)	Thornton Spring Sampling Results
		(µg/L)
Acetone	450,000	4.7 JB
Benzene	640	1.0 J
Chlorobenzene	1,200	1.7 J
1,1,2,2-tetrachloroethane	1,000	5
PCE	700	3.1
Toluene	1,700	2.8
TCE	2,300	3.1
Vinyl chloride	--	3.6
cis-1,2-DCE	--	66
trans-1,2-DCE	6,800	6.1
Isopropylbenzene	--	0.48 J
1,2-Dichlorobenzene	820	0.53 J
2-chlorotoluene	--	0.9 J
m- and p-xylene	1,100 ³	3.8 J
o-xylene	1,100 ³	2.0 J
Notes: 1 – Table includes only those COCs detected above method detection limits. 2 - Pennsylvania Code, Title 25, Chapter 93, Water Quality Standards, Fish and Aquatic Life Standards, Table 5, Maximum concentrations. 3 – Standard listed is for total xylenes. J – estimated value. B – analyte also found in the associated blank -- – No water quality standard established		

Appendix F: Historic Site Features

