SECOND FIVE-YEAR REVIEW REPORT
MONTGOMERY TOWNSHIP HOUSING DEVELOPMENT AND ROCKY HILL MUNICIPAL WELL SUPERFUND SITES
SOMERSET, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
Region 2
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Date

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Executive Summary

This is the second Five-Year Review for the Montgomery Township Housing Development (MTHD) and Rocky Hill Municipal Well (RHMW) Superfund sites. The sites are located in Somerset County, New Jersey. Both Sites are being addressed jointly due to their close proximity and the similarity of contaminants present. The purpose of this Five-Year Review (FYR) is to review Site-related data and information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this policy FYR was the completion date of the first FYR, which was April 6, 2010.

MTHD has two operable units (OUs) and RHMW has one OU. MTHD OU1 addressed potential exposure to groundwater contaminants and provides alternative water supply to impacted residences. MTHD OU2 and RHMW OU1 address groundwater contamination in the underlying aquifer beneath both sites.

In 1987, a ROD was signed for MTHD OU1 requiring an alternate water supply to be installed for residents of the MTHD and sealing of abandoned private wells. In June 1988, one remedy was chosen for MTHD OU2 and RHMW OU1 which addresses the entire groundwater contaminant plume beneath the Sites. The most predominant site contaminant is trichloroethene (TCE), both with the respect to concentration and areal extent. The remedy called for the extraction of contaminated groundwater from the primary source area (hotspot areas where TCE concentrations were greater than 100 parts per billion (ppb)) followed by on-site treatment and reinjection of the treated water back into the underlying aquifer; connection of affected residences to the public water supply; sealing of private water supplies within the contaminant plume; and implementation of a groundwater sampling program to monitor the effectiveness of the cleanup. The less contaminated ground water in the secondary source area, where TCE concentrations are less than 100 ppb, will be allowed to naturally attenuate.

This FYR found that the MTHD OU2 and RHMW OU1 remedy is protective of human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Montgomery Township Housing Development Rocky Hill Municipal Well		
EPA ID: Montgomery Housing Township Development: NJD980654164 Rocky Hill Municipal Well: NJD980654156		
Region: 2	**State:** NJ	**City/County:** Somerset County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the Site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Federal (EPA) **If "Other Federal Agency" was selected above, enter Agency name:** N/A
Author name (Federal or State Project Manager): Michelle Granger
Author affiliation: EPA
Review period: 04/01/10 – 01/31/2016
Date of site inspection: 11/04/2015
Type of review: Policy
Review number: 2
Triggering action date: 04/06/2010
Due date *(five years after triggering action date)*: 04/06/2015

Five-Year Review Summary Form (continued)

Protectiveness Statement(s)		
Operable Unit: 02- MTHD 01 - RHMW	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The remedy for MTHD OU2 and RHMW OU1 is protective of human health and the environment.		

Sitewide Protectiveness Statement	
Protectiveness Determination: *Protective*	*Addendum Due Date (if applicable):* N/A
Protectiveness Statement: The remedy at the Montgomery Housing Township Development and Rocky Hill Municipal Well Superfund sites is protective of human health and the environment.	

Introduction

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

This is the second FYR for the Montgomery Township Housing Development (MTHD) and Rocky Hill Municipal Well (RHMW) Sites, located in Somerset County, New Jersey. This FYR was conducted by the USEPA Remedial Project Manager (RPM) Michelle Granger. The review was conducted pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. Section 9601, et seq., and 40 C.F.R. 300.430(f)(4)(ii) and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The report will become part of the Site file.

The triggering action for this policy review is the signature date of the previous FYR, dated April 6, 2010 for both sites. A five-year review is required at this site due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

The MTHD site is addressed by two operable units (OUs). OU1 provides alternate water supply to the MTHD and is completed. Contaminated groundwater in the aquifer beneath the MTHD and RHMW Sites is addressed by a single remedy (designated as MTHD OU2 and RHMW OU1) and these OUs are the subject of this FYR.

Site Chronology

See Table 1 for the Site Chronology.

Background

Physical Characteristics:

The RHMW/MTHD Superfund Sites (See Figure 1) are located adjacent to one another in the Borough of Rocky Hill and in Montgomery Township, respectively, west of the Millstone River in the southern part of Somerset County, New Jersey. The RHMW site is located on approximately two acres of land situated east of New Jersey State Route 206 and directly south of Route 518. The MTHD site includes 71 one-acre residential lots located in Montgomery Township and six additional residences nearby. The homes are on Montgomery Road, Sycamore Lane, Robin Drive, Oxford Circle, and Cleveland Circle, and are east of New Jersey Route 206 and north of Route 518. The area surrounding the Sites consists of wooded areas and residential and commercial development.

Geology/Hydrogeology

The fractured siltstones, shales, and sandstones of the Passaic Formation underlie the Sites. Mapping by Parker and Houghton (1990) indicates that the Passaic Formation in the vicinity of the Sites has undergone little deformation and that bedding strikes generally north, 65 degrees east (N65E) and dips to the northwest at about 17 degrees towards the Hopewell Fault located about 5 miles northwest of the Sites. A diabase sill outcrops to the south of the Sites and forms the "Rocky Hill." Parker and Houghton (1990) also observed some steeply dipping joints in the study area ranging in strike from subparallel to bedding to 11 degrees east (N11E). Unconformibly overlying the Passaic Formation are unconsolidated sediments comprised mainly of Quaternary weathered shale and the older Pliocene Pennsauken Formation. The sediments range in thickness from 3 feet to more than 15 feet at the Sites. They are underlain by the much older bedrock of the Triassic Age Passaic Formation (NJDEP 2002). Weathered bedrock extends as deep as 30 feet below ground surface (bgs) beneath the Sites.

Groundwater flow is perpendicular to the potentiometric lines, from the highest elevations toward the lowest elevations. In both surfaces the cone of depression created by pumping at the RHMW is evident to the southwest of the well. To the north of the RHMW, the primary direction of groundwater flow at the Sites is to the east towards the Millstone River and north towards Beden Brook. Finally, the potentiometric surfaces show a groundwater flow divide, trending northeast/southwest, trenching along a line between former monitoring wells MW-16/MW-16D and MW-04D.

Land and Resource Use

The MTHD site includes 71 one-acre residential lots located in Montgomery Township and six additional residences nearby. The homes are on Montgomery Road, Sycamore Lane, Robin Drive, Oxford Circle, and Cleveland Circle, and are east of New Jersey Route 206 and north of Route 518. The area surrounding the Sites consists of wooded areas and residential and commercial development.

The RHMW site is located on approximately two acres of land situated east of New Jersey State Route 206 and directly south of Route 518. The area that surrounds the site is wooded, and land use is primarily agricultural and residential.

Approximately 400 property owners reside (part-time or permanently) within a one-mile radius of the Sites. Residences within the immediate vicinity of the Sites get their water from New Jersey American Water.

The future land and groundwater use is anticipated to remain unchanged.

History of Contamination

RHMW wells numbered 1 and 2 were constructed in 1936. These two wells provided a source of potable water to the Borough of Rocky Hill. Well number 1 was abandoned and

sealed between 1976 and 1978. In 1978, a study by Rutgers University on the RHMW well number 2 revealed trichloroethene (TCE) contamination in groundwater at levels of approximately 25 parts per billion (ppb). Continued testing of this well by the Borough of Rocky Hill from 1978 to 1983 indicated that the TCE concentration ranged from about 50 ppb to 200 ppb. Due to the elevated levels of TCE in groundwater, well number 2 was closed in November 1979. Levels of TCE in the well water eventually declined, and the well was subsequently reopened. Levels of TCE, however, increased, and the well was closed for a second time in January 1982. During the shutdown of well number 2, the Borough of Rocky Hill obtained potable water from Elizabethtown Water Company. After the installation of two air stripping units by the Borough for well number 2, the well reopened as a potable source of water in July 1983, and has been operating ever since.

Groundwater at both sites is contaminated with volatile organic compounds (VOCs) and TCE in particular. Although the RHMW and MTHD Sites were listed separately on the National Priority List (NPL) in 1983, they are being addressed jointly due to similarity of contaminants and their close proximity to each other.

Initial Response

Due to concern over groundwater contamination in Rocky Hill, the New Jersey Department of Environmental Protection (NJDEP) conducted initial sampling of commercial and domestic wells in Montgomery Township from December 1979 to January 1980. Results indicated that approximately half of the private wells in the development were contaminated with TCE, while the remaining half were threatened. On August 21, 1980, Montgomery Township passed an ordinance authorizing water line extensions into the development. In March 1981, Elizabethtown Water Company mains were installed in a portion of the Montgomery Township, and residents were advised not to use well water.

In 1983, the Sites were included on the National Priorities List. In 1984, NJDEP entered into a Cooperative Agreement with EPA under which it performed the remedial investigation and feasibility study (RI/FS) for the RHMW and MTHD Sites.

In 1985, NJDEP began conducting the RI/FS for the Sites. The RI included groundwater, surface water and stream sediment, septic tank, soil, and air sampling. In January 1986, the NJDEP Division of Water Resources placed a restriction on future well drilling for water supply in the area. In April 1988, NJDEP issued a remedial investigation (RI) report which identified the nature and extent of the groundwater contamination and concluded that the source of groundwater contamination to the RHMW and MTHD Sites was at or in the vicinity of the Princeton Gamma-Tech, Inc. (PGT) facility located on Route 518 in Montgomery Township. In the 1970's, PGT used a septic system to dispose of sanitary and lab sink waste. Septic tank samples at this property identified the presence of TCE at levels as high as 5,000 ppb. The tank was tested by NJDEP and removed from the property following a spill in 1980.

The RI/FS reported results for 28 soil samples taken at the PGT property, none of which showed TCE contamination.

Concentrations of TCE found in the major source area of groundwater contamination in the PGT property well (well PGTMW-1) had decreased from 5,000 ppb in the 1980s to 1,800 ppb of TCE by 1992. The maximum concentration of TCE in the well continued to decline over the next six years to 320 ppb. The above information indicates that the past septic tank discharge was the source of the contamination found in the shallow groundwater. Following the tank removal performed under the guidance of NJDEP, TCE concentrations in the groundwater have decreased significantly.
The sediment and surface water samples collected from Beden Brook and the Millstone River did not contain any of the site contamination. Additionally, soil sampling did not show any detection of the site contaminants.

Basis for Taking Action

Since the site characterization determined that soils and surface waters are not currently being impacted by the site related contamination present in the groundwater, exposure to soils and surface waters was not included in the health assessment of the MTHD/RHMW sites. Thus, the risk assessment only considered exposure to contaminated groundwater through potable uses. Results of the risk evaluation indicated the exposure to contaminants at the maximum concentration detected over a lifetime, may lead to adverse noncarcinogenic health effects. The estimated hazard index from an adult's exposure to plume contamination was 13.21 and 175.07, for mean and maximum exposures, respectively. Further, the risk assessment found that the total upper bound cancer risk estimates ranged from 4.14×10^{-2} to 5.47×10^{-1}. The 1988 ROD also noted that data collected in the RI indicated that many of the compounds used in estimating the risk were sporadically detected and not site related (specifically inorganics and chlordane). Negating the non-site related compounds when estimating the site risks, resulted in lifetime cancer risks ranges of 8.6×10^{-4} to 7.0×10^{-3}, for mean and maximum exposures respectively.

In summary, based on the results of the RI a health assessment was conducted for the site and indicated that exposure to contaminated site groundwater via potable uses would result in lifetime cancer risk and noncancer hazard estimates that exceeded EPA's threshold criteria.

Remedial Actions

The MTHD site was divided into two operable units (OUs): OU1 addressed the private potable well contamination in the MTHD by providing for public water supply to those residents whose wells were threatened or contaminated and permanently sealing those private wells, and OU2 addressed the entire groundwater contaminant plume in the aquifer beneath the Sites. RHMW was addressed under as a single OU (OU1) concurrently with MTHD OU2.

Remedy Selection

MTHD - OU1 Remedy Selection

Following completion of the RI/FS, a Record of Decision (ROD) was issued by EPA in September 1987 that called for an alternate water supply to be provided for residents of the MTHD by installing waterline extensions and connections and sealing of abandoned private wells.

MTHD OU2 and RHMW OU1 Remedy Selection

EPA issued two RODs, in June 1988 for both the MTHD and RHMW Sites. The objective of the selected remediation alternative is to reduce the entire groundwater concentration of TCE to one (1) ppb. Tetrachloroethene (PCE) and 1,1 -dichloroethene (1,1 DCE) also have a remedial objective of reducing such concentrations to below 1 ppb and 2 ppb, respectively. The remedies called for:

- the extraction of contaminated groundwater from the primary source areas, (where TCE is approximately greater than 100 ppb) within the contaminant plume, followed by on-site treatment and reinjection of the treated water back into the underlying aquifer;
- connection of any remaining affected residences to the public water supply;
- sealing of private water supplies within the contaminant plume; and
- implementation of a groundwater sampling program to monitor the effectiveness of the cleanup.

The less contaminated ground water in the secondary plume limits (where TCE concentrations are less than 100 ppb) will be permitted to attenuate through natural means. VOC concentrations and natural attenuation parameters will be monitored in the secondary plume on a regular basis as part of the long-term groundwater sampling program.

Remedy Implementation

MTHD OU1 Remedy Implementation

Extension of water mains and connection of residents to water supplied by the Elizabethtown Water Company was completed in 1989 and 1990. Pursuant to the OU1 ROD, the alternate water supply lines were installed and residential properties in the MTHD received individual connections with the exception of two residences where the property owners refused to use water supplied by Elizabethtown Water Company.

MTHD OU2 and RHMW OU1 Remedy Implementation

In 1988, the NJDEP began to design the remedy for the Site employing Camp, Dresser, & McKee (CDM) as its contractor. Initial remedial design (RD) work included construction and sampling of new monitoring wells, and sampling of existing monitoring wells. During the RD it was found that contamination had been detected in a downgradient well (MW-19), located on the

east side of the Millstone River, that did not previously contain detectable levels of TCE in prior sampling events. This indicated that the contaminated groundwater plume was migrating beyond previously estimated contamination boundaries. The RD also indicated the concentrations of TCE found in a major source area of groundwater contamination in the Princeton Gamma-Tech, Inc. property well (well PGTMW-1) had decreased from 5,000 ppb in the 1980s to 1,800 ppb of TCE by 1992. The maximum concentration of TCE in the well continued to decline over the next ten years to 320 ppb.

In 1991, cost recovery litigation was initiated between the potentially responsible parties (PRPs) and EPA. In 1994, the PRPs indicated an interest in negotiating the implementation of the remedy and the RD contract between NJDEP and CDM was suspended. During this period of negotiations, another potential source of contamination was identified. Separate negotiations began in 1995 between EPA and a prior operator and current owner of the former Fifth Dimension Facility to investigate this other potential source of contamination. Negotiations were unsuccessful and EPA conducted an investigation at the property.

In December of 1996, the lead for the remedial design and implementation of the remedy for the Site was transferred from NJDEP to EPA.

In January 1998, EPA performed a limited groundwater sampling event to determine the current vertical and horizontal extent of the groundwater contaminant plume. The analytical results showed that TCE contamination concentrations, while still significantly elevated above the state drinking water standard of 1 ppb, had further decreased. TCE was detected in the groundwater at the Sites at levels ranging from non-detect to a high of 320 ppb.

EPA restarted the RD work following the conclusion of unsuccessful settlement negotiations between the parties in 1999. In August 1999, EPA entered into an interagency agreement with the United State Army Corps of Engineers (USACE) for the completion of RD work at the Site. USACE contracted with CDM Federal Programs Corporation to complete the RD.

CDM resumed RD field work in February 2001. As part of this work, 20 bedrock monitoring wells were re-constructed to further refine groundwater sample collection. Following bedrock monitoring well reconstruction, additional rounds of groundwater sampling were conducted in 2002. The information obtained from these sampling events suggests that concentrations of TCE decreased in the aquifer between 1998 and 2002. Although levels have decreased from those found in previous sampling events, TCE contamination in groundwater remains at levels several hundred times greater than the selected site cleanup standard of 1 ppb.

The remedial design for the groundwater pump and treatment systems called for pumping the contaminated groundwater from two areas of the contaminant plume containing concentrations of TCE higher than 100 ppb. Areas of the plume exceeding TCE concentrations of 100 ppb are known as primary source areas. The remedial design called for the treatment of groundwater extracted from the primary source areas with Granular Activated Carbon (GAC) and discharge of treated water to a surface water body. The treatment using GAC and discharge to surface water, called for in the design represented a minor modification to the remedy selected in the 1988

ROD. The ROD specified treatment by air stripping and reinjection of the treated water back into the underlying aquifer. The surface water discharge via connection to the existing storm water sewers was chosen as the preferred option for effluent disposal. The change in the treatment and discharge components to the remedy have been documented in an Explanation of Significant Differences (ESD) issued by EPA in August 2005. NJDEP was consulted and approved the surface discharge of treated water.

Following completion of remedial design activities in August 2003, the USACE awarded a contract for the construction and operation of two groundwater treatment systems to Cape Environmental.

Construction activities for the remedy began on March 15, 2004. Construction activities included the installation of eight recovery wells and the construction of two treatment plants.

One of the targeted remediation zones is the primary source area located on the property at 1377 Route 206. Ground Water Treatment Facility #1 (GWTF #1) and its three pairs of recovery wells were constructed at this location. The targeted remediation zone for this area of the plume extends vertically from 50 feet to 200 feet below ground surface and is enclosed horizontally by the 100 ppb TCE isoconcentration contour. The objective of the capture zone was to achieve capture of the targeted remediation zone. The paired recovery wells (i.e. shallow and deep) for GWTF #1 were designed to avoid creating a conduit for vertical migration of contamination from the shallow bedrock to the deeper bedrock. Two of the three pairs of wells generated adequate amounts of water that produced a flow rate of 56 gallons per minute into the treatment plant. The third pair, recovery well 3S and recovery well 3D, were not productive and were converted into monitoring wells in 2005.

A second smaller primary source area is located to the south underlying the Princeton Gamma Tech property near the intersection of Routes 206 and 514. Two recovery wells were installed on this property. These two wells were constructed to extract groundwater within the primary source area underlying this property that extends vertically between 25 to 100 feet below ground surface within the weathered bedrock and shallow bedrock aquifer. These two recovery wells pump a total six gallons per minute of extracted groundwater into a portable trailer-mounted treatment unit known as GWTF #2. This treatment unit, similar to GWTF #1, uses GAC to treat extracted groundwater and discharges treated water to a surface water body via a storm sewer.

Construction activities of the recovery wells, a number of additional monitoring wells, and GWTF #1 and #2 were completed on January 11, 2005.

Performance and startup testing of the groundwater treatment systems began on January 11, 2005 and consisted of a 14-day pump test. The 14-day pump test was satisfactorily completed on January 25, 2005. A final inspection of the two groundwater pump and treatment plants was conducted by EPA, NJDEP, and USACE on February 1, 2005. The two treatment plants have been running continuously since January 2005. GWTF #1 is currently pumping contaminated water from the aquifer at a flow rate of 33 gallons per minute (gpm). GWTF #2, located on the Princeton Gamma Tech property, is currently pumping at a flow rate of 11 gpm.

Systems Operation/Operations and Maintenance (O&M)

A Final Operations and Maintenance Manual was submitted to EPA on July 29, 2005 and reviewed by EPA and NJDEP and approved in January 2006.

GWTF #1 and GWTF #2 currently operate at a combined flow of 44 gallons per minute (gpm) extracting groundwater from the two primary source areas. Over 300 million gallons of contaminated groundwater have been pumped from the primary source areas and have been treated and discharged to date.

During this review period, groundwater monitoring in the primary and secondary source plume areas has been conducted on an annual basis. The groundwater samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs). Natural attenuation parameters (methane/ethene/ethane, total organic carbon, chloride, ferrous iron, total alkalinity, sulfate, and nitrate/nitrite) are monitored in the secondary plume every five years as part of the long-term groundwater sampling program.

Based on groundwater concentrations of site-related chemicals that exceeded conservative screening values presented in the draft 2002 guidance, "*Evaluating the Vapor Intrusion into Indoor Air*" (USPEA), a vapor intrusion investigation was initiated in 2006. Four rounds of sub-slab and /or indoor VOC analyses were conducted for the sites to date (see Section VI Technical Assessment, Question B for details on the vapor intrusion investigation conducted). To ensure protectiveness, ongoing sampling and monitoring of both sub-slab and indoor VOCs is being conducted periodically for the commercial stores located within the shopping center.

Site inspections are conducted by the USACE and their contractor regularly to ensure that the fence is in good repair and to look for signs of trespass. Any deficiencies which may be noted, such as plant growth requiring clearing and grubbing or removal of debris and minor fence repair, are addressed quickly by the USACE.

Potential impacts on the Site from climate change were assessed. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region near the Site.

On June 6, 2014, a Classification Exception Area (CEA) was established by NJDEP within the area of groundwater contamination to regulate the installation of additional wells within the contaminated groundwater plume.

Progress Since the last Five-Year Review

The first FYR was conducted on April 6, 2010. It concluded:

The remedies at the MTHD and RHMW Superfund sites are protective of human health and the environment. Implementation of the OUl and OU2 remedies has provided for the protection of

public health and the environment by connecting affected residents to the public water supply, sealing of private water supply and monitoring wells within the contaminant plume, and pumping and treating of contaminated groundwater, thereby eliminating the possibility of exposure to the contaminated groundwater. Groundwater sampling will be continued as part of long-term groundwater monitoring program. The remedies are protective in the short-term. In order for the remedies to be protective in the long-term, the action identified in Section VII needs to be taken to ensure protectiveness.

Section VII of the first FYR recommended that a CEA be established. The CEA was established by NJDEP on June 6, 2014, within the area of groundwater contamination to regulate the installation of additional wells within the contaminated groundwater plume.

Five-Year Review Process

Administrative Components

The FYR team consisted of Michelle Granger (EPA – Remedial Project Manager), Sharissa Singh (EPA - Hydrogeologist), Urszula Filipowicz (EPA – Human Health Risk Assessor), Pat Seppi (EPA Community Involvement Coordinator (CIC)) and Michael Clemetson (EPA Ecological Risk Assessor).

Community Involvement

On November 19, 2015, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 32 Superfund sites and four federal facilities in New York and New Jersey, including the MTHD/RHMW Site. The announcement can be found at the following web address: http://www2.epa.gov/sites/production/files/2015-11/documents/fy_16_fyr_public_website_summary.pdf. Additionally, the CIC, Pat Seppi, provided a FYR notice to the Borough of Rocky Hill engineer by email on May 31, 2016 and it was subsequently posted on the Rocky Hill Township web page on June 2, 2016. The Notice was also provided to the Montgomery Township Health Officer, by email on May 31, 2016 and it was posted on July 13, 2016. The purpose of the public notice was to inform the community that the EPA would be conducting a second FYR to ensure that the remedies implemented at the Site remain protective of public health and are functioning as designed. In addition, the notice included the RPM's and the CIC's addresses and telephone numbers for questions related to the FYR process or the MTHD and RHMW Sites. No questions were received.

Once the FYR is completed, the results will be made available at the local Site repository, which is at the Mary Jacobs Library, 64 Washington Street, Rocky Hill, New Jersey and on the Montgomery Township and Rocky Hill Borough webpages. In addition, efforts will be made to reach out to local public officials to inform them of the results.

Document Review

The documents, data, and information which were reviewed in completing this five-year review

are identified in Table 2.

Groundwater Data Review

This Five Year Review focuses on analyzing groundwater data collected from this review period (2010 – 2016). The groundwater samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) in the primary and secondary source areas. Natural attenuation parameters are monitored every five years. During this review period natural attenuation monitoring was conducted in 2014.

GWTF #1 Primary Source Area Data

Eight groundwater monitoring wells are located within the primary source area capture zone for GWTF#1 (See Figure 2 attached). TCE and PCE have been detected at levels that exceeded the New Jersey Groundwater Quality Standard (NJGWQS) of 1 ppb for TCE and PCE. The maximum concentrations detected of TCE and PCE in the most recent sampling event (January 2016) were 100 ppb (which is the criteria defining the primary plume) and 8.1 ppb at MW-17, respectively.

Groundwater monitoring results indicate decreasing trends in TCE within the capture zone for GWTF#1. A review of influent sample results for GWTF #1 confirms a decline in TCE levels from approximately 9.8 ppb in June 2012 to 2.4 ppb in December 2015, with a maximum of 12 ppb in September 2013. GWTF #1 influent PCE concentrations fell from 26 ppb in June 2012 to 5.8 ppb in December 2015, with a maximum of 28 ppb in September 2013. Review of monitoring well data indicates overall general declines in levels of TCE with few exceptions. In monitoring well MW-17, TCE concentrations initially decreased to 15 µg/L (April 2012) and then increased to 75 ppb in January 2015 and to 100 ppb in January 2016. The sampling results from MW-17 also reveal fluctuating levels of PCE with concentrations increasing from 15 ppb to 190 ppb in April 2013, then decreasing to a concentration of 8.1 ppb in January 2016. The monitoring well is located immediately downgradient from the Montgomery Shopping Center complex building, but is within the capture zone of GWTF # 1. EPA will continue to regularly monitor the concentrations of TCE and PCE in this area, if concentrations continue to increase further evaluation may be warranted.

During this reporting period, groundwater sampling results for 1,1-DCE and vinyl chloride indicate no detectable levels of these compounds.

GWTF#2 Primary Source Area Data

Ten groundwater monitoring wells are located within the primary source area capture zone for GWTF #2. TCE and PCE have been detected at levels that exceeded the NJGWQS of 1 ppb for TCE and PCE in groundwater. The maximum concentration detected of TCE in the most recent sampling event (January 2016) was 140 ppb of TCE in PGT-MW-01. PGT-MW-01 is the only

well that has a TCE concentration above 100 ppb, which is the criteria defining the primary plume. PGT-MW-01 has been the only well exhibiting TCE concentrations above 100 ppb for the October 2011 through April 2014 sampling events. Groundwater from PGT-MW-01 is captured by GWTF#2. The maximum concentrations detected of PCE in the most recent sampling event (January 2016) was 4 ppb of PCE in PGT-MW-05.

Groundwater monitoring results indicate decreasing trends in TCE and PCE within the capture zone for GWTF#2. A review of influent sample results from GWTF # 2 confirms a general downward trend of TCE since initiation of extraction pumping, with the exception of one well. TCE influent to the treatment facility has remained relatively steady during the current period, ranging from 38 ppb in March 2013 to 18 ppb in August 2015. Similarly, TCE levels in PGT-MW-01 have fluctuated but began the period with 140 ppb in October 2010 and concluded the period with 140 ppb in January 2016. Sampling results for PCE indicate that it is not a concern at GWTF # 2. PCE levels into the treatment facility have been at or below 1 ppb since 2007.

During this reporting period, groundwater sampling results for 1,1-DCE and vinyl chloride indicate no detectable levels of these compounds.

Secondary Source Plume Data

A review of groundwater monitoring data in the secondary plume confirms a general decreasing trend for PCE concentrations with PCE concentrations in these wells generally remaining at or below the NJGWQS through the five-year period. One exception was the PCE concentration of 2.3 ppb at MW-29I (located in the southern portion of the plume) in January 2015, which is within the historical PCE concentration range for that well.

The secondary plume of groundwater contamination (where TCE concentrations were found to be less than 100 ppb) will be allowed to naturally attenuate. Of thirty-seven groundwater monitoring wells in the secondary plume monitoring-well network, (excluding the two former Fifth Dimension wells discussed below) nineteen were found to have TCE concentrations less than NJGWQS of 1 ppb (in quarterly sampling events performed between 2005 and 2009) and are therefore no longer sampled. Of the remaining sixteen wells, TCE values ranged from non-detect to 64 ppb. Thirteen of the sixteen wells reported TCE concentrations less than or equal to 20 ppb; results for these wells are either stable or decreasing over seven groundwater sampling events collected during the review period (2010 to 2016).

Three of the sixteen wells reported TCE values greater than 20 ppb during the review period. The TCE concentrations at MW-20S (just north of the former Fifth Dimension area located in the southern portion of the plume) ranged from 10 to 64 ppb and concentrations at MW-29I ranged from 24 to 55 ppb during the review period, respectively; both of these wells exhibited a clear downward trend over the last three sampling rounds. TCE concentrations at MW-27D (located in the northern portion of the plume) ranged from 12 to 28 ppb during the review period; values were stable over the last five sampling rounds (14 to 21 ppb). Sentinel well data has been consistently non-detect during the review period.

The former Fifth Dimension (FFD) area is located in the southern portion of the secondary plume. The results of the investigation at the FFD Facility conducted by EPA in 1995 showed that it was a source of TCE groundwater contamination with a maximum concentration of 89 ppb of TCE in groundwater. The primary monitoring wells in the FFD area are FD-01 and FD-01D. PCE was not detected in these monitoring wells, and the TCE concentrations in these wells are generally unchanged throughout the five-year period ranging from 4 ppb and 12 ppb.

During this reporting period, groundwater sampling results for 1,1-DCE and vinyl chloride have been non-detect. *Cis*-1,2-DCE detections are relatively low level (below 10 ppb). The concentrations of *cis*-1,2-DCE, and other daughter products of PCE and TCE dechlorination are not showing increases in correlation with decreased PCE and TCE concentrations at the wells, indicating that the level of the daughter product concentrations are not the result of anaerobic reductive dechlorination (ARD).

Monitored Natural attenuation (MNA) parameters (methane/ethene/ethane, total organic carbon (TOC), chloride, ferrous iron, total alkalinity, sulfate, and nitrate/nitrite) were monitored in the secondary plume in 2014 as part of the long-term groundwater sampling program. Results for MNA parameters were compared to New Jersey State MCLs or Secondary Drinking Water Regulations (SDWR). Chloride exceeded the SDWR (250 mg/L) at wells FD-01D (1,200 mg/L), MW-04D (260 mg/l); MW-29D (1,700 mg/L), and MW- 30I (360 mg/L). Nitrite slightly exceeds the MCL (1 mg/L) at MW-07D (1.1 mg/L). No other MNA parameter results exceeded SWDRs or MCLs.

Attenuation of the plume is occurring (see Fig. 3), and is likely occurring due to dispersion, dilution, and/or sorption.

Rocky Hill Municipal Well number 2 (RHMW No. 2) is within the secondary plume. Historical elevated TCE levels (between 50 and 200 ppb) discovered at RHMW No. 2 between 1978 and 1983 led the Borough of Rocky Hill to install two air stripping units for RHMW No. 2. The air stripping units were installed in 1983 and have been operating ever since. A review of RHMW No. 2 influent data collected during the review period indicates decreasing levels of TCE and stable low levels of PCE in the groundwater. Influent TCE levels have declined from 16 to 6.5 ppb and influent PCE levels have ranged from 1.6 to 0.5 ppb during the review period.

Groundwater Data Review Summary

GWTF #1 and GWTF #2 (Primary Plume Areas)

Over all since 2010, groundwater sampling results in the primary plume continue to indicate general declines in levels of TCE for GWTF#1 with few exceptions. In monitoring well MW-17, TCE and PCE concentrations fluctuated during the review period. The monitoring well is located immediately downgradient from the Montgomery Shopping Center complex building, but is within the capture zone of GWTF # 1. Groundwater sampling results within the capture zone for GWTF#2 indicate general decreasing trends in TCE and PCE as well. PGT-MW-01 is the only well that has a TCE concentration above 100 ppb (See Table 3). EPA will continue to regularly

monitor the concentrations of TCE and PCE in these areas. If concentrations increase, further evaluation may be warranted.

During this reporting period, groundwater sampling results for 1,1-DCE and vinyl chloride have been non-detect. The *cis*-1,2-DCE detections have been relatively low level , below 10 ppb, except for PGT-MW-01 (77 ppb in April 2014). The concentrations of *cis*-1,2- DCE, and other daughter products of PCE and TCE dechlorination are not showing increases in correlation with decreased PCE and TCE concentrations at the wells, indicating that the level of the daughter product concentrations are not the result of ARD.

GWTF #1 and #2 operations have either reduced or eliminated the Primary TCE Plumes. TCE was not detected above 100 ppb in any of the monitoring wells around GWTF #1. TCE was detected above 100 ppb in only one monitoring well (140 µg/L at PGT-MW-01) located adjacent to extraction well RW-4 at GWTF #2. Groundwater from PGT-MW-01 is captured by GWTF#2. The Primary TCE Plume at GWTF #2 has been reduced to a small disk centered on RW-4. See Figure 3. In the primary plume area, TCE and PCE will be treated to the selected site cleanup standard of 1 ppb.

Secondary Plume Areas

Secondary Plume data indicates PCE concentrations generally remained at or below the NJGWQS throughout the five year period. One exception was the PCE concentration of 3.4 µg/L at MW-23D (in 2016), which is within the historical PCE concentration range for that well. TCE concentrations in the Secondary Plume are either stable or decreasing since the previous Five Year Review reporting period. FFD data indicates decreasing trends in TCE and PCE.

The concentrations of *cis*-1,2- DCE, and other daughter products of PCE and TCE dechlorination are not showing increases in correlation with decreased PCE and TCE concentrations at the wells, indicating that the level of the daughter product concentrations are not the result of ARD.

The Secondary TCE Plume has been reduced in the vicinity of both GWTFs compared to the 2002 extent of the Secondary TCE Plume. Attenuation of the plume is occurring (see Fig. 3), and is likely occurring due to dispersion, dilution, and/or sorption.

Rocky Hill Municipal Well No. 2 is within the secondary plume. A review of RHMW number 2 influent data collected during this review period (2010 – 2016) indicates decreasing levels of TCE and stable low levels of PCE in the groundwater. The air stripping units that were installed in 1983 are still in operation.

Vapor Intrusion

In the past five years, one additional round of vapor intrusion (VI) data was collected at five locations of interest in the adjacent shopping center. Detected concentrations of volatile constituents in indoor air and sub-slab samples were compared with their corresponding risk-

based vapor intrusion screening levels (VISL). The VISLs are chemical- and media-specific screening values used by the Agency in accordance with the framework for evaluation and assessing VI investigations as identified in EPA's 2015 final vapor intrusion guidance document entitled, "*OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air.*" Results of the vapor intrusion investigation and sampling are discussed below.

Based on past sub-slab results showing elevated concentrations of PCE, concurrent indoor air and sub-slab samples were collected at Ya-Yas restaurant, located within the shopping center, in 2014. Results of the sampling indicate concentrations of PCE found below the slab are an order of magnitude less than previously detected concentrations (280 $\mu g/m^3$ in 2014 as compared with 4,300 $\mu g/m^3$ in 2007). Samples from two indoor air locations were collected and show PCE concentrations ranging from 130 $\mu g/m^3$ to 140 $\mu g/m^3$. As noted in the previous FYR, a dry cleaning facility is located in close proximity to this location. It is unclear what impacts the dry cleaner has on indoor air quality at Ya-Yas. Although PCE levels detected in indoor air are elevated, they do not exceed cancer and non-cancer risk-based vapor intrusion screening levels (VISL).

Ewing Sports, located within the shopping center over the plume was also re-sampled based on past detections of PCE and TCE in sub-slab and indoor air. Sub-slab data collected in 2014 show low levels of PCE and TCE at 1.6 and 2.1 $\mu g/m^3$, respectively. No detectable concentrations of PCE were found in either indoor air sample. TCE was detected at 0.38 $\mu g/m^3$ in one of the two indoor air samples collected within the store. Concentrations of TCE and PCE in this locations were well below chemical specific VISL values for both chemicals.

Three additional stores within the shopping center were also investigated during the 2014 sampling effort. Results of paired sub-slab and indoor air data collected at each location do not indicate an exceedance of risk-based VISLs. Concentrations of PCE found in sub-slab ranged from 190 $\mu g/m^3$ to 7.8 $\mu g/m^3$, while indoor air concentrations ranged from non-detect to 2 $\mu g/m^3$. TCE was found in sub-slab samples ranging from 5.2 to 0.27 $g/\mu m^3$. Out of the three samples collected, only one indoor air hit of TCE was reported at a concentration of 0.7 $\mu g/m^3$.

To ensure that the vapor intrusion pathway remains incomplete, periodic sampling and monitoring of sub-slab and indoor air in nearby commercial store locations will be continued.

Site Inspection

The inspection of the Site was conducted on November 4, 2015. In attendance were Michelle Granger, EPA Region II Project Manager, Urszula Filipowicz, EPA Region II Risk Assessor, Tom Roche, USACE, Project Manager. The purpose of the inspection was to assess the protectiveness of the remedy.

Interviews

No interviews were conducted for this site.

Technical Assessment

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

The remedies for the Montgomery Township Housing Development and Rocky Hill Municipal Well sites are functioning as intended by the decision documents.

The MTHD OU2 and RHMW OU1 groundwater remedy includes extraction of the contaminated groundwater through pumping from the two most contaminated areas of the aquifer, followed by on-site treatment with liquid-phase granular activated carbon (GAC) adsorption. After treatment to meet New Jersey Pollutant Discharge Equivalency System (NJPDES) requirements, the water is discharged to surface water. A groundwater sampling program to monitor the effectiveness of the cleanup was also implemented and includes an evaluation of plume attenuation outside the extraction and treatment system footprint. In addition, subslab and indoor air sampling of properties overlying the contaminated plume will continue to be performed on a periodic basis.

Groundwater sampling indicates that the pump and treat systems continue to contain and remove contamination in the two primary source areas. Outside of the capture zones, the Secondary Plume has been reduced in the vicinity of both GWTFs compared to the 2002 extent of the Secondary TCE Plume. See Figure 3.

The concentrations of *cis*-1,2- DCE, and other daughter products of PCE and TCE dechlorination indicate that the level of the daughter product concentrations are not the result of ARD. Attenuation of the plume is occurring (see Fig. 3), and may be occurring due to dispersion, dilution, and/or sorption.

Subslab and indoor air samples were collected in 2014 at five locations in the Montgomery Township Shopping Plaza. Data was compared to the VISLs for PCE and TCE and no indoor air samples exceeded these screening values.

A CEA was established by NJDEP on June 4, 2014. Establishment of a CEA by NJDEP assures that there is no unacceptable future use of the contaminated groundwater in the vicinity of the Sites.

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

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. Land use assumptions, exposure assumptions and pathways, and clean up levels considered in the decision document followed risk assessment guidance used by the Agency and remain valid. Although specific parameters may have changed since the time the risk assessment

was completed, the process that was used remains valid.

As indicated in the 1988 RODs, a public health assessment was conducted in accordance with The Superfund Public Health Evaluation Manual (1986). Since the site characterization noted that soils, sediments, and surface waters were not being impacted by site related contamination present in groundwater, the risk assessment only considered exposures to contaminated groundwater.

Two primary exposure pathways: direct ingestion of contaminated groundwater (as a potable water source) and the possibility of vapor intrusion into buildings constructed over the plume, are exposure pathways of concern at the site while remediation is ongoing. Nearby residents were provided public water in 1990. All residents using public water are not current users of the contaminated groundwater for potable purposes; therefore direct exposure to site groundwater by current users has been interrupted. Further, a CEA has been established which places restrictions on future well drilling in the affected area which ensures that future use of site groundwater stays an incomplete exposure pathway. The potential for vapor intrusion (VI) into building overlaying the groundwater plumes is the second exposure pathway of interest at the site. Since 2006 several rounds of VI data have been collected in residential and commercial structures within and nearby the site. The most recent 2014 sampling event at five locations shows that indoor air concentrations remain below screening levels for PCE and TCE.

Groundwater cleanup criteria selected at the time of the decision documents were the more stringent of the available State and Federal Maximum Contaminant Levels. The 1988 ROD stated that the objective of the remediation alternatives was to reduce the Site groundwater concentration of TCE to 1 ppb. The document also noted that the remediation objective (i.e., the cleanup goals) for PCE and 1,1-DCE were 1 ppb and 2 ppb, respectively. These cleanup goals remain unchanged. The cleanup goals and remedial action objectives identified in the ROD documents remain valid.

Ecological risks were not evaluated in the RODs because contamination was limited to groundwater. The plume remains bounded and does not impact surface water; therefore this assumption remains valid.

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

There is no information that calls into question the protectiveness of the OU1 and OU2 remedies.

Technical Assessment Summary

According to the reviewed data, the site inspections, the OU1 and OU2 groundwater remedies are functioning as intended by the decision documents.

Issues, Recommendations and Follow-up Actions

There are no significant issues, recommendations, and follow-up actions as a result of this second FYR.

Protectiveness Statement

The remedies at the MTHD and RHMW Superfund sites are protective of human health and the environment.

Next Review

The Third FYR for the Montgomery Housing Township Development and Rocky Hill Municipal Well Sites should be completed five years from the completion date of this review.

FIGURE 1 – SITE LOCATION MAP

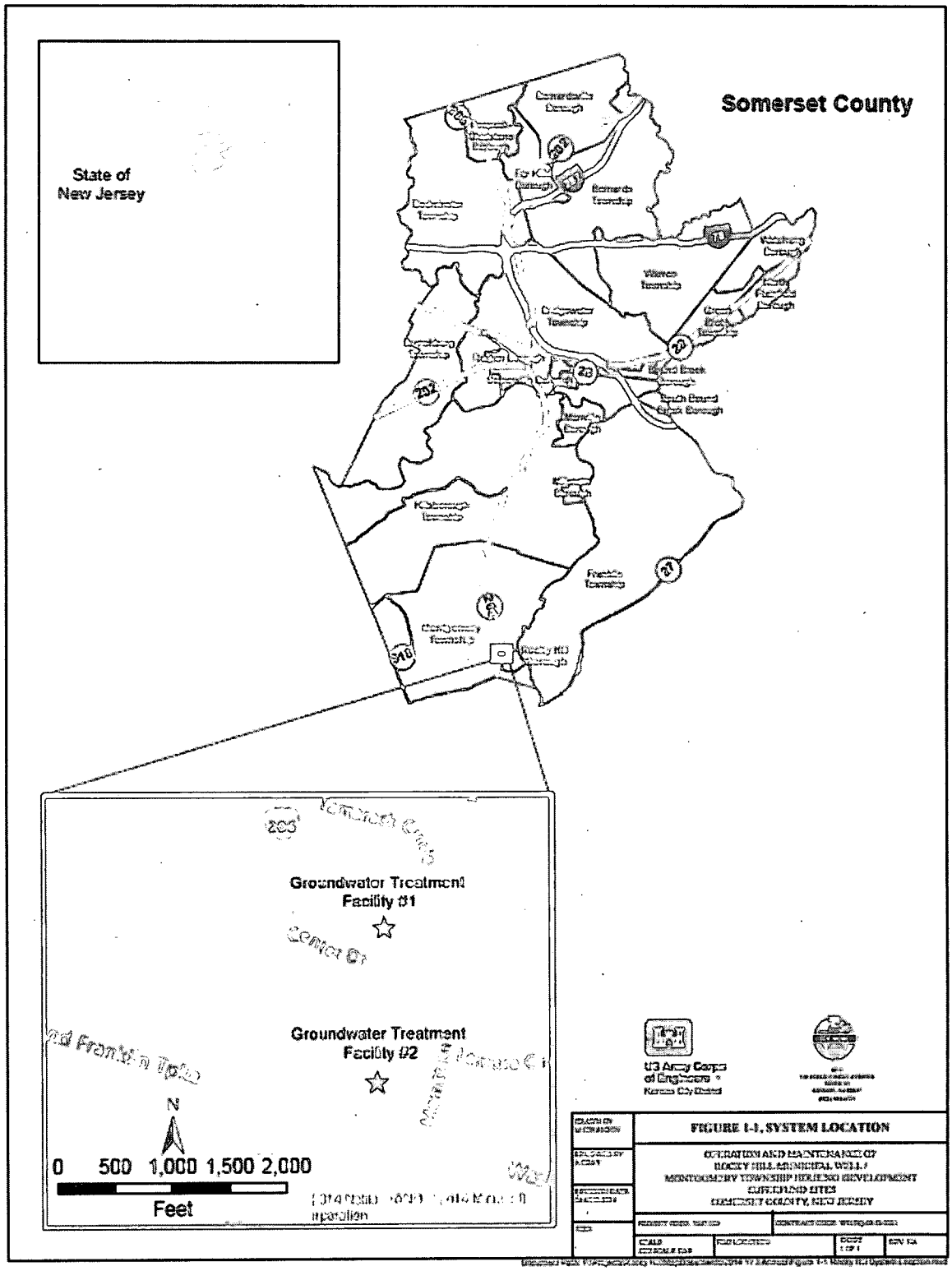

Figure 2 - Monitoring Well Location Map

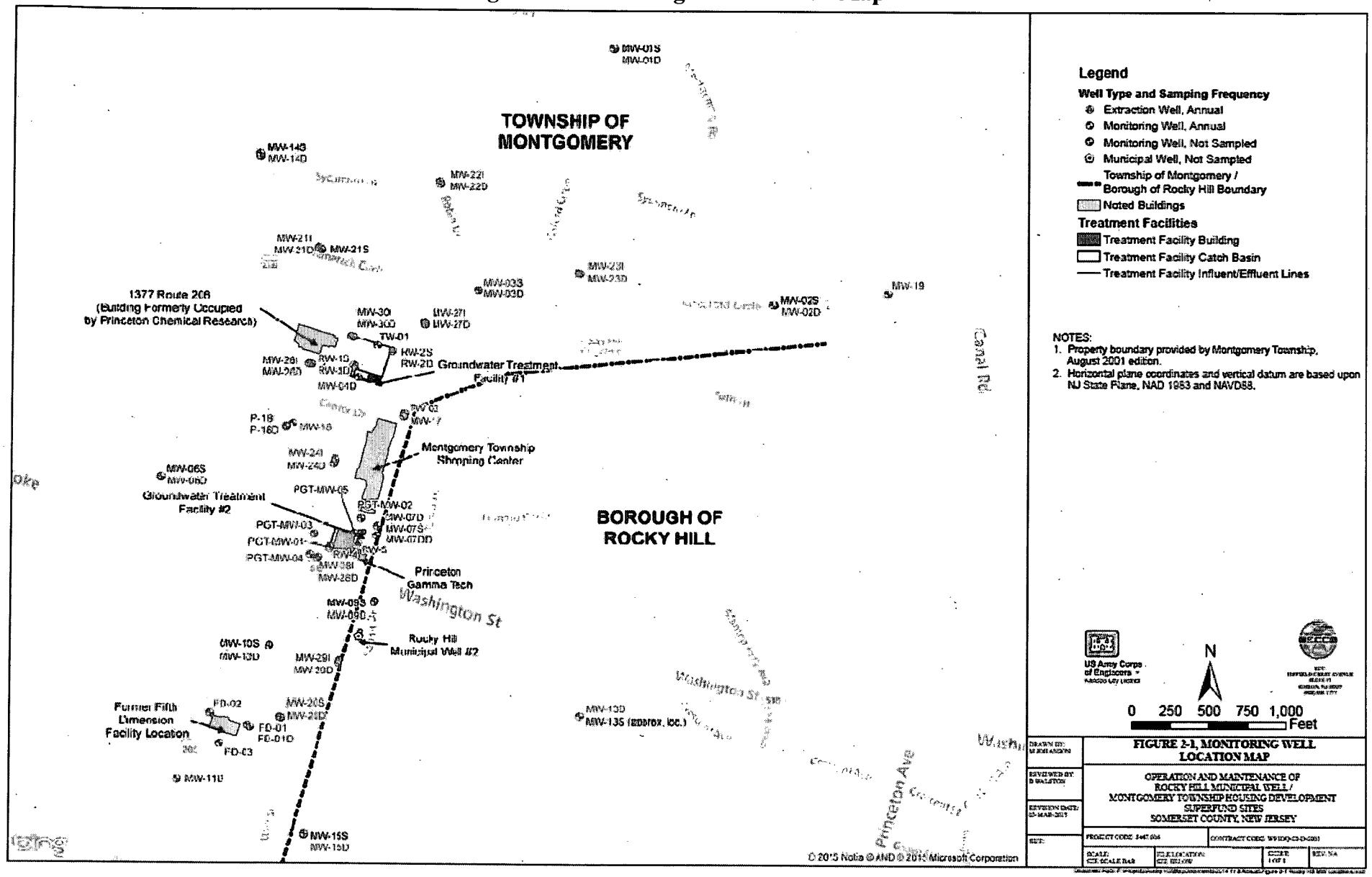

Figure 3 – Site Overview

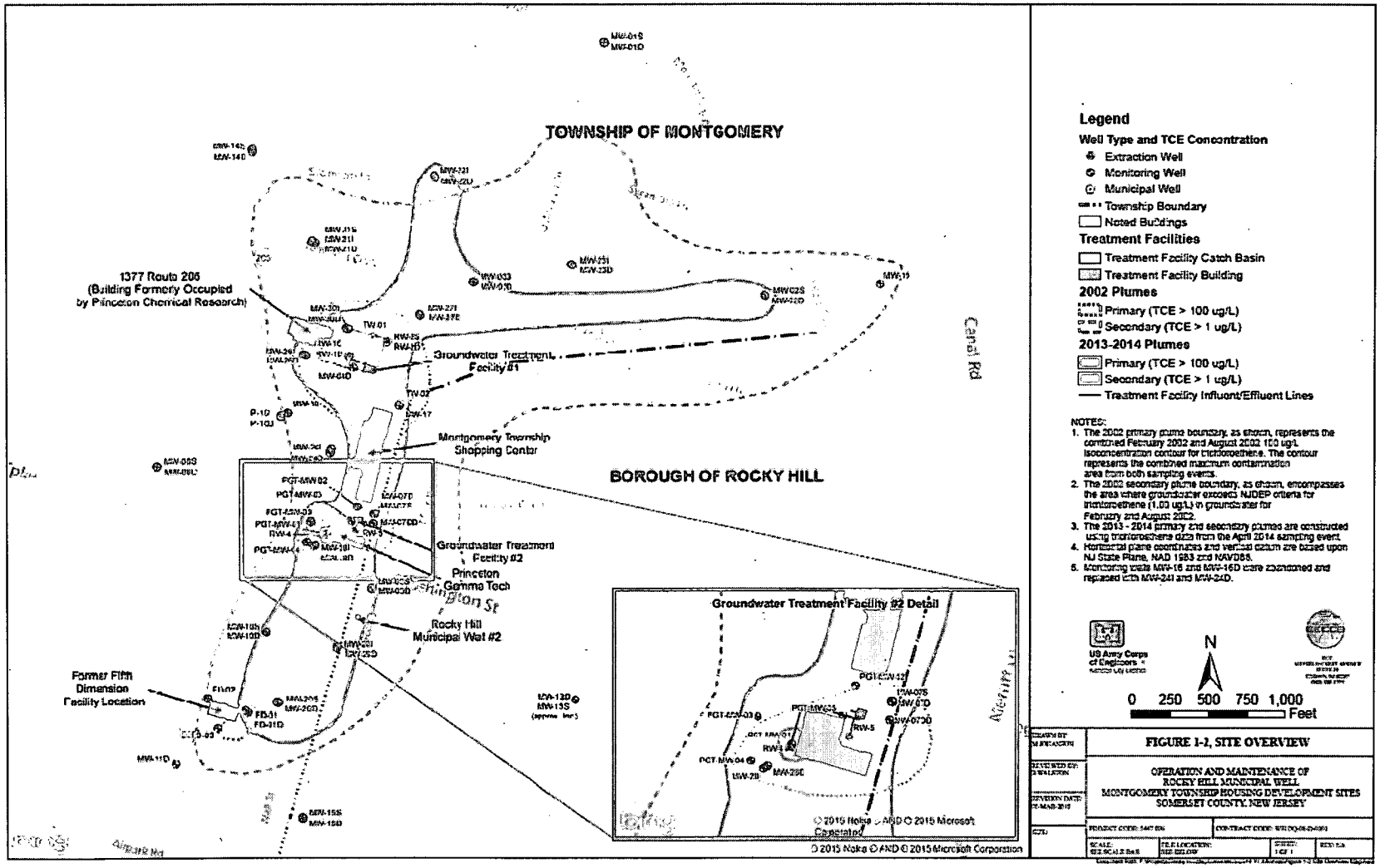

Table 1: Chronology of Site Events

Event/Activity	Date
RHMW Wells 1 and 2 constructed	1936
RHMW Well 1 abandoned and sealed	between 1976 and 1978
RHMW Well 2 closed due to elevated TCE concentrations in groundwater	November 1979
Elizabethtown Water Company installed water lines in MTHD and residents were advised not use well water	March 1981
RHMW Well 2 closed for a second time	January 1982
After the Installation of 2 air stripping units by the borough of Rocky Hill for RHMW Well 2 the well reopened as a potable water source	July 1983
MTHD and RHMW Sites were included on the National Priorities List	September 1983
NJDEP placed a restriction on future well drilling for water supply wells in the area	January 1986
NJDEP entered into a Cooperative Agreement with EPA to perform an RI/FS for the RHMW Site	1984
MTHD OU1 ROD issued	September 1987
NJDEP issued a RI Report	April 1988
MTHD and RHMW OU2 RODs issued	June 1988
Cost Recovery litigation between the PRPs and EPA	1991 – 1999
The lead for the RD and implementation of the remedy for the Site was transferred from NJDEP to EPA	December 1996
EPA performed a limited groundwater investigation to determine current extent of the groundwater plume	January 1998
EPA entered into an interagency agreement with USACE for the completion of RD work	August 1999
RD field work resumed	February 2001
Additional rounds of gw sampling conducted	2002
Completion of RD activities	August 2003
RA WP approved	January 2004
Construction activities of the recovery wells, a number of additional monitoring wells and GWTF #1 and #2 completed	January 2005
14 day pump test completed	January 2005
Final inspection of 2 gw pump and treat plants conducted	February 2005
ESD for OU2 issued	August 2005
Preliminary Site Closeout Report for MTHD and RHMW	August 2005
Final Operation and Maintenance Manual for GWTF #1 and GWTF #2	January 2006
Long-Term Groundwater Sampling Program	Ongoing

Table 2 Documents, Data, and Information Reviewed in Completing the Five-Year Review

Record of Decision for OU1, dated September 29, 1987
Record of Decision for OU2, dated June 30, 1988
RHMW and MTHD Remedial Design, Groundwater Treatment Systems Report, May 2003
Preliminary Closeout Report, August 2005
Explanation of Significant Differences, August 2005
RHMW and MTHD Final Remedial Action Report, September 2005
Groundwater Data Summary for RHMW/MTHD Superfund Sites LTRA, October 2004 – June 2007
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, September 2007
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, March 2008
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, June 2008
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, September 2008
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, December 2008
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, March 2009
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, June 2009
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, September 2009
Five-Year Review Report, April 2010
Annual O&M Report for Reporting period June 2011 – May 2012, LTRA, January 2014
Annual O&M Report for Reporting period June 2012 – May 2013, LTRA, April 2014
Annual O&M Report for Reporting period June 2013 – May 2014, LTRA, April 2015
Annual O&M Report for Reporting period June 2014 – April 2015, LTRA, December 2015
Annual O&M Report for Reporting period June 2014 – April 2015, LTRA, April 2016
Groundwater Data for RHMW/MTHD Superfund Sites LTRA, January 2016

TABLE 3 - GROUNDWATER CONTAMINANT TRENDS

TCE - Maximum Concentrations Detected

Location	ROD Cleanup Standard	2005	2009	2010	2016
Groundwater Treatment Facility #1 (MW-30I)	1.0	9 1.0	2.0	1.0	0.5 U
Groundwater Treatment Facility #2 (PGT MW-01)	1.0	250.0	270 .0	190	140
Secondary Plume (MW-29I)	1.0	140.0	75.0	57	35
Former Fifth Dimension (FD-01D)	1.0	20.0	14.0	13	7.1

All concentrations are in parts per billion (ppb).

TCE Trichloroethene

U Not detected at listed detection limit

PCE - Maximum Concentrations Detected

Location	ROD Cleanup Standard	2005	2009	2010	2016
Groundwater Treatment Facility #1 (MW-04D)	1.0	82.0	29.0	42.0	0.83
Groundwater Treatment Facility #2 (PGT MW-01)	1.0	4.3	4.0	2.0	0.68
Secondary Plume (MW-23D)	1.0	9.0	1.0	12.0	3.4
Former Fifth Dimension (FD-01)	1.0	1.0	0.9	0.18 U	0.5 U

All concentrations are in parts per billion (ppb).

PCE Tetrachloroethene (Perchloroethylene)

U Not detected at listed detection limit