Mohonk Road Industrial Plant Superfund Site

ULSTER COUNTY, NEW YORK

United States Environmental Protection Agency

July 2008

Purpose of Proposed Plan

This Post-Decision Proposed Plan describes the proposed fundamental changes to the March 2000 Record of Decision (ROD) issued by the United States Environmental Protection Agency (EPA) with concurrence by the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) for the Mohonk Road Industrial Plant (MRIP) Site (the Site) located in the towns of Marbletown and Rosendale, Ulster County, New York.

The remedy specified in the ROD required construction and operation of a new public water supply system to supply water to those with impacted or threatened private supply wells, active remediation of contaminated groundwater by extraction and treatment - including continued operation of the groundwater extraction and treatment system installed to address the area around the source (the near-field plume) and installation of a separate extraction and treatment system to address the portion of the groundwater plume downgradient from the source (the far-field plume), additional removal and disposal of contaminated soil, and long-term monitoring of groundwater conditions. EPA has implemented all components of the remedial action specified in the ROD except installation of the far-field plume extraction and treatment system, because EPA no longer believes such an installation is necessary. In this Post-Decision Proposed Plan, EPA is proposing a monitored natural attenuation (MNA) remedy because it will be equally protective of human health and the environment and cost effective.

This Post-Decision Proposed Plan was developed by EPA in consultation with NYSDEC. EPA is issuing this Post-Decision Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended (commonly known as the federal “Superfund” law), and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). EPA encourages the public to review these documents to gain a more comprehensive understanding of the Superfund process.

This Post-Decision Proposed Plan is being provided to inform the public of EPA’s preferred remedy and to solicit public comments pertaining to all the remedial alternatives evaluated. The proposed alternative described in this Post-Decision Proposed Plan is the *preferred* alternative for the Site. Changes to the preferred alternative or a change from the preferred alternative to another remedy may be made if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered because EPA may select a remedy other than the preferred remedy.

Mark Your Calendar

July 7, 2008 – August 6, 2008: Public comment period on the Proposed Plan.

July 17, 2008 at 7:00 P.M.: Public meeting at the Fire House, 1 Fire House Road, High Falls, New York.

COMMUNITY ROLE IN SELECTION PROCESS

EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. Similarly, EPA also relies on public input when proposing fundamental changes to a remedy previously selected. To this end, this Post-Decision Proposed Plan and all reports referenced herein have been made available to the public for a public comment period which begins on July 7, 2008 and concludes on August 6, 2008.

Comments received at the public meeting, as well as written comments received during the public comment period, will be documented in the Responsiveness Summary section of the ROD Amendment, the document which formalizes the selection of the remedy.

Written comments on this Proposed Plan should be addressed to:

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SITE REPOSITORIES

Copies of the Proposed Plan and supporting documentation are available at the following information repositories and website:

Stone Ridge Library
3700 Main Street, P.O. Box 188
Stone Ridge, NY 12484-0188
(914) 687-7023

Hours:
Monday and Wednesday, 1:30 A.M. - 8:00 P.M.
Tuesday, Thursday, and Saturday 10:00 AM - 5:30 PM
Friday 1:30 PM - 5:30 PM

and

Rosendale Library
264 Main Street, P.O. Box 482
Rosendale NY 12472
This information repository contains many of the Site documents, but not the entire Administrative Record (which is available at the Stone Ridge Library).

and

USEPA Region 2
Superfund Record Center
290 Broadway, 18th Floor
New York, NY 10007-1866
Telephone: (212) 637-3000
www.epa.gov/region2/superfund/npl/mohonkroad

Hours:
Monday - Friday, 9:00 A.M. - 5:00 P.M.

SCOPE AND ROLE OF ACTION

The primary objective of this Proposed Plan is to present an Amendment to the ROD for the Mohonk Road Industrial Plant (MRIP) Superfund Site (Site). The remediation goal of the ROD is to eliminate human exposure to groundwater contaminated by the MRIP Site that does not meet state or federal drinking water standards, restore the groundwater contaminated at the Site to drinking water standards, and prevent the contaminated groundwater from spreading and further impacting the aquifer, and eliminate the potential for human exposure to any contaminants in subsurface soils on the MRIP Property or the release of those contaminants into the groundwater.

Prior to the issuance of the ROD, several interim actions had occurred at the Site, including the installation of a groundwater extraction and treatment system to minimize the further migration in the bedrock aquifer of the most highly contaminated portion of the groundwater plume (conducted as a non-time critical removal action [NTCRA]) closest to the MRIP Property.

EPA has implemented the following elements of the ROD:

- construction and operation of a new public water supply system, providing an alternate water supply to those with impacted or threatened private supply wells;
- removal and disposal of contaminated soils which are a source for groundwater contamination;
- active remediation of contaminated groundwater by the continued operation of the groundwater extraction and treatment system to address the near-field plume at the source, and long-term groundwater monitoring; and
- institutional controls preventing future use of the aquifer within the High Falls water District (HFWD) via Ordinances of the Towns of Marbletown and Rosendale prohibiting establishment or maintenance of a source of drinking or domestic water separate from the public water supply of the HFWD.

The ROD also included a separate groundwater extraction and treatment system to address the portion of the plume which is downgradient from the source (the far-field plume). EPA and NYSDEC now believe that this second extraction and treatment system is no longer necessary. With the construction of the public water supply system, human health risks are controlled. The removal of potential sources, the continued operation and maintenance (O&M) of the existing groundwater extraction and treatment system, and the reduction of contamination within the near-field plume have significantly reduced the migration of contaminants from the Site. Over the last several years, EPA has performed extensive monitoring of the far-field plume and conducted an investigation to evaluate potential vapor intrusion. Evaluations of monitored natural attenuation (MNA) as a remedy for the far-field plume suggest that MNA is a viable alternative to groundwater extraction and treatment within the far-field plume.

EPA has developed this proposed plan to evaluate the following three alternatives for the far-field groundwater remedy for this Site: (1) No Further Action, (2) Groundwater Extraction and Treatment (the remedy selected in the ROD for the far-field plume), and (3) MNA/Long-term Monitoring.

SITE BACKGROUND

Site Description

The MRIP Site is located in the Hamlet of High Falls, Ulster County, New York, approximately seven miles north-northwest of the Village of New Paltz and ten miles south-southwest of the City of Kingston. High Falls is situated within two townships; the Towns of Marbletown and Rosendale (see Figure 1). The Site includes a facility located at 186 Mohonk Road (the MRIP Property), and all surrounding properties that have been impacted by the contaminated groundwater plume. Residents and businesses within the area are now obtaining their potable water from the High Falls Water District, a publicly-operated water supply system.

The MRIP Property originally consisted of approximately 14.5 acres of mostly undeveloped land, with a 43,000-square-foot building in its southern corner. As part of the water supply remedy, consistent with the ROD, 6.9 acres of the northern property were conveyed by the Kithkin Corporation on August 19, 2005 to the High Falls Water District. This northern portion of the property is now the location of the High Falls Water District's drinking water treatment plant.

The Site-related groundwater plume extends approximately 4,000 feet downgradient from the MRIP Property, and had adversely impacted at least 75 residential and commercial water supply wells. The "near-field plume" as historically defined in the ROD refers to that portion of the groundwater plume with total volatile organic compound (VOC) concentrations greater than 1,000 parts per billion (ppb), while the "far-field plume" refers to the component of the groundwater plume between 10 ppb and 1,000 ppb total VOCs. Figure 3 depicts the current extent of the plume boundary to the 5 ppb total VOC concentration. The entire near-field plume is currently within the estimated capture zone of the existing groundwater pumping and treatment system.

CONTAMINANTS of CONCERN (COCs)

As a result of the historic use of solvents and other chemicals at the MRIP Property, Site groundwater contains contaminants known as volatile organic compounds (VOCs). The contaminants of concern (COCs) specifically identified as a result of investigations at this site include the following:

- **trichloroethene (TCE)** - an industrial solvent
- **1,1,1-trichloroethane (TCA)** – an industrial solvent, the contaminant typically found in highest concentrations at the site
- **1,1-dichloroethane (DCA)** – a breakdown product of TCA
- **1,1-dichloroethene (DCE)** – a breakdown product of TCA
- **1,4-dioxane** - a stabilizer associated with TCA

The NYS Maximum Contaminant Level (MCL) for TCE, TCA, DCA, and DCE is 5 ppb, while the MCL for 1,4-dioxane is 50 ppb.

Site Geology/Hydrogeology

Three distinct water bearing zones have been identified at the Site, including an overburden (till) flow zone, a bedrock interface flow zone (at the shallow soil/bedrock interface), and a bedrock flow zone (the bedrock aquifer). The till, which dominates in the vicinity of the Site, is a highly compacted silt and fine-grained sand matrix and does not transmit water readily.

Regional groundwater flow is controlled by the structural geology of the area and is dominated by the orientation of the fractures within the bedrock aquifer. Groundwater flow is primarily to the north-northeast with localized variations to the west and east towards Rondout Creek and Coxing Kill Creek. Downhole geophysical investigations identified water-producing fractures with thin beds of finer-grained material throughout the vertical extent of the bedrock aquifer at depths ranging from approximately 20 to 194 feet below the ground surface (bgs).

Vertical flow gradients on the MRIP Property are clearly downward. However, artesian or upward groundwater flow has been reported in several residential wells and multi-level monitoring wells outside of the MRIP Property.

The MRIP Property is situated near a topographical high that serves as a recharge area for the bedrock aquifer. The remedial investigation (RI) concluded that contamination entered the bedrock groundwater near the former septic tank and spread northward from the MRIP Property in the bedrock aquifer. In the vicinity of the near-field groundwater extraction and treatment system, active pumping of groundwater from the bedrock is resulting in the capture of a significant portion of the groundwater contaminated with VOCs.

Site History

The MRIP Property had been used for industrial purposes since the early 1960s. These activities included metal finishing, wet spray painting, and manufacturing of store display fixtures, card punch machines, and computer frames. Wastes from these operations were typically discharged into a septic tank on the property.

The Site first came to the attention of state and local authorities in April 1994, when a resident near the MRIP Property contacted the Ulster County Health Department (UCHD) regarding the quality of her drinking water. The resident's well was sampled in April 1994 by UCHD, and the sample was found to contain levels of VOCs above federal and/or NYS MCLs for drinking water. Subsequent sampling performed by UCHD identified 70 other homes or businesses downgradient of the Site with VOCs above the aforementioned standards for drinking water. As an interim action to address immediate health threats, NYSDEC installed point-of-entry treatment (POET) systems at homes or businesses whose potable water supply exceeded the NYS MCLs (5 ppb) for the individual VOCs. These systems included particulate filters, granular activated carbon (GAC) for VOC removal, and ultraviolet (UV) oxidation for disinfection. Monitoring of private wells on the perimeter of the plume was instituted to ensure that impacts to previously unaffected private wells downgradient of the Site would be addressed. As a result of the ongoing monitoring program, five additional homes and businesses were ultimately supplied with POET systems. In 1994, NYSDEC placed the Site on the NYS Registry of Inactive Hazardous Waste Sites, indicating that the Site posed a significant threat to public health and the environment.

In the fall of 1996, NYSDEC assessed subsurface conditions within five suspected disposal areas. Investigations included geophysical surveys, soil gas screening, soil borings, and monitoring well installation. Samples of surface soils, subsurface soils, groundwater, soil vapor, and water and sludge samples from within an abandoned 1,000-gallon septic tank located north of the MRIP building, were collected. Two sources of VOC contamination were identified on the MRIP Property, including (1) subsurface soil beneath the gravel driveway at the western end of the MRIP building, and (2) the abandoned septic tank (see Figure 2). Additionally, VOC concentrations above MCLs were detected in groundwater.

Based on this investigation, NYSDEC initiated an RI in 1997 to characterize the nature and extent of groundwater contamination. The RI results indicated that VOC contamination, including PCE, TCE, TCA, DCE, DCA, ethylbenzene, and xylenes, existed in soils at the MRIP Property; the dissolved-phase groundwater VOC plume was found to extend approximately 4000 feet north-northeast from the MRIP Property; and downgradient private water supplies, as well as groundwater in the bedrock aquifer beneath the MRIP Property, exhibited VOC concentrations above EPA Removal Action Levels, federal and NYS MCLs, and NYSDEC Class GA Drinking Water Standards. During the RI, the abandoned septic tank, its contents, and 25 tons of surrounding contaminated soil were excavated and removed from the Site.

Additionally, 1,4-dioxane, a stabilizer associated with TCA, was detected at the MRIP Property at concentrations above the 10 NYCRR Part 5 standard of 50 ppb for “unspecified organic contaminants” (which includes 1,4-dioxane). Sampling of private wells indicated that 1,4-dioxane was present at concentrations ranging from 2 to 96 ppb. NYSDEC provided bottled water for two residences which exceeded only this standard until the 1,4-dioxane levels fell below the 50 ppb level.

The Site was added to the National Priorities List (NPL) on January 19, 1999. NYSDEC released a feasibility study (FS) which evaluated cleanup alternatives for the entire Site in March 1999, and a proposed plan in November 1999. Public comments were accepted from November 15, 1999 through March 15, 2000. EPA assumed the role as lead agency with the issuance of the ROD in March 2000.

The major components of the selected remedy documented in the ROD are:

- construction of a new public water treatment plant and distribution system to serve the proposed water service area in High Falls;
- extraction of groundwater on and off the MRIP Property, with treatment via air stripping and GAC; and
- excavation of approximately 500 cubic yards (CY) of contaminated soils on the MRIP Property and disposal off-Site.

On June 4, 1999, EPA authorized a NTCRA consisting of the construction of the near-field groundwater extraction and treatment system designed to minimize the further migration of the most highly contaminated portion of the groundwater plume within the bedrock aquifer. The groundwater extraction and treatment plant began operating 24 hours a day, seven days a week in May 2000. As of December 2007, over 46.6 million gallons of contaminated groundwater have been extracted and treated via this system.

Additional removal and disposal of contaminated soils was performed based on data collected by NYSDEC during the RI and by EPA during the NTCRA, and as prescribed by the ROD. The four areas shown in Figure 2 were identified as requiring soil cleanup. EPA excavated and disposed of a total of 2,036 tons of contaminated soil, paint waste and debris from these areas.

In addition, COCs were found in soil gas immediately north of the commercial building on the MRIP Property. An 18-well soil vapor extraction (SVE) system was installed in 2007. The SVE system has been fully operational since February 2008.

In February 2005, EPA initiated an investigation to determine if subsurface contamination originating from the MRIP Property may put nearby residents at risk due to vapor intrusion of VOCs into homes. Permanent sub-slab soil gas sampling ports were installed in 34 residential and 9 non-residential locations, with soil gas samples collected and analyzed for VOCs. The sampling determined that the concentrations of VOCs at all residential locations were below the health-based screening levels. Therefore, no further evaluation and/or action were deemed necessary. However, samples obtained in the commercial building on the MRIP Property indicated the need to install a vapor mitigation system. In early 2007, six new sub-slab ventilation systems were installed, with extraction points in the subsurface layer underneath the building’s concrete floor. These mitigation systems are currently operating as designed.

The construction of the water treatment plant and water distribution system called for in the ROD began in the fall of 2005 and was completed in the fall of 2007. The water treatment plant and accompanying water tower occupy approximately seven acres of land in the northern section of the MRIP Property (see Figure 2). The system is connected to the pressurized Catskill Aqueduct, which is part of the New York City reservoir system. Stringent sampling and monitoring is conducted to verify that the treated water meets all federal and NYS drinking water standards. NYSDOH certified the newly constructed High Falls Water Treatment Plant as operational on September 24, 2007. Connection of homes and businesses within the water district to the public water supply was completed in November 2007. The MRIP building at 186 Mohonk Road was also connected to public water supply. Concurrently, POET systems were removed, associated well lines were capped, and well pumps' piping and power were disconnected. An ordinance within the High Falls Water District prohibits residents from establishing or maintaining a source of drinking and domestic water separate from the public water supply, yet allows existing separate water sources to be used for purposes other than drinking and domestic use.

In 2006, an evaluation of the potential for MNA for the far-field plume, based on groundwater monitoring data collected on a semi-annual basis from 1999 through April 2006 was performed. In April 2008, EPA obtained an update to the 2006 MNA assessment. These reports conclude that MNA is a viable remedy for the far-field plume. Monitoring data indicate groundwater contaminant concentration trends are either decreasing or stable (see Figure 4), and exhibit the presence of the full range of TCA breakdown products within the far-field plume and/or wells bounding the far-field plume.

SUMMARY OF GROUNDWATER CONDITIONS

Site investigations have indicated that groundwater in the bedrock aquifer is contaminated with various VOCs, including TCA, TCE, DCE, and DCA, above Federal and NYS MCLs. A plume with a total VOC concentration of at least 5 ppb extends a distance of approximately 4000 feet from the MRIP Property and covers an area of roughly 170 acres. Since the discovery of the Site in 1994, residential wells beyond the perimeter of the plume have been monitored to verify that the water in these wells was suitable for domestic use.

From 1996 to 1998, NYSDEC installed 22 monitoring wells - including two in the overburden (MW-9 and -11), five in shallow soil/bedrock (MW-1 through -5), and thirteen in bedrock (MW-1B, -5B through -15B, and -11C), installed two bedrock extraction wells (MW-5R and -7R), and performed six rounds of groundwater sampling. The RI concluded that contamination entered the bedrock groundwater near the former septic tank and spread northward from the MRIP Property in the bedrock aquifer. The most concentrated portion of the VOC plume was detected in wells near the former septic tank. In November 1996, a groundwater sample from shallow soil/bedrock well MW-4 was found to contain 87,000 ppb of TCA, 10,000 ppb of DCE, 6,700 ppb DCA, and 3,300 ppb of TCE. Subsequent rounds of sampling confirmed levels of these VOCs above MCLs, and although levels decreased significantly after NYSDEC removed the tank in August 1997, the levels of VOCs remained elevated well above MCLs at the time of the ROD. Samples from the nearest downgradient bedrock monitoring well, MW-5B, also contained levels of TCA, DCA, DCE and TCE above MCLs, with the total VOC levels consistently greater than 1,000 ppb during the RI. At the time of the ROD, contaminant levels in MW-5B had not appreciably decreased.

As part of the NTCRA, EPA installed four additional bedrock wells on the MRIP Property (ERT-1 through ERT-4). Sampling results from these wells confirmed VOC concentrations were above MCLs on the MRIP Property, and ERT-4, the well closest to the location of the former septic tank, had the highest VOC total (an estimated total of 7,510 ppb TCA, DCA, DCE and TCE in October 1999).

Monitoring well data indicated that upon release into the overburden, contaminants migrated downward into the bedrock aquifer without significant lateral movement. Monitoring wells located upgradient of the MRIP Property have not been found to contain TCA or other VOCs at concentrations above MCLs.

From 2004 through 2007, 1,4-dioxane has been detected in well ERT-3 on the MRIP Property at concentrations ranging from 30 to 83 ppb. The highest concentration of 1,4-dioxane detected in the far-field monitoring wells has been 18 ppb at MW-17-1, with levels at non-detect or near non-detect (2 ppb) in the far down-gradient wells (Sevenson 2008). Concentrations in residential wells are presently below the 10 NYCRR Part 5 Unspecified Organic Compound standard of 50 ppb. With the present far-field concentrations below the NYSDEC cleanup level and the relatively low near-field concentrations, it is likely that natural attenuation physical processes which were identified in the 2008 MNA evaluation will continue to reduce 1,4-dioxane concentrations in the far-field to below the NYSDEC cleanup level.

Groundwater elevation level measurements have typically been recorded from 15 residential and Site-related monitoring wells every two weeks for the last eight years in order to evaluate regional drawdown due to the groundwater extraction system and to ensure continued water supply to nearby residential wells, avoiding drawing water levels below the intake of the well pumps. Historically, the hydraulic gradient has been impacted by the operation of the near-field groundwater extraction and treatment system and slow groundwater recharge in the area. The completed public water system has resulted in the termination in pumping of private wells in the area of groundwater contamination. Monitoring of water levels continued after the residential wells were disconnected in

November 2007; an updated groundwater contour map is provided as Figure 3. A new monitoring well fitted with several ports to enable groundwater sample collection from different bedrock zones will soon be installed approximately 2000 feet east-northeast of the MRIP Property to assist in evaluating conditions along the eastern edge of the plume.

Historically, the 25 monitoring wells associated with the Site have been sampled every six months in order to track the migration of the contaminant plume. Quarterly O&M reports for the near-field system have included the results of all monitoring well and residential well sampling. Since the disconnection of the residential wells in November 2007, sampling and analyses were performed in December 2007 and April 2008; Table 1 provides the December 2007 analytical results. The extent and concentration levels of the bedrock groundwater contamination are depicted in Figure 3; Figure 4 presents total VOC concentration trends in several source (near-field), mid-plume, and far-field wells. The December 2007 VOC data indicate the limits of the plume are generally defined in all directions (Figure 3). Downgradient residential wells provide no suggestion of increasing trends in any of the contaminants. All wells in the far-field plume with statistically significant trends show decreasing contaminant concentrations. The increased extraction rates of the near-field treatment system and the additional source removal anticipated with the SVE system operation increase the likelihood that the plume margins will shrink in the future.

Groundwater quality monitoring of the Site has been an ongoing biannual effort at most of the 25 monitoring wells in the network since 1999. Sampling and analysis for MNA parameters began at most of the monitoring wells in April 2006 and has continued biannually. In order to obtain sufficient data to complete a full MNA evaluation of the current plume, the monitoring wells have been sampled on a quarterly basis since December 2007 for VOCs and 1,4-dioxane, along with standard field monitored parameters. The most recent monitoring well sampling event was performed in April 2008.

The 2008 MNA evaluation verified that the Site chemical and geochemical data show definitive evidence for biological activity supporting reductive dechlorination of TCA and TCE, including:

- Decreasing contaminant concentrations in the near-field plume;
- Stable and low or non-detectible contaminant concentrations in the far-field plume;
- The full range of TCA breakdown products have been detected in the far-field plume and/or the wells bounding it;
- Presence of reducing conditions bounding the plume in the far-field plume; and
- Presence of reducing conditions in localized areas in both the near- and far-field plumes.

Sampling for VOCs and 1,4-dioxane along with standard field monitored parameters will be continued quarterly. Water level data will continue to be collected and carefully monitored to ensure that analytical samples and natural attenuation data are sufficient to confirm that the near-field plume is under hydraulic control.

SUMMARY OF SITE RISKS

The purpose of the following summary of the risk assessment is to identify potential cancer risks and non-cancer health hazards at the Site assuming that no further remedial action is taken. A risk evaluation was performed to evaluate future health risks associated with exposure to contamination at the Site based on current (2007) Site data.

Human Health Risk Assessment

As part of the 1999 RI/FS, a baseline human health risk assessment (BHHRA) was conducted to estimate the risks associated with the current and future effects of contaminants on human health and the environment. A baseline human health risk assessment is an analysis of the potential adverse human health effects caused by hazardous-substance exposure in the absence of any actions to control or mitigate these under current and future land uses. A four-step human health risk assessment process was used for assessing Site-related cancer risks and non-cancer health hazards. The process includes: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment, and Risk Characterization (see following box "What is Risk and How is it Calculated").

In the BHHRA conducted as part of the RI, unacceptable cancer risks and non-cancer hazards were identified based on soil contact and potential future use of groundwater as a potable drinking water supply.

EPA recently sampled monitoring wells that are outside of the capture zone of the current groundwater remedy. These wells are in place to monitor levels of contamination that are not being addressed by the current pump-and-treat system and will continue to migrate. These wells have been sampled and the results indicate that Site-related contaminants are in the groundwater above MCLs. In 2008, a new risk evaluation was performed on these contaminants, with a focus on TCE. EPA's statistical evaluation of the TCE in groundwater, if used as a potable drinking water source for residents in the future, would result in an excess lifetime cancer risk of 3×10^{-5} (3 in one hundred thousand). All non-cancer health hazard estimates are within the acceptable limits. In addition, concentrations of 1,1-DCE, 1,1-DCA, 1,1,1-TCA, and

WHAT IS RISK AND HOW IS IT CALCULATED?

Human Health Risk Assessment

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current- and future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (i.e., soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants in air, water, soil, etc. identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a “reasonable maximum exposure” scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a “one in ten thousand excess cancer risk”; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one in ten thousand to a one in a million excess cancer risk. For non-cancer health effects, a “hazard index” (HI) is calculated. The key concept for a non-cancer HI is that a “threshold” (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a non-cancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at the site and are referred to as Chemicals of Concern or COCs in the final remedial decision or Record of Decision.

TCE exceeded their respective MCLs in 88% of the samples (21 of 24).

These calculated risks to human health require EPA to evaluate remedial measures to reduce the potential for exposure and risks associated with the observed contamination and restore the groundwater to beneficial use.

In February 2005, EPA initiated an investigation to determine if subsurface contamination originating from the MRIP Property may put residents at risk via vapor intrusion. Permanent sub-slab soil gas sampling ports were installed in 34 residential and 9 non-residential locations, with soil gas samples collected and analyzed for VOCs. The sampling determined that the concentrations of VOCs at all residential locations were below the health-based screening levels. Therefore, no further evaluation and/or action were deemed necessary.

However, samples obtained in the commercial building on the MRIP Property indicated the need to install a vapor mitigation system. In early 2007, six new sub-slab ventilation systems were installed in the subsurface underneath the building’s concrete floor. These mitigation systems are currently operating as designed.

Ecological Risk Assessment

The purpose of an ecological risk assessment (ERA) is to provide a baseline evaluation of the nature and geographical extent of possible ecological risks based on current environmental conditions. During the RI, a Fish and Wildlife Impact Assessment performed during the RI identified no threatened or endangered birds, mammals, reptiles, amphibians, fish, or invertebrates within the Site area and no currently existing pathways for significant exposures to fish or wildlife to Site-related contaminants. The study concluded that no further study of fish and wildlife resources was necessary at that time.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals established to protect human health and the environment. RAOs are based on available information and regulatory standards, such as applicable or relevant and appropriate requirements (ARARs), NYSDEC’s soil cleanup objectives, Site-specific risk-based levels, and the reasonably anticipated future land use for the MRIP Property, i.e., commercial development.

The RAOs developed during the FS for soil and groundwater were designed, in part, to mitigate the health threats posed by ingestion and inhalation (through showering) of groundwater and contact with soils. The following RAOs were established in the ROD:

- Eliminate inhalation and ingestion of, and dermal contact with, contaminated groundwater associated with the Site that does not meet State or Federal drinking water standards.
- Restore the bedrock aquifer to its most beneficial use (i.e., as a source of potable water), and restore it as a natural resource.
- Prevent or minimize cross-media impacts from COCs in contaminated soil to the underlying groundwater, which will also eliminate potential future exposure to this soil. Site soil cleanup objectives for COCs would be based on NYSDEC's TAGM 4046 for groundwater protection.
- Eliminate further off-MRIP Property contaminated bedrock groundwater migration.

The selected remedy included:

- Continued O&M of POET systems at homes and businesses adversely impacted by the VOC plume until the construction and operation of a new public water supply system provides an alternate water supply;
- Active remediation of contaminated groundwater by the continued operation of the existing extraction and treatment system to address the near-field plume at the source;
- Removal and disposal of additional contaminated soils which were a source for groundwater contamination;
- Installation of a separate extraction and treatment system to address the portion of the far-field plume, and long-term groundwater monitoring; and
- Institutional controls to prevent future use of the bedrock aquifer within the impacted or threatened area (i.e., within the HFWD)

Since the development of the RAOs, approximately 2,567 tons of contaminated soil has been removed from source areas at the MRIP Property; the septic tank, believed to be the primary source of Site contamination, was excavated along with approximately 25 cubic yards (CY) of associated soil in September 1997. These remedial activities meet the intent of the soil RAO described above.

Homes and businesses with impacted water supplies were provided with POET systems until their connection to the newly constructed High Falls Water District public water supply system; local regulations currently mandate connections to this system within the Water District. Additionally, sub-slab vapor mitigation systems have been installed to address vapor intrusion at the MRIP commercial building at the Site. These remedial activities have eliminated the groundwater exposure pathway, and their continuance meets the intent of the associated RAO.

A groundwater extraction and treatment system was installed within the near-field plume, and has been operating 24 hours a day since May 2000. Groundwater monitoring in the vicinity of the former septic tank has shown reductions of total VOC concentrations, and Site-wide groundwater monitoring has shown groundwater quality has improved over the last several years. The continued control and remediation of groundwater via the operation of the groundwater extraction and treatment system at the MRIP Property is reducing off-MRIP Property migration within the near-field plume.

Current contaminant trends and water quality parameters indicate that MNA, in conjunction with the currently active remedies, are expected to be adequate in remediating the far-field plume without a far-field pump and treat system. In addition, recent increases in the extraction rates for the near-field groundwater extraction and treatment system also provides support for MNA as an effective remedial approach for the far-field plume. As a result, EPA has decided to reevaluate the active groundwater extraction and treatment remedy for the far-field plume specified in the ROD, leading to this Post-Decision Proposed Plan.

Since it remains a part of the overall remedy for groundwater, the continued operation of the existing groundwater treatment system will be included under each of the remedial alternatives evaluated herein. Accordingly, the RAOs established for this evaluation are the following:

- Restore the bedrock aquifer to its most beneficial use (i.e., as a source of potable water), and restore it as a natural resource.
- Eliminate further off-MRIP Property contaminated bedrock groundwater migration.

SUMMARY OF REMEDIAL ALTERNATIVES FOR FAR-FIELD GROUNDWATER

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with ARARs, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The alternatives for addressing groundwater contamination are provided below and are identified as GW-1, GW-2, and GW-3. Consistent with EPA guidance documents concerning ROD Amendments, the components of the original remedy proposed for amendment have been updated for cost and are compared to a new preferred alternative which was developed based upon existing Site circumstances. For all alternatives, the near-field pumping and treatment system will continue to operate. Additionally, each alternative assumes that compliance with local regulations requiring property owners within the High Falls Water District to receive their domestic water supply from the High Falls Water Supply System will continue to be employed, preventing future use of the bedrock aquifer in the impacted or threatened area. The groundwater remedial alternatives are:

Alternative GW-1: No Further Action

The Superfund program requires that the "No Further Action" alternative be considered as a baseline for comparison with the other alternatives.

Under this alternative, EPA would take no further action within the far-field plume to prevent migration of or exposure to groundwater contamination. While the operation of the current near-field groundwater extraction and treatment system would be continued, the groundwater monitoring program would be discontinued. As a result, EPA would be unable to determine if contaminants were migrating within groundwater or from groundwater to surface water or the extent to which natural attenuation was occurring. EPA would also be unable to assess source contaminant elimination beyond the evaluation of information inherent in operating the existing system.

Capital Cost	$0
O & M Cost	$375,360 near-field system O&M
Present Worth Cost	$4.7 million
Construction Time	Not Applicable
Duration	Not Applicable

Because this alternative would result in contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, CERCLA requires that the Site be reviewed at least once every five years.

Alternative GW-2: Groundwater Extraction and Treatment / Long Term Monitoring

Under this alternative, the far-field component of the groundwater remedy established in the ROD would be implemented, specifically the installation of a second groundwater extraction and treatment system off the MRIP Property. The system's design would be similar to the existing groundwater extraction and treatment system, and would include a long-term monitoring component. The continued operation of the existing groundwater extraction and treatment system would control and remediate groundwater in the vicinity of the MRIP Property. This remedy would result in achievement of an unlimited use and unrestricted exposure scenario. Achievement of this result would require longer than five years. In accordance with CERCLA, a remedy review would be conducted at least every five years until such time that the Site allows for unlimited use and unrestricted exposure.

Cleanup levels would be based on Federal and NYS MCLs. The extraction wells would be designed to operate at an optimal rate to collect contaminated groundwater, intercept the contaminant plume, and prevent any potential migration downgradient. For the purposes of conceptually identifying the number of wells, pumping rates, and well locations, the same assumptions made in the ROD (based on groundwater modeling performed during the FS) were assumed, specifically three wells pumping at a rate of 40 gallons per minute (gpm) each for approximately 30 years, to effectively capture the contaminants in the interior of the plume. Optimal design parameters and a more refined estimate of the time required to remediate the aquifer would be developed during the remedial design phase.

Contaminated groundwater would be pumped from the extraction wells to an air stripper for VOC removal. Pretreatment of the groundwater would be necessary to remove conventional contaminants such as iron and manganese (which may foul treatment plant equipment) and in order to meet surface water discharge limits. For cost estimating purposes, it was assumed that treated groundwater for the new groundwater treatment plant would be discharged to the Rondout Creek via a gravity discharge line. Effluent criteria would be based on State regulatory standards under the State Pollutant Discharge Elimination System (SPDES) program and obtained from NYSDEC. The treatment process would produce precipitate, which would be thickened and disposed of off-Site periodically following pre-disposal characterization; for cost estimating purposes, it was assumed that this precipitate would be disposed of as non-hazardous waste at a local landfill.

Capital Cost	$5.44 million
O & M Cost (annual)	$375,360 near-field system O&M $375,360 far-field system O&M $241,088/yr LTM years 1-5 $222,240/yr LTM years 6-10 $164,096/yr LTM years 11-30
Present Worth Cost	$17.4 million
Construction Time	12 months
Duration	30 years

Long-term groundwater monitoring (as described for GW-3) would be conducted during the active remediation phase to assess the effectiveness of the groundwater extraction and treatment system. Periodic evaluations of the groundwater monitoring data would be used to evaluate the continued operation of the groundwater extraction and treatment systems. During the implementation of the remedy, the appropriateness of the monitoring well network with respect to the plume would be assessed as the plume is further refined. Potential modifications to the network would include the abandonment and/or installation of monitoring wells as necessary to support the selected remedy. In addition, periodic monitoring of the sub-slab ventilation system within the MRIP building would be performed to evaluate the effectiveness of the system. This evaluation would be conducted during the annual groundwater monitoring event, at a minimum.

Alternative GW-3: MNA/Long-Term Monitoring

Under this alternative, VOCs within the far-field plume would be allowed to attenuate via naturally occurring processes within and along the perimeter of the far-field plume. The continued operation of the existing groundwater extraction and treatment system would control and remediate groundwater in the vicinity of the MRIP Property. A long-term groundwater monitoring and data evaluation program would be implemented to monitor the groundwater contaminant concentrations and reduction of VOC concentrations over time and to confirm that the remedy remains protective. Cleanup levels would be based on Federal and NYS MCLs; these levels are estimated to be achieved in approximately 30 years. In addition, periodic monitoring of the sub-slab ventilation system within the MRIP building would be performed to evaluate the effectiveness of the system. This evaluation would be conducted during the annual groundwater monitoring event, at a minimum.

Capital Cost	$12,720
O & M Cost (annual)	$375,360 near-field system O&M $241,088/yr LTM years 1-5 $222,240/yr LTM years 6-10 $164,096/yr LTM years 11-30
Present Worth Cost	$7.23 million
Construction Time	Not Applicable
Duration	30 years

Long-term monitoring would include periodic recording of groundwater elevations, recording of water quality parameters, and collection and analysis of groundwater samples to provide an indication of the movement of the contaminants or of the progress of remedial activities. Quarterly monitoring would include wells representative of background conditions, horizontal and vertical plume boundaries, and the center of the plume, and include sentinel wells along the established perimeter. The annual monitoring event would include additional wells in the monitoring well network to refine contaminant distribution within the plume and to confirm conditions beyond the plume boundary.

Table 1 presents the monitoring wells expected to be initially included in the long-term monitoring well network. During the implementation of the remedy, the appropriateness of the monitoring well network with respect to the plume will continually be evaluated as the plume is further refined. Potential modifications to the network would include the abandonment and/or installation of monitoring wells as necessary to support the selected remedy. Under this alternative, additional monitoring wells would be installed, as necessary, to allow for comprehensive monitoring of the contamination.

This remedy would result in achievement of an unlimited use and unrestricted exposure scenario. Achievement of this result would require longer than five years. In accordance with CERCLA, a remedy review would be conducted at least every five years until such time that the Site allows for unlimited use and unrestricted exposure.

WHAT IS MONITORED NATURAL ATTENUATION?

Natural attenuation relies on natural processes to clean up or *attenuate* pollution in soil and groundwater. Natural attenuation occurs at most polluted sites. However, the right conditions must exist underground to clean sites properly. If not, cleanup will not be quick enough or complete enough. Scientists *monitor* or test these conditions to make sure natural attenuation is working. This is called *monitored natural attenuation* or MNA.

HOW DOES IT WORK?

When the environment is polluted with chemicals, nature can work in four ways to clean it up:

1. Tiny bugs or *microbes* that live in soil and groundwater use some chemicals for food. When they completely digest the chemicals, they can change them into water and harmless gases. (*A Citizen's Guide to Bioremediation* [EPA 542-F-01-001] describes how microbes work.)
2. Chemicals can stick or *sorb* to soil, which holds them in place. This does not clean up the chemicals, but it can keep them from polluting groundwater and leaving the site.
3. As pollution moves through soil and groundwater, it can mix with clean water. This reduces or *dilutes* the pollution.
4. Some chemicals, like oil and solvents, can *evaporate*, which means they change from liquids to gases within the soil. If these gases escape to the air at the ground surface, sunlight may destroy them.

IS IT SAFE?

MNA can be a safe process if used properly. No one has to dig up the pollution, and nothing has to be added to the land or water to clean it up. But MNA is not a "do nothing" way to clean up sites. Regular monitoring is needed to make sure pollution doesn't leave the site. This ensures that people and the environment are protected during cleanup.

EVALUATION OF ALTERNATIVES

In selecting a remedy for a site, EPA considers the factors set forth in CERCLA §121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial alternatives pursuant to the NCP, 40 CFR

§300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with applicable or relevant and appropriate requirements addresses whether or not a remedy would meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and regulations or provide grounds for invoking a waiver.
- Long-term effectiveness and permanence refer to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.
- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, a remedy may employ.
- Short-Term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- Cost includes estimated capital and O&M costs, and net present-worth costs.
- State acceptance indicates whether, based on its review of the Proposed Plan, the State concurs with, opposes, or has no comment on the preferred remedy at the present time.
- Community acceptance will be assessed in the ROD Amendment, and refers to the public's general response to the alternatives described in the Proposed Plan.

Comparative Analysis of Alternatives

Overall Protection of Human Health and the Environment

GW-1 would not be protective because the future and present use scenarios which assume that the Site groundwater is utilized as a potable water supply present unacceptable carcinogenic risks. The Site groundwater is not currently being used as a source of drinking water within the water district, but is used currently and will be in the future beyond the Water District. Alternatives GW-2 and GW-3 would be protective of human health and the environment, as contaminant migration beyond the boundaries of the Water District would be restricted by natural attenuation or active treatment. GW-1 would not be protective of human health and the environment and/or achieve ARARs, since it would be unknown if Site contaminants would naturally attenuate or impact downgradient areas in the absence of the long-term groundwater monitoring program. Alternative GW-1 will therefore be eliminated from further discussion within the Comparative Analysis of Alternatives.

Compliance with ARARs

For GW-2 and GW-3, ARARs set forth in the ROD would be achieved over time. Compliance with ARARs would be demonstrated through the long-term monitoring program.

Long-Term Effectiveness and Permanence

Alternative GW-3 is expected, over the same time period, to provide the same level of long-term effectiveness and permanence as Alternative GW-2. Groundwater modeling conducted during the 1999 FS predicted a groundwater restoration timeframe of approximately 30 years for Alternative GW-2. For Alternative GW-3, monitoring data was evaluated in the MNA Report to produce an estimated aquifer restoration goal for each COC in the groundwater in the vicinity of each monitoring well. The restoration timeframe at each of the monitoring wells ranged from a low of 0.5 years to a high of 56 years, with the average of all COCs at all near-field and far-field locations at less than 30 years. Overall, given the similar average estimated restoration timeframes for both alternatives, EPA believes that Alternative GW-3 would provide similar levels of long-term effectiveness and permanence as Alternative GW-2. The effectiveness of Alternatives GW-2 and GW-3 would be assessed through routine groundwater monitoring and five-year reviews. O&M of the near-field pump-and-treat system under Alternative GW-2 would provide an additional means to monitor removal of contaminants.

Reduction in Toxicity, Mobility or Volume

Alternative GW-3 would reduce the toxicity, mobility and volume of contaminated groundwater through treatment, with additional reduction of toxicity and volume within the far-field plume due to natural mechanisms. Alternative GW-2 would reduce the toxicity, mobility, and volume of contaminated groundwater through treatment to a greater extent than GW-3.

Short-Term Effectiveness
Alternative GW-3 presents virtually no short-term impacts to human health and the environment since no construction is involved. The construction activities required to implement Alternative GW-2 would potentially result in greater short-term exposure to contaminants by workers who would come into contact with the treatment system; however, proper health and safety precautions would minimize this occurrence. While efforts would be made to minimize the impacts, some disturbances would result from disruption of traffic, excavation activities on public and private land, noise, and fugitive dust emissions. The technologies included under Alternative GW-2 and under Alternative GW-3 are proven and reliable.

Implementability
Alternatives GW-2 and GW-3 are available and can be implemented. Alternative GW-3 does not involve any significant construction and, consequently, is much easier to implement. Alternative GW-3 only requires a monitoring program utilizing monitoring wells and the continued O&M of the operational system. Alternative GW-2 would be much more complex since it would also involve construction and piping installation in the short-term and long-term O&M of an additional treatment system.

Cost
Estimated capital, annual O&M (including monitoring), and present-worth costs for each of the alternatives are presented in the Cost Comparison Table.

Cost Comparison Table		
Alternative	GW-2	GW-3
Capital Cost	$5.44 million	$12,720
Annual Costs		
Systems O&M		
near-field system	$375,360	$375,360
far-field system	$375,360	$0
Long-term Monitoring		
years 0-5	$241,088	$241,088
years 6-10	$222,240	$222,240
years 11-25	$164,096	$164,096
Present Worth Cost	$17.4 million	$7.23 million

According to the capital cost, O&M cost and present worth cost estimates, GW-3 has the lowest cost.

State Acceptance
NYSDEC and NYSDOH concur with the preferred remedy.

Community Acceptance
Community acceptance of the preferred remedy will be assessed in the ROD Amendment following review of the public comments received on this Post-Decision Proposed Plan.

PREFERRED ALTERNATIVE

Based upon an evaluation of the various alternatives, EPA recommends Alternative GW-3, MNA/Long-Term Monitoring, as the preferred alternative. Alternative GW-3 provides the best balance of trade-offs among the three alternatives with respect to the evaluation criteria. EPA believes that the preferred alternative will be protective of human health and the environment, will comply with ARARs, and will be cost-effective.

REFERENCES

EPA. 2000. Record of Decision, MRIP, EPA ID: NYD986950012, OU1, High Falls, New York. March 31.

Sevenson Environmental Services, Inc. 2008. Quarterly O&M Report, July to September 2007, MRIP Superfund Site. January 15.

USACE. 2008. Final MNA Assessment, MRIP Superfund Site. April 11.

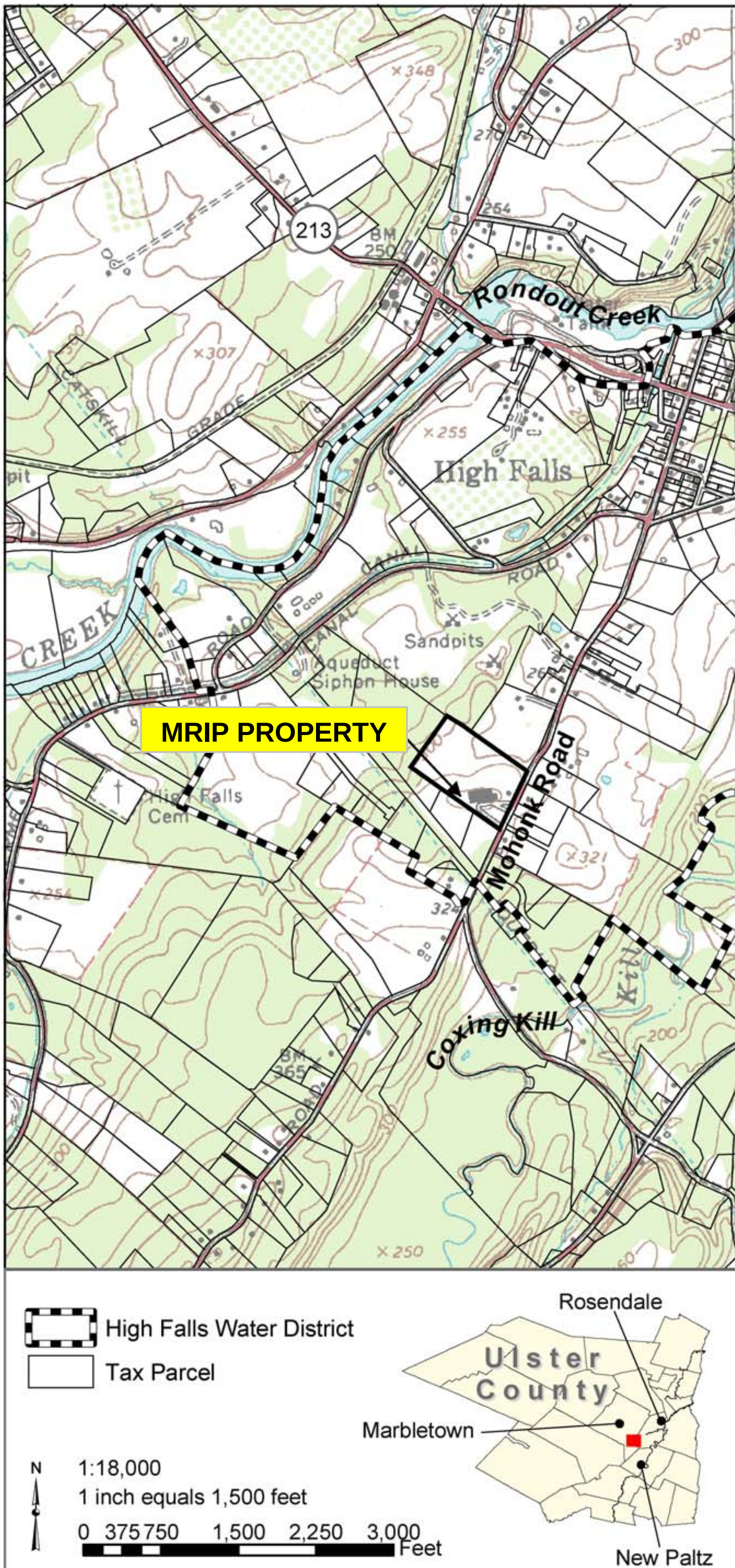


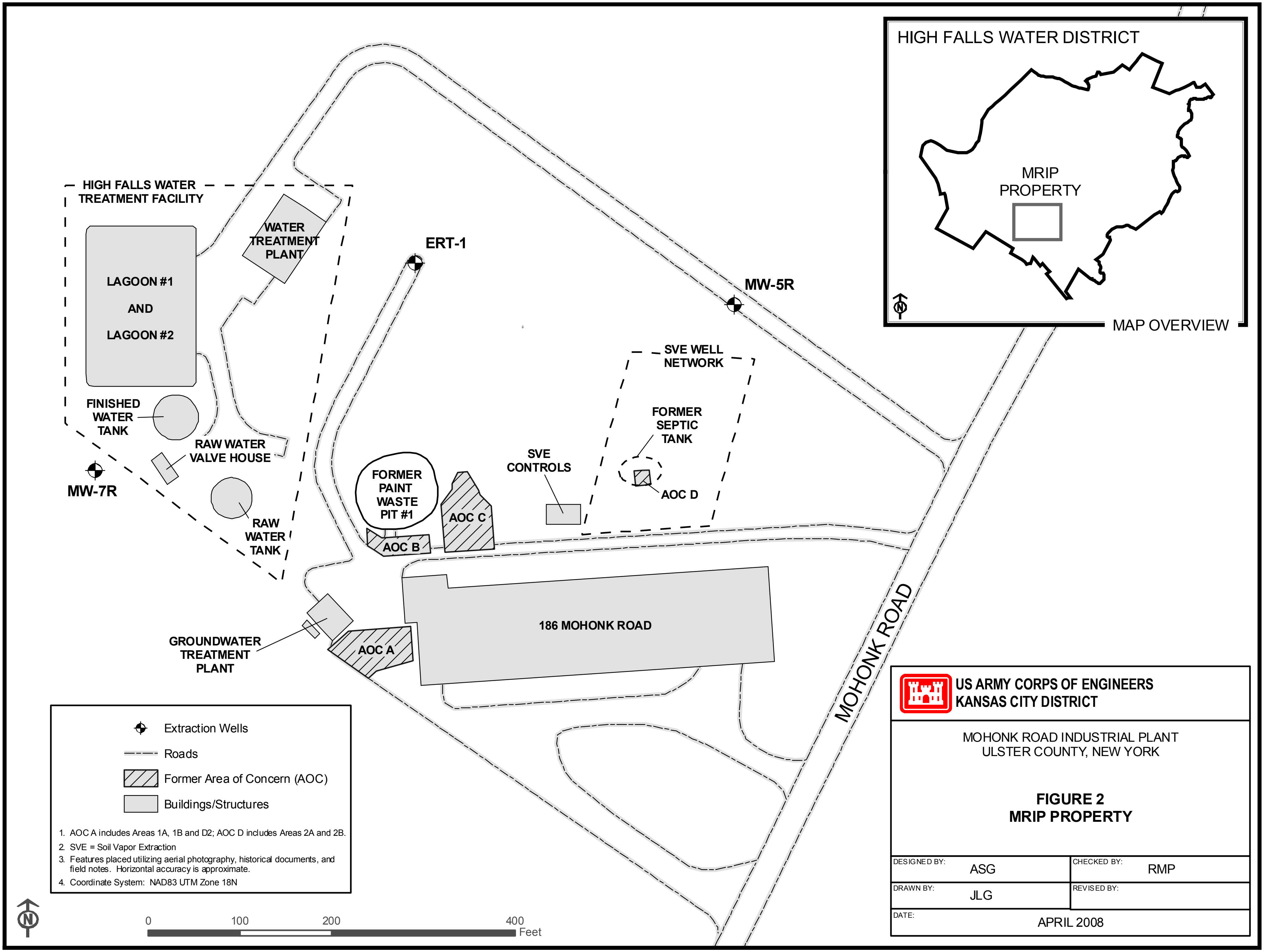
Figure 1

Site Location Map

Mohonk Road Industrial Plant

(MRIP)

High Falls, New York



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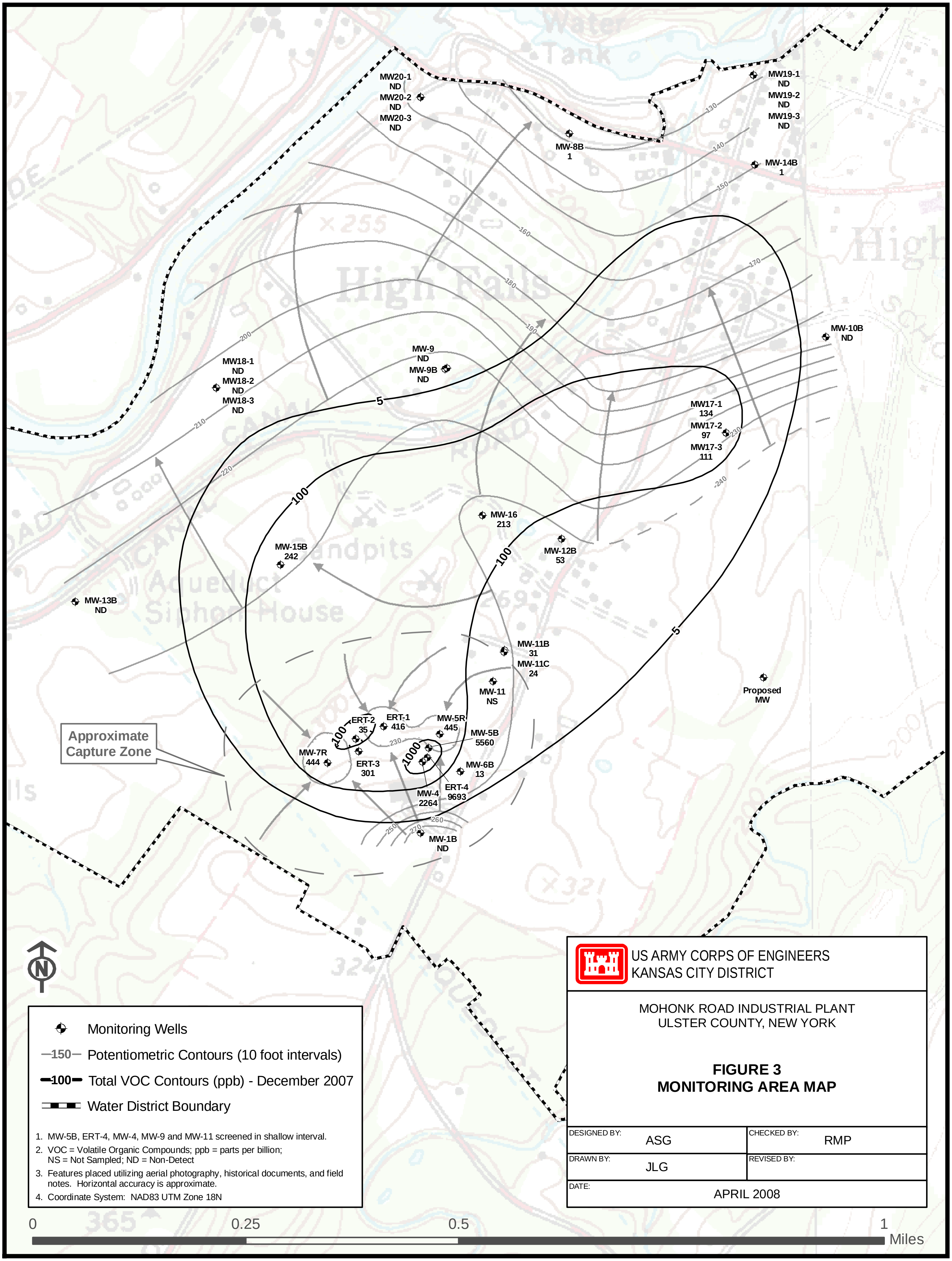

Monitoring Wells

150 Potentiometric Contours (10 foot intervals)

100 Total VOC Contours (ppb) - December 2007

Water District Boundary

1. MW-5B, ERT-4, MW-4, MW-9 and MW-11 screened in shallow interval.
2. VOC = Volatile Organic Compounds; ppb = parts per billion;
   NS = Not Sampled; ND = Non-Detect
3. Features placed utilizing aerial photography, historical documents, and field notes. Horizontal accuracy is approximate.
4. Coordinate System: NAD83 UTM Zone 18N

US ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

MOHONK ROAD INDUSTRIAL PLANT
ULSTER COUNTY, NEW YORK

FIGURE 3
MONITORING AREA MAP

DESIGNED BY: ASG	CHECKED BY: RMP
DRAWN BY: JLG	REVISED BY:
DATE: APRIL 2008	

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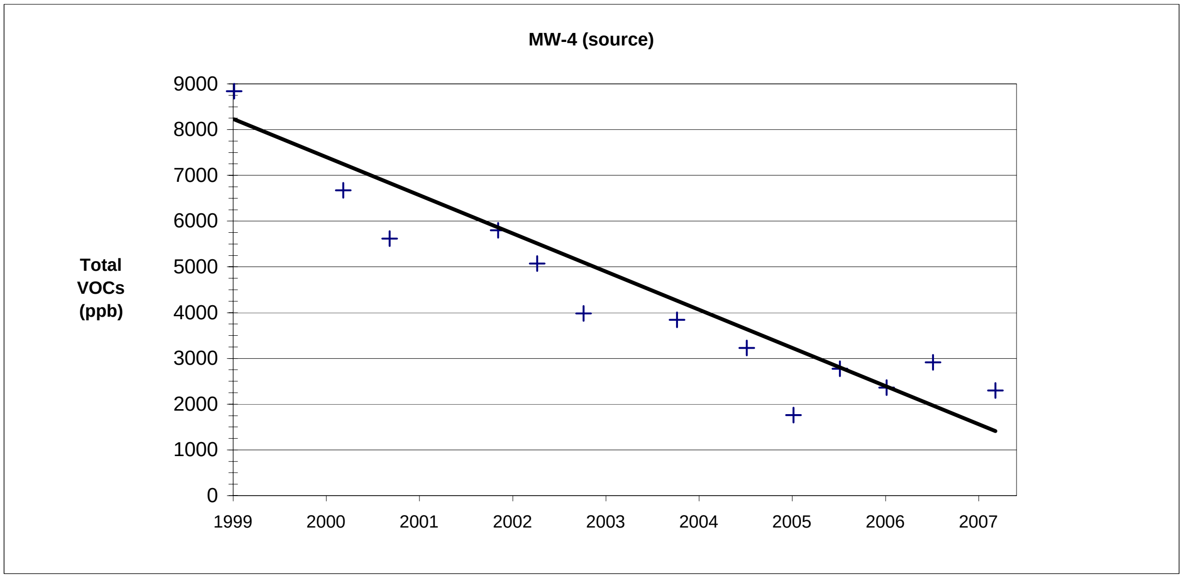
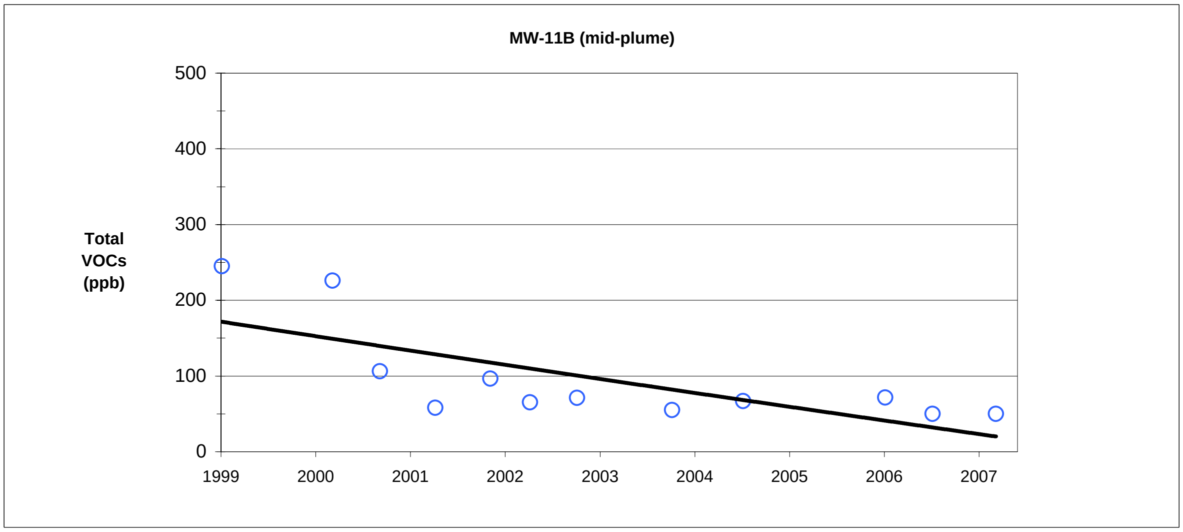
Figure 4
Total VOC Concentration Trends
Mohonk Road Industrial Plant Site





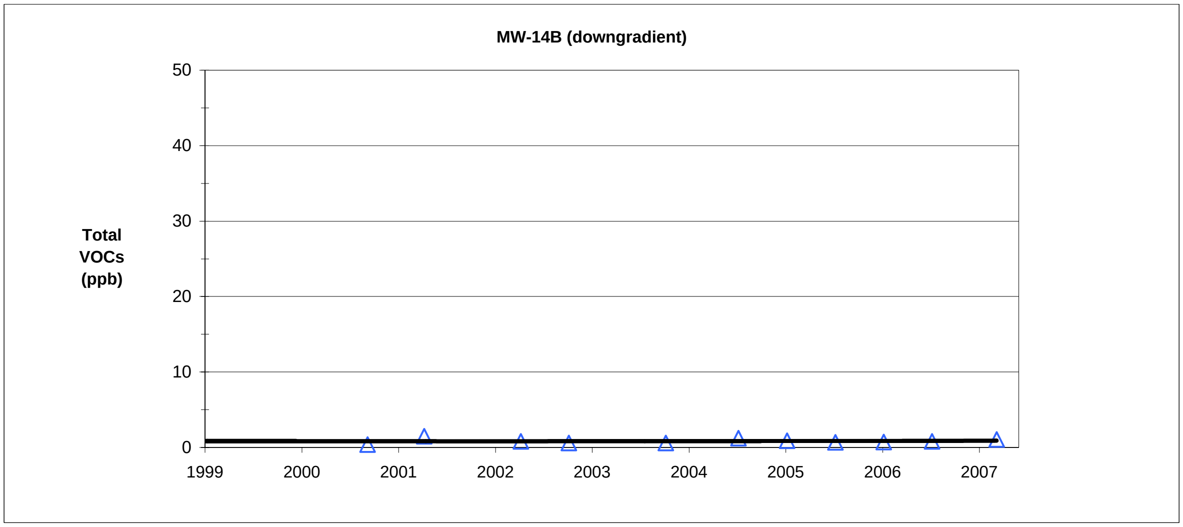


Table 1
Proposed Long-term Monitoring Well Network
Mohonk Road Industrial Plant
High Falls, New York

Monitoring Well	Analytical Results for COCs[1]					Projected Long-term Monitoring Frequency[2]		
	1,1-DCE (µg/L)	1,1-DCA (µg/L)	1,1,1-TCA (µg/L)	TCE (µg/L)	1,4-Dioxane (µg/L)	yrs 0 - 5	yrs 6 - 10	yrs 11 - 30
MCLs	5	5	5	5	50			
Perimeter Wells / Non-Detects								
MW-8B	0.22J	0.37J	0.5U	0.5U	2U	Qtr	NS	NS
MW-9	0.5U	0.5U	0.5U	0.5U	NA	C[4]	C[4]	C[4]
MW-9B	0.5U	0.5U	0.48J	0.5U	2.1U	Qtr	Qtr	Ann
MW-10B	0.5U	0.5U	0.5U	0.5U	2.1U	Qtr	Qtr	Ann
MW-13B[3]	0.5U	0.5U	0.5U	0.5U	2.1U	Qtr	Ann	Ann
MW-14B	0.3J	0.76	0.5U	0.5U	2.1U	Qtr	Qtr	Ann
MW-18-1	0.5U	0.32J	0.5U	0.5U	2.1U	Qtr	Qtr	Ann
MW-18-2	0.5U	0.5U	0.5U	0.5U	2U	Qtr	Qtr	Ann
MW-18-3	0.5U	0.3J	0.5U	0.5U	2.1U	Qtr	Qtr	Ann
MW-19-1	0.5U	0.5U	0.5U	0.5U	2U	Ann	Ann	Ann
MW-19-2	0.5U	0.5U	0.5U	0.5U	2.1U	Ann	Ann	Ann
MW-19-3	0.5U	0.5U	0.5U	0.5U	2.1U	Ann	Ann	Ann
MW-20-1	0.5U	0.5U	0.5U	0.5U	2U	Ann	NS	NS
MW-20-2	0.5U	0.5U	0.5U	0.5U	2.1U	Ann	NS	NS
MW-20-3	0.5U	0.5U	0.5U	0.5U	2U	A	NS	NS
New Well (to-be-installed)[6]								
interval-1	NS	NS	NS	NS	NS	Qtr	Qtr	Ann
interval-2	NS	NS	NS	NS	NS	Qtr	Qtr	Ann
interval-3	NS	NS	NS	NS	NS	Qtr	Qtr	Ann
Plume Wells								
ERT-2	5	2.4	25	1.9	2.2U	Ann	Ann	Ann
ERT-3	32	18	210	39	7.6	Ann	Ann	Ann
MW-11	NS	NS	NS	NS	NS	C[4]	C[4]	C[4]
MW-11B	19J	8.3	19	3.5	2U	Qtr	Ann	Ann
MW-11C	8.2	2	12	1.7	2.1U	Qtr	Ann	Ann
MW-12B	15	6.2	26	4.3	2.1U	Qtr	Qtr	Qtr
MW-15B	43	25	170	3.5	4	Qtr	Qtr	Qtr
MW-16	53	11	140	8.8	5.1J	Qtr	Qtr	Qtr
MW-17-1	37	12	77	6.4	4.3	Qtr	Qtr	Qtr
MW-17-2	26	15	49	5.3	4.8	Qtr	Qtr	Qtr
MW-17-3	30	16	56	0.55	4.7	Qtr	Qtr	Qtr
MW-6B	1.5	0.33J	11	0.5U	2.1U	Qtr	Qtr	Qtr
MW-7B	NS	NS	NS	NS	NS	C[6]	C[6]	C[6]
Former Septic Tank Area Wells								
ERT-4	850	110J	8400	300	4.7	Qtr	Qtr	Qtr
MW-4	160	47J	1100	990	3.3	Ann	Ann	Ann
MW-5B	560	15	4600	380	4	Ann	Ann	Ann
Extraction Wells								
ERT-1	32	49	330	2.1	2.1U	Qtr	Qtr	Qtr
MW-5R	36	55	350	2.1	2.1U	Qtr	Qtr	Qtr
MW-7R	37	52	350	2	2	Qtr	Qtr	Qtr
Background Wells								
MW-1B	0.5U	0.5U	0.5U	0.5U	2U	Qtr	Qtr	Qtr

Notes:
1. Environmental samples collected December 14, 2007.
2. Frequency of collection of environmental samples and water quality parameters may be altered in response to significant changes in data throughout the course of the program.
3. Artesian well.
4. Sampling not currently projected at this existing network well.
5. MW-1, -2, -3, -5, and -6, formerly part of the historic monitoring network, have since been replaced, removed, abandoned, or destroyed.
6. This well will be installed in the near future and is not considered a component of the alternatives evaluated in this Post-Decision Proposed Plan.

Abbreviations:

1,1-DCA	1,1-dichloroethane	J	estimated value	Semi	semi-annually (2 times/year)
1,1-DCE	1,1-dichloroethene	MCL	Maximum Contaminant Levels	TCE	trichloroethene
1,1,1-TCA	1,1,1-trichloroethane	NA	not available	U	not detected above the reported value
Ann	annually (1 time/year)	NR	not recorded		
C	contingent sampling only	NS	not sampled	µg/L	micrograms per liter
COCs	Contaminants of Concern	Qtr	quarterly (4 times/year)	yrs	years
ft amsl	feet above mean sea level				