Superfund Proposed Plan

Hopewell Precision Area Groundwater Contamination Site

Hopewell Junction, Dutchess County, New York

July 2008

PURPOSE OF THE PROPOSED PLAN

This Proposed Plan identifies the preferred remedy for Operable Unit (OU) 1 at the Hopewell Precision site (the Site), and provides the rationale for this preference. The U.S. Environmental Protection Agency's (EPA's) preferred remedy consists of the following components:

- Provide potable water to all properties within the study area by installing a system to deliver water from a nearby existing public water supply system.
- Construct additional storage capacity near the existing Little Switzerland Storage Tank.
- Construct water mains to deliver water from the nearby Little Switzerland Water District to the study area. A service connection from the main would be extended to each house and/or commercial building.
- Abandon private residential wells within the study area following connection to the public water supply. Abandonment would result in the elimination of annual sampling of the private wells.

The Site consists of the Hopewell Precision facility and the hydraulically downgradient area affected by the contaminated groundwater plume and vapors. This Proposed Plan was developed by the EPA in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH). The preferred remedy for OU 1 addresses human health risks associated with contaminants identified in private drinking water wells at the Site (see Figures 1 and 2).

EPA divides Superfund sites into OUs to prioritize and accelerate selection of a remedy, when warranted. EPA has divided the Site into two OUs. OU 1 includes provision of an alternate water supply to the area (see Figures 1 and 2) with private drinking water wells that have been or have the potential to be affected by the groundwater plume from the Hopewell Precision facility. OU 2 will include other exposures to contaminated or potentially contaminated media such as the groundwater, soils, surface water, sediments and vapors associated with the Hopewell plume. The nature and extent of the contamination at the Site and the alternatives for OU 1 summarized in this Proposed Plan are further described in the June 2008 Remedial Investigation (RI) Report and the June 2008 Focused Feasibility Study (FFS) Report, respectively. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted at the Site.

Mark Your Calendar

July 7, 2008 – August 5, 2008: Public Comment Period on the Proposed Plan.

July 17, 2008 at 7:00 p.m.: The U.S. EPA will hold a Public Meeting to explain the Proposed Plan. The meeting will be held at the Town of East Fishkill Town Hall, 330 Route 376, Hopewell Junction, New York 12533. Telephone: (845) 221-4303.

For more information, see the Administrative Record file (which will include the Proposed Plan and supporting documents), which is available at the following locations:

Town of East Fishkill Community Library
348 Route 376
Hopewell Junction, NY 12533
Telephone: (845) 221-9943
Website: www.eastfishkilllibrary.org
Hours: Monday-Thursday: 10 am – 8 pm
Friday: 10 am – 6 pm
Saturday: 10 am – 5 pm

and

USEPA-Region II
Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308
Hours: Monday-Friday, 9:00 a.m. - 5:00 p.m.

Written comments on this Proposed Plan should be addressed to:

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The EPA has a web page for the Hopewell Precision Site at www.epa.gov/region2/superfund/npl/hopewell.

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA, also commonly known as the federal "Superfund" law), and Sections 300.430(f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The Proposed Plan is being provided to inform the public of EPA's preferred remedy and to solicit public comments on the preferred remedy and the remedial alternatives that were evaluated.

The remedy described in this Proposed Plan is the EPA's and NYSDEC's preferred remedy for OU 1 at the Site, the provision of an alternate water supply. Changes to the preferred remedy or a change from the preferred remedy 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 for OU 1 will be made after EPA has taken into consideration all public comments. EPA is soliciting public comment on all of the alternatives considered in this Proposed Plan.

A separate Proposed Plan will be issued for OU 2 and will provide details on EPA's preferred remedy for the groundwater, surface water, sediments, soils, and vapors.

COMMUNITY ROLE IN SELECTION PROCESS

EPA and NYSDEC rely on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To meet this goal, the Proposed Plan, along with the supporting Remedial Investigation and Focused Feasibility Study Reports, has been made available to the public for a public comment period which begins on July 7**,** 2008 and concludes on August 5**,** 2008.

A public meeting will be held on July 17, 2008 at 7:00 P.M. during the public comment period at the Town of East Fishkill Town Hall, 330 Route 376, Hopewell Junction, New York to present the preferred remedy (or "Proposed Plan") and to receive public comments.

Comments received at the public meeting, as well as written comments that EPA receives during the comment period, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD), the document which formalizes the selection of the remedy.

SCOPE AND ROLE OF ACTION

This Proposed Plan presents the preferred remedy for OU 1 at the Site. The objective of the preferred remedy is to provide an alternate water supply to eliminate the current and future human exposure to contaminated groundwater associated with the Hopewell Precision Site. OU 2 will be addressed in a separate Proposed Plan and ROD.

SITE BACKGROUND

Site Description

The Hopewell Precision Site is located in Hopewell Junction, Dutchess County, New York. The Site consists of the Hopewell Precision facility and the hydraulically downgradient area affected by the groundwater plume and its vapors. The Hopewell Precision facility was located at 15 Ryan Drive from 1977 to 1980. The facility moved to the adjacent property at 19 Ryan Drive in 1980 and continues to operate at that location. The combined size of the two properties is 5.7 acres. The rest of the Site consists mostly of residential neighborhoods, all of which are served by private wells and septic systems. Almost 27,000 people live within 4 miles of the Hopewell Precision facility. Commercial development (e.g., strip malls, businesses, gas stations) in the area is primarily along New York State Route 82, which traverses the area in a northeast-southwest direction. An area of farmland borders the eastern side of a section of Route 82. Whortlekill Creek flows in a southerly direction across the residential area and along the western border of the Site. Several ponds are present within the area, including two large former quarries (Redwing Lake and the gravel pit) that are partially fed by groundwater.

Site Geology/Hydrogeology

The Site is situated in a glaciated valley underlain by the Hudson River Formation in the northern portion of the Site and the Stockbridge Limestone in the southern portion of the Site. The bedrock is overlain by unconsolidated sediments deposited by glaciers and glacial meltwater. The glacial outwash deposits are a complex mixture of boulders, gravel, sand, silt, and clay which form discontinuous beds or lenses. Due to multiple glaciation events, subsurface units are heterogeneous and highly localized. Glacial till deposits are also present in some areas of the Site, including a tear drop shaped mound between Creamery Road and Clove Branch Road. Glacial tills generally have low permeability and limited ability to transmit groundwater.

The unconsolidated deposits at the Site have been grouped into three hydrostratigraphic units: 1) sand and gravel unit (including silty sand, silty gravel, and mixtures of sand, silt, and gravel), 2) silt and clay (including silty clay), and 3) the till mound between Creamery Road and Clove Branch Road. The sand and gravel units transmit groundwater more readily than the silt and clay units and act as preferential flow paths for groundwater contamination. All of these units are localized and discontinuous, and they are likely to create multiple complex flow pathways throughout the unconsolidated deposits.

In general, groundwater flow is towards the valley from the upland areas on the east and west sides of the valley. In the valley, groundwater flow is generally towards the southwest along the valley axis. The glacial till mound located between Creamery Road and Clove Branch Road impedes groundwater flow within the valley. Groundwater flows preferentially in silty sand and gravel units. The vertical gradient in most monitoring wells is upwards, indicating groundwater discharges into the valley and Whortlekill Creek which runs along the axis of the valley and also flows toward the southwest. The contaminant flow velocity at the Site was estimated to average from 0.8 to 1.1 feet/day in the permeable preferential flow pathways. The depth to groundwater across the Site varies but is generally about 15 feet below the ground surface. The groundwater at the Site is classified by NYSDEC as Class GA, indicating it is considered a source of drinking water.

Site History

Hopewell Precision is a manufacturer of sheet metal parts that are assembled into furniture. The property at 19 Ryan Drive was vacant land prior to 1980, and the company has been the sole occupant of the building. Since 1981, the former facility at 15 Ryan Drive has been used by Nicholas Brothers Moving Company for equipment storage and office space.

Processes at Hopewell Precision include shearing, punching, bending, welding, and painting. The painting process includes degreasing prior to application of the wet spray paint application. Hopewell Precision currently uses a water-based degreaser, but the company used trichloroethene (TCE) and 1,1,1-trichloroethane (1,1,1-TCA) in a vapor degreasing machine until 1998.

EPA was made aware of Hopewell Precision in October 1979 through a letter from a former Hopewell Precision employee. During an on-Site inspection at the former facility (15 Ryan Drive) in November 1979, EPA observed solvent odors coming from an open disposal area. At the time of the 1979 inspection, Hopewell Precision was dumping one to five gallons per day of waste solvents, paint pigments, and sodium nitrate directly onto the ground. In August 2003, a former employee stated that the common practice for disposal of waste solvents at the former facility was to pour the material on the ground outside the building. Waste paints and thinners were dumped on a daily basis and waster solvents from the degreasers were dumped on a biweekly basis while he worked at Hopewell Precision in 1979 and 1980. The results of EPA's November 1979 inspection were sent to the NYSDEC, along with a memorandum recommending that the facility be required to drum the solvent and dispose of it in a proper manner rather than open dumping.

NYSDEC installed 3 monitoring wells at the former facility in May 1985 and sampled the wells in March 1986. The analytical results for monitoring well B-3, located between the current and former buildings, indicated the presence of 1,1,1-TCA at 23 micrograms per liter (µg/L) and TCE at an estimated 4 µg/L. In 1985, the Dutchess County Department of Health sampled four private drinking water wells near the Site, and no volatile organic compounds (VOCs) were detected in any of the samples.

NYSDEC performed a Hazardous Waste Compliance Inspection of Hopewell Precision in May 1987. The inspector observed eleven 55-gallon drums of waste paint and thinners; six 55-gallon drums of waste 1,1,1-TCA; and one 55-gallon drum of unknown material. During another inspection in October 2002, NYSDEC observed four full or partially full 55-gallon drums of waste paint and solvent at the facility.

In February 2003, as part of an effort to make decisions on historic sites, EPA sampled 75 residential wells near the Hopewell Precision facility. Analysis of these samples revealed that five residential wells were contaminated with TCE ranging from 1.2 µg/L to 250 µg/L. At that time, NYSDEC, on behalf of NYSDOH, requested that EPA conduct a removal action at the Site, including installation of carbon filter systems on the residential wells.

From February to November 2003, EPA collected groundwater samples from hundreds of private drinking water wells in the vicinity of Hopewell Precision. TCE and 1,1,1-TCA were detected in numerous private well samples, at individual concentrations up to 250 µg/L for TCE and 11.7 µg/L for 1,1,1-TCA. EPA subsequently installed point of entry treatment (POET) systems to remove VOCs at 39 homes where TCE exceeded or approached the maximum contaminant level (MCL). NYSDEC installed POET systems to remove 1,1,1-TCA that exceeded its New York State drinking water standard, but that fell below the Federal MCL, at 14 homes in the southern part of the groundwater plume.

In April 2003, EPA also collected water and sediment samples from small, unnamed ponds located about 300 feet south-southwest (downgradient) of the Hopewell Precision facility. TCE was detected at concentrations of 4 µg/L and 3.4 µg/L in the water samples and 88 micrograms per kilogram (µg/kg) in one of the two sediment samples. EPA collected additional samples from two unnamed ponds located approximately 900 and 4,500 feet southwest of Hopewell Precision in May 2003. TCE was detected at an estimated concentration of 3.6 µg/kg in a sediment sample from the closer pond, but was not detected in a water sample from the same location or in sediment and water samples collected from the distal pond on Creamery Road.

In July 2003, EPA collected 19 soil samples at and downgradient of the Hopewell Precision facility. TCE was detected in two soil samples on the facility property and 1,1,1-TCA was detected in one sample on the facility property; neither contaminant was detected in any samples collected downgradient (south) of the facility. Additional sampling was conducted at the Hopewell Precision facility in December 2003. TCE was detected in five soil samples, at depths ranging from 0 to 12 feet. The maximum detected concentration was 3.7 µg/kg; TCE was not detected in background samples from the same depth range.

In October and December 2003, EPA installed and sampled temporary shallow monitoring wells on both properties, 15 and 19 Ryan Drive. The analytical results indicated TCE concentrations up to 144 µg/L in groundwater at depths ranging from 10 to 30 feet below the ground surface (bgs).

EPA has conducted vapor intrusion indoor air testing at the Site. Since February 2004, EPA has collected sub-slab and/or indoor air samples from over 200 homes in the area above the groundwater plume. EPA has installed sub-slab ventilation systems (SVSs) at 53 homes with vapors above the action level to reduce the residents' exposure to indoor air contaminants associated with the Site. In addition, EPA conducts annual vapor sampling during the winter heating season to monitor the migration of vapors to structures throughout the area of the groundwater plume. Remediation of vapors will be addressed as part of OU 2.

The Site was listed on the National Priorities List in April 2005.

SUMMARY OF RESIDENTIAL WELL SAMPLING

In December 2005, EPA initiated a remedial investigation and feasibility study (RI/FS) as part of the long-term Site cleanup phase. The RI/FS will evaluate the nature and extent of groundwater, soil, sediment, surface water, and vapor contamination at the Site, and will help EPA determine the appropriate cleanup alternatives for the identified contamination prior to selection of a comprehensive cleanup plan for the Site. EPA completed all RI field activities during the Summer of 2007 and publicly releases both the RI Report and the OU 1 FFS Report, subject of this Proposed Plan, in June 2008.

The primary field activity performed as part of the RI for OU 1 included several rounds of groundwater sampling of private wells in the area downgradient of the Hopewell Precision facility. Additional media, as described above, were sampled as part of the RI/FS for OU 2 and will be summarized in a separate Proposed Plan. The results of the sampling related to OU 1 are summarized below.

<u>Residential Well Results</u>

During the RI, two rounds of groundwater samples were collected from residential wells in the vicinity and downgradient of the Hopewell Precision facility. The first round was a limited sampling event that included 48 residential wells in the southern portion of the groundwater plume and near wells with POET systems. The second round was a large-scale sampling event which included 195 residential wells in the TCE and 1,1,1-TCA portions of the plume. The residential wells sampled during the RI were not outfitted with POET systems. Wells with POET systems are sampled and maintained by EPA and NYSDEC. The analytical results were compared to the Federal MCLs and the New York State Drinking Water Standards. The following summary focuses on the seven contaminants that were determined to be related to activities at the Hopewell Precision facility. The Site-related contaminants include TCE, 1,1,1-TCA, 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), chloromethane, methyl ethyl ketone (MEK) and tetrachloroethene (PCE). Although the discussions below do not include the results from the residential wells outfitted with POET systems, the results from these wells were included in all mapping of the groundwater contaminant plumes.

Round 1 Sampling Results

Six of the seven Site-related contaminants have the same screening criterion: 5 µg/L. The screening criterion for MEK is 50 µg/L. None of the residential well samples exceeded these criteria in Round 1.

1,1,1-TCA was detected in 12 of the 48 residential wells. Levels in these wells ranged from 0.11 estimated (J) µg/L to 2.2 µg/L. The highest results were detected near the corner of Baris Lane and Clove Branch Road (2.2 µg/L); along Hamilton Road (1.1 µg/L); and along Route 82, just north of the intersection with Clove Branch Road (1.0 µg/L). Results below 1.0 µg/L are clustered north of the intersection of Route 82 and Creamery Road (two wells), and near the intersection of Clove Branch Road and Cavelo Road. PCE was detected in one residential well located along Route 82, just north of the intersection with Clove Branch Road (0.17 J µg/L); the same residential well had 1,1,1-TCA at 1.0 µg/L.

Eight of the 48 residential wells contained TCE with levels ranging from 0.13 J µg/L to 4.7 µg/L. The distribution of TCE in residential wells is similar to 1,1,1-TCA. The highest results were detected near the corner of Baris Lane and Clove Branch Road (4.7 µg/L), and near the intersection of Clove Branch Road and Cavelo Road (1.3 and 2.6 µg/L). Results below 1.0 µg/L were detected north of the intersection of Route 82 and Creamery Road (one well); north of the intersection of Route 82 and Clove Branch Road (two wells) and at the intersection of Clove Branch Road and Cavelo Road (one well).

Low levels of chloromethane were detected in three residential wells along Route 82: near the intersection with Creamery Road (0.12 J µg/L); near the intersection with Mary Lane (0.16 J µg/L); and near the intersection with Clove Branch Road (0.35 J µg/L).

1,1-DCE was detected in one residential well located on Hamilton Road (0.11 J µg/L). *Cis*-1,2-DCE and MEK were not detected in any of the residential wells.

Round 2 Sampling Results

1,1,1-TCA was detected in 23 of the 195 residential wells, with levels ranging from 0.5 J µg/L to 3.3 µg/L. The highest results were detected on Baris Lane (2.2 µg/L); south of Cavelo Road (3.3 µg/L and 2.7 µg/L); and along Route 82, just north of the intersection with Clove Branch Road (1.0 µg/L). Results below 1.0 µg/L are clustered north of the intersection of Route 82 and Creamery Road (two wells), and near the intersection of Clove Branch Road and Cavelo Road.

TCE was detected in 16 of the 195 of the residential wells, with levels ranging from 0.53 µg/L to 7.4 µg/L. The highest results were detected near the corner of Baris Lane and Clove Branch Road (7.4 µg/L); clustered near the intersection of Clove Branch Road and Cavelo Road (4.0, 3.7, 3.4, and 2.7 µg/L); and along Route 82, just south of the Creamery Road intersection (3.5 µg/L). Lower results were detected along Route 82 (0.53 µg/L to 0.98 µg/L); clustered along Cavelo Road (0.67 µg/L to 1.8 µg/L); and near the intersection of Creamery Road and Hamilton Road (1.2 µg/L and 1.9 µg/L).

MEK was detected in two wells, at concentrations ranging from 0.77 µg/L to 1.6 µg/L, which are below the screening criterion.

The Site-related contaminants PCE, 1,1-DCE, *cis*-1,2-DCE, and chloromethane were not detected in residential well samples.

Summary of Residential Well Contamination

The majority of residential well samples did not contain detectable levels of VOCs. 1,1,1-TCA, which was the most prevalent Site-related contaminant during both sampling rounds, was detected in 25 percent of wells sampled in Round 1, and in approximately 13 percent of wells sampled in Round 2. TCE was detected in approximately 17 percent of wells in Round 1 and 8 percent in Round 2. The majority of 1,1,1-TCA and TCE results for both rounds are clustered in the area along Clove Branch Road, between Baris Lane and Route 82, and in areas just downgradient. In wells with detectable VOCs, concentrations were generally well below the Site-specific groundwater screening criteria, and in many cases were only detected at trace levels.

Wells outfitted with POET systems were also sampled by EPA or NYSDEC. These wells have higher levels of TCE and 1,1,1-TCA than wells sampled during the RI (summarized above). TCE in wells with POETs sampled by EPA ranged from 0.6 µg/L to 70 µg/L. 1,1,1-TCA in wells with POETs sampled by NYSDEC ranged from 0.7 µg/L to 5.7 µg/L in July 2007. Figure 1 shows the TCE and 1,1,1-TCA groundwater contaminant plumes.

RISK SUMMARY

The purpose of the risk assessment is to identify potential cancer risks and noncancer health hazards at the Site assuming that no further remedial action is taken. This Proposed Plan presents the results of the risk assessment for groundwater. Risks posed by other Site media will be presented in the Proposed Plan for OU 2.

Human Health Risk Assessment

As part of the RI/FS, a baseline human health risk assessment was conducted to estimate the current and future cancer risks and noncancer health hazards 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

WHAT IS RISK AND HOW IS IT CALCULATED?

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 to assess site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at a 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 identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of 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 noncancer health effects, 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 noncancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. 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 explained in the Exposure Assessment. Current Superfund guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For noncancer health effects, a “hazard index” (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a “threshold level” (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

the absence of any actions to control or mitigate these exposures under current and future land uses.

A four-step human health risk assessment process was used for assessing Site-related cancer risks and noncancer health hazards. The four-step process is comprised of: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment, and Risk Characterization (see adjoining box "What is Risk and How is it Calculated").

The baseline human health risk assessment began with selecting COPCs in the groundwater, using monitoring well data, which could potentially cause adverse health effects in exposed populations. These populations included current and future residents who may be exposed to contaminants through ingestion and inhalation of untreated groundwater used as a potable water supply and current and future facility workers who may be exposed to contaminants through ingestion of untreated contaminated groundwater used as a potable water supply. In this assessment, exposure point concentrations were estimated using either the maximum detected concentration of a contaminant or the 95 percent upper confidence limit of the average concentration. Chronic daily intakes were calculated based on the reasonable maximum exposure (RME), which is the highest exposure reasonably anticipated to occur at the Site. The RME is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. Central tendency exposure (CTE) assumptions, which represent typical average exposures, were also developed. A complete summary of all exposure scenarios can be found in the baseline human health risk assessment, including media designated as OU 2.

Groundwater

Risks and hazards were evaluated for current and future adult and child residents for ingestion of untreated tap water, dermal contact with untreated tap water, and inhalation of vapors during showering or bathing. Risks and hazards were evaluated for current and future facility workers for ingestion of untreated tap water at the Hopewell Precision facility. The total incremental lifetime cancer risk estimates were:

- Adult: RME = 7×10^{-4}; CTE = 4×10^{-5}
- Child: RME = 1×10^{-3}; CTE = 2×10^{-4}
- Facility Worker: RME = 2×10^{-5}; CTE = 6×10^{-6}

The estimates of risk for the adult and child residential exposure exceed EPA's acceptable target range of 1×10^{-6} to 1×10^{-4}. Exposure to TCE and arsenic in groundwater accounts for approximately 65 and 35 percent, respectively, of the total excess cancer risk. Arsenic is considered a known human carcinogen (Group A) by EPA.

Hazard indices (HIs) greater than 1 indicate the potential for noncancer hazards. The calculated HIs were:

- Adult: RME HI = 4; CTE HI = 3
- Child: RME HI = 12; CTE HI = 4
- Facility Worker: RME HI = 0.2; CTE HI = 0.1

The total HI for the adult and child resident, based on individual health endpoints, is above EPA's acceptable threshold of 1 and could possibly have adverse effects on the liver, kidney, central nervous system, fetus, endocrine, and skin. TCE and arsenic contribute most of the potential noncancer hazard.

The installation of a public water supply in the area affected by the Hopewell groundwater plume will eliminate risks to residents from consumption of and contact with contaminated drinking water. The hot spot of the groundwater plume (see Figure 1) will continue to migrate toward the south-southwest and will impact more private drinking water wells as it migrates. A preliminary assessment of the groundwater plume indicates that it will take 20 to 30 years for the groundwater contamination to naturally attenuate to levels below the MCLs.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are media-specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and risk-based levels established in the risk assessment.

The overall RAO is to ensure the protection of human health and the environment. The specific RAO identified for OU 1 at the Site is to:

- Prevent or minimize current and future human exposure to VOC-contaminated groundwater by providing an alternate water supply.

Preliminary Remediation Goals

Preliminary Remediation Goals (PRGs) for OU 1 were selected based on federal and state promulgated ARARs known as groundwater Federal MCLs and New York State Drinking Water Standards, respectively. These PRGs or MCLs were then used as a benchmark in the technology screening, alternative development and screening, and detailed evaluation of alternatives presented in the FFS Report. The PRGs for groundwater are the most conservative of Federal MCLs or New York State Drinking Water Standards and are shown in Table 1 below.

Table 1: Preliminary Remediation Goals

Site-Related Contaminants	PRG for Groundwater (ug/L) *
Trichloroethene (TCE)	5
1,1,1-Trichloroethane (1,1,1-TCA)	5
1,1-Dichloroethene (1,1-DCE)	5
Cis-1,2-Dichloroethene (cis-1,2-DCE)	5
Chloromethane	5
Methyl ethyl ketone (MEK)	50
Tetrachloroethene (PCE)	5

* Groundwater PRGs for Site-related contaminants are based on the more conservative of the Federal MCLs and the New York State Drinking Water Standards.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. Section 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, cost-effective, comply with ARARs, and utilize permanent solutions and alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA Section 121(d), 42 U.S.C. Section 9621(d) further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. Section 9621(d)(4).

The objective of the FFS for OU 1 was to identify and evaluate remedial action alternatives for providing an alternate source of drinking water for the affected area. Figure 1 shows the area proposed for an alternate source of drinking water and the groundwater contaminant plume.

Detailed descriptions of the remedial alternatives for alternate water supplies for the Site can be found in the FFS report. The sections below present a summary of the three alternatives that were evaluated. Alternatives AWS-2 and AWS-3 were evaluated for a duration of 30 years because it is the standard default timeframe used for comparison purposes. However, an evaluation of the groundwater contamination indicated a similar timeframe for the contamination to naturally decrease to levels below the MCLs. The use of the 30-year timeframe does not imply that the remedy would become ineffective or be removed after 30 years.

Alternative AWS-1 – No Action

Capital Cost:	$0
Annual Cost:	$0
Present-Worth Cost:	$0
Duration Time:	0 years

The “No Action” alternative is considered in accordance with NCP requirements and provides a baseline for comparison with other alternatives. If this alternative were implemented, the current status of the Site would remain unchanged. No remedial actions would be implemented as part of this alternative. Groundwater would continue to migrate and contamination would continue to attenuate through dilution. This alternative does not include institutional controls or long-term groundwater monitoring.

Alternative AWS-2 – Installation and Operation of POET Systems

Capital Cost:	$3,292,000
Annual Cost:	$978,000
Present-Worth Cost:	$15,448,000
Duration Time:	30 years

This alternative would provide potable water to all properties within the study area that utilize private wells for drinking water. Individual POET systems would be installed at each property near the wellhead to ensure that water extracted from the existing private wells is treated prior to consumption or other household use by the residents/workers. This alternative includes the implementation of a quarterly sampling program to monitor the effectiveness of the POET systems. The alternative also includes the comprehensive long-term operation, maintenance, and monitoring (OMM) associated with the implementation of this alternative. It would take approximately four months to implement AWS-2.

Alternative AWS-3 – Provision of Alternate Water Supply

Capital Cost:	$15,599,000
Annual Cost:	$0
Present-Worth Cost*:	$15,617,000
Duration Time:	30 years

* Present-worth cost includes costs for 5 year reviews.

This alternative would provide an alternate water supply to all properties within the study area by installing a system to deliver water from a nearby existing public water supply system. The Little Switzerland Water District, located north-northeast of the Hopewell Precision facility, was selected as the representative water district for this alternative because of its proximity to the affected area. Additional storage capacity would be constructed near the existing Little Switzerland Storage Tank. Water mains would be constructed to deliver water from the nearby Little Switzerland Water District to the study area (see Figure 2). A service connection from the main would be extended to each house and/or commercial building.

Following connection to the public water supply, private wells within the study area would be abandoned in accordance with applicable requirements. Abandoned wells would be completely unusable even for non-potable purposes. Abandonment would result in the elimination of annual sampling of the private residential wells. Properties connected to the public water supply would be responsible for payment of water bills once the connections are complete. POET systems would be disconnected, removed, and properly disposed of by EPA or NYSDEC after the property is connected to the public water supply. It would take approximately two years to implement AWS-3.

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 ARARs of 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, that 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 annual operation and maintenance costs, and net present-worth costs.

- State acceptance indicates whether, based on its review of the RI/FFS reports and 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, and refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FFS reports.

A comparative analysis of the remedial alternatives for OU 1, based upon the evaluation criteria noted above, is presented below.

Comparative Analysis for Groundwater

- Overall Protection of Human Health and the Environment

Currently, there are unacceptable risks to human health if untreated contaminated groundwater at the Site is used as a source of drinking water. Alternative AWS-1 would not provide protection of human health because exposure to contaminated groundwater would not be restricted and contamination would remain in groundwater for some time into the future. Alternatives AWS-2 and AWS-3 would be protective of human health through elimination of current and future exposure to contaminated groundwater. Alternative AWS-2 would utilize treatment processes at individual wells to eliminate contaminants from Site groundwater prior to use as potable water. Some potential for exposure to contaminated water remains if the granular activated carbon (GAC) filter in a POET system becomes saturated with contaminants and contaminants pass through the filter and remain in the drinking water. However, this should not occur if the quarterly sampling program, which would be a requirement, ensures the continued effectiveness of the POET systems. Alternative AWS-3 would provide potable water via a public supply system. Alternative AWS-3 would be more permanent and reliable in the long-term than the POET systems under Alternative AWS-2.

- Compliance with ARARs

Alternative AWS-1 would not comply with the chemical-specific ARARs for groundwater; location- and action-specific ARARs are not applicable to AWS-1. Alternatives AWS-2 and AWS-3 would meet the chemical-specific ARARs because the new potable water supply would not contain contaminants at concentrations above MCLs. Alternatives AWS-2 and AWS-3 would also comply with location- and action-specific ARARs.

- Long-Term Effectiveness and Permanence

Alternative AWS-1 would not be effective or permanent because the contaminants would not be destroyed and there would be no mechanism to prevent current and future exposure to contaminated groundwater. Alternative AWS-3 would be effective and permanent because it involves permanent infrastructure to convey water from a reliably clean source, but it would require pressure hookups to be made. Town of East Fishkill regulations restricting use of private wells within a public water district would also assist in ensuring the long-term effectiveness of this alternative. Alternative AWS-2 would be effective in the short-term, yet it would require significantly more maintenance to remain reliable. Monitoring and servicing over 300 POET systems for contaminant breakthrough, fouling, and breakdown and regular sampling would be cumbersome and would require highly coordinated efforts. In addition, if filters are not properly maintained, they can serve as a source of microbial contamination in the water system.

- Reduction in Toxicity, Mobility or Volume

Alternatives AWS-1 and AWS-3 would not reduce the VOC mass through treatment since no active treatment of contaminated groundwater occurs. Under Alternative AWS-2, the POET systems would remove contaminants from the groundwater, albeit only at their point-of-use. The continued pumping of the residential wells would remove contaminants from the aquifer and would accelerate the overall remediation of the groundwater plume. The contaminants would be treated by the POET systems installed on each private well. Alternatives AWS-2 and AWS-3 would reduce the toxicity in potable water supplied to residents, although only AWS-2 would potentially reduce the toxicity, mobility, or volume of groundwater contamination through continued pumping of the aquifer by the private wells. Under AWS-3, if residents are no longer utilizing the groundwater as a source of drinking water, the range of potential treatment alternatives for the groundwater resource (to be evaluated in the OU 2 FS for the Site) would be expanded to include technologies that would inject remedial materials (e.g., microbes) into the aquifer to reduce the toxicity, mobility or volume of contaminants.

- Short-Term Effectiveness

The short-term impact from Alternative AWS-1 would be no impact to nearby communities. Under Alternative AWS-1, protection of the community and workers during implementation would not be applicable since no remedial action would occur.

Alternative AWS-2 would be minimally disruptive to the existing residents and workers since disruption would be of very short duration and on a property-by-property basis. Alternative AWS-3 would be the most disruptive in the short-term since construction activities involving water main and service connection installations would create inconveniences to traffic flow within the community for longer periods of time. No major adverse health impacts would be expected under Alternatives AWS-2 and AWS-3. Under Alternative AWS-3, the community and workers would be protected by appropriate worker personal protective equipment and engineering controls, including air monitoring.

- Implementability

Alternative AWS-1 has no technical or administrative regulations to implement. Of the two action alternatives, Alternative AWS-3 would be more difficult to implement technically and administratively based on the type and amount of construction required within the study area as well as the administrative and legal controls necessary to ensure that no one uses groundwater. Alternative AWS-2 would be easier to implement initially, but would require significant ongoing efforts associated with OMM.

- Cost

The estimated capital, annual OMM, and present-worth costs for each of the alternative water supply alternatives are presented in Table 2. All costs are presented in U.S. dollars and were developed using a discount rate of 7%.

Table 2: Cost Comparison for Alternate Water Supply Alternatives

Remedial Alternative	Capital Cost	Annual Cost	Present Worth	Duration
AWS-1	0	0	0	N/A
AWS-2	3,292,000	978,000	15,448,000	30 years
AWS-3	15,599,000	0	15,617,000	30 years

According to the capital cost, OMM cost and present-worth cost estimates, Alternative AWS-1 has the lowest cost and AWS-3 has the highest cost when comparing all alternatives.

- State Acceptance

NYSDEC concurs with the preferred remedy.

- Community Acceptance

Community acceptance of the preferred remedy will be assessed in the ROD following review of the public comments received on the Proposed Plan.

PREFERRED REMEDY

Based upon an evaluation of the three alternatives, EPA recommends Alternative AWS-3: Provision of Alternate Water Supply as the preferred remedy for OU 1. Implementation of this alternative would provide the best overall protection of human health and eliminate the potential for exposure to contaminated groundwater from private drinking water wells. The hot spot of the groundwater plume (see Figure 1) will continue to migrate toward the south-southwest and will impact more private drinking water wells as it migrates. A preliminary assessment of the groundwater plume indicates that it will take 20 to 30 years for the groundwater contamination to naturally attenuate to levels below the MCLs.

The Little Switzerland Water District, located north-northeast of the Hopewell Precision facility, was selected as the representative water district for Alternative AWS-3 because of its proximity to the affected area.

Alternative AWS-3 would provide an alternate water supply to the area shown in Figure 2 via the delivery of water from a nearby existing public water supply. Private properties within the area would be provided with a connection to the nearby Little Switzerland Water District located approximately a half-mile northeast of the Hopewell Precision facility. The water supplied by the Little Switzerland Water District undergoes regular testing to ensure the quality of the water is in compliance with New

York State regulations. Results for 2005 and 2006 indicated the drinking water is free of VOCs.

The Little Switzerland Water District is currently supplied by a system that includes two 200-foot supply wells and one 210,000-gallon storage tank, located at the topographic high point within the district. The supply wells have reported yields of 140 gallons per minute (gpm) and 220 gpm, giving a maximum yield of 518,000 gallons per day (gpd). Extracted groundwater is chlorinated prior to distribution; the raw water is not filtered.

The 210,000-gallon storage tank was installed in 2007. The Little Switzerland Water District currently serves approximately 135 homes. Annual Drinking Water Quality Reports for the Little Switzerland Water District for 2005 and 2006 show average daily household usage rates of 453 and 639 gpd. The rates are reportedly high because of leaks in the distribution system. The Town of East Fishkill reports that most of these leaks have been repaired, and although metered usage rates are reportedly approximately 250 gpd, current rates are approximately 450 gpd because of to losses along approximately 2,000 feet of the Little Switzerland distribution loop. Based on the Town's current estimated household usage rate of 450 gpd, the average daily water need is approximately 60,750 gallons. The Hopewell connection area includes an assumed 363 residential properties and 14 commercial properties to be connected to the public water supply. A survey would be conducted during the design phase to provide a more accurate count of residences requiring public water. Based upon usage estimates (250 gpd for residential properties and 670 gpd for commercial properties), the Hopewell area properties would require a mean daily supply of 100,130 gallons, bringing the total mean daily water usage to 160,880 gpd. Peak demand within Little Switzerland is currently estimated to be 40% greater than the annual mean demand; however, this rate fluctuation is likely dampened because of the loss within the existing loop. Estimating the peak daily usage at 300% of the mean daily usage gives a peak demand of 482,640 gpd. Following the expected repair of leaks within the Little Switzerland loop (and dropping the usage estimates to 250 gpd for existing users) this peak demand would fall to 401,640 gpd (300% of 133,880 gpd). Such demands could be served via the operation of both of the existing supply wells. Although such operation would not provide for a standby well, it is assumed that such conditions would be of short duration and understood that provisional service agreements could be established as necessary (e.g., short-term use of drinking water from another source).

These calculations suggest that the additional water needed to supply the Hopewell area could not be supported by the existing Little Switzerland storage capacity, but could be supplied by the Little Switzerland wells. Therefore, an additional storage tank would be constructed adjacent to the existing storage tank, within the footprint of the former storage tank.

A ten-inch diameter water main would be installed along Dogwood Road, 800 feet of which is estimated to be underlain by shallow bedrock. Ten-inch diameter piping would also be installed in or along State Route 82, creating a main distribution trunk. New eight-inch water mains would be constructed to deliver water from the main within study area streets. Some rehabilitation of the existing distribution system and some upgrading from six-inch to eight-inch diameter pipes may also be required to establish appropriate connections to the existing system. During the installation of the water supply line, fire hydrants will be installed every 500 linear feet of supply line. The proposed water main delivery route is presented in Figure 2.

Under this alternative, connection from the water main to the house would be provided in the form of ¾ inch copper piping, typical of the connections made within the Little Switzerland district. Soil cuttings from the connection of the private properties to the water mains would remain on the property.

Following connection to a public water supply, private wells in the hook-up area would be abandoned. As a result of the well abandonment, annual sampling of private residential wells would be terminated.

OMM is currently provided by the existing public water utility. Under this alternative, the utility would continue to oversee the OMM of the system.

Basis for the Remedy Preference

EPA is proposing Alternative AWS-3 to eliminate any potential exposure to contaminated groundwater through private drinking water wells. The Agency believes it would be the most protective of human health in the long-term. While Alternative AWS-2 would include installation of POET systems on all private water wells, such systems are generally not considered to be a permanent remedy and breakthrough of contaminants could occur in the future, resulting in exposure to contaminants. In the short-term, Alternative AWS-2 would be protective of human health, but it would not provide a permanent solution. While Alternative AWS-3 would be more difficult to implement in the short term, the overall long-term benefits of a clean and reliable source of drinking water would be the most beneficial outcome.

Alternative AWS-1, No Action, would rely solely on natural processes to restore groundwater quality to beneficial use, and it does not include any long-term groundwater monitoring to assess the effectiveness of this remedy.

Therefore, EPA and NYSDEC believe that Alternative AWS-3, Provision of Alternate Water Supply, would eliminate the potential for exposure to contaminated drinking water at the Site while providing the best balance of tradeoffs among the alternatives with respect to the evaluation criteria.

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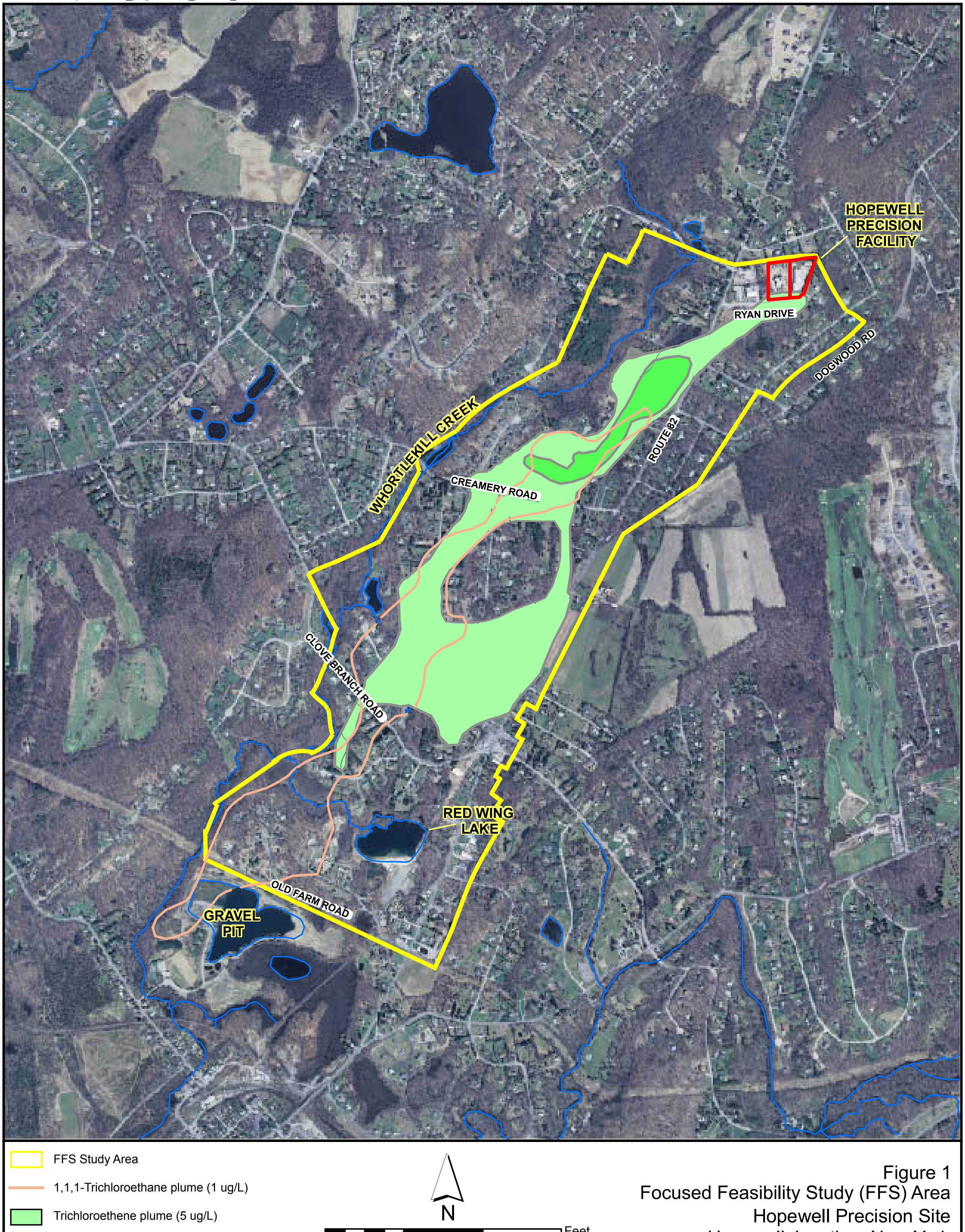

Figure 1
Focused Feasibility Study (FFS) Area
Hopewell Precision Site
Hopewell Junction, New York

CDM

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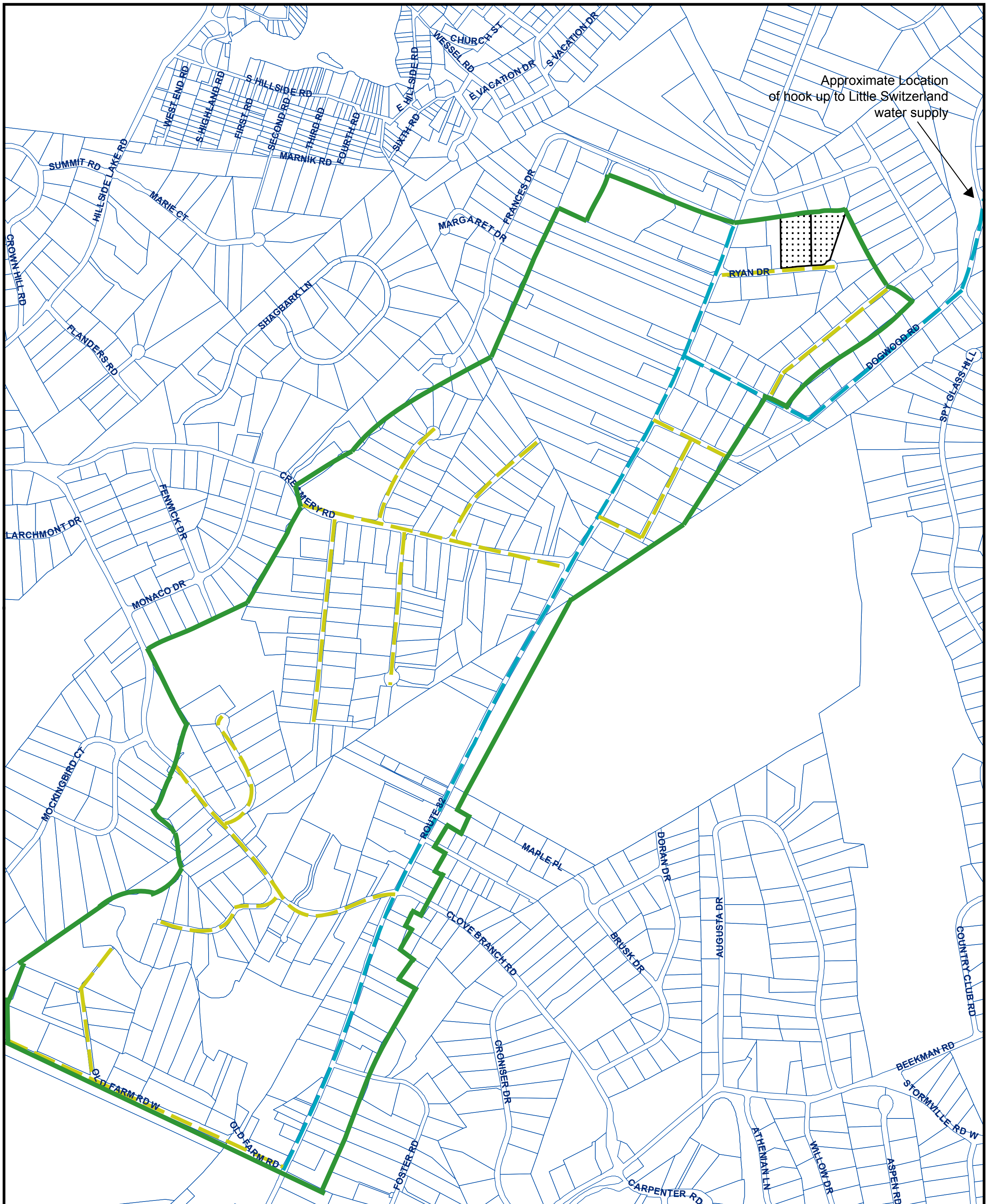

Hopewell Precision Facility
Parcel Boundary
Study Area
Water Supply Delivery Route (8" pipe)
Water Supply Delivery Route (10" pipe)

N

Feet
0 500 1,000 2,000

Figure 2
Alternate Water Supply Delivery Route
Hopewell Precision Site
Hopewell Junction, New York

CDM