DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Mohonk Road Industrial Plant Site

Superfund Identification Number: NYD986950012

Hamlet of High Falls, Towns of Marbletown and Rosendale

Ulster County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for the Mohonk Road Industrial Plant Superfund Site, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for the Site. The information supporting this remedial action decision is contained in the administrative record. The index for the administrative record is attached to this document (APPENDIX III).

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from the NYSDEC is attached to this document (APPENDIX IV).

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

The remedial action described in this document addresses contaminated soil and groundwater at the Mohonk Road Industrial Plant Site. The Site includes the Mohonk Road Industrial Plant property as well as those areas impacted by the groundwater plume emanating from the property. This remedial action supplements a non-time critical removal action (NTCRA) undertaken by EPA to address the most contaminated portion of the groundwater plume, and interim remedial measures taken by NYSDEC to provide granular activated carbon (GAC) filters for residential and commercial wells with volatile organic compounds (VOCs) above New York State (NYS) Maximum Contaminant Levels (MCLs), and to remove a 1000-gallon tank which was the major suspected source of contamination.

Selected Groundwater Response and Alternate Water Supply Remedy

The selected groundwater and potable water supply remedy includes:

$ Extraction of contaminated groundwater in the nearfield and farfield plume to restore the aquifer to most beneficial use (as a potable water supply), treatment with and air stripper, and discharge of the treated water to the Rondout Creek and Coxing Kill. The Anearfield plume@ refers to that portion of the groundwater plume with total VOC concentrations greater than 1,000 parts per billion (ppb), while the Afarfield plume@ refers to the groundwater plume with 10 ppb to 1,000 ppb total VOCs. The nearfield plume will be addressed through continued operation of the NTCRA groundwater extraction and treatment system. The farfield plume will be addressed through the construction of an additional extraction and treatment system.

$ The construction of a public water supply system to provide potable water to the residences and businesses in the Towns of Marbletown and Rosendale with impacted or threatened private supply wells. The primary water supply for the system will be the Catskill Aqueduct.

$ Implementation of a groundwater monitoring program to evaluate the effectiveness of the remedy, and institutional controls, such as groundwater use restrictions, may be employed to prevent use of the bedrock aquifer in the impacted or threatened area.

Selected Source Control Remedy (for contaminated soil)

The major components of the selected soil remedy include:

$ Excavation of VOC-contaminated soils above the cleanup criteria to prevent or minimize cross-media impacts from contaminants of concern in soil to the underlying groundwater.

$ Off-Site disposal of the contaminated soil at appropriately permitted facilities.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA '121. It is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and the groundwater remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because this remedy will not result in hazardous substances, pollutnats, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, but will take more than five years to attain remedial action objectives and cleanup levels in the groundwater, a policy review may be conducted no less often than each five years after the initiation of the remedial action for the Site to ensure that the remedy is, or will be, protective of human health and the environment.

DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the Administrative Record file for this site.

A Chemicals of concern and their respective concentrations (see ROD pages 4-8);

A Baseline risk represented by the chemicals of concern (see ROD pages 9-);

A Cleanup levels established for chemicals of concern and the basis for these levels (see ROD page);

A How source materials constituting principal threats are addressed (see ROD page);

A Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD (see ROD page);

A Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy (see ROD page);

A Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (see ROD page); and

A Key factors that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (see ROD page).

AUTHORIZING SIGNATURE

Jeanne M. Fox
Regional Administrator

Date

RECORD OF DECISION

Mohonk Road Industrial Plant Superfund Site

Hamlet of High Falls,
Towns of Marbletown and Rosendale
Ulster County, New York

United States Environmental Protection Agency
Region II
New York, New York
March 2000

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ATTACHMENTS

SITE NAME, LOCATION AND DESCRIPTION

The Mohonk Road Industrial Plant (MRIP) Superfund Site (the Site) is located in the Hamlet of High Falls, Ulster County, New York, approximately 7 miles north-northwest of the Village of New Paltz and 10 miles south-southwest of the City of Kingston. The Hamlet of High Falls is situated within two townships, the Towns of Marbletown and Rosendale (see FIGURE 1). The MRIP Site was added to the National Priorities List (NPL) on January 19, 1999; the Superfund identification number for the Site is NYD986950012. The New York State Department of Environmental Conservation (NYSDEC) served as the lead agency for the Remedial Investigation and Feasibility Study (RI/FS) which was initiated prior to the Site being placed on the NPL, however the United States Environmental Protection Agency (EPA) has assumed the role as lead agency; the likely source of cleanup monies is the Superfund trust fund.

The MRIP Site includes the Mohonk Road Industrial Plant property located at 186 Mohonk Road (the MRIP property), and all surrounding properties that have been impacted by the contaminated groundwater plume emanating from the MRIP property (off-MRIP property). The MRIP property consists of approximately 14.5 acres of mostly undeveloped land with a 43,000 square foot building in its southern corner. The Site-related groundwater plume extends approximately 4,000 feet from the MRIP property and has adversely impacted at least 70 residential, commercial and/or municipal water supply wells as of this date.

The Site is located in an area of primarily residential development. There are approximately 159 households and 412 people residing within a 1-mile radius of the Site. Groundwater is the primary source of drinking water in the Hamlet of High Falls. Industrial activities have taken place on the MRIP property since the early 1960's. The MRIP property is currently zoned for light industrial use, and the most reasonably anticipated future use for the MRIP property is light industrial use.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

History

The MRIP property has been used for industrial purposes since the early 1960s. From the early 1960s to 1972, Varifab, Inc., a metal finisher, owned and occupied the Site and reportedly used solvents in the finishing and assembly of metal parts for card punch machines and computer frames. From 1972 to 1975, a wet spray painting company, R.C. Ballard Corp., operated at the Site. This type of painting operation would require large quantities of solvents in order to clean surfaces prior to painting. The Site was purchased by in 1976 by Daniel Gelles; Daniel E. Gelles Associates, Inc. manufactured store display fixtures which may have involved the use of solvents. Banco Popular de Puerto Rico foreclosed on the MRIP property in 1992. The Site is currently owned by Kithkin Corp., which purchased the property at auction in 1993, and currently leases the northeastern section of the building to a small woodworking company.

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) concerning the quality of her drinking water. The resident=s well was sampled in April 1994 by UCHD and was found to contain elevated levels of volatile organic chemicals (VOCs). Additional sampling was performed by UCHD, and to date residential well sampling has identified 70 other homes or businesses downgradient of the Site with VOCs above Federal and/or New York State (NYS) Maximum Contaminant Levels (MCLs). NYSDEC began investigating the MRIP Site in 1994. As an interim action to address immediate health threats, NYSDEC installed granular activated carbon (GAC) filters at preexisting homes or businesses whose wells exceeded the NYS MCLs [5 parts per billion (ppb), or micrograms/liter, for individual VOCs]. UCHD is currently monitoring domestic wells on the perimeter of the plume to ensure that the water continues to be safe for domestic use.

In August 1994, NYSDEC designated the MRIP Site a Class 2 site on the New York State Registry of Inactive Hazardous Waste Sites. The Class 2 designation indicated that the Site posed a significant threat to public health and the environment. In the fall of 1996, NYSDEC contracted Lawler, Matusky & Skelly Engineers LLP (LMS) to conduct an Immediate Investigation Work Assignment (IIWA). An additional IIWA was tasked to LMS by NYSDEC in the spring of 1997. As an interim action, NYSDEC excavated a tank believed to be the major source of groundwater contamination at the Site, along with approximately 25 tons of contaminated soil in September 1997. This tank was originally installed as part of a septic system, but subsequently was also used for solvent disposal at the Site; hereinafter it is referred to as the Adisposal tank@. In 1997, after repeated, unsuccessful attempts to have a responsible party fund the Site investigation and cleanup, NYSDEC contracted LMS to conduct a RI/FS. The RI and FS Reports were issued by NYSDEC in September 1998 and March 1999, respectively.

On March 11, 1998, the EPA received a request from the NYSDEC to evaluate a proposed Interim Response Measure (IRM) at the MRIP Site as a removal action under CERCLA. EPA determined that a sufficient planning period existed before Site activities for the removal action had to be initiated, and accordingly, this response was conducted as a non-time critical removal action (NTCRA). The NTCRA has involved construction of a groundwater extraction and treatment system which is designed to minimize the further migration of the most highly contaminated portion of the groundwater plume in the bedrock aquifer. EPA issued a Proposed Response Action document for this interim groundwater action on February 26, 1999. The Action Memorandum for the NTCRA was finalized on June 4, 1999. As part of the NTCRA, throughout 1999, EPA conducted additional field work to characterize the Site. The NTCRA groundwater extraction and treatment plant is expected to become operational in spring 2000.

Enforcement Activity

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The following PRPs have been identified with regard to the Mohonk Road Industrial Plant Site: Varifab, Inc., R.C. Ballard Corporation, Daniel E. Gelles Associates, Inc., Mr. Daniel E. Gelles, and Kithkin Corporation. With the exception of Kithkin Corp., which is a current owner, all of the identified PRPs are former owners and/or operators of 186 Mohonk Rd., the source of the release of hazardous substances from the Site.

The PRPs declined the opportunity to perform the RI/FS at the Site when requested by the NYSDEC. EPA issued Notice of Liability letters to Kithkin Corporation, Mr. Daniel E. Gelles and Daniel E. Gelles Associates, In. Each of the three PRPs were offered the opportunity to perform a non-time critical removal action at the Site. The PRPs declined to undertake the removal action. EPA=s PRP search efforts are ongoing.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

NYSDEC prepared a Citizen Participation Plan for the Site, dated June 1997. The Citizen Participation Plan included a community profile and contact list, and has also been used by EPA for its community outreach efforts at the Site. Site reports have been made available for public review at information repositories at the EPA Docket Room in Region II, New York, the Stone Ridge Library, Stone Ridge, New York, and the Rosendale Public Library, Rosendale, New York.

EPA participated in a public meeting hosted by NYSDEC on October

28, 1998 to discuss the RI and the preliminary results of the FS. At the October 1998 meeting, EPA presented the preliminary findings of its Engineering Evaluation and Cost Analysis (EE/CA) report, which reviewed alternatives for the NTCRA.

EPA issued a Proposed Response Action document for the NTCRA on February 26, 1999. The EE/CA, the Removal Site Evaluation (RSE), and a Site Fact Sheet were made available for review at the information repositories for the Site. On March 22, 1999, EPA conducted a public meeting at the High Falls Firehouse to discuss the NTCRA and to receive public comments.

EPA mailed an updated Fact Sheet for the Site to all persons on the Site mailing list in June 1999 and hosted a public availability session to discuss the NTCRA and potential long-term cleanup plans on June 17, 1999. Another updated Fact Sheet was mailed to all persons on the Site mailing list in October 1999 and an another public availability session was hosted by EPA on November 3, 1999.

A Technical Assistance Grant (TAG) was awarded to the High Falls Water Coalition (HFWC) on September 2, 1999. The HFWC sent out two newsletters to people on the Site mailing list in October 1999 and January 2000. HFWC has selected two firms, Rhode, Soyka & Andrews, and Leggette, Brashears & Graham, to provide technical input on remedy selection and design.

The Proposed Remedial Action Plan (PRAP, or Proposed Plan) was prepared by NYSDEC, with consultation by EPA, and finalized in November 1999. A notice of the Proposed Plan and public comment period was placed in the <u>Daily Freeman</u> on November 15, 1999 consistent with the requirements of NCP '300.430(f)(3)(i)(A), and a summary of the Proposed Plan was mailed to all persons on the Site mailing list. The PRAP was made available for review at the information repositories for the Site. Prior to the onset of the public comment period, EPA received a request from the HFWC that the comment period be established for 60 days rather than 30 days. The public comment period was scheduled from November 15, 1999 to January 15, 2000, but was extended to February 15, 2000 to accommodate additional requests for an extension. EPA hosted a public meeting on December 2, 1999 to discuss the Proposed Plan. At this meeting, representatives from EPA and NYSDEC answered questions about contamination at the Site and the remedial alternatives. EPA=s responses to comments received during the public meeting, along with responses to other written comments received during the public comment period, are included in the Responsiveness Summary (APPENDIX V).

SCOPE AND ROLE OF RESPONSE ACTION

Cleanup at the Site is currently being addressed as one operable unit (OU). To date, the following interim actions have occurred at the Site:

$ removal of the major suspected source of contamination (a 1000-gallon disposal tank) by NYSDEC in 1997, and 25 tons of contaminated soil;
$ installation of GAC filters on 70 homes and businesses adversely impacted by the VOC plume; and
$ installation of a groundwater extraction and treatment system as part of the NTCRA undertaken by EPA, to minimize the further migration in the bedrock aquifer of the most highly contaminated portion of the groundwater plume (the nearfield plume).

This Record of Decision (ROD) describes the comprehensive long-term remediation plan for the entire Site, which will incorporate the above actions, and is expected to be the only ROD issued for the Site. The components of this ROD will:

$ address soils above cleanup objectives which serve as a source for groundwater contamination;
$ provide an alternate water supply for impacted and threatened residences; and
$ address the long-term remedial action for the near- and farfield plume.

The interim actions described above will be incorporated through continued maintenance of the GAC filters until an alternate water supply is provided, and continued operation of the NTCRA until the comprehensive groundwater remedy can be implemented.

SUMMARY OF SITE CHARACTERISTICS

The purpose of the RI was to define the nature and extent of contamination resulting from previous industrial activities at the MRIP property. NYSDEC=s fieldwork for the RI was conducted from April 1997 to December 1997, and April 1998 to June 1998. The RI Report was issued by NYSDEC in September 1998.

The RI included the following activities:

$ private water well survey and sampling;
$ soil borings and sampling;
$ test pit excavation and subsurface soil sampling;
$ tracing drain lines from the building to determine additional contamination source areas on the MRIP property;
$ surface water sampling;

- groundwater monitoring well installation and sampling;
- groundwater flow monitoring analysis and water table elevation monitoring;
- groundwater pumping tests;
- human health exposure assessment; and
- habitat assessment.

In 1999, additional site characterization was performed by EPA's Removal Program in order to implement the NTCRA. This work consisted of:

- geophysical investigations;
- installation of additional monitoring and extraction wells;
- groundwater sampling and pump tests;
- groundwater modeling;
- ecological study of the Coxing Kill creek;
- residential well sampling and surveys;
- soil test pitting and contaminated soil removal.

To determine which media (soil, groundwater, air, etc.) contain contamination at levels of concern, the analytical data were compared to applicable or relevant and appropriate requirements (ARARs), or other relevant guidance if no ARARs were available.

Based upon the results of the RI and the additional EPA field investigations, it is clear that soil and groundwater at the Site require remediation. Results of these investigations are summarized in this Record of Decision, however, more complete information can be found in the RI and the relevant Technical Memoranda (that document the Removal Program's field activities which are relevant to this ROD). Documents are included in the administrative record for the Site (APPENDIX III), and are available at the Site information repositories.

Physical Site Conditions

The MRIP property consists of approximately 14.5 acres of mostly wooded, undeveloped land and a 43,000 square foot building in the southern corner of the property (FIGURE 2). Two production wells are located within the building. The area south of the building consists of a large lawn and a gravel driveway. The gravel drive wraps around the sides of the building, providing access to loading docks along the western end of the building. The lawn and driveway slope gently down to a culvert that passes beneath Mohonk Road allowing surface water to drain from the property. The small open area immediately west of the building is level to the edge of the driveway. The NTCRA treatment plant has been constructed in this area.

The Site is located in an area of chiefly residential development. The MRIP property is bounded on the southeast by Mohonk Road and to the northeast, northwest, and southwest by residential properties on large wooded lots. The property to the south is currently used to store machinery and trucks utilized for paving operations. Approximately 159 households and 412 people reside within a one-mile radius of the MRIP property. Groundwater is the primary source of drinking water within four miles of the MRIP property. The nearest residential drinking water wells are located within 500 feet of the building located on the MRIP property.

The nearest permanent watercourses to the Site are the Rondout Creek (Class B waters; Waters Index #139-14, Part 855.4) and Coxing Kill creek (Class C[T] waters, Waters Index #139-14-9, Part 855.4). Rondout Creek is not stocked with trout near the Site by either NYSDEC or the Ulster County Federation of Sportsmen. The creek is popular with recreational anglers, who fish for warmwater species such as smallmouth bass.

The Catskill Aqueduct, which passes about 700 ft to the south of the MRIP property, is owned by the City of New York and maintained by the New York City Department of Environmental Protection (NYCDEP). This aqueduct supplies water to the New York City Reservoir System from the Ashokan Reservoir via an underground tunnel. The tunnel, as it passes through the Rondout Valley area in High Falls, is 14.5 feet in diameter, is about 500 feet below grade and is lined with concrete. A siphon house for the aqueduct (the Rondout Dewatering Chamber) is located approximately 1,200 feet west of the MRIP property.

Geology and Hydrogeology

The Site is located in the Northern Shawangunk Mountain region where the Shawangunk Formation is the dominant rock type. The Shawangunk Formation is principally interbedded orthoquartzite sandstone and conglomerate that is highly resistant to erosion. It has essentially no primary porosity and permeability, and only secondary fracture porosity and permeability exist, which are the primary controls on groundwater flow and the hydraulic properties of the Shawangunk Fractured Bedrock Aquifer System (SFBA). The fractures are highly variable in geometry and density making the flow conditions highly variable and localized, causing the aquifer to have poor groundwater storage capacity. This aquifer is recharged directly by precipitation on exposed bedrock areas and by infiltration through the overburden material. The MRIP property is found near a topographical high and serves as a recharge area for the bedrock aquifer. In general, the migration of groundwater from the Site is to the north-northeast toward Rondout Creek, which lies approximately 5,000 feet north of the Site (see water contour map, FIGURE 3). Vertical flow gradients on the MRIP property are clearly downward. However, artesian or upward groundwater flow has been reported in residential wells along Berme Road near the Rondout Creek and has been observed in a monitoring well near this location.

The Shawangunk Formation is locally overlain by the High Falls Shale. The locations of geologic cross-sections are shown in FIGURE 4, an actual cross section is shown in FIGURE 5, and a more localized geological cross section is shown in FIGURE 8. Much of the bedrock in the area is unconformably overlain by lodgement till. These deposits thinly mantle most of the area, with depths ranging from 9 to 28 feet on the MRIP property, and from 7 to 85 feet in off-MRIP property wells. The till (hereinafter Aoverburden@) consists of a nonstratified and poorly sorted mostly silt and fine grained sand matrix with coarser clasts predominantly of sandstone-quartzite composition. The compactness of this till inhibits rapid infiltration and subsurface water movement. The soil or overburden groundwater is limited and is not widely used as a source of potable water. There are a number of springs in the area which are used as sources of water by some residents. Sampling indicates that these springs are not contaminated by Site-related chemicals.

Previous pumping tests conducted as part of a study by an organization known as Mohonk Preserve, Inc. concluded that the SFBA is a very poor aquifer with regard to its low storitivity values. Well yields were found to be highly erratic and the average production figures do not assure successful well installation. Despite this, the entire potable water supply for the Hamlet of High Falls comes from individual groundwater wells. Highly variable water levels within very short distances indicate that the SFBA is comprised of distinct fracture networks that are only locally interconnected.

Three distinct water bearing zones were identified in the RI: an overburden flow zone, a bedrock interface flow zone (at the shallow soil/bedrock interface), and a bedrock flow zone [the Shawangunk Fractured Bedrock Aquifer System (SFBA)]. Throughout this ROD, monitoring wells installed to these depths are referred to as overburden, interface, and bedrock (or SFBA) wells, respectively.

In order to better evaluate alternatives for alternate water supplies and plume control systems, a groundwater flow model (MODFLOW) was developed as part of the FS. The modeling study was used to predict the effect that groundwater pump and treat systems would have on continued use of private wells as a water source and plume migration, as well as to predict the bedrock aquifer response to the water supply alternatives. The model assumed that the NTCRA extraction and treatment system was operational (pumping at 40 gallons per minute), and evaluated the plume migration when the private (primarily residential) wells were pumping as well as when the wells were taken out of service. Important conclusions drawn from the model include:

$ The model indicated that if the residential wells were pumping, the VOC groundwater plume would continue to migrate north and northwest towards the Rondout Creek and northeast towards the Coxing Kill (FIGURE 6).

$ The model also indicated that if the residential wells were taken out of service, the groundwater plume would migrate north and northwest towards Rondout Creek and northeast towards the Coxing Kill creek at a more rapid rate and be drawn into currently unimpacted private wells (a section of properties near Rondout Creek)(FIGURE 7). In other words, if a public water supply were implemented, an aquifer-wide groundwater extraction and treatment system would be needed to prevent the plume from migrating further.

EPA performed additional groundwater modeling (using the TIMES model) to determine optimal rates of groundwater extraction, and expected water table drawdown, for the NTCRA. The modeling is described in a June 15, 1999 Technical Memorandum, which is part of the administrative record for the Site. The maximum estimated water table drawdown in the closest residential well is expected to be approximately 20 feet based on the extraction model simulating steady-state conditions. Initially, the drawdown at this well will be substantially less than 20 feet, and it would take several years to reach this level of steady-state drawdown. As part of the NTCRA, EPA will install monitoring devices in the monitoring wells near Mohonk Road; therefore, there will be sufficient time to monitor the drawdown levels and reduce the rates of extraction prior to any adverse impact on nearby wells.

In order to locate zones of groundwater entry into monitoring wells, determine optimum sampling depths, and to better define lithology, downhole geophysical investigations were performed by NYSDEC and EPA=s Removal Program. NYSDEC geophysically logged several wells off the MRIP property and one well on the MRIP property. In September 1999, EPA=s Removal Program geophysically logged several wells on the MRIP property. The NYSDEC logging identified water producing fractures throughout the vertical extent of bedrock, at depths ranging from 37 to 194 feet. The results of the NYSDEC geophysical study correlate well with observations made during well drilling. FIGURE 8 shows a geologic cross section as compiled from the monitoring well boreholes. The geophysical logging performed by EPA=s Removal Program found fractures at depths of 20 to 176 feet below ground surface, and the results suggested the presence of thin interbeds of a finer-grained material.

Soil, Sediment and Surface-Water and Groundwater Contamination

The field work and sampling performed during the RI and additional field studies during the removal action characterized the nature and extent of chemical contamination at the MRIP Site. A general discussion of these findings is presented below, organized by media sampled (e.g., soil, groundwater). See TABLES for analytical data; see the RI and the technical reports by EPA=s Removal Program for a more complete examination of the analytical results. This information is available in the administrative record (index attached as APPENDIX III).

Drum and Sludge (Disposal Tank) Sampling

During Phase I and Phase II Environmental Assessments performed by Enviropact, Inc. for Banco Popular in 1992 and 1993, respectively, 10 drums were found on the MRIP property and subsequently sampled. Samples from these drums contained the following VOCs: 1,1-dichloroethene (DCE), toluene, 1,1,1-trichloroethane (TCA), ethylbenzene, and xylene.

Sludge samples collected from the 1000-gallon disposal tank on the MRIP property during NYSDEC=s IIWA were found to contain 26% TCA (260,000 milligrams/kilogram, or mg/kg) and DCE at 18,000 mg/kg (TABLE 1). The disposal tank is believed to have been the major source of groundwater contamination, and was excavated with approximately 25 tons of contaminated soils by NYSDEC in September 1997 as an interim remedial measure.

Groundwater Sampling

The results of the Site investigations indicate that a VOC groundwater plume exists in the SFBA at the Site with VOCs above Federal and NYS MCLs [40 CFR Part 141.11-141.16 and Part 141.60-141.63, and New York Code of Rules and Regulations (NYCRR) Title 10, Chapter I, Subpart 5-1, respectively]. An approximately 170-acre groundwater plume with total VOC concentrations of at least 10 ppb extends a distance of about one mile to the north of the MRIP property. The extent and concentration levels of the bedrock groundwater contamination are depicted in FIGURE 9. For the most part, total VOCs consisted of TCA, the contaminant typically found in highest concentrations at the Site, and its degradation products (e.g., 1,1-dichloroethane (DCA) and DCE). In addition, trichloroethene (TCE) was also frequently detected in groundwater wells. The NYS MCL for each of these VOCs is 5 ppb.

From 1996 to 1998, NYSDEC installed eleven monitoring wells on the MRIP property, and eleven monitoring wells off the MRIP property. Of the wells installed on the MRIP property, five are interface wells (MRMW-1, -2, -3, -4, and -5), four are bedrock monitoring wells (MRMW-1B, -5B, -6B, and -7B), and two are bedrock extraction wells (MRMW-5R and -7R) (see FIGURE 2). As part of the NTCRA, EPA=s Removal Program later installed four additional wells on the MRIP property (ERT-1, ERT-2, ERT-3, and ERT-4), which are all bedrock extraction wells (see FIGURE 10). Of the wells installed by NYSDEC off the MRIP property, two are overburden wells (MRMW-9, and -11), and nine are bedrock monitoring wells (MRMW-8B, -9B, -10B, -11B, -11C, -12B, -13B, -14B, and -15B) (see FIGURE 9).

Six rounds of groundwater monitoring well samples for the RI were collected by NYSDEC in November 1996, May 1997, September 1997, December 1997, May 1998, and October 1998. Not all monitoring wells were sampled during each sampling event. Two additional rounds of groundwater sampling were performed by EPA=s Removal Program in March (wells on the MRIP property) and October 1999 (all Site monitoring wells).

The RI concluded that contamination entered the bedrock groundwater near the former disposal tank and spread northward from the MRIP property in the SFBA. The most concentrated portion of the groundwater VOC plume was detected in wells near the former disposal tank (indicated on FIGURE 2). Interface well MRMW-4 is located next to the former disposal tank, and a sample collected from this monitoring well in November 1996 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 elevated levels of these VOCs in this well, and although levels decreased significantly after the disposal tank was removed by NYSDEC in August 1997, the levels of VOCs remain elevated well above NYS or EPA MCLs. For example, TCA was detected at 15,000 ppb in May 1998 and at an estimated 6,800 ppb in October 1999 (see TABLES 2 and 3).

Samples from the nearest downgradient bedrock monitoring well, MRMW-5B, were also found to have elevated levels of TCA, DCA, DCE and TCE. The total VOC levels found in this well were consistently greater than 1,000 ppb during sampling performed for the RI. The levels of TCA found in MRMW-5B were 4,900 ppb in September 1997; 1,800 ppb in December 1997; and 2,800 ppb May 1998. Monitoring well sampling of MRMW-5B completed since the conclusion of the RI has indicated that the contaminant levels in this well have not appreciably decreased (2,900 ppb TCA in October 1999). MRMW-5R had similar, although lower, levels of contaminants as MRMW-5B, e.g., 1,300 ppb TCA in May 1998.

The sampling results from ERT-1, -2, -3, and -4 (installed on the MRIP property in 1999 by EPA's Removal Program) have also confirmed elevated VOC levels on the MRIP property. Of the four ERT wells, ERT-4 is closest to the location of the former disposal tank which was believed to be the source of contamination, and had the highest VOC total (an estimated total of 7,510 ppb TCA, DCA, DCE and TCE in October 1999). ERT-1 is also located within the nearfield plume, with an estimated total of 1,764 ppb TCA, DCA, DCE and TCE in October 1999. VOC levels in ERT-2 and ERT-3 are considerably lower, with estimated totals of TCA, DCA, DCE and TCE of 452 ppb and 195 ppb in October 1999, respectively (TABLE 3).

The flow direction of the nearfield plume has a westward component, as is evidenced by the monitoring results for MRMW-7B. MRMW-7B is approximately 400 feet northwest of the former disposal tank, and had elevated levels of TCA and related compounds. The VOC levels in this well have fluctuated dramatically, with TCA levels of 28 ppb (May 1997), 1,600 ppb (September 1997), 930 ppb (December 1997), and 54 ppb (May 1998). VOC levels are also elevated in MRMW-7R, which is located immediately adjacent to MRMW-7B, with 970 ppb of TCA detected in May 1998.

Monitoring well data also indicates that upon release into the overburden, the contaminants migrated into the bedrock aquifer without significant lateral movement. For example, interface monitoring well MRMW-5 (14.5 feet deep) is located less than 100 feet downgradient of MRMW-4 (19.5 feet deep) but is significantly less impacted than MRMW-4, with the highest detection of TCA at 51 ppb in the December 1997 sampling round (compared to 28,000 ppb TCA detected in MRMW-4 during this sampling round). However, the bedrock well nearest MRMW-5 (MRMW-5B, 34 feet deep) has been significantly impacted by VOCs, as previously discussed. This indicates that the contamination is moving vertically downward on the MRIP property directly into the underlying bedrock aquifer. No VOCs above the 5 ppb groundwater standard have been detected in off-MRIP property overburden wells MRMW-9 and MRMW-11, confirming that the contaminant plume entered the SFBA before the plume migrated from the MRIP property.

Data from monitoring wells installed off the MRIP property have helped to delineate the extent of the groundwater plume. The off MRIP property bedrock monitoring well MRMW-11B was drilled to a depth of 181 feet; TCA was detected at 540 ppb in May 1998 and 190 ppb in October 1999. Further downgradient, levels of TCA in monitoring well MRMW-12B have ranged from an estimated 5 ppb

(December 1997) to 190 ppb (October 1999), and levels of TCA in MRMW-15B have ranged from 340 ppb (May 1998) to 380 ppb (October 1999). Monitoring wells MRMW-12B and MRMW-15B are located approximately 1,600 feet downgradient from the former disposal tank.

Sampling using packers to isolate fracture zones was conducted on MRMW-11B, MRMW-12B and the MRIP production well MRPW-2 in order to characterize the vertical extent of contamination; the results are summarized in TABLE 4. A sample from MRMW-11B taken at 181 feet below grade during packer testing had an estimated 628 ppb of total VOCs. The levels of total VOCs detected in MRMW-12B during packer testing were 604 ppb (at 40 feet below grade), 598 ppb (at 60 feet below grade), and 312 ppb (at 80 feet below grade). These values are significantly higher than those detected in this well during the 1997 and 1998 rounds of sampling. TABLE 5 indicates the bottom elevations of interface well MRMW-4 and bedrock well MRMW-5B, the elevations of known contaminated fractures in MRMW-11B, MRMW-12B, and MRPW-2, the elevation of fractures (detected during drilling) in MRMW-5R and MRMW-11C, the distance from the former disposal tank, and the total VOC levels found in each well. The data indicates that contamination generally exists deeper in the aquifer with distance downgradient from the MRIP property; however, the contamination in MRMW-12B is found at a higher elevation than that in MRMW-11B, which is located closer to the MRIP property. This illustrates that contaminated fractures are located throughout the vertical extent of the SFBA which exhibit localized vertical flow patterns (i.e., vertically downward from MRMW-4 to MRMW-11B, then upward from MRMW-11B to MRMW-12B).

Monitoring wells located upgradient of the MRIP property were also tested during the remedial investigation, but none were found to contain TCA or other VOCs at concentrations above NYS or Federal MCLs.

Elevated levels of naturally occurring metals (primarily iron, manganese, calcium, and magnesium) have been detected at the Site and have also been observed in the background overburden and bedrock wells; the levels fluctuated dramatically during the sampling rounds, for example, the levels of iron in MRMW-7R ranged from 10,300 ppb in May 1998 to 38 ppb in October 1999. Only a few inorganics were detected above their respective MCLs. Arsenic was detected above Federal MCLs in samples from MRMW-8B in September 1997 (76 and 26 ppb in total and dissolved samples, respectively), but not during subsequent sampling. The Federal MCL for arsenic is 50 ppb. Barium has been detected at levels above Federal MCLs in MRMW-14B (3,800 ppb and 3,660 ppb in total and dissolved samples, respectively, from September 1997; and 3,390 ppb in December 1997) and MRMW-8B (4,350 ppb in October 1999), but subsequent samples were not above MCLs. The Federal MCL for barium is 2,000 ppb. Antimony has been detected in dissolved samples from MRMW-1B (September 1997), MRMW-6B (September 1997), and MRMW-10B (December 1997), at low levels below the Federal MCLs. The Federal MCL for antimony is 6 ppb. No inorganic chemicals have been retained as chemicals of concern.

Residential Well Sampling

The maximum concentrations of TCA, TCE, DCE, and DCA detected during UCHD residential and business well sampling were: 4,700 ppb TCA and 270 ppb TCE in one residential well located over 1,000 feet downgradient of the MRIP property, 270 ppb DCE in a residential well over 1,100 feet downgradient of the MRIP property, and 260 ppb DCA in a residential well located over 200 feet downgradient of the MRIP property. Since the discovery of the Site in 1994, the UCHD has continued to monitor residential wells on the perimeter of the plume to ensure that the water in these wells continues to be safe for domestic use. The results from residential and business well sampling conducted by NYSDEC during the RI found a maximum concentration of 880 ppb TCA, and a maximum total VOC concentration of 1,077 ppb in a residential well more than 750 feet downgradient of the MRIP property. Approximately 230 residential and/or business wells in the Towns of Marbletown and Rosendale have been sampled as part of the UCHD, NYSDEC and/or EPA sampling events.

Surface Water

Samples were collected from various ponds and other water bodies downgradient of the MRIP property. With the exception of the cistern located just north and downgradient of the MRIP property, none of the samples were contaminated with Site-related contaminants. The cistern was 10-12 feet in depth and contained approximately a foot of water at the bottom. This water was more indicative of groundwater at the bedrock interface than surface water. The sample, collected in July 1997, contained TCA at 43 ppb and DCE at 4 ppb, which is consistent with interface monitoring well MRMW-5 located on the MRIP property, approximately 300 feet upgradient of the cistern. VOCs have not been detected in samples collected from springs which are used by some residents in the area.

EPA sampling in 1999 indicated the Rondout Creek and Coxing Kill are not contaminated with Site-related chemicals. For additional details on the Rondout Creek sampling event see the Removal Program sampling trip report, dated April 8, 1999, and the data validation reports dated June 3, and June 21, 1999. For additional details on the Coxing Kill sampling see Interim Report 2, Ecological Evaluation of the Proposed Effluent Discharge to the Coxing Kill

Creek From the Mohonk Road Industrial Plant Site. These reports are part of the administrative record.

Surface and Subsurface Soils

The 1000-gal underground disposal tank with two concrete access covers, removed by NYSDEC in August 1997, was located just over 100 feet north of the building in a wooded area. NYSDEC used radiodetection in conjunction with the excavation of test pits at strategic points around the building to trace the influent and effluent lines for the disposal tank, and identify drain lines exiting the building that might lead to other potential source areas. The locations of test pits, test pit samples, and identified drain lines are depicted on FIGURE 11.

RI samples were collected by using a direct push soil sampler and through the excavation of test pits and trenches. The excavations uncovered drain lines originating from inside the north, east, and west sides of the building. Subsurface soils samples were also collected from three locations inside the building. The soil data from the RI indicate that contaminated subsurface soils remain in the vicinity of the former 1,000-gallon disposal tank north of the building, in an area just west of the building, and in a small area under the building with limited quantities above cleanup objectives (FIGURE 12). There are approximately 200 cubic yards of contaminated subsurface soils that would need to be addressed in these areas identified by NYSDEC. Additional soil sampling will be conducted during the remedial design (RD) to refine this estimate. Contaminants that were found above NYSDEC Technical and Administrative Guidance Memorandum #4046 (TAGMs) for the protection of groundwater, include TCA at 4.6 parts per million (ppm) with a cleanup objective of 0.8 ppm, TCE at 0.73 ppm with a cleanup objective of 0.7 ppm, DCA at 1.3 ppm with a cleanup objective of 0.2 ppm, perchloroethylene (PCE) at 25 ppm with a cleanup objective of 1.4 ppm, ethyl benzene at 61 ppm with a cleanup objective of 5.5 ppm and xylene at 570 ppm with a cleanup objective of 1.2 ppm. The data from the NYSDEC test pit samples are shown on TABLE 6.

Based on EPA review of historical aerial photographs of the Site, in May 1999, EPA=s Removal Program performed a geophysical survey and developed test pits which identified a paint and debris disposal area immediately north of the northwest corner of the building on the MRIP property. Samples from this area were found to contain elevated levels of ethylbenzene, xylenes, and other paint-related compounds (including toluene, isopropylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, lead and naphthalene). This work is detailed in an EPA Trip Report titled Exploratory Trenching at the Mohonk Road Industrial Site, dated June 28, 1999. TABLE 7 displays soil sampling data from this event that exceed soil cleanup objectives. The highest levels of contaminants were found in test pit samples of solidified paint waste (P-1), a mix of paint waste and soil (S-4), and soil from the trench sidewall (S-11). Contaminants found above cleanup objectives include 6,132 ppm total xylenes, and 1,243 ppm ethylbenzene in the paint waste sample; 827 ppm total xylenes and 174 ppm ethylbenzene in the sample of the soil/paint waste mixture; and 18 ppm total xylenes in the soil sample. Low levels of TCA (below the cleanup objectives) were found in soil from the trench sidewall (S-11) and the northern excavation trench (S-1); and low levels of TCE (below the cleanup objectives) were also found in S-11 and in the solidified paint waste sample (P-1). In the fall of 1999, EPA=s Removal Program excavated a large portion of these contaminated soils (approximately 350 cubic yards). It is estimated that approximately 300 cubic yards of additional contaminated soil remains in the paint waste area which will require excavation. Additional soil sampling will also be conducted in this disposal area during the RD to further refine this estimate.

Ecology and Cultural Resources

Four freshwater wetlands regulated by NYSDEC (under Article 24 of the NYS Environmental Conservation Law) are present within a 2-mile radius of the MRIP property; however, none of the four are within 0.5 miles of the Site or are hydraulically connected to the Site.

A Federally-regulated wetland is present along Mohonk Road, approximately 50 feet southwest of the MRIP property. This wetland is designated as palustrine, scrub-shrub, broad-leafed deciduous, seasonally flooded/saturated on the U.S. Department of Interior Fish and Wildlife Service National Wetlands Inventory Map (Mohonk Lake quadrangle, draft). Other wetlands present in the area, associated with the flood plain of the Coxing Kill, are not associated with the proposed project area. Potential impacts and mitigation measures related to the construction of the NTCRA pipeline in this area were considered in the report entitled Ecological Evaluation of the Proposed Effluent Discharge Pipeline Routing from the Mohonk Road Industrial Plant Site, Interim Report 1, which is part of the administrative record.

A Step 1 Analysis of the MRIP Site was conducted following the guidelines in Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (NYSDEC, October 1994) in order to identify wildlife resources. The studies included: a desktop analysis of available maps and information; contact with agencies and organizations to provide Site-specific resources; a field survey, and an assessment of applicable fish and wildlife regulatory criteria based on the sampling results. Numerous wildlife observations have been made. No threatened or endangered birds, mammals, reptiles, amphibians, fish, or invertebrates inhabit this area. A description of the Step 1 Analysis is available in the RI (Chapter 8). The study concluded that no further study of fish and wildlife resources was necessary at that time.

A Phase 1A Literature Review and Archeological Sensitivity Assessment was finalized in March 1999 by Hartgen Acheological Associates for NYSDEC. The assessment concluded that numerous historic and prehistoric resources existed near the Site, including the Delaware and Hudson Canal Locks (Locks 15 through 20 are part of the Delaware and Hudson Canal Thematic National Historic Landmark), the High Falls Historic District (which includes properties on Bruceville Road, Second Street, Firehouse Road, Mohonk Road, and NYS Route 213) and the Lock Tender=s House and Canal Store Ruin. The assessment concluded that if water lines are installed within three feet of existing pavement or in other areas previously disturbed, it is likely that an archeological survey would not be necessary.

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USERS

The MRIP property is currently zoned for light industrial use. Discussions with the Town of Marbletown indicate it has no intent of modifying the zoning for the MRIP property. The most reasonably anticipated future use for the MRIP property is light industrial.

The Site is located in an area of chiefly residential development, where groundwater is the sole source of potable water. Most wells in the area currently draw water from the bedrock aquifer, which has been designated as Class GA groundwater by NYSDEC. Class GA groundwater is defined as follows: AThe best use of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters found in the saturated zone of unconsolidated deposits and consolidated rock or bedrock.@ Groundwater near the Site will continue to be used as a supply of potable water under future use scenarios.

SUMMARY OF SITE RISKS

Based on the analytical results of the RI, a Human Health Exposure Assessment was conducted by the NYSDEC to provide a qualitative assessment of the health risks to humans under current and future land-use scenarios. A full baseline risk assessment is not required for sites in the NYS program. In order to comply with EPA Risk Assessment Guidance, EPA prepared an abridged baseline risk assessment based upon the results of the Human Health Exposure

Assessment, and an analysis of residents within and adjacent to the area covered by nearfield plume, in order to estimate the risks associated with current and future Site conditions. The baseline risk assessment estimates what risks the Site poses if no action were taken, and the GAC systems were not in service. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of NYSDEC=s Human Health Exposure Assessment and the baseline risk assessment for this Site.

Based on the results of the baseline risk assessment, EPA has determined that actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to human health and the environment.

Human Health Risk Assessment

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification* **B** identifies the contaminants of concern at the Site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment* **B** estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well-water by which humans are potentially exposed). *Toxicity Assessment* **B** determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization* **B** summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks. The reasonable maximum exposure was evaluated.

Current Federal guidelines for acceptable exposures are an individual lifetime excess carcinogenic risk in the range of E-04 to E-06 (e.g., a one-in-ten-thousand to a one-in-one-million excess cancer risk) and a health Hazard Index (HI) (which reflects the likelihood for noncarcinogenic effects for a human receptor) equal to or less than 1.0. (A HI of greater than 1.0 indicates a potential for noncarcinogenic health effects.)

Hazard Identification

Contaminants of concern (COCs) were identified in the Human Health Exposure Assessment conducted in the RI (Chapter 7). Based on the

RI data, COCs were identified based on the frequency of detection, range of detected concentrations, and relative toxicity of Site contaminants. The data from NYSDEC=s residential well sampling, the RI monitoring well data (December 1997), the subsurface soil data collected by NYSDEC (October 1996), and the RI test pit soil sample data (June 1997) were used in the assessment. Based on this data, COCs were identified for groundwater on and off the MRIP property and for subsurface soils on the MRIP property. TCA, DCE, and TCE were identified as COCs for groundwater on or off the MRIP property. DCA was identified as another COC for groundwater off the MRIP property. 1,2 Dichloroethene (1,2 DCE), TCA, PCE, ethylbenzene, and xylenes were identified as COCs for subsurface soil on the MRIP property. TABLE 8 presents the COCs for each medium, the frequency of detection for each COC, and the exposure point concentration used in the risk assessment.

Exposure Assessment

The Human Health Exposure Assessment in the RI concluded that the primary routes of exposure and most significant exposure intakes under a current land use scenario are inhalation of VOCs from groundwater (via showering with contaminated groundwater) by residents off the MRIP property, followed by ingestion of groundwater by workers on the MRIP property and ingestion of groundwater by local residents (primarily children) off the MRIP property. It is important to note that the GAC filtration systems, while they are a interim measure and are not very reliable for long-term use, have eliminated these exposure pathways for the time being and ensure a current safe supply of water for those wells which are impacted.

Under future-use scenarios, inhalation (via showering for a hypothetical resident on the MRIP property) and ingestion of groundwater (for a worker on the MRIP property) contribute the most significant COC exposure routes, followed by ingestion and inhalation to residents off the MRIP property. A more detailed discussion of the Human Health Exposure Assessment can be found in Chapter 7 of the RI Report, and in the EPA Addendum to the DEC Exposure Assessment. Additionally, TABLE 9 identifies all exposure pathways, media, potential receptors, and the rationale used to select these pathways.

The baseline risk assessment conducted by EPA considered the following current use scenarios: adult workers on the MRIP property (incidental ingestion of soils, inhalation of fugative dust, and ingestion of drinking water), adult and child residents off the MRIP property (inhalation, ingestion, and dermal contact with groundwater used as drinking water). Future use scenarios included: adult and child residents off the MRIP property exposed to groundwater as drinking water (ingestion, inhalation, and dermal contact), workers on the MRIP property exposed to subsurface soils (incidental ingestion of soil and inhalation of fugative dust), and adult and child residents on the MRIP property exposed to groundwater as drinking water (this hypothetical scenario is not based on the most reasonably anticipated future use for the MRIP property; it was considered to evaluate potential risks if the property was rezoned, and to evaluate risks to residents adjacent to the MRIP property under the assumption that the contaminant concentrations on the MRIP property would migrate and likewise impact these residential developments.) Potential current and future risk was also evaluated based on the residences in the nearfield plume and adjacent properties using the UCHD residential well sampling data.

Toxicity Assessment

Groundwater COCs were identified as TCA, DCA, DCE and TCE. These substances belong to a class of compounds called chlorinated volatile hydrocarbons. As a class, chronic oral and inhalation exposure to these compounds have demonstrated toxicity to the liver, kidney and central/peripheral nervous system. Additionally, chronic inhalation exposure to ethylbenzene may result in adverse developmental effects. Concomitant short/long-term exposure to these compounds could result in additive negative effects. Additionally, some of the compounds (e.g., TCE, DCE) have been shown to be carcinogenic in animal bioassays, and are considered probable or possible human carcinogens by EPA. Because of their volatility when water-bourne, in addition to ingestion exposure routes, significant exposure can result from inhalation routes. For more information on the documented health effects of the COCs, see Section 7.5.1 of the RI.

Toxicity data for the baseline risk assessment were provided by the Integrated Risk Information System (IRIS) database, Health Effects Assessment Summary Tables (HEAST), and EPA=s National Center for Environmental Assessment. This information is presented in TABLE 10 for noncarcinogenic toxicity data and TABLE 12 for carcinogenic toxicity data.

Risk Characterization

The baseline risk assessment estimates the human health risk which would result from the contamination at the Site if no remedial action were taken, and the currently operating GAC filters were not in use. A more detailed discussion of the baseline risk assessment can be found in an EPA Memorandum dated October 20, 1999.

For carcinogens, risks are generally expressed as the incremental probability of an individual=s developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

where: risk = a unitless probability (e.g., 2×10^{-5}) of an individual=s developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an Aexcess lifetime cancer risk@ because it represents the number of additional cancers that would be expected to be seen if a population is exposed to the contaminants in a manner consistent with the scenario defined in the exposure assessment. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI < 1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic, noncarcinogenic effects from exposure to all contaminants are unlikely. An HI > 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic daily intake averaged over the exposure duration
RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Under current use scenarios, the carcinogenic risk for the adult worker on the MRIP property through ingestion of groundwater is 4.6E-04, which slightly exceeds EPA=s acceptable level. The HI for workers on the MRIP property under current use scenarios is 1.3, which exceeds EPA=s acceptable level for noncarcinogenic health effects. Estimated carcinogenic risk to adults off the MRIP property in the nearfield plume under current and future use scenarios is 6.4E-4 for adults, which exceeds EPA=s acceptable level for carcinogenic risk. Estimated carcinogenic risk to children off the MRIP property in the nearfield plume is 4.4E-04 for children, which also slightly exceeds EPA=s acceptable risk level. The HI for adults and children off the MRIP property in the nearfield plume under current and future use scenarios is 0.38 and 0.94, respectively, which are below EPA=s acceptable level for noncarcinogenic health effects. Noncarcinogenic hazards and carcinogenic risks for all potentially exposed populations are shown in TABLES 11 and 13, respectively.

Basis for Action

The results of the baseline risk assessment indicate that the groundwater at the Site poses an unacceptable risk to human health. These calculations assume the currently operating GAC filters are not in use. Actual or threatened releases of hazardous substances from this Site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health or welfare.

Discussion of Uncertainties in Risk Assessment

The procedure and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

_ environmental chemistry sampling and analysis;
_ environmental parameter measurement;
_ fate and transport modeling;
_ exposure parameter estimation; and,
_ toxicological data.

Uncertainty in environmental sampling arises, in part, from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources, including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the contaminants of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the contaminants of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the baseline human health risk assessment provides upper-bound estimates of the risks to populations at and near the Site, and it is highly unlikely to underestimate actual risks related to the Site.

Specifically, several aspects of risk estimation contribute uncertainty to the projected risks. EPA recommends that an arithmetic average concentration of the data be used for evaluating long-term exposure and that, because of the uncertainty associated with estimating the true average concentration at a site, the 95% upper confidence limit (UCL) on the arithmetic average be used as the exposure point concentration. The 95% UCL provides reasonable confidence that the true average will not be underestimated. Exposure point concentrations were calculated from residential well and soil sample data sets to represent the reasonable maximum exposure (RME) to various current and hypothetical future populations on and around the MRIP property. Some of the residential well sampling locations used were biased, i.e., they were selected due to the presence of elevated levels of contamination (e.g., residents in the nearfield plume area). Therefore, the UCL values calculated on those data sets are a conservative estimate of the RME. Uncertainty associated with sample laboratory analysis and data evaluation is considered low as a result of quality assurance and data validation.

In addition to the calculation of exposure point concentrations, several site-specific assumptions regarding future land use scenarios, intake parameters, and exposure pathways are a part of the exposure assessment stage of a baseline risk assessment. Assumptions were based on site-specific conditions to the greatest degree possible, and default parameter values found in EPA risk assessment guidance documents were used in the absence of site-specific data. However, there remains some uncertainty in the prediction of future use scenarios and their associated intake parameters and exposure pathways. The exposure pathways selected for current scenarios were based on the site conceptual model and related RI and FS data. The uncertainty associated with the selected pathways for these scenarios is low because site conditions support the conceptual model.

Standard dose conversion factors, risk slope factors, and reference doses are used to estimate the carcinogenic and noncarcinogenic hazards associated with site contaminants. The risk estimators used in this assessment are generally accepted by the scientific community as representing reasonable projections of the hazards associated with exposure to the various chemicals of potential concern.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the NYSDEC=s Human Health Exposure Assessment (in Chapter 7 of the RI) and EPA=s baseline human health risk assessment (EPA Memorandum, dated October 20, 1999).

Summary of Environmental Exposure Pathways

This section summarizes the types of environmental exposures which may be presented by the Site. The Fish and Wildlife Impact Assessment included in the RI (Chapter 8) presents a more detailed discussion of the potential impacts from the Site to fish and wildlife resources. The RI impact assessment did not identify currently existing pathways for significant exposures to fish or wildlife to Site related contaminants, and an ecological risk assessment was not performed. The study concluded that no further study of fish and wildlife resources was necessary at that time.

An Ecological Impact Assessment was also performed as part of the NTCRA for the Coxing Kill discharge, which concluded that the NTCRA discharge would not have an adverse impact on the Coxing Kill ecosystem. For further information, consult Interim Report 2, Ecological Evaluation of the Proposed Effluent Discharge to the Coxing Kill Creek From the Mohonk Road Industrial Plant Site, which is part of the administrative record. Some of the alternatives considered for the Site would involve discharge of treated groundwater to the Rondout Creek and Coxing Kill in compliance with NYSDEC effluent limitations for these surface water bodies.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. The objectives for the MRIP Site are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), NYSDEC=s recommended soil cleanup objectives, Site-specific risk-based levels, and the most reasonably anticipated future land use for the MRIP property, i.e., commercial development. The RAOs which were developed for soil and groundwater are designed, in part, to mitigate the health threat posed by ingestion and inhalation (through showering) of groundwater and contact with soils.

The following remedial action objectives were established for the Site:

_ 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.

Groundwater, drinking water and surface water standards identified for the Site are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part 5 of NYS Sanitary Code, as well as Federal Safe Drinking Water Act, 40 CFR Part 141 et.seq., MCLs for drinking water. NYSDEC TAGM 4046 provides soil cleanup objectives for the protection of groundwater, background conditions and health-based exposure scenarios; after identifying soil COCs for the Site, the TAGMs were considered and selected as cleanup criteria for the COCs. The contaminant and media-specific cleanup levels are presented in TABLE 14. In developing the final soil cleanup numbers, consideration was given to risks posed by the contaminants under reasonably anticipated future uses of the Site, and consistency with the New York State TAGMs.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected remedy be protective of human health and the environment, be cost-effective, comply with other laws, 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 Proposed Plan and FS evaluate, in detail, the alternate water supply, groundwater and soil alternatives for the MRIP Site. These alternatives are presented below.

The implementation time for each alternative reflects only the time required to construct or implement the remedy and not the time required to design the remedy, negotiate its performance by the parties responsible for the contamination, or procure contracts for design and construction.

Alternate Water Supply Alternatives

Alternatives were developed to provide a permanent, safe water supply for all the private well owners impacted or threatened by contamination from the Site.

Three alternatives were established for the Alternate Water Supply (AWS).

AWS-1 **<u>No Further Action</u>**

Present Worth:	$ 0
Capital Cost:	$ 0
Annual Operation and Maintenance (O&M):	$ 0
Time to Implement:	0 years

The Superfund Program requires that the ANo-Action@ Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative includes no active remedial measures. Monitoring and maintenance of the 70 currently operational point-of-use (POU) GAC systems for private well owners would be discontinued after the current service contract for these filters expires on February 26, 2001; further maintenance of these systems would be the responsibility of the homeowner.

AWS-2 **<u>Installation and Maintenance of Additional GAC Filter Systems</u>**

Present Worth:	$5,749,000[1]
Capital Cost:	$406,000[1]

Annual O&M (30 year O&M period): $348,000[2]
Time to Implement: 3 months

[1] The cost estimate of Alternative AWS-2 was increased from the FS and Proposed Plan to account for additional properties which were added to the proposed water service area (PWSA) during the public comment period (capital costs were increased by $22,000 and annual O&M was increased by $27,000, yielding a net increase of $430,000 in present worth).

[2] This alternative assumes residents with GAC systems will be responsible for funding the O&M of the GAC filters, because EPA does not fund O&M expenses, and NYSDEC has indicated they would not fund O&M for this number of GAC filters. Therefore EPA and NYSDEC expenditures for this alternative would only be the $406,000 in capital costs.

Alternative AWS-2 includes installation of GAC systems for all of the private well owners in the proposed public water service area (PWSA) that are currently not on GAC filters (approximately 85 more systems). Continued monitoring and maintenance of the GAC systems would be the responsibility of the homeowners. The GAC filters are designed to provide water that meets State and Federal MCLs.

The PWSA is depicted in FIGURE 13 and includes all properties currently impacted by Site-related groundwater contamination or considered threatened by the Site-related groundwater contamination. For cost estimating purposes, this alternative assumes that all private wells within the PWSA would become impacted in the future and would require a GAC filter. The PWSA was designed to be protective of human health. The RI groundwater sampling data, the historical private well sampling data and the simulations from the groundwater flow model were used to determine the boundaries. The proposed PWSA is currently comprised of 192 lots in the Towns of Marbletown and Rosendale. Of these 192 lots, approximately 155 are currently developed for residential or commercial use and contain private wells.

This alternative includes institutional controls, such as groundwater use restrictions, which may be employed to prevent use of the bedrock aquifer in the impacted or threatened area.

AWS-3 Public Water Supply Using Catskill Aqueduct

Present Worth: $ 8,799,000[1]
Capital Cost: $ 7,631,000[1]
Annual O&M (30 year O&M period): $ 76,000[2,3]
Time to Implement: 2 years

[1] The cost estimate of Alternative AWS-3 was revised from the FS and Proposed Plan to account for the additional properties which were added to the PWSA during the public comment period (capital costs were increased by $42,000 and annual O&M was increased by $12,000, yielding a net increase of $226,000 in present worth).

[2] The proposed water district will be responsible for funding the O&M expenses of the drinking water treatment plant.

[3] The estimate for annual O&M expenses for Alternative AWS-3 was increased by $12,000 from the Proposed Plan and FS based on an estimate by the Towns= engineers, which includes additional expenses related to NYCDEP=s water use fee, insurance, contracted labor, and benefits. This estimate is documented in the Town=s Map, Plan & Report.

Alternative AWS-3 includes the use of the Catskill Aqueduct as a new potable water supply source (FIGURE 14) and the establishment of a water distribution system in the PWSA. The PWSA for AWS-3 is the same as described in AWS-2 (FIGURE 13). Pursuant to the Surface Water Treatment Rule (40 CFR Parts 141 and 142), raw water from the aqueduct would require treatment to remove conventional contaminants, such as particulates, color, taste, odor, and microbes. A conventional treatment scheme for a surface water supply, such as the aqueduct water, includes coagulation, flocculation, sedimentation, and filtration (FIGURE 15). After filtration, a final disinfectant (e.g., chlorine) would be added to inactivate bacteria and other microbes, and control algal growth. A similar treatment scheme is currently used by the Village of New Paltz to treat its water supply, a portion of which is also drawn from the Catskill Aqueduct. The exact treatment system used would be determined during remedial design, consistent with the Small System Compliance Technology List for the Surface Water Treatment Rule (EPA 815-R-97-002, EPA 815-R-98-001, EPA 815-R-98-002, EPA 815-R-98-003).

Utilization of the Catskill Aqueduct would require the establishment of a community water district in the Towns of Marbletown and Rosendale and a use agreement between the PWSA and the New York City Department of Environmental Protection (NYCDEP). A connection to the Rondout Dewatering Chamber on Canal Road would be made and a main and pump would be installed to transfer raw water from the Rondout Dewatering Chamber to the treatment plant. To develop conceptual design cost estimates, it was assumed that the treatment plant would be located on the MRIP property. The location of the plant would be finalized during the design of the system. A pump would be needed to transfer the treated water to a water storage tank. Waste sludge generated from the water treatment process would be transferred to a dewatering unit where the sludge would be thickened then disposed of off-Site. A distribution system must also be constructed to convey the treated water from the storage tank to the users in the PWSA (shown conceptually in FIGURE 16). The system would be designed to provide fire protection to comply with local requirements.

NYCDEP requires that public water systems using the aqueduct as a source have a backup supply of water available for a minimum five-day period for periods of time when the Catskill Aqueduct is temporarily out of service (1905 New York City Water Supply Act). The sources of backup supply being considered are bedrock supply wells, the NTCRA treatment plant, and the Rondout Creek. The selection of the actual backup supply would be determined during predesign activities. The raw water from the backup water supplies would require treatment. As a possible backup supply well, monitoring well MRMW-13B, located near the Rondout Dewatering Chamber, was found to have a high yield (approximately 100 to 150 gallons per minute (gpm)) and was not in the contaminated plume area. The costs provided for this alternative reflect the bedrock well as a backup supply. The Town of Marbletown has indicated an interest in using the treated groundwater from the extraction and treatment system from groundwater response Alternative GR-3 (discussed below), if that alternative is selected as the groundwater response remedy; this option would be considered during the RD. Using the Rondout Creek would involve a pumping station at the pool created by the dam in High Falls and a raw water transmission main from the Rondout Creek to the treatment plant.

This alternative includes institutional controls, such as groundwater use restrictions, which may be employed to prevent use of the bedrock aquifer in the impacted or threatened area.

AWS-4 <u>Public Water Supply Using A Well Field</u>

Present Worth:	$ 9,015,000[1]
Capital Cost:	$ 7,662,000[1]
Annual O&M (30 year O&M period):	$ 88,000[2]
Time to Implement:	2 years

[1] The cost estimate of Alternative AWS-4 was revised from the FS and Proposed Plan to account for the additional properties which were added to the PWSA during the public comment period (capital costs were increased by $42,000, yielding a net increase of $42,000 in present worth).

[2] The proposed water district will be responsible for funding the O&M expenses of the drinking water treatment plant.

Alternative AWS-4 includes the installation of a well field to service the PWSA on a full-time basis and the establishment of a water distribution system in the PWSA. The PWSA for AWS-4 is the same as described in AWS-2 (FIGURE 13), however, the PWSA boundaries may have to be expanded to include residences whose private wells may be impacted by drawdown associated with the actively pumping well field. The actual location of the well filed would be determined during predesign and require the drilling of test wells, additional pump tests and groundwater modeling. In this alternative, it was assumed that two supply wells would be pumping simultaneously at approximately 20 to 25 gpm each to sustain the average water demand of 45 gpm required by the PWSA. A third well would be drilled as a backup.

Raw water from the supply wells would be pumped to a storage tank. It is assumed that treatment of the raw water would include chlorination at the very least and probably inorganic removal (needed because of the high metal content of the groundwater). Dosing equipment would maintain the necessary chlorine level to maintain disinfection. From the storage tank, water would be transferred to a distribution system, which would supply the PWSA. Waste sludge generated from the water treatment process would be transferred to a dewatering unit where the sludge would be thickened then disposed of off-Site. Access would need to be obtained to install and operate the well field and the distribution system. The system would be designed to provide fire protection to comply with local requirements.

This alternative includes the implementation of institutional controls, such as groundwater use restrictions, which are intended to prevent development of the bedrock aquifer in the area of currently existing or potential future contamination as a potable water supply without appropriate treatment.

Groundwater Remediation Alternatives

Alternatives were also developed to comprehensively respond to the groundwater contaminant plume emanating from the MRIP property. As noted above, EPA is implementing a NTCRA to minimize the migration of the most contaminated groundwater in the nearfield plume.

Three alternatives were established for the groundwater response (GR).

GR-1 <u>No Further Action</u>

Present Worth:	$ 654,000
Capital Cost:	$ 131,000
Annual O&M (30 year O&M period):	$ 34,000
Time to Implement:	3 months

The Superfund Program requires that the ANo-Action@ Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative includes no active remedial measures. Alternative GR-1 is a no further action option that includes a long-term monitoring and evaluation program, presumed to be 30 years; the NTCRA extraction and treatment system on the MRIP property would only operate for the length of time authorized under removal authorities.

Alternative GR-1 also includes the installation of new groundwater monitoring wells and the required sampling of potable and monitoring wells as part of a long-term groundwater monitoring program. The Rondout Creek and Coxing Kill would also be sampled as part of the long-term monitoring program. This program would monitor and evaluate the fate and transport of the contaminant plume on an annual basis to determine whether the groundwater MCLs are satisfied. The groundwater monitoring program may be discontinued when contaminant levels in the plume are below MCLs for two consecutive years. This alternative assumes that the groundwater monitoring program would be the same regardless of the water supply alternative that is selected. The O&M cost for this alternative includes the monitoring program. Capital costs for this alternative covers monitoring well installation.

Modeling was not performed during the FS to estimate the time required to achieve MCLs under this alternative, though it is apparent that the time frame would be much greater than under Alternatives GR-2 and 3.

Because this alternative would result in contaminants remaining on-Site above levels that allow for unrestricted use, CERCLA would require that the remedy be reviewed every five years.

GR-2 <u>Continuation of Non-Time Critical Removal Action</u>

Present Worth:	$3,482,000
Capital Cost:	$ 131,000
Annual O&M (30 year O&M period):	$ 218,000
Time to Implement:	3 months

Alternative GR-2 includes active treatment of the nearfield plume, specifically, the operation of the NTCRA extraction and treatment system as a remedial action for a presumed period of 30 years. This alternative includes the implementation of institutional controls, such as groundwater use restrictions, which are intended to prevent development of the bedrock aquifer in the area of currently existing or potential future contamination as a potable water supply without appropriate treatment. The NTCRA system includes extraction of 40-45 gpm of contaminated groundwater from three recovery wells on the MRIP property, treatment with an air stripper, carbon polishing and inorganic treatment (using a Dynasand filter) of the effluent, vapor phase carbon treatment of air releases, and discharge of the treated effluent to the Coxing Kill. Effluent criteria would be based on state regulatory standards under the State Pollutant Discharge Elimination System (SPDES) program. NYSDEC has provided effluent criteria for discharge to the Coxing Kill, which are documented in EPA=s June 4, 1999 Action Memorandum for the NTCRA (in Appendix E); the standards are generally in the range of 5 to 10 parts per billion for specific VOCs. A long-term groundwater and surface water monitoring program would be included in this alternative, similar to the one described under Alternative GR-1, to monitor the movement of contaminants and to assess the efficiency of the NTCRA recovery wells in removing the contaminants from the plume. Target cleanup levels in the near- and farfield plumes would be based on Federal and NYS MCLs. The O&M cost for this alternative includes the monitoring program and operation of the NTCRA treatment plant on the MRIP property. The treatment process will produce waste sludge, which will be thickened and disposed of periodically following analyses to determine the appropriate disposal option; for cost estimating purposes, it was assumed that the sludge would be disposed of off-Site as nonhazardous waste at a local landfill.

The groundwater modeling performed during the FS did not estimate the time required to achieve MCLs under this alternative. The groundwater modeling performed during the FS estimated the time required for the untreated plume to reach the model boundaries. Using this estimate, it would take approximately 68 years for three aquifer volumes of contaminants to migrate from the SFBA; however, in this case (without active extraction and treatment in the farfield plume), a large component of the plume could migrate and impact other wells. For cost estimating purposes, the it is assumed that the system would need to be operated for 30 years. The actual length of time needed to operate the system until the cleanup levels are attained may be more than 30 years

Because this alternative would result in contaminants remaining on-Site above levels that allow for unrestricted use, CERCLA would require that the remedy be reviewed every five years.

GR-3 Extraction and Ex-Situ Treatment

Present Worth:	$ 6,043,000
Capital Cost:	$ 1,247,000
Annual O&M (30 year O&M period):	$ 312,000
Time to Implement:	2 years

Alternative GR-3 involves active remediation of contaminated groundwater by extraction and treatment Site-wide, i.e., continued operation of the NTCRA system as detailed in Alternative GR-2 to address the nearfield plume, and installation of a separate extraction and treatment system off the MRIP property. The alternative also has a long-term monitoring component. The system's design would be similar to the extraction and treatment system of the NTCRA.

Selection of a particular pumping pattern (i.e., placement of wells in and around the contaminant plume) depends on the identified depth and extent of contamination. The extraction wells would be designed to operate at an optimal rate to collect contaminated groundwater, contain the contaminant plume, and prevent the plume from migrating further downgradient. Because groundwater extraction at high pumping rates may cause depressed levels of groundwater in the bedrock aquifer and many of the existing private wells, this alternative must be paired with an AWS alternative that does not rely on local groundwater as a water supply (i.e., a groundwater supply that is not under the influence of the proposed extraction system, such as Alternatives AWS-3 or AWS-4).

Contaminated groundwater would be pumped from the extraction wells to an air stripper to remove VOCs. 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, and that the NTCRA effluent would continue to be discharged to the Coxing Kill. Effluent criteria would be based on state regulatory standards under the SPDES program. NYSDEC has provided effluent criteria for the NTCRA discharge to the Coxing Kill, which are documented in EPA's June 4, 1999 Action Memorandum for the NTCRA (in Appendix E); the standards are generally in the range of 5 to 10 parts per billion for specific VOCs; effluent criteria for the Rondout discharge would be obtained from NYSDEC. The treatment process will produce waste sludge, which will be thickened and disposed of periodically following analyses to determine the appropriate disposal option; for cost estimating purposes, it was assumed that the sludge would be disposed of off-Site as nonhazardous waste at a local landfill.

Target cleanup levels in the near- and farfield plumes would be based on Federal and NYS MCLs. The FS groundwater model was used to simulate this groundwater extraction and treatment option. For the purposes of conceptually identifying the number of wells, pumping rates, and well locations, these parameters were varied to determine which combination would effectively capture highly contaminated groundwater in the interior of the plume (within the 100 ppb contour as of the June 1998 sampling) while letting lower contamination levels on the periphery remediate through natural processes. After running several different cases with pumping rates between 25 and 50 gpm, it was determined that using three wells pumping the farfield plume at a rate of 40 gpm each produced drawdown averaging less than 10 ft in residential wells outside of the PWSA and effectively captured the contaminants released in the interior of the plume. If this alternative is selected, optimal pumping rates, well placement, and the number of extraction wells would be confirmed during the remedial design phase to ensure effective capture of the plume.

Active remediation would reduce the time frame for restoration of the bedrock groundwater. Steady-state simulations of the time necessary to achieve MCLs in the aquifer were conducted in the FS. For the case with three extraction wells each pumping at 40 gpm, along with the NTCRA extraction wells pumping at a total of 40 gpm, it would take an estimated 29 years for one aquifer volume of contaminants to be captured. Therefore, the estimated time to attain ARARs is 29 years.

Long-term groundwater monitoring would be conducted during the active remediation phase to assess the effectiveness of the groundwater extraction and treatment system. No new monitoring wells are proposed under this alternative, but would be installed if determined to be necessary. Periodic evaluations of the groundwater monitoring data would be used to evaluate the continued operation of the pump and treat system. The monitoring program may be discontinued when contaminant levels are below ARARs for two consecutive years.

Soil Remediation Alternatives

Contaminated soils on the MRIP property are limited to the subsurface, i.e., greater than 2 ft below grade. The COCs in these soils were identified as TCA, 1,2 DCE, PCE, ethylbenzene, and xylenes, but additional groundwater COCs (DCE, TCE, and DCA) were also retained as soil COCs as the soil has the potential of leaching of the VOCs into the groundwater. Areas of the MRIP property containing contaminated soils include those labeled on FIGURE 12 as Areas 1A, 1B and 2B. Additional sampling for COCs would be conducted in Areas D-1 and D-2 to determine if additional soils need to be excavated. The disposal pit area characterized by EPA=s Removal Program was found to contain elevated levels of soil COCs and paint-related compounds which had not been identified elsewhere on the Site.

Three alternatives have been established for source control (SC) Alternatives.

SC-1 No Further Action

Present Worth:	$25,000
Capital Cost:	$25,000
Total Annual O&M:	$ 0
Time to Implement:	0 year

The Superfund Program requires that the ANo-Action@ Alternative be considered as a baseline for comparison with the other alternatives. The No-Action Alternative includes no active remedial measures. Alternative SC-1 does not include any excavation or treatment of contaminated soils on the MRIP property, but includes fencing to restrict access to the contaminated soils.

SC-2 Excavation and Ex-Situ Treatment Performed on the MRIP Property

Present Worth:	$ 624,000[1]
Capital Cost:	$ 330,000[1]
Total Annual O&M:	$ 158,000[1]
Time to Implement:	2 years

[1] The cost estimate for SC-2 differs from the Proposed Plan, because the Proposed Plan identified but did not quantify the approximately 300 cubic yards of additional contaminated soils in the paint waste area characterized by EPA=s Removal Program (capital costs were increased by $153,000 and annual O&M was increased by $95,000, yielding a net increase of $330,000 in present worth).

Alternative SC-2 involves the excavation and ex-situ biological treatment of approximately 200 cubic yards of soil in the areas identified by NYSDEC with contaminants at levels that exceed the cleanup levels for COCs. These areas are indicated on FIGURE 12 as Areas 1A, 1B and 2B, however, additional sampling would be performed during the RD to further define the extent of contamination at the Site. The contaminated soils remaining in the paint disposal area characterized by EPA=s Removal Program with COCs above cleanup levels would also be excavated for treatment. There are approximately 300 cubic yards of contaminated soils remaining in this area. Alternative SC-2 would also require a treatability study to determine the effectiveness of the enhanced biodegradation/aeration of Site soils. During the excavation, sampling would be conducted to ensure that contaminated soil is removed to satisfy the cleanup levels. Uncontaminated soil, particularly the surface soil, would be stockpiled on the MRIP property and used to backfill the excavation, along with uncontaminated backfill material transported to the MRIP property.

An area of the MRIP property would be designated to perform the soil remediation using enhanced biodegradation and aeration.

Contaminated soil would be spread on a liner in a 12-inch thick layer. Soil nutrient levels would be measured and modified as necessary to promote optimal biodegradation. The soil would be aerated periodically to enhance volatilization of VOCs, and would be backfilled at the Site after the cleanup levels are achieved. Cleanup levels for soils would be based on NYS TAGMs for COCs to prevent cross media impacts to groundwater. For cost-estimating purposes, it is assumed that the treatment area would not be covered and that storm water runoff would not be collected. These assumptions would be reassessed in the remedial design phase. As storm water which contacts these soils could contain low levels of VOCs, it would be sampled to determine whether collection and treatment would be necessary prior to discharge.

The most suitable place to conduct the enhanced biodegradation and aeration process would be in an easily accessible area that is void of trees and structures. This area would be sloped slightly so that storm water could be easily collected, if necessary.

SC-3 **Excavation and Off-Site Disposal**

Present Worth:	$ 469,000[1]
Capital Cost:	$ 469,000[1]
Total Annual O&M:	$ 0
Time to Implement:	1 month

[1] The cost estimate for SC-3 differs from the FS, because the Proposed Plan identified but did not quantify the approximately 300 cubic yards of additional contaminated soils in the paint waste area characterized by EPA's Removal Program (capital costs were increased by $216,000, yielding a net increase of $216,000 in present worth).

Alternative SC-3 involves the excavation and off-Site treatment (if necessary) and disposal of approximately 200 cubic yards of soil in the areas identified by NYSDEC with contaminants at levels that exceed the cleanup levels for COCs. These areas are indicated on FIGURE 12 as Areas 1A, 1B and 2B, however, additional sampling would be performed during the RD to further define the extent of soil contamination at the Site. The contaminated soils remaining in the paint waste area characterized by EPA's Removal Program with COCs above soil cleanup levels would also be excavated for treatment (if necessary) and disposal. There are approximately 300 cubic yards of contaminated soils remaining in this area. The excavation and sampling procedures for Alternative SC-3 would be similar to that of Alternative SC-2. Contaminated soil would be stockpiled or placed in rolloff containers on the MRIP property. Liners and/or covers may be necessary for the stockpiling of contaminated soil. Uncontaminated soil would be stockpiled and used as a portion of the backfill to the excavation.

Based on the analytical results of the RI, and field work by EPA=s Removal Program, the contaminated soil would likely be classified as nonhazardous industrial waste. Additional sampling of the excavated soil would be required to characterize the soil. Once characterized for disposal, the soil would be transported off-Site to an appropriate, permitted, waste treatment or disposal facility, and transportation of the soil would be performed in accordance with Department of Transportation (DOT) regulations. For cost estimating purposes, it is assumed that the soils could be directly landfilled without treatment. Alternative methods of treatment and disposal would be reviewed during RD and the most economical option selected.

EVALUATION OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative is assessed against nine evaluation criteria. These nine criteria are as follows: overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; cost; and State and community acceptance. The evaluation criteria are described below.

$ 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 (ARARs) 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 requirements, or provide grounds for invoking a waiver.

$ Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. This criteria 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 operation and maintenance (O&M) costs, and net present worth costs.

- $ State acceptance indicates whether the State concurs with, opposes, or has no comment on the preferred remedy.

- $ 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/FS reports.

Comparative Analysis of Groundwater and Potable Water Supply Remedial Alternatives

The comparative analysis of the groundwater response and alternate water supply alternatives are being grouped together because both may impact the fate and transport of contaminants and hydrology in the SFBA, and therefore, implementation of one response action would effect the implementability of the other.

Overall Protection of Human Health and the Environment

The no further action alternative for the potable water (Alternative AWS-1) would not be protective of human health in the currently impacted and threatened areas. Alternative AWS-2 would be more protective of human health than Alternative AWS-1, but the potential for human exposure remains if and when the GAC filters fail. The NYSDOH does not consider the use of point-of-use GAC filtration units a long-term remedy, if a cost-effective, safe and reliable alternate water supply is available. It is generally the policy of both the NYSDEC and the EPA not to fund the long-term O&M of a large number of GAC filters as a long-term remedy, such as Alternative AWS-2. Alternatives AWS-3 (Catskill Aqueduct as primary supply) and AWS-4 (Well Field as primary supply) are the most protective alternate water supply alternatives. Alternatives AWS-3 and AWS-4 would be protective of human health through the supply of reliable, uncontaminated potable water.

Alternative GR-1 would not include any measures to prevent human contact with contaminated groundwater. Alternative GR-2 would extract and treat the nearfield portion of the groundwater and would rely on only institutional controls to prevent human contact with contaminated groundwater in the farfield portion of the plume. The farfield plume would continue to migrate and potentially impact additional wells. Of the three groundwater response alternatives, Alternative GR-3, which would extract and treat the contaminated groundwater in the near- and farfield plumes, is the most protective by preventing human contact with the plume, and by minimizing migration of the plume to other wells.

Compliance with ARARs

The most significant ARARs for potable groundwater are the Safe Drinking Water Act (42 U.S.C. '' 300f et. seq.), National Primary Drinking Water Standards (40 CFR Part 141), and 6NYCRR Part 703 Groundwater Standards. For groundwater COCs, the NYS Class GA groundwater (fresh groundwaters whose best usage is a source of potable water) and NYS drinking water standard is 5 ppb. For a complete listing of ARARs, see FS Chapter 10, Table 10-1, and the EE/CA, Section 2.4.

The no further action alternative for the potable water (Alternative AWS-1) would not achieve compliance with ARARs for drinking water. Potable water Alternatives AWS-2, AWS-3 and AWS-4 are similarly effective in their ability to achieve applicable drinking water standards through either GAC treatment at individual wells or the installation of a public water supply. However, selection of Alternative AWS-2 could hamper active remediation of the farfield plume (Alternative GR-3) because, in the absence of a public water supply system, groundwater extraction may depress the water table and have an adverse impact on nearby private wells. Therefore, selection of this alternative would hinder attempts to actively restore the aquifer. In addition, AWS-2 would only be protective and comply with ARARs if 155 GAC filters were effectively maintained by homeowners over the long-term.

The no further action alternative for groundwater, GR-1, would not achieve compliance with NYS Class GA groundwater standards in either the currently impacted or threatened areas.

Groundwater Response Alternative GR-2 would achieve applicable groundwater standards in the nearfield plume through active groundwater extraction and treatment, but would not take active measures to achieve NYS Class GA groundwater standards in the farfield plume. Alternative GR-3 would be more effective than Alternative GR-2 in that it would achieve applicable groundwater standards throughout the near- and farfield plumes through active treatment and in a shorter time frame.

Construction of either potable water supply Alternatives AWS-3 or AWS-4 would comply with the National Historic Preservation Act (NHPA) (16 U.S.C. 470), Executive Order 11988 - Flood Plain Management, Executive Order 11990 - Protection of Wetlands and 40 CFR 6 Apx. A (Policy on Implementing Executive Order 11990), EPA=s 1985 Statement of Policy on Floodplains/ Wetlands Assessments for CERCLA Actions, New York State wetlands protection under 6 NYCRR Part 662, and 6 NYCRR Part 601 for the development of a water distribution system. The pipeline installation as depicted conceptually in FIGURE 16 for Alternatives AWS-3 and AWS-4 would also comply with location-specific ARARs. Alternative AWS-3 would also comply with NYCDEP requirements for use of New York City=s water supply system as a source of potable water.

Residual VOC concentrations in the treated discharge from the active groundwater response Alternatives GR-2 and GR-3 would be at or below federal and state standards (Clean Water Act, 33 U.S.C. '' 1251-1387, and NYS Surface Water Standards, 6 NYCRR Parts 700-705).

Air emissions for the treatment system identified in Alternatives GR-2 and GR-3 would comply with the Clean Air Act (CAA, 42 U.S.C. '' 7401 et. seq.), 6 NYCRR Part 2129 (air emissions) and NYS Air Guide - 1. The alternatives would also comply with the National Historic Preservation Act (NHPA), Executive Order 11988 - Flood Plain Management, Executive Order 11990 - Protection of Wetlands and 40 CFR 6 Apx. A (Policy on Implementing Executive Order 11990), EPA=s 1985 Statement of Policy on Floodplains/Wetlands Assessments for CERCLA Actions, and New York State wetlands protection under 6 NYCRR Part 662.

Long-Term Effectiveness and Permanence

Alternative AWS-3 provides the greatest degree of permanence and long-term effectiveness, followed by Alternatives AWS-4, AWS-2, and AWS-1. Alternative AWS-1 does not provide long-term effectiveness or permanence. Alternative AWS-2 could be effective in providing a long-term source of potable water, but the potential for contaminant breakthrough exists in GAC systems; thus, GAC systems are not considered by EPA and NYSDEC to be a permanent remedy. In addition, maintaining a large number of individual POU GAC systems is less reliable, and would require more maintenance than an area-wide water treatment system, which would be used with Alternatives AWS-3 and AWS-4. Therefore, Alternatives AWS-3 and AWS-4 would be more effective than Alternatives AWS-1 or AWS-2 in providing a long-term, reliable source of potable water.

The water supply from Alternative AWS-4 is slightly less reliable than that of Alternative AWS-3, since under Alternative AWS-4 the wells could lose productivity during drought conditions. Based on groundwater model simulations, water supply wells pumping under Alternative AWS-4 in the proposed upgradient location would not draw contaminants upgradient, to any previously unaffected residential areas or into the supply wells. Also, based on model results, the impact of pumping the supply wells at 22.5 gpm each and NTCRA extraction wells at a total of 40 gpm on residential wells outside of the PWSA would be minimal except for two residential wells located relatively close to both the supply wells which the model predicted would exhibit a drawdown of about 16 ft. For Alternative AWS-4, it is important to note that without a detailed survey of well depths (and the depth of pumps in these wells), drawdowns such as those simulated, coupled with seasonal water level variations, may adversely affect some residential wells.

Groundwater Response Alternative GR-1 would not be an effective or permanent remedial alternative in the long term. Also, the NTCRA extraction and treatment system would be shut down and would no longer be acting to minimize the migration of the nearfield plume at the conclusion of the removal action authorization. Alternative GR-2 would be more effective in reducing impacts to downgradient wells, however, contaminants in the farfield plume would not be addressed. Alternative GR-3 would be the most effective alternative to control and remediate the groundwater contaminant plume and reduce impacts to downgradient wells. The groundwater model results show that implementation of Alternative GR-3 should contain all contaminants above MCLs within the potential PWSA and that any wells outside the PWSA would not be impacted.

Reduction of Toxicity, Mobility, or Volume through Treatment
None of the alternate water supply alternatives directly addresses the mobility or volume of contaminants in the groundwater plume, although Alternative AWS-2 indirectly reduces the mobility of contaminants to a limited extent through localized pumping and treatment with the GAC systems. Alternative AWS-1 would not reduce the toxicity, mobility or volume of contaminants in the groundwater. Alternative AWS-2 would reduce toxicity by treating contaminated groundwater/drinking water with point-of-use GAC filtration. Alternatives AWS-3 and AWS-4 would eliminate the toxicity in residents' water supply by providing clean potable water to the currently impacted area and the threatened area.

Groundwater Response Alternative GR-1 would not actively result in any reduction of toxicity, mobility, or volume of contamination present in the groundwater. Both Alternatives GR-2 and GR-3 would reduce these parameters in the nearfield plume, but GR-2 would not actively reduce these parameters in the farfield plume. Alternative GR-3 addresses this criterion most effectively as it would actively reduce these parameters throughout the near- and farfield groundwater contaminant plume.

Short-Term Effectiveness
Alternative AWS-1, no action, would not be effective in the short term for providing clean potable water. All of the remaining potable water supply alternatives would be effective in providing potable water in the short term to the consumers whose wells have GAC filtration systems currently installed. GAC treatment has proven to be effective to date. Periodic monitoring of private wells that could potentially be impacted by the contaminant plume (i.e., wells downgradient of the contaminant plume) has been instituted by UCHD and has been effective to date. Alternatives AWS-3 and AWS-4 would be effective in the short term as they incorporate the provision for installation and maintenance of GAC filters to impacted wells until a public water supply is provided. Implementation of these alternatives would take an estimated two years and cause noise and traffic impacts. However, these impacts can be minimized by employing appropriate construction techniques and practices.

Groundwater Response Alternatives GR-1 and GR-2 would have minimal short-term impacts on human health and the environment as they would not require any significant construction. Alternative GR-3 would result in adverse impacts to local roads and would disrupt traffic. Additional potential impacts to the community include noise and dust generation due to the installation of piping and the construction of a groundwater treatment facility. However, these impacts would be minimized by employing appropriate construction techniques and practices.

Implementability
The no action alternative, AWS-1, is easily implemented. The installation of an additional 85 filtration systems can be readily implemented under Alternative AWS-2 as 70 existing GAC filtration systems have been installed and maintained successfully. However, maintaining this large a number of individual systems would require significant oversight, and also relies on individual property owners' willingness to have a system installed and maintained.

Alternatives AWS-3 and AWS-4 are both technically feasible. A water district must be formed in the PWSA for Alternatives AWS-3 and AWS-4 to be implementable. The Towns of Marbletown and Rosendale have prepared a draft intermunicipal agreement, as well as a Plan, Map & Report which describes the PWSA boundaries and per user cost estimates. The Towns held a public hearing on district formation on March 16, 2000, and the district is expected to officially form later this year. Alternatives AWS-3 and AWS-4 would require the construction of a water treatment plant, storage tower and a water distribution system and state and local approval of the design of the facilities. Construction efforts would need to be coordinated with the local utility companies. In addition, a water usage agreement would need to be reached between the PWSA water district and the NYCDEP for Alternative AWS-3.

Groundwater response Alternatives GR-1 and GR-2 would be easily implemented, as no additional construction is required. Institutional controls to prevent groundwater use for GR-2 and GR-3 would be established by the EPA and the NYSDEC. The NTCRA component of Alternative GR-2 would already be in place on the MRIP property, and would continue operating and require a part-time operator. For Alternative GR-3, the technologies for the installation of the extraction wells and treatment facility off the MRIP property are readily available, although they would take about two years to construct. Because groundwater extraction at high pumping rates may cause depressed levels of groundwater in the bedrock aquifer and many of the existing private wells, this alternative must be paired with an AWS alternative that does not rely on local groundwater as a water supply (i.e., a groundwater supply that is not under the influence of the proposed extraction system such as in Alternatives AWS-3 or AWS-4). Access to private property for the treatment plant, piping and wells would need to be obtained. Public concerns regarding the placement of the facilities would also need to be addressed.

Cost

The capital costs, O&M costs, and present worth costs associated with each of the alternate water supply and groundwater response alternatives which were estimated by NYSDEC for the FS and Proposed Plan are presented below. Present worth costs were calculated over a 30-year period using 5 percent as the discount rate.

Alternate Water Supply Alternative	Capital Cost	Annual O&M	Present Worth
AWS-1	$0	$0	$0
AWS-2	$ 406,000[1]	$ 348,000[1,3]	$ 5,749,000[1]
AWS-3	$ 7,631,000[1]	$ 76,000[2,3]	$ 8,799,000[2]
AWS-4	$ 7,662,000[1]	$ 88,000[3]	$ 9,015,000[1]

[1] The cost estimates of Alternatives AWS-2, AWS-3, and AWS-4 were revised from the FS and Proposed Plan to account for the additional properties which were added to the PWSA during the public comment period.

[2] The estimate for annual O&M expenses for Alternative AWS-3 was increased by $12,000 from the Proposed Plan and FS based on an estimate by the Towns= engineers (Plan, Map & Report), which includes of additional expenses related to NYCDEP=s water use fee, insurance, contracted labor, and benefits.

[3] As discussed in the alternative descriptions, the O&M expenses for all AWS alternatives are assumed to be the responsibility of the proposed water district or local residents.

Groundwater Response Alternative	Capital Cost	Annual O&M	Present Worth
GR-1	$ 131,000	$ 34,000	$ 654,000
GR-2	$ 131,000	$ 218,000	$ 3,482,000
GR-3	$ 1,247,000	$ 312,000	$ 6,043,000

As indicated above, Alternative AWS-1, no further action, is the least costly alternative while Alternative AWS-4 is the most costly. As presented above, the capital costs for Alternatives AWS-3 and AWS-4 are similar and considerably higher than Alternative AWS-2. The O&M of Alternative AWS-4 is somewhat higher than Alternative AWS-3 due to greater electrical usage.

As indicated above, Alternative GR-3 is the most costly alternative, followed by Alternatives GR-2 and 1.

State Acceptance
NYSDEC concurs with the selected remedy. A letter of concurrence is attached as APPENDIX IV.

Community Acceptance
Community acceptance of the proposed remedy for groundwater and alternate water supply were assessed during the public comment period. EPA believes that the community generally supports this approach. Specific responses to public comments are addressed in the Responsiveness Summary, which is attached as APPENDIX V.

Comparative Analysis of Soil Remedial Alternatives

Overall Protection of Human Health and the Environment
The no further action alternative, SC-1, for the soils on the MRIP property would not provide protection of human health and the environment as the contaminants would remain in the environment, however access would be restricted by fencing. It is noted that surface soils (0 to 2 ft below grade) in Areas 1, 2, and D-2 do not

contain COCs above cleanup goals and would act as a barrier to human contact with any contaminated soil in the subsurface. The concrete floor inside the building would act as a barrier to the contaminated soil in Area D-1. However, the contaminants in the subsurface soil could leach into to groundwater.

Alternatives SC-2 and SC-3 would be equally protective of human health and the environment. Alternative SC-2 would remove the contaminants through excavation and treatment on the MRIP property. Alternative SC-3 would remove the contaminants through excavation and disposal at a permitted off-Site facility.

Compliance with ARARs

The no further action alternative, SC-1, for the contamination in the MRIP subsurface soils would not take any active measures to achieve the cleanup levels established for soil COCs (TCA, TCE, DCA, DCE, 1,2 DCE, PCE, ethylbenzene and xylenes); the specific cleanup levels for these COCs were taken from the NYS Recommended Soil Cleanup Objectives contained in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046. Alternative SC-2 would achieve applicable soil cleanup objectives through excavation and on-Site treatment, and Alternative SC-3 would achieve soil cleanup objectives through excavation and shipment to an appropriate off-Site disposal facility. Although the current areas of excavation are outside floodplains, wetlands, and cultural resources, if additional areas are excavated or the existing areas are expanded, the alternatives would also need to comply with the National Historic Preservation Act (NHPA), Executive Order 11988 - Flood Plain Management, Executive Order 11990 - Protection of Wetlands and 40 CFR 6 Apx. A (Policy on Implementing Executive Order 11990), EPA=s 1985 Statement of Policy on Floodplains/Wetlands Assessments for CERCLA Actions, and New York State wetland protections under 6 NYCRR Part 662. Disposal of contaminated soils under Alternative SC-3 would also comply with the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. Section 6901 et. seq.), the NYS solid and hazardous waste regulations (6 NYCRR Parts 370-376), DOT transportation regulations, and CERCLA off-Site policy (if wastes are sent to a RCRA Subtitle C facility).

Long-Term Effectiveness and Permanence

Alternative SC-1 for contaminated soil on the MRIP property would not provide long-term effectiveness or permanence since contaminants would remain at the Site, and the contaminated soils could continue to impact groundwater. Alternatives SC-2 and SC-3 would be similarly effective in satisfying this criterion. Alternative SC-2 would permanently remove contaminants from Site subsurface soils through biodegradation; Alternative SC-3 would remove the contaminated subsurface soils and dispose of them off-

Site.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SC-1 for contaminated soil on the MRIP property would not reduce toxicity, mobility or volume of contamination present in the subsurface soils. Both Alternatives SC-2 and SC-3 reduce the mobility and volume of the VOCs through excavation. However, only Alternative SC-2 would reduce the toxicity of the subsurface soils through treatment. Based on existing RI data and data collected during the NTCRA field activities, it is not expected that the soils excavated under Alternative SC-3 would require treatment for disposal at an off-Site facility.

Short-Term Effectiveness
Alternative SC-1 for contaminated soil on the MRIP property would not result in short-term health or environmental impacts. Daily activities conducted by the current Site owner and tenants may be disrupted by the excavation and construction activities that would be required to implement Alternatives SC-2 and SC-3. However, these impacts can be minimized by employing appropriate construction techniques and practices.

Implementability
Subsurface contaminated soil remedial alternatives on the MRIP property are all implementable; however, Alternative SC-2 would require a treatability study to determine the effectiveness of the enhanced biodegradation/aeration of Site soils. Alternative SC-3 would require waste acceptance by the off-Site disposal facility, although this is not expected to be a problem.

Cost
The capital costs, O&M costs, and present worth costs associated with each of the source (soil) control alternatives which was estimated by NYSDEC for the FS and Proposed Plan are presented below. Present worth costs were calculated over a 2-year period using 5 percent as the discount rate.

Source (Soil) Control Alternatives	Capital Cost	O&M (total)	Present Worth
SC-1	$ 25,000	$ 0	$ 25,000
SC-2	$ 330,000[1]	$ 158,000[1]	$ 624,000[1]
SC-3	$ 469,000[1]	$ 0	$ 469,000[1]

[1] The cost estimates for Alternatives SC-2 and SC-3 differ from those in the FS

because the Proposed Plan identified but did not quantify the approximately 300 cubic yards of additional contaminated soils in the paint waste area characterized by EPA's Removal Program.

As indicated above, Alternative SC-1 is the least costly alternative, followed by Alternatives SC-3 and SC-2.

State Acceptance
As mentioned above, NYSDEC concurs with the selected remedy. A letter of concurrence is attached as APPENDIX IV.

Community Acceptance
Community acceptance of the proposed remedy for soil was assessed during the public comment period. Comments were expressed at the public meeting and written comments were received during the public comment period. Specific responses to public comments are addressed in the Responsiveness Summary, which is attached as APPENDIX V.

PRINCIPAL THREAT WASTES

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. Contaminated groundwater generally is not considered to be source material; accordingly, there are no source materials defined as principal threat wastes at the MRIP Site.

SELECTED REMEDY

Groundwater and Potable Water Supply

Based upon an evaluation of the various alternatives and consideration of community acceptance, EPA and NYSDEC have selected alternate potable water supply **Alternative AWS-3: Public Water Supply Using Catskill Aqueduct**, contaminated groundwater response **Alternative GR-3: Extraction and Ex-Situ Treatment**, and source control (contaminated soil) **Alternative SC-3: Excavation and Off-Site Disposal** as the selected remedy for the MRIP Superfund Site.

Summary of the Rationale for the Selected Remedy
The selected remedy will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria, as described below.

Alternative AWS-3 is being selected because it eliminates inhalation, ingestion and dermal contact with contaminated groundwater associated with the Site that does not meet the State or Federal drinking water standards, and because it is considered to be the most reliable source of potable water over the long term. The potential for breakthrough exists with the GAC filtration systems (Alternative AWS-2). GAC filters are not considered a reliable long-term remedy, and it is more efficient to operate a central treatment plant rather than maintain an estimated 155 individual GAC units. In addition, selection of Alternative AWS-2 would hinder Site-wide remediation because, in the absence of a public water supply system, groundwater extraction to address the farfield plume (Alternative GR-3) may depress the water table and have an adverse impact on local private wells. The use of a well field as the primary source of potable water (AWS-4) is considered less desirable, since the wells may not be productive during drought conditions; would likely be high in iron content which would require iron removal and the resulting generation and disposal of sludge from this operation; and would be more susceptible to possible future contamination. Selection of Alternative AWS-3 to provide a permanent, alternative water supply is consistent with the recommendations made in the NYSDOH Health Consultation completed for the Site in December 1997.

Alternative GR-3 is the only alternative that will attempt to actively achieve applicable ARARs in the near- and farfield contaminant plumes. Alternative GR-1 would not actively reduce the toxicity, mobility or volume of contamination present in the groundwater. Alternative GR-2 provides prevention of human contact through institutional controls and extraction and treatment of contaminated groundwater in the nearfield plume, but relies on natural processes to address the farfield plume. Alternative GR-3 will reduce the volume, mobility and toxicity of the contaminated groundwater both in the near- and farfield plumes in the shortest amount of time. Alternative GR-3 will be designed to prevent the migration of the VOC contaminants in the groundwater to areas outside the proposed PWSA and possibly impacting additional private water supply wells.

Alternative SC-3 is selected because it is cost-effective, will permanently mitigate the threat posed by Site soils, and will result in less disruption of MRIP property operations than Alternative SC-2. Unlike Alternative SC-1, which takes no active measures to achieve Site cleanup objectives, Alternative SC-3 will remove the sources of contamination in the subsurface soils on the MRIP property and achieve applicable soil cleanup objectives through excavation.

Description of Selected Remedy

The selected alternate water supply remedy, **Alternative AWS-3:**

Public Water Supply Using Catskill Aqueduct, includes the construction and operation of a new public water supply system to provide safe potable water to the residences or businesses in the Towns of Marbletown and Rosendale with impacted or threatened private supply wells, with the Catskill Aqueduct as the water supply. FIGURE 14 shows the proposed major components of this alternative, and FIGURE 15 presents the proposed location of these components.

Raw water will be conveyed from the Catskill Aqueduct through the Rondout Dewatering Chamber to an elevated raw water storage tank on the MRIP property. The transmission line is assumed to be 6-inch diameter, constructed of ductile iron, and installed in a trench approximately 4 to 5 feet below ground surface wherever possible. Approximately 2,400 feet of piping is assumed to be necessary for this stretch of pipe. The raw water storage tank will be constructed of steel and have a storage capacity of approximately 10,000 gallons. Raw water will flow via gravity to a treatment plant located adjacent to the storage tank. Treatment is assumed to consist of equalization, pH adjustment, coagulation, flocculation, clarification, filtration, and disinfection. The size of the treatment plant will be designed based on two times the average daily flow (approximately 126,100 gallons per day, or 88 gallons per minute). Pumps will be sized to transfer five times the average daily flow (220 gallons per minute).

Waste sludge will be generated from the water treatment process, namely in the sedimentation unit. Sludge will be transferred to a dewatering unit (e.g., a recessed plate filter press) where the sludge will be thickened to approximately 30% solids and the filtrate will be collected and disposed of off-Site.

Finished water will be pumped from the treatment plant to a nearby elevated storage tank. Based on the anticipated water demand of the PWSA, the tank will have at least a 150,000 gallon capacity. Approximately two acres of land will be needed at the MRIP Site for a water treatment plant with water storage components.

From the finished water storage tank, water will be gravity fed to the distribution system of the PWSA. The distribution system will consist of an 8-inch ductile iron primary main and 1-inch copper connection lines to buildings within the PWSA. Pipelines will be installed in a trench approximately 4 to 5 feet below ground surface under major roads wherever possible. The distribution system will consist of roughly 28,000 linear feet of installed primary main. There are a total of 192 properties in the PWSA. 155 developed properties, and one property currently being developed, will be connected to the distribution system. FIGURE 16 depicts the conceptual layout for this system. The exact layout of the PWSA may be modified during the RD based on additional sampling data, or groundwater modeling results, to include additional properties which are threatened or impacted by the contaminant plume or may be affected by water table drawdown from the groundwater extraction and treatment system (see Proposed Water District Formation discussion below).

For periods of time when the Catskill Aqueduct is temporarily out of service, a backup supply of water will be needed. Three options will be considered during RD for this backup supply, namely: 1)installation of a public supply well(s) (the preferred option), 2) the Rondout Creek, and 3) use of treated effluent from the NTCRA groundwater extraction and treatment system. Under option 1, consideration is being given to converting MRMW-13B to an extraction well or locating a new well in the vicinity of MRMW-13B. MRMW-13B, located near the Rondout Dewatering Chamber, is being considered for conversion to a backup supply well(s) because it was found to have a high yield and has not been impacted by the VOC plume, and residential wells in this area reportedly have artesian properties. Pump tests of MRMW-13B and groundwater modeling would be conducted during the remedial design to determine the well's yield and assess the impact of pumping this well, or another well in this area, for extended periods on nearby potable wells. If pump tests or modeling indicate that nearby wells or the progress of groundwater remediation would be adversely impacted by water table drawdown from the operation of backup well(s) for an extended period of time, measures would be taken to minimize these impacts (i.e., these residences would be considered eligible for inclusion in the PWSA, the potable wells could be drilled to a deeper depth, or another backup supply well would be installed a further distance from these wells). Based on community input, option 2, use of the Rondout Creek as a potential source of backup supply, would not be the preferred backup water supply source. This alternative would be pursued during the design if no other alternative for backup is available (e.g., insufficient yield from option 1). During the public comment period, Town officials requested that the treated groundwater from the NTCRA groundwater extraction and treatment system be considered as a backup water supply source (option 3). This option will be considered further during RD.

This alternative also includes continued operation of the NYSDEC Interim Remedial Measure to monitor and maintain the individual GAC filtration systems currently in use until such a time that the new public water supply system is fully operational. If additional wells are impacted above MCLs in the interim, GAC filtration systems would be provided. Institutional controls may also be employed to prevent groundwater usage within the PWSA.

The elements of the selected groundwater response **Alternative GR-3 Extraction and Ex-Situ Treatment** are as follows:

The design and construction of a groundwater extraction and treatment system. A series of 3 to 6 new bedrock groundwater extraction wells, pumping at a total rate of approximately 120 gallons per minute, would be installed to gain hydraulic control over the farfield contaminant plume and to prevent the plume from migrating further downgradient. The exact location and number of these new extraction wells will be determined by conducting pump tests and groundwater modeling during the pre-design phase of the project.

The extracted groundwater will be treated with an air stripper in a new water treatment plant to remove VOCs from the groundwater. Treated water would be discharged to the Rondout Creek in compliance with effluent limitations for this surface water body. Conceptually, the location of the treatment plant would be near the Rondout Creek and north of Route 213. The exact location of the plant will be determined during the pre-design phase of the project. The cultural resources and the aesthetics of the neighborhood and availability of land will be important factors in the final location and design of the treatment plant.

The remedy also includes continued operation of the groundwater pumping wells and treatment system on the MRIP property, which are part of EPA=s NTCRA to address the most contaminated portion of the groundwater plume. The NTCRA system includes extraction of 40-45 gpm of contaminated groundwater from three recovery wells on the MRIP property, treatment with an air stripper, carbon polishing and inorganic treatment (using a Dynasand filter) of the effluent, vapor phase carbon treatment of air releases, and discharge of the treated effluent to the Coxing Kill. The NTCRA system has been designed for 80 gpm capacity, which will allow and additional extraction wells to be connected to this system at a later date, if necessary.

A long-term groundwater monitoring program will be implemented that will assess the effectiveness of groundwater pumping and treatment on the contaminant levels in the aquifer over time. The need for additional monitoring wells would also be assessed during the remedial design. Surface water samples from the Rondout Creek and the Coxing Kill will be collected and analyzed as part of the long-term monitoring program to ensure compliance with discharge standards and to ascertain that the groundwater plume has not migrated into these water bodies.

Proposed Water District Formation

Implementation of the selected alternate water supply and groundwater response alternatives in this ROD is contingent on the formation of a local water district (the PWSA boundaries are depicted in FIGURE 13). The PWSA boundaries may be expanded during the remedial design if additional wells are found to be impacted or threatened by the VOC plume or water table drawdown from either the groundwater extraction and treatment system or backup supply wells. The Towns of Marbletown and Rosendale have been proceeding with the necessary steps to form a water district, and have recently prepared an intermunicipal agreement, a Plan, Map & Report (which defines the district boundaries and gives estimated costs for users of the district), and have scheduled a public hearing on district formation. Details on the exact fee structure for district users is still being determined by the Towns. The district formation may be subject to local referendum. It is anticipated that the water district will require mandatory hook-ups for members of the district and closure of existing wells within the district. The cost for well closure is included in the capital cost projections for Alternative AWS-3 which will be funded by EPA and NYSDEC. In addition, prior to using the Catskill Aqueduct as a water supply, a water use agreement will need to be approved between the water district and the NYCDEP.

The source control supply remedy (for contaminated soils on the MRIP property), **Alternative SC-3: Excavation and Off-Site Disposal**, includes the excavation of soil containing contaminants at levels that exceed cleanup levels for soil COCs, and off-Site disposal and treatment (if necessary). The soil areas to be addressed which were identified in the RI are indicated on FIGURE 12 as Areas 1A, 1B and 2B. There are approximately 200 cubic yards of soil in these areas. Approximately 300 cubic yards of additional soil in the paint waste area characterized by EPA's Removal Program will also be addressed. Additional sampling will be performed during the design to further delineate COCs exceeding the cleanup levels. Soil from these areas will be excavated and stockpiled or placed in rolloff containers on the MRIP property. Once characterized for disposal, the soil will be transported off-Site to a permitted waste treatment or disposal facility. Uncontaminated soil will be stockpiled and used as a portion of the backfill for the excavation. Soil samples will be collected from the side walls and bottoms of the excavations to verify that cleanup levels are achieved. Once the completion of excavation is confirmed, the excavated areas will be backfilled with clean fill and restored.

Summary of Estimated Remedy Costs

The estimated present worth cost to implement the potable water supply portion of this remedy (AWS-3) is $8.8 million. The cost to construct the remedy is estimated to be $7.6 million and the estimated average annual O&M cost (which will be borne by the proposed water district) for 30 years is $76,000. See TABLE 15.

The estimated present worth cost to implement the groundwater restoration portion of this remedy (GR-3) is $6 million. The cost to construct the remedy is estimated to be $1.2 million and the estimated average annual operation and maintenance cost for 30 years is $312,000. See TABLE 16.

The estimated present worth cost to implement the contaminated soils portion of this remedy (SC-3) is $472,000; there are no long-term operation and maintenance costs associated with this remedy. See TABLE 17.

The information in this cost estimate summary is based on the best available information regarding the anticipated scope of the remedial alternatives. These are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual cost of the project. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the components of this remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Difference (ESD), or a ROD amendment.

Expected Outcomes of Selected Remedy

Implementation of alternate water supply **Alternative AWS-3** will eliminate potential risks associated with exposure to contaminated groundwater on and off the MRIP property. Upon implementation, this remedy will provide safe potable water to the threatened and impacted residences and/or businesses within the PWSA. Design and construction of the system is expected to take approximately three to four years.

Based on the modeling performed by NYSDEC in the FS, it is estimated that implementation of groundwater response **Alternative GR-3** will achieve Site cleanup objectives for groundwater in 29 years through operation of a groundwater extraction and treatment system (the FS estimate was based on the amount of time for one aquifer volume to be captured). By achieving cleanup levels, the groundwater will be available for its best use (as a source of potable water supply).

The cleanup levels, summarized in TABLE 14, are based on ARARs (i.e., EPA and NYS groundwater and drinking water standards). Design and construction of the system is expected to take approximately three to four years.

Implementation of source control **Alternative SC-3** will eliminate potential cross-media impacts from the soil source areas. The cleanup levels for these soils, see TABLE 14, were based on NYS recommended levels to prevent groundwater impacts, and will allow the Site to continue to be used as a light industrial facility. Implementation of this alternative is expected to take approximately six months.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established under Federal and State environmental laws unless a waiver from such standards is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, as available. The following sections discuss how the selected remedy meets these statutory requirements.

EPA and NYSDEC believe that the selected remedy will be protective of human health and the environment, comply with ARARs, be cost-effective, and utilize permanent solutions to the maximum extent practicable, as discussed below.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. The selected alternate water supply remedy, AWS-3, is protective of human health and the environment because it will eliminate human exposure to water above NYS and Federal MCLs, by providing an alternate water supply. The selected groundwater response remedy, GR-3, will minimize the migration of the groundwater plume and achieve cleanup levels for the best available use of the aquifer, as a potable water supply. The long-term monitoring of the groundwater in the vicinity of the Site will assess the rate of recovery of the SFBA. The selected soil remedy, SC-3, will address soils to prevent cross-media impacts to groundwater. Implementation of the selected remedies will not pose unacceptable short-term risks, and no adverse cross-media impacts are expected.

Compliance with ARARS

The NCP (''300.430(f)(5)(ii)(B) and (C)) requires that the selected remedy attain federal and state ARARs. The remedy will comply with the following action-, chemical- and location-specific ARARs identified for the Site and will be demonstrated through monitoring, as appropriate. For a complete listing of ARARs, see FS Chapter 10, Table 10-1, and the EE/CA, Section 2.4.

Action-Specific ARARs:

40 CFR Part 61 - National Emissions Standards for Hazardous Air Pollutants
42 U.S.C. '' 7401 et. seq., Clean Air Act
40 CFR Part 254.25 - Excavation and Fugitive Dust Emissions
42 U.S.C. Section 6901 et seq., 40 CFR Parts 260-268 - Resource Conservation and Recovery Act (RCRA) Standards for Handling, Transportation and Disposal of Hazardous Waste, including Land Disposal Restrictions
CERCLA off-Site policy (NCP '300.440)
6 NYCRR Part 200.6 - Ambient Air Quality Standards
6 NYCRR Parts 370-376 - New York State Standards for Handling, Transportation and Disposal of Hazardous Waste
DOT transportation regulations
Small System Compliance Technology List for the Surface Water Treatment Rule (EPA 815-R-97-002), Small System Compliance Technology List for the Surface Water Treatment Rule and Total Coliform Rule (EPA 815-R-98-001), Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996 (EPA 815-R-98-002), and Variance Technology Findings for Contaminants Regulated Before 1996 (EPA 815-R-98-003)

Chemical-Specific ARARs:

40 CFR Part 141 - Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs)
42 U.S.C. '' 300F et. seq., Safe Drinking Water Act
6 NYCRR Parts 700-705, NYS Surface Water Standards
6 NYCRR Part 703, Groundwater Standards for Class GA groundwater
33 U.S.C. '' 1251-1387, Clean Water Act
10 NYCRR Part 5 - New York State Sanitary Code for Drinking Water

Location-Specific ARARs:

National Historic Preservation Act (NHPA)
Executive Order 11988 - Flood Plain Management

Executive Order 11990 - Protection of Wetlands
40 CFR 6 Apx. A (Policy on Implementing Executive Order 11990)
EPA=s 1985 Statement of Policy on Floodplains/Wetlands Assessments for CERCLA Actions
6 NYCRR Part 662, New York State wetland protection provisions

To-Be-Considered:

NYSDEC TAGMs 4046 - Hazardous Materials Soil Cleanup Levels
Air Guide I - NYSDEC Control of Toxic Ambient Air Contaminants
NYC 1905 Water Supply Act
Local Law Filing, New York State Department of State, re: Town of Marbletown, Local Law no. 3, a local law to mandate necessary fire flows in new water districts

Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP ''300.430(f)(1)(i)(B)). Overall effectiveness is based on the evaluations of: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective (NCP ''300.430(f)(1)(ii)(D)).

Each of the alternatives has undergone a detailed cost analysis. In that analysis, capital costs and O&M costs have been estimated and used to develop present-worth costs. In the present-worth cost analysis, annual costs were calculated for 30 years (estimated life of an alternative) using a five percent discount rate (consistent with the NYSDEC FS and Proposed Plan). For a detailed breakdown of costs associated with the selected remedy, please see TABLES 15-17.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized. The selected remedy utilizes permanent solutions to address the groundwater, drinking water supply, and soil contamination problems at the Site. The selected remedy represents the most appropriate solution at the Site because it provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria.

Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element is satisfied through the use of treatment measures to reduce the volume and mobility of contaminated groundwater in the aquifer.

Five-Year Review Requirements

Because this remedy will not result in hazardous substances, pollutnats, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, but will take more than five years to attain remedial action objectives and cleanup levels in the groundwater, a policy review may be conducted no less often than each five years after the initiation of the remedial action for the Site to ensure that the remedy is, or will be, protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

There were no significant changes from the preferred remedy presented in the Proposed Plan, however, the following changes should be noted:

The boundaries of the PWSA have been expanded to include an additional 18 properties, bringing the total number of properties within the PWSA to 192 (155 of which are developed), based on correspondence with the Towns of Rosendale and Marbletown, engineering considerations, and December 1999 residential well sampling results;

At the request of the Town of Marbletown, the use of treated groundwater from the groundwater extraction and treatment system as a backup water supply will be considered during the remedial design;

The cost estimates have been revised to account for the NYCDEP water use rate (for AWS-3) and the additional volume of soil in the paint waste area characterized by EPA's Removal Program. Capital cost and present worth were also recalculated for AWS-2, 3, and 4 in order to account for the additional properties within the PWSA; and

Alternatives GR-2 and GR-3 were revised to include institutional controls, such as groundwater use restrictions, which may be employed to prevent use of the bedrock aquifer in the impacted or threatened area.

<u>APPENDIX I</u>

FIGURES

APPENDIX II

TABLES

APPENDIX III

ADMINISTRATIVE RECORD INDEX

APPENDIX IV

STATE LETTER OF CONCURRENCE

APPENDIX V

RESPONSIVENESS SUMMARY