United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-87/039
July 1987

EPA

Superfund Record of Decision:

GE MOREAU, NY

[redacted]

TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
1. REPORT NO. EPA/ROD/R02-87/039	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION GE Moreau, NY First Remedial Action - Final		5. REPORT DATE July 13, 1987
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report
		14. SPONSORING AGENCY CODE 800/00
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

The GE Moreau site, located in the Town of Moreau, Saratoga County, New York, is situated is a semi-rural setting with single family houses nearby. These houses rely on individual drinking water wells as their water supply. From 1958 to 1968, the site was used as an industrial waste disposal site. An evaporative pit received approximately 452 tons of waste material generated by the General Electric Company (GE). The waste materials include trichloroethylene (TCE), polychlorinated biphenyls (PCBs), spent solvents, oils, sludge and other miscellaneous waste. In late 1982, elevated levels of TCE were found onsite in the ground water. The Town of Moreau installed activated carbon filter systems on the drinking water systems of 70 homes believed to be downgradient of the site and therefore affected, or potentially affected, by contaminants eminating from the site. In the summer of 1983, EPA initiated negotiations with GE to address the offsite contamination problems. The primary contaminants of concern affecting the ground water, surface water and river include: TCE, dichloroethylene, VOCs and organics. Approximately 8,600 cu. yds. of soil are contaminated with PCBs.

The selected remedial action includes: Utilize the soil-bentonite cutoff wall constructed in 1984 around the former disposal area to contain the source of offsite ground water contamination; utilize the air stripping system installed in fall 1985 to
(See attached sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision GE Moreau, NY First Remedial Action - Final Contaminated Media: gw, sw, soil, river Key contaminants: TCE, PCE, trans - 1, 2-dichloroethylene, VOCs		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report) None	21. NO. OF PAGES 75
	20. SECURITY CLASS (This page) None	22. PRICE

EPA/ROD/R02-87/039

SUPERFUND RECORD OF DECISION
GE Moreau, NY
First Remedial Action - Final

16. ABSTRACTS (continued)

remove VOCs offsite at Reardon Brook; remove 8,600 cu. yds. of PCB-contaminated soil adjacent to the disposal area and place within the slurry wall containment area (This was completed in late summer 1985); capping of the disposal area in conformance with New York State Department of Environmental Conservation requirements; and extensio of public water mains to approximately 100 homes. The estimated capital cost of the selected alternative is $16,382,000 with annual O&M of $78,000.

RECORD OF DECISION

Site: GE Moreau Site, Moreau, Saratoga County, New York

Documents Reviewed:

I am basing my decision on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the GE Moreau Site:

- Remedial Investigation, GE/Moreau Site, October 1984;
- Addendum, Remedial Investigation, GE/Moreau Site, March 1985;
- Feasibility Study of Remedial Alternatives, Moreau Site, August 1985;
- Regional Water Supply Evaluation for the General Electric Co., April 30, 1984
- The attached Site History, Alternatives Evaluation, and Selection;
- Public Comments and Responsiveness Summary; and
- Staff summaries and recommendations.
- Quantity and Quality of Water From Public-Supply Wells and Springs in the Village of South Glens Falls, New York, 1987 (USGS Administrative Report)

Description of Selected Remedies:

This Record of Decision (ROD) for the GE Moreau site calls for the following actions:

° Utilize the soil-bentonite cutoff wall constructed in 1984 around the former disposal area to contain the source of offsite groundwater contamination. The wall was constructed in compliance with an Order on Consent between the General Electric Company (GE) and the New York State Department of Environmental Conservation dated September 23, 1980. It is 1600 feet in circumference, 30 inches thick, 100 feet deep and keyed a minimum of 6 feet into the underlying natural clay confining layer.

° Continue to monitor 18 downgradient wells to assure that the slurry wall is containing the source of groundwater contamination and monitor 29 wells to determine if changes are occurring in the size and direction of the plume.

° Continue treatment of the plume where it exits at Reardon Brook. This water is currently treated by the air stripping system for the Village of Fort Edward public water supply. The degree of lateral dispersion of the plume is dictated by existing hydrogeologic features. Therefore, it is not anticipated that further significant lateral dispersion of the plume will occur. Consequently, active pumping of the plume prior to its discharge at Reardon Brook does not appear to be necessary to control further widening of the plume. Although active pumping may accelerate aquifer restoration it may also adversely affect groundwater flow feeding the resevoirs which comprise the Village of Fort Edward resevoirs. In addition, evaluations indicate that active pumping is not cost-effective at this time.

- Utilize the air stripping system installed in fall 1985 to remove volatile organics from Reardon Brook feeding New Reservoir which is one of 4 reservoirs making up the public water supply system of the Village of Fort Edward. This work was performed as a remedial measure under the Comprehensive Environmental Response, Compensation, and Liability Act with the agreement of EPA, NYSDEC, and the Village of Fort Edward. This air stripping system is sized for flows up to 400 gallons per minute and volatile organic contaminant concentrations up to 100 parts per billion. It has been operating since late fall 1985 and effectively removes contaminants to non-detectable (less than 1 part per billion). This also provides for the treatment of both the downgradient plume and the aquifer as well as the surface water streams which form Reardon Brook.

- Remove 8,600 cubic yards of PCB-contaminated soil adjacent to the disposal area and place these soils within the disposal site, which is contained by the slurry wall described above. This work was completed in late summer 1985 in compliance with an Administrative Order between GE and EPA dated July 12, 1985 which found that the removal of these materials would prevent and/or mitigate immediate and significant risk of harm to human health. Construct an impermeable cap over the disposal area in conformance with the NYSDEC/GE Administrative Order. This has also been completed.

- Provide a public water supply for residences affected by the plume of contaminated groundwater identified in the Remedial Investigation and modified by EPA's comments, by extending public water supply mains from the Village of South Glens Falls. The institutional requirements of this alternative include the formation of a water district which is ordinarily created by local government; alternatively GE may be the purveyor of water to the affected area, if necessary. Approximately 100 homes will be provided with public water. They are along Bluebird Road, Cheryl Drive, Terry Drive, and Myron Road. These mains will be sized to be consistent with the Town of Moreau Water Service Comprehensive Plan. EPA is also recommending that the Town of Moreau establish institutional controls for restricting the withdrawal of groundwater within the groundwater plume.

- Review the remedial action no less than each 5 years after the initiation of such action to assure that human health and the environment are being protected by the remedial action. Require additional action as EPA deems appropriate based upon this review.

Declarations:

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act (CERCLA), 42 U.S.C. §9601, et seq., and the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300, I have determined that the following remedies implemented at the GE Moreau Site, constitute cost-effective remedies and would provide adequate protection of public health, welfare, and the environment.

- the already-installed soil bentonite cutoff wall in conjunction with continued groundwater monitoring;
- the currently-operating air stripper system on Reardon Brook;
- the previously-removed PCB contaminated soils; and
- the extension of the South Glens Falls water supply to the residences deemed by EPA to be affected or potentially affected by the plume of contaminated groundwater.

The State of New York has been consulted and agrees with the approved remedies. GE has performed the Remedial Investigation/ Feasibility Study activities in conformance with an Administrative Order between EPA and GE dated November 21, 1983. The results of these studies have provided a basis for the selection of the remedies contained in this Record of Decision. Pursuant to the above-referenced Administrative Order, GE has agreed to provide for those operation, maintenance, and monitoring activities necessary to assure the future effectiveness of the selected remedies.

July 13, 1987
Date

Christopher J. Daggett
Regional Administrator

SITE HISTORY
ALTERNATIVES EVALUATION
AND
SELECTION

SITE: GE Moreau Site

SITE LOCATION AND DESCRIPTION

The GE Moreau Site is located on Fort Edward Road in the Town of Moreau in Saratoga County, New York, approximately 20 miles north of Albany and 18 miles south of the Hudson River. See Figure 1.1, attached. The site is located in a semi-rural setting with single-family houses nearby. These houses rely on individual drinking water wells as their water supply. These wells tap the Moreau sand aquifer which is some 60 feet thick at the site. Groundwater in the area flows in a southerly direction and the aquifer decreases in thickness in the southerly direction. Eventually, the aquifer discharges into surface streams which feed the Village of Fort Edward public water supply reservoirs.

SITE HISTORY

The GE Moreau site was used as an industrial waste disposal site from 1958 to 1968. An evaporative pit at the site received approximately 452 tons of waste material generated by the General Electric Company. The waste materials included trichloroethylene (TCE), polychlorinated biphenyls (PCBs), spent solvents, oils, sludge, and other miscellaneous waste. In 1978, the Town of Moreau and the New York State Department of Health tested groundwater, surface water, soil, and air at and around the site. In September 1980, the site was included in an Order on Consent with the NYSDEC whereby GE would conduct investigations at seven waste disposal sites in the area and contain the waste materials at these sites. In late 1982, it was determined that there were elevated levels of TCE in the groundwater at this site. The site was proposed for inclusion on the National Priorities List (NPL) in December 1982. The Town of Moreau installed activated carbon filter systems on the drinking water systems of 70 homes believed to be downgradient of the site and therefore affected or potentially affected by contaminants emanating from the site. In the Summer of 1983, after meetings with the Town of Moreau and New York State representatives, EPA initiated negotiations with GE to address the off-site contamination problems. These negotiations resulted in an Administrative Order between EPA and GE whereby GE would (1) install and maintain activated carbon filter systems on homes whose wells exceeded contaminant levels established by EPA and specified in the Order; (2) sample and analyze drinking water well water in homes downgradient of the site on a monthly basis until full remediation is completed; (3) conduct a Remedial Investigation and Feasibility Study; (4) design and construct the EPA-selected remedy; and (5) conduct post-remediation monitoring and operation and maintenance.

Immediate Corrective Action

As a result of GE's testing program, GE has installed activated carbon filter systems on six homes whose drinking water has exceeded the volatile organic contamination established in the Administrative Order. GE is also monitoring the influent and effluent of these carbon filter systems to assure that the units continue to reduce contaminants from the well water to acceptable levels until the final remedy is implemented.

Remedial Investigation

The Remedial Investigation focused on groundwater contamination. It consisted of a complete characterization of the aquifer including groundwater flow and contaminant transport phenomena. This entailed the installation of groundwater monitoring well clusters at 25 locations along with the installation of single monitoring wells at 5 other locations to fully identify and define the groundwater flow pathways as well as the horizontal and vertical extent of contamination emanating from the GE Moreau site. In all, 72 monitoring wells were installed from May through November, 1984. See Plate 1, March 1985 Remedial Investigation, Study Area, Well Locations & Location of Geologic Cross Section for the well locations; not attached because of large size. This plate is part of the Remedial Investigation report and is available for viewing at the EPA Region 2 offices.

Water level measurements were obtained monthly for several months from the monitoring wells and groundwater samples were analyzed for volatile and semivolatile organics as well as PCBs for several months. This included over 200 groundwater samples obtained between June 1984 and February 1985. In addition, water samples were obtained from 160 private residential drinking water wells and analyzed for these contaminants on a monthly basis. These data were used to supplement the monitoring well sampling and to provide a basis for the provision of activated carbon filter systems under the auspices of the Administrative Order.

A plume of volatile organic contaminants has been identified emanating from the GE Moreau site. The plume consists of trichloroethylene, trans-1,2-dichloroethylene, vinyl chloride, 1,1,1-trichloroethane, 1,1-dichloroethylene, tetrachloroethylene, methylene chloride, chloroform, chlorobenzene, and dichlorobromomethane. The plume is approximately 4800 feet long and about 2000 feet at its widest point. The plume originates at the GE Moreau site and follows the regional groundwater flow, extending southeastward to the point where the Moreau aquifer decreases in thickness, resulting in surface water streams feeding the New Reservoir. Trichloroethylene is the most prevalent organic contaminant detected in the Remedial Investigation and its highest level can be found within the center of the plume. The highest levels are from 70 to 81 milligrams per liter or parts per million (ppm)

for trichloroethylene and 46 to 52 ppm for trans-1,2-dichloroethylene in monitoring well TM 4. These levels decrease to 16 ppm for trichloroethylene and 11 ppm for trans-1,2-dichloroethylene in monitoring well DGC 3 after travelling a distance of 3200 feet downgradient due to dilution and dispersion. See Table 6.1, Summary of Analytical Results, Groundwater Monitoring, March 1985 Remedial Investigation, attached. The level of contamination is lower on the outskirts of the plume and some 10's of micrograms per liter or parts per billion (ppb) of trichloroethylene have been detected in monitoring wells (DGC 15, near Terry Drive) on the western edge of the plume. See Plate 1, not attached. EPA sampling, conducted on January 30 and 31, 1985, detected trans-1,2-dichloroethene at 140 ppb and trichloroethylene at 200 ppb in monitoring well DGC 24. Four GE sampling events and one other EPA sampling event of monitoring well DGC 24 have detected no contamination. Some of these sampling events occurred prior to the EPA January 30 and 31, 1985 event and some occurred after that event. One sampling event was on the same date. Monitoring well DGC 24 is 800 feet west southwest of monitoring well DGC 15. This level of contamination has not been detected in monitoring well DGC 15. Subsequently, EPA ordered GE to install seven piezometers to confirm the western boundary of the plume. The results of water level measurements from these piezometers indicate that a groundwater mound exists in the area which precludes the movement of contaminants further west than DGC 15.

The Remedial Investigation identified contamination in Reardon Brook which feeds the Village of Fort Edward public water supply reservoirs which are along Reservoir Road. Reardon Brook had been diverted by the Village of Fort Edward in early 1984. Surface water samples were collected and analyzed some 40 times from nine stream locations as well as New Reservoir and the Village's three other reservoirs. Trichloroethylene and trans-1,2-dichloroethylene have been identified in Reardon Brook. The highest level of trichloroethylene detected in Reardon Brook was 900 ppb, at its origin. Contamination has not been detected in New Reservoir which is fed by Reardon Brook nor in the other reservoirs of the Village of Fort Edward public water supply. See Table 7.1 and Figure 7.2, Stream and Reservoir Analytical Results, Fort Edward, New York, March 1985 Remedial Investigation, both attached.

The Remedial Investigation also identified PCB-contaminated soils within the dirt roads leading to the GE Moreau site from Fort Edward Road. About 8600 cubic yards of contaminated soils were identified with varying concentrations of PCBs. 512 locations on these dirt roads were sampled and 76 locations showed detectable concentrations of PCBs. The highest level detected was 3000 ppm at the ground surface. Lower levels, up to 42 ppm, were detected down to a depth of 6 inches below the surface. See Plate 10, not attached, and Figure 8.1, attached, March 1985 Remedial Investigation.

ALTERNATIVES EVALUATION AND SELECTION

Objectives

The most important objective of the proposed remedial actions is to provide a safe drinking water supply for residents whose drinking water wells have been adversely impacted by groundwater contamination emanating from the GE Moreau site. This objective includes the continued monitoring of the groundwater quality in the area to assure that the existing groundwater plume does not adversely affect other areas. Part of this objective is to insure that the soil-bentonite slurry cut off wall is effective in containing the hazardous substances within the site. A second objective is to remediate the water quality of Reardon Brook feeding the New Reservoir which is one of the public water supply reservoirs of the Village of Fort Edward. A third objective is to reduce the potential for exposure to PCB contaminated soils adjacent to the GE Moreau site.

The level of response for NPL sites is determined by the requirements of CERCLA Section 104, which mandates that EPA protect public health and welfare and the environment. At this site, the response is dictated by the desire to minimize the public health risk presented by exposure to drinking contaminated water and exposure through direct contact with contaminated soils.

Initial Screening Process

Remedial alternatives for the GE Moreau site can be divided into the following categories: Surface Water Supply, Residential Water Supply, Aquifer Restoration, and Soil Remediation. All remedial alternatives were screened according to three criteria. These were cost, effects of the alternative, and engineering acceptability. The cost of installing or implementing the remedial alternative is considered including operation and maintenance costs. An alternative that far exceeds the cost of other alternatives and does not provide greater health or environmental benefit is excluded from further consideration in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP). The effects of each alternative are evaluated in two ways. These are whether the alternative or its implementation has any adverse environmental effects and whether the alternative is likely to effectively mitigate and minimize the threat of harm to public health, welfare, or the environment. The engineering acceptability means that the alternative must be feasible for the location and conditions at the site and present a reliable means of addressing the problem. The level of technological development is also considered.

Alternatives passing the initial screening process were then evaluated in greater detail. All considered alternatives are listed in Table 2, Potential Remedial Action Alternatives at the Moreau Site, August 1985, attached, and alternatives which passed the initial screening process and then subjected to a detailed evaluation of alternatives are listed on page 53 of the Feasibility Study, also attached. A discussion follows for describing the process whereby alternatives identified in Table 2 were either eliminated from or included in the detailed evaluation of alternatives. This discussion is organized according to the site problems they are intended to mitigate.

Surface Water Supply

Surface water at the Site is used for drinking water, therefore, the proposed Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act will be considered relevant and appropriate standards. The New York State Ambient Water Quality Standards and Guidance Values will be considered relevant and appropriate where proposed MCLs do not exist. Trichloroethylene and trans-1,2-dichloroethylene have been detected at Reardon Brook. The proposed MCL for trichloroethylene is 5 ppb. An MCL has not been proposed for trans-1,2-dichloroethylene; the State Guidance Value for this contaminant is 50 ppb.

-No Action
Water in Reardon Brook contains trichloroethlyene and trans-1,2-dichloroethylene in excess of the appropriate and relevant requirements described above. The Village of Fort Edward public water supply depends on Reardon Brook to meet its water supply needs, therefore, remedial alternatives are required. Accordingly, the no action alternative was eliminated.

-Diversion
Early in 1984, Reardon Brook was diverted to bypass New Reservoir and continue on and discharge into the Hudson River. Under this alternative, that diversion would be maintained. Reardon Brook, however, supplies approximately 40 percent of the Village's total water supply demand. Therefore, during extended periods of low precipitation, without the Reardon Brook supply, the Village's water supply demand would exceed the amount of water available. Thus, stream diversion as a long term remedy is eliminated because it would lead to a water supply shortage for the Village.

-Treatment by Carbon Adsorption
Activated carbon treatment has the advantage of high adsorption potential, tolerance of fluctuation in concentrations and flows, and has high flexibility in operation and design. The suspended solids in Reardon Brook water and its microbial content would cause premature fouling of the activated carbon. Activated carbon will also remove the naturally occurring

organic chemicals found in this water, which by causing competition for adsorption sites on the carbon, can result in reduced removal efficiency of organic contaminants. This would necessitate pretreatment of the influent water prior to the carbon adsorption process. The appropriate and relevant requirements discussed above, could be met by this alternative.

-Treatment by Air Stripping
Air stripping provides an effective means of removing the trichloroethylene and trans-1,2-dichloroethylene from Reardon Brook water. The appropriate and relevant requirements discussed above, could be met by this alternative.

-Treatment by Resin Adsorption
Resin adsorption is another effective means for removing organic contaminants. The method is not that widely employed for potable water treatment because of the difficulty of selecting the appropriate resin and adsorbant/regeneration combinations. Disadvantages of resin adsorption include high initial cost due to its lower adsorption capacity relative to activated carbon. Resin adsorption was therefore eliminated from further analysis.

-Treatment by Ion Exchange
Ion exchange will remove a limited number of organic contaminants from aqueous solutions. The nonpolar organic compounds found in the water of Reardon Brook are inappropriate for this treatment technology and therefore ion exchange was eliminated from further analysis.

-Reverse Osmosis
The technology of reverse osmosis is not well suited for treatment of Reardon Brook water. It would require pretreatment to remove colloidal and suspended solids, rigid pH control, and may lead to routine fouling of the expensive reverse osmosis membranes due to the precipitation of insoluble salts. Reverse osmosis is better suited to a water "polishing" operation following conventional treatment. Therefore, reverse osmosis was eliminated from futher consideration.

Residential Water Supply

Although the water supplies affected by the site are private and not public supplies, the proposed MCLs will be considered relevant and appropriate standards. Trichloroethylene has been detected in private wells. As stated above, the proposed MCL for trichloroethylene is 5 ppb.

-No Action
Concentrations of trichloroethylene in some residential drinking water wells along Bluebird Road have exceeded the proposed MCL thus necessitating further action. In addition, the no action alternative would not assure that residential drinking water wells in areas adjacent to the currently-defined groundwater plume would not become contaminated in the future.

These wells are along Cheryl Drive, Terry Drive, and Myron Road. The no action alternative for the Bluebird Road area is eliminated from further consideration and the no action alternative for the Cheryl Drive, Terry Drive, and Myron Road area is given further consideration and addressed in the Detailed Analysis section of this document.

-Monitoring
The monitoring of residential drinking water wells would not provide any control on groundwater movement; it would only provide the capability to detect contamination. This alternative would allow the proposed MCL for trichloroethylene to be exceeded. This alternative was therefore eliminated from further consideration. Monitoring of groundwater monitoring wells is considered in greater detail in connection with long term operation and maintenance of the slurry wall containment along with continued monitoring in the Detailed Analysis section.

-Groundwater Pumping and Recharge
The pumping of groundwater would not remedy the currently contaminated residential drinking water wells along Bluebird Road (i.e., the MCL for trichloroethylene would still be exceeded). It would only prevent wells along Cheryl Drive, Terry Drive, and Myron Road from eventually becoming contaminated. Groundwater pumping and recharge is a viable option for rehabilitation of the aquifer. For these reasons, a more detailed analysis of the groundwater pumping and recharge option is given further consideration in the Detailed Analysis section.

-Individual Whole House Treatment
The use of activated carbon filter systems to treat the water coming from residential wells is a viable way of reducing the concentration of trichloroethylene in drinking water to meet the proposed MCL. This option is given further consideration in the Detailed Analysis section.

-Alternate Water Supply (Pipeline)
An alternate water supply to residents whose wells do not meet water quality standards may be accomplished by extending a pipeline from a nearby public water supply system. This option would meet the proposed MCL for trichloroethylene and is given further consideration in the Detailed Analysis section.

-New Domestic Wells
This option is eliminated from further consideration because, at certain locations, the contaminants are distributed throughout the entire thickness of the Moreau sand aquifer and changing the well depth will not provide safe potable water (i.e., below the proposed MCL for trichloroethylene). Wells completed in the bedrock aquifer and disturbing the integrity of the confining layer could provide a pathway for movement of contaminants into the bedrock aquifer. Even if wells could be safely installed to preclude this possibility, the option would have to include long term monitoring to assure water quality. The new domestic wells alternative was therefore eliminated from further consideration.

-Cisterns
With the use of cisterns, precipitation water is collected from the roof and piped to a holding tank in the basement or elsewhere underground. Filters are used to eliminate dust and debris from the collected water. Although the proposed MCL for trichloroethylene would not be exceeded by this alternative with respect to private wells, it was eliminated from further consideration because water quantity may not be sufficient and cisterns could also present hydraulic and sanitary problems.

-Bottled Water
The use of bottled water would require 210 five-gallon containers on a weekly basis for each house and would also require a system for pumping the water through the house distribution system. Although this alternative would not exceed the proposed MCL for trichloroethylene with respect to private wells, it would not eliminate direct contact with contaminated water during bathing. This option was eliminated from further consideration.

Aquifer Restoration

The aquifer at the GE Moreau site may be used as a potable water supply, therefore, the proposed MCLs are considered relevant and appropriate requirements. Absent a proposed MCL, the New York State Ambient Water Quality Standards and Guidance Values will be considered relevant and appropriate.

-No Action
Water within the groundwater plume emanating from the site contains significant concentrations of volatile organic contaminants which exceed proposed MCLs and State standards and guidelines. The no action alternative would rely upon the ability of the Moreau sand aquifer to dilute and attenuate these contaminants under natural conditions. The GE Moreau site was contained with the installation of the soil-bentonite slurry wall. In the absence of source control, contaminants would continue to flow from the site and dilution and attenuation would not be effective. For these reasons, the no action alternative was eliminated from further consideration.

-Containment Barriers
Except for source containment purposes at the GE Moreau site itself, additional downgradient containment barriers are eliminated from further consideration. This is because the contaminant plume has already migrated to its full areal extent, as evidenced by groundwater sampling, water level measurements and surface water sampling conducted at Reardon Brook. Therefore, these barriers would be ineffective at this point in time.

-Source Containment, Groundwater Monitoring and Air Stripping Groundwater Discharge
This alternative would include the combination of groundwater containment barriers to restrict groundwater movement, sampling and analysis of selected monitoring wells to assess the degree of natural aquifer restoration over time, and air stripping the volatile contaminants from groundwater discharges leading to Reardon Brook. This alternative would not meet the appropriate and relevant requirements described above. As the GE Moreau site already has a containment barrier and air stripping the groundwater discharge can provide a cost effective means of treating the contaminants, this combination of remedial alternatives passes the initial process and is considered in the Detailed Analysis section.

-Source Containment, Groundwater Pumping and Recharge
This alternative includes the containment system described above along with the installation and operation of groundwater recovery wells to capture the downgradient contaminant plume, treatment to remove the groundwater contaminants, and either discharging the effluent from the treatment system to the streams feeding Reardon Brook or discharging the effluent back to the aquifer through recharge basins or injection wells. Although this alternative could meet the relevant and appropriate requirements described above, is not considered further because it could adversely affect the distribution pattern of water flowing to the reservoirs which comprise the Village of Fort Edward reservoirs. Injection wells are preferred over recharge basins in the second case because many basins would be required which would require the utilization of land in a residential neighborhood. The alternative of source containment, recovery wells, and treatment and reinjection wells is considered in the Detailed Analysis section.

-Permeable Treatment Beds
Permeable treatment beds require the installation of a trench filled with permeable treatment materials that would passively intercept and treat contaminated groundwater flows emanating from a site. The trench would have to be long enough and deep enough to intercept the entire contaminant plume. Such a trench for the GE Moreau site would have to be some 100 feet deep and filled with activated carbon for organics removal. This depth would prohibit installation and the volume of carbon would also be large. Therefore this alternative is eliminated from further consideration.

Soil Remediation

-No Action
This alternative would not eliminate the threat of public exposure to the highly-contaminated soils at the GE Moreau site. The no action alternative is therefore eliminated from further consideration.

-Sealing
Surface sealing or capping the contaminated soils would eliminate the possibility of public exposure as well as minimize water infiltration and erosion runoff.

-Excavation and Removal
Excavation of the PCB-contaminated soils and removal to a secure chemical landfill is an appropriate alternative. The ultimate disposal site could be the GE Moreau site itself, within the slurry wall or other secure chemical landfills in western New York State. These alternatives are considered further in the Detailed Analysis section.

-Treatment
Incineration, either on site or off site for some 8600 cubic yards of materials would be prohibitively expensive compared to the the other two alternatives described above. Incineration was therefore eliminated from further consideration.

Detailed Analysis and Alternatives Selection

Each alternative and combination of alternatives passing the initial screening process was evaluated in detail. The detailed analysis consisted of evaluating the following aspects: technical feasibility, public health protection, institutional requirements, environmental effects, and cost. This analysis is in accordance with Section 300.68 of the NCP and Section 121 of CERCLA.

The technical feasibility of a remedial action was evaluated for performance, reliability, implementability, safety and level of technological development. Two aspects of performance determine desirability on the basis of performance, namely effectiveness and useful life. Effectiveness refers to the degree to which the action will prevent or minimize substantial danger to public health, welfare, or the environment. The useful life is the length of time this level of effectiveness can be maintained. The cost of installing and operating remedial alternatives, and the importance of protecting public health and the environment factor into reliability. The frequency and complexity of operation and maintenance are also considered in evaluating the reliability of alternatives. Implementability is the relative ease of installation and the time required to achieve a given level of response. The time requirements are generally classified according to the time required to implement a technology and the elapsed time before results are actually realized. The safety evaluation considered threats to nearby communities and environments as well as those to workers during implementation. The major risk considered was exposure to hazardous substances. A proven and widely used technology was rated high for technological development, and those technologies considered experimental were rated lower.

In addition to being technologically feasible and reliable, a remedial action must adequately protect public health. Remedial actions were evaluated with respect to the degree to which

they mitigate health and environmental impacts, and for each remedial alternative evaluated, any negative environmental effects resulting from the implementation of that alternative. Alternatives requiring federal, state or local permits are identified where relevent.

As specified in Section 300.68 (i)(2)(B) of the NCP, remedial alternative cost estimates, including distribution of costs over time were developed. In developing detailed cost estimates, the following steps were performed;

1. Estimated capital and operation and maintenance costs for remedial action alternatives.

2. Present worth analysis was calculated assuming 10 percent interest and 5 percent inflation. This analysis allows evaluation of expenditures that occur over a length of time by discounting all future costs to the present. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money, that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over a thirty year life.

Surface Water Supply

From the initial screening of alternatives, activated carbon adsorption and air stripping the water in Reardon Brook are the two alternatives considered. Both alternatives can meet the appropriate and relevant requirements for surface water supply.

-Carbon Adsorption
Carbon Adsorption is technically feasible for removing the volatile organic contaminants from the waters of Reardon Brook. The carbon adsorption capacity for trichloroethylene and trans-1,2-dichloroethylene is 28 mg/gm and 3.1 mg/gm respectively. For the streamflow of Reardon Brook and its contaminant loading, the rate of carbon usage would be 22 pounds per day. A standard carbon unit, holding 20,000 pounds of carbon, would have a life span of 2-1/2 years.

Public health would be protected by this alternative because the effluent water quality would meet or exceed the MCL for trichloroethylene and State guidelines for trans-1,2-dichloro-ethylene.

New York State Department of Environmental Conservation permits would be required for construction and operation of a carbon adsorption water treatment facility.

There should be no adverse environmental effects from the operation of a carbon adsorption water treatment facility.

The capital costs of a 20,000 pound carbon adsorption unit is $600,000. The annual operation and maintenance costs are $150,000 which converted to a 30-year basis would be $2,306,000. Therefore, the total costs are $2,906,000 for such a unit. There are some disadvantages to a carbon adsorption unit which should be considered. It has some inherent inflexibility as far as contaminant loading which can reduce the useful life of the carbon. In addition, the carbon, when saturated with organic contaminants, has to be replaced. This operation is labor intensive.

-Air Stripping
Removing volatile organic contaminants from water by air stripping is a well proven and available technology. Because trichloroethylene and trans-1,2-dichloroethylene have high vapor pressures compared to water, these organic compounds can be removed from the water phase by exposure to air in a packed stripping column. Air stripping can remove the contaminants in Reardon Brook to levels less than 1 part per billion which meets and exceeds the MCL for trichloroethylene and the State guideline for trans-1,2-dichloroethylene.

A permit to construct an air stripping tower on Reardon Brook has been granted by Region 5 of the New York State Department of Environmental Conservation. This initial remedial measure complies with Section 300.68(e) of the NCP whereby remedial activities may be instituted prior to the selection of the final remedy.

There is no detrimental environmental impact associated with an air stripping water treatment facility.

The air stripping tower costs $90,000 and the entire treatment facility including pumps, supplementary air heating for extreme cold weather operations, and supplementary back up equipment is $500,000. The annual operation and maintenance costs for the facility is $16,000 and, when converted to a 30-year present cost, is $246,000. The total cost for the air stripping facility is therefore $746,000.

Comparison of Alternatives for Surface Water Treatment-
Carbon adsorption and air stripping are both technically feasible and available alternatives for treating Reardon Brook waters.

Carbon adsorption, costing $2,906,000, is some $2.2 million more expensive than air stripping which costs $746,000. The Environmental Protection Agency hereby selects air stripping as the cost effective alternative for treating Reardon Brook waters. As the air stripping facility has been operational since fall 1985, the EPA decision is therefore to continue to utilize the air stripping facility initial remedial measure as the selected remedial measure.

Residential Water Supply

The options for residential water supply in the Cheryl Drive, Terry Drive, and Myron Road areas are the no action alternative, groundwater monitoring alone, and groundwater pumping and recharge. For the Bluebird Road area, the alternatives are individual whole house treatment and alternate water supply from an existing public water supply which both can meet the appropriate and relevant requirements for residential water supplies.

-Individual Whole House Treatment (Bluebird Road)
The in-line whole house treatment unit consists of two activated carbon filter canisters in series with the incoming water from the individual domestic well followed by an ultraviolet disinfecting unit. Monthly sampling and analysis to assure the proper operation of these units is inclued within this alternative. It is also assumed that the carbon units would be changed annually.

The whole house treatment alternative is technically feasible and achieves a high level of decontamination almost immediately. The whole house treatment alternative effectively reduces the risk of consuming contaminated drinking water. A small risk still exists for contaminant breakthrough to occur between the sampling events and therefore the potential for consumption of contaminated water exists during that time period.

There are no institutional requirements for the whole house treatment alternative.

No adverse environmental effects are related to the whole house treatment alternative. The only negative aspect with respect to environmental concerns is the disposal or regeneration of spent carbon.

The costs for whole house treatment units are strictly linear with respect to the number of treatment units ultimately needed. For eight units the capital costs would be $24,000. The annual operation and maintenance costs are $32,000 and converted to a 30 year basis are $492,000. Therefore, the total cost for this alternative is $516,000. Again, if more domestic wells need treatment, this cost would escalate linearly.

-Alternate Water Supply (Bluebird Road)
This alternative involves the extension of the public water supply mains to the Bluebird Road area. Public water supplies in the area include Village of South Glens Falls supply to the north and the Town of Moreau Water District No. 2 to the west. Water could also be obtained from the Town of Queensbury Water District No. 1 and the Village of Hudson Falls. Water could also be obtained from a new, not yet constructed, public water supply. Water mains would be sized to be compatible with the Town of Moreau Water Service Comprehensive Plan. The alternate

water supply pipeline is both technically feasible and achieves a high level of performance and reliability in a short time. The pipeline alternative would effectively isolate residents from exposure to contaminated drinking water and would therefore eliminate risks to public health.

Permits to install the pipeline may be required from the Town of Moreau and New York State Department of Health approval to extend water supply mains may be required. If the Queensbury supply is the source of alternative water, permission from the New York State Department of Transportation, the Federal Highway Administration, and the U.S. Coast Guard would have to be granted for a water main to be installed on the I 87 bridge across the Hudson River.

No adverse environmental effects can be attributed to this alternative.

The capital cost for extending water supply mains to the Bluebird Road area range from a low of $463,000 to a high of $692,000 depending on pipeline sizing and compatibility with the Town of Moreau Water Service Comprehensive Plan. Operation and maintenance costs would be covered by water usage fees: i.e., the operation and maintenance expenses for this alternative are contained within the water bills collected from all water supply users within the water district.

-No Action (Cheryl Drive, Terry Drive, Myron Road)
The no action alternative for the Cheryl Drive, Terry Drive, and Myron Road area would not mitigate any potential impact from the existing groundwater contaminant plume and further, selection of this alternative alone would not provide verification that the plume has remained unchanged from its present condition.

This involves no analysis of technical feasibility, institutional requirements, or cost.

-Groundwater Monitoring (Cheryl Drive, Terry Drive, Myron Road)
This alternative involves the regular sampling and analysis of groundwater monitoring wells between the GE Moreau site and the Cheryl Drive, Terry Drive, and Myron Road area. Four monitoring wells, sampled on a semi-annual basis, would provide for the implementation of additional remedial measures in this area.

This alternative is technically feasible and well established. The monitoring wells were installed under the Remedial Investigation and already exist.

This alternative would only provide a warning system for this area. It would not, on its own, provide public health protection. Access to the four monitoring wells would have to be assured as an institutional requirement.

This alternative would have no adverse environmental effect. The capital cost of the four monitoring wells is zero because they already exist. The annual operation and maintenance of semi-annual monitoring and analysis is $22,000. That cost, when converted to a 30-year term, is $338,000 which means the total cost of this alternative is also $338,000.

-Groundwater Pumping and Recharge (Cheryl Drive, Terry Drive, Myron Road)
This alternative would involve the installation of four groundwater production wells placed between the GE Moreau site and the Cheryl Drive, Terry Drive, and Myron Road area. Pumping, treating, and returning this water to the aquifer would provide a barrier between the contaminants at and downgradient of the GE Moreau site and the Cheryl Drive, Terry Drive, and Myron Roads area. The system would include eight recharge wells, southeast of the withdrawal production wells, to return treated water to the aquifer. The treatment system would be an air stripping water treatment facility.

This alternative is technically feasible and commonly used to control groundwater contaminant plumes.

This alternative would provide a barrier between the GE Moreau site and the Cheryl Drive, Terry Drive, and Myron Road area to prevent groundwater contaminants from migrating to the wells in this area.

The institutional requirements for this alternative include the purchase of land for the production wells, treatment plant, and the reinjection wells. Permits would have to be obtained under the Clean Air Act for the air stripping treatment plant, and under the Underground Injection Control program of the Safe Drinking Water Act for the injection wells.

The detrimental environmental effects are drawdown of residential drinking water wells, creation of groundwater sinks and mounds, and drawing groundwater contaminants closer to the Cheryl Drive, Terry Drive, Myron Road area by pumping groundwater.

The capital cost of this alternative is $1,100,000. The annual operation and maintenance costs are $74,000 which converted to a thirty year base is $1,144,000. The overall cost of the groundwater pumping and recharge alternative for this area is $2,244,000. This is not a cost effective alternative.

-Individual Whole House Treatment (Cheryl Drive, Terry Drive, Myron Road)
This alternative involves installing activated carbon water treatment units and ultraviolet disinfection units on residential drinking water wells in the Cheryl Drive, Terry Drive, and

Myron Road area. This alternative is technically feasible and easily installed. It also effectively mitigates public health risks.

There are no institutional requirements for this alternative. This alternative has no adverse environmental effect except for the regeneration of spent activated carbon.

The capital costs for the installation of whole house treatment units is, for 22 houses, $63,000. Operation and maintenance is $72,000 annually and for 30 years is $1,107,000. If more than 22 houses are involved, the costs will increase on a linear basis.

-Alternate Water Supply (Cheryl Drive, Terry Drive, Myron Road) This alternative is the same as that described for the alternate water supply alternative for Bluebird Road previously; namely the extension of water mains from an existing public water supply or a new, not yet constructed, public water supply. The analysis of technical feasibility, public health effects, institutional requirements, and environmental effects are identical. The capital cost of this alternative is between $527,000 and $755,000 once again depending on pipeline sizing. The operation and maintenance costs are again within the user fees.

The alternate water supply alternative for the Cheryl Drive, Terry Drive, Myron Road area can be combined in an effective manner with the alternate water supply alternative for Bluebird Road. This combination would result in a significant cost saving. The combined alternative cost is between $695,000 and $974,000. This range is again dependent of pipe sizing. Connection to the Town of Queensbury Water District No. 1 would cost an additional $1,403,800 beyond the cost of connection to the Village of South Glens Falls or the Town of Moreau Water District No. 2 sources. The connection to Queensbury involves the installation of an additional 29,700 feet, or roughly six miles, of water main as well as a crossing of the Hudson River. These cost figures were derived from the Feasibility Study and the Regional Water Supply Evaluation reports.

-Comparison of Alternatives for Residential Water Supply: (Bluebird Road and Cheryl Drive, Terry Drive, Myron Road)- Comparison of Alternatives for Bluebird Road results in the selection of the alternate water supply as the cost effective solution. The technical feasibility and public health protection aspects are higher for a water supply pipeline than for whole house treatment units and the costs are the same. For the Cheryl Drive, Terry Drive, Myron Road area, the alternate water supply is also the cost effective alternative. The no action alternative alone would not assure public health protection and groundwater monitoring would only indicate the need for other remedial action. Groundwater pumping and recharge has several disadvantages along with high cost and

individual whole house treatment is even more expensive than that. The alternate water supply pipeline provides a high degree of public health protection and is also a technically feasible solution. The Environmental Protection Agency hereby selects an alternate water supply as the cost effective alternative for contaminated or potentially contaminated residential drinking water wells on Bluebird Road and in the Cheryl Drive, Terry Drive, and Myron Road area. There are several existing public water supplies that can provide the necessary water. The Village of South Glens Falls has stated that its supply has an excess capacity of approximately 100,000 gallons per day. The ability of this water supply to provide water to the 100 additional homes contemplated by this alternative is further supported by the USGS Administrative Report. The Town of Moreau Water District No. 2 was reported to have an excess capacity of 100,000 gallons per day in the FS. However, subsequent comments from the Town of Moreau in addition to discussions with the New York State Department of Health, have revealed that sufficient capacity does not exist. The Town of Queensbury Water District No. 1 has a potential excess capacity of 1.8 million gallons per day. Discussion with the New York State Department of Health indicate that modifications to the existing system would be necessary to increase the supply. The Village of Hudson Falls has an excess capacity of 250,000 gallons per day.

100,000 gallons per day can supply water for approximately 263 homes. This is based on the following accepted engineering assumptions. The average per capita water use is 100 gallons per capita per day and the average household is comprised of 3.8 residents.

The Town of Queensbury Water District No. 1 alternative would cost an additional $1.4 million beyond the selection of the Village of South Glens Falls supply or the Town of Moreau Water District No. 2 supply. (This estimate does not include the added expense of the river crossing and extending the main from the Queensbury Regional Plant to the river).

The cost effective alternative that would supply water to houses on Bluebird Road and Cherly Drive, Terry Drive, and Myron Road is the Village of South Glens Falls supply. The Environmental Protection Agency hereby selects the Village of South Glens Falls as the water supply source.

The water supply main sizes will be compatible with the Town of Moreau Water Service Comprehensive Plan. The attached Figure 3 (modified) of the Regional Water Supply Evaluation report describes the location and sizing of the water mains for Bluebird Road and Cheryl Drive, Terry Drive, and Myron Road.

The institutional requirements for this alternative include the formation of a water district which is ordinarily created

by local government; alternatively, GE may be the purveyor of water to the affected area, if necessary.

Aquifer Restoration

The two remedial alternatives to be evaluated in detail are source containment, groundwater monitoring and air stripping groundwater discharge; and source containment, groundwater pumping and recharge. The aquifer restoration alternative is considered for the groundwater contaminant plume defined by the Remedial Investigation, namely the plume emanating from GE Moreau site and migrating south-southeasterly ultimately discharging as surface water flow at the Moreau sand aquifer escarpment. Both alternatives can meet the appropriate and relevant requirements with respect to aquifer rehabilitation.

-Source Containment, Groundwater Monitoring, and Air Stripping Groundwater Discharge

Within this alternative, the soil-bentonite cutoff wall constructed in 1984 around the disposal site is utilized to contain the source of off site groundwater contamination. The wall was designed and constructed to prevent the further release of contaminants from the site. The aquifer should be restored to acceptable conditions within a time period of decades.

This should occur because the source is eliminated from further contributing contaminants to the aquifer, regional groundwater flow will dilute by advection, dispersion, sorption, and degradation of the contaminants within the plume on either side of the plume below grade, and precipitation will also dilute these contaminants from above. Groundwater monitoring under this alternative will determine the rate at which aquifer restoration will proceed. In addition, groundwater monitoring will assure that the direction of plume migration does not change. Eighteen groundwater monitoring wells are included in this alternative for groundwater monitoring on a semi-annual basis. They are DGC 2S, I, D; DGC 15S, I, D; DGC 16 S, D; DGC 18 S, I, D; DGC 25 Ia, Ib; TM 2; TM 5; TM C; TM G; and FE 1. In addition, water level will be measured in monitoring wells DGC 19, DGC 20, DGC 21, DGC 28 and DGC 31-37. These groundwater monitoring wells define the existing boundaries of the plume and monitoring of these wells will identify changes in groundwater quality and flow direction.

The third element of this alternative is to utilize the air stripping water treatment facility at Reardon Brook to treat the aquifer discharge flow. This facility has been operating since fall 1985 and is effectively removing volatile contaminants from the brook.

The three technologies within this alternative are well established and commonly used. These are in fact in place at the present time.

The public health effects associated with this alternative are those for removing contaminants from Reardon Brook which is one source for the Village of Fort Edward public water supply.

The institutional requirements for the soil-bentonite cutoff wall and the air stripping treatment facility have already been satisfied. Easements for the wall were obtained from the property owners and the wall was installed with the approval of the New York State Department of Environmental Conservation. Permits for the water treatment facility were obtained from the same agency as well and the facility was considered an initial remedial measure under the NCP.

Since treatment at Reardon Brook will continue, no adverse environmental effects are forseen for this alternative. The capital cost for all elements of this alternative are $2,600,000. The annual operation and maintenance costs are $40,000 and converted to a 30 year basis are $615,000. The total cost of the source containment, groundwater monitoring, and air stripping alternative is $3,215,000.

-Source Containment, Groundwater Pumping and Recharge
The source containment element of this alternative is the same as discussed within the previous alternative. The groundwater pumping and recharge element would utilize production wells with the plume to remove contaminated groundwater. This water would then be passed through an air stripping water treatment facility to remove volatile organic contaminants and then returned to the aquifer through recharge wells. There are various pumping schemes that could be used to remove the contaminant plume from the aquifer. For this alternative, placement of nine pumping wells along the logitudinal axis of the plume was evaluated. The combined pumping rate would be 390 gallons per minute. The treated water would be returned to the aquifer through 21 recharge wells located along the outer boundaries of the plume. Groundwater monitoring wells would be sampled on a periodic basis to determine the effectiveness of groundwater pumping, treatment, and recharge in the way this alternative would affect the size and quality of the plume.

This alternative is technically feasible because the cutoff wall already exists, groundwater monitoring wells exist, and a great deal is known about the Moreau sand aquifer. The source containment, groundwater pumping and recharge alternative would restore the quality of the Moreau sand aquifer.

The public health effects for this alternative are those related to the operation of air stripping facilities. The institutional requirements for this alternative are the need to purchase land or obtain agreements for access. The treatment plant would need a Clean Air Act permit and the recharge wells would need Underground Injection Control permits.

The environmental effects of the source containment, groundwater pumping and recharge alternative are that it would facilitate the restoration of the Moreau sand aquifer. The amount of time that would be saved by this alternative compared to the time for unfacilitated restoration within the source containment, groundwater monitoring, and air stripping groundwater discharge alternative is unknown. Possible detrimental effects associated with this alternative are an alteration of the groundwater flow regime with possible reduction of water flow to Reardon Brook. This would effect the Village of Fort Edward public water supply.

The capital cost of the source containment, groundwater pumping and recharge alternative is $4,251,000. The operation and maintenance costs are $240,000 annually and $3,689,000 on a 30 year basis. Therefore the total cost is $7,940,000.

Comparison of Alternatives for Aquifer Restoration-
Both the source containment, groundwater monitoring, and air stripping groundwater discharge alternative and the source containment, groundwater pumping and recharge alternative are technically feasible. The source containment, groundwater pumping and recharge alternative has the disadvantages of possibly altering the groundwater flow system in the Moreau sand aquifer and affecting the flow to Reardon Brook. In addition, the cost of source containment, groundwater pumping and recharge alternative is some $4.7 million more expensive than source containment, groundwater monitoring, and air stripping groundwater discharge. The possibly shorter time period for restoring the quality of groundwater in the Moreau sand aquifer does not justify this since absent this additional pumping, the groundwater quality will ultimately be restored to appropriate and relevant standards with respect to aquifer restoration. The Environmental Protection Agency hereby selects source containment, groundwater monitoring, and air stripping groundwater discharge as the cost effective alternative for aquifer restoration at the GE Moreau site.

Soil Remediation

The initial screening process identified excavation/on site disposal and excavation/off site disposal for the PCB-contaminated soils along with surface sealing the soils to minimize public exposure.

-Excavation/On Site Disposal
This alternative involves the excavation of 8,600 cubic yards of PCB-contaminated soils and redeposition of these soils within the soil-bentionite slurry wall of the GE Moreau disposal site.

This is technically feasible and involves the well established techniques of earth moving engineering. An impermeable clay cap would be installed on top of the GE Moreau site after the soils are deposited.

This achieves a high degree of public health protection as the contaminated soils are removed from possible public exposure immediately.

The New York State Department of Environmental Conservation and the United States Environmental Protection Agency have already approved soil removal and on site disposal within the slurry wall.

This has beneficial environmental effects because the land would become uncontaminated.

The cost of excavation/on site disposal is $500,000. There is no operation and maintenance cost for this alternative.

-Excavation/Off Site Disposal
This is the same alternative as described above except that the soils would be transported off site to a secure chemical landfill. This alternative is also a well established technically feasible.

The only disadvantageous public health element associated with this alternative is the possible public exposure to contaminated materials during transport.

This also requires state and federal approvals as does the excavation/on site disposal alternative.

It results in the same beneficial environmental effect of land restoration.

The cost of this alternative is $2,500,000 with no operation and maintenance costs.

-Surface Sealing
This alternative has three choices. The in-place contaminated soils could be sealed with natural soils, asphalt, or synthetic membrane. The contaminated soils are covered to prevent public exposure and to minimize surface infiltration and erosion. All of these choices include fencing of the sealed areas to restrict access.

All of these surface sealing choices are technically feasible and can be implemented in a timely fashion.

These soil remediation alternatives all provide public health protection because the soils can no longer come in contact with people or the environment.

These choices require state and federal approvals.

Soil sealing costs $160,000 with $8,000 annual operation and maintenance or $123,000 for 30 years resulting in a $283,000 total cost. Asphalt sealing costs $286,000 with $14,000 annual operation and maintenance or $215,000 for 30 years resulting in a $501,000 total cost. Synthetic sealing costs $230,000 with $12,000 operatiion and maintenance or $185,000 for 30 years resulting in a $415,000 total cost.

Evaluation of Alternatives for Soil Remediation -
The excavation/removal alternatives have the advantage of completely isolating the contaminated soils from public and environmental exposure. In addition, the decontaminated land again becomes usable. The General Electric Company has already excavated and redeposited the PCB-contaminated soils within the slurry wall during mid-summer 1985 in compliance with an EPA Administrative Order signed July 12, 1985. The United States Environmental Protection Agency hereby selects the excavation/on site disposal alternative as the cost effective alternative for the PCB-contaminated soils at the GE Moreau site.

ENFORCEMENT ANÁLYSIS

The General Electric Company has already installed and is operating the Reardon Brook air stripping water treatment facility since fall 1985.

The General Electric Company has already removed the PCB-contaminated soils at the Moreau site and has already disposed of these soils within the slurry wall at the GE Moreau site during summer 1985.

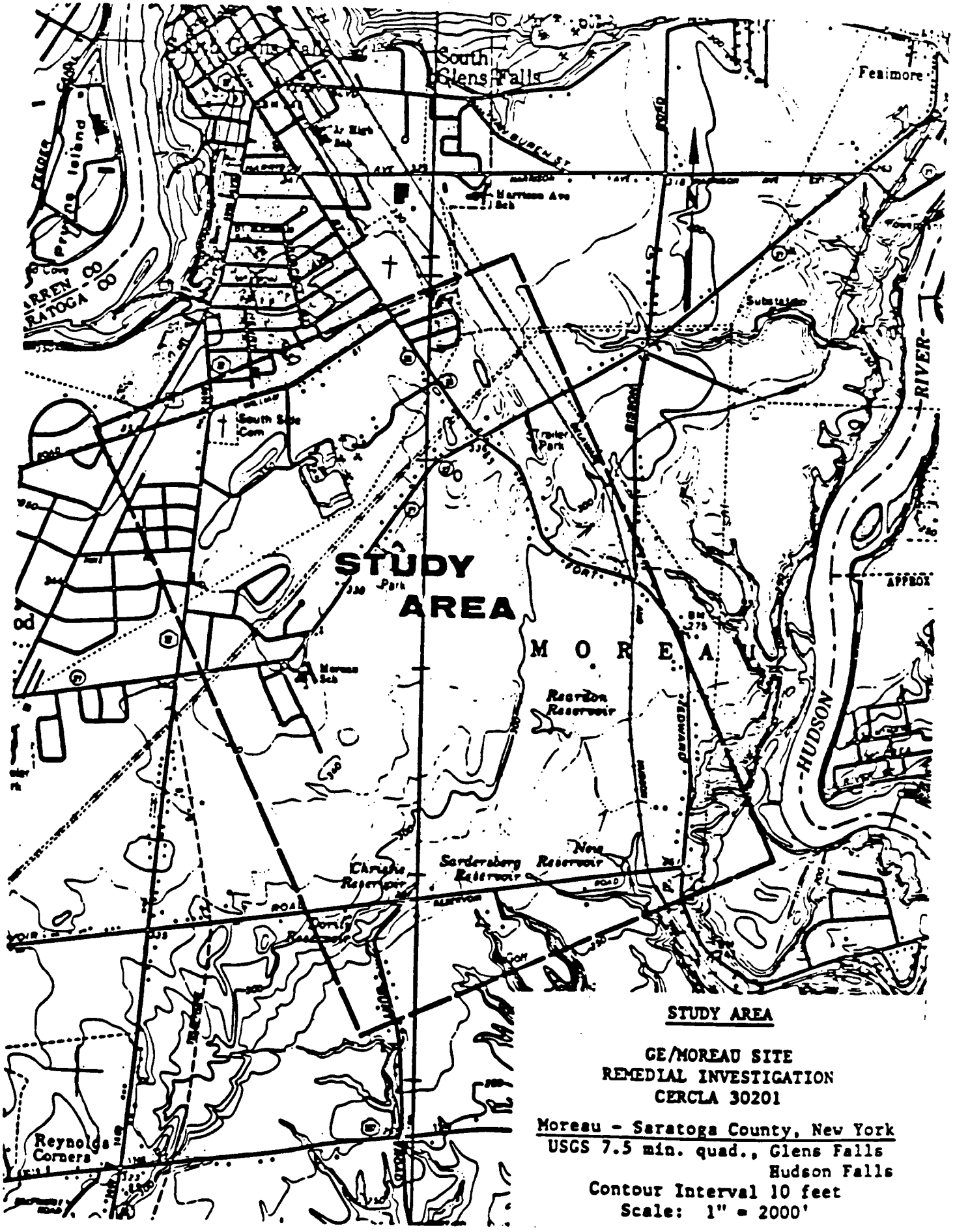
The General Electric Company will be required to extend the water supply mains from the Village of South Glens Falls to provide public water supply to residences along Bluebird Road and along Cheryl Drive, Terry Drive, and Myron Road. All of these remedial alternatives are in accordance with the Administrative Orders between the General Electric Company and the Environmental Protection Agency dated November 21, 1983 and July 12, 1985. The General Electric Company is required to continue to provide for the operation and maintenance of the Reardon Brook air stripping facility. In addition, the General Electric Company is required to maintain the GE Moreau Site. That is, the slurry wall surrounding the GE Moreau Site is to be maintained to prevent the release of hazardous substances from the site. The cap above the GE Moreau site is to be maintained to prevent the infiltration of precipitation waters which may lead to hazardous substances release from the site.

COMMUNITY RELATIONS

The Environmental Protection Agency has conducted numerous community relation activities since the GE Moreau facility was first listed as an NPL site. The agency has met with the Citizens of Moreau Against Contamination (C.O.M.A.C.) and elected officials on numerous occasions. These meetings were intended to describe the Superfund process and to inform these groups of the progress of the Remedial Investigation activities. Meetings were held to inform the groups of the GE Moreau soils removal activities and the Reardon Brook air stripping water treatment plant activities. Meetings were also held when the Feasibility Study was first presented to the regulatory agencies. A public comment period starting on September 9, 1985 and continuing to February 4, 1987, was utilized to solicit comments from these groups on the Feasibility Study as well as other aspects of the GE Moreau site. The Environmental Protection Agency has attempted to respond to all the comments during these meetings. In particular, specific concerns raised during the comment period are addressed in the Responsiveness Summary which is attached.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The remedial activities described in this Record of Decision are consistent with the technical requirements of both state and federal environmental laws. The Reardon Brook air stripping water treatment facility has already been issued an air permit from the New York State Department of Environmental Conservation. The removal of the PCB-contaminated soils and the disposal of these soils within the slurry wall at the GE Moreau site was performed with the approval of the New York State Department of Environmental Conservation and the Environmental Protection Agency. The extension of public water supply mains to Bluebird Road and to Cheryl Drive, Terry Drive, and Myron Road may require permits from the Town of Moreau and the New York State Department of Health as well as the New York State Department of Transportation.



STUDY AREA

GE/MOREAU SITE
REMEDIAL INVESTIGATION
CERCLA 30201

Moreau - Saratoga County, New York
USGS 7.5 min. quad., Glens Falls
Hudson Falls
Contour Interval 10 feet
Scale: 1" = 2000'

Figure 1.1

note: all results in parts per billion

Table 6.1
Summary of Analytical Results
Groundwater Monitoring

Well No.	Sampling Round	Trichloroethylene	Trans-1,2- dichloroethylene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
1S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
1I	1	—	—	—	—	—	—	—	—	—	—
	2	4.3	—	—	<1	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
1D	1	—	—	—	—	—	—	—	—	—	—
	2	4.6	—	—	<1	—	3.3	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
2S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
2I	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
2D	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
3S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
3I	1	54	—	—	—	—	—	—	—	—	—
	2	250	1.0	—	—	—	—	—	<1	—	—
	4	93	<1	—	—	—	—	—	1.3	—	—
3D	1	2700	11	—	—	—	—	39	6.1	—	—
	2	16000	2.2	—	—	—	—	—	1.9	—	—
	4	530	5.3	—	—	—	—	—	3.8	—	—
4S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
4I	1	4.0	—	—	—	—	—	—	—	—	—
	2	<1	—	—	—	—	—	—	1.0	—	—
	4	—	—	—	—	—	—	—	—	—	—
4D	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	1, 1.4	—	—
	4	—	—	—	—	—	—	—	—	—	—
5S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
5I	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	4.2	—	—
	4	—	—	—	—	—	—	—	—	—	—
5D	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
6S	1	31	—	—	—	—	—	—	—	—	—
	2	120	2.7	—	—	—	—	—	<1	—	—
	3	42	2.1	—	—	—	—	—	—	—	—
	4	31	2.2	—	—	—	—	—	—	—	—
6I	1	69	—	—	—	—	—	—	—	—	—
	2	30	1.4	—	—	—	—	—	<1	—	—
	3	42	2.1	—	—	—	—	—	—	—	—
	4	69	<1	—	—	—	—	—	—	—	—

4.4 Summary of Inital Screening Results

Using the screening process previously discussed in Section 4.1, the remedial alternatives that were initially developed were screened to eliminate infeasible or non cost-effective alternatives.

The following list presents the alternatives which passed the initial screening phase. These alternatives are categorized into groups according to which site problems the remedy addresses (i.e., aquifer remediation, residential water supply).

Note: the following is a modification of p. 53

ALTERNATIVE	COST
Surface Water	
-Treatment by Carbon Adsorption	$2,906,000
-Treatment by Air Stripping	746,000
Residential Water Supply	
Cheryl Drive, Terry Drive, Myron Road-	
-No Action	0
-Monitoring	338,000
-Groundwater Pumping and Recharge	2,224,000
-Alternate Water Supply	527,000 to 755,000
Bluebird Road-	
-Individual Whole-House Treatment	64,500 per house
-Alternate Water Supply	463,000 to 692,000
Cheryl Drive, Terry Drive, Myron Road and Bluebird Road together-	
-Alternate Water Supply	695,000 to 974,000 or 2,098,000 to 2,377,800
Aquifer Restoration	
-Source Containment, Groundwater Monitoring and Air Stripping Groundwater Discharge	3,215,000
-Source Containment, Groundwater Pumping and Recharge	7,940,000
Soil Remediation	
-Excavation and Removal	500,000 to 2,500,000
-Sealing	283,000 to 501,000

Table 2

Potential Remedial Action Alternatives
At the Moreau Site

SURFACE WATER

No Action
Diversion
Treatment
- Carbon adsorption
- Air stripping
- Resin adsorption
- Ion exchange
- Reverse osmosis

RESIDENTIAL WATER SUPPLY

No Action
Monitoring
Groundwater Pumping and Recharge
Individual Whole-House treatment
Alternate Water Supply (pipeline from existing municipal system)
New Wells
Cisterns
Bottled Water

AQUIFER RESTORATION

No Action
Containment Barriers
Source Containment, Groundwater Monitoring and Air Stripping of Groundwater Discharge
Source Containment, Groundwater Pumping and Recharge
Permeable Treatment Beds

SOIL REMEDIATION

No Action
Sealing
Excavation and Removal
Treatment
- Incineration
- Wet Air Oxidation
- Biological Degradation
- Chemical Treatment

Table 6.1
Summary of Analytical Resu
Groundwater Monitoring
page 2

Well No.	Sampling Round	Trichloroethylene	Trans-1,2- dichloroethylene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
6D	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
7S	1	800	130	4.3	—	—	<1	—	—	—	—
	2	1400	81	—	—	—	—	—	10	—	—
7I	1 e	5300	3000	31	—	6	—	—	77	—	—
	2	12000	5000	—	—	13	5.5	—	2.6	—	—
7D	1	3700	480	—	—	—	—	—	—	—	—
	2	3200	550	—	—	—	—	—	<1	—	6.9
8S	1	13	—	—	—	—	—	—	—	—	—
	2	56	2.7	—	—	—	—	—	—	—	—
8I	1	290	—	—	—	—	—	—	—	—	—
	2	450	—	—	—	—	—	—	—	—	—
8D	1	1.3,1.8	—	—	—	—	—	—	—	—	—
	2	3.8	—	—	—	—	—	—	—	—	—
9S	eee										
9I	1	47	—	—	—	—	—	—	—	—	—
	2	32	1.2	—	—	—	—	—	—	—	—
9D	1	1300	460	—	—	—	—	—	—	—	—
	2	1200	450	—	—	—	—	—	—	—	—
10S	1	110	—	—	—	—	—	—	—	—	—
	2 e	1200	8.9	—	—	—	—	—	—	—	—
	3 ee	2300	870	—	—	—	—	—	1.7	—	—
10I	1	700	81	—	—	—	—	—	—	—	—
	2	1300	52	—	—	—	—	—	—	—	—
	3 e ee	2300	870	—	—	—	2.6	—	6.7	—	—
10D	1	81	<1	—	—	—	—	—	—	—	—
	2	2300	56	—	—	—	—	—	—	—	—
	3 e ee	2300	870	—	9.3	—	47	—	12	—	—
11S	1	3400	70	5.8	—	—	<1	—	—	—	—
	2	970	11	—	—	—	—	—	—	—	—
	3 e ee†	2400	880	60	3.8	—	32	—	2.1	—	—
								12	5.6	—	—
11I	1	4100	1300	190	—	—	—	—	—	—	—
	2	28000	1500	41	—	—	—	—	—	—	—
	3 e ee†	2400	880	60	4.1	6.4	80	20	4.8	93	—
					—	—	—	12	5.6	—	—
11D	1	8300	160	—	—	—	—	—	—	—	—
	2	22000	730	—	—	—	1.7	19	1.8	—	—
	3 e ee†	2400	880	60	1.3	3.1	9.8	25	4.9	—	—
					—	—	—	12	5.6	—	—
12S	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
12I	1	—	—	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—	—	—
12D	1	2.2	—	—	—	—	—	—	—	—	—
	2	310	—	—	—	—	—	—	—	—	—
13	1	—	—	—	—	—	—	—	—	—	—
	2	<1	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
14S	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
14I	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
14D	2	—	—	—	—	—	—	—	—	—	—

Table 6.1
Summary of Analytical Results
Groundwater Monitoring
Page 3

Well No.	Sampling Round	Trichloroethylene	Trans-1,2- dichloroethylene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
15S	2	—	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
15I	2	—	—	—	—	—	—	—	—	—	—
	3	4.6	<1	—	—	—	—	—	—	—	—
	4	4.8	<1	—	—	—	—	—	—	—	—
	6	15	4.9	—	—	—	—	—	—	—	—
15D	2	35	1.6	—	—	—	—	—	<1	—	—
	3	14	<1	—	—	—	—	—	—	—	—
	4	23	—	—	—	—	—	—	—	—	—
16S	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
16D	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
17	2	—	—	—	—	—	—	—	—	—	—
18S	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
18I	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
18D	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
19	2	[illegible]	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	1.2	—	—	—	—
	4	—	—	—	—	—	—	—	<1	—	—
20S	2	—	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
20I	2	—	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
20D	2	—	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
21S	2	120	<1	—	1	—	12	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
21I	2	4.4	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
	6	—	—	—	—	—	—	—	—	—	—
21D	2	9.3	—	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
22S	2	22	—	—	—	—	—	—	<1	—	—
22I	2	7600	180	—	—	—	—	93	<1	—	—
	3	2000	260	—	—	—	—	91	—	—	—
22D	2	15000	320	—	—	—	—	220	<1	—	—
	3	2000	260	—	—	—	—	91	—	—	—

Table 6.1
Summary of Analytical Results
Groundwater Monitoring
page 4

Well No.	Sampling Round	Trichloroethylene	Trans-1,2- dichloroeth-lene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
23S	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	4	—	—
23I	4	<1	—	—	—	—	<1	—	<1	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
23D	4	<1	—	—	—	—	<1	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
24S	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	6	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
24I	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	6	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
24D	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	6	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
25Ia	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
25Ib	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	3.7	—	—
TMA	2	5.8	<1	—	—	—	—	—	—	—	—
	3	—	—	—	—	—	—	—	—	—	—
TMB	2	8.5	1.2	—	—	—	—	—	—	—	—
TMC	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
TMD	2	—	—	—	—	—	—	—	2.3	—	—
TME	2	—	—	—	—	—	—	—	—	—	—
TMF	2	690	8.8	—	—	—	—	—	—	—	—
TMG	2	120	5.4	—	—	—	—	—	—	—	—
TM2	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—
TM3	2	52	2.3	—	—	—	—	—	—	—	—
TM4	2	81000	46000	310	—	140	11	200	750	—	—
	3*	70000	52000	280	—	160	—	—	260	—	—
TM5	2	—	—	—	—	—	—	—	—	—	—
	4	—	—	—	—	—	—	—	—	—	—
	5	—	—	—	—	—	—	—	—	—	—
	7	—	—	—	—	—	—	—	—	—	—

Well No.	Sampling Round	Trichloroethylene	Trans-1,2- dichloroeth-ylene	Vinyl Chloride	1,1,1-trichloroethane	1,1-dichloroethylene	Tetrachloroethylene	Methylene Chloride	Chloroform	Chlorobenzene	Dichlorobromomethane
FE1	2	600	6.9	---	---	---	---	16	3.6	---	---
	4	420	2.9	---	---	---	---	---	2.6	---	---
	5	410	2.8	---	---	---	---	---	2.6	---	---

Sampling Round Number	Dates
1	June 25 - July 9, 1984
2	September 5 - 17, 1984
3	October 16 - 19, 1984
4	December 5 - 21, 1984
5	January 15 - 17, 1985
6	January 30 - 31, 1985
7	February 15 - 18, 1985

* EPA Method 624, GC/MS Analysis

** Composite of Cluster

*** Insufficient Water for Sampling

--- Not Detected

† Also detected were benzene (8.8ppb) and acetone (110ppb)

‡ Also detected was acetone (1200ppb)

• Also detected were benzene (230ppb) ethyl benzene (62ppb), toluene (110 ppb) and acetone (3400 ppb)

note: all results in parts per billion

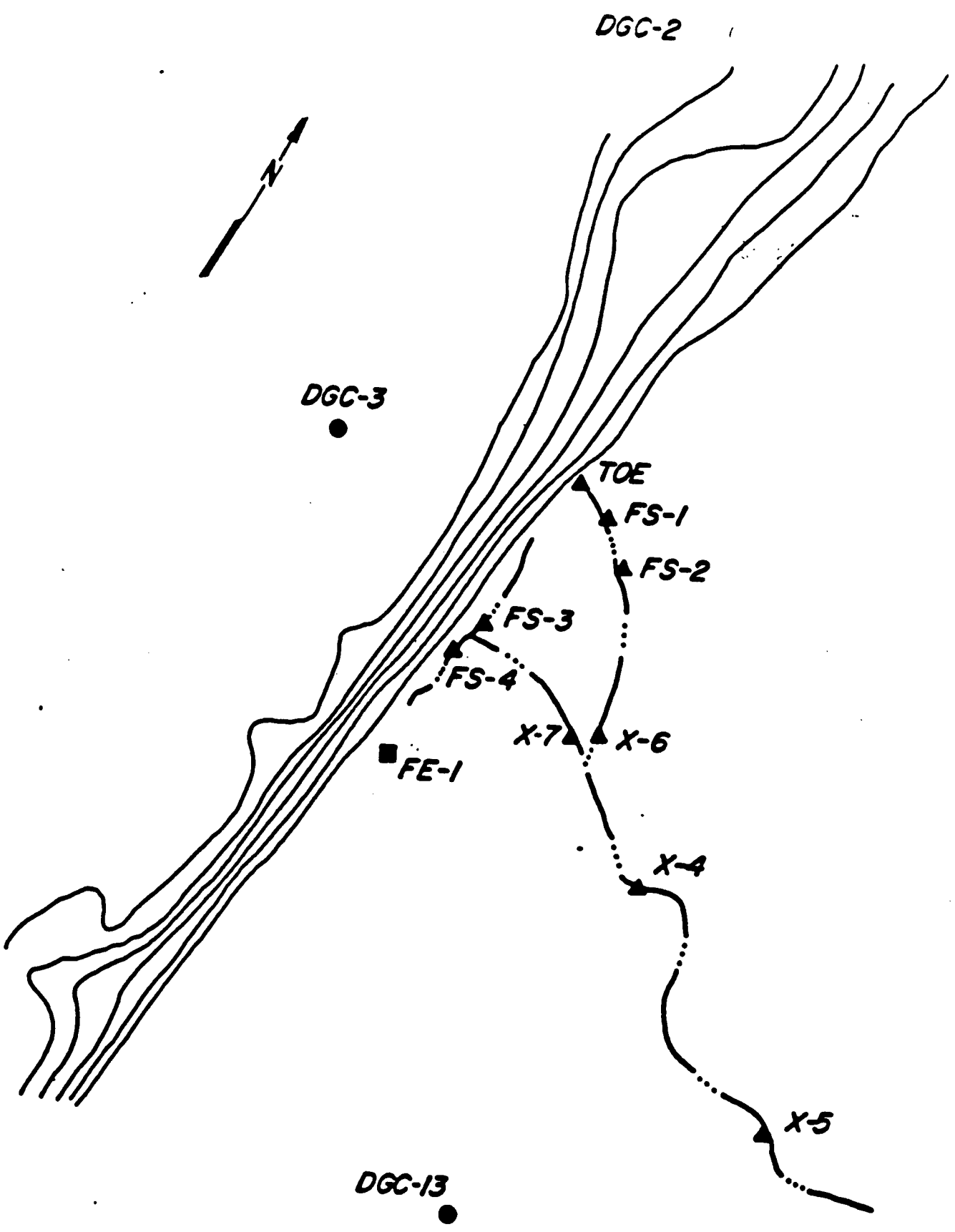
Table 7.1

STREAM AND RESERVOIR ANALYTICAL RESULTS
FORT EDWARD, NEW YORK

	Code	September 5	September 19	October 3,4	October 19	November 1	November 14	November 29	December 12	December 26	January 9	January 23
Rau Reservoir		ND[a]	ND[a]	ND[†]	C=2.1[a]	ND	ND[†]	C<1	ND[†]	ND	ND	ND
Collection Box 1		ND[a]	ND[a]	ND[a]	ND[†]	ND	ND[†]	ND	ND[†]	ND	ND	ND
Collection Box 2		ND[a]	ND[†]	ND[a]	ND[†]	ND	ND[†]	ND	ND[a]	ND	ND	ND
Christie Reservoir		ND[†]	ND[†]	ND[†]	C=2.1[a]	ND	ND[a]	ND	ND[a]	ND	ND	ND
Sandersprae Reservoir		ND[†]	ND[a]	ND[a]	ND[†]	ND	ND[a]	ND	ND[†]	ND	ND	ND
Durity Reservoir		ND[†]	ND[†]	ND[†]	C=2.4[a]	ND	ND[a]	ND(ND)	ND[a]	ND(ND)	ND	ND
R-4	A	150	100	200	170	130	190	110	180	92	110	100
	B	10	3.9	9.3	9.3	3.8	8.5	11	7.9	5.5	11	13
R-5	A	68(65)	37	69(81)	70(82)	ND	76	49	82	43	110	130
	B	4.6(5.7)	1.8	2.5(2.6)	2.9(2.3)	ND	3.0	4.6	3.5	2.5	12	14
R-6	A	85	180(180)	340	280	210(180)	270	190	260	150(220)	220(310)	150(140)
	B	28	16(14)	23	25	11(8.3)	26	23	18	11(16)	20(28)	35(32)
R-7	A	63	39	80	54	48	54	38	20	51	39	44
	B	ND	ND	ND	ND	ND	ND	<1	ND	ND	ND	ND
PS-1	A	-	-	-	140	47	-	-	140	49	7.0	75
	B	-	-	-	68	30	-	-	42	27	3.0	59
PS-2	A	-	-	-	840	-	-	-	900	430(490)	590(840)	440(480)
	B	-	-	-	180	-	-	-	160	110(130)	170(180)	220(230)
PS-3	A	-	-	-	ND	ND	-	-	ND	ND	ND	ND
	B	-	-	-	ND	ND	-	-	ND	ND	ND	ND
PS-4	A	-	-	-	9.0	ND	-	-	ND(<1)	ND	ND	ND
	B	-	-	-	ND	ND	-	-	ND(ND)	ND	ND	ND
Toe of Escarpment		-	-	ND	ND	ND	-	-	ND	ND	A,<1	ND
Clear Well	A	ND	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND
	B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	C	ND	<1	4.7	4.5	1.8	ND	1.5	4.2	1.2	1.8	<1
	D	ND	<1	ND	ND	ND	ND	ND	ND	ND	ND	ND

Code: A Trichloroethylene
B trans-1,2-dichloroethylene
C Chloroform
D Tetrachloroethylene

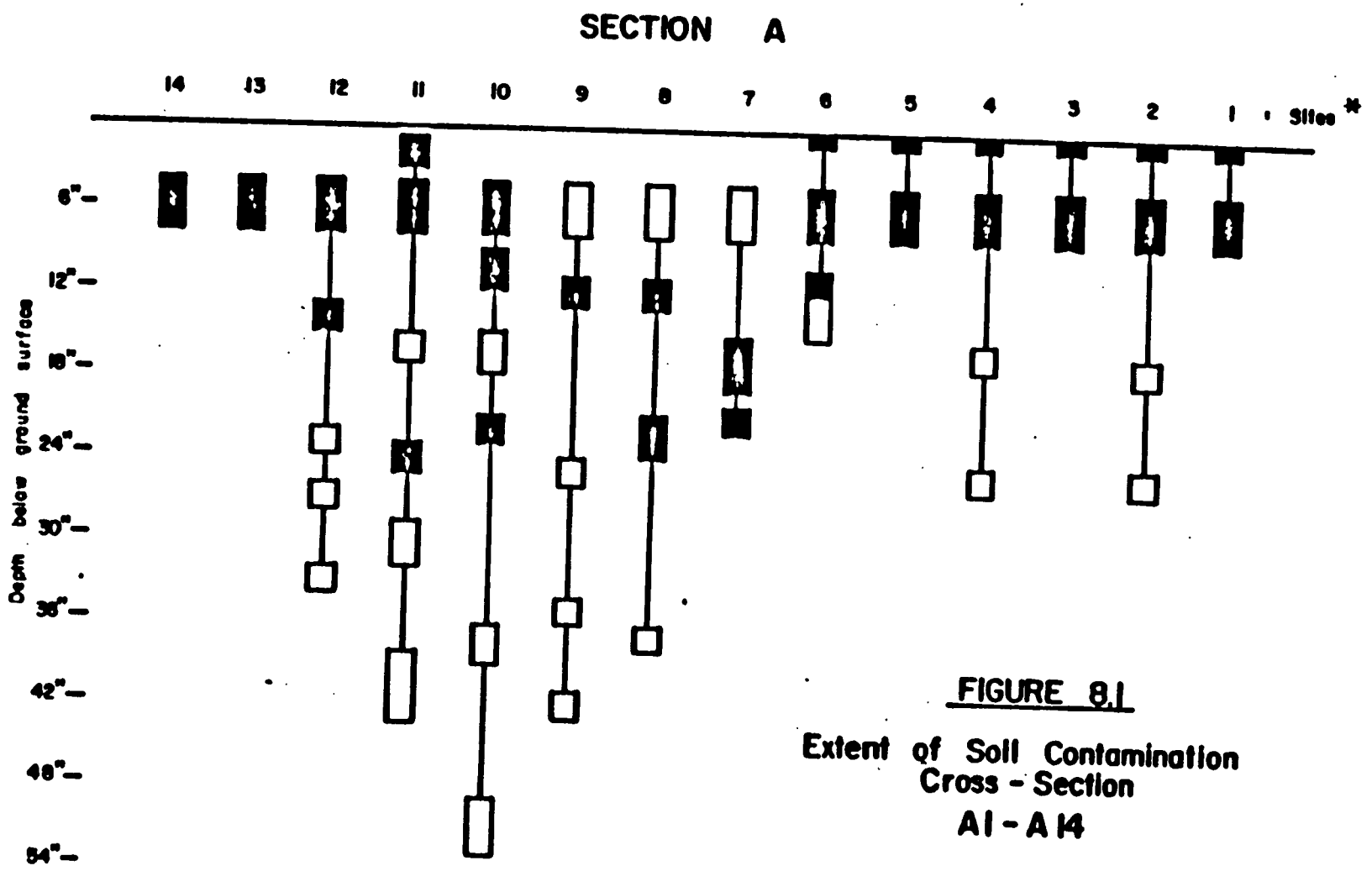
a,† Components of composite[a] or composite[†].
ND Not Detected
NA Not Applicable
All values in ug/L(ppb)



(not to scale)

FIGURE 7.2

REMEDIAL INVESTIGATION
GE/MOREAU SITE
II-CERCLA-30201
SURFACE WATER
Approximate Sampling Locations



Scale : $\frac{\text{Vertical : 1" = 1'}}{\text{Horizontal : 1" = 100'}}$

FIGURE 8.1

Extent of Soil Contamination Cross - Section A1 - A14

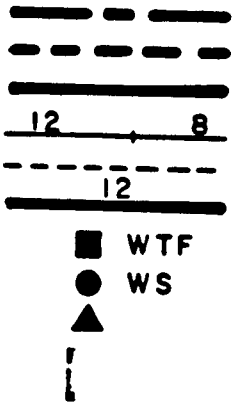
Legend

■ - Contaminated

□ - Non-Contaminated

* - Soils collected down to 8" below ground level may be anywhere along a lateral transect, soils collected below 8" are always "C" points along axis of road.

LEGEND



COUNTY BOUNDARIES
TOWN SERVICE AREAS
WATER DISTRICT
EXISTING TRANSMISSION LINES
EXISTING DISTRIBUTION LINES
PROPOSED TRANSMISSION & DISTRIBUTION LINES
WATER TREATMENT FACILITIES
WATER STORAGE
KNOWN OR POTENTIAL CONCERN AREAS
IMPACT AREA(S) SERVED

NOTES:

1. THE EXISTING WATER SYSTEM PLAN WAS DEVELOPED AS SHOWN THROUGH MEETINGS AND INTERVIEWS WITH THE VARIOUS WATER SUPERINTENDANTS.
2. PIPE SIZES RANGE FROM 2 INCH TO 24 INCH, ONLY 8 INCH AND LARGER ARE NOTED.

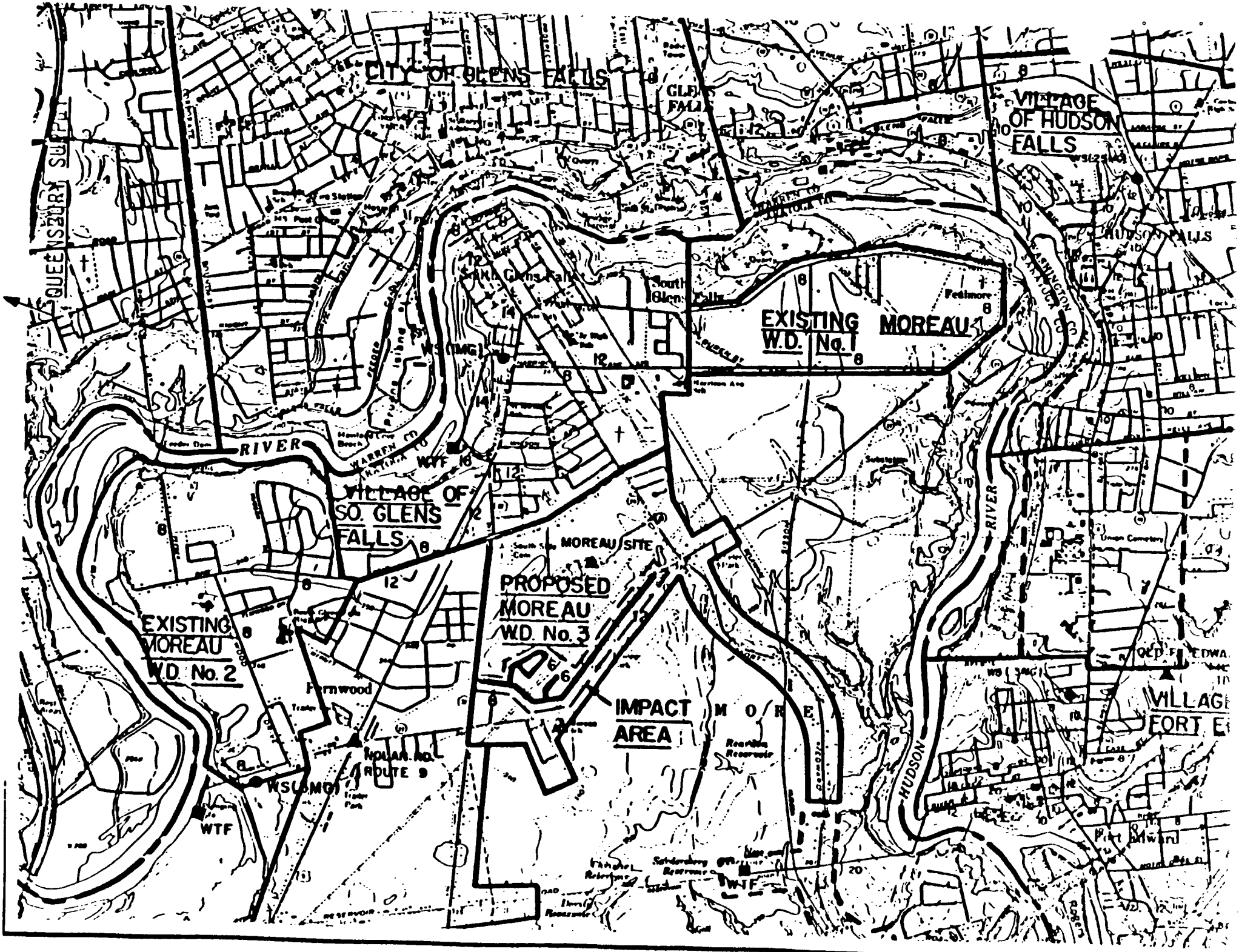
BLUEBIRD ROAD IMPACT AREA

SHORT/LONG TERM ALTERNATIVE No. 2A

SCALE IN FEET

2000' 0' 2000' 4000'

BLARAND & BOUCK ENGINEERS, P.C.


CITY OF GLENS FALLS
VILLAGE OF HUDSON FALLS
QUEENSBURY SUPPLY
EXISTING MOREAU W.D. No. 1
RIVER
VILLAGE OF SO. GLENS FALLS
MOREAU SITE
PROPOSED MOREAU W.D. No. 3
EXISTING MOREAU W.D. No. 2
IMPACT AREA
Fernwood
ROUTE 9
WTF
HUDSON
RIVER

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

QUANTITY AND QUALITY OF WATER FROM PUBLIC-SUPPLY WELLS AND SPRINGS IN THE VILLAGE OF SOUTH GLENS FALLS, NEW YORK

Administrative Report

Prepared for the

U.S. ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

QUANTITY AND QUALITY OF WATER FROM PUBLIC-SUPPLY WELLS AND SPRINGS IN THE VILLAGE OF SOUTH GLENS FALLS, NEW YORK

By Daniel C. Hahl and Edward F. Bugliosi

Administrative Report

Prepared for the

U.S. ENVIRONMENTAL PROTECTION AGENCY

Albany, New York

1987

DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

ADMINISTRATIVE REPORT

CONTENTS

TABLE

ILLUSTRATIONS

CONVERSION FACTORS AND ABBREVIATIONS

Factors for converting the metric (International System) units used in this report to inch-pound units are shown below.

Divide metric (SI) units	By	To obtain inch-pound units
Length		
meter (m)	0.3048	foot (ft)
kilometer (km)	1.609	mile (mi)
Area		
square kilometer (km^2)	2.59	square mile (mi^2)
hectare (ha)	0.405	acre (a)
Flow		
liter per second (L/s)	28.32	cubic feet per second (ft^3/s)
liter per second (L/s)	0.06309	gallon per minute (gal/min)
liter per second (L/s)	43.81	million gallons per day (Mgal/d)
cubic centimeter per day (cm^3/d)	3784	gallon per day (gal/d)
cubic meter per second (m^3/s)	0.0283	cubic feet per second (ft^3/s)
Hydraulic Units		
meter per day (m/d)	0.3048	hydraulic conductivity, foot per day (ft/d)
meter per kilometer (m/km)	0.1894	foot per mile (ft/mi)
Volume		
cubic meter (m^3)	35.31	cubic foot (ft^3)
cubic meter (m^3)	264.2	gallon (gal)

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order nets of both the United States and Canada, formerly called "Mean Sea Level."

QUANTITY AND QUALITY OF WATER FROM PUBLIC-SUPPLY WELLS AND SPRINGS IN THE VILLAGE OF SOUTH GLENS FALLS, NEW YORK

By

Daniel C. Hahl and Edward F. Bugliosi

ABSTRACT

The Village of South Glens Falls, N.Y. has not collected sufficient data to describe, in detail, the quantity and quality of water available from wells and springs that are used for its water supply. The area contains a sand aquifer that is underlain by shale of the Snake Hill Formation. Data from several consultants' reports indicate that wells drilled in shale can yield 0.65 million gallons per day, and the spring gallery can yield up to 0.20 million gallons per day. The assumed range of horizontal hydraulic conductivity of the bedrock shale and the Pleistocene sand aquifer that feeds the springs, together with the water-table gradient in the sand aquifer, suggest that the published yield values are correct to within an order of magnitude. Calculations based on the analysis suggest that regular use of the wells could provide the additional 0.03 Mgal/d of water for the 100 homes in the Town of Moreau.

Water from the wells contains an elevated concentration of hydrogen sulfide which supports the conclusion that the water is directly or indirectly supplied from the shale bedrock, which is characteristically high in hydrogen sulfide. The available data suggest, however, that if the wells are pumped at a rate necessary to satisfy the 100 additional homes in Moreau, the effect on the quality of the water supply will be small.

INTRODUCTION

In September 1986, the U.S. Environmental Protection Agency formally requested the U.S. Geological Survey to evaluate the quantity and chemical quality of ground water in the Village of South Glens Falls (fig. 1) that has been proposed for use as a supplemental source of public supply for about 100 residences in the nearby Town of Moreau. The evaluation was based on information extrapolated from several engineering consultants' reports for nearby areas, data from the New York State Department of Health, geologic maps by the New York State Geological Survey, well-operation records, and a geologic reconnaissance.

This report identifies the assumptions made, describes the methods used to estimate potential yield of the shale aquifer, and presents the data available on chemical quality of water from bedrock wells and springs.

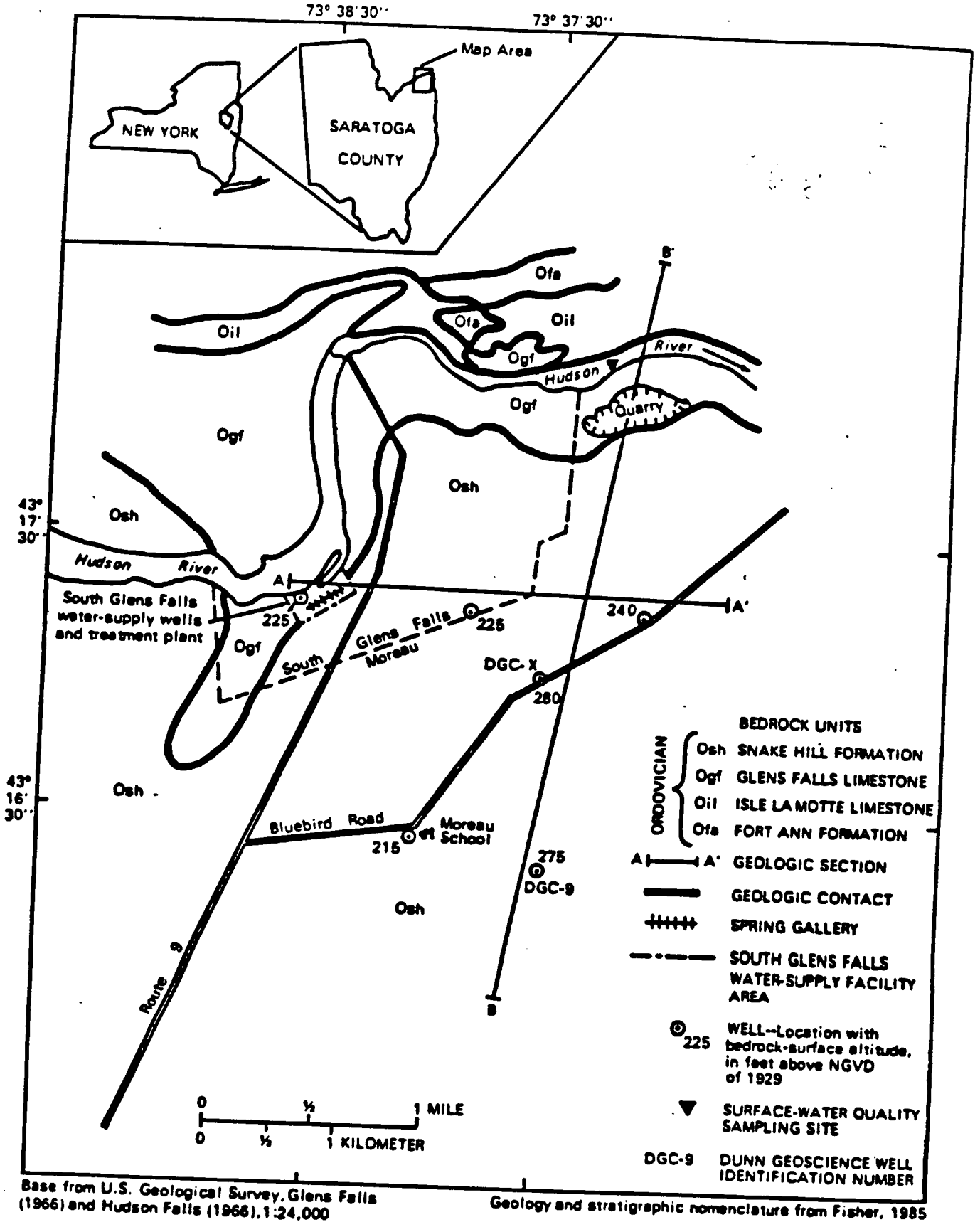


Figure 1.—Bedrock geology and major geographic features of the Village of South Glens Falls and vicinity.

QUANTITY OF WATER

Sources of Water

The South Glens Falls public water supply is derived from a series of springs that flow from a Pleistocene sand aquifer east of the present pumping and water-treatment plant (fig. 1). The supply is supplemented in summer by two wells that are about 600 feet southwest of the plant and about 100 feet south of the Hudson River. Each well is 210 feet deep and is reportedly finished in shale of the Ordovician Snake Hill Formation (fig. 2). Although the wells are in an area that is mapped as the Ordovician Glens Falls Limestone (Fisher, 1985), comparison of the drillers' logs for the supply wells, stratigraphic data from selected wells east of the site, and measured stratigraphic sections in the limestone quarry to the northeast (fig. 3) suggest that the supply wells are completed, at least partially, in shale.

Potential Yield of Aquifers

The springs reportedly yield an average of 0.2 Mgal/d (million gallons per day) (Stearns and Wheler, 1968, p. VI-72). A discharge from the springs in the sand aquifer was calculated from the equation:

$$Q = KiA$$

where: Q = total discharge, in Mgal/d;
K = hydraulic conductivity of sand aquifer, in ft/d (feet per day);
i = hydraulic gradient, in ft/mi (feet per mile); and
A = cross-sectional area of the aquifer, in ft^2 (feet squared).

The discharge of the springs would range from 0.014 to 0.14 Mgal/d, as calculated from (1) horizontal hydraulic-conductivity values of 18.4 and 21 ft/d (Dunn Geoscience, 1985 and 1984, respectively), (2) hydraulic gradients of 0.0123 and 0.0015 (Dunn Geoscience, 1984, 1985) for an area 1.5 miles southeast of the village water supply, and (3) a lineal seepage face of 1,400 feet and an assumed saturated thickness of 55 feet.

The wells reportedly are pumped at a rate of 0.65 Mgal/d or 450 gal/min (gallons per minute) (George Gonyea, South Glens Falls water-treatment plant operator, oral commun., 1986) during the summer only. Pumpage was first recorded in May-August 1986, during which time an average of 0.65 Mgal/d was pumped. The wells were pumped from 12 to 165 hours each month (George Gonyea, oral commun., 1986). Whether the pumping was continuous or intermittent is uncertain. A well-capacity test conducted in 1968 (Rist-Frost Associates, 1968) indicated that the bedrock aquifer has a specific capacity of 5 (gal/min)/ft (gallons per minute per foot) of drawdown and a calculated transmissivity of 3.2×10^6 to 4.3×10^6 $ft^3/(ft/d)$ (feet cubed per foot-day). Well logs indicate that 165 feet of shale was penetrated. On the assumption that the shale is the aquifer that is being tapped, the horizontal hydraulic conductivity of the shale can be estimated from the equation:

$$T = Kb$$

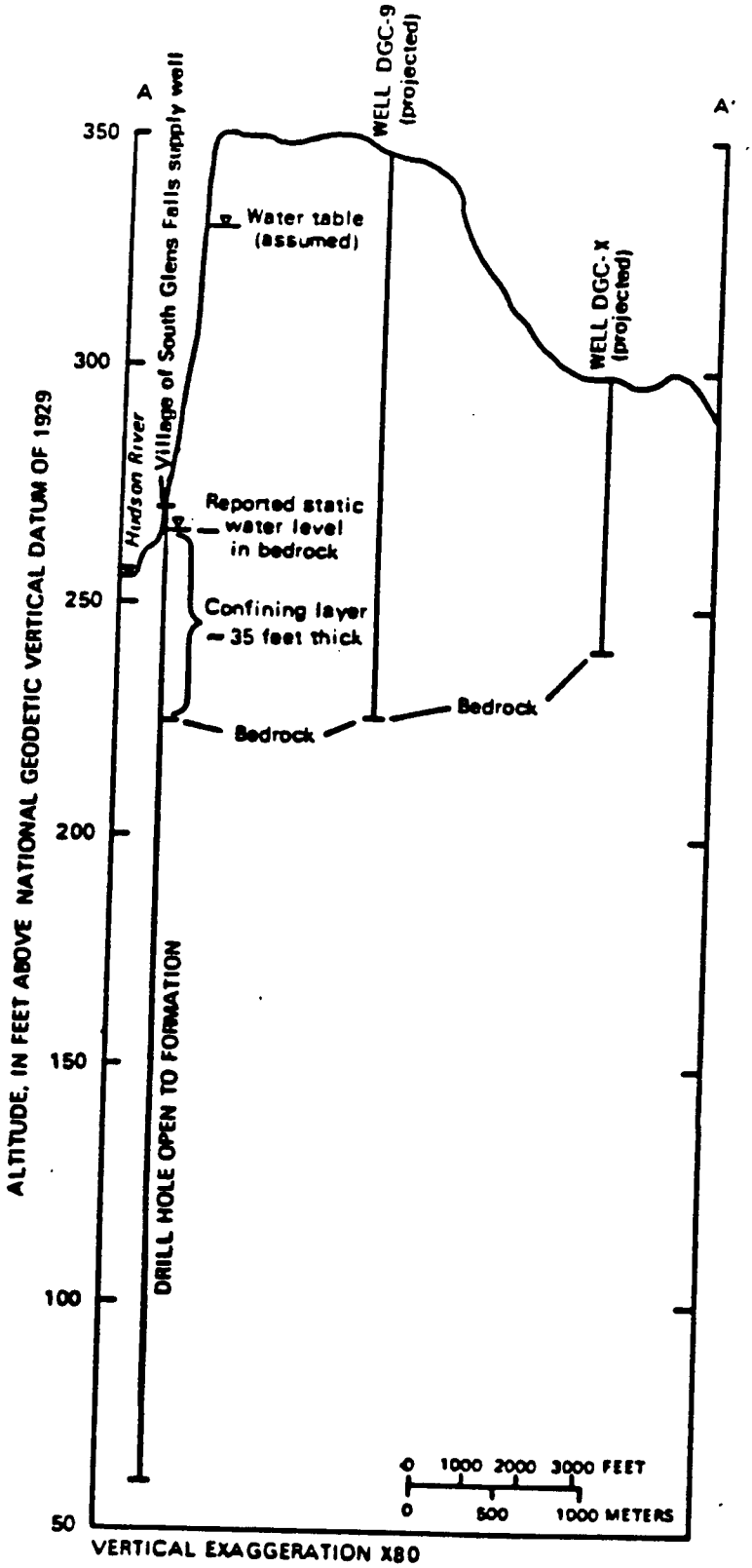


Figure 2.--Geologic section A-A' through Village of South Glens Falls water-supply area. (Location shown in fig. 1.)

where: T = aquifer transmissivity, in ft^2/d;
K = hydraulic conductivity, in ft/d; and
b = saturated thickness of the aquifer, in feet.

then: $K = T/b$

From an assumed saturated thickness of 165 ft (drillers' logs and fig. 2), and the two reported transmissivities of 2,250 and 2,974 ft^2/d (Rist-Frost, Associates, 1968), the horizontal hydraulic conductivity of the shale would range from 14 to 18 ft/d. Horizontal hydraulic conductivity of fractured shale generally ranges from 0.001 to 0.00001 ft/d (Heath, 1983); thus, the estimated transmissivity range of 14 to 18 ft/d would appear at least 4 to 6 orders of magnitude too large. One reason may be that bedrock is exposed in the river about 1 mile downstream and, according to well logs of the supply wells, is at most 20 feet below the river bottom near the wells, which would allow direct infiltration from the river. Data are insufficient, however, to delineate the cone of depression generated by pumping of the wells or to describe the extent to which pumping induces river water to enter the aquifer, or to predict the effects of pumping on discharge of the springs.

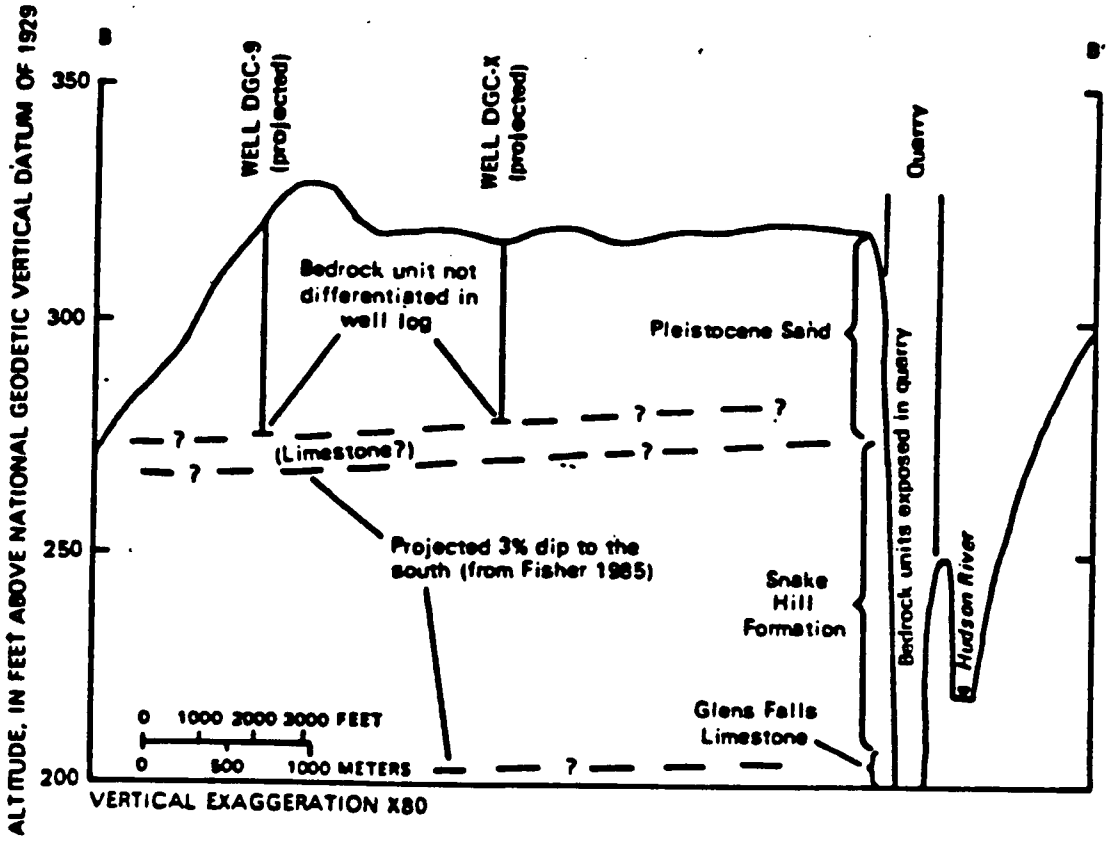


Figure 3.--Geologic section B-B' through Village of South Glens Falls water-supply area. (Location shown in fig. 1.)

The rough calculations of seepage from the springs and the transmissivity and hydraulic conductivity of the shale aquifer near the supply wells (assuming infiltration from the river to the aquifer) indicate that the ranges given in consultants' reports for the discharge of the sp. ngs and for a "safe" yield for the wells are reasonable.

Quantity Used by Village

Water demand by the Village of South Glens Falls during the fall, winter, and spring is met by the 0.2-Mgal/d discharge from the spring-collection gallery (fig. 1) and is supplemented during the summer by intermittent pumping from the supply wells at a rate of 0.6 Mgal/d. Rough calculations based on several assumptions suggest that regular use of the wells could provide the additional 0.03 Mgal/d of water for the 100 homes in the Town of Moreau.

QUALITY OF WATER

Too few chemical analyses of ground water from the springs and water-supply wells of the Village of South Glens Falls are available to predict the effect of increased pumping on water quality. Table 1 shows the ranges in concentration of constituents measured in finished water[1] at South Glens Falls during 1974-81. Only one set of analyses was available for water coming directly from the spring gallery and from the wells. For reference, the ranges in corresponding constituents found in Hudson River water during 1975 are given. Some generalization of the water quality may be made from the few analyses available, however.

A comparison of water from the supply wells with water from the spring gallery (table 1) indicates that the well water is harder and contains less chloride than the spring water; it also contains a significant amount of hydrogen sulfide. (The spring water shows none.) The presence of hydrogen sulfide in the well water is typical of water from the shale unit of the Snake Hill Formation (Fisher, 1985) and is probably derived from the pyrite deposits in the shale.

The lack of data on major cations and anions in well and spring water precludes determination of the relation between ground water and surface water in the South Glens Falls water-supply area. The available data suggest, however, that if the wells are pumped at a rate necessary to satisfy the 100 additional homes in Moreau, the effect on water quality of the two systems will be small. Hardness may be expected to increase and chloride concentration to decrease, as the ratio of well water to spring water increases, but this assumption is based on only one data set and is inconclusive.

---

[1] The term "finished" water applies to the water that has passed through the public-supply treatment process and is delivered to the South Glens Falls distribution system. The treatment consists of aeration and chlorination.

Table 1.--Concentrations of selected ground-water and surface-water constituents at South Glens Falls, N.Y.

[Concentrations in milligrams per liter, dashes indicate no data.]

Constituent	Finished water (range in concentration 1974-81[a])	Raw water, Oct. 11, 1974[a]		Hudson River at Glens Falls (range in concentration, 1975 water year[b])
		Spring gallery	Supply wells	
Ammonia, as N	0.005-0.09	0.03	0.94	0.14-0.85
Nitrate plus nitrite, as N	2.2-3.8	1.8	.1	.15-.53
Chloride	26-40	50	6.0	2.2-6.0
Total hardness, as $CaCO_3$	28-51	174	200	9-15
Iron	.02-.15	—	—	.16-.36
Sodium	14-19	—	—	1.8-3.3
Total dissolved solids	—	—	—	48-77
Hydrogen sulfide (free)	—	—	.34[c]	—

[a] From New York State Department of Health, unpublished records.
[b] From U.S. Geological Survey, 1976.
[c] From George Conyea, Village of South Glens Falls, treatment-plant operator, written commun., 1986.

CONCLUSIONS

No reliable estimate of the quantity of water available from the Pleistocene sand and underlying bedrock aquifers can be given because (1) too few data are present to calculate the amount of water available; (2) hydraulic properties such as saturated thickness and hydraulic gradient of the sand aquifer are only inferred; (3) aquifer-pumping tests have not been done; and (4) data indicative of the hydraulic properties of the bedrock aquifer are not available. A report by Stearns and Wheler (1968) indicates that a "safe" yield[2/] of 0.6 Mgal/d for the supply wells and an average discharge from the spring gallery of 0.2 Mgal/d would be within an order of magnitude of gross calculated values that were based on simplified assumptions of aquifer properties.

The effect of increased pumping on water quality of the springs and the supply wells cannot be predicted because too few water-quality data are available. Increased pumping for the additional 100 homes probably would not cause a significant change in water quality, however, if the treatment for hydrogen sulfide were adjusted to compensate for the increased volume of well water withdrawn.

---

2 The term "safe" yield is imprecisely defined but commonly used by consulting firms to indicate the amount of water available for withdrawal from a well on a regular basis. The reference is usually related only to well diameter, type of screening, and amount of development and rarely includes aquifer characteristics or variations in recharge.

REFERENCES CITED

Dunn Geoscience Corporation, 1984, Remedial investigation of GE/Moreau site 11-CERCLA-30201: Albany, N.Y., Dunn Geoscience Corporation, 2 v.

_____ 1985, Addendum--remedial investigation GE/Moreau site II-CERCLA-30201: Albany, N.Y., Dunn Geoscience Corporation, 2 v.

Fisher, D. W., 1985, Bedrock geology of the Glens Falls-Whitehall region, New York: Albany, N.Y., New York State Museum Map and Chart Series No. 35, 58 p.

Heath, R. C., 1983, Basic ground-water hydrology: U.S. Geological Survey Water-Supply Paper 2220, 84 p.

Rist-Frost, Associates, 1968, Village of South Glens Falls, Saratoga County, New York--technical report for proposed water facilities: Glens Falls, N.Y., Rist-Frost Associates-Consulting Engineers, 58 p.

Stearns and Wheler, 1968, Comprehensive intermunicipal public water supply study, Saratoga County, New York, No. 6: Cazenovia, N.Y., Stearns and Wheler, Civil and Sanitary Engineers, p. VI-66-73.

U.S. Geological Survey, 1976, Water Resources data for New York--Water Year 1975: U.S. Geological Survey Water-Data Report NY-75-1, p. 359

RESOLUTION OF NOVEMBER 20, 1985
BOARD OF TRUSTEES OF THE VILLAGE OF
SOUTH GLENS FALLS, NEW YORK

WHEREAS, inquiry has been made of the Village of South Glens Falls by representatives of the General Electric Company concerning the capacity of the Village of South Glens Falls water supply and the interest of the Village, if any, in selling water to the Town of Moreau; and

WHEREAS, it has been determined that the Village of South Glens Falls can supply up to a maximum of 100,000 gallons per day to the Town of Moreau; NOW, THEREFORE,

BE IT RESOLVED, that the Village of South Glens Falls is willing to enter into an agreement upon terms and conditions to be mutually agreed upon by the parties thereto to sell water to the Town of Moreau up to a maximum of 100,000 gallons per day, and

BE IT FURTHER RESOLVED, that the Mayor is hereby authorized to enter into negotiations with the Town of Moreau and/or its representatives, including representatives of the General Electric Company for the aforesaid purpose.

This resolution shall take effect immediately.

RESPONSIVENESS SUMMARY FOR THE
GE MOREAU SITE
TOWN OF MOREU
SARATOGA COUNTY, NEW YORK

JUNE, 1987

Introduction

This Responsiveness Summary for the GE Moreau Site outlines key community concerns regarding the Remedial Investigation/Feasibility Study (RI/FS) Report and the proposed alternatives for site cleanup. These public comments will be taken into consideration when the Environmental Protection Agency (EPA) makes its final selection of the preferred Remedial Actions. The Responsiveness Summary is prepared by the EPA to addresss these comments and is incorporated into the Record of Decision, which states the selected Remedial Actions.

This Responsiveness Summary is divided into the following sections:

Section A: Background on Community Involvement and Concerns: This section provides a brief history of community relations activities conducted by the EPA during the RI/FS.

Section B: Summary of Major Questions and Comments Received During the Public Comment Period and EPA Responses: This section summarizes significant questions and comments made to the EPA during the public comment period, including the public meeting of September 19, 1985. Comments with the EPA responses are categorized under separate topics.

A. Background on Community Involvement and Concerns

The GE Moreau Site, also known as the Caputo Landfill, is located in the Town of Moreau in northeastern Saratoga County, New York. Waste materials were scattered over approximately 30 acres of the site, a portion of which included a small evaporation lagoon and drum disposal area. The evaporation lagoon was previously an open sand pit that was used for the disposal of polychlorinated biphenyls (PCBs). The drum disposal area consisted of approximately 100 drums and associated contaminated soil.

In 1978, town and state officials began testing the air, surface water, groundwater, and soil on and near the site for possible PCB contamination. The evaporation pit was covered in May 1979. Also, several barrels of liquid PBC and some PCB-contaminated soils were removed from the site.

In November 1983, the New York State Department of Environmental Conservation (NYSDEC) determined that there was a high concentration of trichloroethylene (TCE) in the groundwater system and suggested that an alternative water supply be located for several homes. The Town of Moreau purchased and installed carbon filters for 70 homes as a protective health measure. The Citizens of Moreau Against Contamination (COMAC) citizen's group was formed in 1983, consisting of over 70 families living in proximity of the site and using water via private wells from the contaminated Moreau aquifer.

Also, in November 1983, the Environmental Protection Agency and General Electric entered into an Administrative Order on Consent. The Order called for General Electric to perform a Remedial Investigation and Feasibility Study (RI/FS) and to implement the selected remedial actions for offsite contamination at the GE Moreau Site.

Information repositories were established at the following locations: Crandall Library, Glens Falls; Ft. Edward Free Library, Ft. Edward; and the Offices of the Town Supervisors of Moreau and Ft. Edward.

A 30-day comment period was established from December 2, 1983 to January 2, 1984. Comments were received concerning the Order and incorporated into a "Summary of the Final Administrative Order" - Index No. II-CERCLA-30201.

A Remedial Investigation was initiated in May 1984, and a Remedial Investigation Report, with added information, was completed in March 1985. An informational meeting concerning the status of the Remedial Investigation was held on June 21, 1985, to present the findings of the Remedial Investigation Report. Major citizen concerns revolved around the provision of an alternative water supply, with regard to quality, quantity, and cost.

A Feasibility Study Report, which evaluated remedial alternatives for the GE Moreau Site, was completed in August 1985. A public comment period was opened from September 9, 1985, to September 28, 1985, to receive input on the Feasibility Study Report. The EPA presented the findings of the Feasibility Study Report and received verbal comments at a public meeting on September 19, 1985, at the Town Hall in the Town of Moreau. At the request of the Town Board of the Town of Moreau, the EPA agreed to extend the public comment period to October 28, 1985.

EPA agreed to the Town's request for a second extension of the public comment period for a reasonable period of time beyond November 12, 1985, so that after considering the results of a technical meeting scheduled for that date, the Town would have time to submit its official comments.

The technical meeting was in fact held on November 12, 1985; the EPA, representatives from the NYSDEC and General Electric met with members of the Town Board of the Town of Moreau in Albany, New York, to answer any questions contained in the Town Board's draft response to the Feasibility Study Report.

On December 31, 1985, the Town submitted its comments on the outcome of the November 12 meeting. In this package, the Town asserted that there was new evidence demonstrating that the plume emanating from the site had migrated to the west and south and contaminated the Jamaica Avenue and Nolan Road areas.

On January 2, 1986, EPA received a letter from the Town's attorney, Louis Oliver, requesting permission to review the ROD before it was finally approved by EPA and released to the public.

EPA responded to the December 21 and January 2 letters on January 13, 1986, stating that the western edge of the plume had been defined; and that chemicals characterizing the plume did not appear in the Jamaica Avenue and Nolan Road areas. EPA further informed the Town that it had ordered GE to place additional wells west of the site to determine whether the possibility of westward migration existed. Finally, EPA stated that it would probably deny the Town's request for permission to review the ROD prior to its issuance.

EPA met with the citizens from the community on February 20, 1986, in order to address their concerns.

The Town submitted further comment on February 27, 1986, reiterating its concerns.

In EPA's April 1, 1986 letter, EPA's Regional Counsel agreed to hold the remedial decision in abeyance until the Town Supervisor met with Mr. Daggett to present the evidence claimed to be in his possession that other areas of the Town are affected by the plume. On the third page of the letter, the Regional Counsel reiterated that EPA would be open to any data or evidence that indicate that EPA has incorrectly assessed this situation, and that the plume has contributed to contamination in that area. As late as the May 14, 1987 public meeting, the Town Supervisor alleged that sampling of homes in the disputed area evidenced that General Electric was responsible for the contamination in the Jamaica Avenue and Nolan Road areas, but has as yet still not shared the information with EPA. Finally, EPA informed the Town that data from the piezometer wells installed by GE under subsequent direction from EPA indicated, on the contrary, that westward expansion of the plume was physically precluded, due to the existence of a groundwater mound.

On June 17, 1986, members of the Town Board of the Town of Moreau and representatives of COMAC met with Mr. Daggett to discuss information in the RI Report-specifically, the size and shape of the contaminant plume--and the alternative sources of water.

Members of the New York State Department of Environmental Conservation, the Department of Health, and the Department of Law were also present at this meeting, as well as EPA project personnel.

Another meeting was held in Mr. Daggett's office on August 5, 1986, at which Mr. Daggett expressed his intention to select the Village of South Glens Falls as a source of potable water. In order to address the quality and quantity concerns raised by the Town, Mr. Daggett agreed to retain the United States Geological Survey (USGS) to examine existing data on those issues. Mr. Daggett stated that if the USGS agreed with EPA experts that the Village supply is capable of providing water to the homes in the effected area, EPA would select the Village supply as the cost effective remedial action.

On August 15, 1986, the Town's attorney submitted a package critiquing the results of the water level measurements taken at the newly installed piezometer wells which evidenced a groundwater mound underlying the Jamaica Avenue area. Further, the attorney registered his dissatisfaction with EPA's decision to order GE to sink additional piezometers without first consulting with the Town. In addition, the Town requested sampling results of all homes, beyond even those located in the plume.

On October 6, 1986, Mr. Daggett disputed Mr. Oliver's contention that EPA did not consult with the Town before directing GE to do additional analysis in the area. Rather, Mr. Daggett pointed to several instances where the record shows that there was consultation with the Town on this topic. Melvin Hauptman, the Project Officer, wrote on November 24, 1986, that pursuant to the Freedom of Information Act regulations, the requested sampling data could be supplied, but that the Town would have to pay a modest copy and search charge. The Town never responded, and has never obtained the requested data.

The Town submitted another package on November 5, 1986, again asserting that General Electric's retained consultants, Dunn Geoscience Corp. (Dunn), had not properly defined the plume, and that it reached as far west as Jamaica Avenue.

EPA responded on February 4, 1987, stating that the mapping of the plume was accurate. EPA formally closed the comment period with its February 4 letter.

B. Summary of Major Questions and Comments Received During the Public Comment Period and EPA Responses

Major comments and questions raised during the GE Moreau Site public comment period are summarized in this section. Examples of the specific comments and questions raised and EPA responses are also provided. The comments are organized by the following sections.

(1) Comments from the Town Board of the Town of Moreau;
(2) Verbal comments expressed at the public meeting of September 19, 1985; and
(3) Written comments submitted to the EPA during the comment period.

1. Comments From the Town Board of the Town of Moreau

The Town Board had requested that the EPA require either a new, modified, or amended RI/FS Report to address relevant concerns and to comply with certain requirements of the Superfund act. The Town Board felt that the RI/FS Report was inadequate in three areas: the provision of alternative water supply sources, the definition of the contaminated area, and the restoration of the aquifer.

The EPA, however, is completely satisfied with the results of the RI/FS Report and adopts it as conclusive. The report meets the requirements of the Administrative Order between General Electric and the EPA. At this time, the EPA does not intend to request that General Electric modify or amend its reports. However, as a result of a meeting held at the Town's request on June 17, 1986, the EPA did direct General Electric to install piezometers in the area between the GE Moreau site and the Jamaica Avenue/Nolan Road areas of town.

GE, through its consultant, Dunn, installed seven additional piezometers, as directed. Water level measurements obtained from the additional piezometers confirmed the existence of the groundwater mound west of DGC 15, and thus enforced the conclusion that DGC 15 locates the western-most edge of the contaminant plume.

Topic: Alternative Water Supply Provisions

Issue: The Feasibility Study Report does not adequately address alternative water supply provisions or the source(s) of such water supply. Also, the report does not address items of concern such as water quality, water quantity, costs, and water pipe size. It therefore did not meet the requirements of the Superfund Act.

Response: The Feasibility Study Report does mention alternative water supply sources on pages 66 and 78. The sources of water are the public water supplies of the Town of Moreau and the Village of South Glen Falls. Public water supplies in New York State are regulated by the New York State Department of Health; these sources of water meet the quality standards.

The pipe sizes identified in the Regional Water Supply Evaluation Report (Short/Long Term Alter-

native No. 2A) for the General Electric Company in April 1984 are consistent with the pipe sizes outlined in the Town of Moreau Water Service Comprehensive Plan.

The Feasibility Study Report does meet the requirements as stated in the National Contingency Plan (40 CFR, Section 300.68(a)-(j), because it does evaluate (1) technical feasibility (2) public health (3) institutional requirements (4) environmental effects (5) cost evaluation and (6) comparison of alternatives.

Issue: The Feasibility Study Report does not contain cost-estimates for the provision of an alternative water supply. It also does not consider the capital, annual, and 30-year operation and maintenance cost.

Response: The costs are explained in the cost evaluation section in the report on pages 67 and 79. There are no figures in the operation/maintenance of the water pipeline because those costs are contained in user charges.

Issue: It is not technically feasible to use either the Town of Moreau Water District No. 2 or the Village of South Glen Falls as a source of water supply for residences. Also, the water district in the Village of Fort Edward does not have sufficient source capacity to serve as a permanent alternative water supply for the affected area.

Response: The EPA realizes that Water District No. 2 in the Town of Moreau has questionable available capacity. However, the Village of South Glen Falls has more than enough water and is able to supply 100,000 gallons per day. (Refer to attachment of resolution dated November 20, 1985. Refer also to attachment of Resolution dated February 27, 1986, reiterating that the capacity exists, but that the Village was rescinding its offer to sell excess water for reasons other than quantity. Finally, refer to the Quantity and Quality of Water From Public-Supply Wells and Springs in the Village of South Glens Falls, New York, 1987 (USGS Administrative Report), confirming that the supply can be utilized to provide potable water to the 100 or so homes in the contaminated area.) The EPA does not believe that 270 homes are effected by the plume; it is likely that the number of homes that may be potentially impacted is closer to 120 homes. General Electric's FS does not propose to tap the Village of Fort Edward's water supply.

Issue: The 1100 acres of land affected by the plume will be subject to sparse development or no development at all because of the limitations imposed by using the municipal water supply of the Village of South Glens Falls.

Response: General Electric has offered (as indicated in the Feasibility Study Report) to provide public water for future development.

Issue: Supplying outside water to the homes in the plume-affected area will cause additional contaminant flows in the direction of the South Glen Falls wells.

Response: General Electric investigated whether the drinking water wells in the Cheryl, Terry, and Myron Road area could possibly affect the contaminant plume. The results of that investigation did not show such an effect. General Electric has performed an additional investigation to determine whether the addition of imported water to the area of the aquifer could have an effect. The EPA believes that any effect is negligible.

Issue: The Feasibility Study Report failed to include fire flow capacity in the alternative water supply cost estimates.

Response: The EPA does not discuss fire flow capacity because this area of the town did not have provisions for such service before the GE Moreau site. If the town desires fire protection capability in the area, that issue may be included in discussions between the Town and General Electric.

Issue: The Feasibility Study Report failed to evaluate in detail at least one alternative water supply that does not involve connection with an existing municipal water district.

Response: Such an alternative was not evaluated because it would exceed the costs of connecting with an existing water supply. However, the EPA may allow the construction of a new public water supply if all existing supplies could not supply water to the plume-impacted area.

Issue: The Feasibility Study Report does not identify the number and location of the residences included in the proposal for a water distribution system.

Response: Everyone in the Cheryl, Terry, and Myron Road area and in the Bluebird Road area will be tied into the

water system. Refer to the Feasibility Study Report and the Short/Long Term Alternative No. 2A in the Regional Water Supply Evaluation Report for General Electric, dated April 30, 1984.

Topic: Contaminated Area Definition

Issue: General Electric failed to adequately define the area affected by the contamination from the GE Moreau site and to scientifically justify its definition of the affected area.

Response: General Electric addressed this in both versions of the Remedial Investigation Reports--October, 1984 and March, 1985. Refer to plate 12 of the October 1984 Remedial Investigation Report (along with plates 6, 7 and 8) and to plates 4, 5, 6, and 7 (groundwater table countour maps) of the March 1985 Remedial Investigation Report for discussion of groundwater flow and contaminant locations. Also, refer to the text of both reports. The area was further defined in EPA's review of the RI Reports. Finally, refer to EPA's February 7, 1987, letter to the Town of Moreau.

Issue: The RI/FS failed to identify the location and the extent of contamination in the plume because General Electric's consultant used 30-foot-long screens on its monitoring wells.

Response: At each monitoring well location, General Electric installed three monitoring wells--one shallow, one intermediate, and one deep--with 30-foot-long screens. The reason for this was to intercept every depth of the aquifer at that location to determine the location of the contaminants. Water analyses conducted to a detection limit of one part per billion served as an indication of either the presence or absence of contaminants at every location and elevation within the aquifer.

The depiction of contamination by isoconcentration lines in plate 12, Dunn Report, 1984, shows the detectable limit of TCE. Although 100 ppb was the outside countour drawn, concentrations were non-detect at very short distances (less than 100 feet) from the 100 ppb line in most cases, except in the Cheryl, Terry, Myron area, where concentrations range from extremely small to non-detect, and which area will be provided, as a precautionary measure, with potable water. EPA believes that the plume is accurately defined by the data generated by Dunn, and that concentrations for the major part of the plume are restricted very closely to the area

depicted by the 100 ppb contour. It should be noted that plate 12 depicts wells outside of the 100 ppb contour, and lists the levels of contamination detected at those wells.

Issue: The RI/FS failed to identify the exact location and the extent of the contaminatant plume because of the exclusive use of TCE as an indicator chemical. Also, if TCE was not detected in samples taken from a particular residence, then the well at that residence was not counted as contaminated.

Response: Incorrect. General Electric conducted sampling and analysis of all monitoring wells and all possibly affected drinking water wells for 50 purgeable organics and PCBs. This analysis includes approximately 50 priority pollutants. TCE was the predominant contaminant appearing in these analyses.

Issue: The RI/FS failed to demonstrate that there is no evidence of radial flow of the plume toward the water supply wells of the Village of South Glens Falls.

Response: The RI Report defined the plume as moving in a south, southeasterly direction and not in a northerly direction toward the South Glens Falls supply wells. The supply wells for the Village of South Glens Falls are upgradient from the site; in addition, there is a naturally occuring groundwater mound north of the site that is also upgradient. In order for contamination to reach the South Glen Falls supply wells, the groundwater would have to overcome the groundwater mound and the regional groundwater flow pattern, which is in a southerly direction. Both situations are highly unlikely to occur.

Issue: What is the possibility of contaminants traveling from the plume to the deep wells used by South Glens Falls through the extensively fractured rock in which the wells are located?

Response: The GE Moreau Site is underlain at a depth of approximately 100 feet by a minimum of 13 feet of a naturally occurring clay layer. The slurry wall around the site is keyed into this clay layer and is, therefore, a separation between the waste material and the fractured bedrock that in which the Village of South Glens Falls wells are located.

Issue: There have been no monitoring wells or other tests to determine whether contamination exists in the groundwater flowing into the Fort Edward watershed in and around the Reardon Brook area.

Response: Among others, monitoring well DGC 13 is located in the Fort Edward watershed. This well has not shown any contamination.

Issue: General Electric failed to generate a working model of the groundwater aquifer that has been contaminated.

Response: Failure to develop a working model is not relevant in this situation. The model would be used only to simulate field conditions, and we feel that General Electric has fully defined actual field conditions.

Topic: Aquifer Restoration

Issue: General Electric failed to adequately address the restoration of the aquifer that has been destroyed by the contamination.

Response: The EPA is requiring General Electric to provide an alternative water supply to areas that currently do not show signs of contamination but may show signs in the future, i.e., the Cheryl, Terry, and Myron Road areas. Although aquifer pumping is not required at this time (due in part to concern over alterations in groundwater flow patterns which may result in loss of water to the Fort Edward Water Supply), aquifer resoration should ultimately be accomplished by natural forces. Furthermore, since the aquifer is being treated at its point of discharge analysis indicate that additional aquifer treatment would not be cost-effective.

Issue: The Feasibility Study Report rejects the pump and recharge alternative for aquifer restoration because of cost factors.

Response: Source containment is included in the pump and recharge alternative. The separate cost for source containment is $2.3 million; the cost for pump and recharge is $5.7 million. Providing an alternative source of water via a pipeline is a more cost-effective solution than pumping and recharging the aquifer. In addition, the aquifer is being treated at the Reardon Brook Water Treatment Facility. The National Contingency Plan requires the most cost-effective solution. Furthermore, as explained above, such pumping and recharge may result in loss of water to the Fort Edward Water Supply.

Issue: The construction of a water treatment plant utilizing the Hudson River in the Town of Moreau should be considered as an alternative in the Feasibility Study Report.

Response: General Electric is not required to consider this approach, which would be considerably more expensive than the solutions already proposed. It is, therefore, not cost-effective, as required by the National Contingency Plan.

2. Verbal Comments Expressed at the Public Meeting of September 19, 1985

The following comments were made by citizens at the public meeting. Robert Buttles, Sr., and Elizabeth Wimette served as representatives of the Citizens of Moreau Against Contamination (COMAC).

Topic: Technological Concerns

Issue: With regard to the air stripping remedy, does that mean that contamination would be released into the air?

NYSDEC
Response: The air stripper itself, when that was proposed to be put in by EPA, the State Health Department, and the DEC, was to require an air permit. The operation of an air stripper does involve air emissions, if you will. General Electric applied to our agency through our regional office and received a permit to discharge into the environment within certain limits, given that kind of loading rate. General Electric was issued the permit; the air stripper has been tested and is in compliance with the operating certificate from the Division of Air. So yes, the air stripper is putting things in the air, but General Electric has a permit allowing for the operation of the air stripper.

Issue: What were the houses affected by when General Electric determined the plume of contamination? Were you looking for one chemical?

Response: No. We dictated to General Electric that those are all the homes that should be addressed as needing a remedy. We weren't looking for one chemical. There is a whole list of volatiles that we asked GE to test for, primarily in newly installed monitoring wells in the area.

Issue: On page 15 of the Feasibility Study Report, could you comment about the concern that the Town Board expressed in regard to the small-sized pipes, which do not include an accurate flow capacity? The report tends to give the feeling that the pipe size is substandard in terms of its capacity.

Response: We were concerned about the size of the pipes, and we want to check that out. One of the other items of interest that we tried to check out with General Electric was hook-ups to individual homes, because that's not delineated in the report. General Electric agreed to the hook-ups; they agreed to put in pipes that could handle a full-size water district. It's not a pipe that would only be able to handle particular homes.

Topic: Administrative Concerns

Citizen Comment: I would agree, as it has already been phrased, that the Feasibility Study Report should be modified or amended. I don't feel that it needs a great deal of extensive research to amend it, but the people have waited long enough. We need water and we need it quickly.

Issue: Was an environmental impact statement (EIS) done?

Response: A formal EIS was not done on this site; the primary reason from the department's office of counsel was that this action is being conducted pursuant to an enforceable document. We have the State Order on Consent and the General Electric/U.S. EPA (Federal Superfund) CERCLA Order. The substantive requirements for what we consider in the environmental impact analysis were complied with by GE in its application to our agency.

Issue: According to this, GE failed to define the affected area. When will that be done? And when will we know what is considered to be the affected area? How will EPA deal with that?

Response: There was an opportunity under the Remedial Investigation for GE to define the affected area. The firm limited itself to Bluebird Road at the time, with some westerly migration. We pushed that westerly migration even further to Cheryl, Terry, and Myron Roads. So, in effect, we defined the area for General Electric, and that area will include all of the houses in the area.

Issue: Do you know actually which homes General Electric plans to hook up to those pipes?

Response: All of the homes in the area--Cheryl, Terry, and Myron Roads and down to the school. If this is the mandated alternative and if the Town Board approves it, or some facsimile of it, there will be a design report that will specify individual homes in the area. The Feasibility Study Report is not really a design document; it is a scoping document to look at alternatives.

Issue: Approximately how many homes are we talking about?

Response: About 60-70 homes, counting Bluebird Road.

Issue: When you say counting Bluebird, what do you mean by that?

Response: I mean counting homes on Cheryl, Terry, and Myron Roads. Maybe 80 homes altogether.

Issue: What kind of time frame are we looking at? We've been waiting for 3 years.

Response: If this document goes through, with no further work on it, there's no reason why work should not begin a month from the signing of the document on September 29, 1985.

NYSDEC
Response: Realistically, you are talking around the first of the year.

Issue: Who gets to choose where we get the water from?

Response: That is included as part of the proposals in the report. EPA will recommed where the water should come from or whether General Electric should go back and look at other alternatives taking into consideration your comments here tonight.

Topic: Health Concerns

Issue: I'm very concerned about the sampling. Analysis of the sampling performed by NUS revealed so many chemicals, yet with the samples from Dunn GeoScience, my well has always been clean.

Response: We were concerned also with the differences in data. We had our own labs do the recent samples because we were wondering about that inconsistency, which we explained to you last time. That's why we had them turned around so quickly to see whether there was any

particular problem, whether Dunn GeoScience was in fact toeing the line as they should. Our most recent samples are from NUS. The samples are sent out to contract labs. The EPA contracts a whole host of labs, as they can't do all the analyses on their own. Even though those other labs are backed up, we'll see what we can do regarding those NUS samples.

3. Written Comments Submitted to the EPA During the Comment Period

The EPA received letters from the Citizens of Moreau Against Contamination (COMAC); the New York State Department of Environmental Conservation (NYDEC); the law firm of Pattison, Sampson, Ginsberg, and Griffin, P.C.; Congressman Gerald B. Solomon; and Frank J. Kottman of South Glens Falls.

° Robert Buttles, Sr., and Elizabeth Wimette, representatives of the COMAC citizens' organization, expressed concern over alternative water supplies, regarding their availability, quality, and cost, as well as fire protection capability. They suggested that the Town of Queensbury be considered as a source for an alternative water supply. It was also requested that Mr. Frank Hardick, engineer for the Town of Moreau, act as the lead agency responsible for final construction procedures, so that construction would be compatible with a final comprehensive water system implemented at a later date.

The EPA has previously addressed the issues related to the alternative water supply in this Responsiveness Summary. The Town of Queensbury was not considered as a source of alternative water in the Feasibility Study Report but the Queensbury supply is considered in the Record of Decision. Also, General Electric is responsible as the lead agency for construction procedures. However, the Town of Moreau may utilize Mr. Hardick as its advisor.

° Mr. Gerald H. Katzman, representing the law firm of Pattison, Sampson, Ginsberg, and Griffin, P.C., submitted a letter outlining the following concerns. The Feasibility Study Report does not acknowledge that the plume has affected the Cheryl, Terry, and Myron Roads area. Specifically, technical evaluation of the plume is not believed to be precise in terms of its location and identification of contaminants. (To support this claim, a deposition of Mr. Theodore Clark, division director and senior hydrologist with the Dunn GeoScience Corporation, was attached to the letter.)

The EPA believes that the Remedial Investigation Report did address these concerns. The EPA has previously addressed this issue in this Responsiveness Summary.

° The NYDEC requested that a permanent water hook-up to the Moreau Elementary School be included in the alternative water supply alternative. The DEC also felt that General Electric did not adequately address the aquifer restoration issue, specifically, with regard to the pumping and recharge alternative.

The EPA believes that General Electric did adequately address the issue of aquifer restoration because G.E. has agreed to supply alternative water for homes in the affected area and also for any future development in the plume affected area and because aquifer restoration presents potential negative impacts and is not a cost-effective remedial action in this situation. EPA's letter of September 25, 1986, explains that the plume does not extend as far west as the school building. General Electric will not be ordered to hook up the school to the alternative water source. It will be ordered, however, to continue monitoring for at least thirty years, in orded to ensure that the size and shape of the plume does not change over time.

In addition, EPA will review the selected remedy no less then each five years after implementation begins. EPA has the authority to require additional corrective measures if it finds that the remedial action is not protective of human health or the environment.

° Congressman Gerald B. Solomon, representing the 24th District of New York, requested that the EPA "act expeditiously and in a manner favorable to the residents of the town by selecting an alternative water supply that provides immediate yet permanent relief to the entire affected area without undue added cost to the property taxpayers of the town."

° Mr. Frank J. Kottman of South Glens Falls requested an explanation as to why he is not eligible for a water hook-up; his home is only 42 feet from the access to the entrance road leading to the dump site.

The EPA stated that the plume is downgradient of his house and, therefore, his water supply is not affected by the plume. The plume is moving in a south, south-easterly direction, and Mr. Kottman's residence is located east of the site.

CLERK'S CERTIFICATION

I, Joyce M. Leombruno, Clerk of the Board of Trustees of the Village of South Glens Falls, Saratoga County, New York, do hereby certify that the foregoing is a true copy of a Resolution duly adopted by the Board of Trustees of said Village on the 20th day of November, 1985.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed hereto the official seal of said Village of South Glens Falls, this 20th day of November, 1985.

Joyce M. Leombruno

Joyce M. Leombruno, Clerk

RESOLUTION OF AUGUST 6, 1986
OF THE BOARD OF TRUSTEES OF THE
VILLAGE OF SOUTH GLENS FALLS, NEW YORK
RESCINDING RESOLUTION OF NOVEMBER 20, 1985

WHEREAS, the Board of Trustees of the Village of South Glens Falls, New York, on November 20, 1985, adopted a Resolution wherein it was stated that the Village of South Glens Falls has excess water supply, which the said Village would be willing to sell outside the Village to the Town of Moreau up to 100,000 gallons of water per day; and

WHEREAS, upon further consideration of the matter by the Board of Trustees it has been determined that it is not in the public interest to sell water to the Town of Moreau pursuant to the request of the General Electric Company,

NOW, THEREFORE, BE IT RESOLVED that the Resolution of November 2 1985, is hereby rescinded; and

BE IT FURTHER RESOLVED that water for sale to the Town of Moreau pursuant to the request of General Electric is no longer available.

This Resolution shall take effect immediately.

THIS IS TO CERTIFY THAT the foregoing is a true copy of a record on file in the OFFICE OF THE VILLAGE CLERK, VILLAGE OF SOUTH GLENS FALLS, NEW YO
IN WITNESS WHEREOF, THIS certificate has been duly signed and sealed by the VILLAGE CLERK, VILLAGE OF SOUTH GLENS FALLS, NEW YORK.

8/7/86
DATE

VILLAGE CLERK, SOUTH GLENS FALLS

MAIN

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Mr. Warren W. Green
School Attorney
37 Hair Street
South Glens Falls, New York 12801

Dear Mr. Green:

This is in response to your letter of September 9, 1986 regarding the desire of the Board of Education of the South Glens Falls Central School District to connect the Moreau Elementary School to an alternate water supply.

Let me bring you up to date on the GE Moreau Superfund site. The General Electric Company (GE) has performed a Remedial Investigation of the site pursuant to the National Oil and Hazardous Substances Contingency Plan, to identify the nature and extent of groundwater contamination emanating from the GE Moreau site. The westerly edge of the groundwater contamination plume has been identified at monitoring well MGC 15 which is located 2100 feet north and 630 east of the Elementary School building. The plume of contamination does not extend further west than that monitoring well and therefore the Elementary School's drinking water well is not currently, nor is it expected to be, impacted by this plume. However, GE is required to continue to monitor the groundwater plume for at least 30 years into the future to assure that the size and shape of the plume does not change over time.

We are now at the point of having GE install water supply mains to provide alternate water to the plume-impacted area. The mains will be installed on Myron Road, Terry Drive, Cheryl Drive, and Bluebird Road. In fact, GE met with the Town on September 12, 1986 to begin plans for the water main installation.

Regarding your concern over allowing the Moreau Elementary School to connect to these water mains, EPA's project officer, Mr. Hauptman has already discussed this with GE and let me assure you that such a connection can be made. Of course the School District will be expected to pay for installing the water line from the street to the school building.

SYMBOL	SCB	ORC	PSB	SCB	ERRD	ERRD	DRA	RA
SURNAME	HAUPTMAN	SCHAAF	[illegible]	CAPOR	LUFTIG	MARSHALL	MUSZYNSKI	DAGGETT
DATE	9/16/86	9/16/86	9/17	9/17/86	9/19/86	9/19		9/23

EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

U.S. GPO 1985-467-853

To obtain additional information on the schedule for installation of the water mains, please contact Mr. T. Leo Collins, Manager, Environmental Quality & Resource Planning, General Electric Company at (518) 385-9400 or Mr. Gardner Congdon, Supervisor, Town of Moreau at (518) 792-1934.

I trust that the above information is responsive to your concerns.

Sincerely,

Christopher J. Daggett
Regional Administrator

cc: Henry G. Williams, Commissioner
New York State Department of
Environmental Conservation

Mr. T. Leo Collins, Manager
Environmental Quality & Resource Planning
General Electric Company

Mr. Gardner Congdon, Supervisor
Town of Moreau