Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision
Operable Unit I
Chromalloy (SEQUA)
West Nyack, Rockland County
Site Number 3-44-039

March 1999

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* JOHN P. CAHILL, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

"Chromalloy (SEQUA)" Inactive Hazardous Waste Site
West Nyack, Rockland County, New York
Site No. 344039
Operable Unit I

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedial action for the Chromalloy (SEQUA) inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for Operable Unit I of the Chromalloy (SEQUA) Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix A of the ROD.

Assessment of the Site

Actual or threatened release of hazardous waste constituents from this site if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and the environment.

Description of Selected Remedy

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Chromalloy (SEQUA) and the criteria identified for evaluation of alternatives the NYSDEC has selected goundwater recovery and treatment of the contamination in the lower aquifer, and a dual phase system extraction system for the contamination in the upper aquifer and the unsaturated soil as the appropriate remedy for this Operable Unit. The components of the remedy are as follows:

- A groundwater recovery and treatment system consisting of a pumping well, connected to a stripping tower and granulated activated carbon (GAC) vessels to cleanup the lower aquifer contaminated with TCE and other dissolved organic compounds.
- A dual phase extraction system to cleanup dissolved and volatile compounds in the unsaturated soils and the upper aquifer.
- The establishment of a set of year-by-year cleanup goals for two on-site and two off-site wells.
- Implementation of additional measures if the concentration of TCE in any of the wells in the monitoring program exceed the goals by 20 % for three consecutive years.

- Placing a restriction on the use of the on-site groundwater in the title deed until the New York State groundwater quality standards are met.
- Monitoring the quality of the nearby private wells still in use to assess impacts from site-related contaminants.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

3/31/99
Date

Michael J. O'Toole, Jr., Director
Division of Environmental Remediation

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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected the remedy designated as Operable Unit No I (OU-I) to address the significant threat to human health and/or the environment created by the presence of hazardous waste at the Chromalloy (SEQUA) site (the Site) designated as a Class 2 site in the list of Inactive Hazardous Waste Disposal Sites in New York State (the Registry).

The Site is located at 169 Western Highway in West Nyack, within the Town of Clarkstown, Rockland County on a 6.5 acre parcel of land. It is approximately 0.5 miles south of New York State Route 59 **(Fig. 1)**.

From 1960 to 1982 Chromalloy Corporation, under various owners and names, manufactured machinable metal alloy parts, and coated metal parts at the Site. The operations involved use of trichloroethylene (TCE) and other chemicals. Analytical results suggest that a significant release of TCE to the soils and the groundwater took place at the Site. In 1978 high concentrations of TCE were found in all the private wells on Pine View Road. In 1979 all the residences on Pine View Road were connected to the municipal water supply with funding from the State and local government, and with cooperation of Spring Valley Water Company. Investigations at the Site conducted in 1994-1995 uncovered a fractured underground pipe that may have been used to deliver waste, including spent TCE, to an on-site treatment plant. The soil under the pipe had high concentrations of TCE. This highly contaminated soil was excavated and removed in 1995. However, the groundwater contamination has not appreciably abated since then.

An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the Site contamination. The extent of TCE in the soil and groundwater at the Site so predominates the other contaminants that this OU-I will focus only on the data and the proposed remedy for the TCE in the soil and groundwater.

Operable Unit II (OU-II), would include supplemental investigative work to identify and delineate non-TCE related contaminants such as metals in the surficial soils on site. Off-site samples, if any, would be collected and analyzed based on on-site soil data. Further definition of off-site groundwater contamination and the need for additional remedial measures will be determined during OU-II. Collection of data for OU-II will commence when OU-I is constructed and in operation.

As more fully described in Sections 3 and 4 of this document, hazardous wastes released or disposed at the Site, principally trichloroethylene (TCE) and to a lesser extent tetrachloroethene (PCE) and their degradation byproducts cis and trans 1,2- dichloroethylene (DCE) have been identified in soil and groundwater at the Site. The contaminants have migrated from the Site to the surrounding areas, including the Pine View Road residential area, north of the Site. These disposal activities resulted in the following significant threats to the public health and the environment:

- A significant threat to human health associated with groundwater contaminated with TCE, PCE and their degradation byproducts cis and trans 1,2 DCE.

- A significant environmental threat associated with the impacts of contaminants to overburden and bedrock aquifers at the Site and the adjoining areas.

In order to restore this inactive hazardous waste disposal site to predisposal conditions to the extent feasible and authorized by law, but at a minimum to eliminate or mitigate the significant threats to the public health and/or the environment that the hazardous waste disposed at the Site has caused, the following remedy was selected in this Operable Unit:

- A groundwater recovery and treatment system consisting of a pumping well, connected to a stripping tower and granulated activated carbon (GAC) vessels to cleanup the lower aquifer contaminated with TCE and other dissolved organic compounds.
- A dual phase extraction system to cleanup dissolved and volatile compounds in the unsaturated soils and the upper aquifer.
- The establishment of a set of year-by-year cleanup goals for two on-site and two off-site wells.
- Implementation of additional measures if the concentration of TCE in any of the wells in the monitoring program exceed the goals by 20 % for three consecutive years.
- Placing a restriction on the use of on-site groundwater in the title deed until the New York State groundwater quality standards are met.
- Monitoring the quality of the nearby private wells still in use to assess impacts from site-related contaminants.

The groundwater recovery and treatment system would have a range of influence that would encompass the Site and most of the Pine View Road area. The two remedial systems, while designed to remove TCE and related contaminants from the groundwater, would also remove other dissolved contaminants within their ranges of influence. The dual phase extraction system would additionally remove other volatile organic compounds (VOCs) that are in the form of vapors within the soil pores and within its range of influence.

The selected remedy discussed in detail in Section 8 of this document, is intended to attain the remediation goals selected for this site in Section 6 of this Record of Decision (ROD), in conformity with applicable standards, criteria, and guidance (SCGs).

SECTION 2: SITE LOCATION AND DESCRIPTION

The Site is located at 169 Western Highway in West Nyack, within the Town of Clarkstown, Rockland County on a 6.5 acre parcel of land. It is approximately 0.5 miles south of New York State Route 59 **(Figures 1 and 2)**. Most of the operational activities by Chromalloy were reportedly conducted in the Main Building which is approximately 61,000 square feet in floor area. The Site now forms the northern end of a much larger industrially zoned property owned by Bradley Corporate Park, and has several smaller industries occupying other buildings on the Site. Residences are located to the north along Pine View Road.

The Hackensack River, flowing south, is 700 feet to the west of the Site. The north-flowing Greenbush Brook, a Hackensack River tributary, separates the Site from the Clarkstown Landfill which is located approximately 350 feet to the east.

The Site is situated amidst several other inactive hazardous waste disposal sites near the Hackensack River. Grant Hardware Co. (Site ID#344031) is located 1,000 feet north of the Site. Orange and Rockland Utilities (Site ID #344014) is located 2,300-3,300 feet to the north. The Clarkstown Town Landfill (Site ID #344001) is situated 800 feet to the east. Approximately 3/4 miles to the south is Xerox Corporation (Site ID #344021).

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

1926: The Site was acquired by Kay Research Co., Inc. and Kay Laboratories, Inc.

1927: A 40-gal. spill of an unknown chemical occurred that resulted in taste problems in the local public water company's downstream water plant and required the abandonment of four nearby wells; the effect of the pollution on the Hackensack River apparently remained for 20 years. Based on the described impacts, the spill likely involved significantly more than 40 gallons of chemical.

1946: The property was passed through a number of individuals and corporations including Infra Insulation, Inc. which sold the Site to Chromalloy Corp. in August 1960. Chromalloy personnel reported that the well water on the property was not drinkable because of its taste, which may possibly have been a manifestation of the 1927 Kay Research spill or some other cause.

1982: Chromalloy sold the Site to Alloy Technology.

1984: Alloy Technology sold the property to Bradley Industrial Park (Bradley Corporate Park), the present owner. Alloy Technology is continuing to operate in the Main Building at the Site as one of the tenants.

1986: Chromalloy merged with Sun Chemical Corporation and changed its name to SEQUA Corporation.

Two different Chromalloy Divisions operated at the Site: Sintercast, which operated throughout Chromalloy's tenure, and the Coatings Operation which operated until 1971 and then was transferred to Chromalloy's Orangeburg plant, also in Rockland County.

The Sintercast Division produced machinable titanium carbide, carbon, chromium, and iron as raw materials. The process entailed milling, mixing with hexane, vacuum drying, drying with hexane recovery, pressing with 2% paraffin, sintering, annealing and machining. Sintering is a heat and pressure treatment process that turns a milled product into a coherent mass without melting it. Annealing is a heating and cooling process that renders metals and alloys more malleable and less brittle. These operations used trichloroethene (TCE) which was applied with wiping rags for degreasing. It has been reported that only one drum of TCE was purchased every 8 to 12 months and, at most, three drums were stored on the property. This degreasing operation reportedly ceased in 1971. Alloy Technology prepares specialty metal products and utilizes many of the operations formerly employed by Sintercast. Alloy Technology reports that it does not use TCE.

At the Coatings Operation, TCE was used as a degreasing agent, and spent TCE was reportedly returned to the supplier, Detrex Corporation. SEQUA personnel have indicated that the degreasing units may have been located inside the eastern and possibly the southern portion of the Main Building.

3.2: Remedial History

In July 1978, a Pine View Road resident complained to the Rockland County Health Department (RCHD) of a taste and odor problem in the well water on his property. RCHD's inspector assigned to the case confirmed the odor in the well water and initiated several rounds of water sampling at all the Pine View Road residences in August and September of that year. All of the wells were contaminated with TCE. One home on Pine View Road, just north of the Main Building, had a concentration of 65,000 ppb **(Fig. 3 and Table 3)**. Following the receipt of the analytical results, RCHD established a temporary water supply for all the residents and ordered them not to use their well water.

In 1979, all the homes on Pine View Road were connected to a permanent water supply with funding from the State and local government, and with cooperation of Spring Valley Water Co. and Chromalloy which permitted a tie-in to their existing supply connection. In 1979, RCDH held a series of hearings to identify possible sources of chemical pollution in the Pine View Road wells.

In 1983 and 1985, NYSDEC completed Phase I and Phase II investigations at the Pine View Road wells. The Pine Road Wells were was listed in the Registry and assigned the site ID No. 344022.

In 1991 and 1992, as a result of the August 29, 1989 Order on Consent, SEQUA conducted a series of extensive tests on and around the Site. TCE was detected in ten of fifteen groundwater monitoring well samples in excess of the NYSDEC groundwater standard of 5 ppb; one monitoring well sample from MW-1B, located south-west of the Main Building, contained 33,000 ppb.

Subsequently, on October 13, 1992, the Chromalloy Site was listed on the Registry as a Class 2 site, ID No. 344039. It was given an EPA ID No. NYD980454877. The Pine View Road site, No. 344022, was delisted because it was determined that the contamination found in the Pine View Road Wells resulted from migration of contaminants from source(s) which were upgradient of the Pine View Road Wells. Therefore, Pine View Road Wells contamination would be investigated as part of the Chromalloy Site Remedial/Investigation Feasiblity Study. The Class 2 designation indicates a site at which the disposal of hazardous waste constitutes a significant threat to the public health and/or the environment, and action is required.

In February 1994, an Order on Consent requiring a remedial program was executed by Chromalloy Gas Turbine Corporation, the Potentially Responsible Party (PRP) and the NYSDEC.

In December 1995, an IRM was conducted to remove highly contaminated soils outside the south wall of the Main Building **(Fig. 4)**. A fuller description of this IRM is provided in Section 4.2.

Off-site investigation had to be held in abeyance from 1996 to 1997, because NYSDEC was denied access to the Pine View Road area by the residents. The off-site investigation was commenced in the summer of 1997, when access was obtained through a court order.

SECTION 4: SITE CONTAMINATION

To evaluate the contamination present at the Site and to evaluate alternatives to address the significant threat to human health and the environment posed by the presence of hazardous waste, the PRP has recently conducted a Remedial Investigation/Feasibility Study (RI/FS).

4.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the Site.

The RI, which spanned from 1994 to 1998, was conducted in multiple phases. The phases were in part necessary because of the IRM that was undertaken during the RI; the difficulty in gaining access to off-site properties to complete the off-site investigation; and the change in the consultants for the PRP in 1996. A report entitled Remedial Investigations, December 1998, has been prepared which describes the field activities and findings of the RI in detail.

The RI included the following activities:

- *Background research of published literature and maps.*
- *Interviews with Chromalloy and SEQUA employees regarding solvent use and disposal.*
- *Review of historical aerial photographs*
- *Private and community well survey*
- *Geophysical surveys to determine fracturing and depth to bedrock (15 borehole surveys).*
- *Soil gas surveys (57 probes).*
- *Geoprobe soil borings to investigate depth to rock, depth to groundwater and to collect samples.*
- *Installation of 6 monitoring wells in addition to the 15 installed during the preliminary investigations.*
- *Excavation of (6) test pits to locate underground drainage/leach fields and to identify shallow soil contamination.*
- *Slug test and pump tests.*
- *Groundwater, Surface Water and Sediment Sampling and Analysis.*
- *Sampling on-site wells.*

- *Sampling off-site wells.*
- *Hackensack River Impact Analysis.*
- *Fish and Wildlife Impact Analysis*
- *Risk Assessment*

To determine which media (soil, groundwater, etc.) contain contamination at levels of concern, the RI analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water and surface water SCGs identified for the Site are based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part 5 of NYS Sanitary Code. For soils, NYSDEC TAGM 4046 provides soil cleanup guidelines for the protection of groundwater, background conditions, and health-based exposure scenarios. guidance values for evaluating contamination in sediments are provided by the NYSDEC "Technical Guidance for Screening Contaminated Sediments".

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, groundwater in the shallow aquifer on site and the deeper aquifer on and off site require remediation. The salient findings in the various media are summarized below. More complete information can be found in the RI Report.

Chemical concentrations in water are reported in parts per billion (ppb), and in soils or sediments in parts per million (ppm). For comparison purposes, where applicable, SCGs are provided for each medium.

4.1.1 Nature of Contamination:

The primary contaminant of concern at the Site is TCE. Lower levels of PCE and breakdown products of TCE like cis and trans 1,2 DCE are also present in groundwater and soils. The characteristics of TCE are presented in **Appendix B.**

As described in the RI Report, many soil, groundwater, surface water, and sediment samples were collected at the Site to characterize the nature and extent of contamination. Groundwater and soil were the only media exhibiting significant concentrations of contaminants. Tests were performed for other potential contaminants as well. No significant concentrations of metals, semivolatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were identified in the media.

4.1.2 Extent of Contamination

Table 1 summarizes the concentrations of contaminants of concern in soil and groundwater, and compares the data with the SCGs for the Site. A summary of the findings of the investigation with respect to each of the media follows:

Soil

The subsurface at the Site consists of a very dense sequence of glacial till overlying alternating sandstones, shales and conglomerates. Because of deep weathering, resulting from poor cementation, determination of the depth to top of bedrock has been uncertain, and has variously been reported to be between 22 feet and 43 feet at the south side of the Main Building.

The six test pits excavated in September, 1994, uncovered nothing of environmental consequence. The locations are shown in **Figure 5**. Following the inspection of test pits, 26 geoprobes were driven and fifty-seven samples were collected from them. The locations of the geoprobes are shown in **Figure 6**, and the salient results are shown in **Figure 7**. The maximum soil contamination was encountered in geoprobe G21, located outside the south wall of the Main Building, with TCE concentration at 30 ppm.

Five soil samples from the geoprobes were analyzed for metals. The results are shown in **Table 2**. As the results show, sample G24S collected at a depth range of 3 to 4 feet below ground surface in the vicinity of a clay pipe exiting from the southeast corner of the Main Building had a chromium concentration of 52.3 ppm, which exceeds the high end of the statistically based range for eastern USA background soil of 40.0 ppm. Similarly sample G16S collected at a depth range of 2.5 to 3 feet below ground surface had a mercury concentration of 0.48 ppm, which exceeds the high end of the background range of 0.001 to 0.2 ppm. A consideration of this and other contaminants not related to TCE will be taken up in OU-II. The investigation that will be conducted in OU-II would establish the site-specific background concentrations of chromium and mercury to determine cleanup objectives in accordance with SCGs.

In May 1995, nineteen samples were collected from five borings (**Fig. 8**). The most significant results were from boring B1 where results of three soil samples between 0-6 feet ranged from 20 to 37 ppm of TCE. Samples from other borings yielded less than 1 ppm of TCE.

The borings were followed by trenching which generally was limited to a depth of less than 4.5 feet (**Fig.8**). The highest concentration of TCE was encountered in the Southwall Trench. At a distance of 77 feet from the southwest corner of the Main Building a broken clay pipe was uncovered. A sample of the soil-like substance from inside the pipe, designated TP-77 (pipe), had a concentration of 35, 000 ppm, and from sample TP-85 (2ft.) had a TCE concentration of 3,900 ppm. Results of other samples are shown in **Figure 3.** There was little TCE encountered in the LD and H Trenches. The maximum concentration was 0.69 ppm.

In summary, at 10 feet from the building, only trace TCE is present. The heaviest contamination begins no more than 10 feet west of probe G21 (located 50 feet east of the Main Building corner) and extends some distance beyond 90 feet east of the corner (to probe G22). Farther east of the 90 feet position, the presence of TCE is primarily limited to the pipes and the bedding soil. The contamination of the soil is deepest at 60 feet from the corner, extending to bedrock at boring B-1. As described in Section 4.2 of this PRAP, shallow soil contamination south of the Main Building was removed to the extent feasible as an IRM.

Groundwater

The bedrock aquifer underlying the Site is recognized as one of the most productive bedrock aquifers in New York State. The section of the Hackensack River basin in the vicinity of the Site overlies a principal aquifer.

Principal aquifers are aquifers which are not currently used for public water supply, but which are either known to be highly productive, or which represent a potentially abundant water supply because of their geologic characteristics. Principal aquifers are important resources for the future. This aquifer is potentially a significant water resource for the county residents. The Hackensack River provides the main source of water supply for the adjacent Bergen County, New Jersey.

Groundwater flow in the shallow aquifer is towards both east and west of the mound on which the Site is located, with the flow and contaminated plume migration having northward components (**Fig. 9**). The groundwater contour map for the lower aquifer indicates that the hydraulic gradient is small, with the flow converging in the direction of, and under, the Pine View Road from either side (**Fig. 10**). This relatively flat gradient may, in part, be explained by the discontinuance of the use of private wells by the residents on Pine View Road, which in turn may explain the persistence of the high concentrations of contaminants in the abandoned wells in the Pine View Road area (**Table 3**).

The highest concentration of TCE measured in groundwater was 160,000 ppb in G4 at 17-19 feet below ground surface. The flow divide in the shallow aquifer is located in the vicinity of the highest TCE concentrations and, as can be seen in **Figures 3 & 7**, has resulted in contaminant distribution in the shallow aquifer to both the east and west.

The results of the June, 1998, round of sampling of one abandoned production well to the west of the Main Building; deep groundwater monitoring wells; and selected abandoned private wells are tabulated and plotted on **Figure 11**. The isoconcentration map is probably more reflective of the residuals of the contaminants transported in the past, when the wells were in use, rather than the present migration pattern.

One of the reasons for listing the Site on the Registry was the finding in 1991 of 328 ppb of chromium in well MW-5A (**Fig. 11**). Since the turbidity was high when the sample was collected, it was decided to resample this well under a more controlled condition. In June 1994, the well was redeveloped and three unfiltered samples (regular, duplicate, and a matrix spike) were analyzed. The chromium concentration in the regular sample was 1.1 ppb. It is surmised that the chromium in the earlier sample was released from the sediment into the water by preservatives and digestion. A sample collected from this well in June, 1998, again reported a concentraton of 1.1 ppb with chromium also detected in the blank.

Sediments

Sediment samples were collected in June, 1998, at four locations SED-1 to SED-4 (**Fig. 12**). The samples were analyzed for VOCs and metals. The VOC analysis indicated the presence of TCE at SED-2 (130 ppb) and at SED-3 (18 ppb) and 2-butanone (MEK) at SED-3 (110 ppb) and SED-4 (4.1 ppb). All other VOCs were either detected in the blank or are considered common laboratory contaminants. SED-2 and SED-3 were sampled again in September, 1998. The tests did not detect any VOCs in these samples. The metal analysis for SED-1 to SED-4 all reported detected metals below their respective NYSDEC guidelines.

Surface Water

Four surface water samples were collected from locations shown in **Figure 12**. The samples were analyzed for VOCs and metals. The salient readings were 7 ppb of TCE and 7.1 ppb of cis 1,2-DCE at SW-4, which are

above the 5 ppb guideline for TCE and cis 1,2-DCE. All metal results were below their respective NYSDEC guidelines except for copper at 289 ppb and lead at 223 ppb at SW-2, which is upstream of the Site. The New York State surface water standards for copper and lead are 200 and 50 ppb respectively.

4.2 Interim Remedial Measures:

Interim Remedial Measures (IRMs) are conducted at sites when a source of contamination or exposure pathway can effectively be addressed before completion of the RI/FS.

During the RI, a fractured clay pipe was discovered outside the south wall of the Main Building (**Fig. 4**) The bedding soil under and along this pipe was found to be highly contaminated with TCE. One sample (TP-77) of sludge inside the pipe registered 35,000 ppm of TCE, and another sample of soil (TP-85(2ft)) registered 3,900 ppm. From November, 27, through December 1, 1995, an IRM was undertaken to remove an estimated 93 cubic yards of this contaminated soil. Tight working space and structural safety considerations limited the quantity of soil that could be excavated. The maximum residual TCE concentration at the bottom of the excavation and the sides away from the building is estimated to be less than 2 ppm. However, the residual concentration under the building is uncertain. Complete details of this IRM is contained in "*Report on November 1995 Soil Removal Program*", January 1996.

4.3 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present health risks to persons at or around the Site. A more detailed discussion of potential health risks can be found in Section 7.0 of the RI Report.

An exposure pathway is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Potential exposures were evaluated for facility employees, nearby residents, and construction workers from contaminants in groundwater, soil, and soil vapor. The following discussion addresses the exposure pathways present at the Site. Due to the low or non-detectable concentrations of contaminants identified in surface water and sediments, exposure pathways were not evaluated for these media.

- Inhalation

Inhalation of indoor contaminant vapors presents a possible exposure pathway. TCE present in soil and groundwater may volatilize into soil gases and, consequently, enter buildings through foundation cracks or openings. TCE and other chlorinated VOCs have resulted in soil vapor problems at sites where significant concentrations were present in subsurface soils. As discussed in Section 4.2 above, the heaviest concentrations of TCE in soils at the Chromalloy site (discovered along the southwest corner of the Main Building) were removed during the 1995 IRM and replaced with clean fill. A limited area within three feet of the building could not be excavated during the 1995 interim measure because of concerns of undermining the building's structural integrity. Data indicate that residual concentrations of TCE remain in these soils at concentrations which could result in contaminated soil vapors beneath the on-site building.

Vapors from TCE in groundwater may also travel through soil pores above the water table. This usually requires significant contamination at the water table surface such as that often encountered immediately below a point source of contamination. Because TCE is more dense (that is, heavier) than water, its tendency is to "sink" into deeper groundwater and therefore does not typically present a soil vapor problem after it enters the water table or at some distance from a source area. Approximately 1,900 to 8,000 ppb of TCE were detected in 1994 within the shallowest groundwater in a localized area along the southern wall of the Main Building (see Figure 7). Similar concentrations may have been present beneath the southwest corner of the building. These concentrations probably decreased since then as a result of the 1995 soil removal IRM; however, residual contamination at the water table surface, if any, could potentially volatilize into soil gas beneath the building.

The predominant driving force for soil vapor entry into a building is pressure gradient. Negative pressure resulting from building exhaust will enhance soil vapor entry; positive indoor air pressures tend to suppress subsurface vapors. Other factors include foundation cracks or joints and utility or other breeches. Building ventilation can help dilute indoor air concentrations of contaminants.

Soil gas samples were collected from a total of 93 subsurface locations in 1991 and 1994. Analytical results from these indicate that contaminant vapors were present in source areas around the Main Building, particularly at the southwestern corner. No contaminants were detected in soil vapors at the northern side of the facility in the direction of the residential dwellings. This suggests that VOC contaminants in soil vapors are most likely attributable to contaminated soils near the facility and possibly with shallow groundwater contamination near the facility. Vapor contaminants do not appear to be associated with contaminated groundwater away from the facility.

In summary, volatilization of vapors into indoor breathing areas remains a possible exposure pathway for employees within the Main Building but is not considered likely for nearby residents.

In addition to indoor air exposures related to soil vapor, disturbance of the subsurface environment during construction-related activities could potentially expose construction workers to VOC vapors. Residual contamination of TCE remains in subsurface soils behind the Main Building. Contamination has also been documented in the upper portion of on-site groundwater although, as noted above, concentrations have probably decreased since the 1995 source removal action. Until the Site has been effectively remediated, it is anticipated that all construction activities in these locations will involve air monitoring and protective measures where necessary to minimize exposures to subsurface contaminants.

- Ingestion and Dermal Contact

The facilities on the Site and the residential dwellings on Pine View Road are supplied with municipal water. The private wells on Pine View Road are no longer used, and the residual contamination in the groundwater in this area is primarily in the deeper aquifer. Other private wells in the immediate vicinity of the Site are either upgradient or side-gradient of the Site. Private wells on the far (west) side of the Hackensack River have not been significantly contaminated with VOCs. This is borne out by several rounds of sampling and analysis of water from wells to the west of the Site (**Fig. 3**). Periodic monitoring of nearby private wells will continue. One well which is about 2000 feet to the west of the Site has consistently contained about 10 ppb of TCE; however, the source of this contamination is unknown.

The extent of the groundwater plume in the direction of the existing private wells will be further delineated under OU-II. The position and magnitude of the plume will also be monitored, as necessary, during and after completion of remedial activities for OU-I and any subsequent remedial activities..

Exposure of facility employees to TCE-contaminated soils at the Site through ingestion or dermal contact is remote. As previously discussed, TCE-contaminated surface soils and accessible subsurface soils were removed in 1995 and replaced with clean fill. The remaining TCE-contaminated soils are subsurface and not presently accessible to facility employees.

Limited data are available relative to site-related to site-related (non-TCE) contamination of surface soils for the Pine View Road area. Two surface soil samples were collected near the southeast corner of the Main Building. These did not appear to contain significant concentrations of contaminants; however, a more thorough investigation should be conducted. The evaluation of surface soil contamination and consequent exposures to facility employees and nearby residents will be completed during OU-II.

The RI considered whether exposure pathways would be created during construction-related activities that could pose risks to construction workers. Potential activities that might lead to such exposures include installation and maintenance of sanitary sewer lines, storm water lines, water mains and basements. Since typical construction activities do not require excavation below 12 feet, it is highly unlikely that construction workers would be exposed to contamination in the lower portion of the groundwater. However, it is possible that disturbance of the subsurface environment could expose construction workers to the upper portion of the groundwater. Additionally, residual concentrations of TCE remain in subsurface soil. Inadvertent ingestion of soil particles and groundwater droplets during such activities is possible but not expected to result in significant exposures. The risk of dermal contact with contaminants during such activities is also expected to be low. As previously noted, until the Site has been effectively remediated, it is anticipated that all construction activities in contaminated locations will involve air monitoring and protective measures where necessary to minimize exposures to subsurface contaminants.

4.4 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by the Site. The Fish and Wildlife Impact Assessment included in the RI presents a more detailed discussion of the potential impacts from the Site to fish and wildlife resources. The following pathways for environmental exposure have been identified:

The wetlands surrounding the study area constitute an important ecosystem. Contaminants in surface water and sediment could potentially affect this ecosystem. Sampling results for surface water have been compared to standards for aquatic life and wildlife as set forth in the Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations guidance document dated June 1998. Sampling results for sediments have been compared to standards for benthic aquatic life and wildlife as set forth in the Technical Guidance for Screening Contaminated Sediment document dated March 1998. Comparing the sampling results to their applicable standard resulted in no surface water constituent appearing at levels greater than regulatory guidelines, nor any sediment constituent appearing at levels greater than regulatory guidelines. Based on these results, there appears to be little, if any, impact on fish and wildlife resources in and around the Site.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The Potential Responsible Parties (PRP) for the Site include: Former Chromalloy (SEQUA), which is presently known as the Chromalloy Gas Turbine Corporation.

The following is the chronological enforcement history of this Site.

Orders on Consent

Date	Index	Subject
Aug.29,1989	W3-0080-87-01	Hydrogeology
Feb.14, 1994	W3-0080-87-01	RI/FS

The NYSDEC and the Chromalloy Gas Turbine Corporation entered into a Consent Order February, 1994 (superseding the 1989 Order on Consent). The Order obligates the responsible parties to undertake an RI/FS. Upon issuance of the Record of Decision the NYSDEC will approach the PRPs to implement the selected remedy under a separate Order on Consent.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria and Guidance (SCGs) and be protective of human health and the environment. At a minimum, the remedy selected should eliminate or mitigate all significant threats to public health and/or the environment presented by the material released at the Site through the proper application of scientific and engineering principles.

The goals selected for OU-I for this Site are:

- *Reduce, control, or eliminate, to the extent practicable, the contamination present within the soils on site.*
- *Eliminate, to the extent practicable, ingestion of groundwater affected by the Site that does not attain NYSDEC Class GA Ambient Water Quality Criteria.*
- *Eliminate, to the extent practicable, off-site migration of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Criteria.*
- *Eliminate, to the extent practicable, exposures to TCE.*

- *Eliminate, to the extent practicable, the migration of TCE into the Hackensack River and its tributaries.*

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy for OU-I should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Site were identified, screened and evaluated in the report entitled, "*Feasibility Study Former Chromalloy RI/FS Report*", December 4; 1998.

The primary constituents of concern identified for the Site and associated Study Area are TCE and its associated degradation byproducts cis-1,2-DCE and trans-1,2-DCE. These VOC constituents have been detected at concentrations exceeding NYSDEC clean-up standards. The environmental media impacted are:

- Soils to the south, southwest and under the Main Building;
- The shallow aquifer in the area to the southwest of the Main Building;
- The deep aquifer on and off site.

In order to address the identified impacted areas, the following three remedial alternatives were retained for further analysis.

Alternative 1 - No Action
Alternative 2 - A Groundwater Recovery and Treatment System and a Dual Phase Extraction System

A summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction, or to negotiate with responsible parties for implementation of the remedy.

7.1: Description of Alternatives

The potential remedies are intended to address the contaminated residual soils under the Main Building, the soils to its south and southwest, the shallow aquifer to the south and southwest of the Main Building building, and the deeper aquifer on and off site.

Alternative 1. No Action

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative would leave the Site in its present condition and would not provide any additional protection to human health or the environment.

Alternative 2. Groundwater Recovery and Treatment System and Dual Phase Extraction System

This alternative would have two systems :
1) The groundwater recovery and treatment system would remove contamination from the bedrock aquifer. One extraction well would be installed at a location approximately shown in **Figure 13**. The exact location will be determined during the detailed remedial design. The operation of the pump at the specified flow rate would create a radius of influence (area where groundwater is withdrawn). The groundwater captured within this radius would then be pumped through a treatment system consisting of a stripping tower and vessels containing granular activated carbon.

The stripping tower treats the impacted groundwater by exposure to air, which would volatilize the VOCs dissolved in the groundwater as the water passes downwards through packing material. At the same time, air would be forced upwards through the tower via a air blower. The water exiting from the stripping tower would be pumped through vessels containing granular activated carbon to remove any remaining VOCs. The water exiting from the carbon vessels would have to comply with the technically substantive requirements of the State Pollution Discharge Elimination System (SPDES) regulations, which prescribe pollutant discharge limitations, frequency of testing, and reporting of analytical results. Neither a hearing nor a permit is required for this discharge, since the work would be performed pursuant to an order on consent.

Conceptually, an 8 inch diameter well would be drilled 100 to 120 feet into the bedrock. Computer modeling presented in the FS report indicates that, at a rate of 75 gallons per minute (gpm) recovery, a capture zone encompassing MW-9B and residential well No. 25 would be created within five years. A second extraction well would be brought in line if the established goals of cleanup are not met, or if the recovery rate is insufficient at the first well.

The costs for this system are as follows:

Construction:	$310,000
Annual Operation & Maintenance:	$150,000
Present Worth:	$2,300,000
Time to construct:	9 months
Operation & Maintenance Duration:	30 years

2) The dual phase extraction system would focus on the high VOC concentration area at the southwest portion of the Main Building. Dual phase extraction has the ability to remove the contaminated groundwater from the upper aquifer system and lower the water table sufficiently to create and, thereby, expose a greater expanse of vadose (unsaturated soil) zone to the soil vapor extraction process for removal of any residual contamination (**Fig. 14**). Conceptually the design envisages 15 dual phase extraction points with a total vapor phase flow of approximately 135 standard cubic feet per minute (scfm) and the total groundwater evacuated at 3 gpm.

The dual phase process equipment would be configured to separate the liquid and air streams for treatment and discharge separately. Groundwater that enters an extraction well would be lifted by means of a high vacuum to a separation tank. Once the groundwater is removed from the extraction point, soil vapor would similarly be extracted from the extraction point, removing the adsorbed VOCs from the surrounding soil. The extracted

water would then be pumped from the separation tank for treatment to the meet allowable contaminant discharge limits. The extracted soil vapor will be treated by either catalytic oxidation or vapor phase activated carbon prior to discharge to atmosphere.

The costs for this system are as follows:

Construction:	$180,000
Annual Operation & Maintenance:	$100,000
Present Worth:	$433,000
Time to construct:	9 months
Operation & Maintenance Duration:	5 years

7.2 Evaluation of Remedial Alternatives

The criteria against which potential remedial alternatives are weighed are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each of the criteria, a brief description is provided, followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation against the criteria and comparative analysis is included in the Feasibility Study Report.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

Alternative 1 "No Action" would not be capable of achieving the clean-up of TCE in the groundwater system or in the soils to SCG Standards in a reasonable time frame, as can be projected from **Table 3**.

Alternative 2 uses proven technologies which under certain conditions would meet the SCG for TCE of 5 ppb in groundwater. The physical conditions of the lower and upper groundwater system and the nature of TCE may not be conducive for achieving the 5 ppb SCG and thus may be impractical. This is based on the uncertainty of groundwater flow in the fractured bedrock and the relatively impermeable nature of clay in the overburden soil. TCE concentrations may possibly stabilize at a concentration range above the 5 ppb SCG even under continued operation of Alternative 2.

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

To the extent that Alternatives 2 would reduce the acute levels of contaminants in the groundwater and the vapors in the pores of the soil more expeditiously than Alternative 1, they would provide greater protection of Human Health and the Environment. A groundwater use restriction would be placed in the title deed until groundwater quality at the Site meet the SCGs.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The

length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Of the two alternatives proposed for the Site, no adverse impacts would be anticipated by their implementation to the community, the workers, or the environment. Alternatives 2 would require the drilling of wells and the construction of a treatment compound. The drilling and construction may cause an inconvenience to some of the local businesses located at the Site due to limited access to areas over short periods of time. However, proper planning and negotiations would prevent any hardships for the local businesses. Additionally, a program of air monitoring during construction activities would be implemented that would ensure that the public is protected from inadvertent exposure to site-related contaminants. Monitoring of any of the remedial alternatives implemented would require access to wells (existing) and may be seen as a necessary accommodation.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 1 would not actively remove any contaminants from the groundwater or soil and its effectiveness would rely on natural attenuation which for the Site is not appreciable. Alternative 2 would remove the contaminants from the groundwater and the soils permanently and, therefore, is increasingly effective as additional contaminants are removed over the period of its operation. The use of carbon as a final stage of treatment for TCE by this alternative would result in the generation of residual waste to be treated. However, spent carbon is easily treated and may be recycled.

Water discharged by the process equipment after treatment to the local surface water would be monitored on a monthly basis to demonstrate compliance with pollutant discharge limitations in accordance with the technically substantive requirements of the SPDES regulations.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the Site.

Alternative 2 would have an immediate effect on reducing the toxicity, mobility, and volume of the TCE by removing the TCE mass from the high concentration areas of the groundwater system. The TCE toxicity and volume would be reduced as a result of the removal of TCE from the groundwater system by this alternative. The mobility of TCE would also be controlled by this alternative because of the capture zones that the alternative creates.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc.

The technical feasibility of implementation of construction and monitoring the effects of Alternative 2 would be good. As stated previously, this alternative uses proven technologies that have been implemented at other

locations with similar concerns and physical characteristics. Construction of the process systems would be considered standard with recent innovative technologies used to streamline the processes for improved performance. Assembly of the process equipment and construction of the treatment facility for the alternatives can be done as a standard construction task. The evaluation program for determination of the alternatives, effectiveness would be easily implemented by collecting representative samples of the impacted media from selected locations (e.g. monitoring or residential wells) and monitoring the alternative's process effluent.

Administrative feasibility of implementing the pump and treat and dual phase system of Alternative 2 (including operation and maintenance) can be easily done, if the alternative is accepted by the impacted community, and has been operated successfully at other locations. The only potential problems that may arise with implementing the alternative would be gaining access for a portion of the Site property from the current owner to be used for construction of the treatment compound. Additionally, the location at which treated effluent water would be discharged would need to be negotiated based on acceptable discharge standards and property access to construct the effluent pipeline to the selected surface water discharge location.

Alternative 1 is technically feasible to implement because it would only require sampling to periodically evaluate the TCE concentrations. Administrative feasibility of implementing Alternative 1 would be easily done, since it would not require a great deal of labor or materials.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in **Table 4**.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan are evaluated. The "Responsiveness Summary" included as Appendix C presents the public comments received and the Department's response to the concerns raised.

The majority of the comments received so far fall into two major categories.

Those from the impacted homeowners seek more investigation off site to establish the added risk that any site-related contaminants, including TCE, may pose.

Those from SEQUA object to any language in the PRAP and the ROD that may be used to infer a direct connection between the contaminations on and off site, or to hold SEQUA responsible for the contamination on or off site.

None of the of comments received diminishes the urgency with which this Operable Unit should be implemented.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

The selected remedy for this Operable Unit I is specifically designed to remediate the predominant concentration of TCE in the groundwater. The contamination in the soil remaining after the December 1995 IRM was completed is mostly under the Main Building. Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC has selected Alternative 2. The intent of Alternative 2 is to recover and treat groundwater in the lower zone throughout the contaminated area, with a dual phase extraction of fluids and vapors to recover the contaminants from the upper groundwater zone at the Site. The selected alternative is compatible with the characteristics of the soils and the bedrock at the Site.

The estimated present worth cost to implement the remedy is $2,733,000. The cost to construct the remedy is $490,000, and the estimated average annual operation and maintenance cost for up to 30 years is $250,000.

The elements of the selected remedy are as follows:

1. **A remedial design program** to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any outstanding items identified during the RI/FS will be resolved.

2. **A groundwater recovery and treatment system** to address the impacted lower portion of the groundwater system. The pumping well will be located in the area of the highest concentration of VOC contamination, or at a location to be determined during the remedial design stage. The system design is based on the pump test data and subsequent groundwater model constructed for the study area.

3. **A dual phase extraction system** will be implemented to address the upper portion of the groundwater system and residual soil contamination in the area identified to have adsorbed phase soil contamination in excess of NYSDEC soil guidelines. A full-scale system will be designed in the remedial design program based upon pilot test results and the current database for the soil and groundwater quality. Indoor air quality will be also be considered as a performance measure during the design.

4. **Year-by-year cleanup goals** for wells MW-1B, MW-4B, MW-11B and MW-12B (**Table 5**). Should the annual maximum concentrations at any of these wells exceed the cleanup goals by 20% for three consecutive years additional measures will be implemented. This will include the addition of one or more recovery wells or dual phase extraction points.

5. **A groundwater monitoring program** that will include the four wells listed above. The monitoring program will be an integral component of the operation and maintenance for the Site.

6. **Groundwater use restriction** to be placed in the title deed until groundwater quality at the Site and the impacted properties meet the SCGs.

7. **A monitoring program of nearby private wells** still in use to assess impacts, if any, from site-related contaminants.

8. **Further delineation of the contamination** in the off-site groundwater under OU-II.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the Site and the potential remedial alternatives. The following public participation activities were conducted for the Site:

- A repository for documents pertaining to the Site was established.
- A site mailing list was established which included nearby property owners, local political officials local media and other interested parties.
- In November 1995, a Fact Sheet was distributed to announce completion of initial phase of RI/FS and the development of plan to conduct an IRM to remove highly contaminated soil south of the main building.
- In October 1994, a Fact sheet announcing the commencement of the RI/FS was distributed .
- In March 1999, the PRAP was released to the public, a public meeting was held to describe the PRAP and receive comments, and a Responsiveness Summary, addressing the comments received during the comment period for the PRAP, was prepared and made available to the public.

Table 1
Nature and Extent of Contamination

MEDIA	CONTAMINANT OF CONCERN	CONCENTRATION RANGE	FREQUENCY of EXCEEDING SCGs	SCG
Groundwate (conc. in ppb)	Trichloroethylene	ND to 160,000	43 of 62	5
	Perchloroethylene	ND to 130	15 of 62	5
	cis 1,2 Dichloroethene	ND to 8,000	20 of 62	5
	trans 1,2 Dichloroethene	ND to 220	18 of 62	5
Soils (conc. in ppm)	Trichloroethylene	ND to 35, 000	21 of 97	0.7
	Perchloroethylene	ND to 58	6 of 97	1.2
	cis 1,2-Dichloroethene	ND to 61	23 of 97	0.3
	trans 1,2-Dichloroethene	ND to 5.6	2 of 97	0.3

Note:

- ND denotes not detected
- For location of maximum groundwater contamination see Fig.7
- For location of maximum soil contamination see Fig 4
- The number of samples are made up of:

  Water

  28 from monitoring and abandoned private wells collected in June 98
  30 from geoprobe survey
  3 from soil borings
  1 from trench

  Soil

  57 from geoprobe survey
  19 from soil borings
  21 from trenching

TABLE 2

OFF-SITE LABORATORY SOIL DATA SUMMARY: METALS

Former Chromalloy Site RI/FS

PARAMETER	G9S (6.0-6.5 ft)	G13S (13.0-13.5 ft)	G15S (2.5-3.0 ft)	G24S (3-4 ft)	G26S (30 in.)	FIELD BLANK (µg/l)	EASTERN USA BACKGROUND SOIL CONCENTRATIONS (b)	RECOMMENDED SOIL CLEANUP OBJECTIVE (b)
TAL METALS (mg/kg)								
Aluminum	6,950	4,460	5,190	17,000	18,600	44.7 B	33,000	SB
Antimony	ND	ND	ND	0.98 B	0.81 B	ND	N/A	SB
Arsenic	4.1	2.9	2.0	5.2	4.2	1.6 B	3.0 - 12.0 æ	7.5 or SB
Barium	59.3	113	46.5	86.6	66.4	ND	15 - 600	300 or SB
Beryllium	0.55 B	0.36 B	0.10 B	0.61 B	0.64 B	ND	0 - 1.75	0.16 or SB
Cadmium	ND	0.78 B	ND	ND	ND	ND	0.1 - 1.0	1 or SB
Calcium	1,570	1,250	2,740	1,990	1,340	239 B	130 - 35,000 æ	SB
Chromium	10.8	6.8	19.6	52.3	29.6	0.98 B	1.5 - 40.0 æ	10 or SB
Cobalt	5.8 B	12.0	13.8	29.8	9.9	ND	2.5 - 60.0 æ	30 or SB
Copper	13.1	33.3	73.0	29.3	18.1	ND	1.0 - 50.0	25 or SB
Iron	8,460	6,830	12,400	19,700	19,700	168	2,000 - 550,000	2,000 or SB
Lead	4.7 E	5.1 E	11.3 E	12.8	7.4	ND	4.0 - 61	SB
Magnesium	4,100	1,810	3,200	5,490	6,420	ND	100 - 5,000	SB
Manganese	355	2,380	262	323	285	2.6 B	50 - 5,000	SB
Mercury	0.06 B	ND	0.48	ND	ND	ND	0.001 - 0.2	0.1
Nickel	12.9 E	107 E	27.7 E	20.9	19.4	31.5 B	0.5 - 25	13 or SB
Potassium	804 E	680 B E	1,070 E	1,030 B E	986 E	ND	8,500 - 43,000 æ	SB
Selenium	ND	ND	1.3	1.2	1.8	ND	0.1 - 3.9	2 or SB
Silver	ND	ND	ND	ND	ND	ND	N/A	SB
Sodium	70.3 B	110 B	253 B	ND	ND	ND	6,000 - 8,000	SB
Thallium	0.56 B	ND	0.50 B	ND	0.84 B	ND	N/A	SB
Vanadium	14.1	10.9 B	24.2	31.2	36.9	ND	1.0 - 300	150 or SB
Zinc	31.4	19.6	42.1	69.1	59.0	2.9 B	9.0 - 50	20 or SB

æ - New York State background concentration.
(b) - NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM), 1/94.
B - Value is less than the contract-required detection limit but greater than the instrument detection limit.
E - Value estimated due to interference.
ND - Not detected at analytical detection limit.
SB - Site background.
N/A - Not available.

TABLE 3

TCE CONCENTRATIONS
PINE VIEW ROAD RESIDENTIAL WELLS
(µg/L)

Pine View Rd. Well #	Date						
	8/78	9/78	11/79	10/84	6/87	91	7/97
#8	*65,000	*32,000	*46,000	NS	NS	*54,000	NS
#9	NS	NS	NS	NS	NS	NS	NS
#10	1,650	5,000	NS	NS	1,360	14,000	1,100
#11	1,100	7,000	NS	NS	NS	NS	NS
#12	3,000	10,000	NS	NS	NS	NS	33,000
#15	*12,000	*25,000	NS	NS	NS	NS	NS
#16	NS	*3,000	NS	NS	NS	NS	17,000
#20	220	920	NS	NS	NS	NS	170
#24	10,000	6,800	NS	NS	NS	NS	NS
#25	18,000	*20,000	NS	NS	NS	NS	6,100
#28	20,000	10,400	NS	NS	NS	NS	NS
#29	5,000	3,000	3,420	3,100	3,370	NS	NS
#32	*17,000	*20,000	*8,400	NS	NS	NS	NS
#35	17,000	8,400	NS	NS	NS	NS	17,000
#36	15,000	*15,000	*7,000	NS	NS	NS	10,000
#40	9,000	2,200	NS	NS	NS	NS	NS
#41	7,000	2,400	*4,000	NS	NS	NS	13,000

NS: Not sampled or report not identified.

* Data provided by NYSDEC in a letter to Alliance dated February 4, 1998.

Table 4
Remedial Alternative Costs

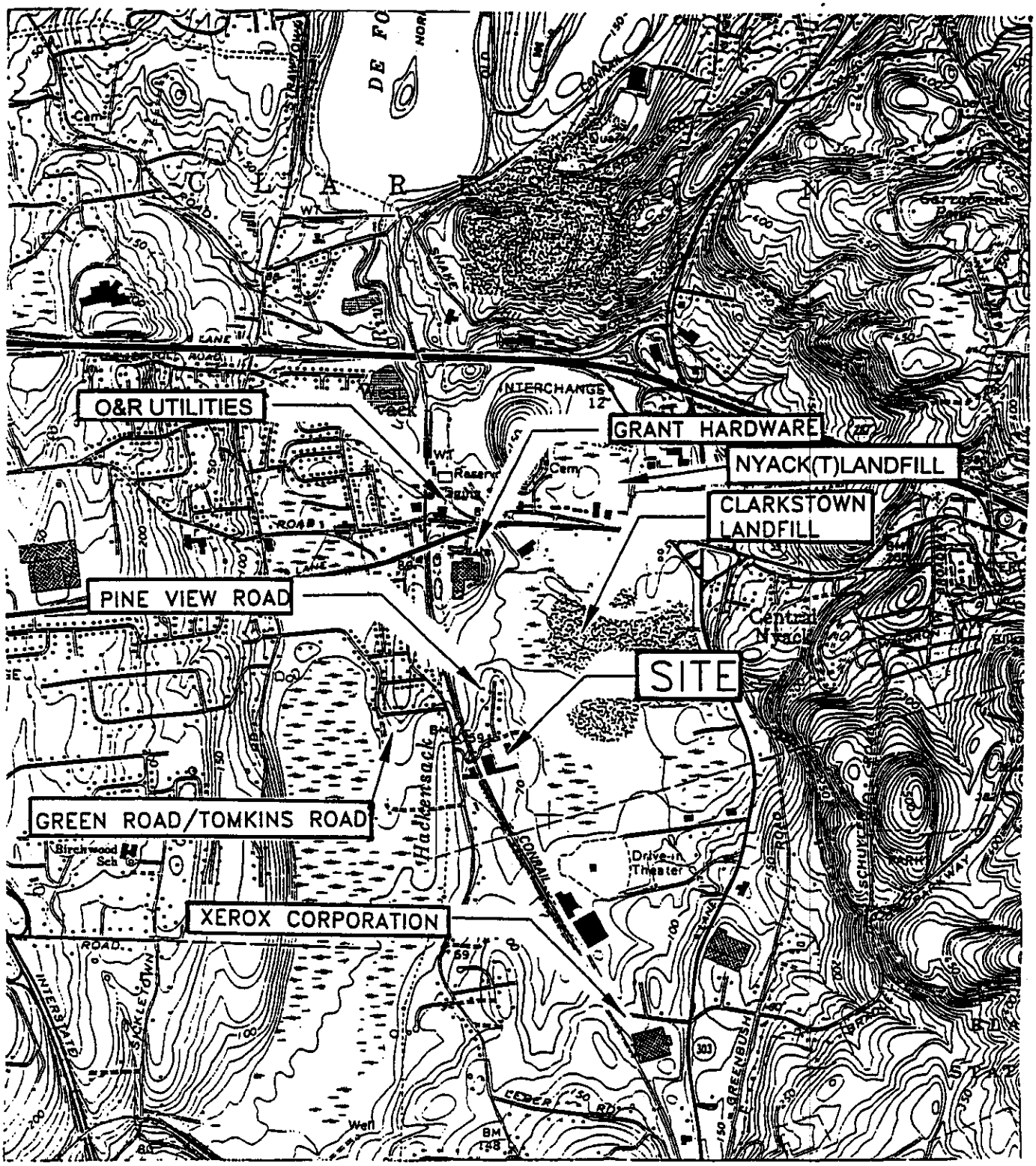
Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
Alternative 1: No Action	$0	$0	$0
Alternative 2: Groundwater Recovery & Treatment & Dual Phase Extraction	$490,000	$250,000	$2,733,000

TABLE 5

YEAR-BY-YEAR TRICHLOROETHENE CLEANUP GOALS

(parts per billion)

Elapsed Time (Years)	Monitoring Well			
	MW-1B	MW-4B	MW-11B	MW-12B
0	49100	8100	28600	10000
1	36142	6331	21435	7762
2	26604	4949	16065	6025
3	19583	3868	12040	4676
4	14415	3024	9024	3630
5	10610	2364	6763	2817
6	7810	1847	5069	2187
7	5749	1444	3799	1697
8	4232	1129	2847	1317
9	3115	882	2134	1023
10	2293	690	1599	794
11	1688	539	1199	616
12	1242	421	898	478
13	914	329	673	371
14	673	257	505	288
15	495	201	378	224
16	365	157	283	174
17	268	123	212	135
18	198	96	159	105
19	145	75	119	81
20	107	59	89	63
21	79	46	67	49
22	58	36	50	38
23	43	28	38	29
24	31	22	28	23
25	23	17	21	18
26	17	13	16	14
27	13	10	12	11
28	9	8	9	8
29	7	6	7	6
30	5	5	5	5



Source: USGS Nyack, N.Y. – N.J. Quadrangle

9/20/97	Environmental Alliance, Inc. 1812 Newport Gap Pike Wilmington, DE 19808
AR	SURROUNDING AREA INVESTIGATIONS FORMER CHROMALLOY FACILITY WEST NYACK, NEW YORK

FIGURE 1

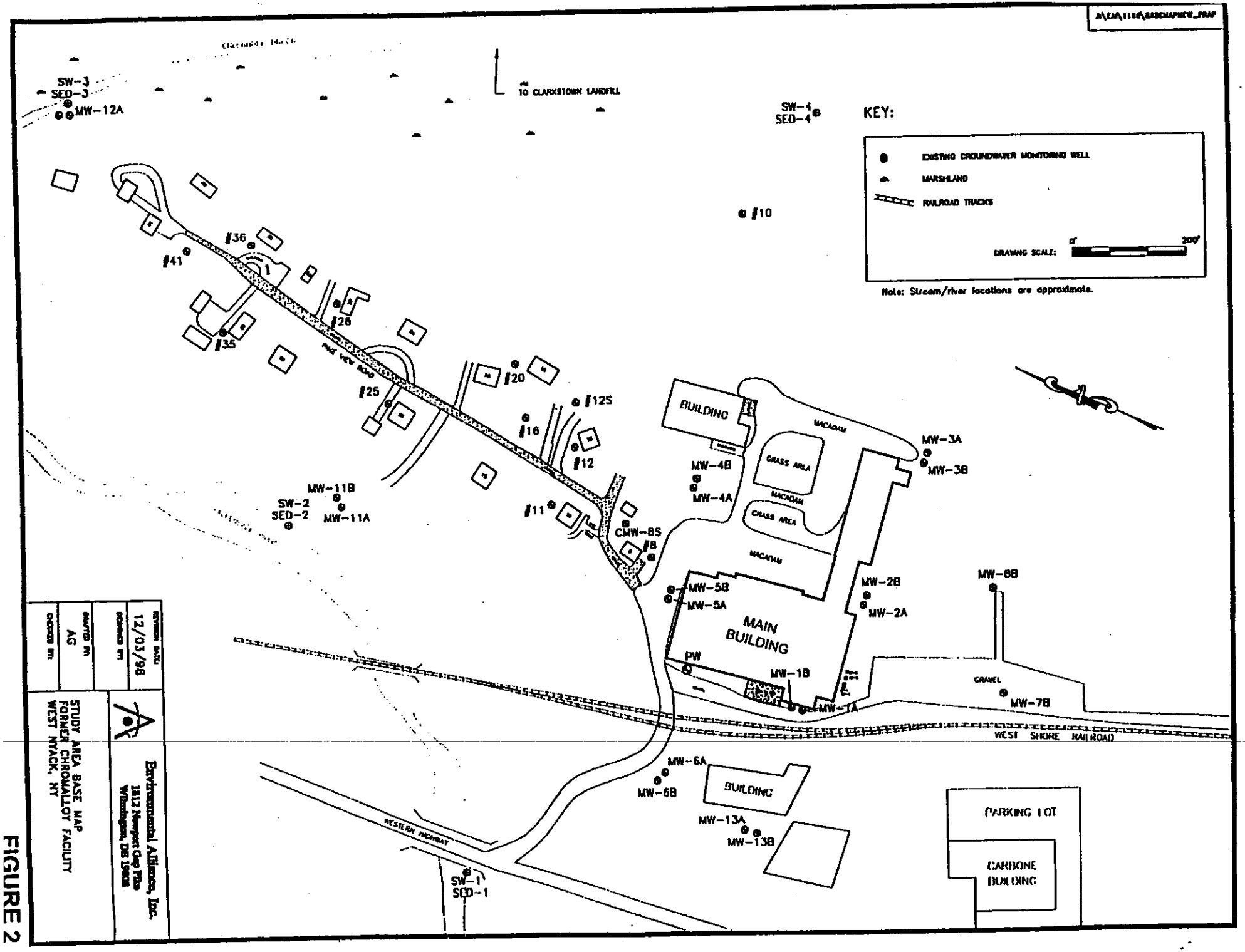
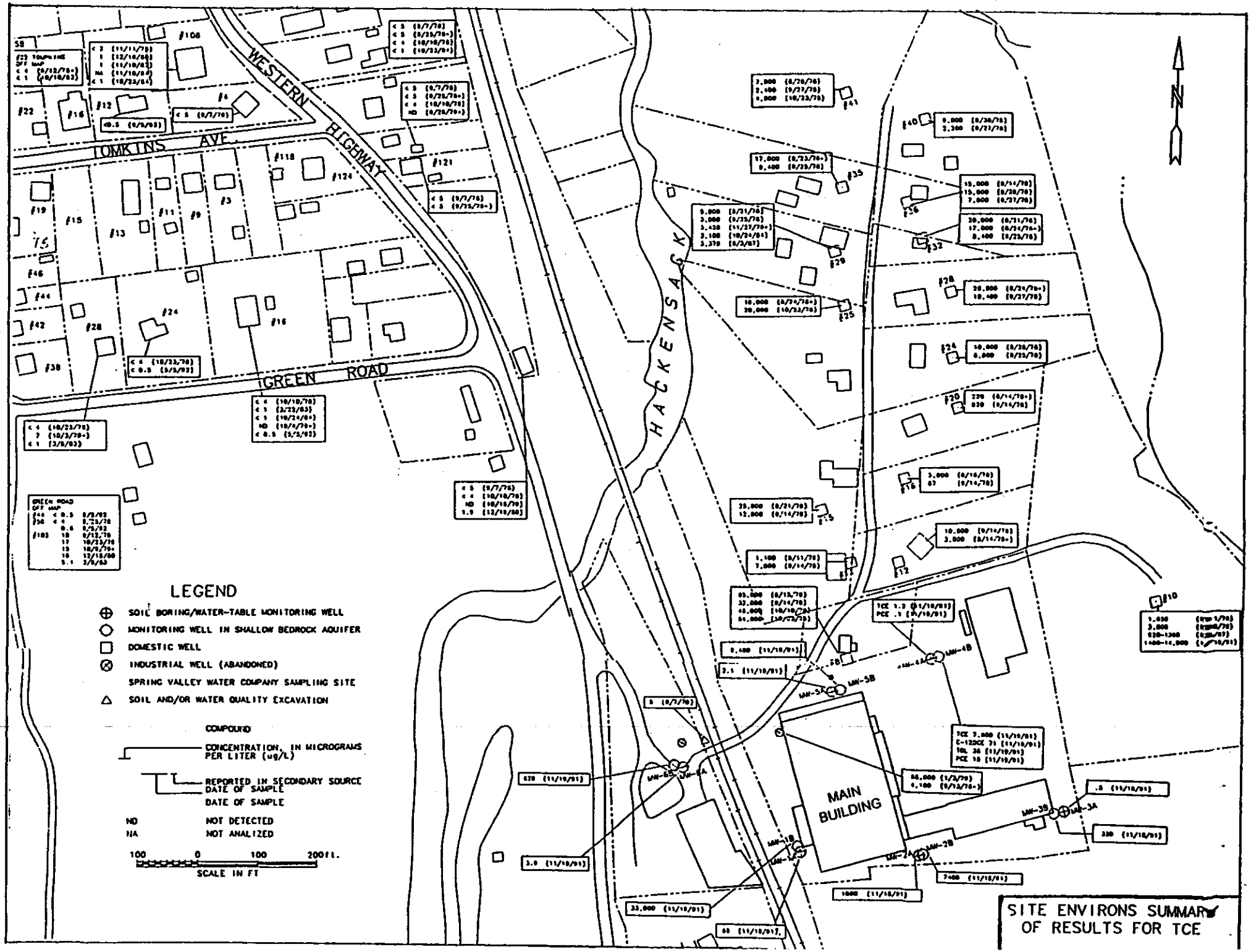
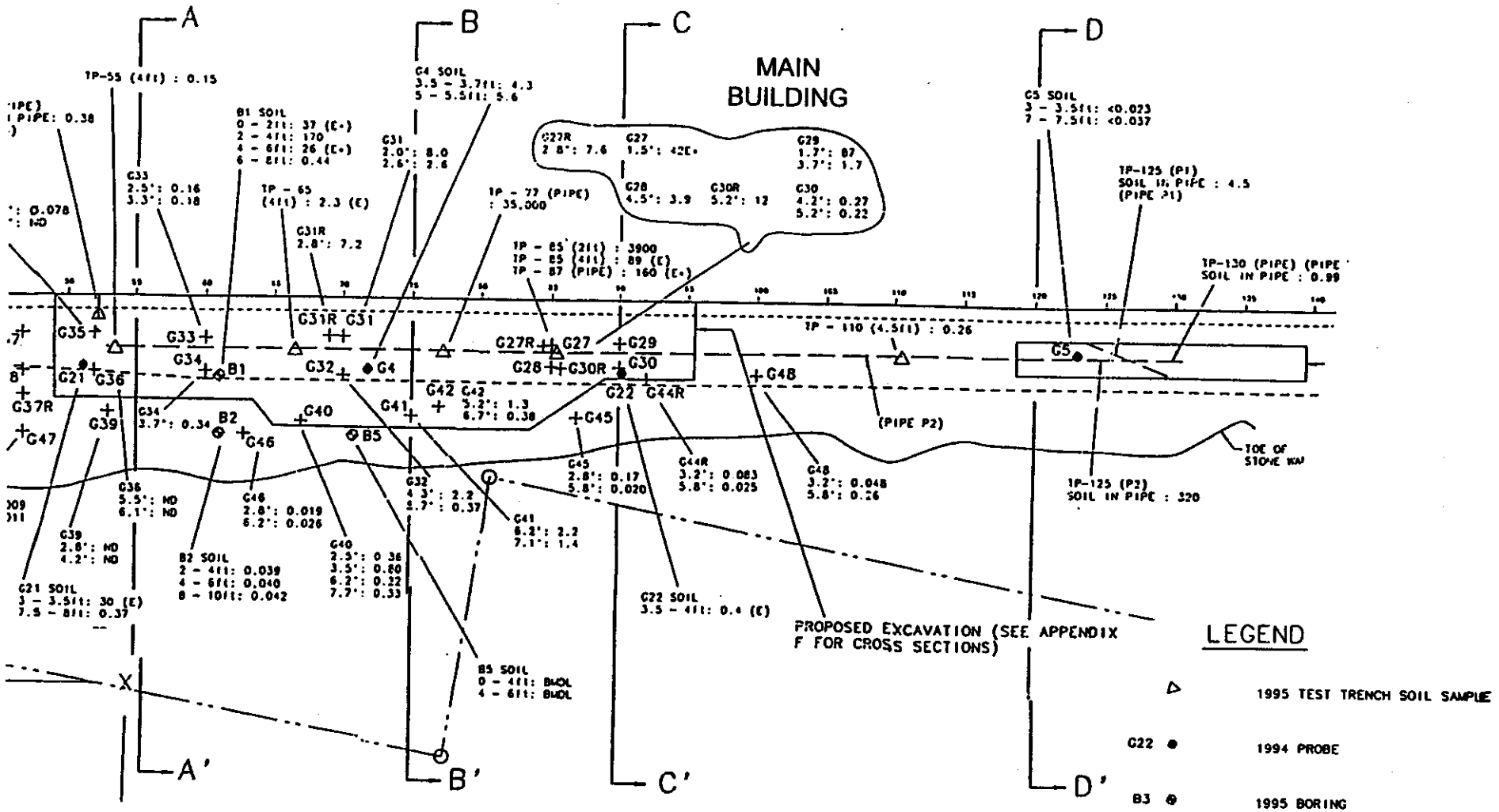

A:\EA\1186\BASEMAP.NEW_PRAP
SW-3
SED-3
MW-12A
TO CLARKSTOWN LANDFILL
SW-4
SED-4
KEY:
EXISTING GROUNDWATER MONITORING WELL
MARSHLAND
RAILROAD TRACKS
DRAWING SCALE: 0' 200'
Note: Stream/river locations are approximate.
#10
#36
#41
#28
#35
PINE VIEW ROAD
#25
#20
#125
#16
#12
#11
BUILDING
MACADAM
GRASS AREA
MACADAM
GRASS AREA
MACADAM
MW-3A
MW-3B
MW-4B
MW-4A
MW-11B
SW-2
SED-2
MW-11A
CMW-8S
#8
MW-5B
MW-5A
MAIN BUILDING
MW-2B
MW-2A
MW-8B
PW
MW-1B
MW-1A
GRAVEL
MW-7B
WEST SHORE RAILROAD
MW-6A
MW-6B
BUILDING
MW-13A
MW-13B
WESTERN HIGHWAY
SW-1
SED-1
PARKING LOT
CARBONE BUILDING
REVISION DATE 12/03/98
DRAWN BY AG
CHECKED BY
Environmental Alliance, Inc.
1812 Newport Gap Pike
Wilmington, DE 19808
STUDY AREA BASE MAP
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

FIGURE 2


WESTERN HIGHWAY
TOMKINS AVE.
GREEN ROAD
HACKENSACK
MAIN BUILDING
N
LEGEND
SOIL BORING/WATER-TABLE MONITORING WELL
MONITORING WELL IN SHALLOW BEDROCK AQUIFER
DOMESTIC WELL
INDUSTRIAL WELL (ABANDONED)
SPRING VALLEY WATER COMPANY SAMPLING SITE
SOIL AND/OR WATER QUALITY EXCAVATION
COMPOUND
CONCENTRATION, IN MICROGRAMS PER LITER (ug/L)
REPORTED IN SECONDARY SOURCE
DATE OF SAMPLE
DATE OF SAMPLE
ND NOT DETECTED
NA NOT ANALIZED
100 0 100 200ft.
SCALE IN FT
SITE ENVIRONS SUMMARY OF RESULTS FOR TCE



SOIL RESULTS IN mg/kg WET WEIGHT EXCEPT FOR PROBES G27 TO G48 WHICH ARE DRY WEIGHT

BMDL or < - DETECTED BELOW QUANTITATION LIMIT
ND - NOT DETECTED
E - BEYOND CALIBRATION RANGE
E• - BEYOND CALIBRATION RANGE BY OVER 2.5 TIMES

ALL TEST TRENCH SAMPLES ARE SOIL, UNLESS OTHERWISE NOTED

5 0 5 10ft.
1" = 5'-0"

BORING, SOIL PROBE, AND TRENCH TCE RESULTS AND PROPOSED EXCAVATION

Chromalloy Gas Turbine Corporation
Former Chromalloy Site

DATE
SEP-10-95

LAWLER, MATUSKY & SKELLY ENGINEERS
Pearl River, New York

FIGURE 4

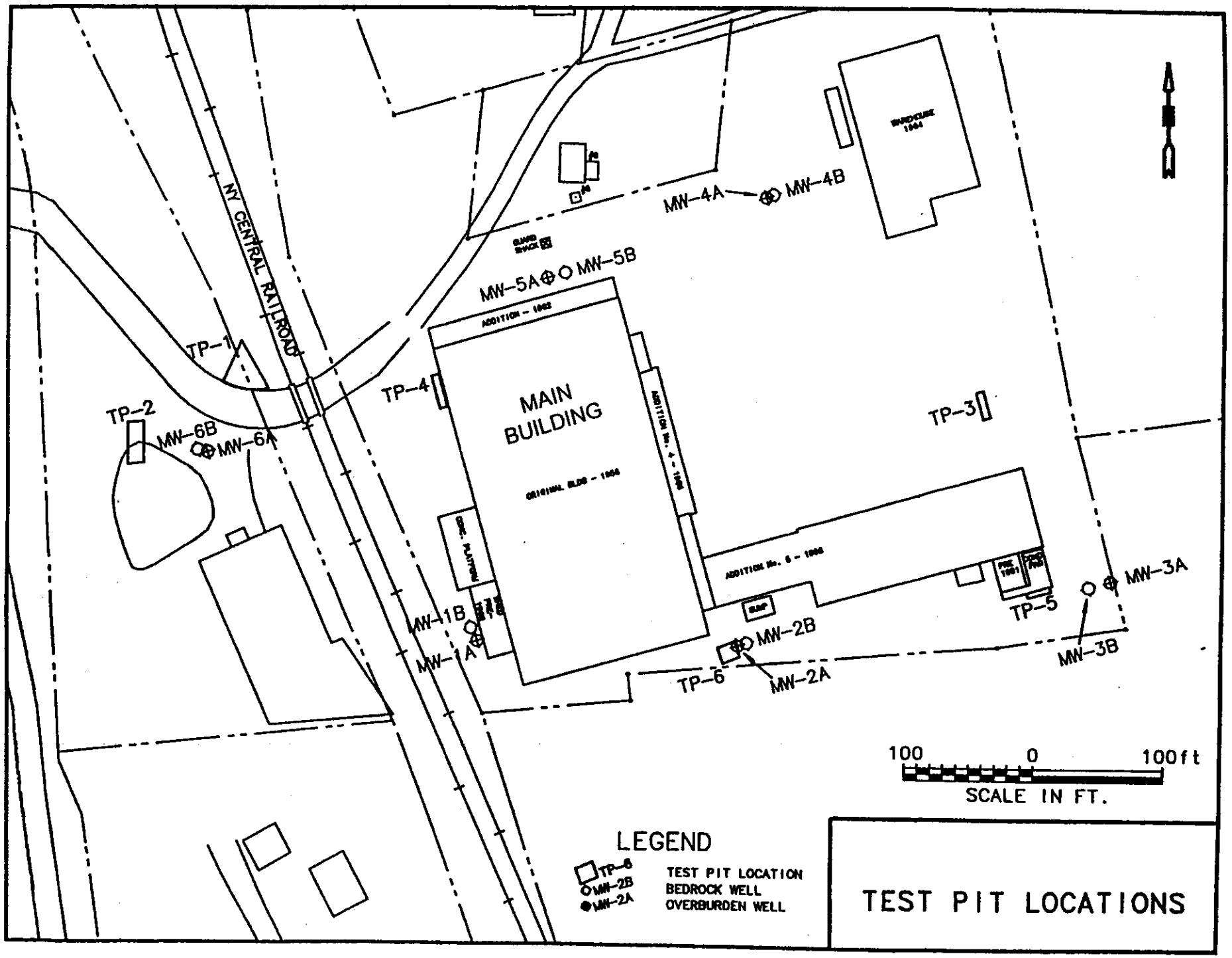

NY CENTRAL RAILROAD
MAIN BUILDING
ADDITION - 1962
ADDITION No. 4 - 1966
ADDITION No. 6 - 1966
ORIGINAL BLDG - 1954
GUARD SHACK
SHED/GARAGE 1944
MW-4A
MW-4B
MW-5A
MW-5B
MW-6B
MW-6A
MW-1B
MW-1A
MW-2B
MW-2A
MW-3A
MW-3B
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
100 0 100ft
SCALE IN FT.
LEGEND
TP-6 TEST PIT LOCATION
MW-2B BEDROCK WELL
MW-2A OVERBURDEN WELL
TEST PIT LOCATIONS

FIGURE 5

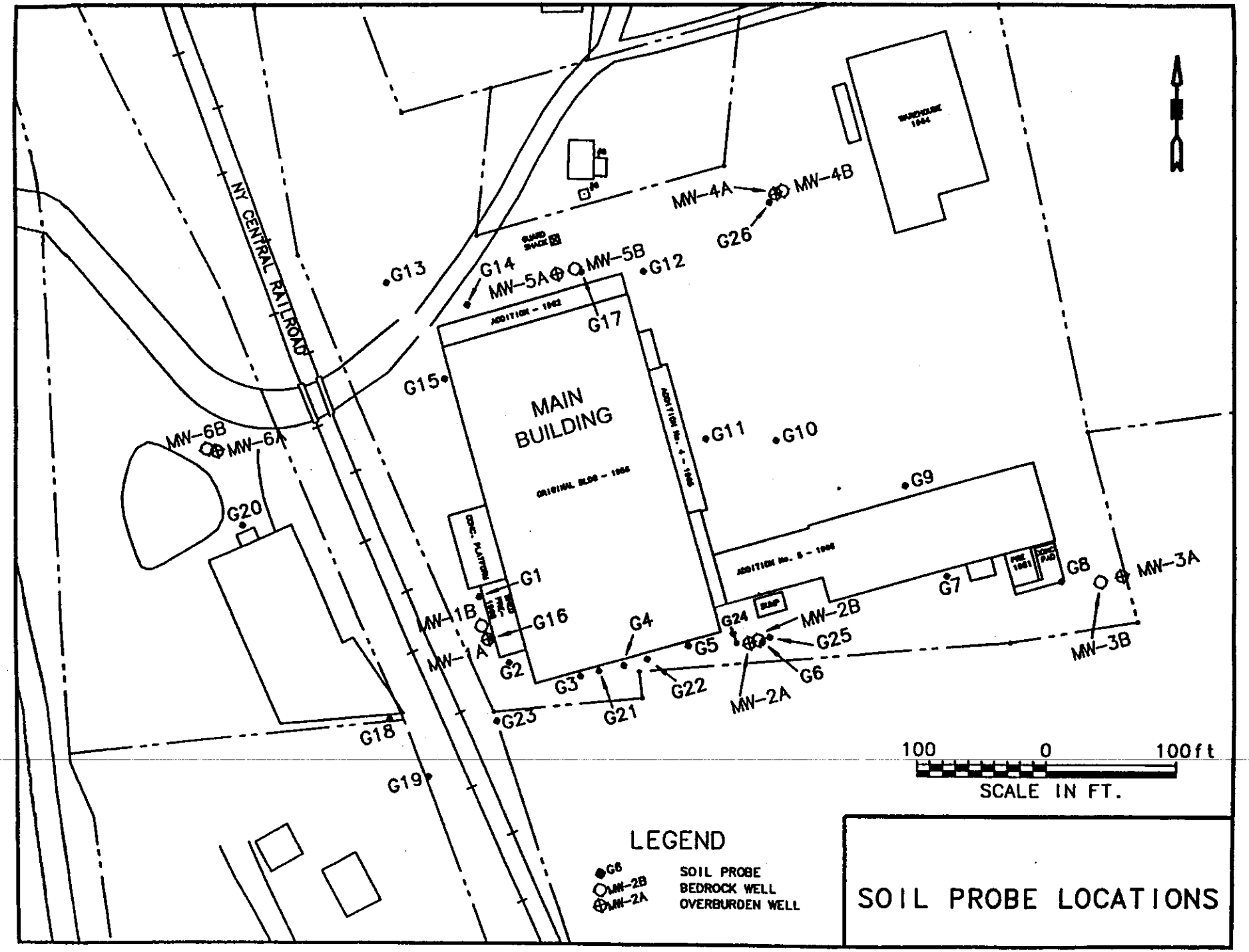

NY CENTRAL RAILROAD
MAIN BUILDING
MW-4A
MW-4B
G26
G13
G14
MW-5A
MW-5B
G12
G17
G15
G11
G10
G9
MW-6B
MW-6A
G20
G1
MW-1B
G16
MW-1A
G2
G4
G5
G24
MW-2B
G25
G6
G3
G22
G21
G23
MW-2A
G7
G8
MW-3A
MW-3B
G18
G19
100 0 100ft
SCALE IN FT.
LEGEND
G6 SOIL PROBE
MW-2B BEDROCK WELL
MW-2A OVERBURDEN WELL
SOIL PROBE LOCATIONS

FIGURE 6

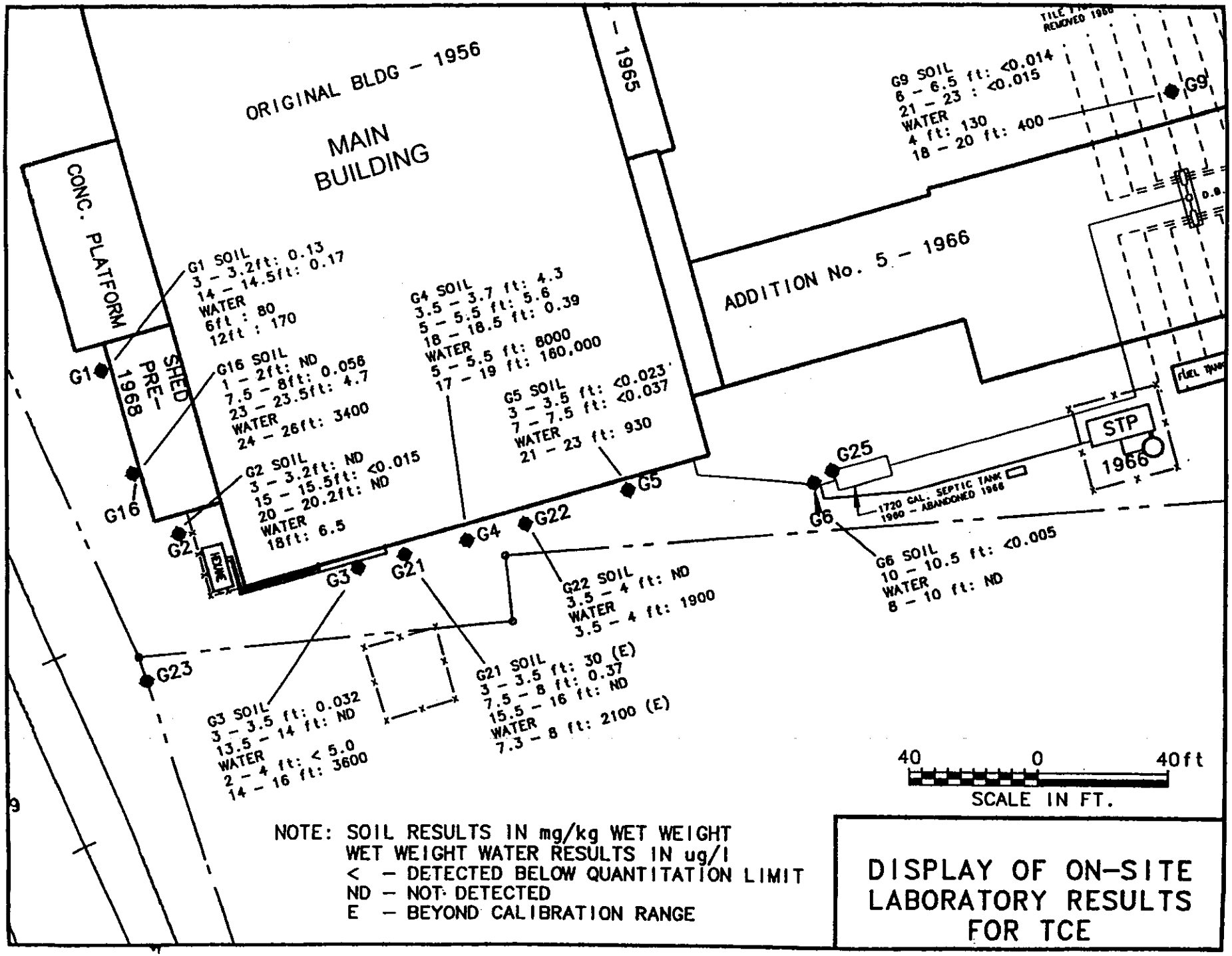

ORIGINAL BLDG – 1956
MAIN BUILDING
1965
ADDITION No. 5 – 1966
CONC. PLATFORM
SHED PRE-1968
TILE FIELD REMOVED 1966
G1 SOIL
3 – 3.2ft: 0.13
14 – 14.5ft: 0.17
WATER
6ft : 80
12ft : 170
G16 SOIL
1 – 2ft: ND
7.5 – 8ft: 0.056
23 – 23.5ft: 4.7
WATER
24 – 26ft: 3400
G2 SOIL
3 – 3.2ft: ND
15 – 15.5ft: <0.015
20 – 20.2ft: ND
WATER
18ft: 6.5
G4 SOIL
3.5 – 3.7 ft: 4.3
5 – 5.5 ft: 5.6
18 – 18.5 ft: 0.39
WATER
5 – 5.5 ft: 8000
17 – 19 ft: 160,000
G5 SOIL
3 – 3.5 ft: <0.023
7 – 7.5 ft: <0.037
WATER
21 – 23 ft: 930
G9 SOIL
6 – 6.5 ft: <0.014
21 – 23 : <0.015
WATER
4 ft: 130
18 – 20 ft: 400
G9
D.O.
FUEL TANK
STP
1966
G25
1720 GAL. SEPTIC TANK
1960 – ABANDONED 1968
G1
G16
G2
G3
G21
G4
G22
G5
G6
G23
G22 SOIL
3.5 – 4 ft: ND
WATER
3.5 – 4 ft: 1900
G6 SOIL
10 – 10.5 ft: <0.005
WATER
8 – 10 ft: ND
G3 SOIL
3 – 3.5 ft: 0.032
13.5 – 14 ft: ND
WATER
2 – 4 ft: < 5.0
14 – 16 ft: 3600
G21 SOIL
3 – 3.5 ft: 30 (E)
7.5 – 8 ft: 0.37
15.5 – 16 ft: ND
WATER
7.3 – 8 ft: 2100 (E)
40 0 40ft
SCALE IN FT.
NOTE: SOIL RESULTS IN mg/kg WET WEIGHT
WET WEIGHT WATER RESULTS IN ug/l
< – DETECTED BELOW QUANTITATION LIMIT
ND – NOT DETECTED
E – BEYOND CALIBRATION RANGE
DISPLAY OF ON-SITE LABORATORY RESULTS FOR TCE

FIGURE 7

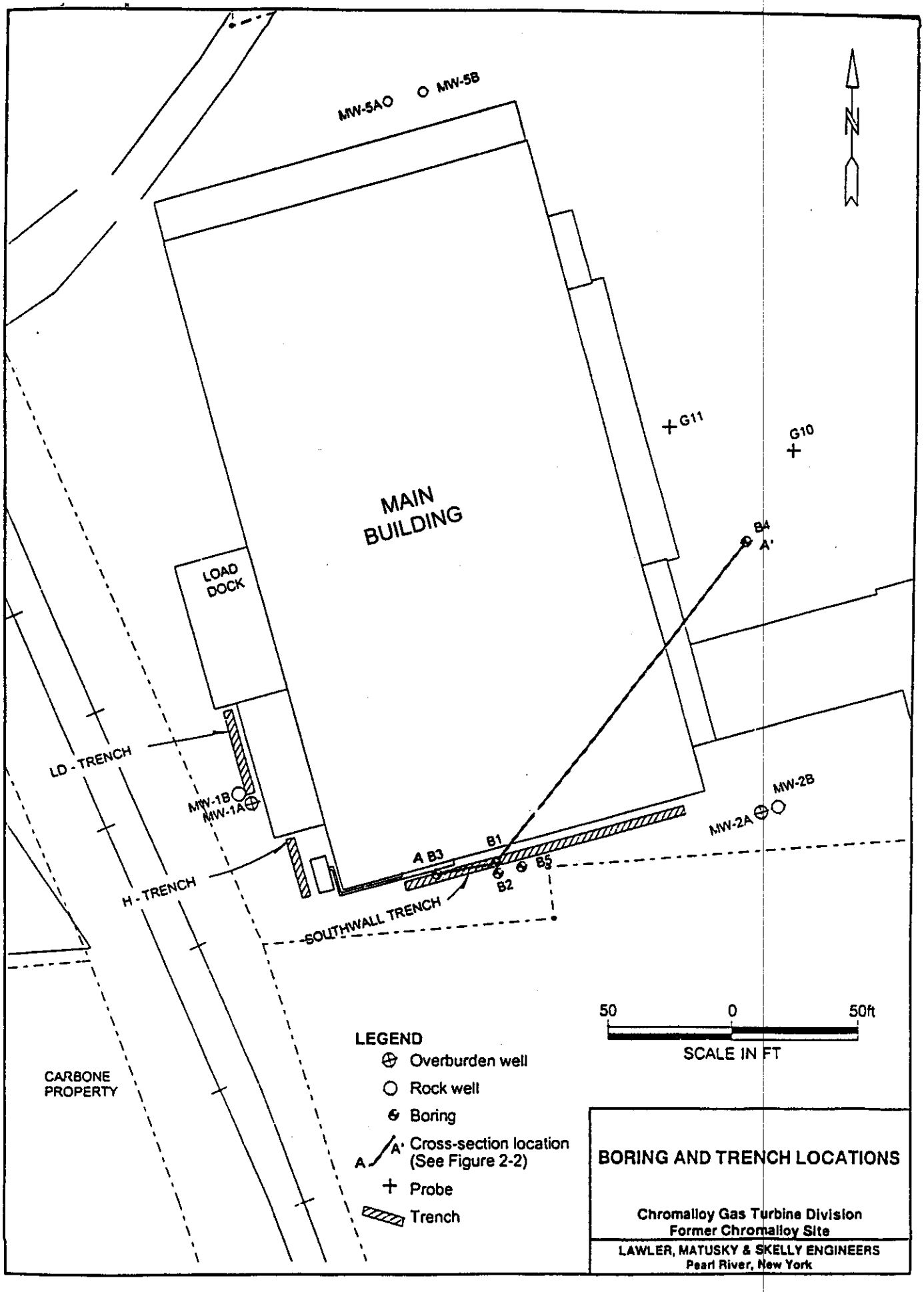

MW-5A
MW-5B
N
MAIN BUILDING
LOAD DOCK
G11
G10
B4
A'
LD - TRENCH
MW-1B
MW-1A
MW-2B
MW-2A
A
B3
B1
B2
B5
H - TRENCH
SOUTHWALL TRENCH
CARBONE PROPERTY
50
0
50ft
SCALE IN FT
LEGEND
Overburden well
Rock well
Boring
A A' Cross-section location (See Figure 2-2)
Probe
Trench
BORING AND TRENCH LOCATIONS
Chromalloy Gas Turbine Division
Former Chromalloy Site
LAWLER, MATUSKY & SKELLY ENGINEERS
Pearl River, New York

FIGURE 8

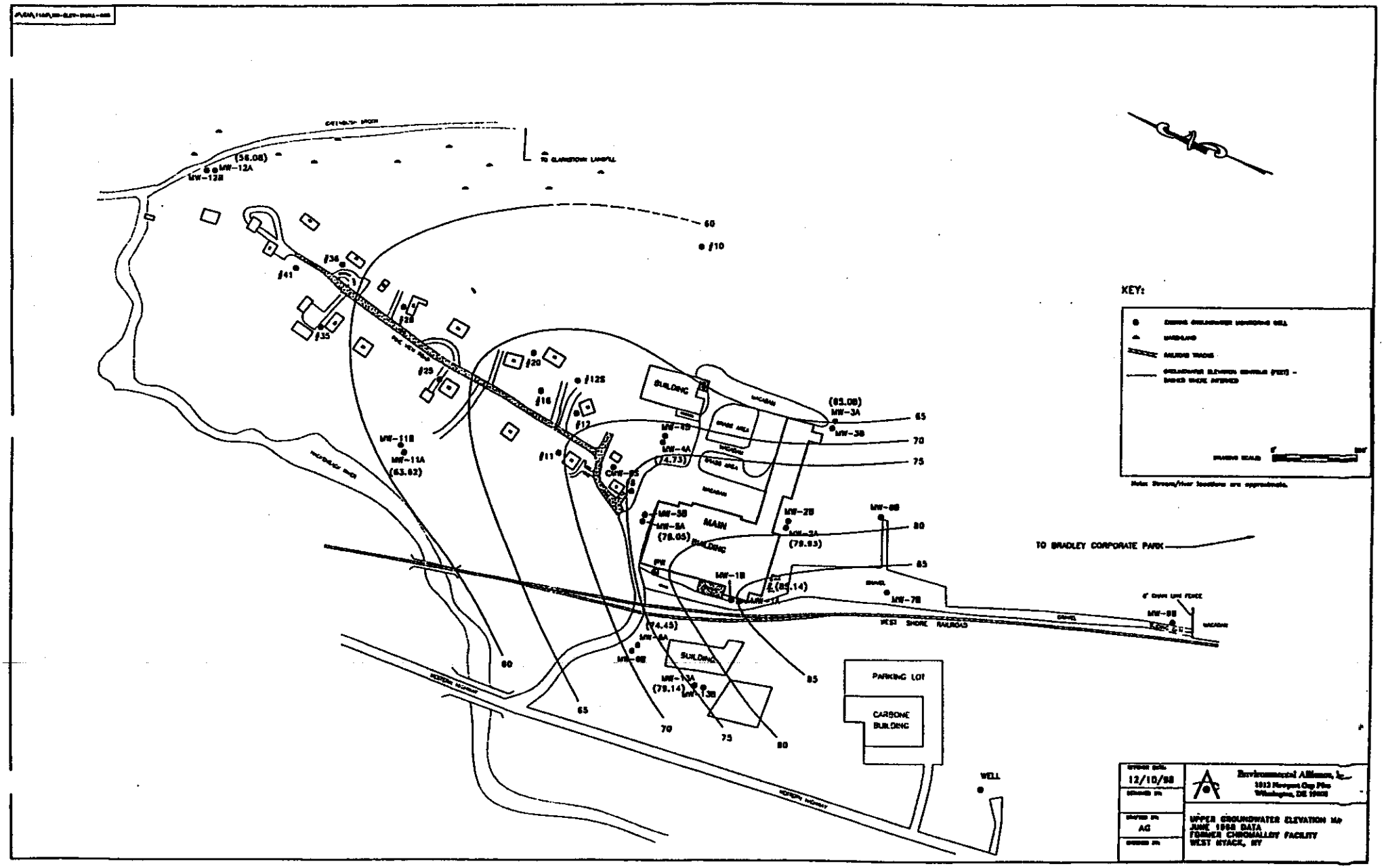

(56.08)
MW-12A
MW-12B
TO GLENIDEN LANDFILL
60
65
70
75
80
85
MW-11B
MW-11A
(63.82)
BUILDING
(83.08)
MW-3A
MW-3B
MW-1B
MW-4A
(74.73)
MW-5B
MW-5A
(78.05)
MAIN
BUILDING
MW-2B
MW-2A
(79.93)
MW-6B
MW-1A
(85.14)
MW-7B
WEST SHORE RAILROAD
TO BRADLEY CORPORATE PARK
(74.45)
MW-6A
MW-6B
MW-13A
(79.14)
MW-13B
PARKING LOT
CARBONE BUILDING
WELL
NORTH MORMAN
KEY:
12/10/98
AG
Environmental Alliance, Inc.
UPPER GROUNDWATER ELEVATION MAP
JUNE 1998 DATA
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

FIGURE 9

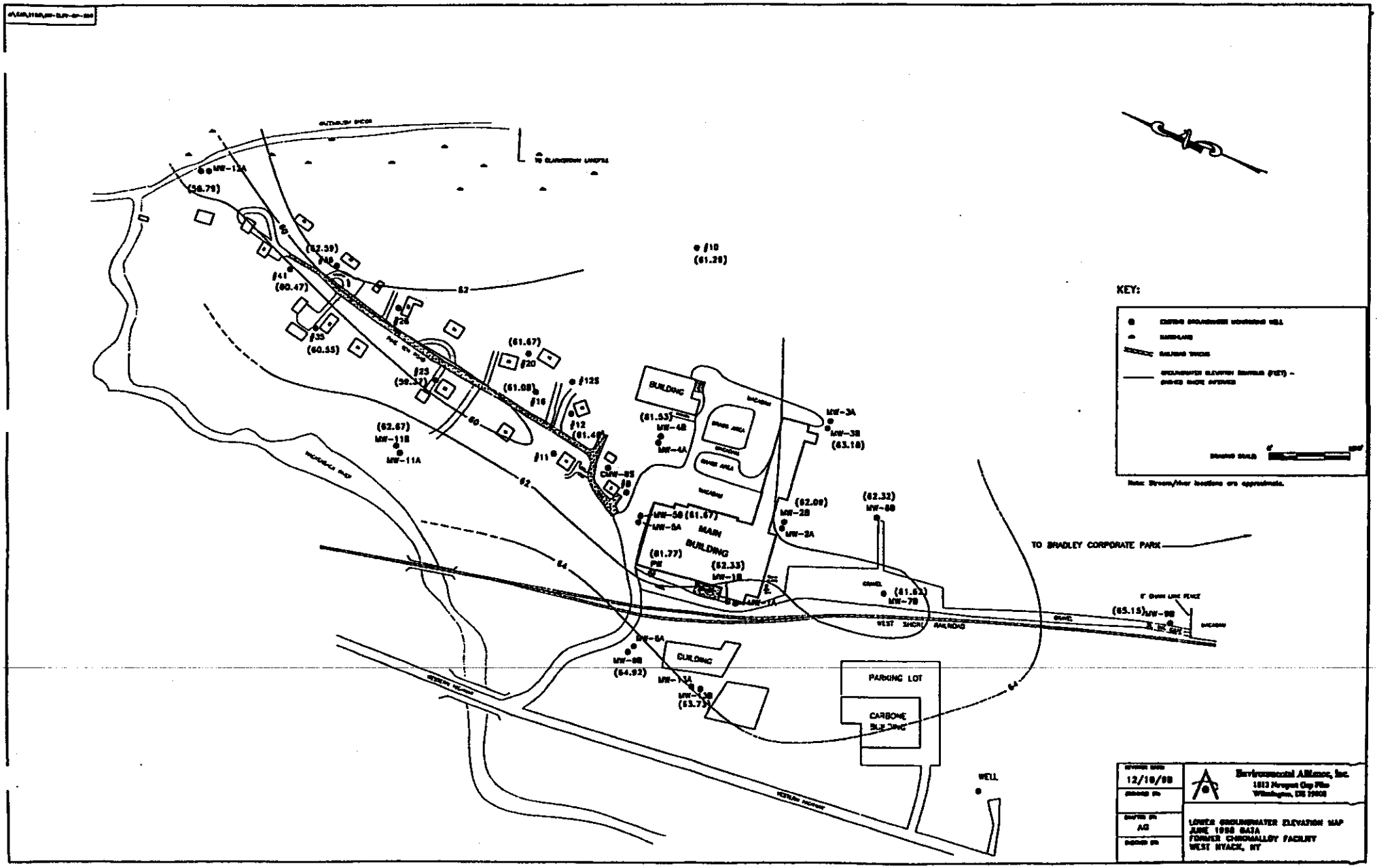
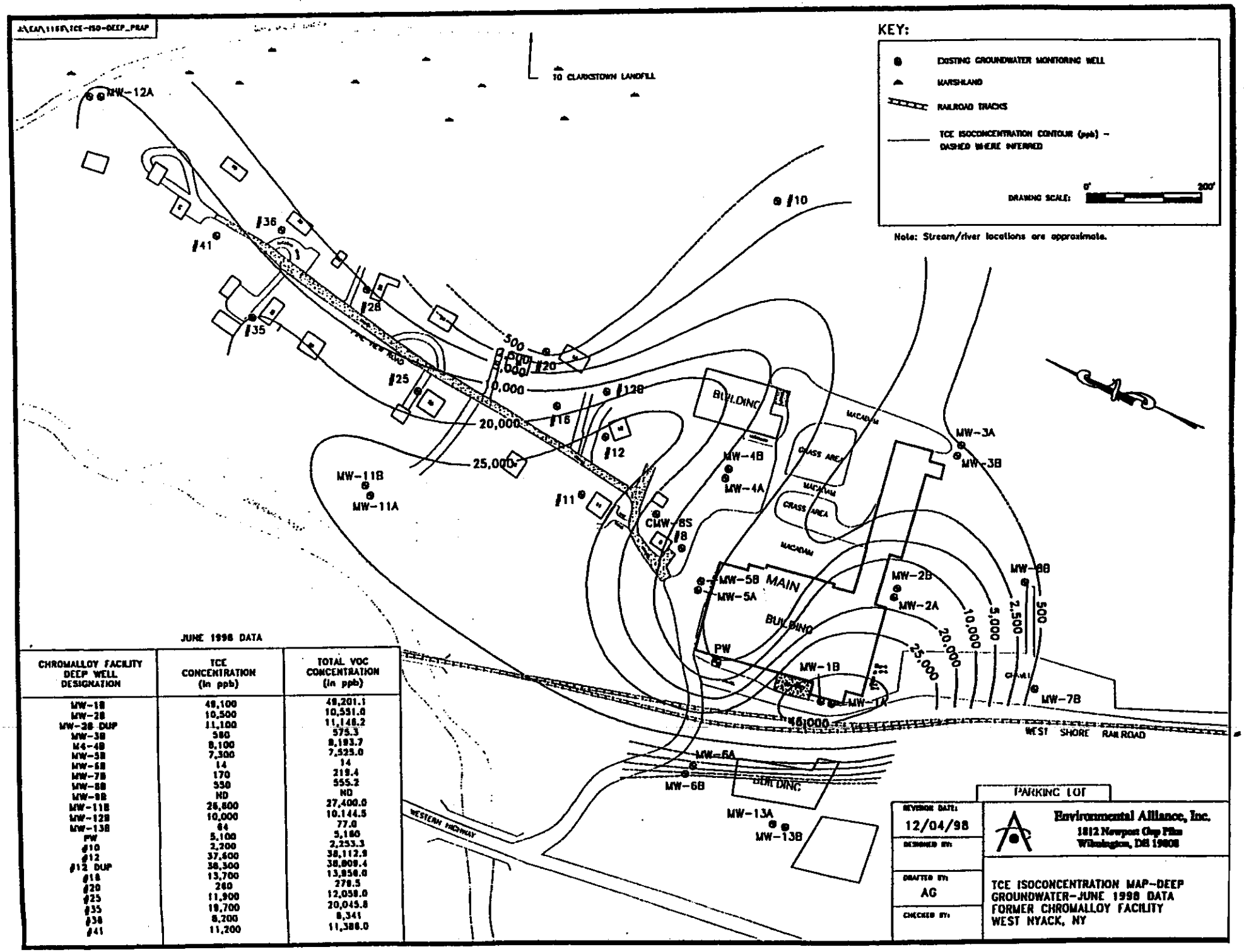

KEY:
TO BRADLEY CORPORATE PARK
BUILDING
MAIN BUILDING
PARKING LOT
CARBONE BUILDING
WELL
MW-13A (58.79)
MW-11B (62.67)
MW-11A
MW-5B (64.92)
MW-13B (63.73)
MW-3A
MW-3B (63.18)
MW-5B (61.67)
MW-5A
MW-2B (62.09)
MW-2A
(62.32) MW-8B
(61.77) PW
MW-1B (62.33)
MW-7B (61.63)
MW-9B (65.15)
12/10/98
AG
Environmental Alliance, Inc.
LOWER GROUNDWATER ELEVATION MAP
JUNE 1998 DATA
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

FIGURE 10



JUNE 1998 DATA

CHROMALLOY FACILITY DEEP WELL DESIGNATION	TCE CONCENTRATION (in ppb)	TOTAL VOC CONCENTRATION (in ppb)
MW-1B	48,100	48,201.1
MW-2B	10,500	10,551.0
MW-3B DUP	11,100	11,146.2
MW-3B	580	575.3
MW-4B	8,100	8,183.7
MW-5B	7,300	7,525.0
MW-6B	14	14
MW-7B	170	219.4
MW-8B	550	555.2
MW-9B	ND	ND
MW-11B	26,800	27,400.0
MW-12B	10,000	10,144.5
MW-13B	64	77.0
PW	5,100	5,160
#10	2,200	2,253.3
#12	37,600	38,112.9
#12 DUP	38,300	38,809.4
#16	13,700	13,956.0
#20	260	278.5
#25	11,900	12,058.0
#35	19,700	20,045.8
#36	8,200	8,341
#41	11,200	11,386.0

REVISION DATE:	12/04/98
DESIGNED BY:	
DRAFTED BY:	AG
CHECKED BY:	

Environmental Alliance, Inc.
1812 Newport Gap Pike
Wilmington, DE 19808

TCE ISOCONCENTRATION MAP-DEEP
GROUNDWATER-JUNE 1998 DATA
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

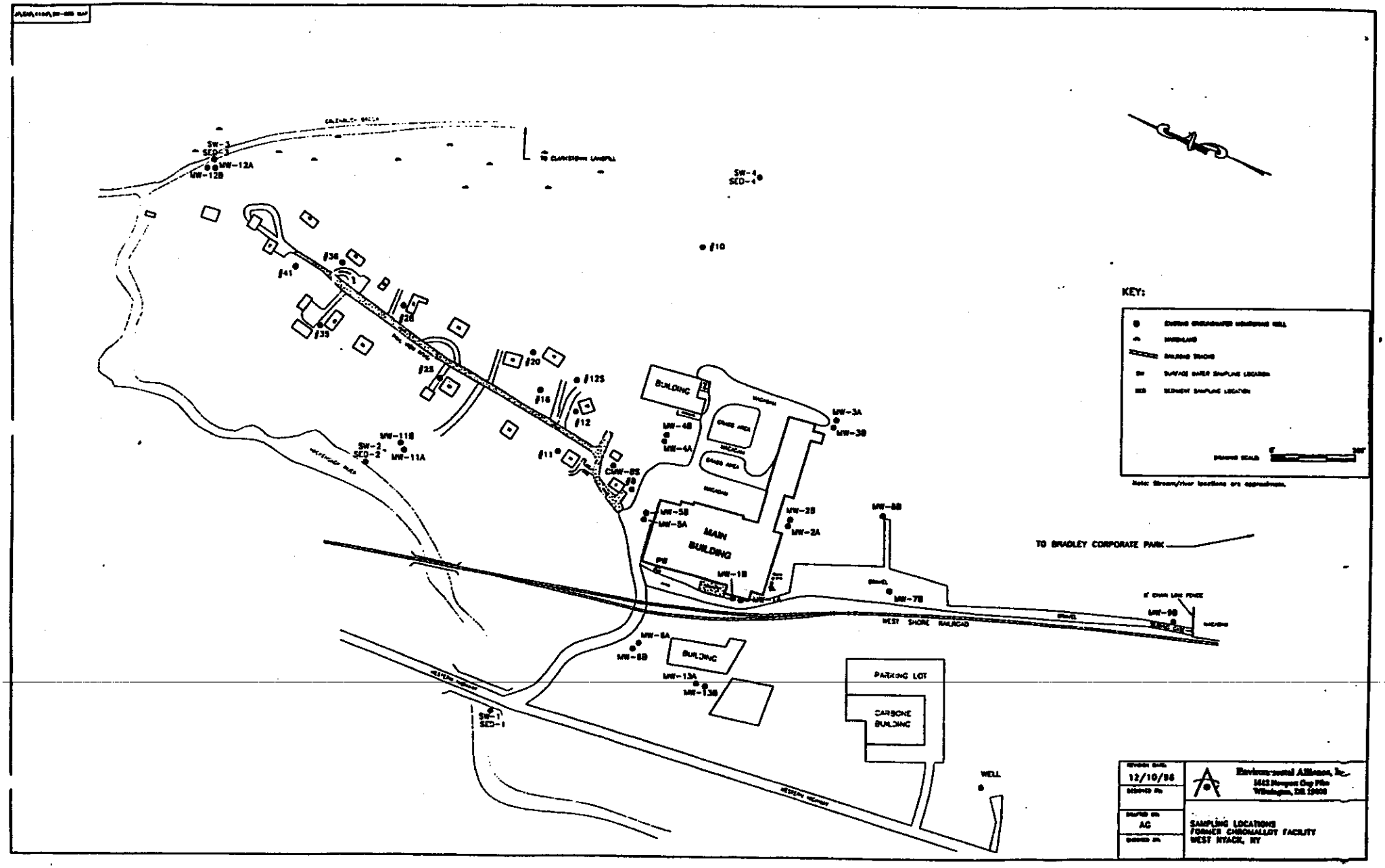
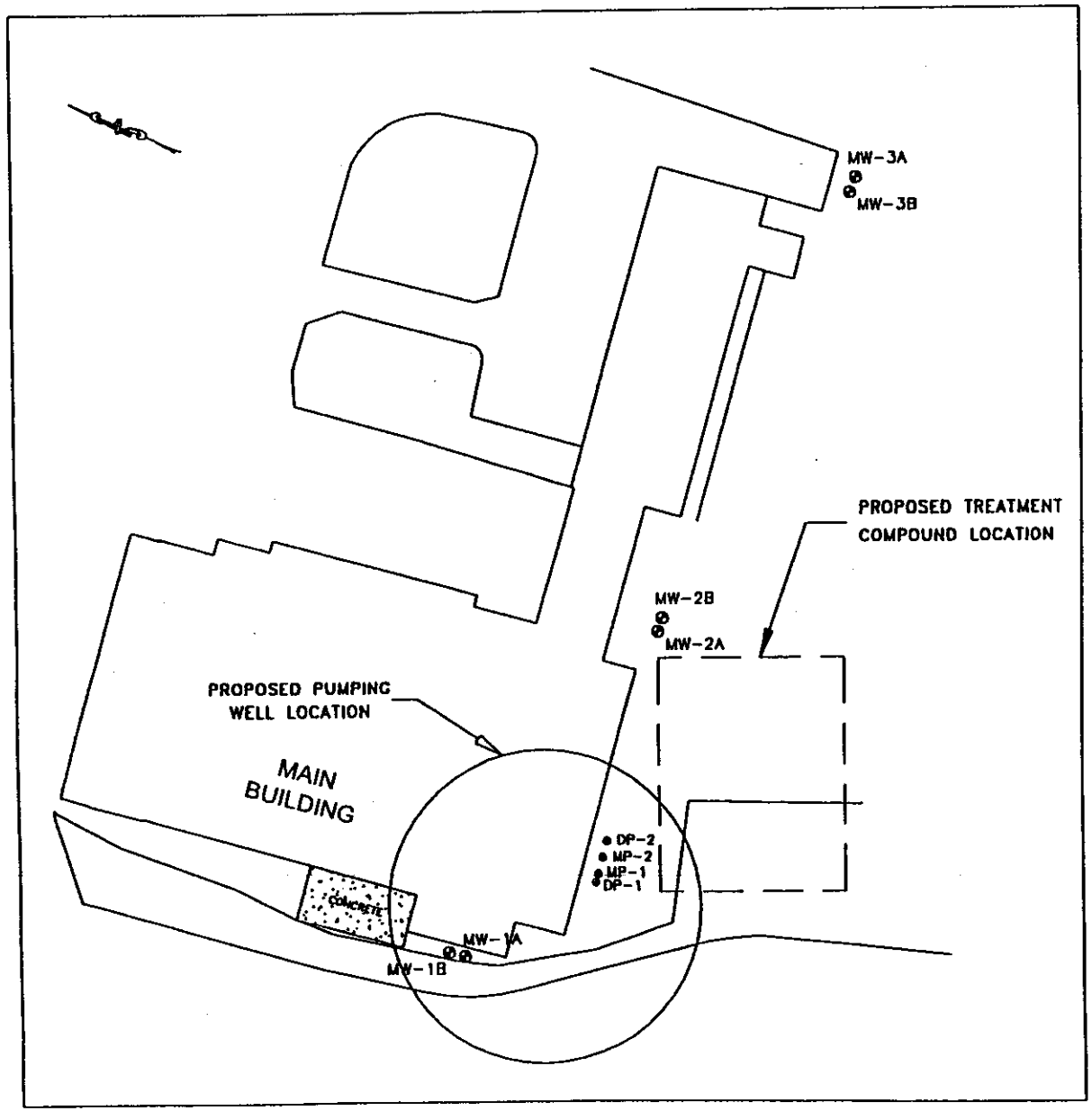

KEY:
TO BRADLEY CORPORATE PARK
MAIN BUILDING
BUILDING
PARKING LOT
CARBONE BUILDING
WEST SHORE RAILROAD
WELL
MW-1A
MW-1B
MW-2A
MW-2B
MW-3A
MW-3B
MW-4A
MW-4B
MW-5A
MW-5B
MW-6A
MW-6B
MW-7A
MW-7B
MW-8A
MW-8B
MW-9A
MW-9B
MW-10
MW-11A
MW-11B
MW-12A
MW-12B
MW-13A
MW-13B
SW-1
SED-1
SW-2
SED-2
SW-3
SED-3
SW-4
SED-4
#10
#11
#12
#15
#20
#25
#28
#36
#39
#41
#125
12/10/98
AC
Environmental Alliance, Inc.
SAMPLING LOCATIONS
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

FIGURE 12

J:\EA\1165\PROPOSED_PUMP_LOCATION



KEY:

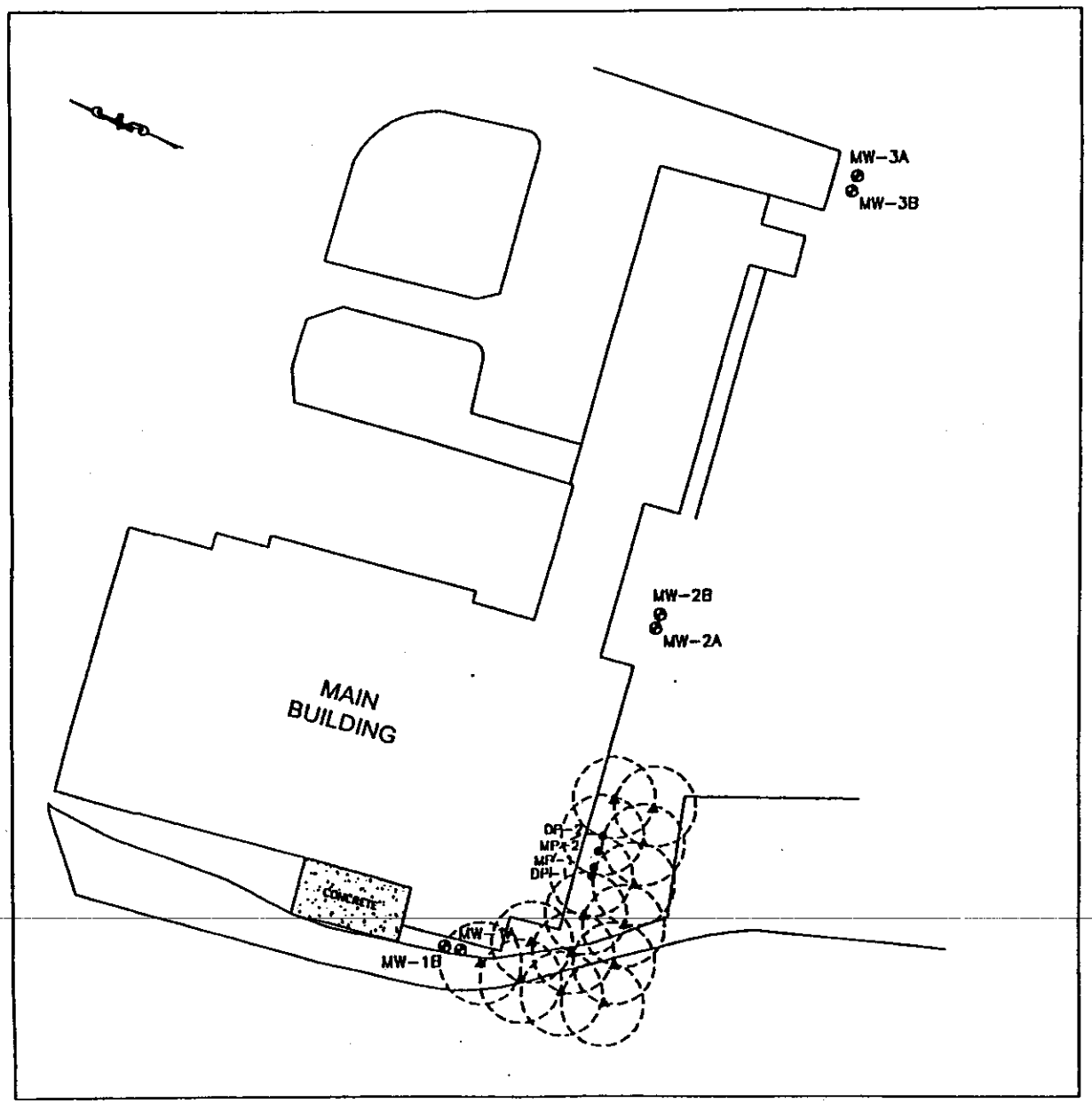
EXISTING MONITORING WELL

0 100'

APPROXIMATE SCALE

12/04/98	Environmental Alliance, Inc 1812 Newport Gap Pike Wilmington, DE 19808
AC	PROPOSED PUMP AND TREATMENT LOCATION FORMER CHROMALLOY FACILITY WEST NYACK, NY

FIGURE 12



KEY:

⊕ EXISTING MONITORING WELL

▲ PROPOSED EXTRACTION POINT LOCATION

0 100'

APPROXIMATE SCALE

12/04/98

AR

Environmental Alliance, Inc.
1812 Newport Gap Pike
Wilmington, DE 19808

PROPOSED EXTRACTION POINT LAYOUT
WITH SVE RADIUS OF INFLUENCE
FORMER CHROMALLOY FACILITY
WEST NYACK, NY

FIGURE 14

APPENDIX A

Administrative Record

Appendix A

Administrative Records
Chromalloy (SEQUA)
Site No. 344039
=====ooooo=====

Preliminary Hydrogeologic Investigation, 169 Western Highway, West Nyack, New York.,Geraghty & Miller, Inc., January 1992. Prepared for Sequa Corporation.

Supplemental Well Installation and Sampling Activities,169 Western Highway, West Nyack, New York. Geraghty & Miller, Inc., August 1992. Prepared for Sequa Corporation.

Investigation of Ground-water Quality Conditions, in the vicinity of the Chromalloy American Sintercast Division Plant, West Nyack, New York, Geraghty & Miller, Inc., (no date).

Remedial Investigation/Feasibility StudyWork Plan for the Former Chromalloy Facility, West Nyack, New York, Lawler, Matusky & Skelly Engineers, July 1994.

Quality Assurance Project Plan for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, July 1994.

Remedial Investigation/Feasibility Study Work Plan for the Former Chromalloy Site, Citizen Participation Plan, Lawler, Matusky & Skelly Engineers, July 1994.

Former Chromalloy Site Remedial Investigation/Feasibility Study, Health and Safety Plan, Lawler, Matusky & Skelly Engineers, July 1994.

Interim Data Report, Remedial Investigation/Feasibility Study Work Plan for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, December 1994.

Modification No. 2, Remedial Investigation/Feasibility Study Work Plan for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, March 1995.

Second Interim Data Report, Remedial Investigation for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, August 1995.

Proposed Soil Removal Program for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, August 1995.

Report on Delineation Study for Proposed Soil Removal Program for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, November 1995.

Report on November 1995 Soil removal Program for the Former Chromalloy Site, West Nyack, New York, Lawler, Matusky & Skelly Engineers, January 1996.

Site Safety Plan, Former Chromalloy Facility, Environmental Alliance, Inc., June 1997.

Modification No. 7, Interim Data Report and Work Plans Update, Former Chromalloy Facility, prepared for Sequa Corporation, Environmental Alliance, Inc., October 1997.

Remedial Investigation Report, Former Chromalloy Facility, Prepared for Chromalloy Gas Turbine Corp., Environmental Alliance, Inc., December 1998.

Feasibililty Study Report, Former Chromalloy Facility, Prepared for Chromalloy Gas Turbine Corp. Environmental Alliance, Inc., December 1998.

Appendix B

Trichloroethene (TCE):

Trichloroethene (also called trichloroethylene and TCE) is a colorless, man-made liquid. It is nonflammable, non-corrosive and has the "sweet" odor of chlorinated hydrocarbons. It boils at 86° to 87° C.

TCE has appeared in drinking water because of improper waste disposal.

Uses of TCE

TCE is primarily used as a solvent for removing grease from metal. It has a variety of other uses including the extraction of caffeine from coffee, as dry-cleaning solvent, and as a chemical intermediate (building block) in the production of other chemicals, such as chloroacetic acid. TCE is also used as an intermediate in the production of pesticides, waxes, gums, resins, tars, paints, and varnishes.

Possible Effects from Acute Exposure

Exposure to high concentrations of TCE vapor may cause irritation of the eyes, nose, and throat. The liquid chemical, if splashed in the eye, may cause burning irritation and damage. Repeated or prolonged skin contact with the liquid may cause dermatitis. Acute exposure to high levels of TCE depresses the central nervous system exhibiting such symptoms as headache, dizziness, vertigo, tremors, nausea and vomiting, irregular heart beat, sleepiness, fatigue, blurred vision, and intoxication similar to that of alcohol. Alcohol consumption may make the symptoms of exposure to TCE worse.

Possible Effects from Chronic Exposure

TCE causes cancer in laboratory animals exposed at high levels over their lifetimes. Chemicals that cause cancer in laboratory animals also may increase the risk of cancer in humans who are exposed to lower levels over long periods of time. Whether or not TCE causes cancer in humans is unknown. Some humans exposed to large amounts of this chemical have had nervous system, liver and kidney damage. Exposure to high concentrations of TCE causes liver and kidney damage and effects on the immune system and blood in laboratory animals.

References:

1) *"NYSDOH Chemical Information Summary for Trichloroethylene"*, March 1991
2) *"Handbook of Toxic and Hazardous Chemicals,"* Marshall Sittig, Noyes Publications, 1981

APPENDIX C

Responsiveness Summary

RESPONSIVENESS SUMMARY

Chromalloy (SEQUA)
Proposed Remedial Action Plan
West Nyack, Rockland County
Site No. 344039

The Proposed Remedial Action Plan (PRAP) for the Operable Unit I at the Chromalloy (SEQUA) Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on March 1, 1999. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and groundwater at the Chromalloy (SEQUA) Site. The preferred remedy is a groundwater recovery and treatment system for the deeper aquifer and a dual phase extraction system for the shallow aquifer and soil.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on March 18, 1999 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this Site. Written comments were received from SEQUA Corporation.

The public comment period for the PRAP ended on March 30, 1999.

This Responsiveness Summary responds to all questions and comments raised at the March 18, 1999 public meeting and to the written comments received.

The following are the comments received at the public meeting, with the NYSDEC's responses:

> **COMMENT 1:** The DEC should release the responsiveness summary before issuing the ROD so that the public has the opportunity to question the responsiveness summary, and can, thereby, be assured that the concerns expressed have been heard and addressed. This will obviate any occasion to challenge the ROD.
> **RESPONSE 1:** The NYSDEC will not hesitate to delay the issuance of the ROD if any of the comments by the public or the PRP indicate that the proposed remedy may have an adverse impact on the public health or the environment. The nature and extent of contamination at the Site requires action since the TCE concentrations in the deep groundwater reaching are 50,000 ppb.

COMMENT 2: There is an upward flow from the deeper groundwater to the shallow groundwater. This may cause contamination to rise up and pose a threat to the Pine View Road residents.
RESPONSE 2: The sampling of off-site wells MW-11A and MW-12A which will be undertaken shortly and independently of OU-I will provide the data to determine the extent of upward flow and the contamination concentration in the shallow groundwater by these wells. The implementation of the selected remedy will virtually eliminate the upward flow, if there is any.

COMMENT 3: There is evidence of bifluoride and carcinogens.
RESPONSE 3: The NYSDEC would welcome any useful data on the presence of any consequential amount of hazardous waste anywhere on or off site. It should be borne in mind that the PRP is obligated to investigate and cleanup only those contaminations for which the PRP is legally responsible. Trichloroethene, the predominant contaminant at the site, is a known animal carcinogen and suspected human carcinogen (see Appendix B).

COMMENT 4: The DEC should insist on the hiring of consultants from a state approved list
RESPONSE 4: There is no such list maintained by the State.

COMMENT 5: OU-I deals only with on-site contamination. Pine View Road properties have been excluded from investigation and remedy because this site which was on the registry has been delisted.
RESPONSE 5: OU-I deals with the TCE contamination in soil on site and the groundwater both on and off site. The scope of the investigation in the RI encompasses the Pine View Road properties. While some of the off-site investigation has been completed, further characterization of groundwater will be conducted under OU-II, and community participation will be encouraged.

COMMENT 6: History of disposal activities of Kay Fries during the 1927 to 1929 has not been considered.
RESPONSE 6: To the extent that Kay Fries disposal activities may have impacted the groundwater, OU-I will address them.

COMMENT 7: Bifurcation of study and remedy as OU-I and OU-II is being used to gloss over the off-site shallow contamination.
RESPONSE 7: Previous analyses have not suggested significant shallow contamination beyond the source area. The quality of shallow groundwater will be determined when MW-11A and MW-12A are sampled and analyzed. This sampling will be performed shortly and will be independent of any activities related to OU-I. The operation of the OU-I remedy will not adversely impact any contamination in the off-site shallow or deep aquifer, and therefore its implementation should not and will not be delayed.

COMMENT 8: The health risk of both the on-site and off-site occupants due to volatilization of contaminants has not been adequately studied. The PRP's consultants estimate of risk is flawed.
RESPONSE 8: It should be noted that the exposure assessment in the PRAP (now Section 4.3 of this ROD) is not drawn from the RI/FS reports, but has been independently written by the NYSDEC and the NYSDOH. Transport of a "denser-than-water" contaminant such as TCE is typically accompanied by a "sinking" of the contaminant plume. Many organic compounds, such as TCE, do

not readily dissolve in water, because of their hydrophobic property. This in part explains the low diffusion of these contaminants into the water. These compounds tend to stay adsorbed on the surface of the soil. Diffusion of hydrophobic organic compounds, such as TCE, in water is a weak process, and escape of these compounds through the groundwater surface into the unsaturated zone of soil, and thence into the soil vapor or the atmosphere is generally insignificant. This is in sharp contrast to the release of such compounds lodged in the unsaturated soil zone (for example, from a source area), from whence the release into the soil vapor or the atmosphere may be significant. Soil vapor analyses (93 samples) did not indicate impacts north of the facility (towards Pine View Road homes), but rather south of the main building near the source area. Therefore, the added risk due to off-site volatilization of contaminant in groundwater under Pine View properties is considered to be insignificant.

COMMENT 9: Interviews with past employees are not included in the RI Report.
RESPONSE 9: The NYSDEC will request the PRP to submit a copy of the proceedings of the interviews. It should however be borne in mind that the interviews may have been conducted on a voluntary basis, and the NYSDEC does not require the identification of interviewees. It should also be noted that NYSDEC does not rely on interviews alone to reconstruct the waste management practices or determine the extent of contamination at the Site.

COMMENT 10: The Coating division used much more TCE than has been reported.
RESPONSE 10: Comment noted.

COMMENT 11: Bifurcation of the remedy as separate operable units will be used to delay the cleanup of the off-site properties.
RESPONSE 11: The NYSDEC disagrees. The dynamics of cleanup require that areas of higher contamination should be accorded priority. In this case the high levels of TCE in the deeper aquifer warrant a discrete treatment.

COMMENT 12: Independent consultants should be hired by DEC to do the RI/FS.
RESPONSE 12: Consultants, however hired, require the same level of review and vigilance by the NYSDEC staff. The Superfund program has been established on the basis that the responsible party should pay for all investigation, design and cleanup. The NYSDEC is constrained by law to spend State Superfund monies only in situations 1) where the PRPs are unknown or can not be found, 2) where the PRP refuses to implement an investigation and/or remediation; and 3) where the PRP proves to the NYSDEC's satisfaction that it can not afford to pay for the investigation and/or remediation. It is the policy of the NYSDEC to allow a PRP who has entered into an order on consent with the NYSDEC to choose and hire any firm of consultants to conduct the RI/FS, provided the firm meets the minimum qualification requirements as regards experience and the New York State licensure.

COMMENT 13: The sediment and surface water samples and analyses are not adequate to assess impact from the Site.
RESPONSE 13: Comment noted and the sampling data will be re-evaluated during OU-II.

COMMENT 14: Why not have two groundwater recovery wells instead of waiting to see the effects of one?
RESPONSE 14: The computer modeling of contaminant transport upon which the conceptual design is based, especially in a bedrock aquifer, is an inexact science. However, the effect of changing the location of the well will be studied during the design stage. Moving the groundwater recovery well location northward may obviate the need for an additional well.

COMMENT 15: Has the area of contamination been adequately defined?
RESPONSE 15: The contamination in the groundwater has been adequately characterized. Twelve off-site wells (including the private wells) and 15 on-site wells constitute a good representation of the groundwater. The extent of the residual contamination under the building is, however, uncertain. Further delineation of the outer extent of the groundwater contaminant plume is anticipated under OU-II.

COMMENT 16: Would the deed restriction be placed on off-site properties too?
RESPONSE 16: No. The deed restriction will only apply to the Site.

COMMENT 17: Does DEC have any say in the development of homes on contaminated sites?
RESPONSE 17: In the case of inactive hazardous waste sites, such as this Site, the owner or developer of the site must inform the NYSDEC of any change in use. Sites within the jurisdiction of other programs in the NYSDEC may have other requirements. In such cases, NYSDEC consults with NYSDOH regarding the significance of residual contamination with respect to a residential scenario.

A comment letter dated March 16, 1999 was received from SEQUA Corporation. The comments and responses to these comments by the NYSDEC and the NYSDOH follow:

COMMENT 18: Chromalloy is particularly troubled that NYSDEC's PRAP brings a number of issues to a public forum with little or, in some cases, no advance notice to Chromalloy. In the past, we have always worked in a cooperative manner with NYSDEC. In addition, NYSDEC is required under the terms of the Order on Consent #W3-0080-87-01 to approve or disapprove Chromalloy's RI/FS Report, and if it disapproves it, to provide specific written reasons for the disapproval. The Order on Consent further allots a time period of approximately 60 days between DEC's approval of the Feasibility Study and the public meeting. To date, NYSDEC has failed to provide any formal written statement of any deficiencies of the RI/FS, other than an advance draft of the Proposed Remedial Action Plan, which appears to ignore major findings of the RI/FS. While NYSDEC has considered some of Chromalloy's comments on the advance draft, NYSDEC certainly has not provided Chromalloy with adequate opportunity to respond to NYSDEC's comments in advance of the public meeting. To the contrary, NYSDEC has issued public notices that raise significant issues on which Chromalloy has not been provided an opportunity to comment. Chromalloy has made every effort to accommodate the Department's wish to accelerate progress towards issuance of a proposed remedy this spring. However, Chromalloy is entitled to a detailed explanation of the

Department's position, and it specifically reserves its rights to invoke the dispute resolution process under the Order on Consent.

RESPONSE 18: The RI/FS reports submitted to the NYSDEC has provided sufficient data to formulate the OU-I and address the very severe TCE contamination in the groundwater. OU-I may not necessarily address all contamination at the Site. Comments on the RI/FS will be provided shortly. The NYSDEC may generate additional comments on the RI/FS after an evaluation of the effectiveness of OU-I.

An Operable Unit represents a portion of the site remedy which for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the Site contamination. The extent of TCE in the soil and groundwater at the Site so predominates the other contaminants that implementation of OU-I at the Site is technically and administratively an appropriate remedy.

The purpose of the 60 days allotment between the approval of the FS report and public meeting has been misconstrued. To quote from the Order on Consent, "Within 60 days after the NYSDEC's approval of the FS Report, the respondent shall **cooperate** [emphasis added] with the NYSDEC by assisting the NYSDEC in soliciting public comment on the proposed remedial action plan and by providing technical assistance in preparing for and conducting public meeting regarding the same, in a manner consistent with CERCLA, the NCP, the guidance documents identified in Sub-para II.B(2)...." Since the NYSDEC did not request assistance, the 60 days allotment was not necessary. Furthermore, it should be noted that the Order on Consent does not allow for dispute resolution with respect to the ROD.

Note: Page number following comment number refers to the page number in the PRAP.

COMMENT 19: Page 1, suggests that the subsurface clay pipe located behind the Main Building delivered waste, including spent TCE, to an on-site treatment plant. The purpose of the clay pipe is not clear to us nor do we have knowledge of an on-site chemical treatment plant. To the best of our knowledge, spent TCE was recycled off-site and the nature of the pipe as well as the source of the soil and groundwater contamination remains unknown to us.

RESPONSE 19: ".. may have been used to deliver waste,..." is the language used in the PRAP. It is a rational deduction based on the contents discovered in the pipe and its heading towards the on-site treatment plant.

COMMENT 20: Page 2, the scope of work for OU-II includes "Further definition of off-Site groundwater contamination." First of all, the statement as is suggests that such further definition is automatic or unconditional. We expect that we should continue to monitor the existing outlying monitoring wells while implementing the groundwater treatment system (OU-I) to determine whether these wells would respond to the treatment *before* making the determination that any additional work would be needed. Second, if further sampling is necessary, the PRAP does not identify nor limit the off-Site areas to be sampled. Third, the scope is unclear as to whether such further sampling is to be exclusively for non-TCE contaminants and precisely as to what contaminants would be monitored. Finally, off-Site investigation may involve other potentially responsible parties (PRPs). We cannot agree to conduct any further investigation until such time as

those PRPs are identified, investigated, and involved to the extent dictated by their contamination contribution.

RESPONSE 20: The purpose of a Remedial Investigation is to determine the nature and extent of contamination. Existing data gaps were aptly noted by Chromalloy in their October 1997 Modification #7 Interim Data Report and Work Plan Update on Page 5-7 (Section 5.4.2) which states "...the extent of impacted groundwater to the north and west of the SITE has not yet been determined." For this reason, Chromalloy then proposed: "The goal of this phase of the investigation is to attempt to define the extent of deep groundwater contamination to non-detect or insignificant concentrations." This was to be accomplished through the installation of three well clusters: one to the north-northwest of the spill area (MW-11A and 11B), one to the north (MW-12A and 12B), and one due west (MW-13A and 13B). While the results of two rounds of sampling at MW-13B appear to have bounded the deeper contaminant plume to the west (TCE ranging from ND to 70 µg/L), no such conclusion can be drawn to the north (TCE in MW-12B at 2,000 to 10,000 µg/L) and or the north-northwest (TCE in MW-11B at 5,000 to 27,000 µg/L). Consequently, the contaminant isopleth for the 20,000 µg/L concentration could not even be inferred in the Remedial Investigation Report (see Figure 5-7). Groundwater concentrations of TCE at several thousand µg/L are not "insignificant concentrations." The intent of additional off-site groundwater investigation under OU-II is to accomplish the reasonable goal set by Chromalloy in its October 1997 Work Plan.

COMMENT 21: Page 2, the PRAP states that present day environmental conditions are a result of disposal activities conducted on-site. Chromalloy wishes to reinforce that there is no known documentation to verify on-site disposal practices nor is Chromalloy management aware of on-site disposal practices that caused the existing environmental conditions other than the 1927 spill by Kay Laboratories, Inc. and Kay Research Co. Inc. While Chromalloy acknowledges that TCE was used on-site, other potential contributors to the groundwater contamination (such as the Carbone facility, the Clarkstown landfill, Orange and Rockland Utilities, Grant Hardware and Xerox Corporation) have yet to be fully investigated or exonerated.

RESPONSE 21: Comment noted.

COMMENT 22: Page 2, the PRAP declares that the site conditions have led to significant threats to the public. Chromalloy takes great exception to this generic statement, particularly since the human health assessment results show the opposite to be the case. (See Comment number 32 below). Despite over-conservative exposure scenarios used in the human health risk assessment, all exposure pathways were well within the United States Environmental Protection Agency established acceptable risk value of 10^{-6}. As accurately presented on page 12 of the PRAP, an **exposure** pathway must exist for there to be a risk. The residents living on Pine View Road have been using publicly supplied water since 1979, thereby precluding the greatest possible risk pathway.

RESPONSE 22: The NYSDEC considers the contamination of a potentially significant source of potable water with TCE in concentrations reaching 49,000 ppb a significant threat to the public.

COMMENT 23: Page 2, Chromalloy supports the placement of title deed restrictions as an effective institutional control measure, but we must remind you that Chromalloy is unable to implement this PRAP requirement since Chromalloy is no longer a site landowner.

RESPONSE 23: Comment noted.

COMMENT 24: Page 2, one of the proposed remedial requirements is to monitor the quality of the "nearby" private wells still in use to assess impacts from site-related contaminants. Residential impact has been limited to Pine View Road and those wells (with assistance by Chromalloy) were taken out of service by providing the residents with public water. Is the PRAP referring to wells in the Green Road area? Some wells in the Green Road area were reported to contain low levels of TCE. However, the source of that contamination is unknown and there has been no previous indication by the State that Chromalloy is in any way related to groundwater conditions in that area. Page 4 of the PRAP appropriately describes the Site setting as, "situated amidst several other inactive hazardous waste disposal sites." While the source of the TCE in the wells still in use is presently unknown, one cannot rule out the influence imposed by the other sites cited on page 4. There is no basis for inferring a requirement for Chromalloy to monitor wells outside of the known groundwater impacts area; therefore, Chromalloy strongly objects to this requirement in the PRAP.

Moreover, Chromalloy is particularly troubled that the NYSDEC has brought this issue to a public forum without any prior notice to Chromalloy and in such a manner that infers to the public Chromalloy's potential responsibility for the contamination that may be present in residential wells still in use. Chromalloy has performed the environmental investigation and feasibility study (RI/FS) inaccordance with the guidance and agreements reached with the NYSDEC. At no time during the course of the RI/FS did the NYSDEC indicate a site relationship to existing wells outside of Pine View Road until the issuance of the PRAP.

RESPONSE 24: As a matter of prudence, NYSDOH recommends sampling potable supply wells in the vicinity of groundwater contaminant plumes. The NYSDOH and Rockland County Department of Health have monitored the private wells northwest of the site since 1978 and expect to continue doing so. While the historic data do not indicate plume migration into this residential area, it should be recognized that the extent of the TCE plume in this direction has not yet been determined (see Response 20 above).

COMMENT 25: Page 5, Chromalloy would like to clarify that Chromalloy cooperated with local and state officials in providing Pine View Road residents access to the public water supply by permitting a tie-in to their existing supply connection, which was a capital expense borne by Chromalloy.

RESPONSE 25: Comment noted and will be reflected in the ROD.

COMMENT 26: Page 6, Chromalloy would like to clarify that the off-site investigation was held in abeyance due to site access. Our decision to change our consultant in no way affected the project timeline.

RESPONSE 26: The NYSDEC agrees. "Phases", the word used in the PRAP is not used to connote delay by your consultants.

COMMENT 27: Page 6, the number of geophysical borehole surveys was 15 not 5.

RESPONSE 27: This typographic error has been corrected.

COMMENT 28: On page 7, NYSDEC states that no significant concentrations of metals, SVOCs and PCBs are present on the Site. However on page 8, metals are later retained for an OU-II

investigation based solely on the results of only two samples whose metal results are insignificant. Additional metals investigation is not warranted based on the RI results. This conclusion is supported by soil data collected by Lawler, Matusky & Skelly Engineers (LM&S) and Geraghty & Miller (G&M). The following is a review of the RI data.

The Interim Data Report from December 1994 (Sections 12.3 and 12.4) called for the elimination of work for metals identified in the LM&S RI/FS Work Plan (January 1994). LM&S based this decision on their analytical data and historical data previously collected and published by G&M for metals in soil at depths ranging from grade to 27 feet below grade. According to LM&S, the metals analysis indicated that some metals exceed NYSDEC soil cleanup guidelines, but remain below USEPA Health Effects Assessment Summary Tables (HEAST) for direct human ingestion by at least one order of magnitude (HEAST data not presented by LM&S or Alliance).

For your convenience, a summary table (**Table 1**) is presented of the G&M and LM&S analytical data for metals in soil, which is compared to NYSDEC guidelines presented in the Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels revised January 24, 1994. The reported metal concentrations in excess of the NYSDEC guidance levels are highlighted in Table 1.

From Table 1, the following metals were shown to have concentrations that slightly exceed their NYSDEC guidance levels for soil but are within the U.S.G.S. Eastern United States Soil Concentration range (Shacklette and Boerngen, 1984).

· Chromium at sample location G24S (3-4 ft) was reported at 52.3 mg/kg, which is slightly above the TAGM range of 1.5 to 40 mg/kg but well within the U.S.G.S. Eastern U.S. range of 1 to 1,000 mg/kg.

· Mercury at sample location G16S (2.5-3 ft.) was reported at 0.48 mg/kg, which is slightly above the TAGM range of 0.001 to 0.2 mg/kg but well within the U.S.G.S. Eastern U.S. range of 0.01 to 3.4 mg/kg.

· Copper at sample locations MW-5S-5, MW-5S-15, MW-5S-30, and G16S (2.5–3.0 ft) were reported at 221 mg/kg, 208 mg/kg, and 213 mg/kg, respectively, which are above the TAGM range of 1.0 to 50.0 mg/kg but well within the U.S.G.S. Eastern U.S. range of <1 to 700 mg/kg.

· Magnesium at sample locations G24S (3-4 ft) and G26S (30 in) were reported at 5,490 mg/kg and 6,420 mg/kg, respectively, which are slightly above the TAGM range of 100.0 to 5,000.0 mg/kg but well within the U.S.G.S. Eastern U.S. range of 500 to 500,000 mg/kg.

· Nickel at sample locations MW-3S-15 replicate, G13S (13.0-13.5 ft), and G16S (2.5-3.0 ft) were reported at 27.5 mg/kg, 107 (Estimate) mg/kg, and 27.7E mg/kg, respectively, which are slightly above the TAGM range of 0.5 to 25.0 mg/kg but well within the U.S.G.S. Eastern U.S. range of <5 to 700 mg/kg.

· Zinc at sample locations MW-3S-0, MW-3S-10, G24S (3-4 ft), and G26S (30 in) were reported at 54.1(Estimate) mg/kg, 74.1(Estimate) mg/kg, 69.1 mg/kg, and 59.0 mg/kg, respectively, which are slightly above the TAGM range of 9.0 to 50.0 mg/kg but well within the U.S.G.S. Eastern U.S. range of <5 to 2,900 mg/kg.

To further evaluate the metal concentrations detected above the NYSDEC guidance levels in soil at the Site, the following two sources were utilized as evaluation criteria:

· "Elemental Concentrations in Soils and Other Surficial Materials of the Conterminous United States"; United States Geological Survey (U.S.G.S.) Professional Paper 1270 by H.T. Shacklette and J.G. Boerngen, in 1984.

· USEPA Region III Risked Based Concentrations (RBCs), April 15, 1998. Chromalloy believes that background concentration ranges for the Eastern United States presented by the U.S.G.S. in Professional Paper 1270 is better suited for establishing background concentrations for the Site due to the statistical care and size of the U.S.G.S. database as compared to the Eastern USA Background Soil Concentrations presented by the NYSDEC as a guidance level. In addition, the evaluation of risk-based metal concentrations is pertinent in the determination of whether the metals detected in soil may be of concern. **Table 2** compares the metal concentrations exceeding NYSDEC guidance levels, the Eastern United States metal (elemental) concentrations in soils (observed range) presented in the U.S.G.S. Professional Paper 1270 and the EPA RBCs for metals concentrations (residential exposure). The results of the comparison are as follows:

· The G&M and LM&S reported metal concentrations for chromium, mercury, copper, magnesium, nickel, and zinc, which exceeded the NYSDEC guidance levels (Eastern United States Background Soil Concentrations), are within the background concentrations presented in the U.S.G.S. Professional Paper 1270 for the Eastern United States. In fact, the reported metal concentrations are at the low end of the concentration ranges for each respective metal as presented in the U.S.G.S. Professional Paper 1270 for the Eastern United States.

· The G&M and LM&S reported metal concentrations for chromium, mercury, copper, nickel, and zinc, which exceeded the NYSDEC guidance levels (Eastern United States Background Soil Concentrations), are below their respective EPA RBCs (residential exposure) by a minimum difference of one order of magnitude. Magnesium is not presented in the EPA RBCs Table because it is not considered to pose a health hazard.

In addition to the data provided in Tables 1 and 2, arithmetic mean at the 99% confidence level (arithmetic mean plus 2 standard deviations) for the two metals of concern (chromium and mercury) cited in the PRAP for the Eastern United States are available from the U.S.G.S. The mean value for chromium is 54.6 mg/kg and 2.64 mg/kg for mercury, which are both above the levels of concern cited in the PRAP (chromium - 52.3 mg/kg and mercury - 0.48 mg/kg).

From the comparisons presented in Table 2 and the mean values, it is apparent that chromium (G24S) and mercury (G16S) concentrations in question in the PRAP (as well as the other samples) are within the background concentration ranges. Further, the metal concentrations are not a

concern to human health when compared to the residential exposure RBCs (a conservative evaluation criteria).

Based on the evaluation of the G&M and LM&S metals data for soil at the Site and the evaluation of metals data for soil presented herein, none of the metals detected in soils on the Site is present at concentrations that pose unacceptable risks to human health or the environment. Therefore, there is no need to conduct an additional investigation for metals.

RESPONSE 28: The NYSDEC will review all data and the analysis provided above before determining the extent of any additional investigation for metals. Of particular interest will be data from surficial soil samples, if available, from around the facility. The NYSDEC's guidelines for establishing soil cleanup levels are contained in *"Technical and Administrative Guidance Memorandum (TAGM) No. 4046."* The underpinnings for the comments are based on statistical studies that depict regional ranges of background contaminant concentrations. What is lost in such studies are singularities that are potentially attributable to discrete facilities. While no inference has been drawn of a significant surficial contamination, the apparent paucity of data on surficial contamination prompts a re-evaluation of the adequacy of the data gathered to date. As required under Section 4.1.2 of this ROD, the NYSDEC will work with the PRP to develop site-specific background concentrations and cleanup goals, if a cleanup is required. The NYSDEC will review the PRP's workplan designed to meet this objective.

COMMENT 29: Page 8 and 10, sample TP-77 is described as a sludge in the PRAP, suggesting that it is a waste residue. Sample TP-77 is classified as a soil sample and not a sludge in the LM&S Second Interim Data Report, August 1995.

RESPONSE 29: The description of the content has been changed to "soil-like substance" in the ROD.

COMMENT 30: Page 8, the PRAP states that further east of the 90 feet position (from the southwestern corner of the main building), the presence of TCE is primarily limited to pipes and the bedding soil. This is immediately followed by a sentence reporting the contamination of soil is deepest at 60 feet from the corner, extending to bedrock at boring B-1. There was no analytical or field data to state the two concentrations are related; therefore, there is no connection between the subject matter of these two sentences.

RESPONSE 30: The PRAP reports data as found. No causal connection, though one may exist, has been stated.

COMMENT 31: Page 9, The PRAP states that the highest concentration of TCE measured in groundwater was 160,000 ppb in G4 at 17-19 feet below ground surface. The PRAP does not identify the sample was collected from a temporary two-inch diameter soil boring at the 17-19 foot depth. The collection of this type of sample is not representative of the groundwater system, but only the groundwater 17-19 foot depth within the immediate vicinity of the soil boring. This conclusion is further supported by the fact that the yield of groundwater from most soil borings was not sufficient to purge three well volumes before sampling (LM&S, Interim Data Report (December 1994), page 4-4). Additionally, the groundwater sample was analyzed by an on-site laboratory, which is typically used as a field tool to guide investigations, and consequently does not have the

level of quality assurance associated with qualitative data typically presented in documents of importance such as this PRAP.

RESPONSE 31: The methods used to sample soils and groundwater at G4 was no different than those used at other geoprobe locations on site, and no different than those customarily used with geoprobes in general. Figure 7 clearly establishes the variations in concentrations at the various geoprobe locations, and provides no basis for concluding that the 160,000 ppb of TCE is spread throughout the groundwater.

On-site laboratories, given adequate quality control and quality assurance and split sampling comparison with off-site laboratories, have proven to be efficient and cost-effective analytical resources. And the one used at the Site certainly proved its worth. Qualitatively, 160, 000 ppb of TCE is a very high concentration even assuming a diminished accuracy of the field laboratory.

COMMENT 32: Page 10, Section 4.3 Summary of Human Health Pathways. This section presents a detailed explanation of exposure pathways and provides conceptual risk pathway scenarios for the Site utilizing analytical data while totally ignoring the risk evaluation results of the RI. NYSDEC clearly implies that an unacceptable human health risk exists, when in fact, the calculated human health risk is below the acceptable 10^{-6} standard. The management at Chromalloy is extremely troubled that the NYSDEC has brought the issue of risk to a public forum without completely informing the public of the actual risk and without providing any advance notice to Chromalloy.

Inhalation - The soil removal action performed in 1995 is described in this section followed by an explanation that 93 subsurface soil gas samples were performed from 1991 and 1994 in which "contaminant vapors were present in source areas around the Main Building, particularly at the southwestern corner" and concludes that the indoor inhalation pathway remains for the Main Building. This discussion suggests that VOC soil vapors are being released into the Main Building, presenting an unacceptable human health risk, when in fact, the worker indoor inhalation risk was calculated as 9.0×10^{-7} as compared to the 10^{-6} acceptable risk level.

Ingestion and Dermal Contact - A description of groundwater usage is presented on page 11 including the private wells on the far side of the Hackensack River. The PRAP does specify that these wells are located either upgradient or side-gradient of the Site, which, by the way, precludes Site influence, but that is not stated in the PRAP. However, by immediately stating that these wells have been contaminated with VOCs (although not significantly) without explaining that other sources may exist, and following with the need to monitor these wells alludes to Chromalloy's involvement. The PRAP again fails to adequately describe contribution from other sources and appears to lay fault for all local groundwater conditions upon Chromalloy.

Paragraph 3 and the later portion of this section overstates the risk potential from ingestion and dermal exposure. Ingestion and dermal contact risk was only presented in the PRAP in a qualitative manner. A complete understanding of the potential risk would include a quantitative presentation. Chromalloy strongly believes that the public should be completely informed of the remote potential human health risk. This would include disclosing that worker incidental ingestion contact with the upper portion of the groundwater was calculated at 1.43×10^{-7} and 7.4×10^{-7} for dermal contact.

Risk calculations for the same pathways were performed for construction workers coming into contact with subsurface soils in the former IRM area. These risk calculations were 4.2×10^{-10} and 1.3×10^{-10} for incidental ingestion and dermal contact, respectively. The public should be advised that these risk levels are well below the acceptable 10^{-6} risk level.

RESPONSE 32: The discussion of the soil vapor pathway relative to the on-site building (Section 4.3) is straightforward, noting the data limitations, present uncertainties, and system variables (pressure gradients, ventilation, etc.). The discussion in the RI Report (Section 7.2.2.2 of that document) is unacceptably brief and simplistic. The quantitative presentation in the RI Report relies on very low concentrations of TCE in groundwater and does not consider the most likely precursor to soil vapor contaminants: soil contamination in the unsaturated zone. The analytical results for the Dual Phase Extraction Pilot Test air samples, presented as Appendix I of the Feasibility Study, suggest that significant TCE vapors may be present in the vadose zone beneath the Main Building (several thousand $\mu g/m^3$). Without a proper investigation of indoor air quality, it is difficult to adequately assess the human exposures (if any) to these vapors and the consequent risks.

Regarding the "Ingestion and Dermal Contact" portion of the comment, Section 4.3 states that exposure of facility employees is remote and that inadvertent exposures to future construction workers are not expected to be significant. These statements are consistent with the results of the Commentator's quantitative risk assessment, which showed very low risks for this pathway.

COMMENT 33: Page 12, the PRAP states (again) that periodic monitoring of nearby private wells will continue. The PRAP does not identify who has performed this monitoring nor who will perform future monitoring.

RESPONSE 33: See response 24 above.

COMMENT 34: Page 12, the PRAP states that the source of the TCE contamination in presently used private wells is unknown. The PRAP states that the groundwater plume will be further delineated under OU-II. Again, the PRAP draws inferences towards Chromalloy without disclosing that other potential sources exist. This scope of work for OU-II also contradicts the scope of work agreement reached between the NYSDEC and Chromalloy as referenced in comment 2.

RESPONSE 34: See responses 20 & 24 above.

COMMENT 35: Page 13, the PRAP states that potentially responsible parties for the Site "include" Chromalloy, but says no more, despite the DEC's acknowledgment on page 4 that hazardous waste sites surround the former Chromalloy facility and that the source(s) of TCE in residential wells is unknown. Furthermore, the Carbone facility, among others, has yet to be investigated or exonerated. Chromalloy wishes to emphasize for the record that further investigation is necessary before the final PRP determination can be made.

RESPONSE 35: Comment noted.

COMMENT 36: Page 16, Chromalloy wishes to point out that air monitoring is a standard practice performed during the course of environmental work, that the risks of exposure during site work are insignificant, and that standard work practices will reliably prevent any such exposure.

RESPONSE 36: Comment noted as appropriate for the remedy proposed in the PRAP..

COMMENT 37: Page 19, the PRAP performance standards include indoor air quality as a performance measure to be considered during the design. Indoor air quality is not a factor that can be incorporated into the design of the dual phase extraction system. Environmental Alliance will design the dual phase extraction system so that an overwhelming negative pressure will exist over the soil column, which will draw soil vapor to the capture system and not into the building. As demonstrated below we have no evidence to suggest the indoor air of the building is currently being affected. Therefore, we would anticipate no indoor air impacts from the active remediation system.

Despite the high confidence that vapors will not enter the building during the remedy, Environmental Alliance has modeled the potential vapor intrusion (assuming negative pressure into the building) to determine the risk of TCE subsurface vapor intrusion into the Main Building. The U.S. EPA has recently released the Johnson and Ettinger model for subsurface vapor intrusion into buildings. The modeling assumes that no remedial system is in place and that vapors are generated from the highest groundwater concentration immediately adjacent to the building. The input data included the following:

- Groundwater concentration of 93,000 ug/L taken from the dual phase pilot test groundwater prior to carbon treatment (October 16, 1998).
- Depth of foundation, depth to groundwater and soil stratum thickness.
- Model default factors for permeability, bulk density, soil porosity and other pertinent factors for a silty clay stratum.
- Main Building dimensions.
- One indoor air exchange rate per hour.
- EPA default occupational exposure duration and frequency rates.
- EPA defaults for carcinogens and noncarcinogens averaging time and target risk of 10^{-6}.

The model predicts a vapor intrusion risk of 6.5×10^{-7} which is well above the acceptable 10^{-6} risk under a negative pressure assumption. The model input, calculations and output are provided as **Attachment 1**. The modeling results further support Chromalloy's position that indoor air quality should not be a design performance standard during the design and should not be discussed as a potential concern for the Site.

RESPONSE 37: Groundwater is a poor medium for contaminant transfer into the air. The relevant consideration would be the residual contamination in the vadose zone under the building. Since this data is incomplete, it is prudent to focus on the actual indoor air quality by sampling rather than by computation.

COMMENT 38: The performance standards on pages 18 and 19 do not address the possibility that the remedial system may not be capable of attaining the 5 ppb groundwater remedial goal and that the 5 ppb level is in fact a goal. Page 16 of the PRAP states "TCE concentrations may possibly stabilize at a concentration range above the 5 ppb SCG even under continued operation of Alternative 2." The PRAP acknowledges the technological limitation commonly known as "technical impracticability" in which some chemicals cannot be removed from the environment (especially when encountered in fractured bedrock) to meet ARAR's. The U.S. EPA and numerous state programs have recognized this limitation by providing technical impracticability waivers (40 CFR 300.430(f)(3)) to meeting ARAR's under certain conditions. These conditions include

contaminant control, including natural attenuation, remediation to the practical extent, achieving an acceptable risk level, and demonstration through fate and transport modeling that no receptors will be effected by the plume. Given advanced knowledge that the TCE will reach some asymptotic level, the performance standards should include provisions for a risk assessment of future conditions so as to develop an Alternative Concentration Level along with a provision for natural attenuation.

The following language is offered for consideration:

> "The remedial system shall be maintained operational until: (1) groundwater TCE concentrations reach asymptotic levels for at least two years; (2) a demonstration is made that it is technically impracticable to attain the TCE 5 ppb SCG using the active remediation system; and (3) a risk assessment is performed to develop a protective Alternate Concentration Level. A Natural Attenuation remedial evaluation shall be performed concurrent with the risk assessment to evaluate the expected effectiveness of continued remediation by natural attenuation."

RESPONSE 38: Sufficient time has been provided for natural attenuation to manifest itself. Not all asymptotic conditions are acceptable or due to technical infeasibility. The remedy provides for consideration of additional groundwater recovery well/s should the rate of contaminant mass recovery prove unsatisfactory. An acceptable asymptotic condition has been built into the goals. It is therefore premature to prescribe or consider any other set of year-by-year goals.

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A facsimile of a comment letter was received on March 31, 1999 from Mr. Jonathan L. Levine, the attorney representing homeowners on Pine View Road. Most of the comments in the letter were also expressed by Mr. Levine and Mr. Alan B. McGeorge (working with Mr. Levine on this case) at the March 18, 1999 public meeting. Responses Nos. 1 to 14 above address their verbal comments, and were prepared prior to the receipt of the facsimile. All the comments in the letter have been summarized below, and, where appropriate, reference to previous responses have been made. Comments not addressed above have been responded more fully. For ease of reference the serial numbers of the comments are continuous with those above.

Comment 39: Three homeowners will be without remedy under the proposed plan.
Response 39: See Response 14 above. Two groundwater recovery wells will be installed if the evaluation during the design indicates that an additional well is required. It should be noted that the ROD pertains to OU-I only, and that the RI has yet to be concluded.

Comment 40: The conclusion of no adverse health effects and no contamination in the upper groundwater under and soil on adjacent properties is not borne out by the RI/FS findings.
Response 40: No such conclusions have been drawn. As stated in Section 4.3 of the PRAP, previous soil vapor analyses indicate that vapor contaminants do not appear to be associated with contaminated groundwater away from the facility, specifically in the direction of residential dwellings. The potential for contamination of surface soil with non-TCE contaminants, and consequent exposure (if any), will be evaluated during OU-II (see Section 4.3 of this ROD). Also see Response 7 above.

Comment 41: Testing of groundwater and soil off-site has not been conducted.
Response 41: A selection of private wells and deep monitoring wells have been tested and have been used as the basis for developing the proposed remedy. Shallow wells installed off-site will be tested shortly and independently of the OU-I as part of the on-going RI. Scope of testing of on-site soils is currently being evaluated. The results of the tests will be reviewed to determine the need for off-site testing of soils. Records will be reviewed to ascertain if any releases of persistent chemicals to the surfaces of nearby properties may have occurred in the past because of Chromalloy operations. An off-site surficial investigation will be conducted independently of any other schedule as part of the ongoing RI, if any information warrants such an investigation. Also see Responses 2 and 8 above.

Comment 42: No air sampling has been done in the basements of off-site homes.
Response 42: See Response 8 above.

Comment 43: The pathway of exposure is apparent.
Response 43: See Responses 2 and 8 above. Data from water elevation readings at monitoring well couplets, presented in the RI, indicate a prevailing downward hydraulic gradient.

Comment 44: The remedy should not have to wait for five years to attain its maximum zone of influence.
Response 44: The remedial design will be reviewed and configured to obtain optimal effects of the remedial systems.

Comment 45: Delisting of Pine View Road Wells has caused the investigation and cleanup of the off-site properties to be deferred.
Response 45: See Response 5 above.

Comment 46: Questions posed to former employers were designed by PRP's attorney, and have, therefore, tainted the investigative process.
Response 46: See Response 9 above.

Comment 47: The RI/FS documents at the repositories did not have the interview transcripts, and, therefore, are incomplete documents.
Response 47: See Response 9 above.

Comment 48: The RI/FS should be rejected as inadequate.
Response 48: The RI/FS reports submitted to the NYSDEC has provided sufficient data to formulate the OU-I and address the very severe TCE contamination in the groundwater. The NYSDEC has not deemed the RI/FS as complete in all respects. The ROD for OU-I contemplates that RI will continue.

Comment 49: The Attorney General's Office should be involved in questioning the former employees.
Response 49: Comment will be forwarded to the NYSDEC's Division of Environmental Enforcement.

Comment 50: Groundwater from the Site flows to the north.
Response 50: The RI/FS Reports indicate the groundwater flow patterns at different depths. There seems to be a variation in flow pattern with depth.

Comment 51: When the on-site 300 feet deep well was shut down by Chromalloy many years ago, the nearby homeowners started to draw in the contamination.
Response 51: The NYSDEC has no comparative or historical data to establish "the before and after" shut down groundwater scenario. It is generally true that a change in groundwater usage changes the groundwater flow pattern.

JONATHAN L. LEVINE
Attorney & Counselor at Law

P.O. Box 540
85 New Main Street
Haverstraw, New York 10927
914-947-3700

JONATHAN L. LEVINE

STEVEN R. FABER
LARRY CLAY DILLARD
Of Counsel

Mr. Glenn Angell, Project Manager
NYSDEC - Region 3
21 South Putt Corners Road
New Paltz, N.Y. 12561-1696

Re: Written Comments on PRAP/RIFS - Chromalloy (SEQUA)
Inactive Hazardous Waste Site #344039

Dear Mr. Angell:

The following comments supplement the testimony already reduced to written form in the transcript of the record of the hearing held by the NYSDEC, at Clarkstown Town Hall, on March 18, 1999 and on behalf of the Pineview Road, West Nyack, New York residents, by the undersigned and Alan B. McGeorge, Esq.

1. The remedy contemplated, even assuming it will be effective to its contemplated end, will not remediate all of the properties of the adjacent homeowners.

Assuming the use of two stripping towers and two dual extraction pumps, even at their present intended locations and based upon the documentation attached to the PRAP, will leave three of the homeowners without any remedy whatsoever.

2. The conclusion that there are no adverse health effects and no contamination in the upper ground water and soil on the properties of the adjacent property owners is belied by the facts and/or data contained in the RIFS document.

The RIFS document is replete with factual findings concerning the nature and characteristics of the bedrock underlying the site and the adjacent property owners' properties at Pine View Road.

For example, the raw data indicates that there are multiple fractures in the bedrock between the lower groundwater and the upper groundwater, permitting passage of the contamination from the lower groundwater to the upper groundwater.

3. The NYS DOH did not conduct soil and underground water testing of the residences of the Pine View Road property owners, before reaching their conclusions.

The foregoing is true, notwithstanding the fact that there is evidence that the contamination migrated via the fractures in the bedrock between the lower groundwater and upper groundwater and given the gross contamination in the lower groundwater.

The NYS DOH stated that, in view of the fact that when they tested at the property of the Site, they reached areas as they approached the boundary of the Site, where there was no contamination found to justify further testing outward and onto the properties of the homeowners.

In view of the fractures of the bedrock and the migration of the lower groundwater to the upper groundwater, the fact that there may be "dead spots" at the edge of the Site, is not a sufficient reason to fail to test the soil and upper groundwater of the Pine View residents.

4. No Air testing was done in the basements of the Pine View Road Residents.

It is noted that NYS DOH conducted testing of the air of the basements and lower levels of the buildings on the Site. The fact that the RIFS documents indicate that the ground-water comes within twelve to twenty feet of the basements of the homeowners and given the gross contamination of their lower groundwater and the fractures in the bedrock between the lower groundwater and upper groundwater, testing should have been done in the basements of the residents, for air contamination, prior to coming to the conclusion, without factual basis, that there was no pathway of exposure.

The application of general assumption to defeat the use of fact finding, especially in the area of health effect determination, is contradictory to the spirit and intent of the NYS Environmental Conservation Law, Article 27.

5. The Pathway of Exposure to the Residents of Pine View Road is Apparent.

Given the fractures in the bedrock between the upper groundwater and the lower groundwater in the Pine View Road and Site areas and the gross contamination in the lower groundwater, there was no factual basis upon which to base the conclusion by NYS DOH that there was no pathway of exposure from the source of the contamination, the Site, to the residences and their upper groundwater and soil.

In fact, the factual information furnished in the RIFS documents lead to the conclusion, even without further testing, that pathways of exposure do in fact exist.

6. The Pine View Road Residents should not be made to wait thirty years for cleanup or total remediation, nor should they be made to wait five years in order to determine whether or not the intended remediation plan will be effective.

At the hearing conducted in the Town of Clarkstown Town Hall, the engineer for the NYS DEC stated that the stripping tower and dual extraction pump should be moved from its present intended location further toward the Pine View Road Residences.

In addition, the alternative remediation proposal, which was rejected by NYS DEC and the PRAT, which calls for two stripping towers and two dual extraction pumps should be implemented with the locations of the towers designed to remediate all of the contamination at all of the properties affected by the Site.

The intention of the NYS DEC to wait up to five years to determine the efficacy of the proposed remediation is a burden that should not be placed upon the homeowners, especially given the pathway of exposure created by the fracture zone upon which they live, between the lower groundwater and the upper groundwater.

7. The proposed remedial action plan does not adequately protect the residents of Pine View Road; the promise of the de-listing of the Pine View Road residence from the New York State Registry of Inactive Hazardous Waste Sites, that the listing of the Chromalloy site and investigation and remediation thereof would take care of the concerns and investigation of the Pine View Road Residents has not been fulfilled.

The RIFS documents state that the Pine View Road properties were de-listed because the listing of the Chromalloy Site, upon the New York State Registry of Inactive Hazardous Sites would take care of the investigative and remediation concerns affecting the Pine View Road residents.

It is clear that this has not taken place, to date, and as set forth above and below.

8. The attorneys for the polluter, Chromalloy, have been permitted to unduly interfere in the investigation of the Site.

As is contained in the RIFS documents, the consulting engineers for the polluter, sought the approval of the firm of Morgan, Lewis & Bockius, Esqs., with respect to the efficacy of questions to be posed to former employees of the consentee.

This totally and irrevocably tainted the investigative process herein and makes it impossible for any reasonable person to accept the findings.

9. The RIFS and PRAP documents were not complete at the depositories.

The RIFS and PRAP documents did not contain the answers to the questions posed by the consulting engineers to former employees at the site.

Given the intrusive effect and appearance of impropriety which arises by the law firm of Morgan, Lewis & Bockius upon the behalf of the consentee, at the same time that they were defending the interests of the consentee in third-party litigation, the questions and answers should have been present in the depositories for the public to view and fairly comment thereon.

It is noted that the responses, although absent, are later referred to in coming to the conclusion that not much TCE was utilized at the Site and the conclusion that the TCE waste was shipped offsite to a third party.

First, such comments belie the massive contamination already found.

Second, in sworn testimony in the third party litigation, the defendants stated that there were over two hundred (200) employees actively engaged in the use of TCE in repairing and cleaning jet engine blades, an intensity of use which would require much more raw product than that amount that is accepted as fact in the reasoning process herein.

Third, the conclusion that only a small portion of the premises was utilized for these purposes by the consentee is belied by the same sworn testimony which stated that over three quarters 3/4 of the premises was used for this purpose.

10. The NYS DEC failed to adequately test the Pine View Road residences upper ground water and soil, notwithstanding their apparent ability so to do.

As was pointed out in the testimony given at the said hearing and which is factually substantiated by the raw data in the RIFS documents, there are multiple occasions

where wells were tested by NYS DEC and/or by the consultant for the consentee, which were alongside each other and the testing for the lower groundwater including testing for TCE was conducted,, while the testings of the upper groundwater failed to include analysis for TCE.

Given the large number of instances in which this occurred and the ease with which the testing for TCE could have been done given the proximity of the wells to each other and the fact that testing was done for other purposes on the upper groundwater wells and borings, such behaviour defies common reasoning and common sense, and especially so given the fracture zones in the bedrock between the lower groundwater and the upper groundwater on the Pine View Road residences.

11. This is the second attempt by Chromalloy to prepare a proper RIFS.

This is the second consent order and second RIFS that has been submitted to the NYS DEC. It is noted that the first RIFS was rejected as inadequate. Therefore, a precedent exists for the rejection of this RIFS at this Site, and especially given the problems with the investigation that was conducted as set forth above.

12. The NYS Attorney General's Office should be involved in questioning of former employees of Chromalloy and of all other witnesses who are pertinent to the development of factual basis for the conclusions drawn.

Given the intrusion by the consentee's attorneys and their dual role as attorneys for the consentee and attorneys for a party defendant in a liability case, the Attorney General's office should be brought in, in an active role, on the further investigation of this Site and the RIFS and PRAP.

We incorporate herein, as if more fully set forth hereat, the comments made by Jonathan L. Levine and Alan B. McGeorge at the hearing conducted by the NYS DEC at the Town of Clarkstown Town Hall with respect to the RIFS and PRAP.

13. The geological construction of the bedrock below the Site and below the residences on Pine View Road, the resulting pathways of release, migration and exposure, together with the massive known contamination present in the lower groundwater, together with the known plume of TCE contamination established prior hereto by the NYSDOH, together with the known fact that the ground water below the Pine View Road residences is flowing in a generally northerly direction, from the Site, to and through the residences, the

fact finding process has been skewed, either intentionally or unintentionally, to ignore these facts, make conclusions at variance with the conclusion most closely drawn from the raw data and to prevent the complete remediation of the Pine View Road properties, in order to save money for the consentee and to prevent the true extent of the pollution to be known.

14. The large number of wells employed by the residents of lands in the general area of the Site, on both sides of the Hackensack River, can assume to have acted as pumps, drawing the pollution from the Site, for over a decade, when the 300 foot deep well on the Site, was closed by Chromalloy, without revealing the massive contamination therein to anyone offsite.

Given the geological fracture zone in the bedrock between the upper and lower groundwater throughout the area in the vicinity of the Site, the RIFS as conducted by the consentee, is not only insufficient, but is wholly fraudulent in ignoring the extreme likelihood of the spread of the contamination, not only into the upper groundwater and soil of the Pine View Road residents, but into, under and onto other properties in the vicinity of the Site.

Dated: March 30, 1999
Haverstraw, N.Y.

Very truly yours,

Jonathan L. Levine
Alan B. McGeorge

JLL/hn
cc: Hon. Elliot Spitzer, NYS Attorney General
Residents of Pine View Road
Hon. Alexander J. Gromack, Member of NYS Assembly
Encs.