ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK

REMEDIAL INVESTIGATION REPORT

MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP.

New Windsor, Orange County, New York
NYSDEC Site No. 336037

Prepared for:
New York State
Department of Environmental Conservation

On behalf of:
Kollmorgen Instruments Corporation

DECEMBER 1995

Prepared by:
H2MGROUP

H2M GROUP

REMEDIAL INVESTIGATION REPORT

MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORPORATION

New Windsor, Orange County, New York

NYSDEC Site No. 3-36-037

December 1995

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REMEDIAL INVESTIGATION REPORT
MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORPORATION

New Windsor, Orange County, New York
NYSDEC Site No. 3-36-037

December 1995

1.0 Introduction

1.1 Purpose and Scope

The New York State Department of Environmental Conservation ("NYSDEC") added the Macbeth Division of Kollmorgen Instruments Corporation site ("Macbeth" or "site") to the New York State Registry of Inactive Hazardous Waste Sites in March 1991, with a Class 2 designation. This Remedial Investigation has been performed to comply with NYSDEC's requirements to undertake a Remedial Investigation/Feasibility Study ("RI/FS") at this site in accordance with NYSDEC's Technical and Administrative Guidance Memorandums ("TAGMs") and Applicable or Relevant and Appropriate Requirements ("ARARs"). The RI was performed in accordance with an Order on Consent between NYSDEC and Kollmorgen Instruments Corporation dated February 14, 1994, and a scope of work, appended to the Order, first submitted to NYSDEC on September 8, 1993.

At the time Macbeth was added to the Registry, the only known source of contamination on the Macbeth property had been discovered during previous investigations and removed. The purpose of this RI/FS is to determine if additional source areas of contamination exist on the Macbeth property, to perform field sampling and analysis for additional site characterization, and to characterize the nature and extent of risks posed by the site.

1.2 Background / Summary of Previous Site Investigations

Kollmorgen initiated a site investigation at the Macbeth facility in early 1986. The purpose of the study was to determine the impact past waste disposal practices at Macbeth may have had on the Macbeth property. A Work Plan for a Phase I investigation was transmitted to NYSDEC in August 1986. Comments from NYSDEC dated January 9, 1987, and the outcome of a meeting held at the Macbeth site on February 24, 1987 between NYSDEC, Orange County Department of Health, H2M, and Kollmorgen personnel, were incorporated into the Phase I Investigation. The Phase I Investigation, transmitted in a letter report to NYSDEC dated August 10, 1987, included installation of six monitoring wells at the site. Boring logs developed from monitoring well installation indicated that the overburden, composed of glacial till, was underlain by complex bedrock topography. Groundwater flow direction and velocity through the

overburden and bedrock were variable, and complicated by an apparent north-south trending ridge of bedrock on the eastern portion of the site.

The Phase I letter report and addendum were forwarded to Mr. Kuldeep Gupta in the NYSDEC Bureau of Eastern Remedial Action per NYSDEC Region 3's request in August 1987, prior to the initiation of field work. Field work was completed by the end of 1987. It included the installation of three additional monitoring wells, groundwater sampling for halogenated and non-halogenated volatile organics and metals, stormwater catch basin sediment sampling, and qualitative preliminary soil gas probing with an HNu photoionization detector ("PID"). The results of the Phase I investigation were presented in an H2M report titled *Hydrogeologic Investigation, Macbeth Division of Kollmorgen [Instruments] Corporation, March 1988*, transmitted to NYSDEC on March 11, 1988. Conclusions of the Investigation were as follows:

- An on-site groundwater divide controlled groundwater flow direction in the shallow bedrock zone from the center of the site. Suspect areas of chemical waste disposal were located west of the divide, indicating that potential contaminants in the aquifer system would flow to the west.

- Results of catch basin sediment sampling indicated that the sediment was not contaminated with volatile organic compounds.

- Groundwater sampling results for monitoring well samples obtained in June and September 1987 indicated that in MW-3 and MW-7 contained volatile organic compounds above the NYS Standards and Guidance Values in effect at that time. Groundwater at all locations was unaffected with respect to metals.

- A thorough reconnaissance and preliminary soil gas probing in the wooded area suspected to be the site of previous waste disposal revealed the presence of a mound of solidified plastic-like material. Photoionization detector (PID) responses of 200 ppm were recorded in this area. Corroboration of this location by facility personnel and its proximity to MW-3 indicated that this area was the most likely on-site source of groundwater contamination found in the monitoring wells.

- Additional studies were proposed; they included a more comprehensive qualitative soil gas survey covering the immediate area adjacent to the

southern side of the main building and wooded area, soil sampling, installation of three additional deep bedrock monitoring well couplets to existing shallow bedrock monitoring wells, and groundwater sampling.

A Work Plan to perform the additional studies was transmitted to NYSDEC Region 3 on April 18, 1988. The results of the investigation, transmitted to NYSDEC Region 3 on November 17, 1988, are provided below:

- Results of soil gas probing in the area specified in the work plan (immediately to the rear and east of the facility) indicated that the source area of contamination was limited to the mound of discarded paint waste materials, approximately 40 feet by 45 feet, in the wooded area adjacent to the southeast corner of the Building No. 1, west of the groundwater divide.

- Results of sampling indicated that the mounded area of residual paint waste contained elevated levels of volatile organic compounds. Additional analyses of the paint waste indicated that it did not contain PCBs, was non-reactive, non-corrosive, and not E.P. Toxic (metals). However, the paint waste was ignitable at 29 degrees Celsius. The ignitability characteristic and elevated concentrations of volatile organic compounds, predominantly 1,1,1-trichloroethane, tetrachloroethene, trichloroethene, ethylbenzene, and toluene indicated that removal of the paint waste was warranted. Soil samples obtained from this area and other areas, including areas adjacent to MW-3 and adjacent to the former paint shop and former hazardous waste storage area, were not contaminated with compounds above present NYSDEC cleanup objectives.

- Results of groundwater sampling indicated that toluene, ethylbenzene, total xylenes, 1,1,1-trichloroethane, and 1,1-dichloroethane were present in MW-3 and its deeper bedrock couplet, MW-8 above standards. The remaining monitoring wells did not contain volatile organic compounds in concentrations above standards. The similarity of these compounds to compounds present in the paint waste area, and the proximity of the paint waste area to these monitoring wells, as well as groundwater flow direction and bedrock topography, indicated that contamination in these monitoring wells could be attributed to the paint waste area.

A work plan for removal of the mounded area of paint waste was submitted to NYSDEC in November 1988. The scope of the work plan included the excavation, removal and disposal of the contaminated material, and post-excavation confirmatory sampling to verify that removal of contaminated materials was complete.

The removal effort was documented in a report to NYSDEC dated September 1989. Waste material and soil excavation of the area was performed from January 4 to January 6, 1989. A total of 46 drums of soil/waste residual was generated during removal; these drums were hauled off-site and incinerated by a licensed facility. Fifty cubic yards of soil underlying and adjacent to the paint waste was excavated for disposal to an approved treatment facility/landfill. Laboratory analyses of post-excavation samples were performed using CLP protocols, per NYSDEC request. Post-excavation samples indicated that residual concentrations of total volatile organic compounds were present above 10 ppm (the informal action level provided by NYSDEC) at four locations within the excavation. A second phase of soil removal was performed in response to these results from March 13 to March 15, 1989. An additional forty cubic yards of soil was removed from the area for disposal to an approved treatment facility/landfill. Excavations were advanced until weathered bedrock was encountered. Post-excavation samples indicated that total volatile organic compounds remaining in the soil ranged from 0.009 ppm to 0.067 ppm, well below NYSDEC action levels.

To provide further information about the effectiveness of the removal effort, Macbeth initiated a quarterly on-site groundwater monitoring program, commencing in March 1989. Groundwater samples have been collected quarterly from March 1989 to April 1995 from eight on-site monitoring wells (MW-2, MW-3, MW-4, MW-6, MW-7, MW-8, MW-9, and MW-10); results of each quarterly monitoring event have been reported to NYSDEC and are included in tabular form in Appendix A. Concentrations of toluene, 1,1,1-trichloroethane, 1,1-dichloroethane, ethylbenzene, and xylenes have significantly decreased in MW-3 and MW-8 since removal of the source area was performed in 1989. Groundwater in MW-4, MW-9 and MW-10 have always been below groundwater quality standards, since their installation in 1987 and 1988, with the exception of one or in the case of MW-10, two rounds, which contained compounds slightly above standards. MW-2 has been below groundwater quality standards in all but one round where they were slightly above standards since December 1990. Since 1987, groundwater has been below standards in all but three rounds where they were slightly above standards in MW-6. MW-7 contained compounds above standards in six of eleven rounds conducted prior to May 1991. Since May 1991, only three rounds contained compounds slightly above standards. MW-8, closest to the former waste disposal area, has contained compounds slightly above NYSDEC standards in only two rounds since October 1992.

MW-3 is the only monitoring well where volatile organic compounds are typically found above NYSDEC standards; however, total concentrations since December 1990 have averaged less than 83 ppb.

NYSDOH discovered the presence of volatile organic compounds in nearby homeowner supply wells in late 1990 and early 1991. The highest concentrations were found northeast of Macbeth at 400 Little Britain Road, where volatile organic compounds were found in total concentrations upwards of 19,000 ppb. Results from NYSDOH sampling conducted on January 14, 1991, demonstrated that 1,1,1-trichloroethane, 1,1-dichloroethane, tetrachloroethene, and 1,1-dichloroethene were found in this homeowner domestic supply well at concentrations of 38 ppb, 7 ppb, 4 ppb, and 23 ppb, respectively. These compounds have been present in some Macbeth monitoring wells. Trichloroethene and its degradation compounds, cis/trans-1,2-dichloroethene, and vinyl chloride were found at concentrations of 6,000 ppb, 12,900 ppb, and 400 ppb, respectively. These compounds had not been found in the Macbeth monitoring wells. Trichloroethene and cis/trans-1,2-dichloroethene had, however, been found in the Macbeth supply well, but at concentrations of 27 ppb and 12 ppb respectively. The magnitude of these concentrations at 400 Little Britain Road and the absence of trichloroethene, and its degradation compounds cis\trans-1,2-dichloroethene, and vinyl chloride at these concentrations in the Macbeth on-site monitoring wells suggested that the source of this contamination was unrelated to Macbeth. Although the majority of these volatile organic compounds, specifically trichloroethene, cis/trans-1,2-dichloroethene, and vinyl chloride, had not been found in the Macbeth monitoring wells and may have come from other sources, Macbeth connected this home, and the two others adjacent to it, to municipal water.

Homeowner supply wells to the west of Macbeth were found to contain concentrations of 1,1,1-trichloroethane and 1,1-dichloroethane which were below drinking water standards, with the exception of the wells located at 419 Little Britain Road and 7 Steele Road. Tetrachloroethene was also found in a homeowner supply well west of Macbeth at 431 Little Britain Road above standards in one of eleven quarterly rounds of sampling (October 1991). Macbeth has provided and maintained for these residences granular activated carbon (GAC) filters. Macbeth performed quarterly sampling of all residences along Little Britain Road from Macbeth west to Newburgh Packing, and along Steele Road from Little Britain Road south to 33 Steele Road from 1991 to December 1993. Starting in January 1994, quarterly sampling has been conducted only at the three locations equipped with carbon filters (419 Little Britain Road, 431 Little Britain Road, and 7 Steele Road residence), and at three additional locations on Steele Road (7 Steele Road auto body shop, 25 Steele Road, and 27 Steele Road), where volatile organic compounds have been found, but below NYSDOH standards. Other locations previously monitored quarterly no longer posed a concern, since volatile organic compounds had not been detected for numerous consecutive quarters. Data for homeowner wells is provided in tabular form in Appendix B.

Qualitative soil gas surveying and soil sampling in abandoned leach fields was performed in February 1991 on-site and off-site by H2M with the consent of the respective property owners, in response to the discovery of volatile organic compounds in the homeowner supply wells. Central Hudson Gas and Electric (CHGE), located across the street from Macbeth and adjacent to the 400 Little Britain Road residence where elevated levels of volatile organic compounds not indicative of groundwater underlying the Macbeth site were found, denied H2M access to perform the sampling. Sample locations included leach fields located at 400 Little Britain Road, 330 Little Britain Road, Macbeth Building 1, and the residence and auto repair shop on the eastern boundary of Macbeth (401 Little Britain Road). The soil gas survey revealed concentrations of total organic vapors more than three times background in the driveway of the auto repair shop, the location of the abandoned leach field. Soil sampling at this location was accomplished by H2M with a truck-mounted drilling rig, by the use of split-spoon sampling through hollow stem augers. A representative of NYSDEC Region 3 was present during part of the sampling activities. The results indicate that elevated levels of xylenes, ethylbenzene, and 1,1,1-trichloroethane below NYSDEC cleanup objectives were present in the auto repair shop soils at depths of up to nine feet below grade. These compounds were not typical of contaminants found across the street, at the 400 Little Britain Road homeowner well. Neither elevated total organic vapors nor volatile organic compounds were present in any of the other abandoned leach field soil samples investigated by H2M, where samples were obtained using a powered hand auger and bucket auger.

In 1992, Central Hudson Gas & Electric (CHGE) was assigned a site number, No. 336042, by NYSDEC. In June 1995, as part of Preliminary Site Assessment (PSA) field work, soil gas samples were collected by CHGE's consultant. Results of the soil gas survey indicated that a number of locations contained volatile organic compounds, predominantly trichloroethene and its degradation compounds, cis/trans-1,2-dichloroethene, and vinyl chloride, at elevated levels. These compounds were among those found in the homeowner well located at 400 Little Britain Road, adjacent to the CHGE property.

With Macbeth's reduction of painting operations in 1991, the need for storage of paints and hazardous wastes on-site was significantly reduced. As a result, the paint storage building and hazardous waste storage area were removed in November 1991. Sampling of soils from beneath the former building was conducted. Laboratory analyses of these soils showed that soils were not contaminated. Two volatile organic compounds were found at one sample location (0.018 ppm of methylene chloride and 0.008 ppm of trichlorofluoromethane) orders of magnitude below NYSDEC cleanup objectives. Results were documented in a letter report by H2M titled *Report on the Closure of the Paint Shed and Hazardous Waste Storage Area*, transmitted to NYSDEC on April 15, 1993.

1.3 Conclusions of Pre-RI/FS Investigations

The only known source of contamination on the Macbeth property was discovered during previous investigations and removed. Since removal of this source area, groundwater in on-site monitoring wells, including groundwater leaving the site, has not typically contained volatile organic compounds in the zones monitored above standards with the exception of MW-3, which is closest to the former source area, but not at the site boundary and therefore not indicative of groundwater leaving the Macbeth site. On-site and off-site soil sampling have been performed in response to the homeowner well contamination at 400 Little Britain Road, along Steele Road, and west of Macbeth along Little Britain Road, since removal of the source area. Soil samples were obtained by H2M in February 1991 on-site at the Macbeth abandoned leach field as well as at off-site leach fields located at 400 Little Britain Road, 330 Little Britain Road, and the residence and auto repair shop on the eastern boundary of Macbeth at 401 Little Britain Road. Elevated levels below NYSDEC cleanup objectives of some volatile organic compounds not indicative of those compounds found across the street at 400 Little Britain Road were present in soils at the auto repair shop. Volatile organic compounds were not present in any of the other soil samples. In 1995, soil gas sampling performed by CHGE's consultanton the CHGE property indicated that volatile organic compounds which are among those predominantly found in the homeowner well located at 400 Little Britain Road, are present in soil gas on the CHGE property.

2.0 Site Description and Physical Setting

Characterization of the Macbeth site began when investigations at the facility were initiated in 1986. The following sections provide a description of the site and its physical setting as developed for the site from 1986 through the completion of the RI.

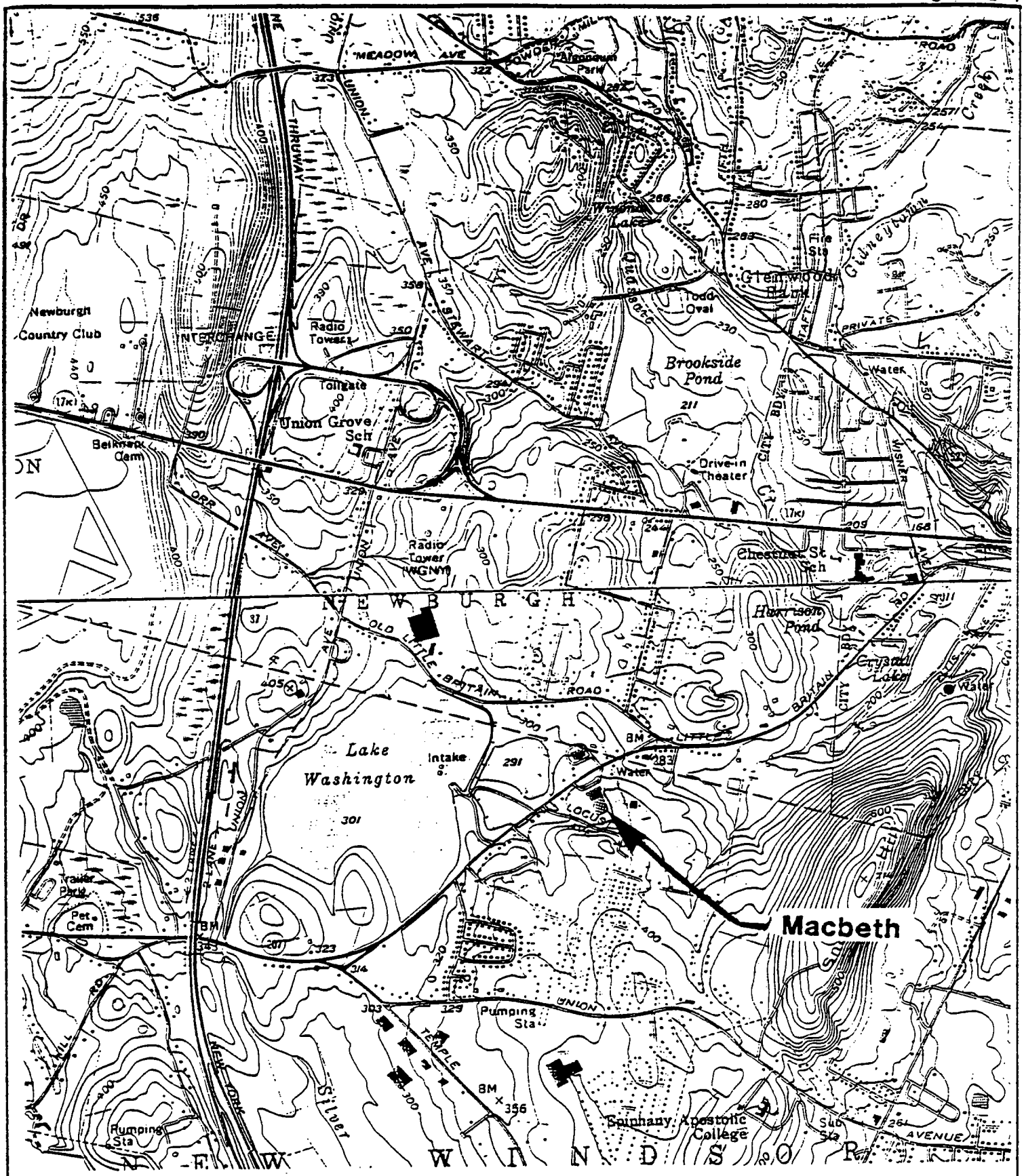
2.1 Location and Site Description

The Macbeth facility is located at 405-415 Little Britain Road (New York State Route 207) in New Windsor, Orange County, New York (Figure 2-1). It lies approximately 2.5 miles west of the Hudson River and within 0.5 mile east of Lake Washington Reservoir and Lockwood Basin (a stilling basin, or pool used to protect against scour below dams). The site (Figure 2-2) is occupied by two buildings surrounded by paved parking areas and driveways. The main building (Building No. 1) is approximately 62,400 square feet; Building No. 2, constructed in the mid-1970s, is approximately 14,600 square feet. The main building consists of office space and assembly areas, used for the development and assembly of software and instrumentation related to the evaluation and control of color systems. Building No. 2 is currently unoccupied. The total land area is approximately 25 acres, and includes wooded and grassy, hilly landscape. Overall relief of the site is approximately sixty feet.

2.2 Local Land Use

The site is located in an area of New Windsor which is primarily rural and residential. A number of commercial/light industrial facilities are also present. Figure 2-3 provides a regional site map of these locations. The immediate area west of the facility along Little Britain Road and Steele Road is not serviced by municipal water. The area is serviced by municipal sewers. H2M confirmed individual hook-ups to the municipal sewer system with area residents in 1991.

H2M has studied both the historic and present commercial/light industrial usage of the immediate Macbeth area. Aerial photographs were obtained for the period from 1953 to 1980 to obtain additional information for the study, as well as to identify potential areas of concern at Macbeth and in the surrounding area. At least seven different industrial/commercial operations have been conducted at sites in the immediate Macbeth vicinity; these sites include Macbeth (405 - 415 Little Britain Road), J&H Smith Manufacturing Co. Inc. (410 Little Britain Road-currently at 499 Little Britain Road as J&H Smith Light Corp.), Central Hudson Gas & Electric (which has occupied the former J&H Smith site since 1977), B & H Auto (401 Little Britain Road) Burgess Sign (412 Little Britain Road), the Auto Finishing Line (7 Steele Road), and Newburgh Packing (439 Little Britain Road). Results of the aerial photograph study indicated that the Macbeth facility has expanded, including additions to the original building (Building 1), construction of one additional building (Building 2), clearing and paving for new parking areas, and construction of storage size buildings, since the original facility was built. The aerial photographs revealed



LOCATION MAP

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

SCALE: 1:24000

N

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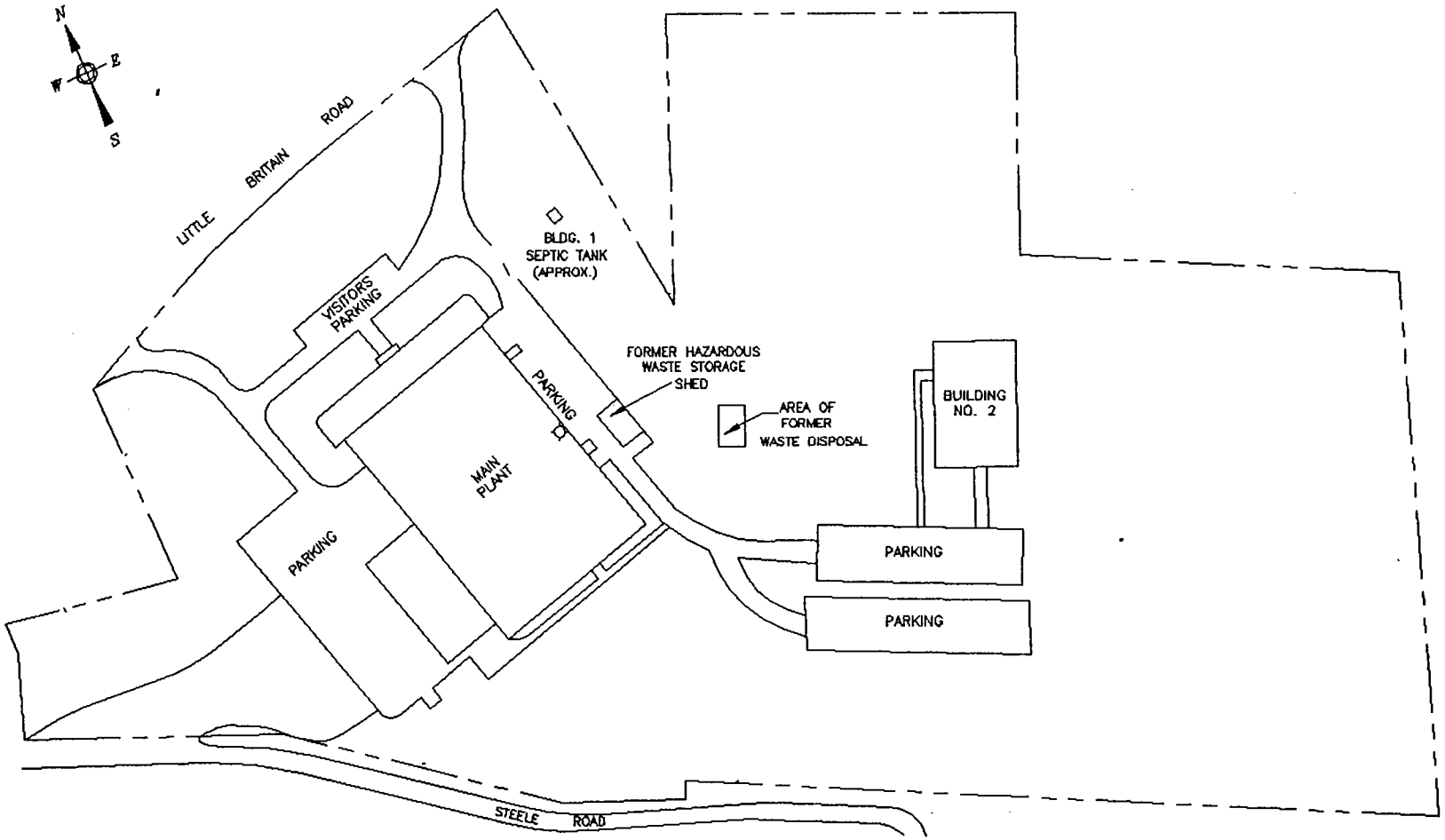
MELVILLE, N.Y. — TOTOWA, N.J.



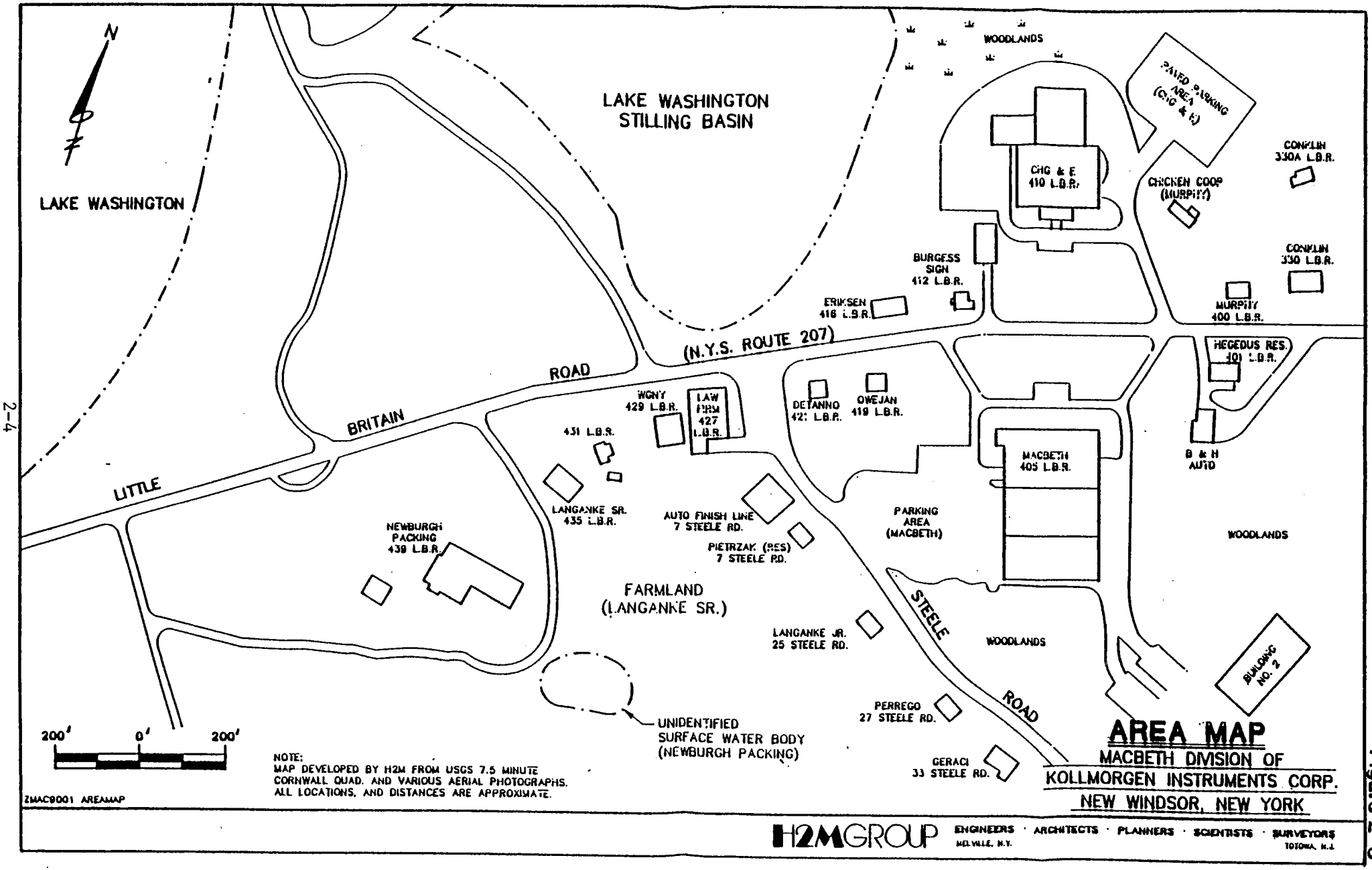
SITE MAP

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

APPROXIMATE SCALE:
125' 0 125'

H2MGROUP ENGINEERS ARCHITECTS PLANNERS SCIENTISTS SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-2



NOTE:
MAP DEVELOPED BY H2M FROM USGS 7.5 MINUTE CORNWALL QUAD. AND VARIOUS AERIAL PHOTOGRAPHS. ALL LOCATIONS, AND DISTANCES ARE APPROXIMATE.

ZMAC9001 AREAMAP

AREA MAP

MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP.

NEW WINDSOR, NEW YORK

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MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-3

no areas of concern on the Macbeth property. Results of the aerial photograph study, as well as a summary of land acquisition and building construction dates for Macbeth, were previously provided to NYSDEC in the August 1994 *Remedial Investigation Work Plan, Field Sampling Plan* (H2M).

2.3 Climate

The climate of the Hudson Valley area is for the most part continental, with winds blowing predominantly from the west towards the Atlantic Ocean. From October to April the prevailing winds are from the northwest; from May to September southwest winds prevail. Summer weather patterns are dominated by tropical air masses while winter weather patterns are controlled by polar air masses. In Orange County, the period between late-April and late-October is typically frost-free. Average mean annual temperature in the county is 51.6 degrees; average mean annual precipitation is 48.01 inches. The average relative humidity ranges from 60% in the mid-afternoon to 80% at dawn. The prevailing wind is from the southwest; average wind speed is highest in April, at ten miles per hour.

2.4 Soils

Surface soils in the immediate Macbeth region are composed of unconsolidated glacial till. The soils on the Macbeth property, and to the immediate north and west, are defined as the Mardin gravelly silt loam - 8 to 15 percent slopes ("MdC"), and the Swartswood and Mardin very stony soils - sloping ("SXC"). Loam consists of soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles. The following paragraphs provide soil descriptions for each soil type in greater detail.

MdC Soils

These moderately well drained soils are formed in glacial till deposits derived from sandstone, shale, and slate. It commonly receives runoff from adjacent soils. The upper layers of soil consist of dark brown and yellowish brown gravelly silt loam, with a leached layer of mottled, pale brown gravelly silt loam. Underlying these soils is a firm, olive brown fragipan layer. Fragipan is a loamy, brittle sub-surface horizon which appears cemented; it is typically low in porosity and organic content. The water table is perched above the fragipan during the spring and other excessively wet periods. Permeability is low to moderate in the surface soil and sub-soil layers, and very low in the fragipan. Infiltration rates in the soil range from 0.6 to 2.0 inches per hour.

SXC Soils

These well drained and moderately well drained soils are composed of gravelly loam, gravelly silt loam, and gravelly fine sand loam. A firm olive brown fragipan typically underlies the soils, and is also

subject to perched water table conditions due to its low permeability. Infiltration rates range from 0.6 to 2.0 inches per hour, as in the MdC soils.

Soils to the northeast of Macbeth and on portions of the Central Hudson Gas & Electric (CHGE) property are composed of Pittsfield soils, a more permeable gravelly loam not typically subject to perched water table conditions, with higher infiltration rates ranging from 2.0 to 6.0 inches per hour.

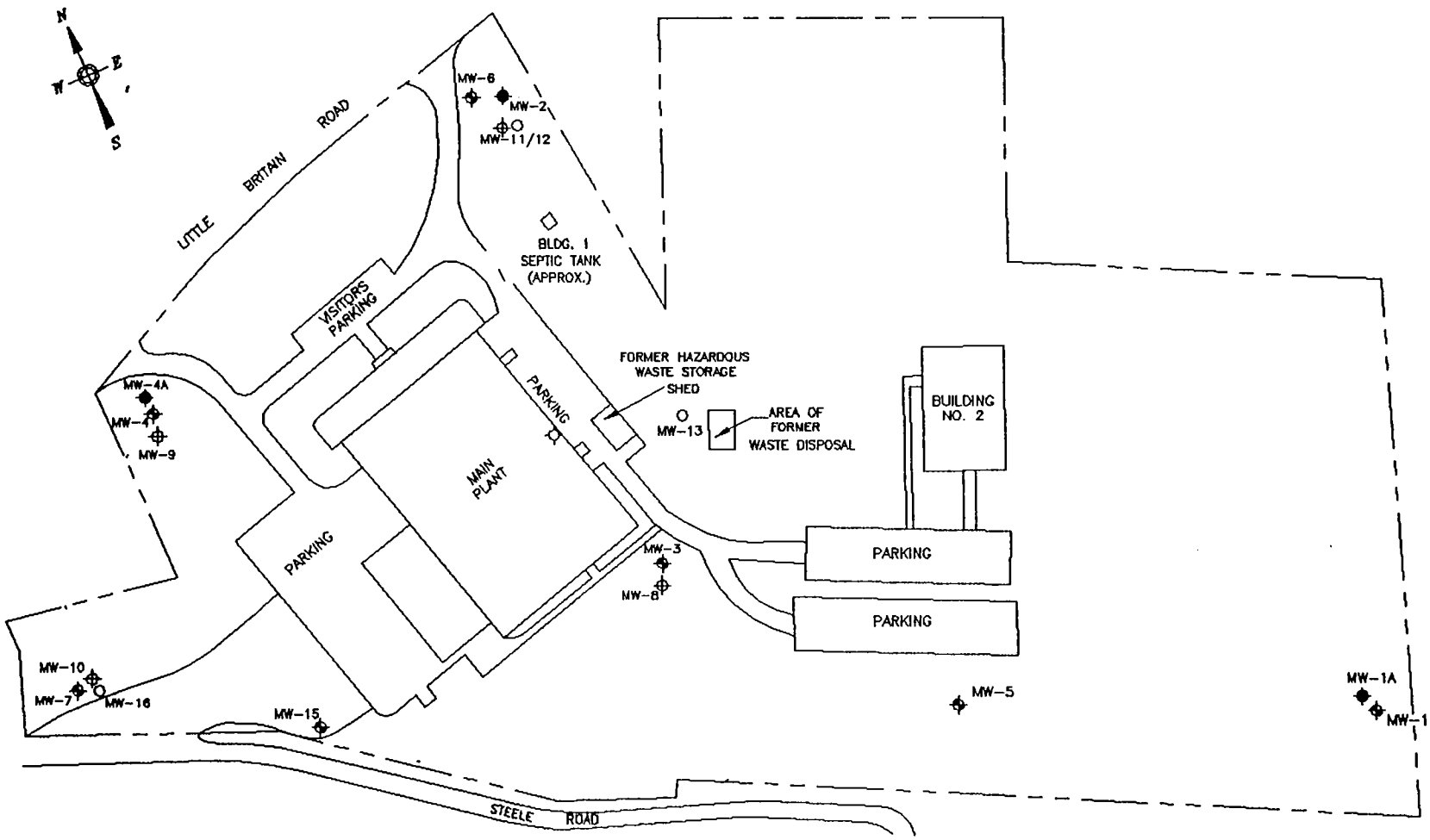
2.5 Geology and Hydrogeology

Seventeen monitoring wells have been installed as part of previous site investigations and the RI Investigation on the Macbeth site to evaluate sub-surface conditions and groundwater quality. The locations of these wells is provided in Figure 2-4. A summary of monitoring well construction details for Macbeth is provided in Table 2-1. These wells were installed within overburden, shallow bedrock, and deeper bedrock zones. Bi-monthly rounds of water levels were required after completion of RI monitoring well installation. This information is presented in Tables 2-2 through 2-5. Water levels concurrent with groundwater sampling originally scheduled for March were performed in April, concurrently with the quarterly residential monitoring.

2.5.1 Overburden

The overburden at the Macbeth site is composed of unconsolidated glacial till. Thickness of the overburden on the site as determined during monitoring well installation ranges from less than one foot at bedrock outcrops along the eastern driveway to thirty feet at MW-2, in the northeastern corner of the property. The till is composed of fine to coarse sands, gravel, and silt, with dense fragipan layers and boulders at some locations.

The overburden at the Macbeth site contains both saturated and unsaturated zones. This layer of till above the bedrock is not considered a significant water bearing zone due to its low permeability and thickness. A slug test performed in MW-1A during previous investigations yielded a computed hydraulic conductivity value of 3x10-6 ft./second. The rate of groundwater flow through the overburden most likely exhibits high variability due to the variable thickness and permeability of this zone. No data could be found for supply wells installed in these deposits. It is doubtful that any such wells exist, as water cannot be readily removed from the till in quantities suitable for commercial or domestic needs. The water table forms the upper boundary of this unconfined flow system; bedrock forms the lower boundary. Infiltration in the unsaturated zone of the till is vertical. The saturated thickness of this unit ranges from 0 at MW-5 (the location of a ridge of bedrock which forms a groundwater divide) to 15 feet at MW-2 on the Macbeth site. Groundwater flow direction in this zone on the Macbeth site most likely flows in the direction of slope of the bedrock surface. Figure 2-5 provides an overburden groundwater elevation map developed from



LEGEND

MW-1A ◆ OVERBURDEN MONITORING WELL

MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL

MW-8 ⊕ INTERMEDIATE BEDROCK MONITORING WELL

MW-12 ○ DEEP BEDROCK MONITORING WELL

MONITORING WELL LOCATION MAP

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
DECEMBER 1995

APPROXIMATE SCALE:

125' 0 125'

H:\ZMAC9401:\94|RIFS:\GDWATER:\WELLS

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Figure 2-4

H2MGROUP

Table 2-1
Summary Matrix of Monitoring Well Construction Details
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

Owner's Well No.	Total Well Depth (ft.)	Riser Diam (in.)	Riser Length (ft.)	Screen Length (ft.)	Screen Diam. (in.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Overburden Thickness	Bedrock Surface Elevation (a)
					Overburden Wells					
MW-1A	26.2	2	13.2	13.0	2	339.81	326.64	313.64	NE	NE
MW-2	36.9	2	26.9	10.0	2	311.11	284.18	274.18	NE	NE
MW-4A	15.7	2	5.7	10.0	2	321.76	316.07	306.07	NE	NE
					Shallow Bedrock Wells					
MW-1	47.6	3	32.6	15.0	2	339.63	307.02	292.02	25	315
MW-3	41.5	3	21.5	20.0	2	332.56	311.04	291.04	15	318
MW-4	36.7	3	22.7	14.0	2	322.18	299.49	285.49	17	306
MW-5	29.9	3	18.3	11.6	2	346.03	327.72	316.12	11	335
MW-6	55.8	3	36.8	19.0	2	310.81	273.99	254.99	29	282
MW-7	43.9	3	23.9	20.0	2	320.04	296.19	276.19	17	303
MW-15	60.2	2	40.2	20.0	2	327.49	287.29	267.29	16	311
					Intermediate Bedrock Wells					
MW-8	87.6	4	57.6	30.0	2.95	332.23	274.59	244.59	17	316
MW-9	78.3	4	48.3	30.0	2.95	322.44	274.10	244.10	17	305
MW-10	85.3	4	55.3	30.0	2.95	320.23	264.90	234.90	18	303
MW-11	88.9	4	63.9	25.0	4	308.20	244.30	219.30	26	282
					Deep Bedrock Wells					
MW-12	142.4	8	88.4	54.0	8	307.98	219.58	165.58	26	282
MW-13	120.2	4	90.2	30.0	4	345.18	254.98	224.98	5	341
MW-16	123.7	4	93.7	30.0	4	321.52	227.82	197.82	17	305

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.

Table 2-2
Groundwater Elevation - January 11, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

Owner's Well No.	Total Well Depth (ft.)	Riser Length (ft.)	Screen Length (ft.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (a)	Groundwater Elevation
				Overburden Wells				
MW-1A	26.2	13.2	13.0	339.81	326.64	313.64	9.49	330.32
MW-2	36.9	26.9	10.0	311.11	284.18	274.18	16.42	294.69
MW-4A	15.7	5.7	10.0	321.76	316.07	306.07	Dry	Dry
				Shallow Bedrock Wells				
MW-1	47.6	32.6	15.0	339.63	307.02	292.02	14.39	325.24
MW-3	41.5	21.5	20.0	332.56	311.04	291.04	18.79	313.77
MW-4	36.7	22.7	14.0	322.18	299.49	285.49	21.47	300.71
MW-5	29.9	18.3	11.6	346.03	327.72	316.12	10.50	335.53
MW-6	55.8	36.8	19.0	310.81	273.99	254.99	21.51	289.30
MW-7	43.9	23.9	20.0	320.04	296.19	276.19	31.79	288.25
MW-15	60.2	40.2	20.0	327.49	287.29	267.29	42.47	285.02
				Intermediate Bedrock Wells				
MW-8	87.6	57.6	30.0	332.23	274.59	244.59	11.82	320.41
MW-9	78.3	48.3	30.0	322.44	274.10	244.10	59.13	263.31
MW-10	85.3	55.3	30.0	320.23	264.90	234.90	72.67	247.56
MW-11	88.9	63.9	25.0	308.20	244.30	219.30	65.96	242.24
				Deep Bedrock Wells				
MW-12	142.4	88.4	54.0	307.98	219.58	165.58	106.75	201.23
MW-13	120.2	90.2	30.0	345.18	254.98	224.98	102.90	242.28
MW-16	123.7	93.7	30.0	321.52	227.82	197.82	78.01	243.51

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.

Table 2-3
Groundwater Elevations - April 19, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

Owner's Well No.	Total Well Depth (ft.)	Riser Length (ft.)	Screen Length (ft.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (a)	Groundwater Elevation
				Overburden Wells				
MW-1A	26.2	13.2	13.0	339.81	326.64	313.64	10.63	329.18
MW-2	36.9	26.9	10.0	311.11	284.18	274.18	17.92	293.19
MW-4A	15.7	5.7	10.0	321.76	316.07	306.07	Dry	Dry
				Shallow Bedrock Wells				
MW-1	47.6	32.6	15.0	339.63	307.02	292.02	16.54	323.09
MW-3	41.5	21.5	20.0	332.56	311.04	291.04	21.36	311.20
MW-4	36.7	22.7	14.0	322.18	299.49	285.49	23.68	298.50
MW-5	29.9	18.3	11.6	346.03	327.72	316.12	12.97	333.06
MW-6	55.8	36.8	19.0	310.81	273.99	254.99	22.99	287.82
MW-7	43.9	23.9	20.0	320.04	296.19	276.19	31.99	288.05
MW-15	60.2	40.2	20.0	327.49	287.29	267.29	23.76	303.73
				Intermediate Bedrock Wells				
MW-8	87.6	57.6	30.0	332.23	274.59	244.59	13.24	318.99
MW-9	78.3	48.3	30.0	322.44	274.10	244.10	59.72	262.72
MW-10	85.3	55.3	30.0	320.23	264.90	234.90	74.68	245.55
MW-11	88.9	63.9	25.0	308.20	244.30	219.30	56.68	251.52
				Deep Bedrock Wells				
MW-12	142.4	88.4	54.0	307.98	219.58	165.58	66.51	241.47
MW-13	120.2	90.2	30.0	345.18	254.98	224.98	104.04	241.14
MW-16	123.7	93.7	30.0	321.52	227.82	197.82	79.25	242.27

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.

Table 2-4
Groundwater Elevations - June 14, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

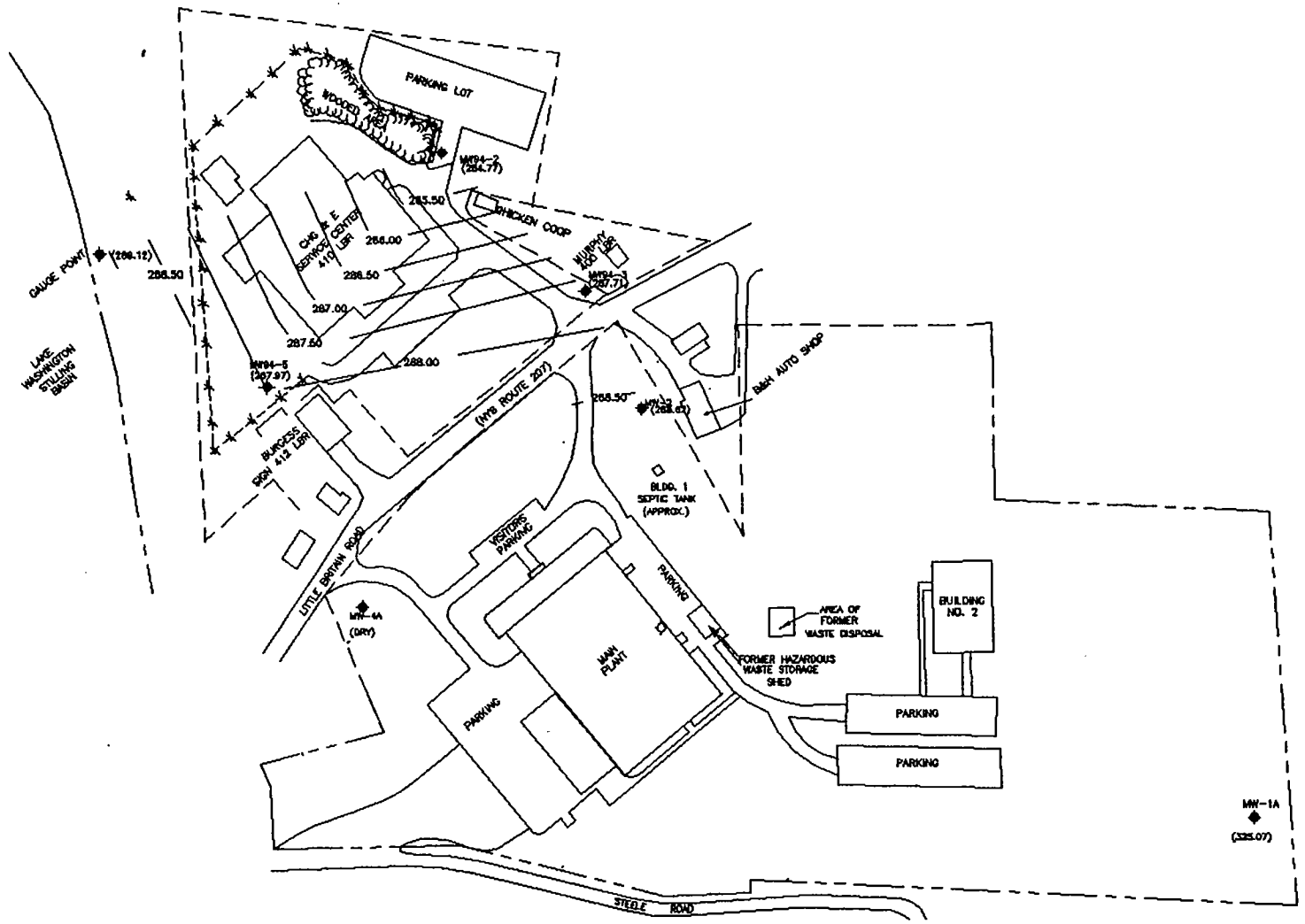
Owner's Well No.	Total Well Depth (ft.)	Riser Length (ft.)	Screen Length (ft.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (a)	Groundwater Elevation
				Overburden Wells				
MW-1A	26.2	13.2	13.0	339.81	326.64	313.64	12.75	327.06
MW-2	36.9	26.9	10.0	311.11	284.18	274.18	20.60	290.51
MW-4A	15.7	5.7	10.0	321.76	316.07	306.07	Dry	Dry
				Shallow Bedrock Wells				
MW-1	47.6	32.6	15.0	339.63	307.02	292.02	19.64	319.99
MW-3	41.5	21.5	20.0	332.56	311.04	291.04	21.84	310.72
MW-4	36.7	22.7	14.0	322.18	299.49	285.49	30.79	291.39
MW-5	29.9	18.3	11.6	346.03	327.72	316.12	18.85	327.18
MW-6	55.8	36.8	19.0	310.81	273.99	254.99	24.82	285.99
MW-7	43.9	23.9	20.0	320.04	296.19	276.19	33.68	286.36
MW-15	60.2	40.2	20.0	327.49	287.29	267.29	30.99	296.50
				Intermediate Bedrock Wells				
MW-8	87.6	57.6	30.0	332.23	274.59	244.59	14.81	317.42
MW-9	78.3	48.3	30.0	322.44	274.10	244.10	59.19	263.25
MW-10	85.3	55.3	30.0	320.23	264.90	234.90	77.01	243.22
MW-11	88.9	63.9	25.0	308.20	244.30	219.30	67.58	240.62
				Deep Bedrock Wells				
MW-12	142.4	88.4	54.0	307.98	219.58	165.58	67.72	240.26
MW-13	120.2	90.2	30.0	345.18	254.98	224.98	106.39	238.79
MW-16	123.7	93.7	30.0	321.52	227.82	197.82	81.74	239.78

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.

Table 2-5
Groundwater Elevations - August 21, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

Owner's Well No.	Total Well Depth (ft.)	Riser Length (ft.)	Screen Length (ft.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (a)	Groundwater Elevation
Overburden Wells								
MW-1A	26.2	13.2	13.0	339.81	326.64	313.64	14.74	325.07
MW-2	36.9	26.9	10.0	311.11	284.18	274.18	22.49	288.62
MW-4A	15.7	5.7	10.0	321.76	316.07	306.07	Dry	Dry
Shallow Bedrock Wells								
MW-1	47.6	32.6	15.0	339.63	307.02	292.02	22.72	316.91
MW-3	41.5	21.5	20.0	332.56	311.04	291.04	22.24	310.32
MW-4	36.7	22.7	14.0	322.18	299.49	285.49	30.72	291.46
MW-5	29.9	18.3	11.6	346.03	327.72	316.12	22.72	323.31
MW-6	55.8	36.8	19.0	310.81	273.99	254.99	26.67	284.14
MW-7	43.9	23.9	20.0	320.04	296.19	276.19	33.59	286.45
MW-15	60.2	40.2	20.0	327.49	287.29	267.29	27.46	300.03
Intermediate Bedrock Wells								
MW-8	87.6	57.6	30.0	332.23	274.59	244.59	15.85	316.38
MW-9	78.3	48.3	30.0	322.44	274.10	244.10	59.36	263.08
MW-10	85.3	55.3	30.0	320.23	264.90	234.90	75.74	244.49
MW-11	88.9	63.9	25.0	308.20	244.30	219.30	67.69	240.51
Deep Bedrock Wells								
MW-12	142.4	88.4	54.0	307.98	219.58	165.58	67.52	240.46
MW-13	120.2	90.2	30.0	345.18	254.98	224.98	104.65	240.53
MW-16	123.7	93.7	30.0	321.52	227.82	197.82	80.20	241.32

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.



LEGEND

MW-1A ◆ OVERBURDEN MONITORING WELL

OVERBURDEN GW ELEV.
MACBETH & CHGE
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
AUGUST 21, 1995
CONTOUR INTR. .50 FT.

APPROXIMATE SCALE:
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. NEWPORT BEACH, CA. TOTOWA, N.J.

Figure 2-5

data collected at Macbeth and CHGE on August 21, 1995 (Table 2-6). Monitoring well specifications for Macbeth and CHGE monitoring wells used in the contour map are provided in Table 2-7. The contour map indicates that groundwater flow in the overburden as it leaves the Macbeth site is to the northeast in the northeastern section of the property; groundwater does not occur in the overburden in the northwestern portion of the property, at MW-4A. Groundwater leaving the site in the overburden at MW-2 contains no volatile organic compounds above NYSDEC standards. Groundwater on the CHGE property in the overburden flows to the east and northeast.

2.5.2 Bedrock

2.5.2.1 Introduction

Bedrock underlying the site is the gray dolostone of the Wappinger Group. Open fractures within the rock mass provide conduits for fluid flow through an otherwise relatively impermeable media. Major factors affecting groundwater flow through fractured rock include fracture density, orientation, effective aperture width, and the nature of the rock matrix. Fracture density and orientation are important determinants of the degree of interconnectivity of fracture sets, which is a critical feature contributing to the hydraulic conductivity of a fractured rock system. Groundwater flow paths are provided only by interconnected fractures; fractures oriented parallel to the hydraulic gradient are more likely to provide effective pathways then fractures oriented perpendicular to the hydraulic gradient. Geologic studies performed by H2M in the area indicate that the outcrop along the eastern driveway and the predominant bedrock underlying the site is the massive Stissing Dolostone member of the Wappinger Group, of Cambrian age. It appears that the younger Pine Plains member of the Wappinger overlies the Stissing along the southern portion of the site and in outcrop on the Macbeth site and on Steele Road, to the west. The Pine Plains formation is characterized by its extreme lithologic variability, exhibiting diverse textures and bedding. The contact between the two members on the Macbeth site is marked by a fault, the contact of which is mappable for 36 feet. The contact is characterized by a three foot zone of sub-angular breccia (rock fragments) overlying altered dolostone (Stissing). Chert nodules and quartz cobbles with no preferred orientation are also present in the breccia zone. The Pine Plains is visibly more fractured than the Stissing in the outcrops observed as part of this study; fracture frequency was measured to be an order of magnitude greater in the Pine Plains than in the Stissing. The preferred fracture orientations of these units in the Macbeth area were measured by H2M to be to the south-southeast and southwest. The orientation of fractures measured in the Macbeth area concurs with previous results published by the New York State Museum and Science Service for the region.

Rock cores were obtained during monitoring well installation performed in 1987 and 1988 to characterize bedrock underlying the site at depths to 80 feet below grade. The cores collectively illustrated that the upper bedrock is a moderately permeable zone which contains fractures in what is probably the

Table 2-6
Groundwater Elevations - August 21, 1995
Central Hudson Gas & Electric / Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

Owner's Well No.	Total Well Depth (ft.)	Riser Length (ft.)	Screen Length (ft.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (a)	Groundwater Elevation
				Overburden Wells				
MW-1A	26.2	13.2	13.0	339.81	326.64	313.64	14.74	325.07
MW-2	36.9	26.9	10.0	311.11	284.18	274.18	22.49	288.62
MW-4A	15.7	5.7	10.0	321.76	316.07	306.07	Dry	Dry
MW-94-2	14.0	3.67	10.0	297.87	283.87	280.20	NP	284.77
MW-94-3	20.0	4.79	15.0	303.89	283.89	279.10	NP	287.71
MW-94-5	16.0	7.43	10.0	297.62	281.62	274.19	NP	287.97
				Shallow Bedrock Wells				
MW-1	47.6	32.6	15.0	339.63	307.02	292.02	22.72	316.91
MW-3	41.5	21.5	20.0	332.56	311.04	291.04	22.24	310.32
MW-4	36.7	22.7	14.0	322.18	299.49	285.49	30.72	291.46
MW-5	29.9	18.3	11.6	346.03	327.72	316.12	22.72	323.31
MW-6	55.8	36.8	19.0	310.81	273.99	254.99	26.67	284.14
MW-7	43.9	23.9	20.0	320.04	296.19	276.19	33.59	286.45
MW-15	60.2	40.2	20.0	327.49	287.29	267.29	27.46	300.03
MW-94-1B	24.5	10.67	13.5	295.24	270.74	260.07	NP	285.30
MW-94-2B	29.5	13.41	16.0	298.61	269.1	255.7	NP	284.71
MW-94-4B2	82.8	62.52	20.0	299.42	216.6	154.1	NP	285.37

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.
NP - Not provided.

Table 2-7
Summary Matrix of Monitoring Well Construction Details
Central Hudson Gas & Electric / Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

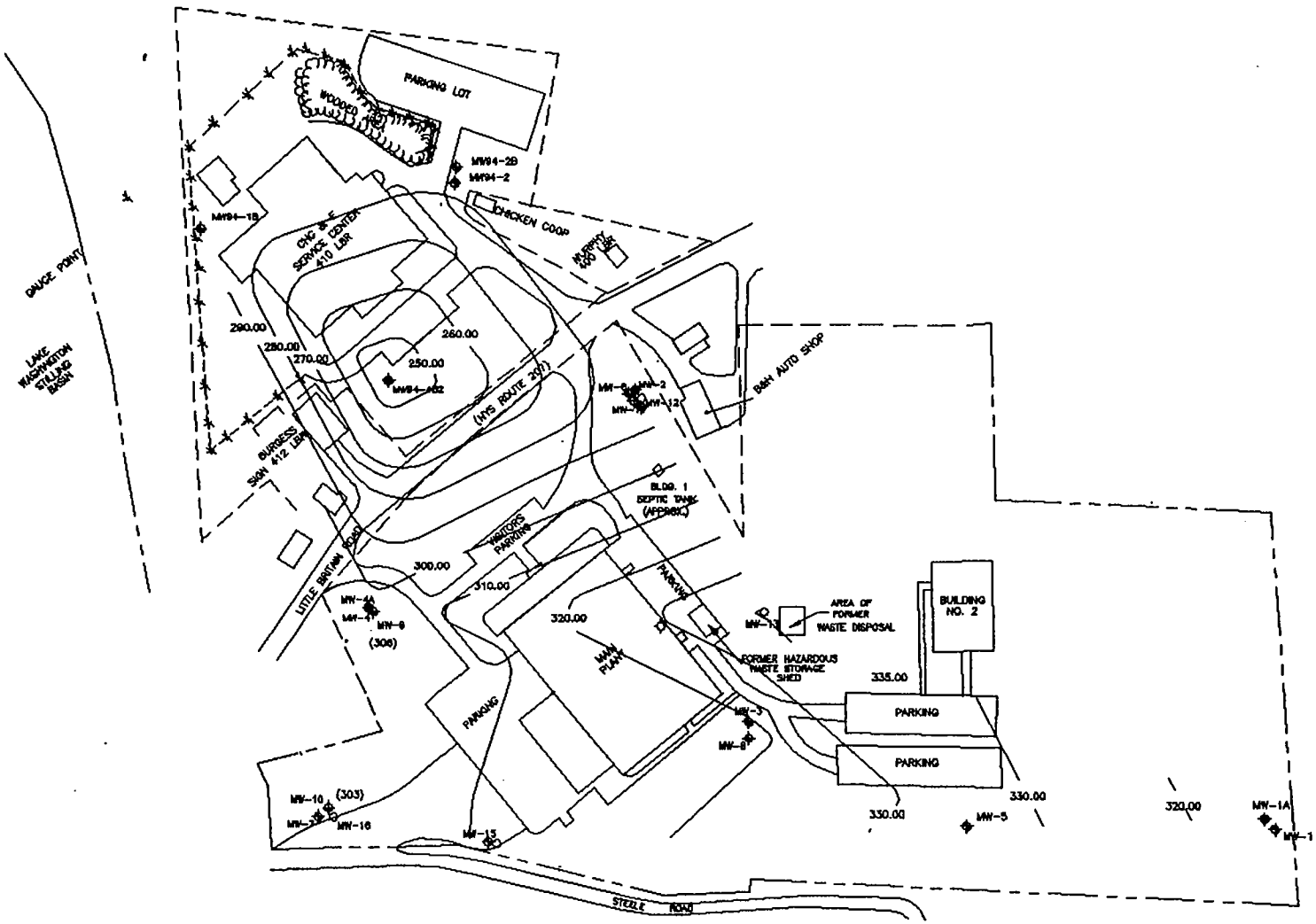
Owner's Well No.	Total Well Depth (ft.)	Riser Diam.(in.)	Riser Length (ft.)	Screen Length (ft.)	Screen Diam. (in.)	Well Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Overburden Thickness	Bedrock Surface Elevation (a)
Macbeth Overburden Wells										
MW-1A	26.2	2	13.2	13.0	2	339.81	326.64	313.64	NE	NE
MW-2	36.9	2	26.9	10.0	2	311.11	284.18	274.18	NE	NE
MW-4A	15.7	2	5.7	10.0	2	321.76	316.07	306.07	NE	NE
Central Hudson Overburden Wells										
MW-94-2	14.0	2	3.67	10.0	2	297.87	294.20	284.20	14.0	284.2
MW-94-3	20.0	2	4.79	15.0	2	303.89	299.10	284.10	>45	NE
MW-94-5	16.0	2	7.43	10.0	2	297.62	290.19	280.19	NE	NE
Macbeth Shallow Bedrock Wells										
MW-1	47.6	3	32.6	15.0	2	339.63	307.02	292.02	25	315
MW-3	41.5	3	21.5	20.0	2	332.56	311.04	291.04	15	318
MW-4	36.7	3	22.7	14.0	2	322.18	299.49	285.49	17	306
MW-5	29.9	3	18.3	11.6	2	346.03	327.72	316.12	11	335
MW-6	55.8	3	36.8	19.0	2	310.81	273.99	254.99	29	282
MW-7	43.9	3	23.9	20.0	2	320.04	296.19	276.19	17	303
MW-15	60.2	2	40.2	20.0	2	327.49	287.29	267.29	16	311
Central Hudson Shallow Bedrock Wells										
MW-94-1B	24.5	4	10.67	13.5	NA	295.24	284.57	271.07	8.1	287.47
MW-94-2B	29.5	4	13.41	16.0	NA	298.61	285.2	269.2	12.0	286.7
MW-94-4B2	82.8	4	62.52	20.0	NA	299.42	236.9	216.9	58.8	240.9

Notes:
a: Reference mark at top of PVC mon. well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.
Bedrock wells constructed with riser and open hole in bedrock.
NA - Not Available.
NE - Not encountered.

Pine Plains formation or the upper, weathered surface of the Stissing Dolostone. Significant solution cavities have been observed in MW-5, MW-6, and MW-11 during drilling activities. The deeper bedrock zone, most probably the Stissing Dolostone, was observed to be highly competent, and to exhibit relatively few fractures of small aperture. An in-situ packer permeability test was performed at MW-8, MW-9, and MW-10 in 1988 in order to determine the site-specific hydraulic conductivity of this bedrock zone. The inflatable packer isolated zones where fractures were assumed to be present based on field observations during monitoring well installation. The calculated values obtained from the test ranged from 2.15 ft./year to 3.76 ft./year. These values are consistent with established hydraulic conductivity rates for competent dolomites with varying degrees of fractures.

Deeper wells installed during the RI also indicate that the Stissing Dolostone, specifically at MW-13, is very dense, with very few fractures. Significant water-bearing zones were not found in the overburden, nor were they found in the few fractures encountered in the bedrock until a solution cavity was found at approximately 120 feet below grade. At MW-13, small fractures appear to have been filled with silt, based on the drill cuttings. Major water bearing zones appear to be limited to solution cavities on the east side of the Macbeth property, as evidenced by MW-13, and the MW-11/MW-12 couplet. A water-bearing solution cavity was encountered in MW-11 from 78 feet to 83 feet below grade; MW-11 was screened in this interval. MW-12, proposed as a deeper couplet to MW-11 to be installed to approximately 110 feet below grade, was installed to 140 feet below grade due to the absence of significant water-bearing zones below 83 feet. The low frequency of fractures and hence the limited connectivity between fractures for any great areal extent, coupled with the absence of water-bearing fractures where fractures are present, most likely hinders groundwater flow and potential contaminant migration on the east side of the property. Wells on the southwest side of the property installed during the RI, specifically MW-15 and MW-16, appear to contain slightly more water-bearing fractures at shallower depths than those observed on the east side of the property.

A bedrock surface elevation contour map was prepared from data obtained during Macbeth well installation, as well as data obtained directly from Blasland, Bouck and Lee, the consultant who oversaw monitoring well installation at the CHGE property across the street. This map, provided as Figure 2-6, illustrates that the bedrock surface topography is highly variable and slopes quicker than the land surface, thus creating saturated and unsaturated zones in both the bedrock and overburden. A ridge of bedrock exists on the Macbeth site, at MW-5, extending north-northwest to just east of the former paint waste disposal area, where the ridge turns and extends westward through the central part of the site. The slope of the bedrock surface in the former paint waste disposal area is southwesterly towards MW-3 and MW-8. This ridge may effectively form a groundwater divide in shallow zones, as groundwater would ride atop the



BEDROCK SURFACE ELEVATIONS
MACBETH & CHGE

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
AUGUST 21, 1995
CONTOUR INTER. 10 FT.

APPROXIMATE SCALE:
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. NEWPORT BEACH, CA. TOTOWA, N.J.

Figure 2-6

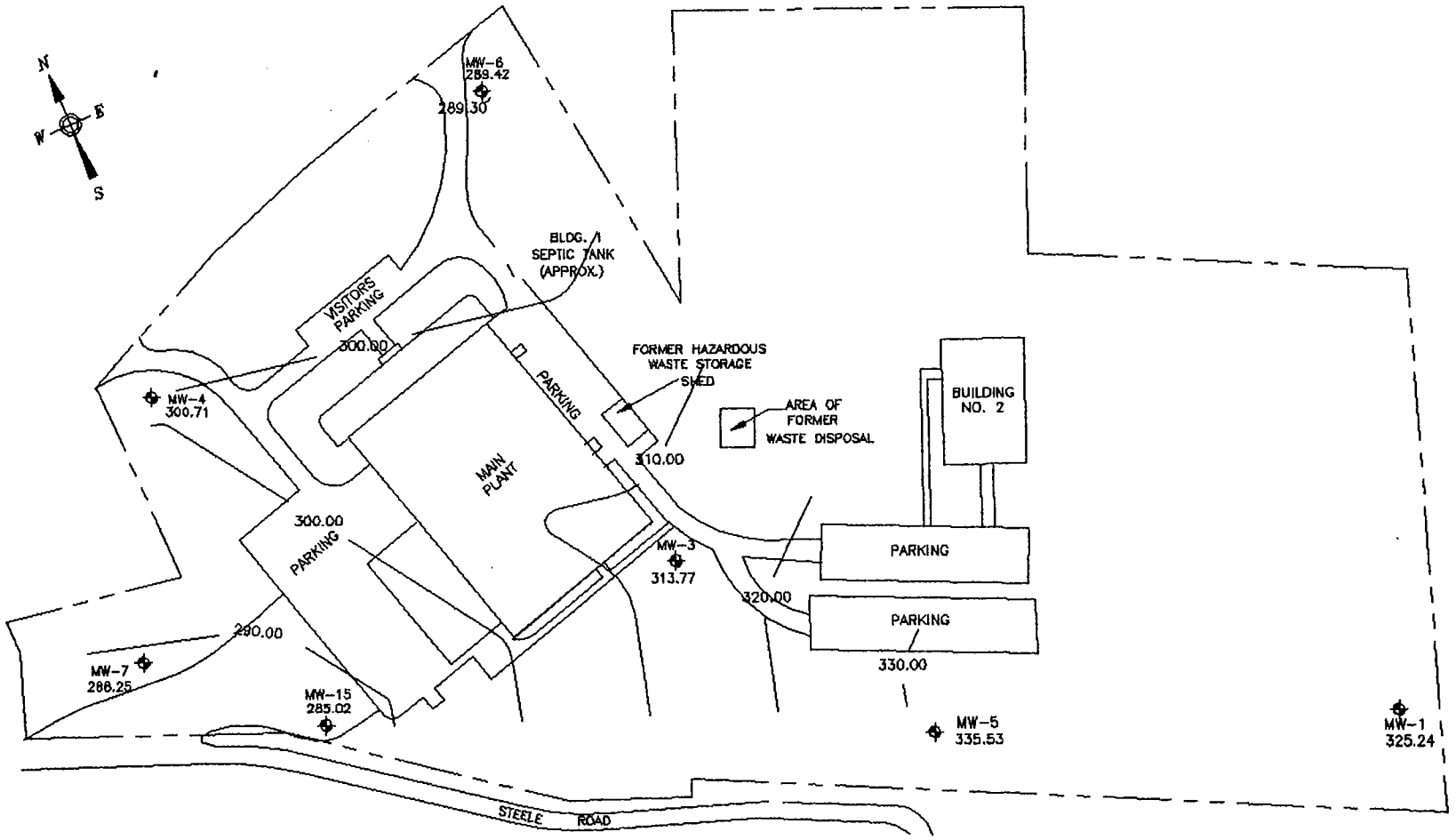
bedrock surface before infiltration into fractures. A large bedrock depression exists in the front yard of the CHGE site.

2.5.2.2 Groundwater Flow - Shallow Bedrock

Seven of the seventeen monitoring wells located on the Macbeth property are set within the shallow bedrock zone. Shallow bedrock wells are MW-1, 3, 4, 5, 6, 7, and 15. The tops of the screened intervals are located between 6 and 8 feet below the top of the bedrock surface, with the exception of MW-15, which begins 24 feet below the top of the bedrock surface, due to the absence of significant water-bearing zones at shallower depths. On-site groundwater elevation contour maps for the shallow bedrock zone at Macbeth are provided as Figures 2-7, 2-8, and 2-9. Groundwater in this zone on the Macbeth site consistently flows to the north and west, as depicted in the attached shallow bedrock groundwater contour maps. Groundwater to the north at the CHGE property flows eastward, as shown in Figure 2-10, which represents data collected from wells screened within the shallow bedrock zones at both sites on August 21, 1995 (Table 2-6).The direction of groundwater flow is influenced by the topography of bedrock, both on site, and immediately surrounding the site. The ridge of bedrock that traverses the site may have the greatest effect on upper bedrock groundwater flow direction, with bedrock surface topography being the primary influence. Although MW-3 appears to be crossgradient to the former waste disposal area with respect to groundwater elevations presented on the contour maps, bedrock slopes from the former waste disposal area, indicating that the area of MW-3 may be the primary receptor of potential contamination from the former waste disposal area. This may be confirmed by the fact that elevated levels of volatile organic compounds have typically been limited to MW-3 in the shallow bedrock zone, and that these levels decreased dramatically once the waste was removed. MW-3 Bedrock on the southern side of Steele Road and in the vicinity of monitoring well MW-5, steeply slopes downward from Steele Road to the site. Groundwater in this area is flowing to the north from Steele Road to MW-1 and MW-5. In the vicinity of monitoring wells MW-15 and MW-7, bedrock slopes westward towards the intersection of Steele Road and Little Britain Road. Groundwater flow direction in this area follows the westward slope of the bedrock from monitoring well MW-4, and is to the southwest. Bedrock slopes downward to the north on the northeastern side of the property towards MW-6. Groundwater leaving the site in the shallow bedrock zone, as monitored by MW-4, MW-6, and MW-7, typically contains no volatile organic compounds above NYSDEC standards.

2.5.2.3 Groundwater Flow - Intermediate Bedrock

Four of the seventeen monitoring wells located on the Macbeth property are screened within the intermediate bedrock zone. Monitoring wells within this zone are MW-8, 9, 10, and 11. The tops of the screened intervals for these wells are located between 31 and 41 feet below the top of the bedrock surface. Groundwater in this zone also appears to be influenced by bedrock topography. Groundwater consistently flows to the north in the northeastern portion of the site, and to the west in the western portion of the site, as



LEGEND

MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
SHALLOW BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JANUARY 11, 1995
CONTOUR INTERVAL – 10 ft.

APPROXIMATE SCALE:
125' 0 125'

H:\ZMAC9401\MACRIFS\11195SH

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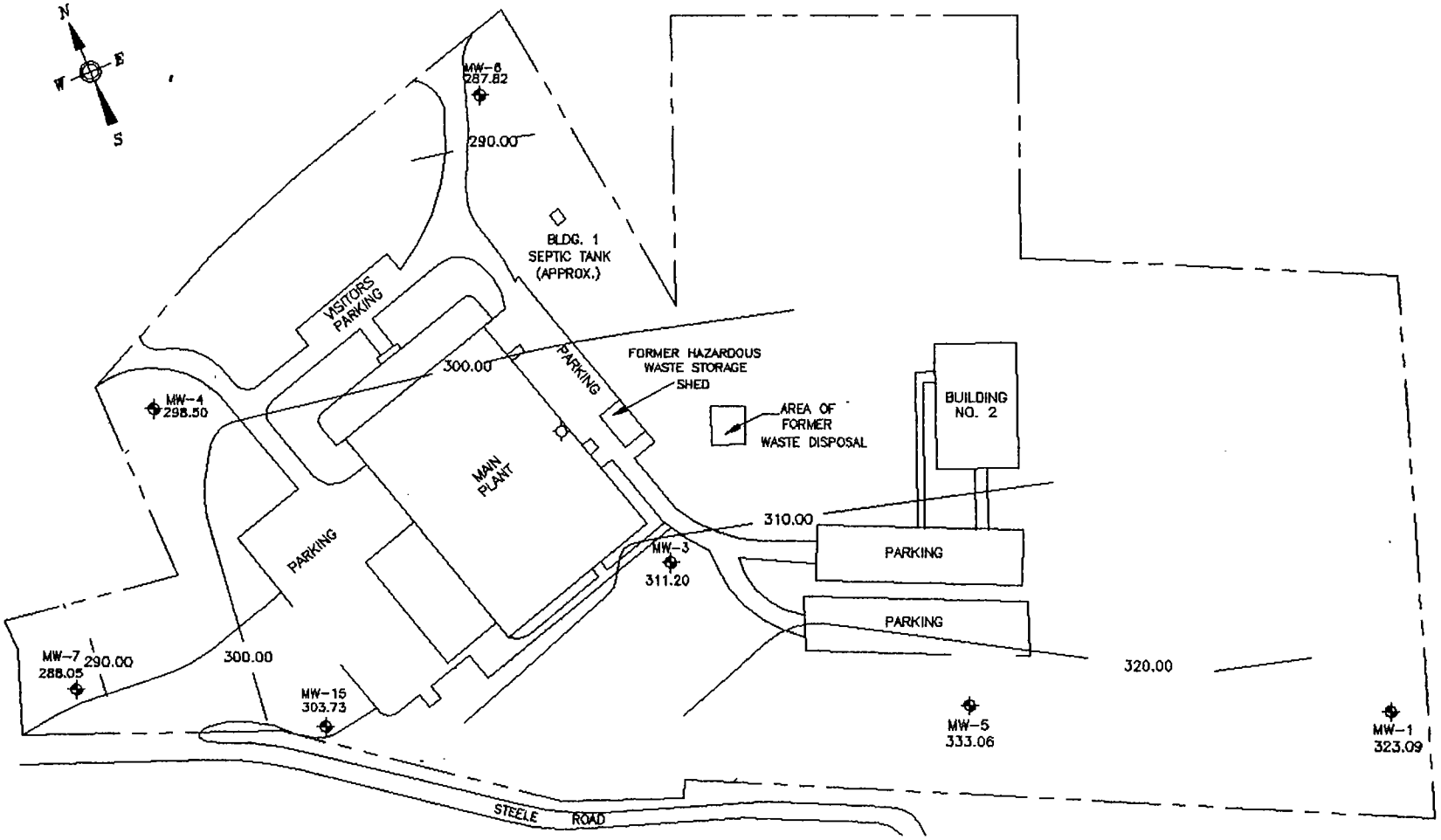
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-7



LEGEND

MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
SHALLOW BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
APRIL 19, 1995
CONTOUR INTERVAL – 10 FT.

APPROXIMATE SCALE:
125' 0 125'

h:ZMAC9501:94]RIFS:GDWATER:495SH

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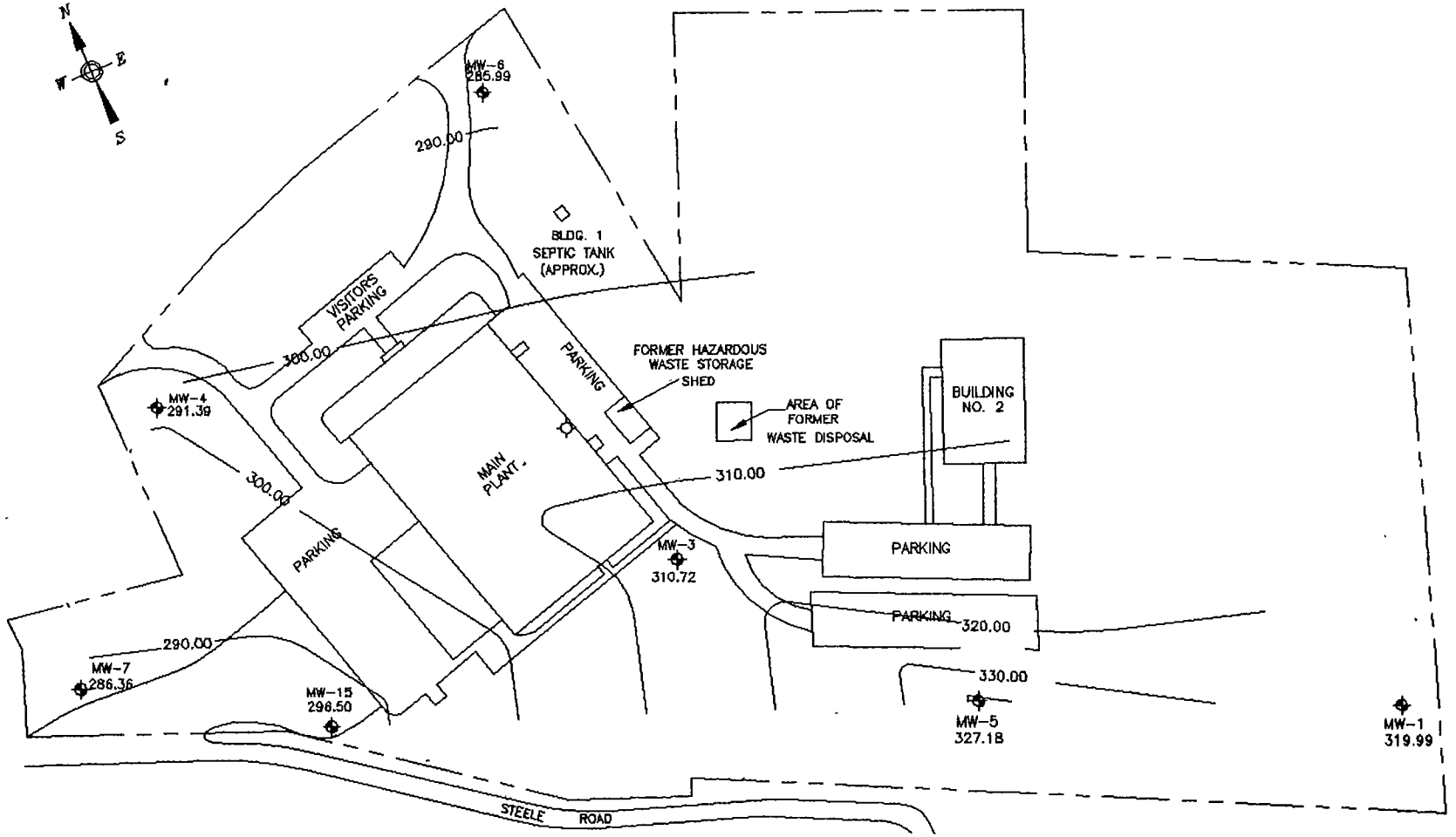
Figure 2-8



LEGEND

MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL

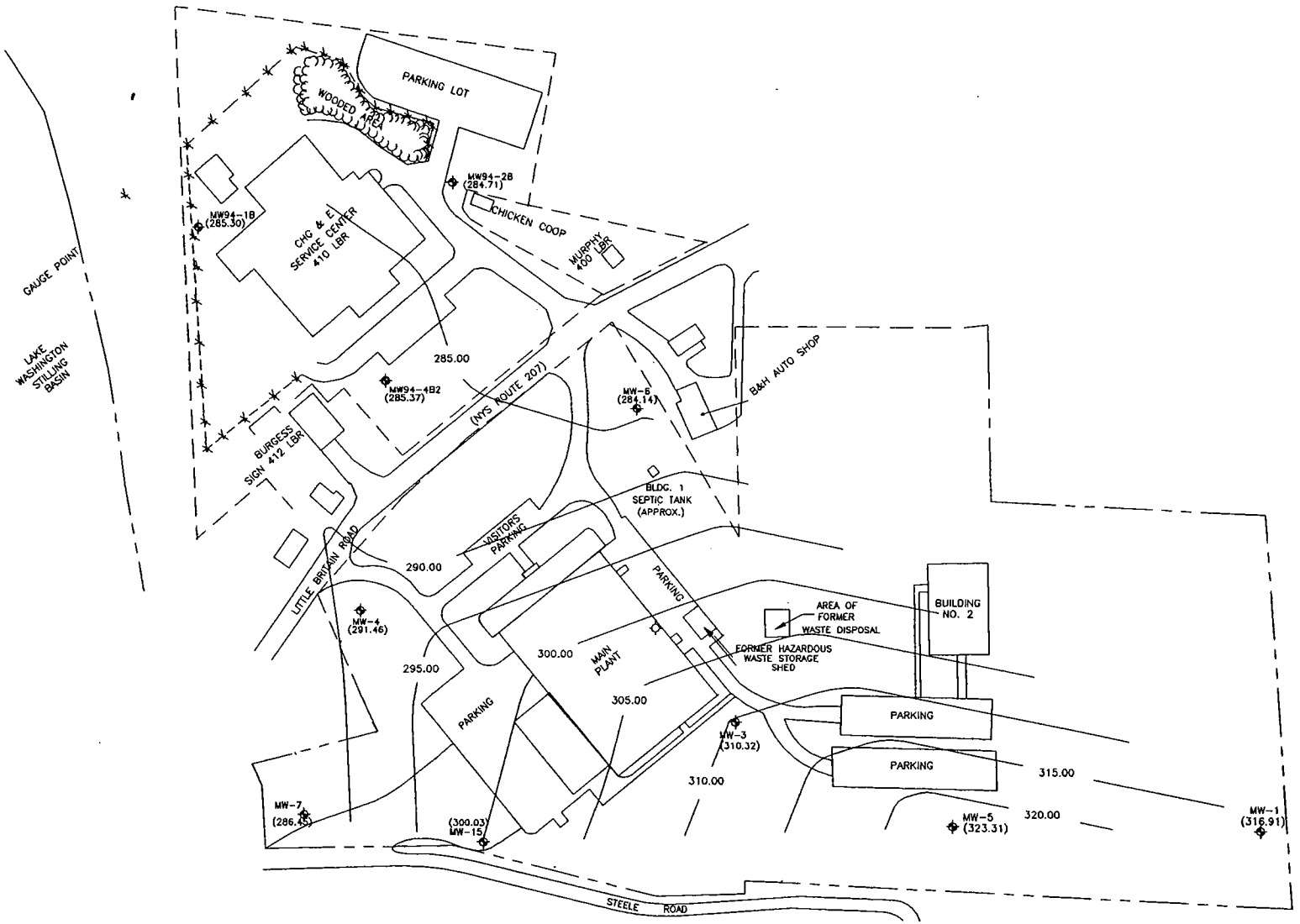
GROUNDWATER ELEVATION CONTOUR MAP
SHALLOW BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JUNE 14, 1995
CONTOUR INTERVAL – 10 FT.

APPROXIMATE SCALE:
125' 0 125'

H:\ZMAC9401\MACRIFS\61495SH

H2MGROUP
ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-9



SHALLOW BEDROCK GW. ELEV.
MACBETH & CHGE

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
AUGUST 21, 1995
CONTOUR INTR. 5 FT.

LEGEND

MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL

APPROXIMATE SCALE:
125' 0 125'

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Figure 2-10

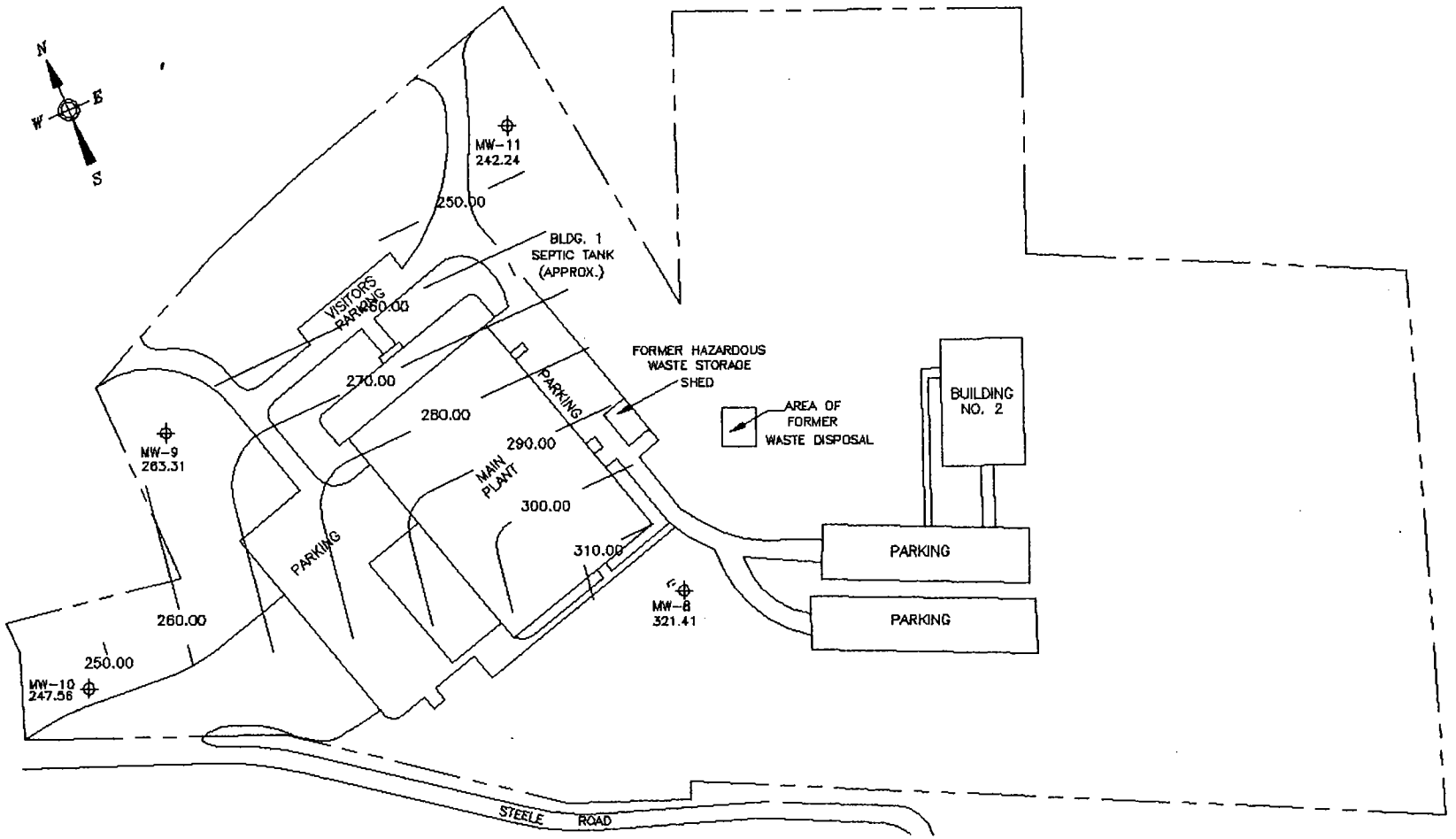
shown in Figures 2-11 thorough 2-14. Groundwater leaving the site, as quarterly monitored by MW-7, MW-9, and MW-10, has typically not contained volatile organic compounds above NYSDEC standards.

2.5.2.4 Groundwater Flow - Deep Bedrock

Three of the seventeen monitoring wells (MW-12, 13 and 16) located on the Macbeth property are screened within the deep bedrock zone. The tops of the screened intervals for these wells are located between 62 and 86 feet below the top of the bedrock surface. Groundwater elevation contour maps for each of the four water level monitoring events are provided in Figures 2-15 through 2-18.

Groundwater elevation contour maps for January 11, 1995, prior to groundwater purging and sampling but approximately 2 weeks after well development, show groundwater flow to the north-northeast, with approximately 43 feet of relief between groundwater elevations obtained at the three monitoring wells. Groundwater elevations measured in April 1995 three months after sampling show groundwater flow to the east-southeast, with 1.13 feet of relief between groundwater elevations obtained at the three monitoring wells, indicating that MW-12 and MW-16 are measuring water quality entering and not leaving the Macbeth site. Groundwater flow measured in June 1995, two months after the April sampling event, similarly shows groundwater flowing south-southeast, towards the Macbeth site from CHGE, with 1.47 feet of relief. The August round, four months after the April sampling round, again shows groundwater flowing southeastward. Relief for this round is 0.86 feet.

The January 11, 1995 data is not considered indicative of steady-state conditions because water in these wells had not fully recovered after installation and development. Water levels in MW-13 and MW-16 varied approximately four feet from January through August 1995. MW-12 water levels varied approximately 39 feet between the January and April events, and by 1.2 feet from April to August 1995. The anomalously low water level in MW-12 in January is due to poor groundwater recovery in this well, related to the short timeframe between well development, at which time MW-12 was repeatedly purged dry, and the water level monitoring event. Subsequent water level monitoring events demonstrate much smaller variability between groundwater elevations, and are more representative of regional flow (believed to be eastward, towards the Hudson River), and preferred fracture orientations (south-southeast and southwest), and are less influenced by the topography of the bedrock surface. Therefore, it is concluded that groundwater flow in the deep bedrock zone is eastward, with southeasterly flow components. This would indicate that MW-16 and MW-12 receive groundwater primarily from upgradient sources to the north and west.



LEGEND

MW-8 ⊕ INTERMEDIATE BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
INTERMEDIATE BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JANUARY 11, 1995
CONTOUR INTERVAL – 10 FT.

APPROXIMATE SCALE:
125' 0 125'

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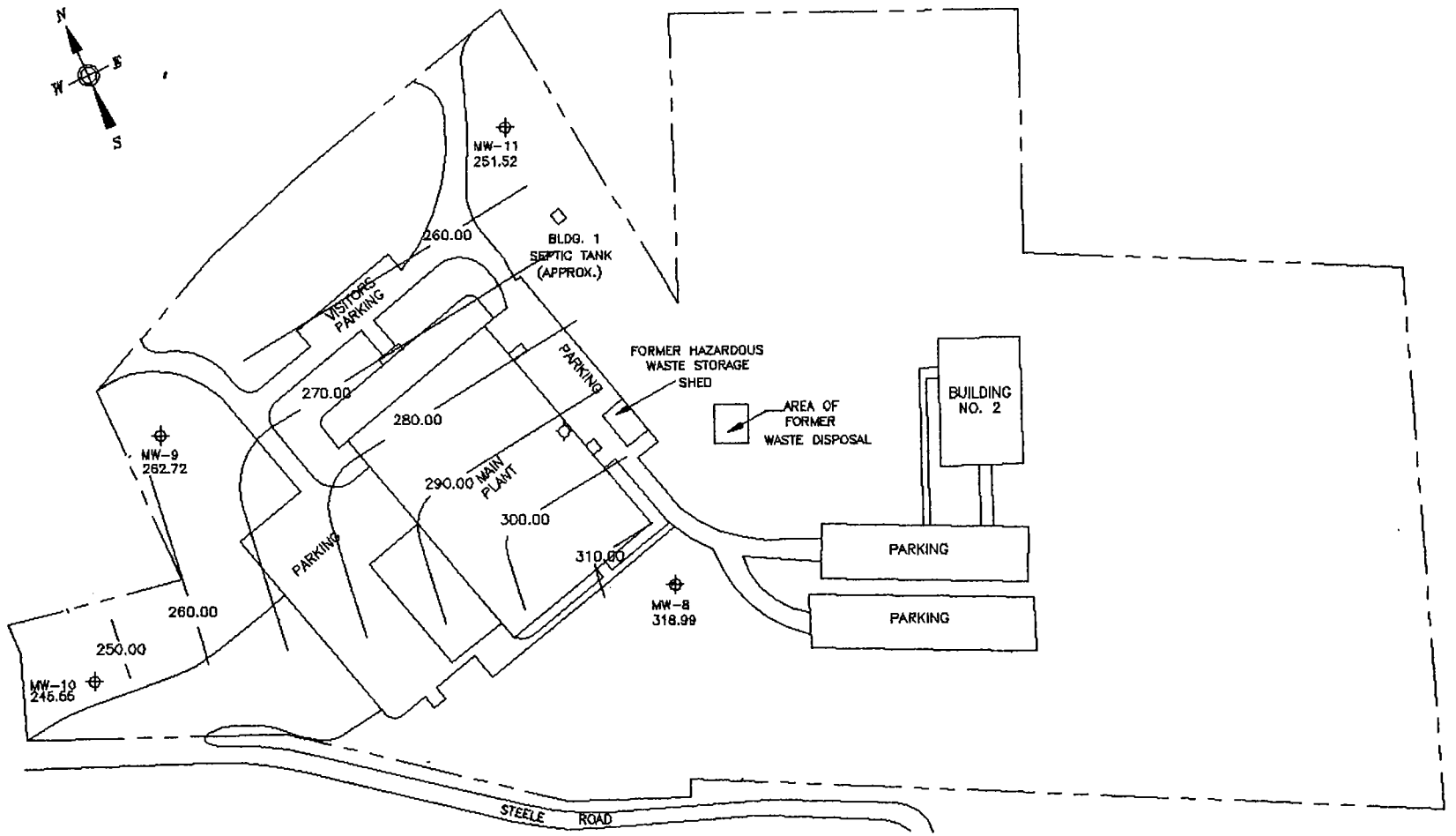
Figure 2-11



LEGEND

MW-8 ⊕ INTERMEDIATE BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
INTERMEDIATE BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
APRIL 19, 1995
CONTOUR INTERVAL - 10 FT.

APPROXIMATE SCALE:
125' 0 125'

H:ZMAC9501:84]RIFS:GDWATER:495INT

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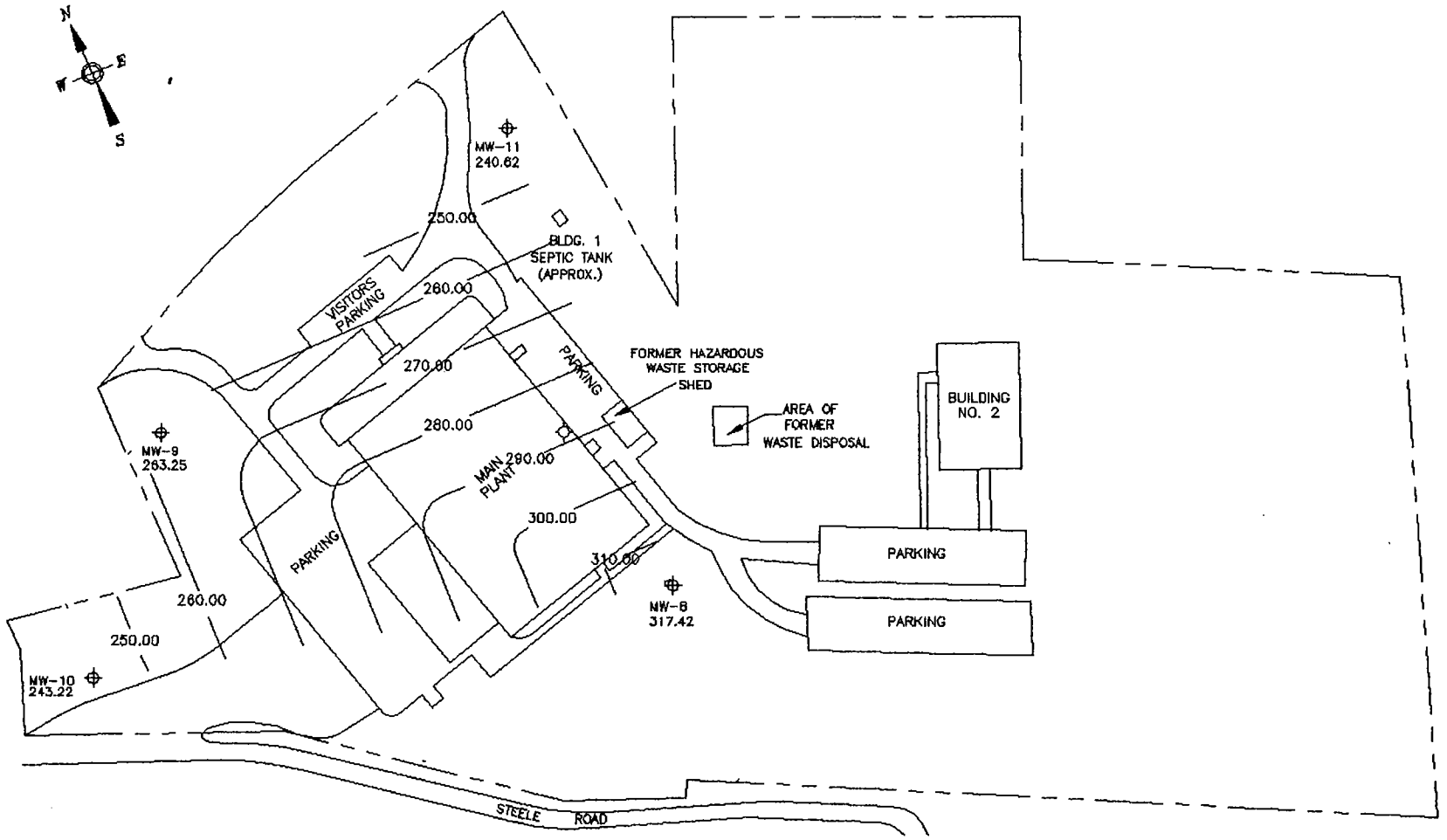
Figure 2-12



LEGEND

MW-8 ⊕ INTERMEDIATE BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
INTERMEDIATE BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JUNE 14,1995
CONTOUR INTERVAL – 10 FT.

APPROXIMATE SCALE:
125' 0 125'

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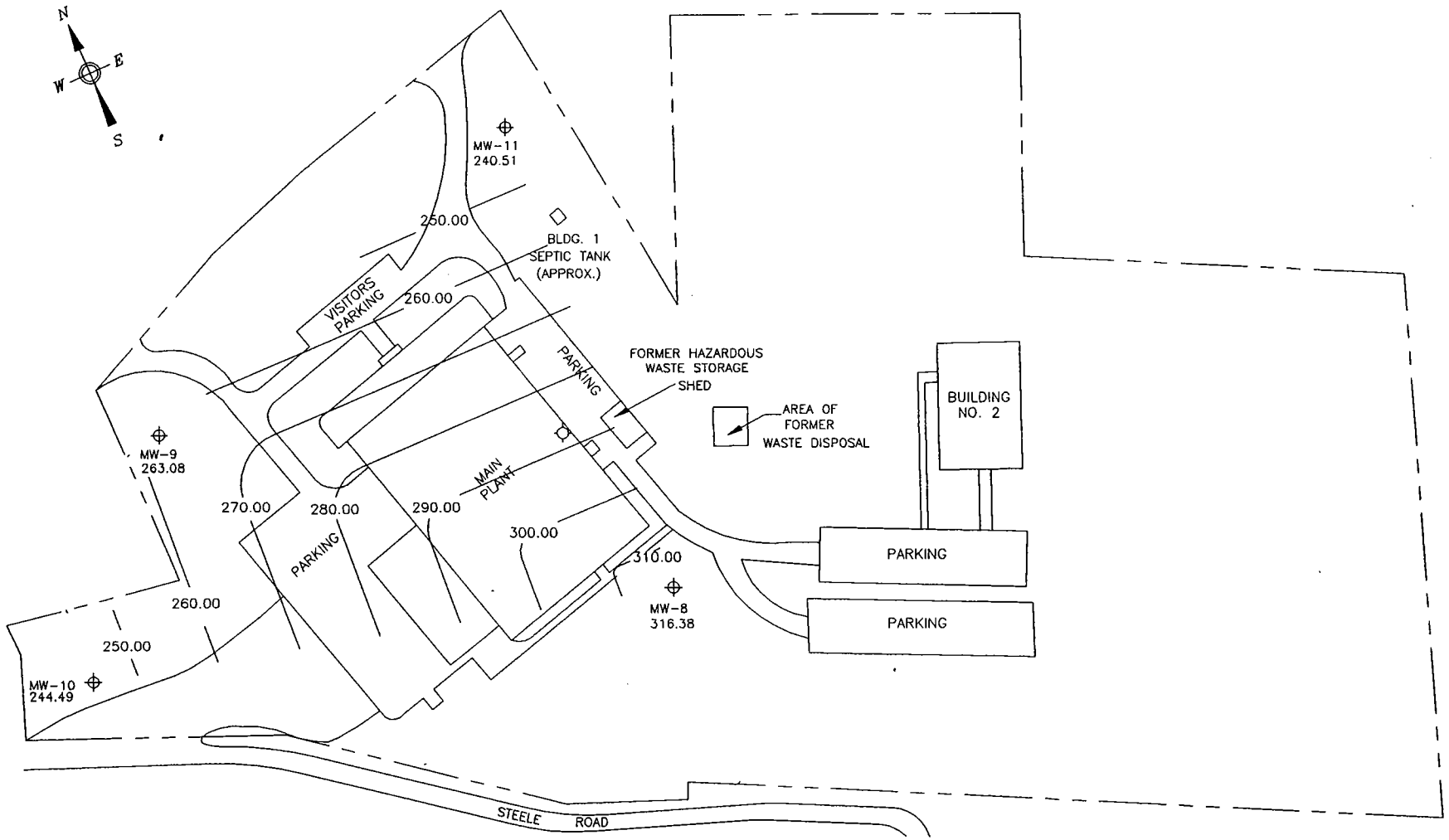
Figure 2-13



LEGEND

MW-8 ⊕ INTERMEDIATE BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
INTERMEDIATE BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
AUGUST 21, 1995
CONTOUR INTERVAL – 10 FT.

APPROXIMATE SCALE:
125' 0 125'

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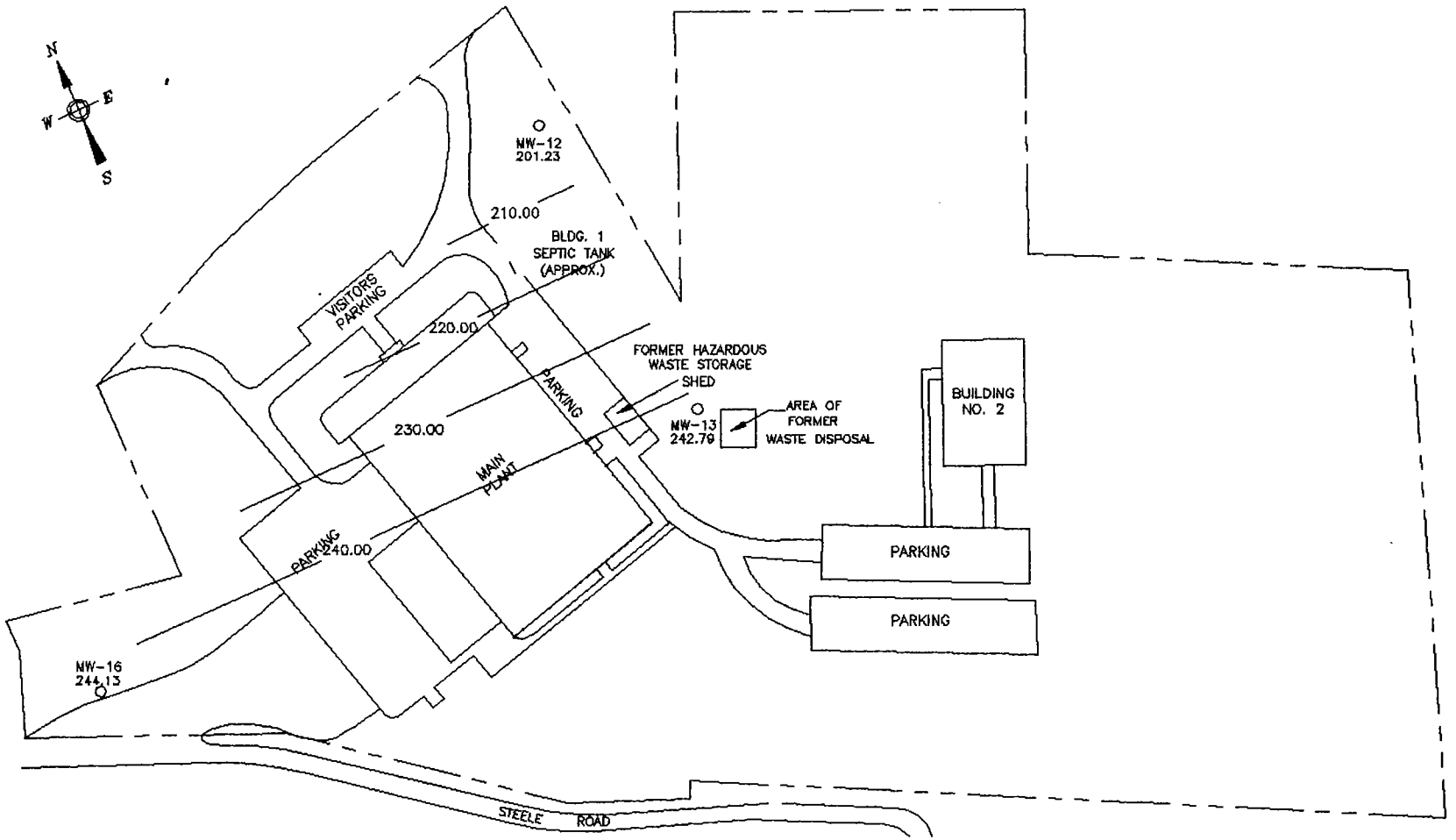
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-14



LEGEND

MW-16 ○ DEEP BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
DEEP BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JANUARY 11, 1995
CONTOUR INTERVAL - 10 FT.

APPROXIMATE SCALE:
125' 0 125'

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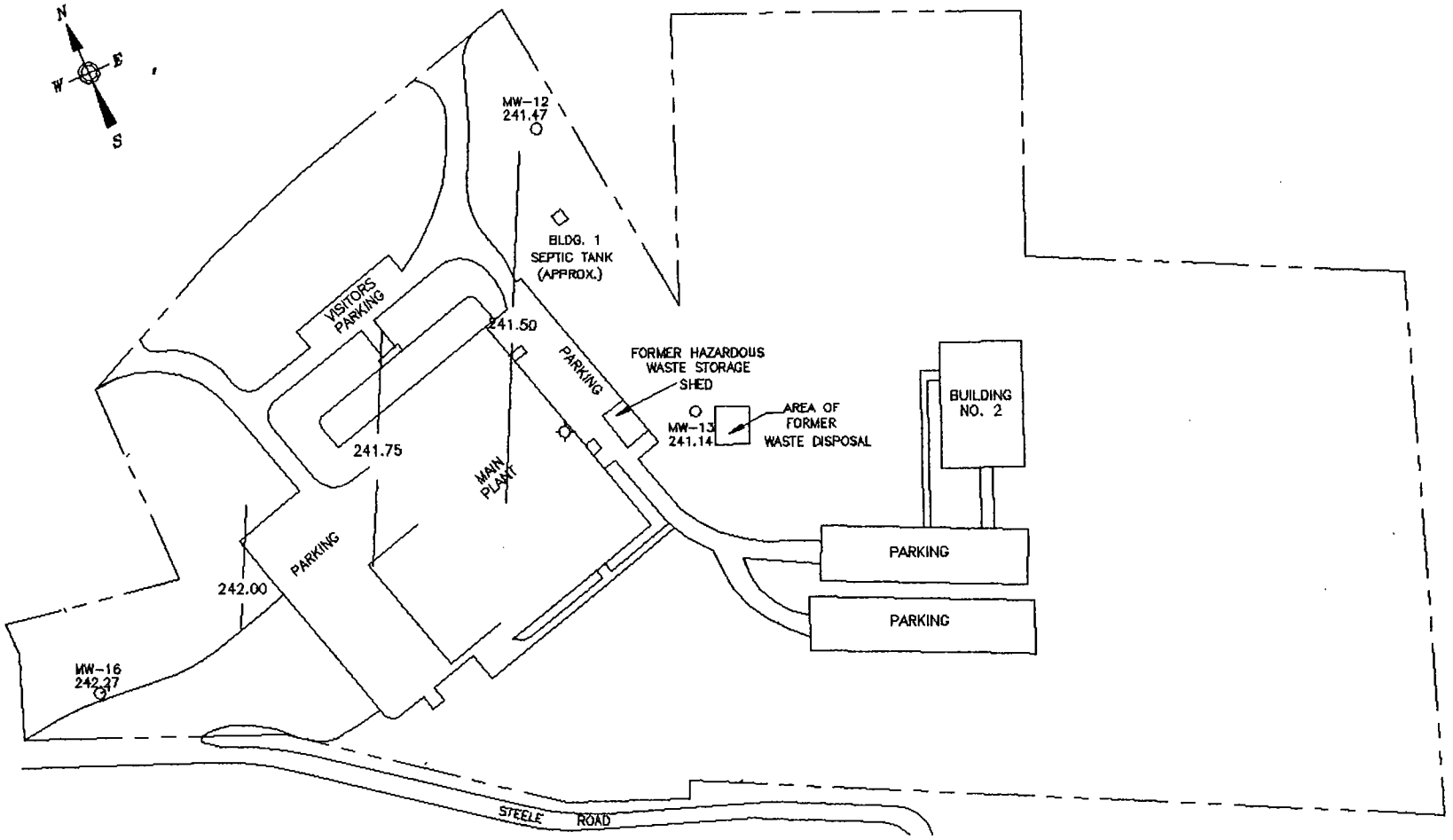
H2MGROUP
ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-15



LEGEND

MW-16 ○ DEEP BEDROCK MONITORING WELL

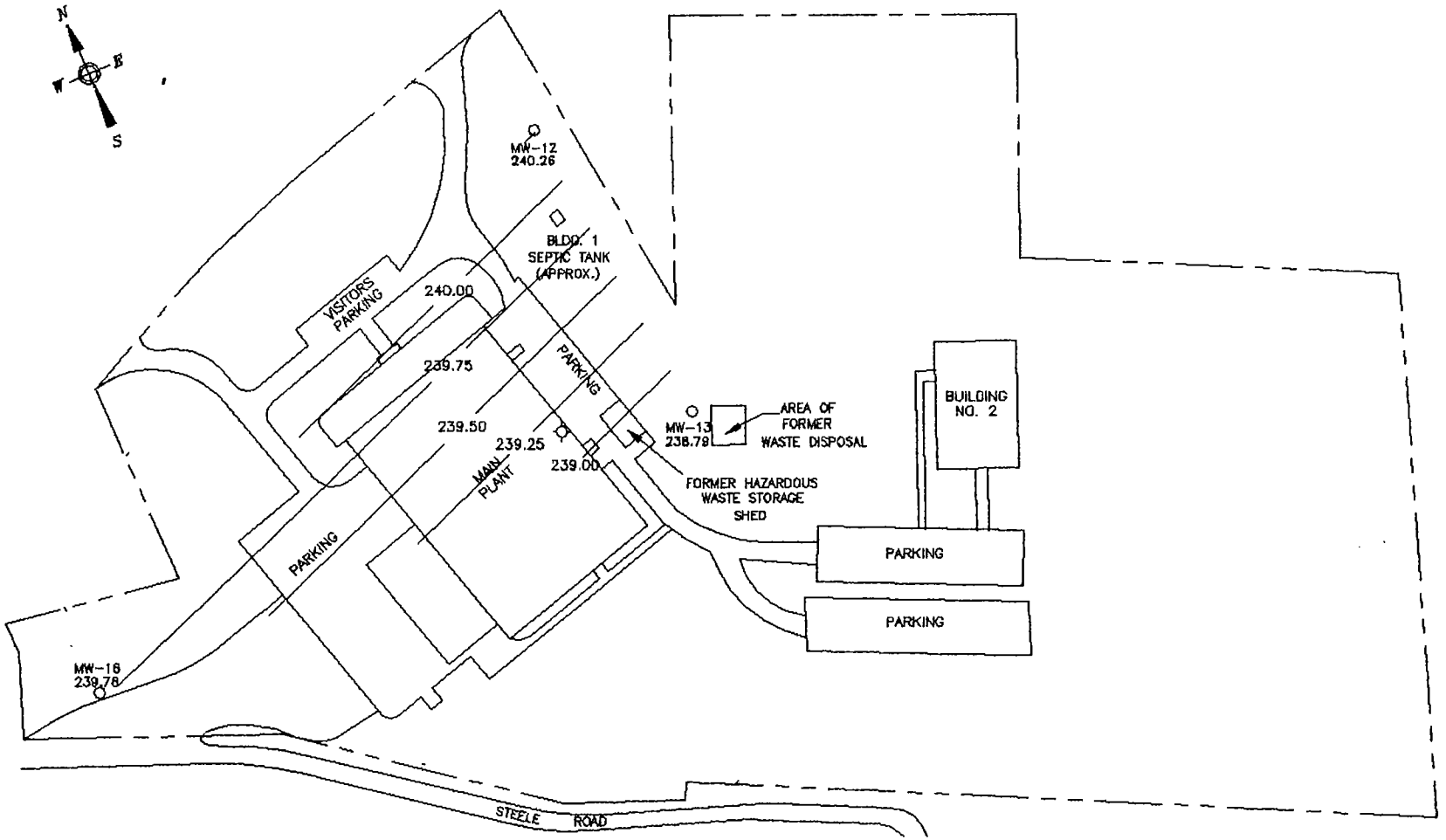
GROUNDWATER ELEVATION CONTOUR MAP
DEEP BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
APRIL 19, 1995
CONTOUR INTERVAL – 0.25 FEET

APPROXIMATE SCALE:
125' 0 125'

H:ZMAC9401:94]RIFS:\GDWATER:\495DB

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. NEWPORT BEACH, CA TOTOWA, N.J.

Figure 2-16



LEGEND

MW-16 ○ DEEP BEDROCK MONITORING WELL

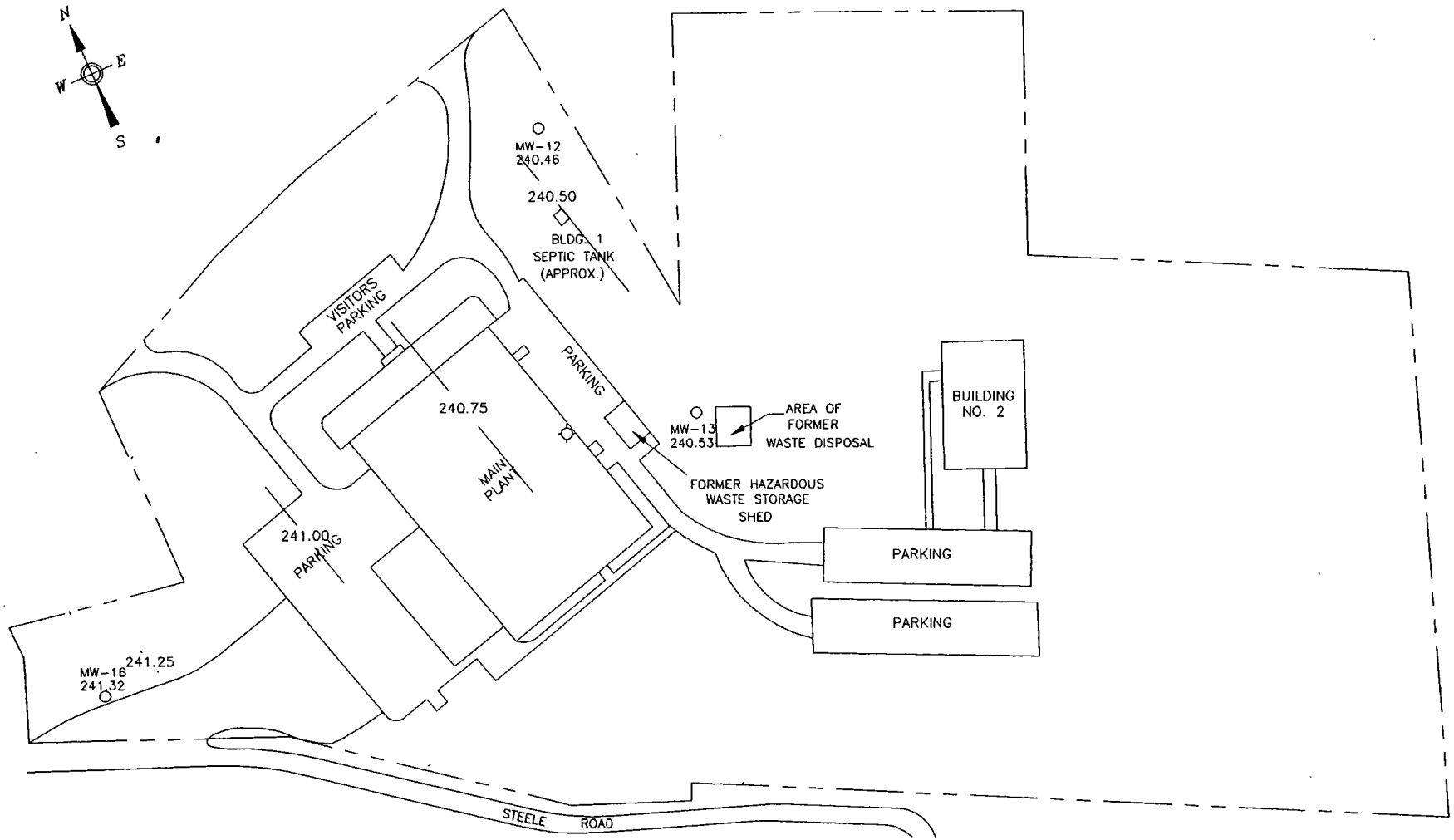
GROUNDWATER ELEVATION CONTOUR MAP
DEEP BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
JUNE 14, 1995
CONTOUR INTERVAL – 0.25 FT.

APPROXIMATE SCALE:
125' 0 125'

H:\ZMAC9401:\MACRIFS:\11195DB

H2MGROUP
ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-17



LEGEND

MW-16 ○ DEEP BEDROCK MONITORING WELL

GROUNDWATER ELEVATION CONTOUR MAP
DEEP BEDROCK WELLS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
AUGUST 21, 1995
CONTOUR INTERVAL – 0.25 FT.

APPROXIMATE SCALE:
125' 0 125'

H:\ZMAC9401:\MACRIFS:\82195DB

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 2-18

3.0 Field Investigation and Results

3.1 Introduction

The objective of the RI/FS is to determine the nature and extent of contamination at the site, and the risk that this contamination, if present, poses to human health and the environment. One primary objective of the Macbeth RI is to determine if other potential source areas of volatile organic contamination exist on the Macbeth property. All data collected prior to initiation of the RI field work indicated that the only on-site source of volatile organic compounds was removed. To accomplish this objective, a soil gas survey was performed on the entire Macbeth property. Subsequent field activities, including soil sampling and test pitting, were performed based on the soil gas survey results and site reconnaissance activities. A groundwater investigation was also conducted at the site. Additional monitoring wells were installed at the site as couplets to compliment existing wells, and to target areas of potential off-site receptors (i.e., homeowner wells at Steele Road and in the vicinity of 400 Little Britain Road), as well as the area of former paint waste disposal.

3.2 Soil Gas Survey

3.2.1 Introduction

A soil gas survey was performed at the Macbeth site from July 25 through August 5, 1994, in accordance with the NYSDEC-approved RI Work Plan and with oversight from NYSDEC field representatives present during the survey. A soil gas survey can be effectively utilized to determine the nature and extent of a source area of contamination, if present. Volatile organic compound contamination produces a concentration gradient in soil gas that decreases radially away from the primary source area of contamination. This gradient may be altered by hydrologic and geologic factors such as perched water and the permeability of the strata. Other surface factors such as paved areas or buildings may also distort the concentration gradient. However, soil gas sampling and analysis results interpreted in conjunction with knowledge of site conditions is an effective tool by which subsequent field sampling activities can be planned. The soil gas survey at the Macbeth site targeted the principal volatile organic compounds quantified in the groundwater in the Macbeth monitoring wells and off-site homeowner supply wells.

3.2.2 Soil Gas Survey Site Monitoring Network

A grid was emplaced on the site by a qualified survey crew using conventional survey equipment. The grid was referenced to existing buildings, stone walls, and survey monuments. The grid was established with survey stakes, flagging, and paint markings at the appropriate interval. For ease of interpretation, the site was discretized into a north and east trending grid, with northings and eastings labeled every 100 feet. Grid spacing varied from 25 feet to 100 feet between sampling points. The rationale for the grid spacing was based on historical knowledge of the site, building "as-built" plans, and stereographic aerial photograph study performed by H2M. This stereographic study revealed historical

locations on the Macbeth property which were cleared and subsequently developed as the facility expanded; debris, drums, or other disturbed areas were not observed on the Macbeth property in the stereographic aerial photograph study.

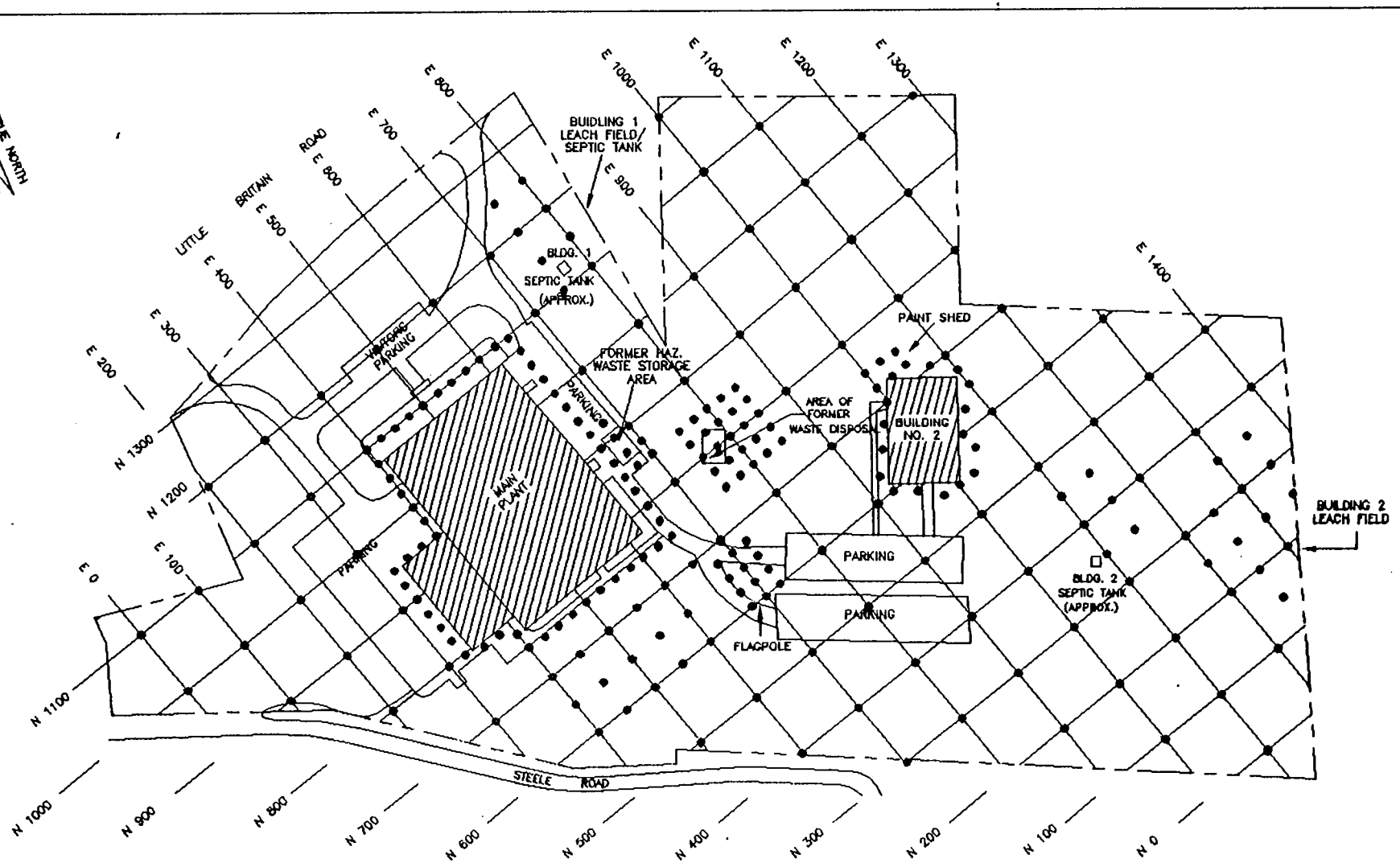
Grid spacing was finest, at 25-foot intervals, in areas of potential concern. These areas include the perimeter of Buildings 1 and 2, which is inclusive of past and present loading docks adjacent to these buildings, the former hazardous waste storage area, the area near the flagpole, and the excavated former paint waste disposal area. A "cinder block" burn pit referenced in early reports was reputed to be present in the area of the flagpole or in the wooded area behind Building 1. A 50-foot spacing was used in the wooded area immediately to the rear of Building 1, in the area of the former septic system servicing Building No. 1, and the area thought to contain the former septic system servicing Building No. 2, whose presence was never confirmed based on a geophysical survey in this area and site reconnaissance using as-built facility plans. A 100 foot grid spacing was utilized in all other locations which do not include areas of potential concern. Figure 3-1 presents the soil gas sampling network.

3.2.3 Soil Gas Survey Methodology

Soil gas samples were obtained with a drive probe with a retractable, perforated tip. The probe was driven manually or via an electric rotary hammer to a depth of approximately two feet below grade, and then opened. Soil gas was collected through dedicated polyethylene tubing connected to the retractable tip and threaded through the drive tubes to the surface. The tubing was fitted snugly at the tip and at the surface of the drive tubes with rod adapters and "o"-rings to prevent ambient air introduction through the drive tubes. Each hole at grade was sealed using a small quantity of hydrated bentonite slurry around the drive tube to exclude the introduction of ambient air. Soil gas was sampled by placing a one-liter Tedlar bag in an air-tight evacuation chamber. The air surrounding the bag in the container was removed using a peristaltic pump set at a rate by which soil gas was not collected at a rate in excess of one liter per minute. The rate of soil gas collection was often much lower than this rate due to the resistance of the formation. Purging of air in the chamber created a vacuum which allowed the Tedlar bag, which was connected to the polyethylene tubing via an air-tight connection at the evacuation chamber, to fill with soil vapors. Collection in this manner precluded soil vapor samples from passing through the pump, thus eliminating a potential source of secondary contamination. Soil vapor samples were not collected during or immediately following one precipitation event that occurred during the survey, as increased soil moisture would inhibit soil gas migration.

3.2.4 Soil Gas Survey Analysis

Soil gas samples were analyzed in the field immediately after collection by OnSite Services, Inc., using a Photovac 10S Plus photoionization detector gas chromatograph (PID/GC). Soil gas samples were



SOIL GAS SURVEY SITE
MONITORING NETWORK
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

LEGEND

● – SOIL GAS SURVEY POINT

H:\ZMAC9401\ZMACGAS.DWG

APPROXIMATE SCALE
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 3-1

extracted from the Tedlar bag using a syringe punched through the septum, and were injected directly into the PID/GC. The time of sample collection and sample analysis were documented in the field and analysts logs; all samples were analyzed on the date of collection. The PID/GC was calibrated for 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, chloroethane, tetrachloroethene, trichloroethene, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, vinyl chloride, and toluene. Detection limits for these compounds using the analysis employed was conservatively estimated to range from approximately 25 to 50 ppb. However, concentrations were quantified at levels of less than 1 ppb (by volume) in some samples. Due to nearly equal retention and elution times, 1,1-dichloroethane and trans-1,2-dichloroethene could not be resolved from each other and were reported as such.

Quality Assurance/Quality Control ("QA/QC") procedures included collection of instrument/equipment/field blanks (daily prior to use of all equipment) and duplicate samples (at a rate of one per 20 sample locations). Calibration standards were run in the PID/GC after every ten samples. All QA/QC procedures were performed as set-forth in the NYSDEC-approved RI work plan.

3.2.5 Soil Gas Survey Results

Soil gas survey results are presented in tabular form in Table 3-1 and as a total volatile organic compound isoconcentration map in Figure 3-2. Raw data, including analyst logs and chromatograms for all samples will be maintained in H2M's files, and will be made available to NYSDEC, if NYSDEC wishes to review the raw data. Approximately only 28 percent, or 72 locations, of the 255 sample locations contained one or more of the targeted volatile organic compounds. Of these, two-thirds of the locations did not exceed a total volatile organic compound concentration of 100 ppb by volume. Twenty two locations contained total volatile organic compounds above a concentration of 100 ppb by volume. Table 3-2 presents a frequency distribution of the range in concentrations for the soil gas survey. Over ninety percent of the samples contained no volatile organic compounds or contained volatile organic compounds at concentrations less that 100 ppb by volume.

Vinyl chloride and chloroethane were not detected at any of the sample locations. Table 3-3 presents a frequency distribution of those compounds that were detected at the site. The most prevalent compound was 1,1,1-trichloroethane, which was quantified at 67 out of approximately 250 locations at concentrations ranging from 0.19 ppb by volume to 208.68 ppb by volume. The next most prevalent compound found was trichloroethene, which was found at 18 out of over 250 locations at concentrations ranging from 0.16 ppb by volume to 198.62 ppb by volume. The remaining six compounds were each found at eight locations or less out of approximately 250 locations.

H2MGROUP

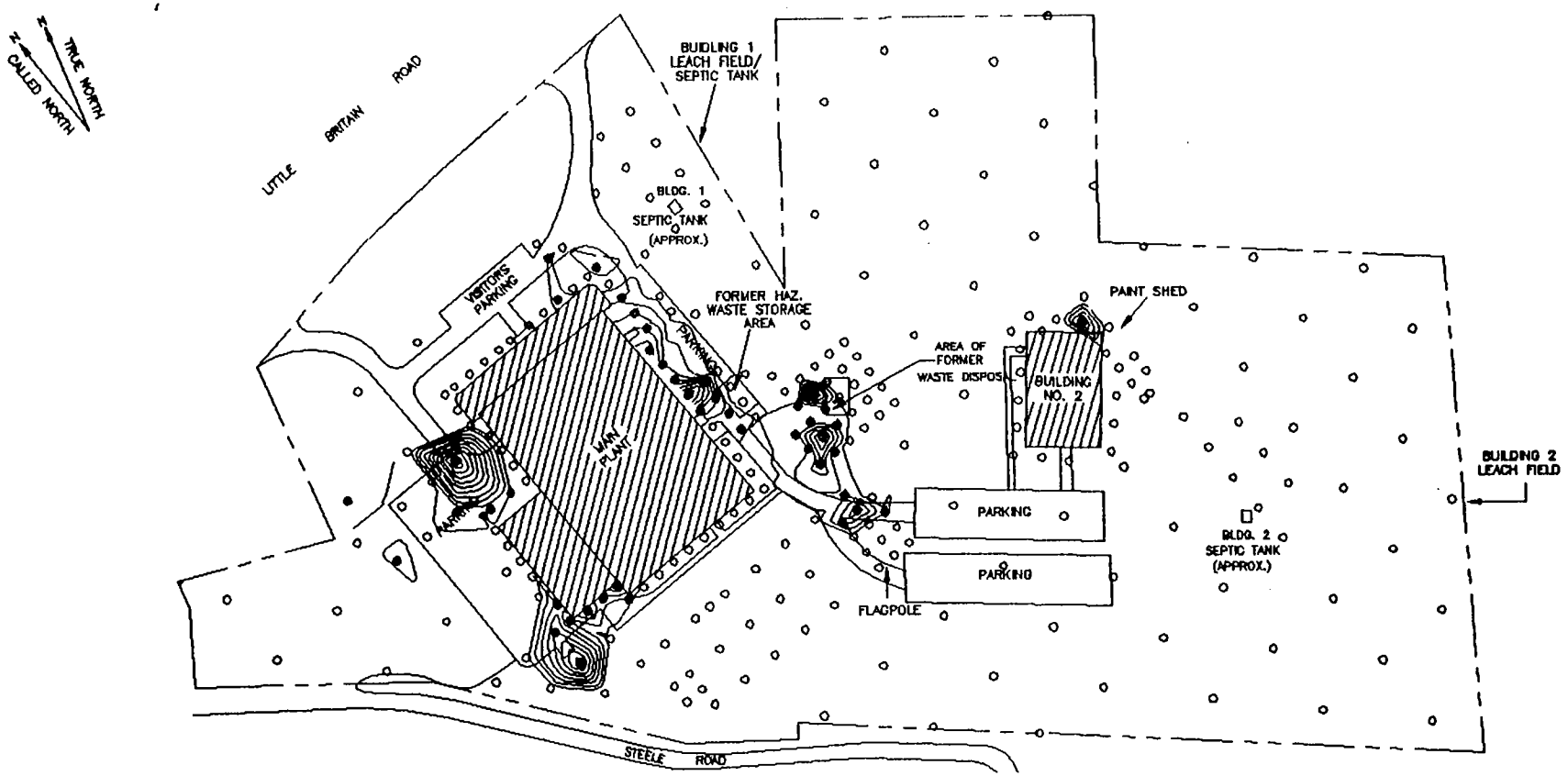
Table 3-1
Volatile Organic Compounds Quanitified During Soil Gas Survey, July 25, 1994 - August 5, 1994
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

Sample Location		Concentration (ppb by volume)								
Northing	Easting	1,1-DCE	1,1-DCA or t-1,2-DCE	c-1,2-DCE	1,2-DCA	1,1,1-TCA	TCE	Toluene	PCE	Total
500	900	0.00	0.00	0.00	0.00	8.13	0.00	0.00	0.00	8.13
600	800	0.00	0.00	0.00	0.00	7.84	0.00	0.00	0.00	7.84
650	700	0.00	0.00	0.00	0.00	6.35	0.00	0.00	0.00	6.35
650	725	0.00	0.00	0.00	0.00	34.58	0.00	0.00	0.00	34.58
675	675	0.00	0.00	0.00	0.00	150.27	0.00	0.00	0.00	150.27
675	700	0.00	0.00	0.00	0.00	208.68	0.00	0.00	0.00	208.68
675	1075	0.00	0.00	0.00	0.00	131.51	0.00	0.00	0.00	131.51
700	500	0.00	0.00	0.00	0.00	13.81	0.00	0.00	0.00	13.81
700	700	0.00	0.00	0.00	0.00	65.72	0.00	0.00	0.00	65.72
750	300	0.00	0.00	0.00	0.00	79.62	0.00	0.00	330.64	410.26
750	700	0.00	0.00	0.00	0.00	153.36	0.00	0.00	0.00	153.36
750	725	0.00	0.00	0.00	0.00	39.81	0.00	0.00	0.00	39.81
750	750	0.00	0.00	0.00	0.00	10.72	0.00	0.00	0.00	10.72
750	775	0.00	0.00	0.00	0.00	18.32	0.00	0.00	0.00	18.32
770	400	0.00	0.00	0.00	0.00	60.43	0.00	0.00	2.76	63.19
775	700	0.00	0.00	0.00	0.00	71.89	0.00	0.00	0.00	71.89
775	725	0.00	0.00	0.00	0.00	54.02	7.61	244.71	0.00	306.34
775	750	0.00	0.00	0.00	0.00	74.22	0.00	0.00	0.00	74.22
775	775	0.00	0.00	0.00	0.00	8.77	0.00	0.00	0.00	8.77
795	350	0.00	0.00	0.00	0.00	102.64	85.22	0.00	0.00	187.86
795	375	0.00	0.00	0.00	0.00	57.79	0.00	0.00	34.58	92.38
795	400	0.00	0.00	0.00	0.00	43.03	0.00	0.00	184.96	227.99
800	300	0.00	0.00	0.00	0.00	76.36	0.00	0.00	160.81	237.17
800	325	0.00	0.00	0.00	0.00	61.58	0.00	0.00	0.00	61.58
800	700	0.00	0.00	0.00	0.00	47.82	0.00	0.00	0.00	47.82
800	725	0.00	0.00	0.00	0.00	37.11	0.00	0.00	0.00	37.11
800	750	0.00	0.00	0.00	0.00	28.74	0.00	0.00	4.22	32.96
800	775	0.00	0.00	0.00	0.00	16.07	0.00	0.00	0.00	16.07
825	325	0.00	0.00	0.00	0.00	151.53	0.16	0.00	0.00	151.69
825	725	0.00	0.00	0.00	0.00	34.35	0.00	0.00	0.00	34.35
825	750	0.00	0.00	0.00	0.00	268.32	8.58	0.00	23.95	300.84
850	650	0.00	0.00	0.00	0.00	49.89	0.00	0.00	0.00	49.89
850	675	0.00	0.00	0.00	0.00	22.72	0.00	0.00	0.00	22.72
875	625	0.00	0.00	0.00	0.00	3.72	0.00	0.00	0.00	3.72
875	650	0.00	0.00	0.00	0.00	37.59	0.60	9.84	0.00	48.04
875	675	0.00	0.00	0.00	0.00	11.13	0.00	0.00	0.00	11.13

H2MGROUP

Table 3-1 (Cont.)
Volatile Organic Compounds Quanitified During Soil Gas Survey, July 25, 1994 - August 5, 1994
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

Sample Location		Concentration (ppb by volume)								
Northing	Easting	1,1-DCE	1,1-DCA or t-1,2-DCE	c-1,2-DCE	1,2-DCA	1,1,1-TCA	TCE	Toluene	PCE	Total
900	200	0.00	0.00	0.00	0.00	1.37	0.00	0.00	0.00	1.37
900	300	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.73
900	625	0.00	0.00	0.00	0.00	57.10	106.65	0.00	0.00	163.75
900	650	0.00	0.00	0.00	0.00	42.86	97.25	0.00	0.00	140.11
925	625	0.00	88.67	0.00	0.00	137.79	198.62	0.00	0.00	425.09
925	650	0.00	7.18	0.00	0.00	178.04	107.74	0.00	0.00	292.96
950	325	0.00	0.00	0.00	0.00	9.82	0.00	0.00	0.00	9.82
950	625	2.92	0.00	0.00	0.00	137.30	17.35	0.00	0.00	157.56
975	325	0.00	0.00	0.00	0.00	16.94	0.00	0.00	0.00	16.94
975	340	0.00	0.00	0.00	0.00	73.48	0.00	0.00	0.00	73.48
975	370	0.00	0.00	0.00	0.00	21.59	0.00	0.00	0.00	21.59
975	395	0.00	0.00	0.00	0.00	14.50	0.00	0.00	0.00	14.50
975	625	0.00	0.00	0.00	0.00	58.90	25.85	49.14	0.00	133.89
1000	200	0.00	0.00	0.00	0.00	0.00	0.00	43.12	0.00	43.12
1000	300	0.00	0.00	0.00	0.00	120.12	0.00	0.00	1.43	121.55
1000	625	0.00	0.00	0.00	0.00	150.65	85.67	22.34	0.00	258.66
1000	800	0.00	0.00	0.00	0.00	16.75	0.00	0.00	0.00	16.75
1025	640	0.00	0.00	0.00	0.00	114.35	52.33	0.00	0.00	166.68
1025	675	0.00	0.00	0.00	0.00	2.79	0.00	0.00	0.00	2.79
1050	350	0.00	0.00	551.00	4601.31	0.00	0.00	0.00	0.00	5152.31
1050	640	0.00	0.00	0.00	0.00	115.76	11.33	0.00	0.00	127.09
1075	640	0.00	0.00	0.00	0.00	56.06	0.00	0.00	0.00	56.06
1100	200	0.00	0.00	0.34	0.00	0.00	0.00	73.03	0.00	73.38
1100	300	0.00	0.00	0.34	0.73	0.00	0.00	10.67	0.00	11.73
1100	750	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.83
1125	385	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.20
1125	450	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.19
1125	575	39.37	0.00	0.00	1.77	0.39	0.00	0.00	0.00	41.53
1125	625	0.00	0.00	0.00	0.20	2.66	0.00	0.00	0.00	2.86
1125	640	0.00	0.00	0.00	0.00	36.13	19.54	0.00	0.00	55.67
1150	750	0.00	0.00	0.00	0.00	10.74	0.00	0.00	0.00	10.74
1175	600	0.00	0.00	0.00	0.00	10.32	17.40	0.00	0.00	27.72
1175	625	0.00	0.00	0.00	0.00	16.76	4.85	0.00	0.00	21.61
1200	700	0.00	0.00	0.00	0.00	12.08	2.66	0.00	0.00	14.74
1200	750	0.00	0.00	0.00	0.00	23.84	0.00	0.00	0.00	23.84
1200	800	0.00	0.00	0.00	0.00	5.69	0.00	0.00	0.00	5.69



LEGEND

● – SOIL GAS SURVEY POINT > 25 ppb (volume)

○ – SOIL GAS SURVEY POINT < 25 ppb (volume)

CONTOUR INTERVAL AS SHOWN

H:\ZMAC9401\94RIFS\SOILGAS\SOILGAS.DWG

TOTAL VOCS QUANTIFIED IN SOIL GAS (ppbv)

MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP.

NEW WINDSOR, NEW YORK

APPROXIMATE SCALE

125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS

MELVILLE, N.Y. NEWPORT BEACH, CA. TOTOWA, N.J.

Figure 3-2

Table 3-2
Frequency Distribution of Soil Gas Concentrations
Macbeth Division of Kollmorgen Instruments Corp.

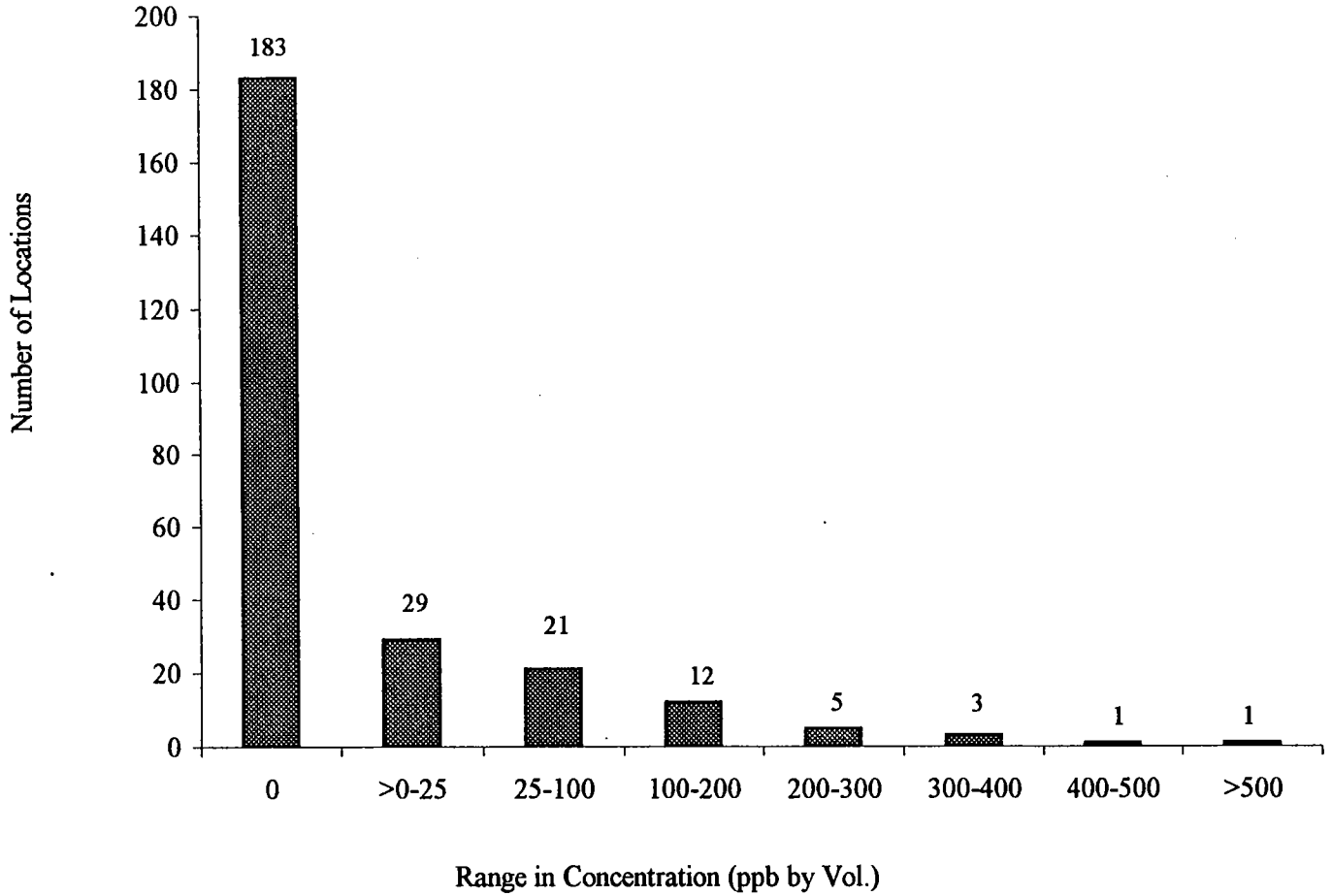
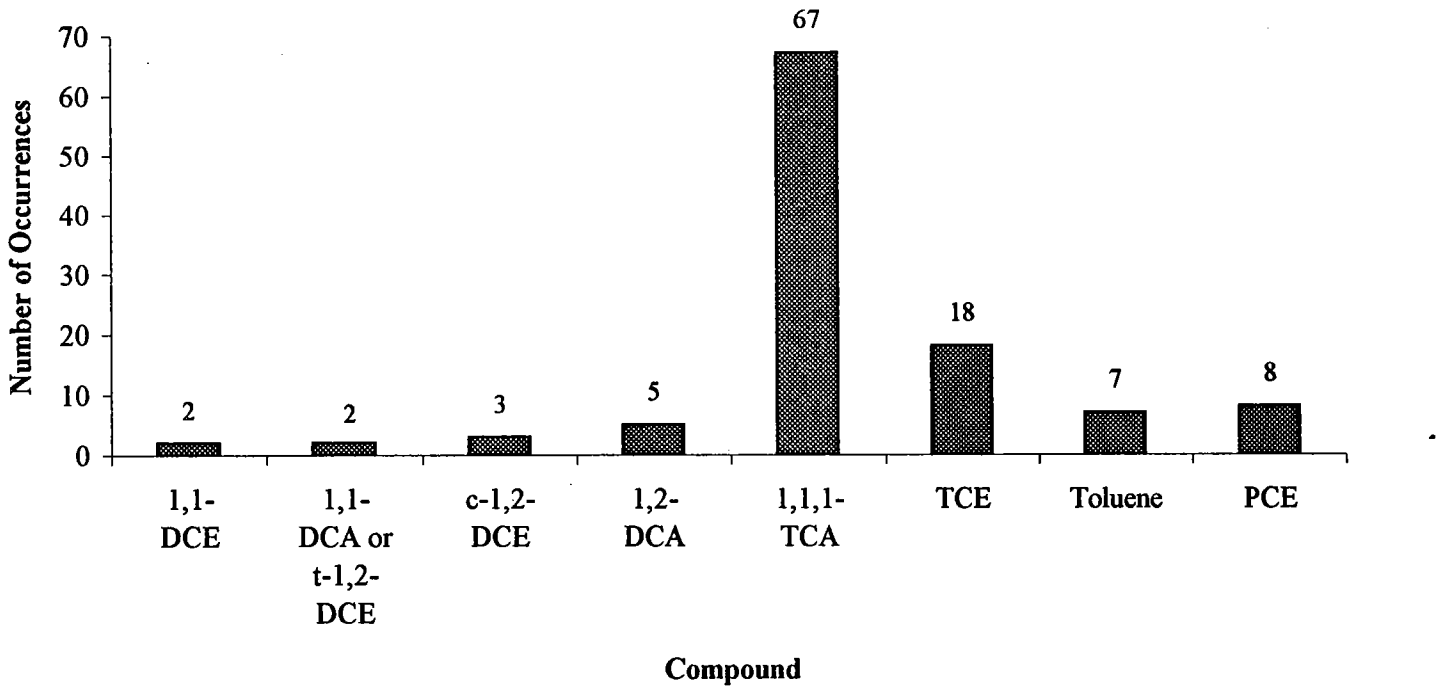


Table 3-3
Frequency Distribution of Quantified Volatile Organic Compounds
Macbeth Division of Kollmorgen Instruments Corp.



Elevated levels of volatile organic compounds in soil gas were found primarily in the area of the northeastern perimeter of Building No.1, in the southwestern corner of Building No. 1, at two discrete locations adjacent to the northwest side of Building No. 1 and northeast corner of Building No. 2, and in the former paint waste disposal area removed in 1989. Elevated soil gas concentrations of volatile organic compounds in this area were observed to attenuate along a utility trench (gas line) southward for approximately 200 feet before dissipating.

The soil gas survey results indicate that a significant, widespread source of volatile organic compound contamination is not present at the Macbeth site. Twenty-seven out of approximately 250 soil gas sample locations contained volatile organic compounds. All 27 locations, with the exception of one discrete point, contained concentrations of volatile organic compounds well below 1,000 ppb by volume.

3.3 Soil Investigation

3.3.1 Soil Boring Investigation and Results

A soil boring program was proposed to NYSDEC and approved based on the results of the soil gas survey. Eleven soil boring locations were proposed, as described in the table below.

Designation	*Location / Rationale*	*Grid Coordinates (Approx.)*
SB-1	East side of Building 1, elevated soil gas concentration	N925/E625
SB-2, SB-3	Adjacent to former waste disposal area, elevated soil gas concentration	N800/E725, N750/E725
SB-4	Behind Building 2, elevated soil gas concentration	N675/E1075
SB-5	Building 2 Paint Shed	N625/E1175
SB-6, SB-7	Rear of Building 1, southwestern portion, elevated soil gas concentration	N725/E300, N775,/E300
SB-8, SB-9, SB-10, SB-11	West side of Building 1, Four borings surrounding most elevated soil gas concentration found at N1050/E350	N1050/E340, N1050/E360, N1040/E350, N1060/E350

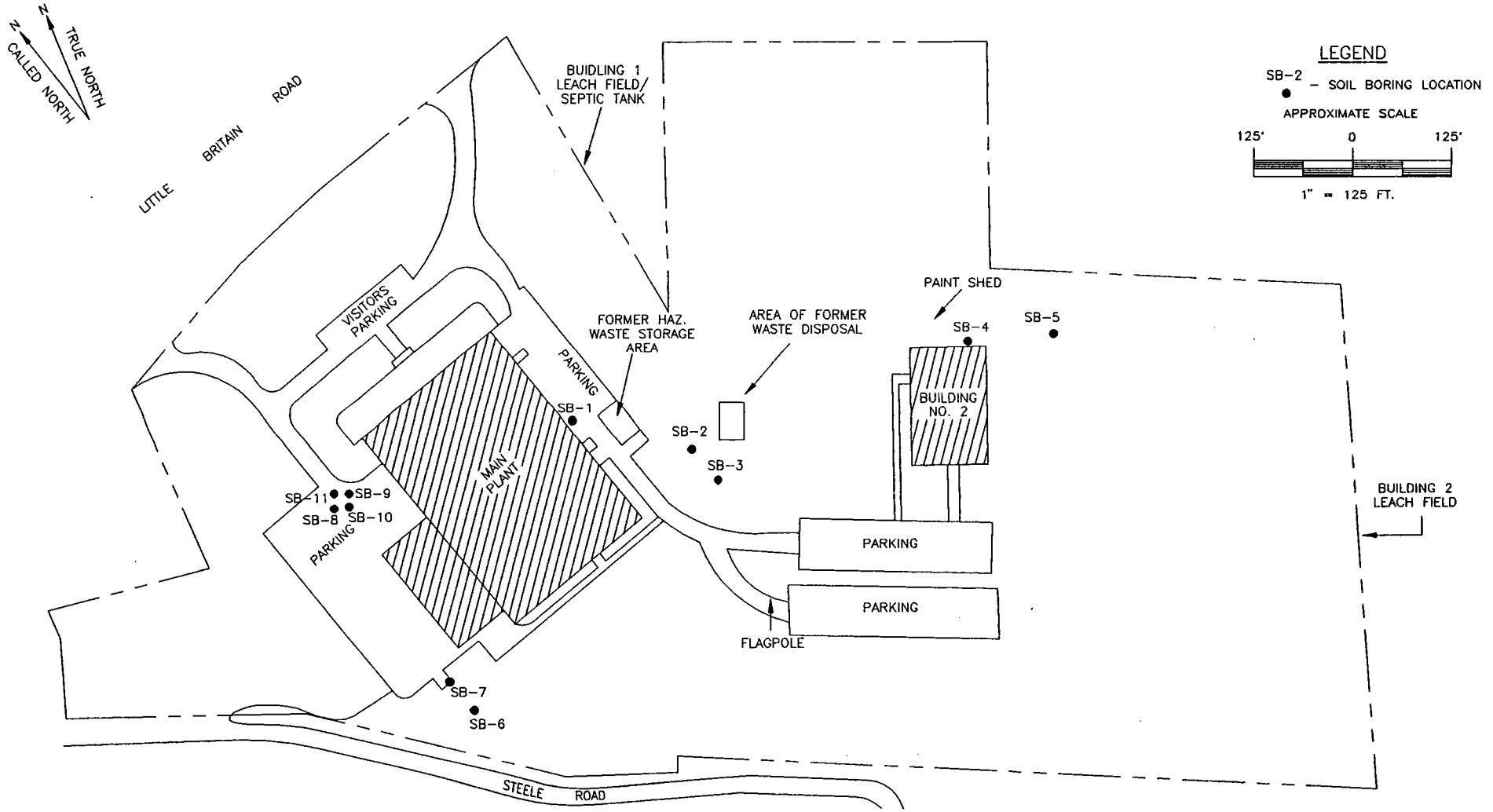
Soil sampling was conducted on September 15, 1994 with oversight by NYSDEC field representatives. Soil borings were advanced using a truck-mounted drilling rig, by the use of split-spoon sampling through hollow stem augers. One boring located adjacent to the former paint waste disposal area was sampled with the use of hand augers, since this location was inaccessible to the drilling rig. Continuous split spoon sampling was performed until bedrock was encountered, or to a maximum of ten feet below grade. Eleven soil borings were constructed in accordance with the RI *Field Sampling Plan*, H2M's soil sampling proposal of August 19, 1994 (provided above), and NYSDEC's approval letter of September 12, 1994. A total of twelve samples were collected from eleven boreholes. These locations are

provided in Figure 3-3. Soil sampling information developed in the field , including locations, hammer counts per six inches of penetration of the split spoon, spoon recovery, PID responses, and lithology, is provided in Table 3-4. Field screening of split spoons with a PID was performed to measure total organic vapors. The sample which exhibited the highest PID response was submitted for laboratory analysis; if no PID response was present, the sample obtained immediately above fractured or competent bedrock was submitted for laboratory analysis, in accordance with the soil sampling proposal.

All samples submitted to the laboratory were analyzed for volatile organic compounds in accordance with NYSDEC CLP methods. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. The sample which exhibited the highest PID response of the four obtained from the area of N1050/E350 was analyzed for TAL metals, TCL semi-volatile organics, pesticides, and PCBs, as directed by NYSDEC. For the purpose of determining soil cleanup objectives in accordance with NYSDEC TAGM HWR-94-4046 dated January 24, 1994, total organic carbon was also analyzed for in samples SB-1, SB-4, SB-5, and the sample exhibiting the most elevated PID response from sample groups SB-2 & 3, SB-6 & 7, and SB-8 - SB-11.

Soil sampling laboratory analytical results are provided in Table 3-5. Volatile organic compounds were quantified in one sample, SB-10, 0-2'. These compounds included total xylenes at a concentration of 0.190 ppm, and acetone, at a concentration of 0.014 ppm. Methylene Chloride and/or acetone, common laboratory contaminants, were present in all samples below contract required practical quantitation limits at estimated concentrations ranging from 0.002 ppm to 0.006 ppm. SB-1,2,6, and 11 contained estimated concentrations below contract required practical quantitation limits of various volatile organic compounds, ranging from 0.001 ppm to 0.007 ppm. These compounds included tetrachloroethene, trichloroethene, 1,2-dichloroethane, benzene, ethylbenzene, and toluene. All concentrations of volatile organic compounds were well below NYSDEC recommended cleanup objectives as described in NYSDEC TAGM HWR-94-4046. The presence of low levels of petroleum related compounds (benzene, toluene, ethylbenzene, and xylenes), where present, are attributable to the asphalt and sub-base immediately above and extending into the depth of sample collection, and do not warrant concern based on their source and their presence at concentrations below NYSDEC cleanup objectives.

One sample from the area of the highest soil gas concentration (SB-11 0-2') was submitted for analysis for TAL metals, TCL semi-volatile organics, pesticides, and PCBs, as directed by NYSDEC. These sample results are also provided in tabular form. Pesticides and PCBs were not found in the sample, with the exception of methoxychlor, at a concentration of 0.023 ppm, well below the NYSDEC recommended cleanup objective for total pesticides of less than 10 ppm. A number of TAL metals were quantified in the sample. Two of the twenty-three metals analyzed for were quantified at concentrations



SOIL BORING LOCATIONS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
SEPTEMBER 1994

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS

Figure 3-3

Table 3-4
Borehole Logs - Soil Sampling Information, 15-Sep-94
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

Sample Location/ Grid Coordinate	Depth (below gd.)	Hammer Counts/6 in.	Recov. (ft)	PID Response (ppm > bckgd)	Lithology	Comments
SB-1 N925/E625	0-2'	26/6/8/5	1.0	0	Asphalt; Grey-black f-c sandy gravelly fill	Sampled beneath asphalt
	2-4'	14/8/6/100	0.8	0	Fine sandy fill, fractured bedrock at 3.0	
SB-2 N800/E725	0-1.5'	NA	NA	0	Topsoil	Hand augered, inacc. to rig, sampled
SB-3 N760/E725	0-2'	10/12/10/14	0.3	0	Topsoil	
	2-4'	10/9/8/10	1.3	0	Tan brown f sands, w/little silt & gravel	
	4-6'	5/4/4/100	1.7	0	Similar, bedrock at 5.5	Sampled above bedrock
SB-4 N675/E1075	0-2'	2/4/4/5	0.4	0	Topsoil; Brown, tight silty sands	
	2-4'	3/4/5/6	0.3	0	Similar	
	4-6'	2/2/2/100	0.5	0	Similar; bedrock at 5.5	Sampled above bedrock
SB-5 approx N550/E1050	0-2'	6/6/4/4	0.5	0	Topsoil; Brown silty sand.	
	2-4'	2/13/9/36	1.5	0	2-2.5 similar; 2.5-2.7 moist dark brown hardpan, then grey weathered rock or hardpan	Sampled
	4-6'	9/36/69/100	0.5	0	Weathered ls, competent at 5.5	
SB-6 N740/E300	0-2'	8/5/3/4	1.0	0	Topsoil; Grey-black f-c gd sandy gravelly fill	
	2-4'	4/4/10/8	1.1	0	Tan brown sandy silt	
	4-6'	6/6/8/9	1.0	0.5	Similar, w/little gravel coarsening downward	Sampled based on slight PID resp.
	6-8'	12/8/7/6	1.8	0	Similar, w/black cobbles & sand	
	8-10'	15/13/10/12	1.1	0	Brown-black f-c sand w/gravel & ls cobbles	

Table 3-5
Volatile Organic Compounds Quanitified in Soil Samples, mg/kg (ppm)
15-Sep-94
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

Sample Location	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SB-11	SB-11
Depth	0.0-2.0	0.0-2.0	4.0-6.0	4.0-6.0	2.0-4.0	4.0-6.0	2.0-4.0	0.0-2.0	4.0-6.0	0.0-2.0	0.0-2.0	2.0-4.0
Parameter												
Tetrachloroethene	< 0.012	0.002 J	< 0.011	< 0.011	< 0.013	0.007 J	< 0.011	< 0.011	< 0.011	< 0.011	< 0.010	< 0.011
Trichloroethene	0.003 J	< 0.011	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.010	< 0.011
1,2-Dichloroethane	< 0.012	< 0.011	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	0.001 J	< 0.010	< 0.011
Benzene	< 0.012	< 0.011	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	0.002 J	< 0.010	< 0.011
Ethylbenzene	< 0.012	< 0.011	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	0.005 J	0.001 J	< 0.011
Toluene	< 0.012	0.001 J	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	< 0.011	< 0.010	< 0.011
Xylenes (total)	< 0.012	< 0.011	< 0.011	< 0.011	< 0.013	< 0.012	< 0.011	< 0.011	< 0.011	0.190	0.007 J	0.002 J
Acetone	0.003 J	0.011 B	0.006 J	0.006 J	0.003 J	< 0.012	< 0.011	< 0.011	0.006 J	0.014	0.004 J	0.003 J
Methylene Chloride	< 0.012	0.004 J	0.003 J	0.003 J	0.004 J	0.002 J	0.002 J	0.002 J	0.002 J	0.002 J	< 0.010	< 0.011

Notes
Depths are expressed in feet below grade.
< 0.012- Not found at or above the laboratory detection limit shown.
J - Estimated concentration for a parameter found below the laboratory analytical detection limit.
B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.
Other volatile organic compounds were analyzed for in accordance with NYSDEC CLP methods and not detected.

Table 3-5 (cont.)
Semi-Volatiles, TAL Metals, Pesticides & PCBs Quanitified in Soil Samples, mg/kg (ppm)
Sample SB-11, 0.0-2.0
15-Sep-94
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

TCL Semi-Volatile Organics	Concentration
Napthalene	0.500
Acenaphthlene	0.270 J
Fluorene	0.460
Phenanthrene	0.940
Anthracene	0.300 J
Fluoranthene	0.410
Pyrene	2.600
Benzo(a)anthracene	0.470
2-Methylnaphtahalene	0.470
Dibenzofuran	0.140 J

Pesticides & PCBs	Concentration
Methoxychlor	0.023

TAL Metals	Concentration
Aluminum	9,710
Antimony	< 5.7
Arsenic	8.2
Barium	45.1
Beryllium	0.70 B
Cadmium	1.3
Calcium	71,600
Chromium	10.4
Cobalt	5.6 B
Copper	12.5
Iron	19,000
Lead	19.2

TAL Metals	Concentration
Magnesium	28,400
Manganese	323
Mercury	< 0.05
Nickel	12.9
Potassium	1,650
Selenium	< 0.1
Silver	< 0.63
Sodium	116 B
Thallium	< 0.3
Vanadium	10.7
Zinc	53.1

Notes

< 0.03: Not found at or above the detection limit shown.

J - Estimated concentration for a parameter found below the laboratory analytical detection limit.

B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.

Other semi-volatile organic compounds, TAL metals, pesticides & PCBs were analyzed for in accordance with NYSDEC CLP methods and not detected.

greater than typical eastern USA background concentrations as described in NYSDEC TAGM HWR-94-4046. Cadmium was quantified at a concentration of 1.3 ppm; the range in eastern USA background concentration is given as 0.1 to 1 ppm. Zinc was quantified at a concentration of 53.1 ppm; the range in eastern USA background concentration is given as 9 to 50 ppm. These concentrations, only slightly above typical eastern USA background and below pavement, do not warrant concern. Three semi-volatile organic compounds related to petroleum compounds were detected at estimated concentrations below laboratory detection limits; seven compounds related to petroleum compounds were quantified at concentrations ranging from 0.410 ppm to 2.600 ppm. Of these ten compounds, only one, benzo(a)anthracene (0.470 ppm), was detected above the health-based NYSDEC recommended cleanup objective (0.224 ppm or detection limit) as described in NYSDEC TAGM HWR-94-4046. However, this concentration is well below the soil cleanup objective to protect groundwater quality of 3.0 ppm. As this area is paved, the presence of this compound does not pose a health-based concern. Furthermore, as stated above, the presence of these petroleum related compounds can be attributed to the asphalt and sub-base immediately above and extending into the depth of sample collection, and do not warrant concern.

The first item of NYSDEC's approval letter of September 12, 1994 specified that surface soil samples (0-3") would be required to assess potential exposure routes of potential soil contamination. Subsequent discussions indicated that if contaminated soils were to be removed, or if the area was paved, surface soil sampling would not be necessary. Of the eleven soil sampling locations, six were beneath pavement (SB-1, SB-7, SB-8, SB-9, SB-10, and SB-11). Of the five remaining locations, surface soil sampling to assess potential exposure routes was determined unnecessary, since quantifiable concentrations of contaminants were not present in soils below the surface, or at concentrations which warrant concern in soil gas sampled from near the surface.

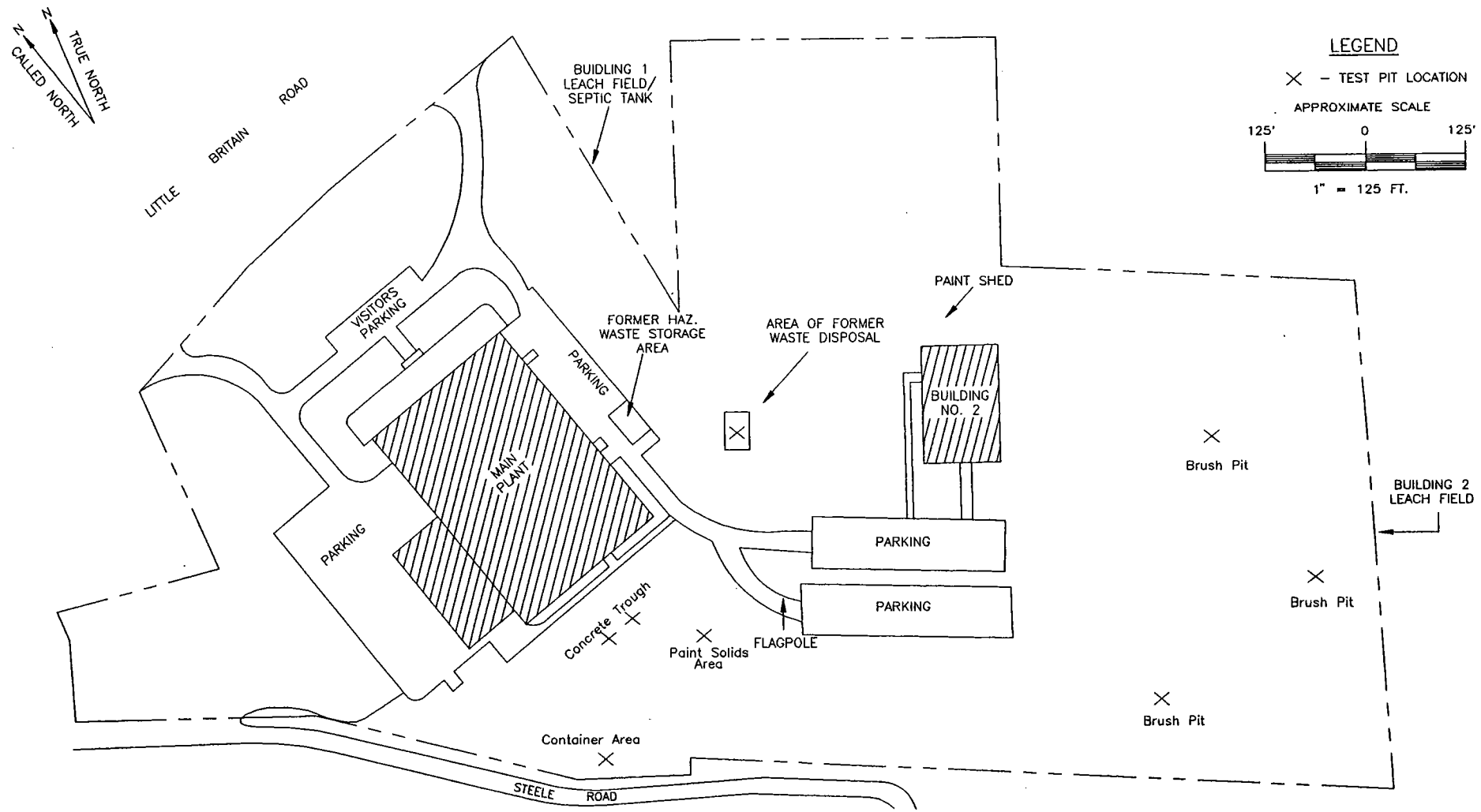
3.3.2 Test Pit Investigation and Results

Various areas of potential concern, including low-lying and mounded areas, were identified by NYSDEC and H2M during the site-wide soil gas survey. Although the soil gas survey did not indicate elevated concentrations of volatile organic compounds in the soil gas at these locations, NYSDEC recommended that a sub-surface investigation be conducted in these areas. A scope of work was provided by H2M to NYSDEC on November 8, 1994. NYSDEC approved the scope of work with comments on November 14, 1994. Areas targeted for test pits on November 18, 1994 included the former waste disposal area, the area where a small concrete trough was present at the rear of Building No. 1, adjacent to site grid coordinates N700 E500, and in the wooded area to the rear of Building No. 1, where a depression approximately 25 feet in diameter was present. Some metal construction debris was present at the perimeter of the depression. Additional locations were targeted for test pits conducted on December 7 and 8, 1994. These locations included areas to the rear of the facility south of Building No. 2, where numerous

depressions, which were revealed to be landscaping fill ("brush pits") and soil "borrow" areas, were present. Test pit locations are provided in Figure 3-4.

Test pits were conducted on November 18, December 7, and December 8, 1994 in areas chosen by NYSDEC and H2M, as described above. Samples were obtained at test pit locations in the former waste disposal area immediately above the fractured bedrock surface (approximately five feet below grade), and a near-surface sample in the concrete trough area to the rear of Building No. 1, and submitted to the laboratory for volatile organic compound analysis in accordance with the NYSDEC-approved scope of work and NYSDEC field representatives present during sampling and test pit activities. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. Samples obtained in the former paint waste disposal area, as shown in Table 3-6, did not contain volatile organic compounds above NYSDEC cleanup objectives, demonstrating that this area has been remediated and poses no further concern. The samples obtained in the area of the concrete trough also contained no volatile organic compounds above cleanup objectives. Test pits conducted on December 7 and December 8, 1994 in areas to the rear of the facility south of Building No. 2, revealed that the numerous depressions were landscaping fill ("brush pits") and soil "borrow" areas, which did not require sampling for laboratory analysis and posed no concern.

On November 18 two areas of concern were found during test pit activities. The circular depression southwest of Building 1 contained at its perimeter approximately one dozen five to ten gallon metal and glass containers containing residual paint materials, as well as general debris. Soil samples were obtained from this depression and analyzed for volatile organic compounds in accordance with NYSDEC CLP methods. Paint solids were found in a second area measuring approximately 25 feet long by thirteen feet wide, to the southeast of Building 1. The paint was a few inches thick at some locations within this area. A sample of the paint was obtained and analyzed for TAL metals and volatile organic compounds in accordance with NYSDEC CLP methods. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. Results of these analyses, presented in Table 3-7, indicated that volatile organic compounds were not present at concentrations of concern in the container area, with the exception of acetone, which was found slightly above the NYSDEC cleanup objective. The paint solids contained elevated levels of primarily non-halogenated volatile organic compounds above NYSDEC cleanup objectives (including toluene, ethylbenzene, and xylenes), and some metals, primarily chromium and lead. 1,1,1-Trichloroethane was also present in the paint solids sample, but below NYSDEC cleanup objectives. The data indicated that neither of these areas are a potential source for the contamination found in the homeowner well located at 400 Little Britain Road, since the compounds of concern (trichloroethene, dichloroethenes, and vinyl chloride) found in that well were not found at these locations.



TEST PIT LOCATIONS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
NOVEMBER AND DECEMBER 1994

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS

Figure 3-4

H2MGROUP

Table 3-6
Volatile Organic Compounds Quanitified in Test Pit Soil Samples, mg/kg (ppm)
18-Nov-94
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

Sample Location	Former Source Area		Bldg 1 Rear	Container Area				NYSDEC Rec.
	Pit 1	Pit 2	Conc.	Center	North	South	SE	Cleanup
	FSA	NSA	Trough	Wall	Wall	Wall	Pit	Objective
Parameter								
1,1,1-Trichloroethane	0.023	0.017	< 0.012	< 0.013	< 0.017	< 0.012	< 0.018	0.8
Tetrachloroethene	0.075	0.057	< 0.012	< 0.013	< 0.017	< 0.012	< 0.018	1.4
Trichloroethene	0.003 J	0.008 J	< 0.012	0.004 J	< 0.017	< 0.012	0.009 J	0.7
Acetone	0.077	0.033	0.012 B	0.011 BJ	***0.250***	< 0.012	0.020	0.2
Methylene Chloride	0.003 BJ	< 0.014	< 0.012	< 0.013	< 0.017	< 0.012	< 0.018	0.1

Notes
< 0.012- Not found at or above the laboratory detection limit shown.
Compounds found above NYSDEC recommended cleanup objectives (TAGM HWR 94-4046) denoted in bold italics.
J - Estimated concentration for a parameter found below the laboratory analytical detection limit.
B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.
Other volatile organic compounds were analyzed for in accordance with NYSDEC CLP methods and not detected.

Table 3-7
Volatile Organic Compounds & TAL Metals Quantified in Paint Solids Sample
Macbeth Division of Kollmorgen Instruments Corp.
11/18/94

Volatile Organic Compounds (total) (mg/kg)	Conc.
Bromomethane	1.300
Methylene Chloride	0.240
2-Butanone	0.670
1,1,1-Trichloroethane	0.490
Toluene	9,000
Ethylbenzene	250
Xylene (total)	2,000

-Other TCL VOCs were analyzed for but not detected.

TAL Metals (total) (mg/kg)	
Aluminum	6,600
Arsenic	5.30
Barium	91.3
Calcium	7,690
Cadmium	7.95
Chromium	8,400
Cobalt	118
Copper	27.1
Iron	18,060
Mercury	0.15
Potassium	3,300
Magnesium	2,450
Manganese	118
Sodium	2,390
Lead	2,310
Antimony	77.8
Zinc	7,365

-Other TAL metals were analyzed for but not detected.

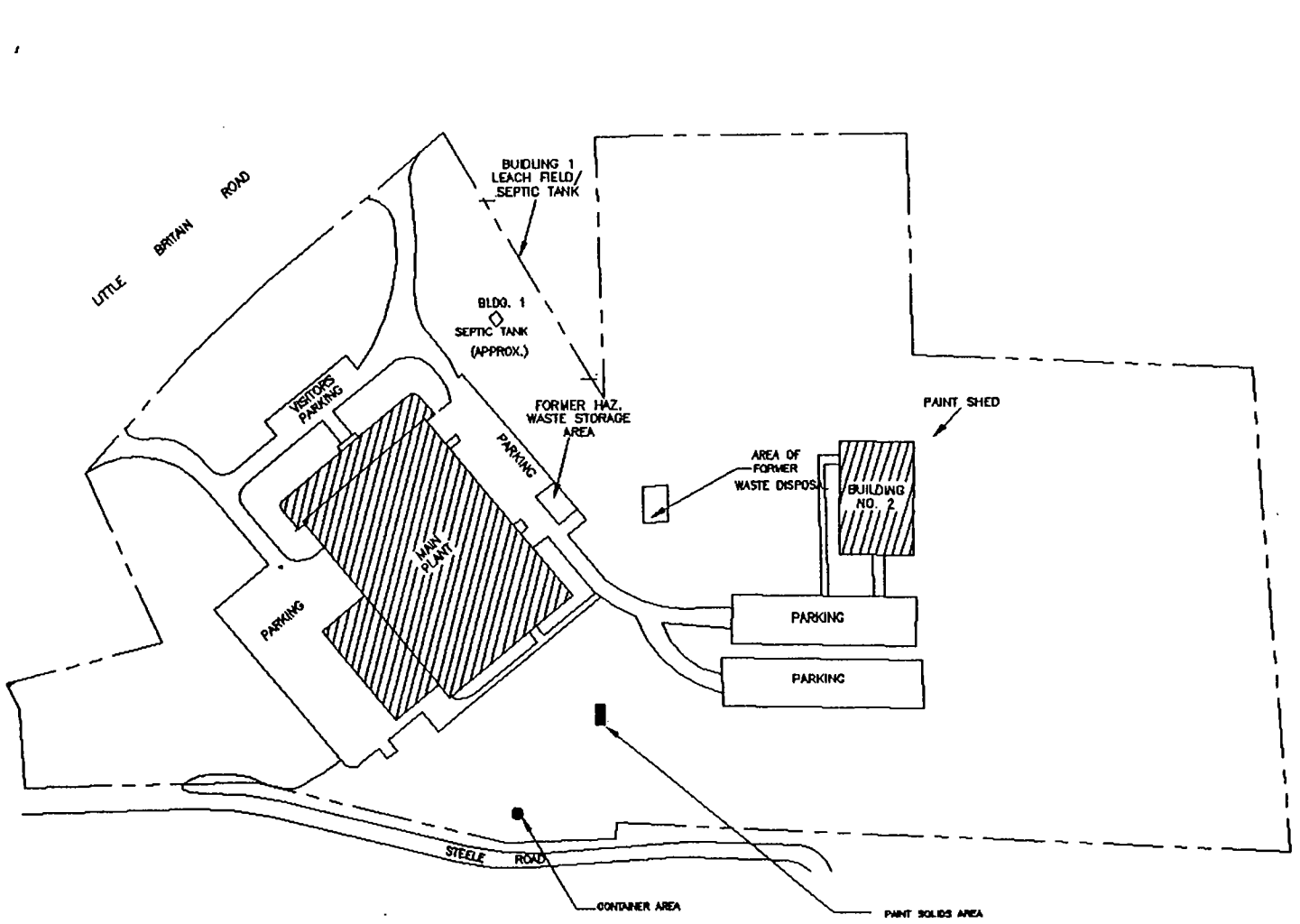
It was decided that these materials be removed from the site as an Interim Remedial Measure (IRM) before conclusion of the RI. This IRM is summarized in the following section. A detailed account of the IRM was provided in the H2M *Interim Remedial Measure Report*, June 1995, approved by NYSDEC with correspondence dated September 12, 1995.

3.3.3 Interim Remedial Measure

Materials from the two areas of concern (Figure 3-5) were excavated and stockpiled on site on December 7 and December 8, 1994. Approximately 45 cubic yards of material was excavated and disposed of at City Environmental, Detroit, Michigan.

Post-excavation confirmatory sampling was conducted at the former container area with NYSDEC oversight on December 8, 1994. Samples were analyzed for TAL metals and volatile organic compounds in accordance with NYSDEC CLP methods. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. Sample locations are provided in Figure 3-6; results are provided in Table 3-8. Three volatile organic compounds were detected at estimated concentrations below instrument detection limits, well below NYSDEC recommended cleanup objectives. A number of metals were quantified in the samples above NYSDEC recommended cleanup objectives or Eastern U.S.A background levels presented in NYSDEC TAGM HWR-94-4046. These compounds include cadmium (1 sample), total chromium (3 samples), copper (4 samples), mercury (4 samples), nickel (3 samples), and zinc (all samples). The "North", "Center", and "Center Wall" samples contained the majority of compounds which exceeded these values. However, all values were at least an order of magnitude below the most conservative U.S.E.P.A. risk-based concentrations for residential soils, based on a direct ingestion scenario, and as such, do not pose a potential risk to human health.

Nine soil samples were obtained in the former paint solids area on April 20, 1995, in accordance with H2M's post-excavation sampling proposal of March 9, 1995, as directed by NYSDEC correspondence of April 11, 1995, and NYSDEC representatives who were present on-site. These locations are provided in Figure 3-7. All soils were analyzed for volatile organic compounds and metals using NYSDEC CLP methods. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. These results are presented in Table 3-9. Four volatile organic compounds (acetone, methylene chloride, toluene, and total xylenes) were detected at estimated concentrations below instrument detection limits, well below NYSDEC recommended cleanup objectives. All metals in the samples were quantified below NYSDEC recommended cleanup objectives or Eastern U.S.A. background levels presented in NYSDEC TAGM HWR-94-4046, with the exception of zinc. Zinc was slightly above typical eastern U.S.A. background in all but one of the samples. The concentration of zinc, which ranged from 51.4 to 88.5 ppm, appears to represent background for the site. These zinc values are three orders of



IRM AREAS
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

APPROXIMATE SCALE
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. NEWPORT BEACH, CA. TOTOWA, N.J.

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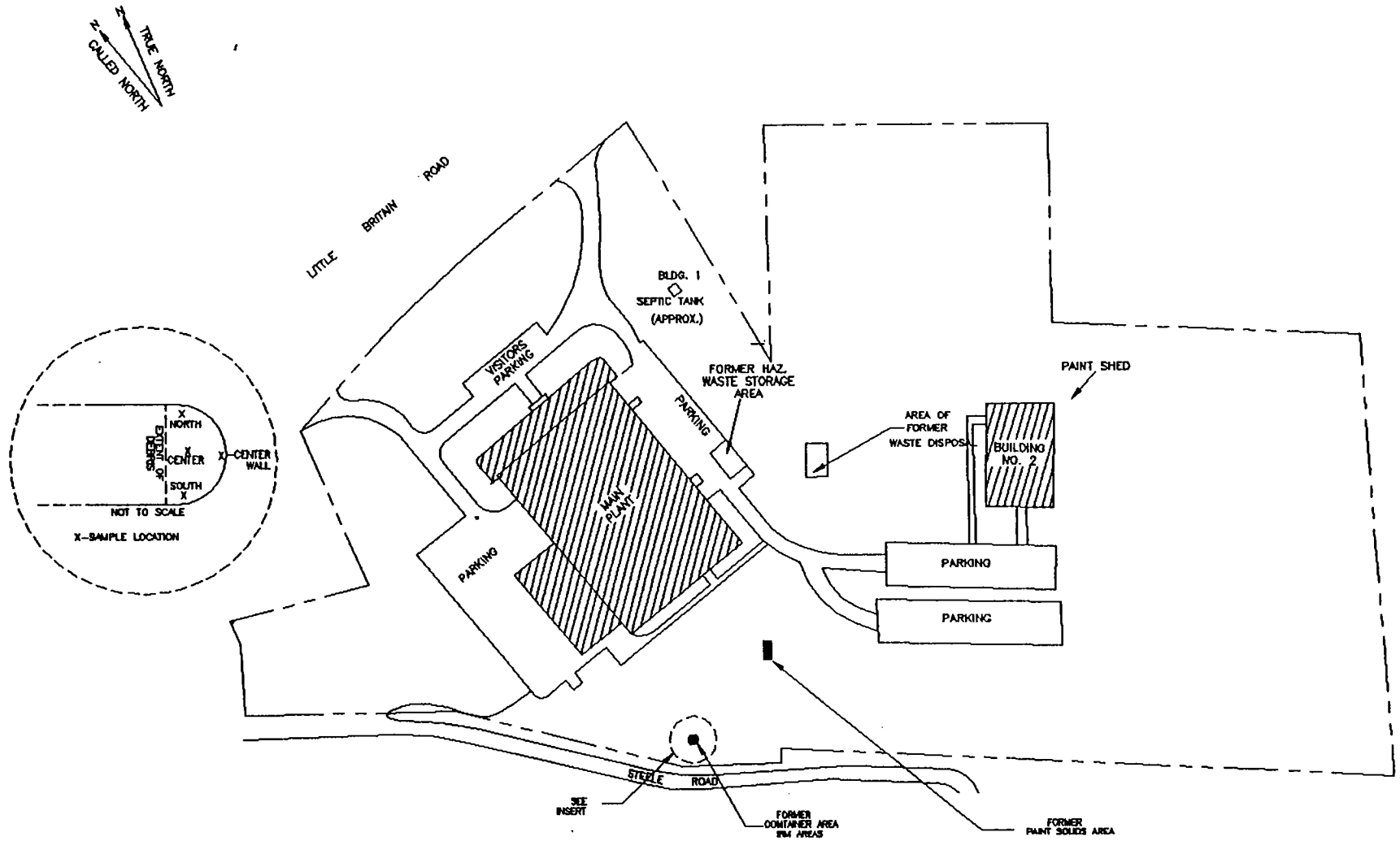
Figure 3-5



POST-EXCAVATION SAMPLING LOCATIONS
FORMER CONTAINER AREA
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

APPROXIMATE SCALE
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
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Figure 3-6

H2MGROUP

Table 3-8
Volatile Organic Compounds & TAL Metals Quanitified in Confirmatory Soil Samples, mg/kg (ppm)
Container Test Pit Area
8-Dec-94
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

	North	South	Center	Center Wall	Backfill	USEPA Heast RBC (1)	NYSDEC Rec. Cleanup Objective (2)	Eastern USA Background (2)
Volatile Organics								
Acetone	< 0.013	< 0.011	< 0.013	< 0.012	0.009 J	7,800	0.2	NA
Carbon Disulfide	< 0.013	0.002 J	< 0.013	< 0.012	< 0.011	7,800	2.7	NA
Xylenes (total)	0.002 J	< 0.011	0.002 J	< 0.012	< 0.011	160,000	1.2	NA
Inorganics								
Aluminum	32,700	14,600	25,300	28,400	15,900	230,000	SB	33,000
Antimony	0.64 B	0.47 B	0.91 B	0.75 B	1.7 B	31	SB	N/A
Arsenic	4.3	5.4	5.8	5.0	6.0	0.37 (c)	7.5 or SB	3 - 12.
Barium	83.4	56.1	109	158	242	5,500	300 or SB	15 - 600
Beryllium	0.62 B	0.47 B	0.54 B	0.65 B	0.56 B	0.15 (c)	0.16 or SB	0 - 1.75
Cadmium	1.2 B	0.2 B	0.33 B	0.84 B	0.05 B	39	1 or SB	0.1 - 1
Calcium	1,040 B	853 B	1,290	883 B	3,240	NA	SB	130 - 35,000
Chromium (total)	32.8	20.0	64.4	40.9	47.1	390 (Cr VI)	10 or SB	1.5 - 40
Cobalt	11.3 B	9.8 B	13.4	13.1	13.4	14,000	30 or SB	2.5 - 60
Copper	967	23.5	484	566	140	2,900	25 or SB	1 - 50.
Iron	26,100	28,300	59,700	28,500	43,900	NA	2,000 or SB	2,000 - 550,000
Lead	67.5	14.5	58.8	61.1	181	NA	SB	4 - 500
Magnesium	4,110	4,790	4,280	4,180	4,360	NA	SB	100 - 5,000
Manganese	675	624	864	865	703	390	SB	50 - 5,000
Mercury	1.6	0.07 B	1.4	0.82	0.47	2	0.1	0.001 - 0.2
Nickel	28.4	20.3	37.9	31.5	23.6	1,600	13 or SB	0.5 - 25
Potassium	2,730	1,960	2,520	2,300	2,800	NA	SB	8,500 - 43,000
Selenium	1.7	1.4	3.6	1.5	2.6	390	2 or SB	0.1 - 3.9
Silver	0.17 B	< 0.05	< 0.05	0.08 B	0.71 B	390	SB	N/A
Sodium	177 B	187 B	159 B	160 B	213 B	NA	SB	6,000 - 8,000
Thallium	< 0.49	< 0.41	< 0.45	< 0.45	< 0.42	NA	SB	N/A
Vanadium	26.9	20.0	28.2	28.3	24.9	550	150 or SB	1 - 300
Zinc	250	77.6	301	259	239	23,000	20 or SB	9 - 50.

Notes:

(1) - USEPA risk-based concentrations obtained from HEAST for non-industrial soils, direct ingestion

(2) - NYSDEC TAGM HWR-94-4046.

SB - Site Background.

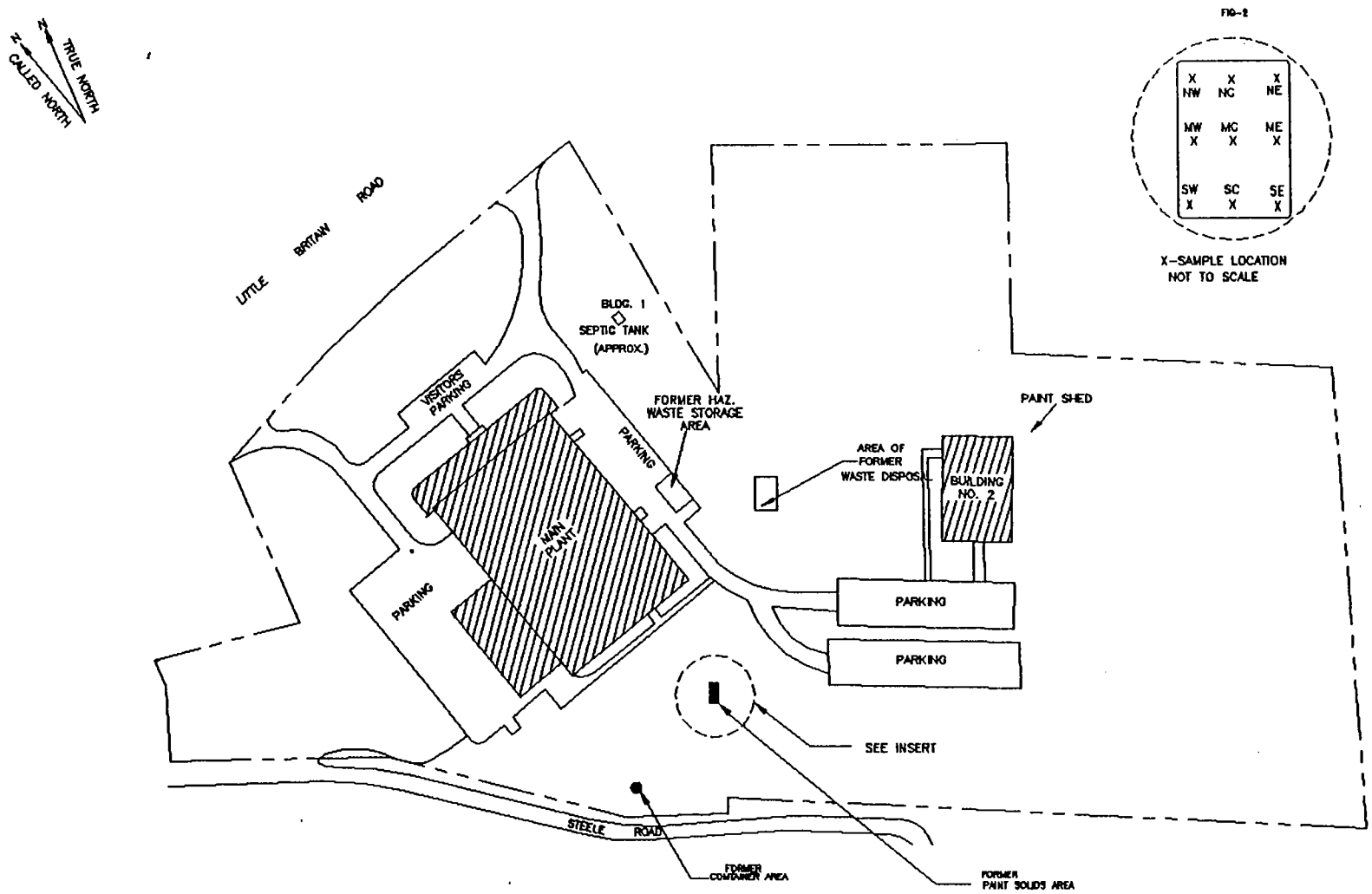
< 0.012- Not found at or above the laboratory detection limit shown.

NA - Not available or not applicable

J - Estimated concentration for a parameter found below the laboratory analytical detection limit.

B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.

(c) -value for carcinogenic effects provided where values for non-carcinogenic effects are also available.



POST EXCAVATION SAMPLING LOCATIONS
FORMER PAINT SOLIDS AREA
MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK

APPROXIMATE SCALE
125' 0 125'

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. NEWPORT BEACH, CA. TOTOWA, N.J.

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Figure 3-7

3-25

Table 3-9
Volatile Organic Compounds Quanitified in Confirmatory Soil Samples, mg/kg (ppm)
Paint Solids Test Pit Area
20-Apr-95
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 336037

	North			Blind dup.	Mid			South			USEPA	NYSDEC Rec. Cleanup	Eastern USA
	East	Center	West	North-West	East	Center	West	East	Center	West	Heast RBC (1)	Objective (2)	Background (2)
Volatile Organics													
Acetone	< 0.013	0.004 JB	0.005 JB	0.004 JB	< 0.012	< 0.012	< 0.012	< 0.015	0.010 JB	< 0.014	7,800	0.2	NA
Methylene Chloride	0.004 J	0.004 J	0.002 J	0.003 J	0.005 J	0.004 J	0.005 J	0.003 J	0.004 J	0.003 J	7,800	2.7	NA
Toluene	< 0.013	< 0.012	< 0.013	0.001 J	0.001 J	< 0.012	< 0.012	< 0.015	< 0.013	< 0.014	16,000	1.5	NA
Xylenes (total)	< 0.013	< 0.012	< 0.013	< 0.013	0.002 J	< 0.012	< 0.012	0.001 J	< 0.013	< 0.014	160,000	1.2	NA

Notes:
(1) - USEPA risk-based concentrations obtained from HEAST for non-industrial soils, direct ingestion
(2) - NYSDEC TAGM HWR-94-4046.
< 0.012- Not found at or above the laboratory detection limit shown.
NA - Not available or not applicable
J - Estimated concentration for a parameter found below the laboratory analytical detection limit.
B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.

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Table 3-9 (Cont.)
TAL Metals Quanitified in Confirmatory Soil Samples, mg/kg (ppm)
Paint Solids Test Pit Area, April 20, 1995
Macbeth Division of Kollmorgen Instruments Corporation, New Windsor, New York
NYSDEC Site No. 336037

	North			Blind dup.	Mid			South			USEPA	NYSDEC Rec.	Eastern USA
norganics	East	Center	West	North-West	East	Center	West	East	Center	West	Heast RBC (1)	Cleanup Obj.(2)	Background (2)
Aluminum	14,300	13,300	12,600	11,500	15,000	14,900	13,300	13,600	13,200	13,100	230,000	SB	33,000
Antimony	< 0.60	< 0.59	< 0.60	< 0.60	< 0.59	< 0.56	< 0.56	< 0.70	< 0.61	< 0.67	31	SB	N/A
Arsenic	4.3	4.0	5.1	4.1	3.5	3.4	3.6	3.5	3.8	3.6	0.37 (c)	7.5 or SB	3 - 12.
Barium	76.5	85.0	71.8	91.7	51.6	45.1	43.2	91.8	50.8	66.9	5,500	300 or SB	15 - 600
Beryllium	0.55	0.51	0.52	0.43	0.40	0.38	0.42	0.60	0.50	0.61	0.15 (c)	0.16 or SB	0 - 1.75
Cadmium	0.32	0.31	0.29	0.30	0.20	0.16	0.19	0.35	0.22	0.29	39	1 or SB	0.1 - 1
Calcium	2,620	1,130	1,860	4,170	835	771	670	2,610	386	1,580	NA	SB	130 - 35,000
Chromium (total)	20.0	24.3	17.5	17.6	14.6	16.0	14.9	12.1	12.5	12.1	390 (Cr VI)	10 or SB	1.5 - 40
Cobalt	9.0	9.9	9.6	8.6	7.4	7.2	7.6	6.6	7.4	6.8	14,000	30 or SB	2.5 - 60
Copper	15.7	18.3	17.1	16.2	10.8	11.0	10.8	12.8	11.2	11.7	2,900	25 or SB	1 - 50.
Iron	19,800	20,300	22,800	19,200	19,000	20,000	18,800	16,300	20,200	17,500	NA	2,000 or SB	2,000 - 550,000
Lead	23.9	13.4	16.4	15.7	7.9	7.6	8.9	29.9	11.6	20.6	NA	SB	4 - 500
Magnesium	3,430	3,220	3,270	3,410	3,070	3,160	2,990	2,510	3,070	2,670	NA	SB	100 - 5,000
Manganese	655	450	651	581	318	263	370	949	688	853	390	SB	50 - 5,000
Mercury	< 0.06	< 0.06	< 0.06	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.05	< 0.07	2.3	0.1	0.001 - 0.2
Nickel	17.4	16.2	17.1	16.3	14.6	15.1	14.3	16.8	15.1	15.0	1,600	13 or SB	0.5 - 25
Potassium	810	462	507	461	669	626	376	488	381	358	NA	SB	8,500 - 43,000
Selenium	0.54	0.74	0.48	< 0.48	< 0.47	0.44	0.48	0.68	0.52	< 0.53	390	2 or SB	0.1 - 3.9
Silver	< 0.22	< 0.22	< 0.23	< 0.23	< 0.22	< 0.21	< 0.21	< 0.26	< 0.23	< 0.25	390	SB	N/A
Sodium	113	113	73.2	77.1	88.1	66.0	74.8	112	70.7	54.1	NA	SB	6,000 - 8,000
Thallium	< 0.60	< 0.59	< 0.60	< 0.60	< 0.59	< 0.56	< 0.56	< 0.70	< 0.61	< 0.67	NA	SB	N/A
Vanadium	20.7	16.5	17.9	16.0	19.6	19.5	15.7	25.8	16.0	17.6	550	150 or SB	1 - 300
Zinc	84.8	88.5	70.4	74.2	52.8	57.3	48.9	77.1	51.4	61.7	23,000	20 or SB	9 - 50.

Notes:

1) - USEPA risk-based concentrations obtained from HEAST for non-industrial soils, direct ingestion

(2) - NYSDEC TAGM HWR-94-4046.

< 0.012- Not found at or above the laboratory detection limit shown.

- Estimated concentration for a parameter found below the laboratory analytical detection limit.

B - Found in blank as well as sample; presence in sample may be attributable to laboratory contamination.

(c) -value for carcinogenic effects provided where values for non-carcinogenic effects are also available.

SB - Site Background.

NA - Not available or not applicable

magnitude below the most conservative U.S.E.P.A. risk-based concentrations for residential soils, using a direct ingestion scenario.

NYSDEC, in conjunction with the New York State Department of Health ("NYSDOH"), requested in correspondence dated April 11, 1995, that the former container area be backfilled with clean fill to "reduce potential risks of exposure," since some metals exceeded NYSDEC cleanup objectives. NYSDEC agreed that drill cuttings resultant from monitoring well installation could be used as fill in this area in correspondence dated May 22, 1995. NYSDEC also recommended in correspondence dated May 22, 1995, that the former paint solids area be backfilled with clean fill to bring the area to grade. The former paint solids area was backfilled with clean fill on June 17, 1995; the former container area was partially backfilled with drill cuttings on May 31 and completed with clean fill on June 21, 1995.

The IRM performed at the Macbeth facility was conducted in accordance with NYSDEC and NYSDOH guidance, and in accordance with NYSDEC-approved sampling plans. The removal of waste materials, confirmatory sampling and analytical data, and site restoration activities conducted as part of the IRM indicate that no further action is required for these areas. NYSDEC found the *Interim Remedial Measure Report* and proposal for no further action acceptable in correspondence dated September 12, 1995.

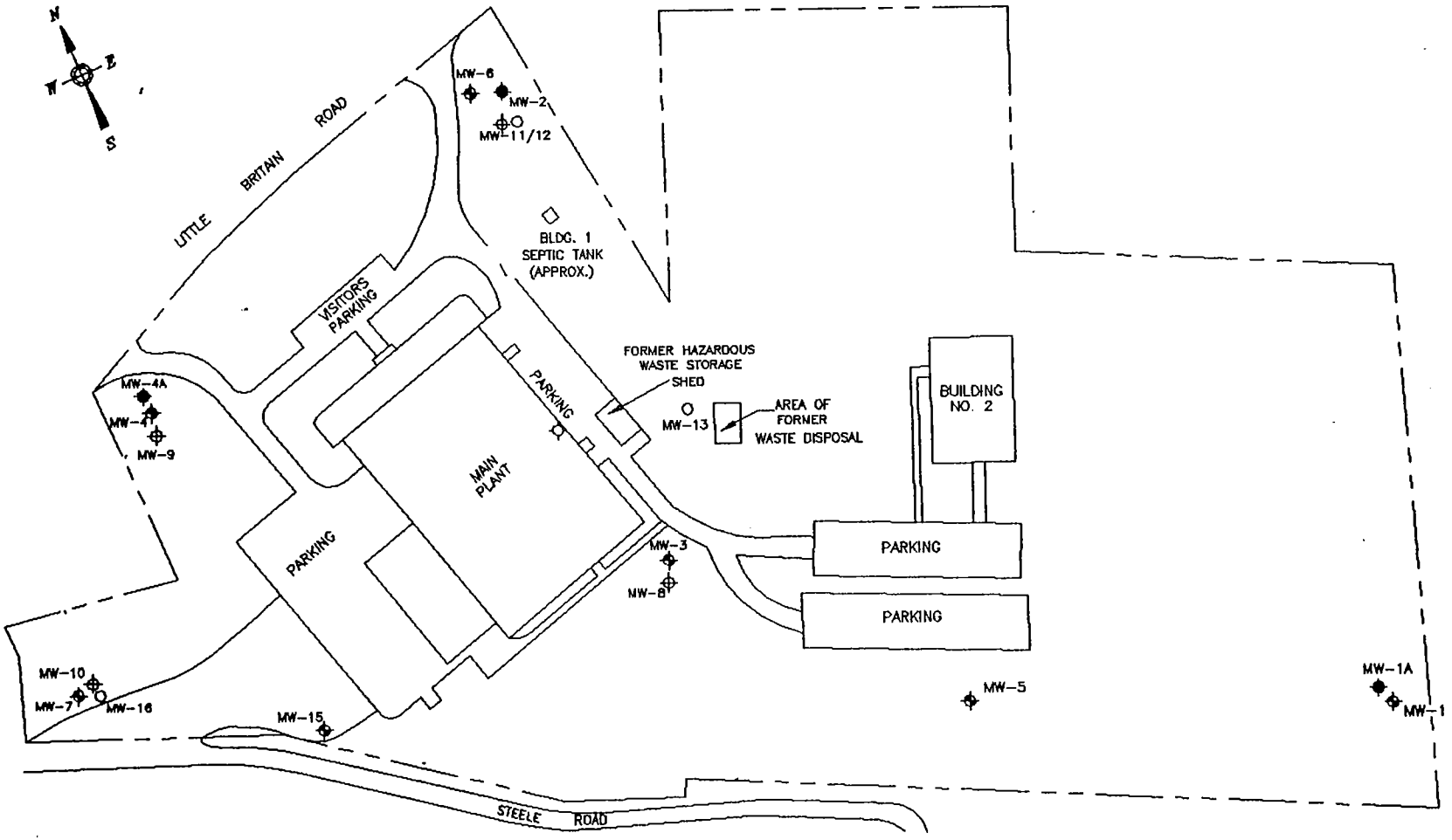
3.4 Groundwater Investigation

3.4.1 Introduction

The additional groundwater investigation performed during the RI for the site targeted areas of potential receptors (i.e., homeowner wells at Steele Road and in the vicinity of 400 Little Britain Road), as well as the area of former paint waste disposal. Five additional monitoring wells were installed to more fully define groundwater flow direction and quality in areas and deeper bedrock zones not monitored by the current monitoring well network, and at depths from which certain homeowner wells are withdrawing water. The locations of these wells are provided in Figure 3-8.

3.4.2 Monitoring Well Location Rationale

MW-11 and MW-12 were installed as deeper couplets to existing wells MW-2 and MW-6. The purpose of these wells is to target discrete zones in the deeper bedrock not screened by the existing wells, extending to a proposed depth of 110 feet below grade, the depth reported for the contaminated homeowner well located at 400 Little Britain Road, northeast of Macbeth. MW-13 and MW-14 were proposed to be installed as a shallow and intermediate bedrock couplet immediately adjacent to the area of former waste disposal. Only one well, MW-13, was installed at this location to a depth of approximately 120 feet, since no detectable water-bearing zones were found in the upper or intermediate bedrock zones. One monitoring



LEGEND

- MW-1A ◆ OVERBURDEN MONITORING WELL
- MW-3 ⊕ SHALLOW BEDROCK MONITORING WELL
- MW-6 ⊕ INTERMEDIATE BEDROCK MONITORING WELL
- MW-12 ○ DEEP BEDROCK MONITORING WELL

MONITORING WELL LOCATION MAP

MACBETH DIVISION OF
KOLLMORGEN INSTRUMENTS CORP.
NEW WINDSOR, NEW YORK
DECEMBER 1995

APPROXIMATE SCALE:
125' 0 125'

H:\ZMAC9401:\94]RIFS:\GDWATER\WELLS

H2MGROUP ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y. TOTOWA, N.J.

Figure 3-8

well, MW-16, was installed as a deeper couplet to monitoring wells MW-7 and MW-10 to target discrete zones in the deeper bedrock not screened by these existing wells. The well located at the auto body shop at 7 Steele Road, was also reported to be at a depth of 110 feet below grade. MW-15 was installed southeast of existing well MW-7, southeast of the Macbeth parking area to the west of Building No. 1.

3.4.3 Monitoring Well Installation

The wells were installed between the dates of November 7, 1994 and December 9, 1994 under the oversight of H2M field geologists. Representatives of the NYSDEC were present during the majority of well drilling activities. The wells were installed via a truck mounted air rotary rig that used various sized pneumatic hammers and roller bits for borehole construction. SBI Environmental Well Drilling of Wayne, New Jersey installed the wells. All downhole drilling equipment and the drill rig were decontaminated between well locations via a portable power steam cleaner in the designated decontamination area located in the southern corner of the rear parking area.

In order to prevent cross-contamination during the installation process, the wells were telescoped in construction as each aquifer zone was encountered. This was accomplished by advancing a borehole to the target depth, setting a steel casing within the borehole, and tremie grouting the casing in place using a bentonite cement mixture. The casing was allowed to set for a minimum period of 24 hours after grouting prior to advancing a smaller diameter size borehole through it. Borehole sizes varied in diameter from 6.0-17.5 inches. Steel casing used to seal off preceding aquifer zones ranged from 8-12 inches in diameter. Once the borehole was advanced to the target monitoring zone, the wells were finished using PVC casing and screen. Monitoring well MW-12 was the only well not completed in this manner, as the intended screened interval was left as an open borehole due to the absence of significant water-bearing zones. The annular space around the PVC well screen was filled with a No. 2 grade Morie sand to a height of 2 feet above the PVC well screen. The remaining annular space was filled with a bentonite cement grout to grade. All wells were finished with stand up, locking protective casings and watertight caps. Wells were developed by pumping after their completion. A summary matrix of monitoring well construction was provided as Table 2-1. Borehole logs for the wells installed during the RI are provided in Appendix C.

All monitoring well boreholes were advanced to the first water-bearing zone within the intended zone of monitoring. Key indicators that were used to identify potential water-bearing zones and fractures were drill times, drilling consistency, color of cuttings, and the absence of cuttings or rock dust at the surface. In general, a significant decrease in drill time occurs when fractures or voids in the bedrock have been encountered. Since fractures and voids in bedrock are the means through which groundwater travels, a waterbearing zone may be present. A loss of drill cuttings at the surface could also indicate that groundwater had been encountered, whereby the water within the formation was preventing wet (heavy)

drill cuttings from being expelled to the surface. Drilling activities were paused when any of these situations occurred within the targeted monitoring zone, to determine if a water-bearing zone had been encountered. A water level measurement would be attempted within the borehole after waiting an appropriate span of time, based on the situation encountered.

At MW-13, bedrock was found to be very dense, with very few fractures. Significant water-bearing zones were not found in the overburden, nor were they found in the few fractures encountered in the bedrock until a solution cavity was found at approximately 120 feet below grade. At MW-13, small fractures appear to have been filled with silt, based on the drill cuttings. Major water bearing zones at MW-11 and MW-12 appear to be limited to solution cavities. A water-bearing solution cavity was encountered in MW-11 from 78 feet to 83 feet below grade; MW-11 was screened in this interval. MW-12, proposed as a deeper couplet to MW-11 to be installed to approximately 110 feet below grade, was installed to 140 feet below grade due to the absence of significant water-bearing zones below 83 feet. Wells on the southwest side of the property installed during the RI, MW-15 and MW-16, appear to contain slightly more water-bearing fractures at shallower depths than those observed on the east side of the property.

3.4.4 Groundwater Sampling and Results

The first CLP round of groundwater sampling was conducted on January 11 and 12, 1995 from sixteen on-site monitoring wells. The second round was conducted on April 20, 1995. The samples were analyzed for volatile organic compounds in accordance with NYSDEC CLP protocols. QA/QC samples were performed in accordance with the RI Field Sampling Plan and QAPP. Groundwater levels were measured from each well prior to purging and sampling. Laboratory results for each round are summarized in Table 3-10 and Table 3-11, and in the text below.

3.4.4.1 Overburden Zone

Three of the seventeen monitoring wells located on the Macbeth property are screened within the glacial till overburden. These overburden wells are MW-1A, 2 and 4A. The glacial till overburden has historically been a water-bearing zone only at monitoring wells MW-1A and MW-2. Some volatile organic compounds were detected in these overburden wells in the January round at estimated concentrations below the method detection limit, but above the practical quantification limit ("PQL"). MW-1A contained toluene at an estimated concentration of 4 ppb, below NYSDEC standards. MW-2 contained 1,1,1-trichloroethane, xylene (total) and acetone at estimated concentrations of 2 ppb, 1 ppb, and 6 ppb, respectively. These concentrations are below the NYSDEC standards. No other compounds analyzed for were detected above the practical quantification limit.

Table 3-10
Volatile Organic Compounds Quantified in Groundwater (ppb)
January 11 - January 12, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

	Overburden Wells		Shallow Bedrock Wells							NYSDEC
Parameter	MW-1A	MW-2	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-15	Standard (a)
1,1,1-Trichloroethane	< 10	2 J	< 10	2 J	< 10	< 10	< 10	1 J	2 J	5
1,1-Dichloroethane	< 10	< 10	< 10	***14***	< 10	< 10	< 10	< 10	3 J	5
Chloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Tetrachloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2 J	< 10	5
Trichloroethene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
1,2-Dichloroethene (total)	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
1,1-Dichloroethene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Vinyl Chloride	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2
Toluene	4 J	< 10	***18***	< 10	2 J	< 10	< 10	< 10	***8 J***	5
Ethylbenzene	< 10	< 10	2 J	< 10	< 10	< 10	< 10	< 10	< 10	5
Xylene (total)	< 10	1 J	***13***	***6 J***	< 10	< 10	< 10	2 J	3 J	5 (b)
Benzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	0.7
4-Methyl-2-Pentanone	< 10	< 10	< 10	< 10	< 10	< 10	< 10	9 J	< 10	NS
Methylene Chloride	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2 J	5
Acetone	< 10	6 J	< 10	< 10	10 J	< 10	< 10	< 10	< 10	50 (c)
Total Targeted Compounds:	4	9	33	22	12	0	0	14	18	100

Notes:
< 10 - Not detected at the Contract Required Detection Limit (CRDL) shown.
4 J - Estimated value for a compound which is present below the CRDL.
Concentrations in bold italics ***18*** are above NYSDEC standards.
MW-4s, screened in the overburden, was dry (consistent with historical sampling episodes), precluding sample collection.
(a) - NYSDEC Divsion of Water T.O.G.S. 1.1.1, October 1993, Ambient Water Quality Standards and Guidance Values.
(b) - Standard for xylene is for each individual isomer.
(c) - Guidance value only.
NS - No standard as of October 1993.

Table 3-10 (cont.)
Volatile Organic Compounds Quantified in Groundwater (ppb)
January 11 - January 12, 1995
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

	Intermediate Bedrock Wells				Deep Bedrock Wells				
Parameter	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-16	Trip Blank	NYSDEC Standard (a)
1,1,1-Trichloroethane	< 10	< 10	< 10	< 10	< 10	***14***	< 10	< 10	5
1,1-Dichloroethane	< 10	< 10	< 10	< 10	< 10	***15***	***61***	< 10	5
Chloroethane	< 10	< 10	< 10	< 10	< 10	< 10	***150***	< 10	5
Tetrachloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Trichloroethene	< 10	< 10	< 10	***14***	***72***	4 J	< 10	< 10	5
1,2-Dichloroethene (total)	< 10	< 10	< 10	***7 J***	***84***	2 J	< 10	< 10	5
1,1-Dichloroethene	< 10	< 10	< 10	< 10	< 10	2 J	< 10	< 10	5
Vinyl Chloride	< 10	< 10	< 10	< 10	2 J	< 10	< 10	< 10	2
Toluene	***11***	< 10	< 10	< 10	3 J	***35***	2 J	2 J	5
Ethylbenzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Xylene (total)	4 J	< 10	< 10	< 10	5 J	***8 J***	< 10	< 10	5 (b)
Benzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	0.7
4-Methyl-2-Pentanone	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NS
Methylene Chloride	< 10	< 10	3 J	3 J	2 J	2 J	3 J	< 10	5
Acetone	< 10	< 10	< 10	< 10	< 10	6 J	< 10	< 10	50 (c)
Total Targeted Compounds:	15	0	3	24	***168***	88	***216***	2	100

Notes:
< 10 - Not detected at the Contract Required Detection Limit (CRDL) shown.
4 J - Estimated value for a compound which is present below the CRDL.
Concentrations in bold italics ***18*** are above NYSDEC standards.
MW-4s, screened in the overburden, was dry (consistent with historical sampling episodes), precluding sample collection.
(a) - NYSDEC Divsion of Water T.O.G.S. 1.1.1, October 1993, Ambient Water Quality Standards and Guidance Values.
(b) - Standard for xylene is for each individual isomer.
(c) - Guidance value only.
NS - No standard as of October 1993.

Table 3-11
Volatile Organic Compounds Quantified in Groundwater (ppb)
20-Apr-95
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

	Overburden Wells		Shallow Bedrock Wells							NYSDEC
Parameter	MW-1A	MW-2	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-15	Standard (a)
1,1,1-Trichloroethane	< 10	1 J	< 10	***9 J***	< 10	< 10	< 10	1 J	< 10	5
1,1-Dichloroethane	< 10	< 10	< 10	***65***	< 10	< 10	< 10	< 10	< 10	5
1,2-Dichloroethane	< 10	< 10	< 10	1 J	< 10	< 10	< 10	< 10	< 10	5
Chloroethane	< 10	< 10	< 10	4 J	< 10	< 10	< 10	< 10	< 10	5
Tetrachloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2 J	< 10	5
Trichloroethene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
1,2-Dichloroethene (total)	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
1,1-Dichloroethene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Vinyl Chloride	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2
Toluene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Ethylbenzene	< 10	< 10	< 10	***10 J***	< 10	< 10	< 10	< 10	< 10	5
Xylene (total)	< 10	< 10	< 10	***18***	< 10	< 10	< 10	< 10	< 10	5 (b)
Benzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	0.7
4-Methyl-2-Pentanone	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NS
Methylene Chloride	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Acetone	< 10	< 10	< 10	< 10	< 10	2 J	< 10	< 10	2 J	50 (c)
Total Targeted Compounds:	0	1	0	***107***	0	2	0	3	2	100

Notes:
< 10 - Not detected at the Contract Required Detection Limit (CRDL) shown.
4 J - Estimated value for a compound which is present below the CRDL.
Concentrations in bold italics ***18*** are above NYSDEC standards.
MW-4s, screened in the overburden, was dry (consistent with historical sampling episodes), precluding sample collection.
(a) - NYSDEC Divsion of Water T.O.G.S. 1.1.1, October 1993, Ambient Water Quality Standards and Guidance Values.
(b) - Standard for xylene is for each individual isomer.
(c) - Guidance value only.
NS - No standard as of October 1993.

Table 3-11 (cont.)
Volatile Organic Compounds Quantified in Groundwater (ppb)
20-Apr-95
Macbeth Division of Kollmorgen Instruments Corporation
New Windsor, New York
NYSDEC Site No. 3-36-037

	Intermediate Bedrock Wells				Deep Bedrock Wells			Trip	NYSDEC
Parameter	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-16	Blank	Standard (a)
1,1,1-Trichloroethane	< 10	< 10	3 J	< 10	< 10	***66***	< 10	< 10	5
1,1-Dichloroethane	< 10	< 10	***26***	< 10	< 10	***22***	***67***	< 10	5
1,2-Dichloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Chloroethane	< 10	< 10	***12***	< 10	< 10	***24***	***130***	< 10	5
Tetrachloroethane	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Trichloroethene	< 10	< 10	< 10	3 J	***80***	***15***	1 J	< 10	5
1,2-Dichloroethene (total)	< 10	< 10	< 10	1 J	***170***	***11***	< 10	< 10	5
1,1-Dichloroethene	< 10	< 10	< 10	< 10	< 10	2 J	< 10	< 10	5
Vinyl Chloride	< 10	< 10	< 10	< 10	***3 J***	< 10	< 10	< 10	2
Toluene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Ethylbenzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Xylene (total)	< 10	< 10	< 10	< 10	< 10	1 J	< 10	< 10	5 (b)
Benzene	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	0.7
4-Methyl-2-Pentanone	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	NS
Methylene Chloride	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	5
Acetone	< 10	3 J	< 10	< 10	3 J	< 10	< 10	< 10	50 (c)
Total Targeted Compounds:	0	3	41	4	***256***	***141***	***198***	0	100

Notes:
< 10 - Not detected at the Contract Required Detection Limit (CRDL) shown.
4 J - Estimated value for a compound which is present below the CRDL.
Concentrations in bold italics ***18*** are above NYSDEC standards.
MW-4s, screened in the overburden, was dry (consistent with historical sampling episodes), precluding sample collection.
(a) - NYSDEC Divsion of Water T.O.G.S. 1.1.1, October 1993, Ambient Water Quality Standards and Guidance Values.
(b) - Standard for xylene is for each individual isomer.
(c) - Guidance value only.
NS - No standard as of October 1993.

Groundwater quality data for samples collected on April 20 indicate that MW-2 contained 1,1,1-trichloroethane at an estimated concentration of 1 ppb, below the method detection limit, but above the practical quantification limit ("PQL"). this concentration is below the NYSDEC standard of 5 ppb. No other compounds analyzed for were detected above the practical quantification limit in MW-1A and MW-2.

Both rounds of groundwater data demonstrate that the glacial till overburden at the site does not contain volatile organic compounds above the NYSDEC groundwater standards. Steele Road is upgradient of MW-1A, based on the slope of the surface topography as well as shallow bedrock flow. Low levels of toluene at MW-1A are most likely attributable to runoff from Steele Road and the residential properties upgradient of the site. The data also indicates that MW-2 does not contain volatile organic compounds above NYSDEC standards. This well is located in the northeastern portion of the site, as groundwater leaves the downgradient edge of the site, adjacent to Little Britain Road and in close proximity to the contaminated homeowner well at 400 Little Britain Road.

3.4.4.2 Shallow Bedrock Zone

Seven of the seventeen monitoring wells located on the Macbeth property are set within the shallow bedrock zone. Shallow bedrock wells are MW-1, 3, 4, 5, 6, 7, and 15.

Volatile organic compounds were not present above the NYSDEC standards in the shallow bedrock zone at locations monitored by MW-4 (closest to the residence at 419 Little Britain Road to the west), MW-5 (upgradient of the site, downgradient of Steele Road), MW-6 (downgradient of the site to the north, closest to Little Britain Road and the homeowner well located at 400 Little Britain Road) and MW-7 (adjacent to Steele Road ,which receives flow from both the eastern portion of the site, as well as from off-site to the north). In January, toluene and ethylbenzene were detected in MW-1 at 18 ppb and 13 ppb, respectively which are above the NYSDEC standard of 5 ppb. This well is downgradient of Steele Road, and most likely receives runoff from upgradient residences and paved areas. Volatile organic compounds were not present in MW-1 above NYSDEC standards in the April round. MW-15, nearly adjacent to Steele Road west of the main building and potentially downgradient of the container area removed during the IRM, contained toluene at an estimated concentration of 8 ppb in the January round, and no volatile organic compounds above NYSDEC standards during the April round. MW-3, closest to the former paint waste area and also downgradient of the second paint solids area removed as an IRM, contained xylene and 1,1-dichloroethane at concentrations of 6 ppb (estimated) and 14 ppb, respectively, above the NYSDEC standards in the January round. MW-3 also contained 1,1,1-trichloroethane below the NYSDEC standard of 5 ppb, at an estimated concentration of 2 ppb in January. In April, MW-3 contained 1,1-dichloroethane (65 ppb), total xylenes (18 ppb), ethylbenzene (10 ppb, estimated), and 1,1,1-trichloroethane (9 ppb, estimated), above the NYSDEC standard of 5 ppb.

The results indicate that groundwater leaving the Macbeth site in the shallow bedrock zone monitored by MW-4, MW-6, and MW-7 is in conformance with NYSDEC standards. Groundwater entering the site as monitored by MW-1 contains toluene and ethylbenzene from upgradient, off-site sources at concentrations above NYSDEC standards. Only one well, MW-3, contained volatile organic compounds above NYSDEC standards in both rounds. The bedrock elevation contour map suggests that this well would be the primary receptor of groundwater flow from the former paint waste area, based on the bedrock topography. This may be confirmed by the fact that groundwater quality at MW-3 has improved dramatically since removal of the source area in 1988.

3.4.4.3 Intermediate Bedrock Zone

Four of the seventeen monitoring wells located on the Macbeth property are screened within the intermediate bedrock zone. Monitoring wells within this zone are MW-8, 9, 10, and 11.

Volatile organic compounds were not present above the NYSDEC standards in both rounds in the intermediate bedrock zone at locations monitored by MW-9 (closest to the residence at 419 Little Britain Road to the west). In January, volatile organic compounds were also not present above NYSDEC standards in MW-8 (the well closest to the former source area) and MW-11 (closest to Little Britain Road and the homeowner well located at 400 Little Britain Road). Volatile organic compounds were not present above the NYSDEC standards in MW-10 (adjacent to Steele Road) in the January round. In the January round, trichloroethene and 1,2-dichloroethene (total) were detected in MW-11 slightly above the NYSDEC standard of 5 ppb, at concentrations of 14 ppb and 7 ppb (estimated) respectively. These compounds are not present, nor can they be related to via typical contaminant degradation scenarios, to contaminants found in any other Macbeth monitoring wells screened at or above this zone. In the April round, MW-10 contained 1,1-dichloroethane and chloroethane at concentrations of 26 ppb and 12 ppb, respectively, above the NYSDEC standard of 5 ppb. Toluene was detected in MW-8 at a concentration of 11 ppb which is above the NYSDEC standard of 5 ppb in the April round.

Groundwater leaving the site as monitored by MW-9 and MW-10 typically does not contain volatile organic compounds above NYSDEC standards. However, MW-10 did contain two volatile organic compounds above standards in the April round. The presence of these compounds may be related to disturbance resultant from RI activities and their presence in MW-16 (see discussion below). Likewise, the presence of volatile organic compounds above NYSDEC standards in MW-11 may be related to disturbance resultant from RI activities and their presence in MW-12 (see discussion below), since these compounds are not present in any other Macbeth monitoring well screened within this zone.

3.4.4.4 Deep Bedrock Zone

Three of the seventeen monitoring wells (MW-12, 13 and 16) located on the Macbeth property are screened within the deep bedrock zone.

All three wells screened within the deep bedrock zone contained volatile organic compounds above NYSDEC standards in both rounds. MW-13, closest to the former area of paint waste disposal contained 1,1,1-trichloroethane (14 ppb and 66 ppb) and a degradation compound, 1,1-dichloroethane (15 ppb and 22 ppb) above the NYSDEC standard of 5 ppb in both rounds. MW-13 also contained low levels of chloroethane, trichloroethene and total 1,2-dichloroethene above standards in the April round, and levels of toluene and total xylenes above standards in the January round. MW-16, closest to Steele Road, contained 1,1-dichloroethane and chloroethane above NYSDEC standards in both rounds. MW-12, closest to Little Britain Road and the contaminated homeowner well at 400 Little Britain Road, contained trichloroethene (72 and 80 ppb) and a degradation compound, total 1,2-dichloroethene (84 and 170 ppb), above the NYSDEC standard of 5 ppb in both rounds. Vinyl chloride was also present in the April round at an estimated concentration of 3 ppb, above the NYSDEC standard of 2 ppb. 1,1,1-Trichloroethane and its typical degradation compounds, which are typically found in some Macbeth monitoring wells, were not present at this location.

Based on the predominant eastward and south-eastward groundwater flow direction from CHGE towards MW-12 and the contaminated 400 Little Britain Road homeowner well, the absence of a source of these compounds on the Macbeth site, the fact that these compounds are found at their highest concentrations downgradient of CHGE at Macbeth in MW-12, and orders of magnitude higher in the 400 Little Britain Road homeowner well, it is concluded that the presence of these compounds in groundwater at the Macbeth site and the contaminated 400 Little Britain Road homeowner well is coming from an off-site source, unrelated to Macbeth.

The source of groundwater contaminants found in MW-16 could have been from the upper bedrock zones monitored by MW-7 and MW-10, or an off-site source unrelated to Macbeth to the west or northwest. For the most part, shallow and intermediate groundwater monitored by MW-7 and MW-10 on the western side of the property, flowing to the west, is in conformance with groundwater standards.. Groundwater in the deep zone monitored by MW-16 is flowing eastward. Vertical flow in the area of MW-16 is downward. However, MW-7 and MW-10 typically do not contain contaminants found in MW-16 that would potentially migrate downward to contaminate the deeper aquifer. MW-13, closest to the former paint waste area and the closest downgradient monitoring well in this zone to MW-16, contains lower concentrations of these contaminants than found in MW-16, indicating that the source of the contamination

within this zone is most likely unrelated to the former paint waste area and is probably offsite to the west, upgradient of MW-16.

3.5 Laboratory Data Validation

Data validation was performed by Chemworld Environmental, Inc. Data acceptability and deviations from protocol were reviewed in accordance with the USEPA Region II Organic and Inorganic Data Validation Checklists/Guidelines (January 1992), and the CLP portion of the NYSDEC ASP (December 1991), where applicable and relevant. All soil and water samples and the associated QA/QC samples were screened. Criteria reviewed included holding times, surrogate recoveries, MS/MSDs, instrument calibration and performance checks, internal standards, method and field blanks, and tentatively identified compounds. The screening consisted of a review of all CLP quality control summary sheets. The screened analytical data was qualified based upon the quality control deviations noted using the standard validation protocols referenced above. Full validation included TCL compound identification, compound quantitation and reported detection limits, and system performance. All data was determined valid, acceptable, and usable with the appropriate qualifiers for all targeted compounds, with the following exceptions:

- Volatile Organics by GC/MS: Various non-detectable results for 2-Butanone associated with post-excavation samples obtained in the former paint solids area were qualified as unusable, due to instrument response factors of 0.05.

- Semi-Volatile Organics by GC/MS: Various TIC sample results were qualified as unusable, due to their presence at less than five times the method blank result. Non-detectable results for chrysene and perylene in samples Blind-Dupe, SB-11 0-2, SB-11 MS, and Blind DupeRE were qualified as unusable due to extremely low area counts generated for the internal standards for these compounds.

- Pesticides and PCBs: All data was usable with appropriate qualifiers where relevant.

- Inorganic Analyses by AA and ICP: All data was usable with appropriate qualifiers where relevant.

- Total Organic Carbon: All data was usable; no qualification was required.

The Data Validation and Data Screening Report without Appendices prepared by Chemworld Environmental, Inc. is provided in Apprndix D. The Appendices include laboratory data reports for all samples collected for the RI, appropriately qualified, where applicable and relevant. The full data

validation reports and CLP laboratory analytical data packages for all samples will be maintained in H2M's files, and will be made available to NYSDEC, if NYSDEC wishes to review the full reports.

4.0 Remedial Investigation Conclusions

The RI at Macbeth was performed to determine if additional source areas of contamination exist on the Macbeth property, to perform field sampling and analysis for additional site characterization, and to characterize the nature and extent of risks posed by the site.

The soil gas survey did not identify any sources of volatile organic contamination on the property. Soil sampling were used to further evaluate areas of potential contamination. Sampling confirmed that these compounds were not present in soils, or present at levels well below NYSDEC cleanup objectives, and therefore pose no concern. Soil samples obtained adjacent to the former paint waste area, and immediately above the bedrock surface within the former paint waste excavation area, indicate that no volatile organic compounds are present above NYSDEC cleanup objectives.

Site reconnaissance activities during the soil gas survey identified potential areas of concern, which included low-lying areas throughout the site. Test pit activities, sampling, and laboratory analysis revealed two areas of concern. Another paint waste disposal area was discovered to the rear of Building No. 1; a depression containing containers and assorted metal debris was found in the wooded area to the rear of Building No. 1, adjacent to Steele Road. Given the proximity of this location to Steele Road, the debris could be unrelated to Macbeth. Neither the soils nor waste materials in these two areas contained halogenated (chlorinated) compounds above NYSDEC cleanup objectives, compounds that are typically present in the Macbeth monitoring wells or homeowner wells, indicating that neither of these areas was a source of this groundwater contamination. These areas were excavated; materials were removed and disposed of off-site as an IRM. Post-excavation sampling was performed as part of the IRM; subsequently, the areas were restored to grade with fill. These efforts were summarized in H2M's *Interim Remedial Measure Report.* NYSDEC found the Report and proposal for no further action acceptable in correspondence dated September 12, 1995.

In summary, a continuing source of volatile organic compound contamination to the groundwater is not present at the Macbeth site. Two areas which contained paint solids were removed in 1989 and 1994. Paint solids removed from the area in 1994 contained non-halogenated compounds (e.g. toluene), not halogenated compounds, at concentrations above NYSDEC cleanup objectives. Soils in all areas tested at the Macbeth site do not pose a concern, and require no further action.

Additional wells were installed during the RI to target areas of potential receptors (i.e., homeowner wells at Steele Road and in the vicinity of 400 Little Britain Road), as well as the area of former paint waste disposal. Five additional monitoring wells were installed to more fully define groundwater flow

direction and quality in areas and deeper bedrock zones not monitored by the current monitoring well network, and at depths from which certain homeowner wells are withdrawing water.

Results of groundwater elevation monitoring, the two rounds of groundwater sampling performed for the RI, and six years of quarterly monitoring data collected since 1989, indicate that groundwater in the overburden, shallow bedrock, and intermediate bedrock flowing from Macbeth to the west towards Steele Road and to the northeast towards Little Britain Road, typically does not contain volatile organic compounds above NYSDEC standards.

The glacial till overburden at the site does not contain volatile organic compounds above the NYSDEC groundwater standards. Groundwater leaving the Macbeth site in the shallow bedrock zone monitored by MW-4, MW-6, and MW-7 is in conformance with NYSDEC standards. Groundwater entering the site in the shallow bedrock as monitored by MW-1 contains toluene and ethylbenzene from upgradient residences and paved areas along Steele Road at concentrations above NYSDEC standards. Only one shallow bedrock well, MW-3, contained volatile organic compounds above NYSDEC standards in both rounds. Groundwater quality in this well has improved dramatically since removal of the paint waste area in 1989. This well is the primary receptor of historic contamination from that area, based on bedrock topography and the correlation between removal of the paint waste and improved water quality in the well. Groundwater in the shallow bedrock north of the Macbeth site, at CHGE, flows eastward.

Groundwater leaving the site in the intermediate bedrock zone as monitored by MW-9 and MW-10 typically does not contain volatile organic compounds above NYSDEC standards. However, MW-10 did contain two volatile organic compounds above standards in the April sampling performed for the RI. MW-11 contained similar compounds to those found at the contaminated homeowner well at 400 Little Britain Road, but at concentrations which were orders of magnitude lower than those found in the homeowner well. These compounds are not present in any other Macbeth monitoring well screened in this zone or above this zone.

All three wells screened within the deep bedrock zone contained volatile organic compounds above NYSDEC standards in both rounds. However, MW-12, closest to Little Britain Road and the contaminated homeowner well at 400 Little Britain Road, and MW-16, closest to Steele Road, are monitoring water entering the Macbeth site. These two wells are downgradient of potential off-site sources to the west of Macbeth, based on the predominantly eastward flow direction. A source of the specific compounds found in MW-11 and MW-12, as well as the contaminated homeowner well at 400 Little Britain Road, may be present off-site, upgradient of MW-12 and 400 Little Britain Road. A source of this contamination is not present on the Macbeth site based on all investigations performed prior to and as part

of the Remedial Investigation , nor is there evidence that one formerly existed, based on the absence of these compounds from all other Macbeth monitoring wells, with the exception of MW-13 where these compounds were found at lower concentrations than found at MW-12. MW-13 is at a minimum crossgradient if not occasionally downgradient of MW-12, as demonstrated by the groundwater elevation contour maps.

The source of groundwater contaminants found in MW-16 is most likely an unconfirmed off-site source unrelated to Macbeth to the west or northwest. For the most part, shallow and intermediate groundwater on the western side of the property is in conformance with groundwater standards. This groundwater is flowing to the west. Groundwater in the deep zone is flowing eastward. Although vertical flow in the area of MW-16 is downward, MW-7 and MW-10 typically do not contain contaminants found in MW-16 during the RI that would potentially migrate downward to contaminate the deeper aquifer monitored by MW-16. MW-13, closest to the former paint waste area and the closest downgradient monitoring well in this zone to MW-16, contains lower concentrations of these contaminants than found in MW-16, indicating that the source of this contamination is unrelated to the former paint waste area and is probably upgradient of MW-16, and is attenuating as groundwater moves towards MW-13. The same source of this contamination, unrelated to Macbeth, is also most likely responsible for contamination in the two homeowner wells at 7 Steele Road and 419 Little Britain Road west of Macbeth, since shallow groundwater leaving the Macbeth site is typically in conformance with NYSDEC standards, and deeper groundwater entering the Macbeth site from the direction of these homeowners is contaminated over groundwater standards.

In nearly five years of quarterly monitoring, volatile organic compounds have not been found above standards in homeowner wells located at 25 Steele Road and 27 Steele Road. These two locations no longer warrant monitoring by Macbeth, based on these results, the fact that no continuing source of groundwater contamination exists on the Macbeth property, and the fact that the source may be unrelated to Macbeth, based on deep groundwater flow direction to the east. Furthermore, there is no basis to support that Macbeth is responsible for the tetrachloroethene found in a homeowner supply well much further west of Macbeth at 431 Little Britain Road. Tetrachloroethene was found above standards in one of eighteen rounds of quarterly sampling, in October 1991; in response to this event, Macbeth installed and has maintained GAC filters at this location. Volatile organic compounds have been below standards in all other sampling rounds, and have not been present in ten of thirteen rounds since the GAC filters were installed. Since there is no basis that Macbeth is responsible for this contamination, this location no longer warrants monitoring by Macbeth. A number of commercial and light industrial facilities exist or formerly existed west of Macbeth which are potential sources of the groundwater contamination found west of Macbeth.

APPENDIX A
MACBETH MONITORING WELL DATA

Volatile Organic Compounds Quantified in MW-2 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1987 to April 1995

Date	1,1,1-TCA	1,1-DCA	1,2-DCA	Chloroethane	Chloroform	Methylene Chloride	Toluene	Xylene (total)	Acetone
Jun-87	1	1	1	<1	1	<1	<1	<1	<1
Sep-87	5	1	<1	<1	<1	<1	<1	<1	<1
Mar-89	3	1	<5	1	<5	<5	<5	<5	<5
Jun-89	<5	<5	<5	<10	<5	<5	<5	<5	<5
Sep-89	<5	<5	<5	<10	<5	<5	<5	<5	<5
Dec-89	<5	<5	<5	<10	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	<3	<3	<3	7	6	<3
Jun-90	<3	<3	<3	<3	<3	<3	<3	<3	<3
Oct-90	<3	<3	<3	<3	<3	<3	<3	<3	<3
Dec-90	7	<5	<5	<10	<5	<5	<5	<5	<5
May-91	4	<1	<1	<1	2	<1	<1	<1	<1
Jul-91	4	<1	<1	<1	<1	1B	<1	<1	<1
Oct-91	5	1	<1	<1	<1	<1	<1	<1	<1
Jan-92	4	<1	<1	<1	<1	<1	<1	<1	<1
Apr-92	2	<1	<1	<1	<1	<1	<1	<1	<1
Jul-92	3	<1	<1	<1	1	<1	<1	<1	<1
Oct-92	4	1	<1	<1	1	<1	<1	<1	<1
Jan-93	2	<1	<1	<1	<1	<1	<1	<1	<1
Apr-93	1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-93	2	<1	<1	<1	<1	<1	<1	<1	<1
Oct-93	3	<1	<1	<1	<1	<1	<1	<1	<1
Jan-94	<1	<1	<1	<1	<1	<1	<1	<1	<1
Apr-94	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1	<1	<1	<1	<1
Oct-94	2	<1	<1	<1	<1	<1	<1	<1	<1
Jan-95	2J	<10	<10	<10	<10	<10	<10	1J	6J
Apr-95	1J	<10	<10	<10	<10	<10	<10	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

Volatile Organic Compounds Quantified in MW-3 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1987 to April 1995

Date	1,1,1-TCA	1,1-DCA	1,2-DCA	Chloroethane	Chloroform	PCE	1,1-DCE	Fluorotrichloromethane	Methylene Chloride	Ethylbenzene	Benzene	Toluene	Xylene (total)
Jun-87	37	420	4	<1	2	2	<1	<1	1	35	<1	2500	107
Sep-87	5	1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1
Jun-88	150	560	<3	<3	<3	<3	<3	<3	<3	37	<3	920	120
Jul-88	40	330	<3	<3	<3	<3	<3	<3	<3	33	<3	690	121
Mar-89	10	320	2	<10	<5	<5	<5	<5	<5	44	<5	1300	157
Jun-89	54	180	<5	<10	<5	<5	<5	<5	<5	41	<5	2700	300
Sep-89	9	240	<5	9	<5	<5	<5	<5	<5	19	<5	130	99
Dec-89	3	30	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5
Mar-90	17	38	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Jul-90	9	44	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	3
Oct-90	5	140	<5	18	<5	<5	<5	<5	<5	27	<5	900	<5
Dec-90	10	33	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
May-91	6	36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-91	7	78	1	<1	<1	<1	<1	<1	1B	<1	<1	1	25
Oct-91	4	24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-92	7	24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Apr-92	8	22	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	2
Jul-92	5	110	1	<1	1	<1	<1	1	<1	<1	3	<1	30
Oct-92	5	18	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-93	5	34	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	9
Apr-93	13	93	<1	<1	3	<1	<1	1	<1	4	<1	<1	29
Jul-93	9	170	2	<1	10	<1	<1	1	<1	19	1	<1	100
Oct-93	3	26	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-94	3	43	1	1	<1	<1	<1	<1	<1	10	<1	110	42
Apr-94	16	49	<1	1	<1	<1	<1	<1	<1	3	<1	<1	6
Jul-94	5	45	<1	<1	<1	<1	<1	<1	<1	5	3	<1	7
Oct-94	10	32	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-95	2J	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	6J
Apr-95	9J	65	1J	4J	<10	<10	<10	<10	<10	10J	<10	<10	18

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

H2MGROUP

Volatile Organic Compounds Quantified in MW-4 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1987 to April 1995

Date	1,1,1-TCA	1,2-DCA	Chloroethane	Chloroform	TCE	Methylene Chloride	Toluene	Acetone
Jun-87	<1	1	<1	3	<1	<1	2	<1
Sep-87	<1	<1	<1	<1	<1	<1	<1	<1
Jun-88	<3	<3	<3	<3	<3	<3	<3	<3
Jul-88	<3	<3	<3	<3	<3	<3	<3	<3
Mar-89	<5	<5	<10	<5	<5	<5	<5	<5
Jun-89	<5	4	<10	5	<5	<5	<5	<5
Sep-89	<5	<5	<10	<5	<5	<5	<5	<5
Dec-89	<5	<5	<10	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	<3	<3	<3	<3	<3
Jul-90	<3	<3	<3	<3	<3	<3	<3	<3
Oct-90	<5	<5	<10	<5	<5	<5	<5	<5
Dec-90	<3	<3	<3	<3	<3	<3	<3	<3
May-91	<1	<1	<1	2	<1	<1	<1	<1
Jul-91	<1	<1	<1	<1	1B	2B	<1	<1
Oct-91	2	<1	<1	<1	<1	<1	<1	<1
Jan-92	<1	<1	<1	<1	<1	<1	<1	<1
Apr-92	<1	<1	<1	<1	<1	<1	<1	<1
Jul-92	<1	<1	<1	<1	<1	<1	<1	<1
Oct-92	<1	<1	<1	<1	<1	<1	<1	<1
Jan-93	<1	<1	<1	<1	<1	<1	<1	<1
Apr-93	<1	<1	<1	<1	<1	<1	<1	<1
Jul-93	<1	<1	<1	<1	<1	<1	<1	<1
Oct-93	<1	<1	<1	<1	<1	<1	<1	<1
Jan-94	<1	<1	<1	<1	<1	<1	<1	<1
Apr-94	<1	<1	<1	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1	<1	<1	<1
Oct-94	58	<1	<1	<1	<1	<1	<1	<1
Jan-95	<10	<10	<10	<10	<10	<10	2J	10J
Apr-95	<10	<10	<10	<10	<10	<10	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

H2M GROUP

Volatile Organic Compounds Quantified in MW-6 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
September 1987 to April 1995

Date	1,1,1-TCA	PCE	TCE	Methylene Chloride	Toluene	Xylene (total)
Sep-87	<1	<1	<1	<1	<1	<1
Mar-89	<5	<5	<5	<5	<5	<5
Jun-89	<5	<5	<5	<5	<5	<5
Sep-89	<5	<5	<5	<5	<5	<5
Dec-89	<5	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	<3	6	6
Jul-90	<3	<3	<3	<3	<3	<3
Oct-90	<5	<5	<5	<5	<5	<5
Dec-90	<3	<3	<3	<3	<3	<3
May-91	<1	<1	<1	<1	<1	<1
Jul-91	<1	<1	<1	2B	<1	<1
Oct-91	1	<1	5	<1	<1	<1
Jan-92	<1	<1	<1	<1	<1	<1
Apr-92	3	9	<1	<1	<1	<1
Jul-92	<1	<1	<1	<1	<1	<1
Oct-92	<1	<1	<1	<1	<1	<1
Jan-93	<1	<1	<1	<1	<1	<1
Apr-93	<1	<1	<1	<1	<1	<1
Jul-93	<1	<1	<1	<1	<1	<1
Oct-93	<1	<1	<1	<1	<1	<1
Jan-94	3	<1	<1	<1	<1	<1
Apr-94	<1	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1	<1
Oct-94	6	<1	<1	<1	<1	<1
Jan-95	<10	<10	<10	<10	<10	<10
Apr-95	<10	<10	<10	<10	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

Volatile Organic Compounds Quantified in MW-7 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
September 1987 to April 1995

Date	1,1,1-TCA	1,1-DCA	Trichlorofluoromethane	PCE	TCE	1,1-DCE	Methylene Chloride	Benzene	Toluene	Ethylbenzene	Xylene (total)
Sep-87	4	<1	<1	20	<1	1	<1	<1	<1	<1	<1
Jun-88	<3	<3	7	<3	<3	<3	<3	<3	2	<3	<3
Jul-88	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Mar-89	2	<5	<5	3	<5	<5	<5	<5	<5	<5	<5
Jun-89	7	<5	5	54	<5	<5	<5	<5	<5	<5	<5
Sep-89	<5	<5	<5	9	<5	<5	<5	<5	<5	<5	<5
Dec-89	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	3	20	<3	<3	4	43	3	34
Jul-90	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Oct-90	<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5
Dec-90	4	<3	<3	6	<3	<3	<3	<3	<3	<3	<3
May-91	3	<1	<1	3	<1	<1	<1	<1	<1	<1	<1
Jul-91	<1	<1	<1	3	<1	<1	2B	<1	<1	<1	<1
Oct-91	3	<1	<1	9	5	<1	<1	<1	<1	<1	<1
Jan-92	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Apr-92	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-92	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Oct-92	1	<1	<1	3	<1	<1	<1	<1	<1	<1	<1
Jan-93	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Apr-93	2	<1	<1	4	<1	<1	<1	<1	<1	<1	<1
Jul-93	1	<1	<1	3	<1	<1	<1	<1	<1	<1	<1
Oct-93	3	<1	<1	3	<1	<1	6	<1	<1	<1	<1
Jan-94	<1	<1	<1	2	<1	<1	<1	<1	1	<1	<1
Apr-94	2	1	<1	1	<1	<1	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1	<1	<1	8	<1	<1	<1
Oct-94	33	1	<1	2	<1	<1	<1	<1	<1	<1	<1
Jan-95	1J	<10	<10	2J	<10	<10	<10	<10	<10	<10	2J
Apr-95	1J	<10	<10	2J	<10	<10	<10	<10	<10	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

Volatile Organic Compounds Quantified in MW-8 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1988 to April 1995

Date	1,1,1-TCA	1,1-DCA	1,2-DCA	Chloroform	TCE	1,1-Dichloroethene	Chloromethane	Methylene Chloride	Benzene	Toluene	Ethylbenzene	Xylene (total)
Jun-88	6	<3	200	<3	<3	<3	<3	<3	3	3200	38	192
Jul-88	14	170	<3	<3	<3	<3	<3	<3	<3	450	17	54
Mar-89	10	<5	<5	<5	<5	70	<5	<5	<5	320	5	18
Jun-89	6	16	<5	<5	<5	<5	<5	<5	<5	140	<5	6
Sep-89	4	12	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dec-89	4	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Mar-90	6	<3	<3	<3	220	8	<3	<3	<3	<3	<3	<3
Jul-90	<3	<3	<3	8	<3	<3	<3	<3	<3	<3	<3	<3
Oct-90	<5	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dec-90	6	4	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
May-91	10	78	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
Jul-91	3	<1	<1	<1	<1	<1	<1	29	<1	<1	<1	<1
Oct-91	6	12	<1	<1	4	<1	2B	<1	<1	<1	<1	<1
Jan-92	3	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Apr-92	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-92	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Oct-92	1	9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-93	<1	2	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Apr-93	5	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-93	1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Oct-93	2	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-94	1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Apr-94	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
Oct-94	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Jan-95	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	<10	4J
Apr-95	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

H2MGROUP

Volatile Organic Compounds Quantified in MW-9 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1988 to April 1995

Date	1,1,1-TCA	Methylene Chloride	Benzene	Toluene	Acetone
Jun-88	<3	<3	<3	<3	<3
Jul-88	<3	<3	<3	<3	<3
Mar-89	<3	<3	<3	3	<3
Jun-89	<5	<5	<5	<5	<5
Sep-89	<5	<5	<5	<5	<5
Dec-89	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	<3	<3
Jul-90	<3	<3	<3	<3	<3
Oct-90	<5	<5	<5	<5	<5
Dec-90	<3	<3	<3	<3	<3
May-91	<1	<1	<1	<1	<1
Jul-91	<1	2B	<1	<1	<1
Oct-91	2	<1	<1	<1	<1
Jan-92	<1	<1	<1	<1	<1
Apr-92	<1	<1	<1	<1	<1
Jul-92	<1	<1	4	<1	<1
Oct-92	<1	<1	<1	<1	<1
Jan-93	<1	<1	<1	<1	<1
Apr-93	<1	<1	<1	<1	<1
Jul-93	<1	<1	<1	<1	<1
Oct-93	<1	<1	<1	<1	<1
Jan-94	<1	<1	<1	<1	<1
Apr-94	<1	<1	<1	<1	<1
Jul-94	<1	<1	<1	<1	<1
Oct-94	36	<1	<1	<1	<1
Jan-95	<10	<10	<10	<10	<10
Apr-95	<10	<10	<10	<10	3J

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

H2M GROUP

Volatile Organic Compounds Quantified in MW-10 (ppb)
Macbeth Division of Kollmorgen Instruments Corp.
New Windsor, New York
June 1988 to April 1995

Date	1,1,1-TCA	1,1-DCA	Chloroethane	PCE	Methylene Chloride
Jun-88	<3	4	<3	<3	<3
Jul-88	<3	<3	<3	<3	<3
Mar-89	2	<5	<5	<5	<5
Jun-89	<5	<5	<5	<5	<5
Sep-89	<5	<5	<5	<5	<5
Dec-89	<5	<5	<5	<5	<5
Mar-90	<3	<3	<3	<3	<3
Jul-90	<3	<3	<3	<3	<3
Oct-90	<5	<5	<5	<5	<5
Dec-90	<3	<3	<3	<3	<3
May-91	2	<1	<1	<1	<1
Jul-91	<1	<1	<1	<1	2B
Oct-91	1	<1	<1	1	<1
Jan-92	<1	<1	<1	<1	<1
Apr-92	<1	<1	<1	<1	<1
Jul-92	<1	<1	<1	<1	<1
Oct-92	<1	<1	<1	<1	<1
Jan-93	<1	<1	<1	<1	<1
Apr-93	<1	<1	<1	1	<1
Jul-93	<1	<1	<1	<1	<1
Oct-93	<1	<1	<1	1	<1
Jan-94	<1	<1	<1	<1	<1
Apr-94	<1	1	1	<1	<1
Jul-94	1	<1	<1	<1	<1
Oct-94	39	<1	<1	<1	<1
Jan-95	<10	<10	<10	<10	3J
Apr-95	3J	26	12	<10	<10

Notes

<10 - Not detected at the Contract Required Detection Limit (CRDL) shown.

J - Estimated concentration for a parameter which is present below the CRDL.

APPENDIX B
HOMEOWNER WELL DATA

H2MGROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Newburgh Packing
439 Little Britain Road
New Windsor, New York

Parameter	Oct-90	Nov-90	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
1,1,2,2-Tetrachloroethane	1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	<0.5	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1
Methylene Chloride	<0.5	<0.5	<1	1B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	2	0	0	0	0	0	0	0	1	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

H2MGROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Pietrzak Auto Finishing Line
7 Steele Road
New Windsor, New York

Parameter	Oct-90	Nov-90	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93
1,1,2,2-Tetrachloroethane	6	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	2	<1	1	1	<1	<1	<1	<1	<1
1,1-Dichloroethane	<0.5	1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	<0.5	<0.5	<1	2	2	1	<1	1	1	<1
Methylene Chloride	<0.5	<0.5	<1	1B	<1	<1	<1	<1	<1	<1
Chloroform	3	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Total:	10	3	0	1	3	1	0	1	1	0

Parameter	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1,1-Trichloroethane	<1	2	1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	<1	1	1	1	<1	<1	<1	<1	<1	<1
O-Dichlorobenzene	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
Total:	0	3	2	1	1	0	1	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.
This water is not a drinking water supply.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Pietrzak Residence
7 Steele Road
New Windsor, New York

Parameter	Oct-90	Nov-90	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93
1,1,2,2-Tetrachloroethane	25	38	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	<0.5	<0.5	5	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	19	21	<1	<1	<1	10	7	17	2	14
1,1-Dichloroethane	2	2	<1	<1	<1	<1	<1	1	<1	<1
Chloroethane	<0.5	<0.5	15	<1	<1	<1	<1	2	3	<1
Tetrachloroethene	<0.5	<0.5	4	<1	<1	<1	1	6	<1	7
Methylene Chloride	<0.5	<0.5	<1	2B	<1	<1	<1	<1	<1	<1
Total:	46	61	24	0	0	10	8	26	5	21

Parameter	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1,1-Trichloroethane	11	3	18	17	6	6	1	7	4	6
Chloroethane	< 1	1	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1
Tetrachloroethene	3	1	6	6	1	1	< 1	3	< 1	1
Total:	14	5	24	23	7	7	2	10	4	7

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.
These results represent influent water quality before GAC treatment.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Langanke Jr.
25 Steele Road
New Windsor, New York

Parameter	Jan-91	Feb-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93
1,1,1-Trichloroethane	<0.5	<0.5	<1	2	1	<1	<1	1	2	<1
1,1-Dichloroethane	2	0.7	<1	2	2	<1	<1	2	1	<1
Chloroethane	<0.5	<0.5	<1	3	4	<1	<1	3	<1	<1
Methylene Chloride	<0.5	<0.5	<1	1B	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	<0.5	<0.5	<1	<1	<1	<1	<1	1	<1	<1
Total:	2	0.7	0	7	7	0	0	7	3	0

Parameter	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1,1-Trichloroethane	< 1	1	2	1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloroethane	< 1	<1	<1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methylene Chloride	< 1	<1	<1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane	< 1	<1	<1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total:	0	2	3	1	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

H2MGROUP

Approximate Domestic Supply Well Depths
Macbeth Area Residents Survey
New Windsor, New York

Location-Resident	Approximate Depth (ft)
330 Little Britain Road - Conklin	150
330A Little Britain Road - Conklin	200
400 Little Britain Road - Murphy	110
412 Little Britain Road - Burgess Sign	Unknown
416 Little Britain Road - Eriksen	Unknown
419 Little Britain Road - Owejan	160
421 Little Britain Road - Detanno	Unknown
427 Little Britain Road - Law Firm	Unknown
429 Little Britain Road - WGNY Radio	Unknown
431 Little Britain Road - Smith	Unknown
435 Little Britain Road - Langanke Sr.	100
7 Steele Road - Auto Finishing Line	110
7 Steele Road - Pietzak (Res.)	230
25 Steele Road - Langanke Jr.	350
27 Steele Road - Perrego	375
33 Steele Road - Geraci	92

Notes:
Depths were provided by homeowners and are approximate; values represent feet below grade.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Murphy
400 Little Britain Road
New Windsor, New York

Parameter	14-Jan-91	19-Jan-91
Tetrachloroethene	4	4.4
Trichloroethene	6,000	3,100
1,1-Dichloroethene	23	34
cis/trans-1,2-dichloroethene	12,900	5,218
Vinyl Chloride	400	370
1,1,1-Trichloroethane	38	23
1,1-Dichloroethane	7	7.3
Total:	19,372	8,756.7

Notes:
Other volatile organic compounds were analyzed for but not detected.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Conklin
330 Little Britain Road
New Windsor, New York

Parameter	Oct-90	Feb-91
Trichloroethene	1	7.7
cis/trans-1,2-dichloroethene	< 0.5	19.6
Total:	1	27.3

Notes:
Other volatile organic compounds were analyzed for but not detected.

H2M GROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Conklin
330A Little Britain Road
New Windsor, New York

Parameter	Oct-90	Feb-91
Trichloroethene	< 0.5	3.6
cis/trans-1,2-dichloroethene	< 0.5	< 0.5
Total:	0	3.6

Notes:
Other volatile organic compounds were analyzed for but not detected.

H2MGROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Burgess Sign
412 Little Britain Road
New Windsor, New York

Parameter	Oct-90	Nov-90	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
Toluene	< 0.5	< 0.5	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1
Xylenes	< 0.5	< 0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1
Total:	0	0	0	0	0	0	0	0	0	0	1	1	0

Notes:
Other volatile organic compounds were analyzed for but not detected.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Eriksen
416 Little Britain Road
New Windsor, New York

Parameter	Jan-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
1,1,1-Trichloroethane	<0.5	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	<0.5	<1	1B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	0	0	1	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

H2M GROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Owejan
419 Little Britain Road
New Windsor, New York

Parameter	Nov-90	May-91	Jul-91	Oct-91	Nov-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93
1,1,1-Trichloroethane	17	5	20	13	<1	4	7	5	3	3
1,1-Dichloroethane	5	<1	6	6	<1	<1	3	4	2	2
Chloroethane	<0.5	<2	<2	5	<1	<1	<1	1	1	<1
Trichloroethene	<0.5	<1	2	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	<0.5	<1	2B	<1	<1	<1	<1	<1	<1	<1
Chloroform	<0.5	<1	1	3	<1	4	<1	<1	<1	<1
Bromodichloromethane	<0.5	<1	<1	2	<1	4	<1	<1	<1	<1
Dibromochloromethane	<0.5	<1	<1	<1	<1	3	<1	<1	<1	<1
Total:	22	5	29	29	0	15	10	10	6	5

Parameter	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1,1-Trichloroethane	3	4	3	4	< 1	< 1	< 1	< 1	< 1	1
1,1-Dichloroethane	3	3	4	6	< 1	< 1	< 1	< 1	< 1	2
Chloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Total:	6	7	7	10	0	0	0	0	0	5

Notes:
Other volatile organic compounds were analyzed for but not detected.
These results represent influent water quality before GAC treatment.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Detanno
421 Little Britain Road
New Windsor, New York

Parameter	Nov-90	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
Methylene Chloride	<0.5	<0.5	1B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Law Firm
427 Little Britain Road
New Windsor, New York

Parameter	Jan-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
Methylene Chloride	<0.5	<1	1B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
WGNY
429 Little Britain Road
New Windsor, New York

Parameter	Feb-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
Methylene Chloride	<0.5	<1	1B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	0	0	0	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

H2MGROUP

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Current Tenant
431 Little Britain Road
New Windsor, New York

Parameter	Feb-91	May-91	Jul-91	Oct-91	Nov-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93
1,1,1-Trichloroethane	2.3	<1	<1	5	5	<1	<1	NS	NS	<1
Tetrachloroethene	2.4	<1	<1	7	5	<1	<1	NS	NS	<1
Methylene Chloride	<0.5	<1	<1	<1	<1	<1	<1	NS	NS	<1
Chloroform	<0.5	1	<1	<1	<1	<1	<1	NS	NS	<1
Total:	4.7	1	0	12	10	0	0	NS	NS	0

Parameter	Apr-93	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1,1-Trichloroethane	<1	2	3	<1	<1	<1	< 1	< 1	< 1	< 1
Tetrachloroethene	<1	1	3	<1	<1	<1	< 1	< 1	< 1	< 1
Chloroform	<1	<1	<1	1	<1	<1	< 1	< 1	< 1	< 1
Total:	0	3	6	1	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.
NS - Not sampled; residence was vacant during change in tenant.
These results represent influent water quality before GAC treatment.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Langanke Sr.
435 Little Britain Road
New Windsor, New York

Parameter	Feb-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
Trichloroethene	<0.5	<1	<1	3	1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	<0.5	<1	2B	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	<0.5	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	1	3	1	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Perrego
27 Steele Road
New Windsor, New York

Parameter	Feb-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93
1,1-Dichloroethane	0.7	<1	2	1	1	1	<1	1	<1	2
Methylene Chloride	<0.5	<1	1B	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	<0.5	<1	1	<1	<1	<1	<1	<1	<1	<1
Total:	0.7	0	3	1	1	1	0	1	0	2

Parameter	Jul-93	Oct-93	Jan-94	Apr-94	Jul-94	Oct-94	Jan-95	Apr-95	Jul-95
1,1-Dichloroethane	1	<1	<1	<1	<1	1	2	<1	<1
1,1-Dichloroethene	<1	<1	<1	1	<1	<1	<1	<1	<1
Total:	1	0	0	1	0	1	2	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

Volatile Organic Compounds Quantified in Homeowner Wells (ppb)
Geraci
33 Steele Road
New Windsor, New York

Parameter	Feb-91	May-91	Jul-91	Oct-91	Jan-92	Apr-92	Jul-92	Oct-92	Jan-93	Apr-93	Jul-93	Oct-93
1,1,1-Trichloroethane	<0.5	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Total:	0	0	0	1	0	0	0	0	0	0	0	0

Notes:
Other volatile organic compounds were analyzed for but not detected.
B - Contamination found in blank as well as sample; sample contamination is attributable to blank contamination and is not included in total.

APPENDIX C

BOREHOLE LOGS FOR MACBETH RI MONITORING WELLS

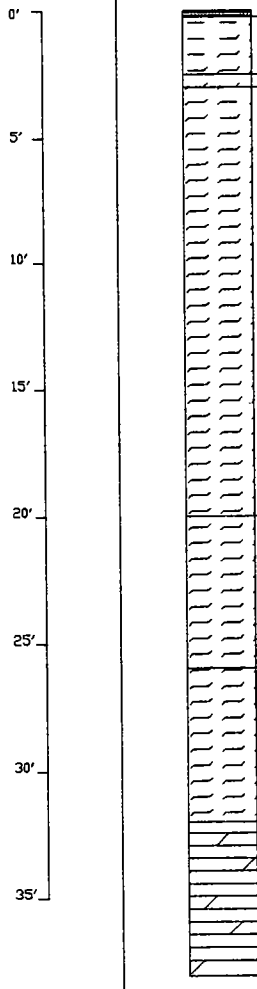
Boring MW-11

Page 1 of 2

PROJECT: MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP. RI/FS: Date Start: 11/9/94 Date Complete: 12/7/95
Location: New Windsor, NY Ground Elev. (FT. MSL) 306.04 : Total Depth (FT. BG) 85.0 :

Casing 1 ID (in.)/type: 12 in. Steel : Casing 1 Depth (FT. BG): 38.0 : Drill Method: Air Rotary : Bit type/size: 17.5 in. :
Well Casing ID (in.)/type: 4 in. PVC : Well Casing Depth (FT. BG): 60.0 : Screened Interval (FT. BG): 60.0-85.0 :
Screen ID (in.)/type: 4 in. PVC : Slot Size (in.): 0.01 : Drill Method: Air Rotary : Bit type/size: 8 in. hammer:

CONTRACTOR: Salamone Brothers, Wayne, NJ: LOGGED BY: H2M Group, Totowa, NJ



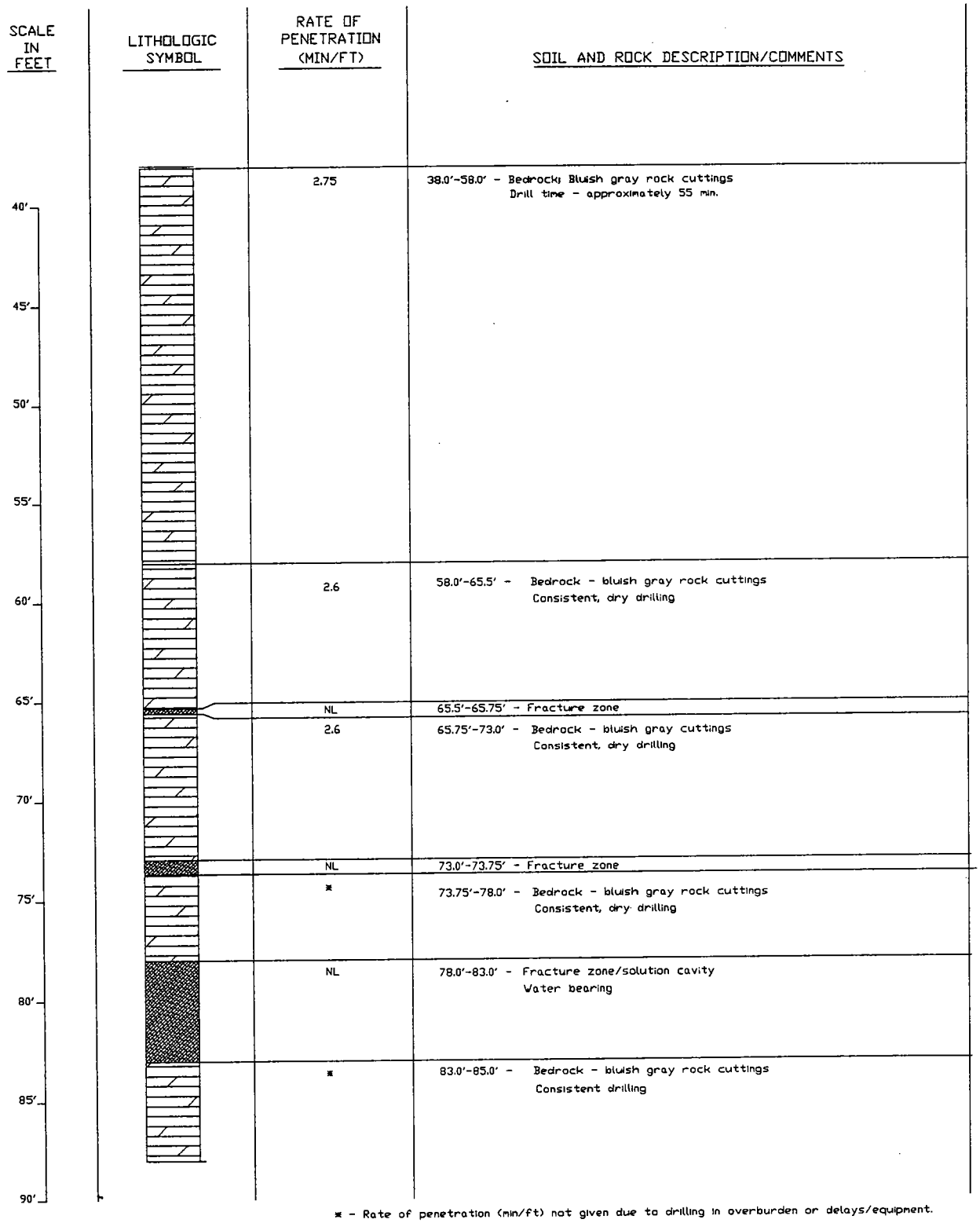
LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
		0-.25' - Topsoil and grass
	*	.25'-2.5' - Light brown silty sand containing some gravel
	*	2.5'-3.0' - Boulder
	*	3.0'-20.0' - Light brown silty sand containing some gravel and large cobbles; as depth increases, cobble and boulder content increases 13'-14.5' - Boulder
	*	20.0'-26.0' - Dull light brown silty sand containing several boulders
	*	26.0'-32.0' - Hardpan; dull light brown silt sand and boulders drilling becomes irregular (rods vibrate and jump through this zone)
	*	32.0'-38.0' - Bedrock; cuttings turn bluish gray drilling smooths out and becomes consistant 0-38.0' - No water encountered to this point while drilling

* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.
NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone

Boring MW-11

Page 2 of 2



* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone

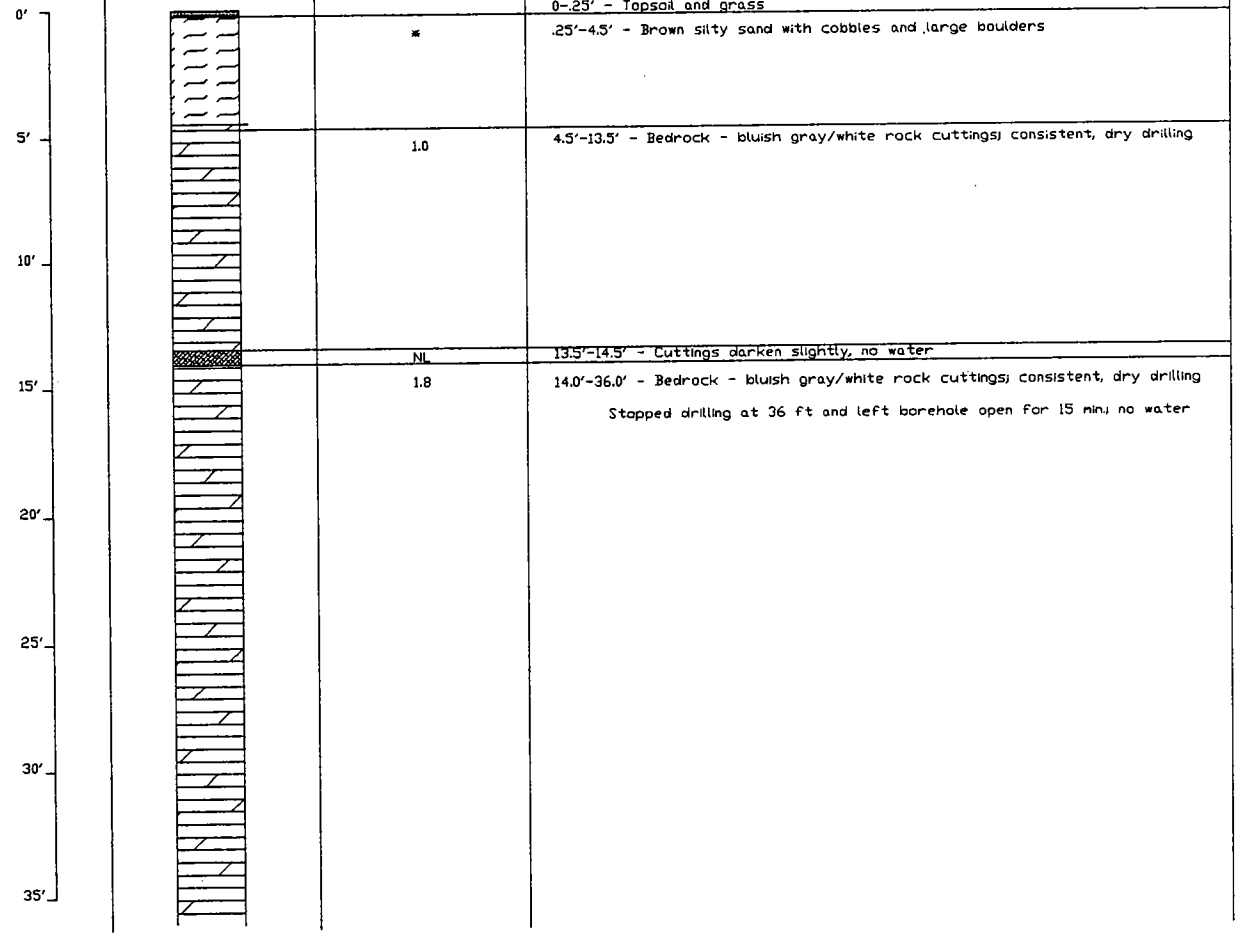
Boring MW-13

Page 1 of 3

PROJECT: MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP. RI/FS: Date Start: 11/7/94 Date Complete: 11/14/94
Location: New Windsor, NY Ground Elev. (FT. MSL) 342.88 : Total Depth (FT. BG) 120.0 :

Well Casing ID (in.)/type: 4 in. PVC : Well Casing Depth (FT. BG): 90.0 : Screened Interval (FT. BG): 90.0-120.0 :
Screen ID (in.)/type: 4 in. PVC : Slot Size (in.): 0.01 : Drill Method: Air Rotary : Bit type/size: 8 in. hammer :

CONTRACTOR: Salamone Brothers, Wayne, NJ: LOGGED BY: H2M Group, Totowa, NJ



* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

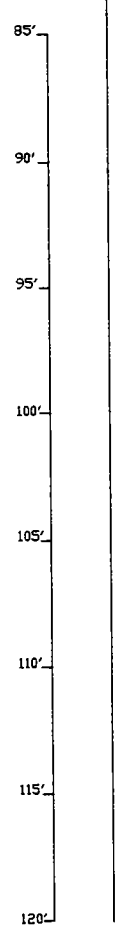
NL - Drill time not logged in void or fracture zone.

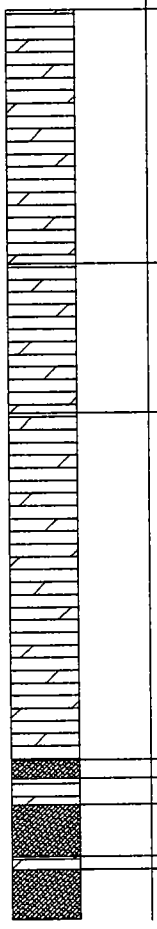
LEGEND: Topsoil Till Dolomite Fracture zone

SCALE IN FEET	LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
40'		2.3	36.0'-46.0' - Bedrock - bluish gray/white cuttings; consistent dry drilling Stopped drilling at 46 ft. and left borehole open for 10 min; no water
45'		NL	46.0'-46.25' - Cuttings darken slightly; remain dry
		2.0	46.25'-54.0' - Bedrock - bluish gray rock cuttings; consistent, dry drilling Stopped drilling at 54 ft. and left borehole open for 17.5 hrs; no water
50'			
55'		2.4	54.0'-64.0' - Bedrock - whithish gray/blue rock cuttings; consistent dry drilling Stopped drilling at 64 ft. and left borehole open for 29 min; no water
60'			
65'		1.5	64.0'-74.0' - Bedrock - whithish gray/blue rock cuttings; consistent dry drilling Stopped drilling at 74.0 feet and left borhole open for 23 hrs.; no water
70'			
75'		1.8	74.0'-79.0' - Bedrock - whithish gray/blue rock cuttings; consistent dry drilling Stopped drilling 79 ft and left borehole open for 30 min; no water
		NL	79.0'-79.5' - Cuttings darken; small seems containing some light brown powder size material
80'		2.2	79.5'-84.0' - Bedrock - Whitish gray/blue rock cuttings; consistent, dry drilling Stopped drilling at 84 ft. and left borehole open for 10 min; no water

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil · Till · Dolomite · Fracture zone





RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
1.9	84.0'-94.0' - Bedrock - Whitish gray/blue rock cuttings; consistent, dry drilling Stopped drilling at 94 ft. and left borehole open for 30 min; no water
2.6	94.0'-100.0' - Bedrock - Whitish gray/blue rock cuttings; consistent, dry drilling Stopped drilling at 100 ft. and left borehole open for 10 min; no water
1.8	100.0'-113.75' - Bedrock - Whitish gray/blue rock cuttings; consistent, dry drilling
NL	113.75'-114.5' - Fracture zone - cuttings darken then cchange back to previous at 114.5 ft.
*	114.5'-115.5' - Bedrock - Whitish gray/blue rock cuttings; consistent, dry drilling
NL	115.5'-117.5' - Fracture zone/solution cavity; hammer falls quickly, dust is cut down in hole Water bearing zone
*	117.5'-118.0' - Consistent drilling - bedrock
NL	118.0'-120.0' - Solution cavity; hammer falls quickly Water bearing zone

* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

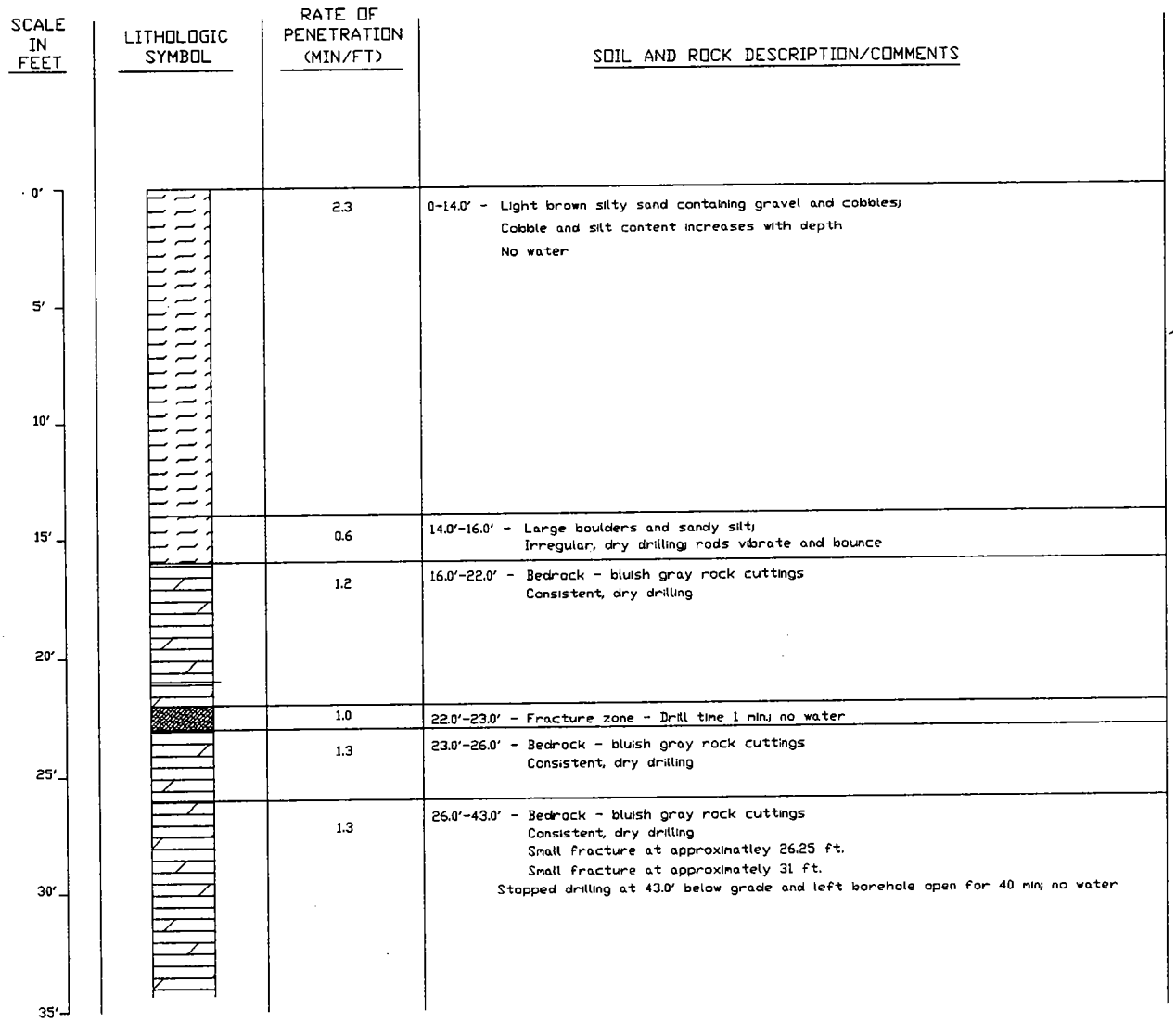
NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone

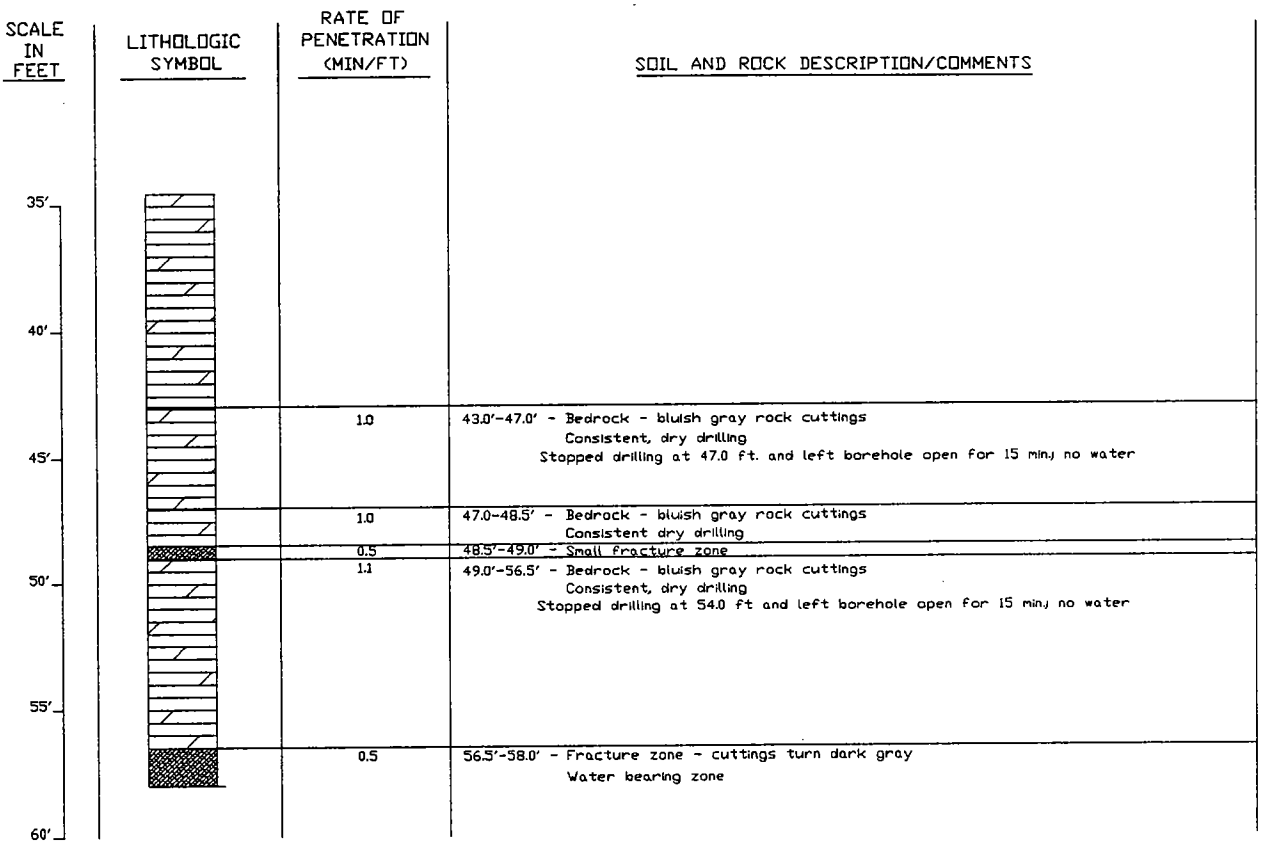
Boring MW-15

Page 1 of 2

PROJECT: MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP. RI/FS: Date Start: 11/8/94 Date Complete: 11/22/94
Location: New Windsor, NY Ground Elev. (FT. MSL) 325.22 : Total Depth (FT. BG) 58.0 :
Casing 1 ID (in.)/type: 6 in. Steel : Casing 1 Depth (FT. BG): 21.0 : Drill Method: Air Rotary : Bit type/size: 8 in. hammer :
Well Casing ID (in.)/type: 2 in. PVC : Well Casing Depth (FT. BG): 38.0 : Screened INterval (FT. BG.): 38.0-58.0 :
Screen ID (in.)/type: 2 in. PVC : Slot Size (in.): 0.01 : Drill Method: Air Rotary : Bit type/size: 6 in. hammer :
CONTRACTOR: Salamone Brothers, Wayne, NJ: LOGGED BY: H2M Group, Totowa, NJ



LEGEND: Topsoil Till Dolomite Fracture zone



* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone

Boring MW-12

Page 1 of 3

PROJECT: MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP. RI/FS: Date Start: 11/15/94 Date Complete: 12/9/94
Location: New Windsor, NY Ground Elev. (FT. MSL) 305.62 : Total Depth (FT. BG) 140.0 :

Casing 1 ID (in.)/type: 12 in. Steel : Casing 1 Depth (FT. BG): 40.0 : Drill Method: Air rotary : Bit type/size: 17.5" roller :
Casing 2 ID (in.)/type: 8 in. Steel : Casing 2 Depth (FT. BG): 85.0 : Drill Method: Air rotary : Bit type/size: 12 in. hammer
Well Casing ID (in.)/type: NA : Well Casing Depth (FT. BG): NA : Screened Interval (FT. BG): 85.0-140.0
Screen ID (in.)/type: Open Hole : Slot Size (in.): NA : Drill Method: Air rotary : Bit type/size: 8 in. hammer :

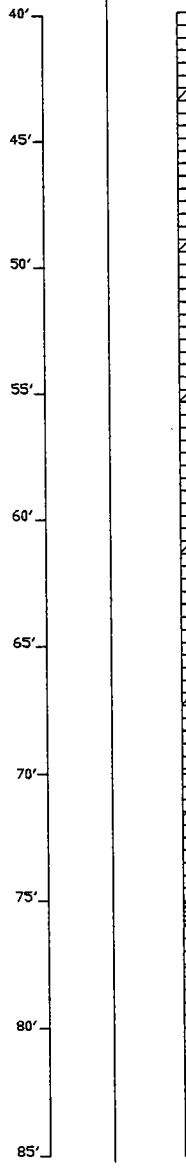
CONTRACTOR: Salamone Brothers, Wayne, NJ: LOGGED BY: H2M Group, Totowa, NJ

SCALE IN FEET	LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
0'			0-.25' - Topsoil and grass
		*	.25'-3.0' - Light brown silty sand containing some gravel and cobbles
5'		*	Light brown silty sand containing some gravel and cobbles; as depth increases, cobble and boulder content increases
10'			
15'		*	13.0'-16.0' - Boulders
		*	16.0'-19.0' - Ligtht brown silty sand and gravel containing some gravel and cobbles
20'		*	19.0'-22.5' - Bluish gray rock cuttings; very smooth consistent drilling
25'		*	22.5'-32.5' - Hardpan - Dull light brown silty sand and cobbles; drilling becomes irregular (rods vibrate and jump through this zone)
30'			
		*	32.5'-34.5' - Bluish gray to whitish gray rock cuttings; Relatively smooth drilling
35'		NL	34.5'-35.5' - Fracture zone
		2.6	35.5'-40.0' - Bedrock - bluish gray rock cuttings; smooth drilling; 34.5'-35.5' - Water in hole after it sat open over night; 0-40.0' - No PID responses above background were recorded
40'			

* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone

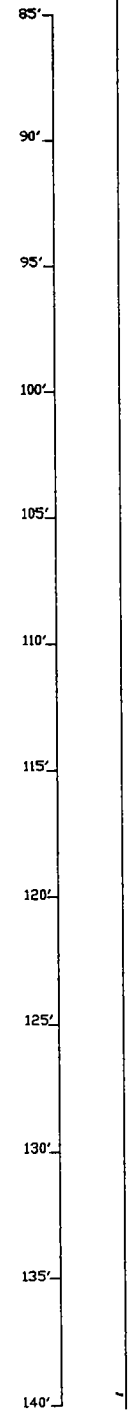


LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
	2.6	40.0'–70.0' – Bedrock - Grayish black rock cuttings Consistent, dry drilling
	8.6	70.0'–75.0' – Bedrock - Grayish black rock cuttings Consistent, dry drilling Drill time - 43 min. 12 in. hammer bit used
	NL	75.0'–76.0' – Fracture zone
	2.6	76.0'–81.0' – Bedrock Consistent, dry drilling
	NL	81.0'–85.0' – Fracture zone; water bearing No water in hole when drilling began through casing set at 85.0 ft.

* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone



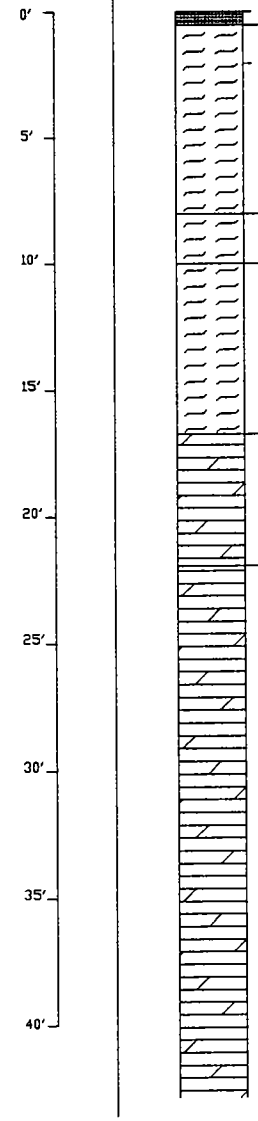
LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
	2.3	85.0'-116.0' - Bedrock Consistent, dry drilling Stopped drilling at 116 ft. and left borehole open for 2 hrs; no water
	2.0	116.0'-120.0' - Bedrock Consistent, dry drilling
	1.9	120.0'-130.0' - Bedrock Consistent, dry drilling Stopped drilling at 130 ft. and left borehole open for 30 min; no water
	1.6	130.0'-135.0' - Bedrock Consistent, dry drilling Stopped drilling at 135 ft. and left borehole open for 1hr. and 35 min; no water
	1.25	130.0'-140.0' - Bedrock Consistent, dry drilling 8 in. open hole from 85-140 ft.

LEGEND: Topsoil · Till · Dolomite · Fracture zone

Boring MW-16

Page 1 of 3

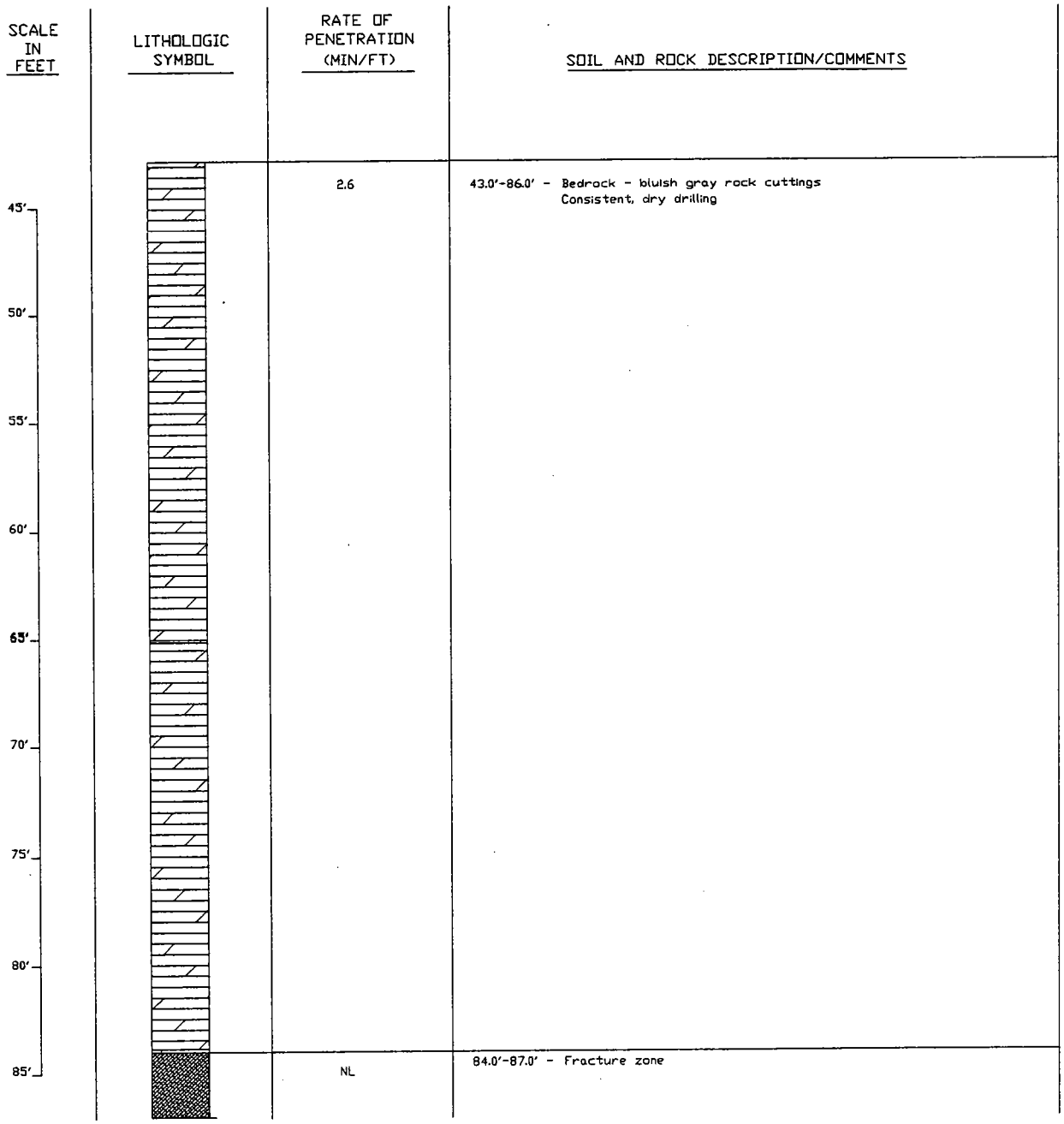
PROJECT: MACBETH DIVISION OF KOLLMORGEN INSTRUMENTS CORP. RI/FS; Date Start: 11/17/94 Date Complete: 12/5/94
Location: New Windsor, NY Ground Elev. (FT. MSL) 319.20 ; Total Depth (FT. BG) 120.0 ;
Casing 1 ID (in.)/type: 12 in. Steel ; Casing 1 Depth (FT. BG): 22.0 ; Drill Method: Air Rotary ; Bit type/size: 17.5" roller ;
Casing 2 ID (in.)/type: 8 in. Steel ; Casing 2 Depth (FT. BG): 90.0 ; Drill Method: Air Rotary ; Bit type/size: 12 in hammer;
Well Casing ID (in.)/type: 4 in. PVC ; Well Casing Depth (FT. BG): 90.0 ; Screened Interval (FT.BG): 90.0-120.0 ;
Screen ID (in.)/type: 4 in. PVC ; Slot Size (in.): 0.01 ; Drill Method: Air Rotary ; Bit type/size: 8 in hammer ;
CONTRACTOR: Salamone Brothers, Wayne, NJ; LOGGED BY: H2M Group, Totowa, NJ



LITHOLOGIC SYMBOL	RATE OF PENETRATION (MIN/FT)	SOIL AND ROCK DESCRIPTION/COMMENTS
		0-0.5' - Topsoil
	1.0	0.5'-2.0' - Dark brown clayey silt containing some gravel and cobbles Cobble and silt content increase with depth
	*	8.0'-10.0' - Boulders and cobbles
	*	10.0'-16.75' - Light brown clayey silt containing some gravel and cobbles Cobble content increases with depth
	7.6	16.75'-22.0' - Bedrock - bluish gray rock cuttings Consistent, dry drilling Stopped drilling at 21 ft. for 64 hrs.; no water
	4.5	22.0'-43.0' - Bedrock - bluish gray rock cuttings Consistent, dry drilling Stopped drilling at 43 ft and left borehole open for 112 hrs. 10 ft. of water in hole after waiting period

* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

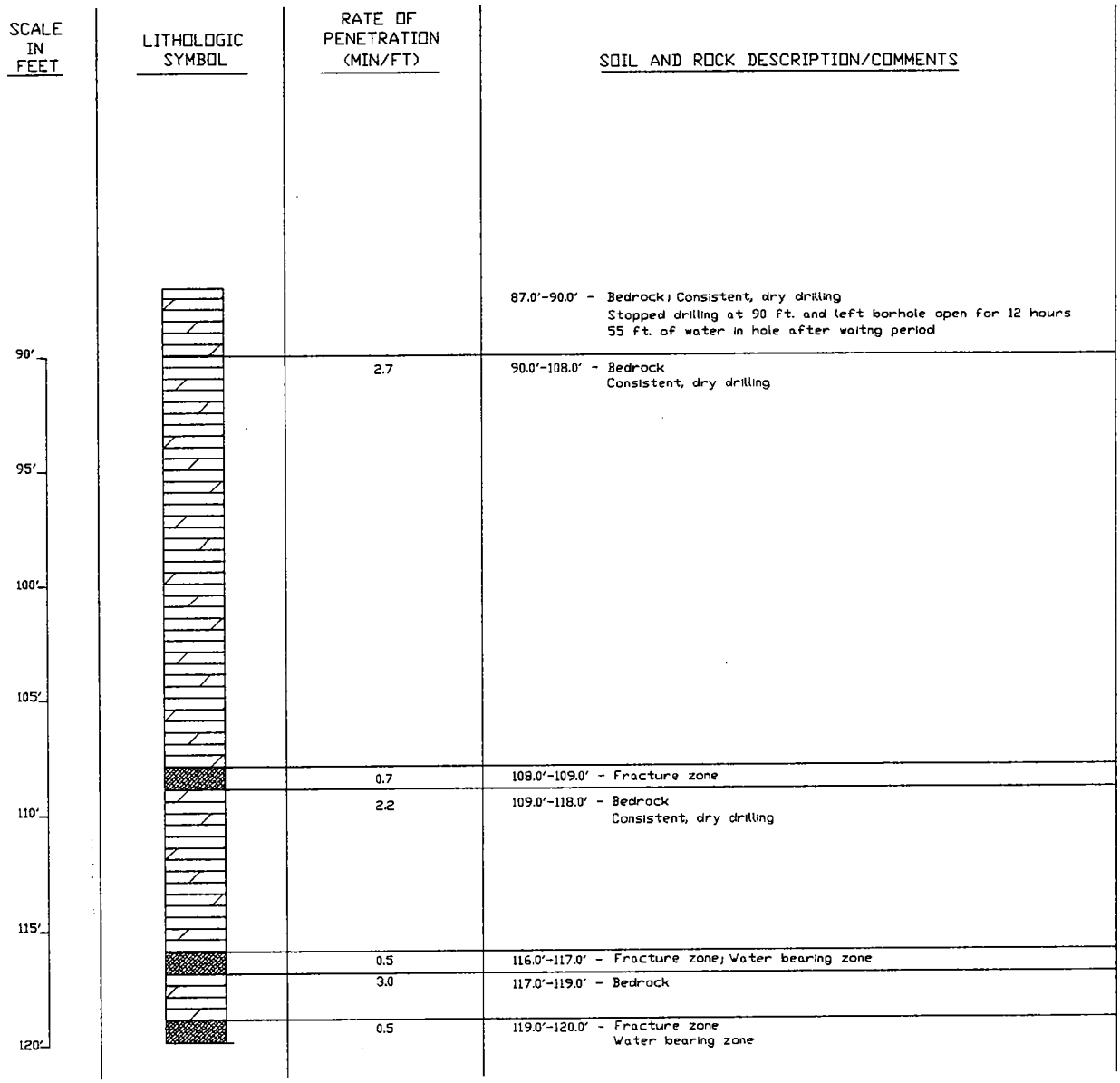
LEGEND: Topsoil Till Dolomite Fracture zone



* - Rate of penetration (min/ft) not given due to drilling in overburden or delays/equipment.

NL - Drill time not logged in void or fracture zone.

LEGEND: Topsoil Till Dolomite Fracture zone



LEGEND: Topsoil Till Dolomite Fracture zone

APPENDIX D
DATA VALIDATION REPORT

DATA VALIDATION AND SCREENING REPORT

ORGANIC AND INORGANIC ANALYSES

Kollmorgen Macbeth Remedial Investigation Project

Sample Delivery Group Nos. KLM001, KLM002, KLM003, KLM004, KLM005, and KLM006

Sampling Dates of September 15, 1994 - April 20, 1995

VOLUME 1 OF 2

PREPARED FOR:

H2M Group
999 Riverview Drive
Totowa, New Jersey 07512

August 1995

PREPARED BY:

ChemWorld Environmental, Inc.
14 Orchard Way North
Rockville, Maryland 20854
(301)294-6144

Kollmorgen Macbeth Project
Data Validation/Screening Report: Organic and Inorganic Analyses

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Appendices

DATA VALIDATION and DATA SCREENING SUMMARY: ORGANIC and INORGANIC ANALYSES

Kollmorgen Macbeth Remedial Investigation Project
Sample Delivery Group Nos. KLM001, KLM002, KLM003, KLM004, KLM005, and KLM006
Sampling Dates of September 15, 1994 - April 20, 1995

INTRODUCTION

This Data Validation and Data Screening Summary report for organic and inorganic analyses was generated for 48 water samples, 40 soil samples, and the associated quality control samples for the Sample Delivery Group (SDG) Nos. referenced above. Sampling activities were conducted in support of the field investigation for the Kollmorgen Macbeth Remedial Investigation (RI) Project. The analytical laboratory work was performed by H2M Labs, Inc.

Analytical testing consisted of Contract Laboratory Program (CLP) analyses, including Volatile Organic analyses by Gas Chromatography/Mass Spectroscopy (GC/MS); Base/Neutral and Acid Extractable Organics by GC/MS; and Pesticides and Polychlorinated Biphenyls (PCBs) by GC. Inorganics were analyzed by Inductively Coupled Plasma (ICP) and Atomic Absorption (AA); Mercury by Cold Vapor and Cyanide by Spectrophotometry. The analytical work was performed utilizing **New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP), December 1991.**

This report provides a summary of data acceptability and deviations in accordance with the **United States Environmental Protection Agency (USEPA) Region II Organic and Inorganic Data Validation Checklists/ Guidelines (January 1992)**; and, the CLP portion of the **NYSDEC ASP (December 1991)**, where applicable and relevant. A total of 10% of the sample results reported were fully validated in accordance with the protocols as referenced. A quality control review or 'screening' was performed for the remainder of the sample results. The screening consisted of a review of all the CLP quality control summary sheets. The screened analytical data was qualified based upon the quality control deviations noted utilizing standard validation criteria, as referenced above. However, review of the raw data was not performed for the screened samples. The validation/screening report pertains to the following samples:

SDG No. KLM001

Samples Validated:

SB1002 (Volatiles, only)
SB11 0-2 (Semi-Volatiles and Pesticides/PCBs)

Samples Screened:

SB102
SB202
SB346
SB446

SB527
SB646
SB72-4
SB802
SB946
SB1102
SB1124
Blind Dupe (duplicate of SB-11 0-2)
Field Blank (9/15/94)
Trip Blank (9/15/94)

SDG No. KLM002

Samples Validated:

PIT2NSA (Volatiles, only)
WASTE-DL (Volatiles, only)

Samples Screened:

Centerwall
Northwall
PIT1FSA
SE PIT
Southwall
Trough1
Waste
Trip Blank (11/18/94)

SDG No. KLM003

Samples Validated:

Blind-Dupe (duplicate of Backfill) (Volatiles, only)
Backfill (Inorganics, only)

Samples Screened:

Backfill
Center
Centerwall
MW-11M
MW-12D
MW-13S
North
South
TripBlank (12/08/94)
BLDDUP (duplicate of Backfill)

SDG No. KLM004

Samples Validated:

MW-2 (Volatiles, only)
MW-12 (Volatiles, only)
Supply Well (Volatiles, only)

Samples Screened:

Blind Dupe (duplicate of MW-3)
Field Blank 1 (1/11/95)
Field Blank 2 (1/12/95)
MW-1
MW-1A
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-13
MW-15
MW-16
Trip Blank (1/12/95)

SDG No. KLM005

Samples Validated:

MW-3 (Volatiles, only)
MW-10 (Volatiles, only)

Samples Screened:

Blind Dupe (duplicate of MW-8)
Field Blank (4/20/95)
MW-1
MW-1A
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12

MW-13
MW-15
MW-16
Trip Blank (4/20/95)

SDG No. KLM006

Samples Validated:

MID EAST (Volatiles, only)
NORTH WEST (Volatiles, only)
North East (Inorganics, only)

Samples Screened:

Blind Duplicate (duplicate of North West)
Mid Center
Mid East
Mid West
North Center
North East
North West
South Center
South East
South West
Field Blank (4/20/95)
Trip Blank (4/20/95)

1.0 VOLATILE ORGANICS BY GC/MS

The following items/criteria were reviewed:

(Data Validation and Data Screening)
* Holding Times
* System Monitoring Compound (Surrogate) Recovery
* Matrix Spikes (MS) and Matrix Spike Duplicates (MSD)
* Initial and Continuing Calibration
* Blanks (Method and Field)
* GC/MS Instrument Performance Check
* Tentatively Identified Compounds (TICs)
* Internal Standards
* Field Duplicates

(Data Validation, only)
* Target Compound List (TCL) Identification
* Compound Quantitation and Reported Detection Limits
* System Performance

All items above were generated within acceptable Quality Control (QC) specifications, with deviations detailed as follows. Various non-detectable results for 2-Butanone for SDG No. KLM006 were qualified as 'R', unusable, due to response factors of less than 0.05. In regard to the type of review noted, all the remaining data is considered to be

valid and usable with the appropriate qualifiers, as noted on the data summary forms in Appendix A and within the following text.

1.1 Holding Times

All holding times were met within the acceptable time frame of 7 days from Verified Time of Sample Receipt (VTSR) at the laboratory for the soil and water samples.

1.2 System Monitoring (Surrogate) Compound Recovery

All system monitoring compound recovery (%R) was found to be generated within acceptable limits for the three surrogate compounds, with the following exceptions.

1.2.1 SDG No. KLM001

Sample ID			
SB1002	Bromofluorobenzene	156%	(Limit 59-113)
SB1002-RE	Bromofluorobenzene	128%	
Blind-Dup-RE	Bromofluorobenzene	122%	
Blind-Dup	Bromofluorobenzene	149%	

The positive results, only, for the samples above were qualified as 'J', estimated, due to high surrogate recovery.

1.2.2 SDG No. KLM002

Sample ID			
SE PIT	Toluene-d8	146%	(Limit 84-138)

Positive results were not detected for the sample SE PIT, therefore, qualification was not required in regard to the high surrogate recovery.

1.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS/MSD sample sets and Matrix Spike Blanks (MSBs) were analyzed for each SDG. Acceptable accuracy (percent recovery) and precision (relative percent difference) were generated, with the following exceptions.

1.3.1 SDG No. KLM002

Low recovery was generated for the MS sample for all of the five spiked compounds. Benzene and chlorobenzene recovery was found to be just out of specification for the MSD sample. Precision was found to be generated out of specification for all of the spiked compounds. The MS sample for PIT2NSA was qualified as 'J', estimated, for the spiked compounds. The remaining samples did not require qualification.

1.4 Calibration

All initial and continuing calibration was performed within acceptable limits for average Relative Response Factors ($\overline{RRF}$), Percent Relative Standard Deviation (% RSD), Relative Response Factors (RRF), and percent Difference (% D), with the following exceptions.

1.4.1 Initial Calibration, SDG No. KLM001

Date			
9/01/94	Acetone	56.6% RSD	(Limit 30%)

Positive results for acetone were qualified as 'J', estimated.

1.4.2 Continuing Calibration, SDG No. KLM001

Date, Time			
9/20/94, 10:41	Chloromethane	29.9% D	(Limit 25%)
	Bromomethane	26.8%	
	Vinyl Chloride	41.8%	
	Acetone	47.0%	
	2-Butanone	100%	
	2-Hexanone	66.2%	
9/21/94, 10:57	2-Butanone	44.5%	
9/21/94, 11:19	Chloromethane	28.0%	
	4-Methyl-2-pentanone	29.0%	
9/22/94, 09:41	2-Butanone	57.2%	
	2-Hexanone	43.9%	

The samples associated with the continuing calibrations above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted.

1.4.3 Initial Calibration, SDG No. KLM002

Date			
10/26/94	Acetone	35.8% RSD	(Limit 30%)
	2-Butanone	33.9%	
11/08/94	Acetone	36.0%	
	1,1,2,2-Tetrachloroethane	36.6%	

The positive results for acetone were qualified as 'J', estimated. The remaining compounds above did not require qualification.

1.4.4 Continuing Calibration, SDG No. KLM002

Date, Time			
11/22/94, 09:40	Bromomethane	27.6% D	(Limit 25%)
	Carbon Disulfide	46.4%	
	2-Butanone	31.6%	
	2-Hexanone	27.3%	
11/22/94, 11:28	Acetone	29.2%	
	Carbon Disulfide	48.0%	
	1,1,2,2-Tetrachloroethane	25.9%	
11/25/94, 11:02	Chloromethane	30.1%	
	Vinyl Chloride	26.0%	
11/26/94, 14:04	Bromomethane	29.9%	
	Carbon Disulfide	54.2%	

The samples associated with continuing calibrations above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted.

1.4.5 Initial Calibration, SDG Nos. KLM003 and KLM004

Date			
12/09/94	Acetone	40.3% RSD	(Limit 30%)
	2-Butanone	33.9%	

Positive results for acetone were qualified as 'J', estimated. The compound 2-Butanone was not detected, therefore, qualification was not required.

1.4.6 Continuing Calibration, SDG No. KLM003

Date, Time			
12/12/94, 09:55	trans-1,3-dichloropropene	28.0% D	(Limit 25%)
	2-Hexanone	25.8%	
	1,1,2,2-tetrachloroethane	26.5%	

The samples associated with the continuing calibration above were qualified as 'UJ', estimated, for the non-detectable results. Positive results were not detected for the compounds affected.

1.4.7 Continuing Calibration, SDG No. KLM004

Date, Time			
1/17/95, 08:24	Bromomethane	27.2% D	(Limit 25%)
	Chloroethane	28.5%	
	Methylene Chloride	28.4%	
	2-Butanone	40.5%	
	2-Hexanone	31.7%	
1/18/95, 09:32	Acetone	52.6%	
	2-Butanone	52.9%	
	2-Hexanone	34.4%	

The samples associated with the continuing calibrations above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted.

1.4.8 Continuing Calibration, SDG No. KLM005

Date, Time			
4/24/95, 09:21	Chloromethane	42.2% D	(Limit 25%)
	Bromomethane	26.6%	
	Vinyl Chloride	38.2%	
	2-Butanone	31.3%	
	2-Hexanone	55.6%	

The samples associated with the continuing calibration above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted.

1.4.9 Initial Calibration, SDG No. KLM006

Date			
4/17/95	2-Butanone	37.2% RSD	(Limit 30%)
3/30/95	Acetone	38.0%	
	2-Butanone	37.3%	

Positive results for acetone were qualified as 'J', estimated. The compound 2-Butanone was not detected, therefore, qualification is not required.

1.4.10 Continuing Calibration, SDG No. KLM006

Date, Time			
4/25/95, 11:46	Chloromethane	49.5% D	(Limit 25%)
	Vinyl Chloride	31.1%	
	Chloroethane	27.4%	
4/26/95, 14:38	1,1,2,2-Tetrachloroethane	26.9%	

4/26/95, 12:11	2-Butanone	RRF50 = 0.044	(Limit ≥ 0.05)
		27.9% D	(Limit 25%)
	Chloromethane	25.6%	
	1,2-Dichloroethene (total)	27.6%	
	trans-1,3-Dichloropropene	26.0%	
4/27/95, 15:23	2-Butanone	RRF50 = 0.039	
		36.1% D	
	Acetone	29.9%	
	1,2-Dichloroethene (total)	26.1%	
	2-Hexanone	26.2%	

The samples associated with the continuing calibrations above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted. However, the non-detectable results for 2-Butanone that are associated with the 4/26/95, 12:11 and 4/27/94, 15:23 calibrations were qualified as 'R', unusable, due to response factors of less than 0.05 for 2-Butanone. The affected samples include the trip blank, field blank, and the associated method blanks.

1.5 Blanks

1.5.1 Field Blanks

1.5.1.1 SDG No. KLM001

One field blank and one trip blank were analyzed for the SDG. Volatile Organics were not detected in the trip blank. The field blank was found to contain acetone at 5 ug/L and tetrachloroethene at 2 ug/L. The acetone results are qualified in *Section 1.5.2, Method Blanks*. Additional qualification is not required for acetone. A limit of five times the tetrachloroethene field blank value was used for review and qualification of the associated samples. Sample results for tetrachloroethene were all reported at less than the Contract Required Quantitation Limit (CRQL) and less than the field blank limit, therefore, were qualified as 'U', not detected, at the CRQL.

1.5.1.2 SDG No. KLM002

One trip blank was analyzed for the SDG. Carbon disulfide was detected in the trip blank at 2 ug/L. Carbon disulfide was not detected in the project samples, therefore, qualification was not required.

1.5.1.3 SDG No. KLM003

One trip blank was analyzed for the SDG. Acetone was detected at 7 ug/L. A limit of ten times the acetone value was used for review and qualification of the associated samples. Acetone sample results that were found to be less than the trip blank limit were qualified as 'U', not detected. Sample results found to be reported at less than the CRQL and less than the blank limit were qualified as 'U', not detected , at the CRQL.

1.5.1.4 SDG No. KLM004

Two field blanks and one trip blank were analyzed for the SDG. Volatile Organics were not detected in the field blanks. Toluene was detected at 2 ug/L in the trip blank. A limit

of ten times the toluene trip blank value was used for review and qualification of the associated samples. Sample results that were found to be less than the trip blank limit were qualified as 'U', not detected. Sample results that were reported at less than the CRQL and less than the blank limit were qualified as 'U', not detected, at the CRQL. Sample results that exceed the blank limit do not require qualification.

1.5.1.5 SDG No. KLM005

One field blank and one trip blank were analyzed for the SDG. Volatile Organics were not detected in either the field or trip blank.

1.5.1.6 SDG No. KLM006

One field blank and one trip blank were analyzed for the SDG. Methylene chloride and acetone results detected are qualified as 'U', not detected, in *Section 1.5.2, Method Blanks*. Additional qualification in regard to the field blanks is not required.

1.5.2 Method Blanks

1.5.2.1 SDG No. KLM001

One water method blank and three soil method blanks were analyzed for the SDG. Volatile Organics were detected, as follows.

Sample ID		
VBLK20S	Acetone	3 ug/Kg, estimated
	2-Hexanone	1 ug/Kg, estimated
	Tetrachloroethene	1 ug/Kg, estimated
VBLK21	4-methyl-2-pentanone	2 ug/L, estimated
	2-Hexanone	3 ug/L, estimated
VBLK22S	Acetone	3 ug/Kg, estimated
	Xylene (total)	2 ug/Kg, estimated

Limits of ten times the highest acetone value above and five times the remaining method blank values were used for review and qualification of the associated samples. Sample results that were found to be less than the respective method blank limit and reported at less than the CRQL, were qualified as 'U', not detected, at the CRQL. Sample results for total xylenes that exceeded the method blank limit did not require qualification.

1.5.2.2 SDG No. KLM002

One water method blank and four soil method blanks were analyzed for the SDG. The following Volatile Organics were detected.

Sample ID		
VBLK19	Methylene Chloride	2 ug/Kg, estimted
VBLK26	Acetone	4 ug/Kg, estimated

A limit of ten times the methylene chloride and acetone values above were used for review and qualification of the soil samples. Sample results that were found to be less than the respective method blank limit were qualified as 'U', not detected. Sample results found to be reported at less than the CRQL and less than the respective limit were qualified as 'U', not detected, at the CRQL. Sample results that exceed the respective method blank limit do not require qualification.

1.5.2.3 SDG No. KLM003

One water method blank and one soil method blank were analyzed for the SDG. Volatile Organics were not detected in either method blank.

1.5.2.4 SDG No. KLM004

Two water method blanks were analyzed for the SDG. Positive results were not detected for Volatile Organics.

1.5.2.5 SDG No. KLM005

One water method blank was analyzed for the SDG. Volatile Organics were not detected.

1.5.2.6 SDG No. KLM006

Three soil method blanks and two water method blanks were analyzed for the SDG. Volatile Organics were detected as follows.

Sample ID		
VBLK09	Acetone	4 ug/Kg, estimated
VBLK10	Acetone	3 ug/Kg, estimated
VBLK11	Methylene Chloride	1 ug/Kg, estimated
	Acetone	4 ug/Kg, estimated
VBLK11	Methylene Chloride	1 ug/L, estimated
	Acetone	5 ug/L, estimated
	1,1,2,2-Tetrachloroethane	1 ug/L, estimated
VBLK12	Methylene Chloride	1 ug/L, estimated
	1,1,2,2-Tetrachloroethane	1 ug/L, estimated

Limits of ten times the highest acetone and methylene chloride values and five times the highest 1,1,2,2-tetrachloroethane values were used for review and qualification of the associated samples. Sample results that were found to be less than the respective blank limit were qualified as 'U', not detected. Sample results that were reported at less than the CRQL and less than the respective blank limit were qualified as 'U', not detected, at the CRQL.

1.6 GC/MS Instrument Performance Check

Instrument performance was generated within acceptable limits and frequency for Bromofluorobenzene (BFB).

1.7 Tentatively Identified Compounds (TICs)

TICs were generated in accordance with protocol. Copies of the Form I's are included in Appendix E.

1.8 Internal Standards

All internal standards were generated within acceptable specifications for area counts and retention time variation, with the following exceptions.

1.8.1 SDG No. KLM001

Sample ID	Internal Standard	Reported Area Count	Lower Limit
Blind Dup	Chlorobenzene-d5	36223	41495

The sample Blind Dup was qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds associated with the chlorobenzene internal standard.

1.8.2 SDG No. KLM002

Sample ID	Internal Standard	Reported Area Count	Lower Limit
SE PIT	Chlorobenzene-d5	86141	106974
SE PIT-RE	Bromochloromethane	10090	13038
	1,4-Difluorobenzene	27954	51044
	Chlorobenzene-d5	14052	42548

The samples above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds associated with the particular internal standards noted above.

1.8.3 SDG No. KLM003

Sample ID	Internal Standard	Reported Area Count	Lower Limit
NORTH	Chlorobenzene-d5	33570	38672
NORTH-RE	Chlorobenzene-d5	29193	38672

The samples above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds associated with the chlorobenzene internal standard.

1.8.4 SDG No. KLM006

Sample ID	Internal Standard	Reported Area Count	Lower Limit
North West	1,4-Difluorobenzene	86026	93067
	Chlorobenzene-d5	56044	72555
North West-MS	Chlorobenzene-d5	72297	72555
North West-MSD	1,4-Difluorobenzene	89753	93067
	Chlorobenzene-d5	55311	72555
MID EAST	1,4-Difluorobenzene	91509	93067
	Chlorobenzene-d5	61853	72555
MID EAST-RE	Chlorobenzene-d5	59763	67728
SOUTH-EAST	Chlorobenzene-d5	61782	67728
SOUTH EAST-RE	Chlorobenzene-d5	73338	75436

The samples above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds associated with the particular internal standards noted.

1.9 Field Duplicates

1.9.1 SDG No. KLM001

Samples SB-11 0-2 and Blind Dupe were collected as field duplicate soil samples and analyzed for Volatile Organics. Acceptable precision was generated.

1.9.2 SDG No. KLM003

Samples Backfill and Blind-Dupe were collected as the field duplicate samples and analyzed for Volatile Organics. Acceptable precision was generated, with the exception of total xylenes. The Blind-Dupe sample was found to contain 55 ug/Kg of total xylenes, while total xylenes was not detected in the Backfill sample. Traces of toluene and ethylbenzene were also detected in the Blind-Dupe sample, but were not detected in the Backfill sample. Non-homogeneity of the soil matrix may contribute to poor precision.

1.9.3 SDG No. KLM004

Samples MW-3 and Blind-Dupe were collected as the field duplicate water samples and analyzed for Volatile Organics. Acceptable precision was generated.

1.9.4 SDG No. KLM005

Samples MW-8 and Blind Dupe were collected as field duplicate water samples and analyzed for Volatile Organics. Acceptable precision was generated.

1.9.5 SDG No. KLM006

Samples North West and Blind Duplicate were collected as the soil duplicate samples and analyzed for Volatile Organics. Acceptable precision was generated.

1.10 TCL Identification

GC/MS qualitative analyses are considered to be acceptable for the samples validated. Retention times and mass spectra were generated within appropriate quality control specifications.

1.11 Compound Quantitation and Reported Detection Limits

GC/MS quantitative analyses are considered to be acceptable for the samples validated. Sample dilutions, internal standards and response factors were found to be within acceptable limits.

1.12 System Performance

Acceptable system performance was maintained throughout the analyses of the samples that were validated. This was exhibited through good resolution and consistent chromatographic performance.

2.0 SEMIVOLATILE ORGANICS BY GC/MS
(Base/Neutral and Acid Extractable Organics)

The following items/criteria were reviewed:

(Data Validation and Data Screening)
* Holding Times
* Surrogate Recovery
* MS/MSD
* Initial and Continuing Calibration
* Blanks (Method and Field)
* GC/MS Instrument Performance Check
* TICs
* Internal Standards
* Field Duplicates

(Data Validation, only)
* TCL Compound Identification
* Compound Quantitation and Reported Detection Limits
* System Performance

All items above were generated within acceptable QC specifications, with deviations detailed as follows. Various TIC sample results were qualified as 'R', unusable, due to their presence at less than five times the method blank result. Various non-detectable results for samples Blind-Dupe, SB11 0-2, SB11MS, and Blind Dupe-RE were qualified as 'R', unusable, due to extremely low area counts generated for the chrysene and perylene internal standards. In regard to the type of review noted, all the remaining data is considered to be valid and usable with the appropriate qualifiers, as noted on the data summary forms in Appendix B and within the following text.

2.1 Holding Times

All holding times were met for extraction and analysis of the soil and water samples. The NYSDEC holding time is 5 days from VTSR at the laboratory for extraction, and 40 days from extraction to analysis.

2.2 Surrogate Recovery

All surrogate recovery was found to be generated within acceptable limits for the eight surrogate compounds, with the following exceptions.

2.2.1 SDG No. KLM001

Sample ID			
SB11 0-2	Terphenyl-d14	198%	(Limit 18-137)
Blind Dupe	Terphenyl-d14	202%	
Blind Dup-RE	Terphenyl-d14	191%	

The samples above do not require qualification, due to the fact that only one surrogate per fraction is out of specification (two are required for qualification).

2.3 MS/MSD

2.3.1 SDG No. KLM001

One MS/MSD sample set and one MSB were analyzed for Semivolatile Organics for the SDG. Acceptable accuracy and precision were generated.

2.4 Calibration

All initial and continuing calibrations were performed within acceptable limits for $\overline{RRF}$, % RSD, RRF, and % D, with the exception of the following.

2.4.1 Initial Calibration, SDG No. KLM001

Date			
9/14/94	4-Chlorophenyl-phenylether	32.5% RSD	(Limit 30%)

The compound above was not detected, therefore, qualification was not required.

2.4.2 Continuing Calibration, SDG No. KLM001

Date, Time			
9/23/94, 12:42	2,4-Dinitrophenol	47.2% D	(Limit 25%)
	4-Nitroaniline	37.9%	
	4,6-Dinitro-2-methylphenol	33.3%	
	Pentachlorophenol	27.4%	
	Carbazole	42.1%	
	3,3'-Dichlorobenzidine	28.7%	
9/26/94, 13:47	bis(2-Chloroethyl)ether	27.2%	
	2,4-Dinitrophenol	38.7%	
	Diethylphthalate	31.0%	
	4-Chlorophenyl-phenylether	30.2%	
	4-Nitroaniline	35.6%	
	4,6-Dinitro-2-methylphenol	40.0%	
	3,3'-Dichlorobenzidine	32.2%	
9/28/94, 12:31	2,4-Dinitrophenol	62.8%	
	4-Nitroaniline	25.5%	
	3,3'-Dichlorobenzidine	25.9%	
	Benzo(k)fluoranthene	25.9%	

The samples associated with the continuing calibrations above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds noted.

2.5 Blanks

2.5.1 Field Blanks

2.5.1.1 SDG No. KLM001

One field blank was collected and analyzed for Semi-Volatile Organics. Positive results were not detected for the field blank.

2.5.2 Method Blanks

2.5.2.1 SDG No. KLM001

One water method blank and one soil method blank were analyzed for the SDG. Semivolatile Organics were not detected for the soil method blank. The water method blank SBLK9/20 was found to contain 4 ug/L of bis(2-ethylhexyl)phthalate. The Field Blank sample was qualified as 'U', not detected, for bis(2-ethylhexyl)phthalate, due to the compound's presence at less than ten times the method blank value. Additional qualification was not required.

2.6 GC/MS Instrument Performance Check

Instrument performance was generated within acceptable limits and frequency for Decafluorotriphenylphosphine (DFTPP).

2.7 TICs

TICs were generated in accordance with protocol. The Form I's, including the appropriate qualifiers, are included in Appendix E.

2.7.1 SDG No. KLM001

The results for the aldol condensation product 4-hydroxy-4-methyl-2-pentanone were qualified as 'R', unusable. In addition, the TIC compound bis(2-ethylhexyl)adipate was qualified as 'R', unusable for the field blank sample, due to the compound's presence at less than five times the method blank result.

2.8 Internal Standards

All internal standards were generated within acceptable specifications for area counts and retention time variation, with the following exceptions.

2.8.1 SDG No. KLM001

Sample ID	Internal Standard	Reported Area Count	Lower Limit
Blind Dup	Naphthalene-d8	40746	41120
	Acenaphthene-d10	17050	24129
	Chrysene-d12	6185	38426
	Perylene-d12	2515	38121
SB11 0-2	Chrysene-d12	9847	38426
	Perylene-d12	3363	38121
SB11 MS	Chrysene-d12	32788	38426
	Perylene-d12	8955	38121
SB11 MSD	Perylene-d12	12170	38121
Blind Dup-RE	Acenaphthene-d10	23574	25160
	Chrysene-d12	8941	37139
	Perylene-d12	3471	33612

The samples above were qualified as 'J', estimated, for the positive results, and 'UJ', estimated, for the non-detectable results, for the compounds associated with the particular internal standards noted. However, various non-detectable results for samples Blind-Dupe, SB11 0-2, SB11MS, and Blind Dupe-RE were qualified as 'R', unusable, due to extremely low area counts (less than 25% of the lower limit) generated for the chrysene and perylene internal standards.

2.9 Field Duplicates

2.9.1 SDG No. KLM001

Samples SB11 0-2 and Blind Dup were collected as the field duplicate soil samples and analyzed for Semi-Volatile Organics. Poor precision was generated for the polynuclear aromatic hydrocarbons detected in the samples. In general, most of the compounds

detected yielded high relative percent difference for the soil samples. Non-homogeneity of the soil matrix may contribute to poor precision. Table 1 includes calculated precision for the duplicate pair.

2.10 TCL Compound Identification

GC/MS qualitative analyses are considered to be acceptable for the sample validated. Retention times and mass spectra were generated within appropriate quality control specifications.

2.11 Compound Quantitation and Reported Detection Limits

GC/MS quantitative analyses are considered to be acceptable for the sample validated. Sample dilutions, internal standards and response factors were found to be within acceptable limits.

2.12 System Performance

Acceptable system performance was maintained throughout the analyses of the sample that was validated. This was exhibited through good resolution and consistent chromatographic performance.

3.0 PESTICIDES AND PCBs BY GC

The following items/criteria were reviewed:

(Data Validation and Data Screening)
* Holding Times
* Surrogate Recovery
* Matrix Spike and Matrix Spike Duplicate (MS/MSD)
* Blanks (Method and Field)
* Instrument (GC) Performance
* Calibration
* Field Duplicates

(Data Validation, only)
* Compound Identification
* Compound Quantitation and Reported Detection Limits

All items above were generated within acceptable QC specifications, with deviations detailed as follows. In regard to the type of review noted, all data is considered to be valid and usable with the appropriate qualifiers, as noted on the data summary forms in Appendix C and within the following text.

3.1 Holding Times

All holding times were met within acceptable time frames for extraction and analysis of the soil and water samples. The NYSDEC holding time is 5 days from VTSR at the laboratory for extraction and 40 days from extraction to analysis.

3.2 Surrogate Recovery

Surrogate recovery was generated within acceptable limits for both surrogate compounds.

3.3 MS/MSD

3.3.1 SDG No. KLM001

One MS/MSD sample set and one MSB were analyzed for Pesticides and PCBs. Acceptable accuracy and precision were generated.

3.4 Blanks

3.4.1 Field Blanks

3.4.1.1 SDG No. KLM001

One field blank was analyzed for Pesticides and PCBs. Positive results were not detected.

3.4.2 Method Blanks

3.4.2.1 SDG No. KLM001

One water method blank and one soil method blank were analyzed for the SDG. Pesticides and PCBs were not detected.

3.5 Instrument (GC) Performance

Adequate chromatographic resolution and instrument sensitivity were achieved through the generation of data within acceptable limits for the Resolution Check Mixture and Performance Evaluation Mixtures. The review included resolution between adjacent peaks, retention time windows, Relative Percent Difference (RPD), and percent breakdown for DDT/Endrin.

3.6 Calibration

All initial and continuing calibration was performed within acceptable limits for the individual standard mixtures, with the exception as noted below. Review items included resolution, retention time windows, calibration factors (CF), percent RSD for linearity, RPD and %R.

3.6.1 SDG No. KLM001

Linearity:

Date			
9/28/94	alpha-BHC	26.05% RSD	(Limit 20%)
	delta-BHC	25.23%	

The alpha-BHC and delta-BHC results were qualified as 'UJ', estimated, for the non-detectable results. Positive results were not detected for either compound.

3.7 Field Duplicates

3.7.1 SDG No. KLM001

Samples SB11 0-2 and Blind Dupe were collected as the duplicate soil samples and analyzed for Pesticides and PCBs. Acceptable precision was generated. However, the relative percent difference (RPD) for methoxychlor was generated slightly high at 56%. Non-homogeneity of the soil matrix may contribute to the slightly high RPD.

3.8 Compound Identification

GC qualitative analyses are considered to be acceptable for the validated sample. In accordance with protocol, the lower of the two values from the GC columns is reported. However, the following percent differences (%D) between the two GC columns exceeded the 25% limit for the samples analyzed.

Sample ID	Compound	% D
MSB-9-18	gamma-BHC	26.0
	Heptachlor	30.8
SB1102MS	gamma-BHC	40.4
	Heptachlor	47.9
	Aldrin	63.7
	Dieldrin	33.6
	4,4'-DDT	31.8
	Methoxychlor	25.6
	Endrin Ketone	112.4
SB1102MSD	gamma-BHC	37.6
	Heptachlor	50.6
	Aldrin	46.7
	Dieldrin	33.9
	Endrin	35.0
	4,4'-DDT	34.3

The samples above were qualified as 'J', estimated, for the compound noted where the percent difference (%D) was reported at up to 50%. The samples were qualified as 'JN', presumptively present at an approximated quantity, where the %D exceeds 50%.

3.9 Compound Quantitation and Reported Detection Limits

GC quantitative analyses are considered to be acceptable for the sample validated. Supporting data was generated within the appropriate quality control specifications.

4.0 INORGANIC ANALYSES BY AA and ICP (Mercury by Cold Vapor, Cyanide by Spectrophotometry)

The following items/criteria were reviewed:

(Data Validation and Data Screening)
* Holding Times
* Initial and Continuing Calibration
* CRDL Standards for ICP
* Blanks (Initial, Continuing Calibration, and Preparation)
* Field Blanks
* ICP Interference Check Sample
* Matrix Spike Sample Recovery
* Laboratory Duplicates
* Field Duplicates
* Laboratory Control Sample (LCS)
* ICP Serial Dilution

(Data Validation, only)
* Sample Result Verification

All items above were generated within acceptable QC specifications, with deviations detailed as follows. In regard to the type of review noted, all data is considered to be valid and usable with the appropriate qualifiers, as noted on the data summary forms in Appendix D and within the following text.

4.1 Holding Times

All holding times were met within the acceptable time frame from VTSR at the laboratory for metals (180 days), mercury (26 days), and cyanide (12 days).

4.2 Calibration

All initial and continuing calibration was performed within acceptable limits for percent recovery.

4.3 Contract Required Detection Limit (CRDL) Standards for AA and ICP

Percent recovery was found to be within the acceptable 80-120% limit, with the following exception.

4.3.1 SDG No. KLM001

AA

Arsenic	122.0%

The arsenic results did not require qualification due to the fact that they were not reported in the affected range.

4.4 Blanks

4.4.1 Laboratory (Method) Blanks

All initial calibration, continuing calibration, and preparation blanks were generated in accordance with acceptable limits.

4.4.2 Field Blanks

4.4.2.1 SDG No. KLM001

One field blank was analyzed for the SDG. Inorganics were detected as follows.

FLD BLK	(ug/L)
Calcium	171
Copper	4.5
Sodium	147
Zinc	5.3

A limit of five times the Inorganic vlaues above were used for review and qualification of the associated samples. The sodium results were qualified as 'U', not detected, due to their presence at less than five times the respective field blank result. The remaining Inorganic results exceeded the respective blank limits and do not require qualification.

4.4.2.2 SDG No. KLM003

Field blanks were not collected for Inorganic analyses for the SDG.

4.4.2.3 SDG No. KLM006

One field blank was analyzed for the SDG. Inorganics were detected as follows.

FLD BLK	(ug/L)
Aluminum	86.7
Barium	4.0
Beryllium	0.90
Cadmium	0.97
Calcium	2020
Chromium	1.2
Copper	1.6
Iron	92.4
Lead	3.6
Magnesium	35.6
Manganese	9.9
Potassium	34.9
Selenium	2.1
Zinc	19.0

Sample results for the Inorganics above that were found to be less than five times the respective field blank result were qualified as 'U', not detected. Sample results that exceed the respective blank limit do not require qualification.

4.5 ICP Interference Check

The recoveries for the ICP Interference Check samples were found to be within the acceptable 80-120% limit.

4.6 Spiked Sample Recovery

All percent recoveries for the matrix spike samples were found to be within the 75-125% limit, with the following exceptions.

4.6.1 SDG No. KLM001

SB1102	(mg/Kg)
Antimony	66.4%
Selenium	55.1%

The non-detectable results for antimony and selenium for the soil samples were qualified as 'UJ', estimated. Positive results were not detected for either Inorganic.

4.6.2 SDG No. KLM003

BACK	(mg/Kg)
Antimony	70.7%
Copper	4.6%
Lead	-17.2%
Mercury	162.3%

The sample results for the Inorganics above were qualified as 'J', estimated. Additional qualification was not required.

4.6.3 SDG No. KLM006

NW	(mg/Kg)
Antimony	42.6%

The non-detectable results for antimony were qualified as 'UJ', estimated. Positive results were not detected for antimony.

4.7 Laboratory Duplicates

Precision (relative percent difference) for the soil samples was found to be acceptable for all the Inorganics, with the following exception.

4.7.1 SDG No. KLM003

Back (mg/Kg)

Lead	123.4% RPD

The positive results for lead were qualified as 'J', estimated.

4.8 Field Duplicates

4.8.1 SDG No. KLM001

Samples SB1102 and BLDDUP were collected as the field duplicate soil samples and analyzed for Inorganics. Acceptable precision was generated. Table 2 includes calculated precision for the duplicate pair.

4.8.2 SDG No. KLM003

Samples Backfill and BLDDUP were collected as the field duplicate soil samples and analyzed for Inorganics. Acceptable precision was generated, with the exception of barium, cadmium, copper, lead, and mercury. Non-homogeneity of the soil matrix may contribute to poor precision. Table 3 includes calculated precision for the duplicate pair.

4.8.3 SDG No. KLM006

Samples NorthWest (NW) and BLINDD were collected as the field duplicate soil samples and analyzed for Inorganics. Acceptable precision was generated, with the exception of calcium. Table 4 includes calculated precision for the duplicate samples.

4.9 Laboratory Control Sample (LCS)

The aqueous and solid laboratory control samples were generated within the acceptable limits for percent recovery.

4.10 ICP Serial Dilution

ICP Serial Dilution was found to be within the acceptable 10% limit for percent difference (%D), with the following exceptions.

4.10.1 SDG No. KLM001

SB1102 (mg/Kg)

Sodium	144.4% D
Zinc	13.9%

The sample results for zinc that were reported at greater than 50 times the Instrument Detection Limit (IDL) were qualified as 'J', estimated. Sodium was not detected, therefore, qualification was not required.

4.10.2 SDG No. KLM003

Backfill (mg/Kg)

Potassium	15.2% D

Sample results for potassium that were reported at greater than 50 times the IDL were qualified as 'J', estimated.

4.10.3 SDG No. KLM006

NW (mg/Kg)

Calcium	15.6% D
Chromium	51.0%
Zinc	178.6%

Sample results for the Inorganics above were qualified as 'J', estimated, where the results exceeded 50 times the IDL.

4.11 Sample Result Verification

Quantitative analyses are considered to be acceptable for the samples validated. Analyte quantitation was generated in accordance with protocols.

TABLE 1

FIELD DUPLICATE SAMPLE ANALYSIS

PRECISION FOR SEMI-VOLATILES

Kollmorgen Macbeth Project

Results in ug/Kg (ppb)

Parameter	SB11 0-2	Blind Dupe	RPD*
Naphthalene	87	510	142%
2-Methylnaphthalene	100	470	130%
Acenaphthene	40	270	148%
Dibenzofuran	ND	150	++
Fluorene	68	470	149%
Phenanthrene	140	940	148%
Anthracene	45	300	148%
Fluoranthene	69	410	142%
Pyrene	510	2600	134%
Benzo(a)anthracene	59	470	155%
Chrysene	130	340	89%
bis(2-ethylhexyl)phthalate	1900	1800	5%
Di-n-butylphthalate	35	ND	++

* Relative Percent Difference (Calculated Precision)

ND Not Detected

++ Unable to be calculated due to non-detected results

TABLE 2

FIELD DUPLICATE SAMPLE ANALYSIS

PRECISION FOR INORGANICS

Kollmorgen Macbeth Project

Results in mg/Kg (ppm)

Parameter	SB11 02	BLDDUP	RPD*
Aluminum	9710	10100	4%
Antimony	ND	ND	++
Arsenic	8.2	6.2	28%
Barium	45.1	39.2	14%
Beryllium	0.70	0.63	11%
Cadmium	1.3	1.4	7%
Calcium	71600	64400	11%
Chromium	10.4	11.4	9%
Cobalt	5.6	5.6	0%
Copper	12.5	12.5	0%
Iron	19000	18700	2%
Lead	19.2	18.7	3%
Magnesium	28400	32800	14%
Manganese	323	408	23%
Mercury	0.05	ND	++
Nickel	12.9	13.2	2%
Potassium	1650	1570	5%
Selenium	ND	ND	++
Silver	ND	ND	++
Sodium	116	102	13%
Thallium	ND	0.73	++
Vanadium	10.7	11.8	10%
Zinc	53.1	51.3	3%
Cyanide	ND	ND	++

* Relative Percent Difference (Calculated Precision)

ND Not Detected

++ Unable to be calculated due to non-detected results

TABLE 3

FIELD DUPLICATE SAMPLE ANALYSIS

PRECISION FOR INORGANICS

Kollmorgen Macbeth Project

Results in mg/Kg (ppm)

Parameter	Backfill	BLDDUP	RPD*
Aluminum	15900	16200	2%
Antimony	1.7	1.5	13%
Arsenic	6.0	5.4	11%
Barium	242	88.0	93%
Beryllium	0.56	0.50	11%
Cadmium	0.05	0.40	156%
Calcium	3240	2340	32%
Chromium	47.1	44.8	5%
Cobalt	13.4	10.8	21%
Copper	140	60.3	80%
Iron	43900	32300	30%
Lead	181	48.4	116%
Magnesium	4360	4600	5%
Manganese	703	645	9%
Mercury	0.47	0.18	89%
Nickel	23.6	22.7	4%
Potassium	2800	2750	2%
Selenium	2.6	1.7	42%
Silver	0.71	ND	++
Sodium	213	206	3%
Thallium	ND	ND	++
Vanadium	24.9	24.5	2%
Zinc	239	183	27%

* Relative Percent Difference (Calculated Precision)

ND Not Detected

++ Unable to be calculated due to non-detected results

TABLE 4

FIELD DUPLICATE SAMPLE ANALYSIS

PRECISION FOR INORGANICS

Kollmorgen Macbeth Project

Results in mg/Kg (ppm)

Parameter	NW	BLINDD	RPD*
Aluminum	12600	11500	9%
Antimony	ND	ND	++
Arsenic	5.1	4.1	22%
Barium	71.8	91.7	24%
Beryllium	0.52	0.43	19%
Cadmium	0.29	0.30	6%
Calcium	1860	4170	77%
Chromium	17.5	17.6	1%
Cobalt	9.6	8.6	11%
Copper	17.1	16.2	5%
Iron	22800	19200	17%
Lead	16.4	15.7	4%
Magnesium	3270	3410	4%
Manganese	651	581	11%
Mercury	ND	ND	++
Nickel	17.1	16.3	5%
Potassium	507	461	10%
Selenium	ND	ND	++
Silver	ND	ND	++
Sodium	73.2	77.1	5%
Thallium	ND	ND	++
Vanadium	17.9	16.0	11%
Zinc	70.4	74.2	5%

* Relative Percent Difference (Calculated Precision)

ND Not Detected

++ Unable to be calculated due to non-detected results

CW CHEMWORLD ENVIRONMENTAL, INC.
Environmental Consultants

August 30, 1995

Mr. Kenneth J. Cottrell, C.P.G.
Project Manager
H2M Group
999 Riverview Drive
Totowa, New Jersey 07512

RE: **Letter Report**
Technical Data Review For Kollmorgen Macbeth Project
H2M Labs, Inc.
SDG Nos. KLM001 and KLM002
Analyses for Total Organic Carbon (TOC)

Dear Mr. Cottrell:

A technical data review was performed by ChemWorld Environmental, Inc. for the Kollmorgen Macbeth RI Project for Total Organic Carbon (TOC) soil results from the sampling events of September and November 1994. The attached Analytical Data Summary Table includes the TOC results for the sampling events. H2M Labs, Inc. provided a New York State Department of Environmental Conservation (NYSDEC) Analytical Service Protocols (ASP) Catagory 'B' deliverable package for the TOC data generated.

The technical data review was performed utilizing standard United States Environmental Protection Agency (USEPA) Quality Control guidelines for general chemistry parameters; and New York State Department of Environmental Conservation (NYSDEC) requirements, where applicable and relevant. All quality control data as presented in both SDG's was found to be acceptable and qualification of the TOC data was not required.

The technical review items and criteria included the following, as method appropriate:

* Holding Times for TOC (26 days from Verified Time of Sample Receipt)
* Calibration (Correlation Coefficient > 0.995)
* Matrix Spike Sample Recovery (Limit 75-125%)
* Laboratory Duplicate Samples (Soils Limit 35% RPD)
* Method and Field Blanks (Contamination should not be detected)
* Laboratory Control Samples (Limit 80-120% for recovery)
* Field Duplicates (Soils Limit 35% RPD)
* Sample Result Verification (Verify in Raw Data)

Samples SB11 0-2 and Blind Dupe were collected as the field duplicate samples and analyzed for TOC. The calculated relative percent difference (RPD) for the soils is 49%. This RPD is generated slightly high. However, non-homogeneity of the soil matrix may contribute to poor precision.

14 Orchard Way North, Rockville, Maryland 20854, Tel. (301) 294-6144, Fax (301) 309-6640

Please contact me by telephone at 301-294-6144, should you require additional information or clarification regarding this Letter Report.

Sincerely,

Andrea P. Schuessler

Andrea P. Schuessler, CHMM

c: HM-9501 file

Attachment

KOLLMORGEN MACBETH PROJECT

TOTAL ORGANIC CARBON/SOIL - DATA SUMMARY

SDG No. KLM001 **All results reported in mg/Kg**

Sample ID	Total Organic Carbon	Q
SB-1 0-2	33600	
SB-3 4-6	1520	
SB-4 4-6	839	
SB-5 2-4	17900	
SB-6 4-6	454	
SB-11 0-2	117000	
BLIND DUPE	71000	
FIELD BLANK (mg/L)	< 1.0	

SDG No. KLM002 **All results reported in mg/Kg**

Sample ID	Total Organic Carbon	Q
CENTER WALL	32500	
PIT 1 FSA	4220	