BUILDING W-209 RFI SUMMARY REPORT
XEROX CORPORATION
JOSEPH C. WILSON CENTER FOR TECHNOLOGY
WEBSTER, NEW YORK

by

Haley & Aldrich of New York
Rochester, New York

for

Xerox Corporation
Webster, New York

File No. 70096-057
October 1996

HALEY & ALDRICH

UNDERGROUND
ENGINEERING &
ENVIRONMENTAL
SOLUTIONS

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4 October 1996
File No. 70096-057

Xerox Corporation
800 Phillips Road 304-13S
Rochester, New York 14580

Attention: Eliott N. Duffney
Program Manager

Subject: Building W-209 RCRA Facility Investigation Summary Report
Joseph C. Wilson Center for Technology
Webster, New York

Dear Mr. Duffney:

In accordance with your request, Haley & Aldrich of New York is pleased to submit this Summary Report for the Xerox Building W-209 Investigative Site in Webster, New York. This report was prepared to address the Module III Corrective Action Requirements for Solid Waste Management Units (Xerox Part 373 Permit) to provide a concise summary of the findings of environmental investigations at the site.

The attached document summarizes the more detailed "RCRA Facility Investigation Final Report" dated 4 October 1993, and incorporates NYSDEC comments on the Final Report dated 12 October 1994 and 12 February 1996. As requested by NYSDEC, this report is intended to provide a less technical overview of site conditions, explaining the significance of the investigation findings and the remediation measures to date.

Thank you for selecting Haley & Aldrich to provide services to Xerox. If you have any questions or comments regarding this submittal please do not hesitate to call us.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

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INTRODUCTION

The Xerox W-209 Investigative Site is located in Webster, New York as shown on Figure 1 (Site Locus). Environmental investigations have been conducted at the site over the time period from 1985 to 1993. These investigations were conducted by various consulting engineering firms, and the major findings and technical details were compiled in the RCRA Facility Investigation (RFI) Final Report dated October 1993. Interim remediation of the site by Xerox 2-PHASE Extraction™ technology began in 1990, and has been implemented continuously since 1992.

The more detailed RFI Final Report (Haley and Aldrich, 1993) has been reviewed and accepted by the New York State Department of Conservation (NYSDEC). NYSDEC made two rounds of comments on the Final Report, and Xerox prepared responses to those comments which were accepted and appended to the RFI Final Report. Those documents, together with this Summary Report, satisfactorily address the site investigation requirements of the Module III Corrective Action Requirements for Solid Waste Management Units (Xerox Part 373 Permit), and the Resource Conservation and Recovery Act (RCRA). The present RFI Summary Report has been prepared to meet the requirements of the Xerox Part 373 Permit for a concise, non-technical Summary Report.

Beyond pursuing a complete site investigation, Xerox has implemented Interim Corrective Measures consisting of the design and installation of a 2-PHASE Extraction™ system and 26 associated extraction wells. Operation of the 2-PHASE Extraction™ system to date has reduced the levels of organic compounds in the soils and groundwater to less than approximately 10% of initial levels. Furthermore, the extraction system provides hydraulic capture of groundwater in the target area, limiting the spread or migration of VOCs. Continued operation of the extraction system is planned to attain site closure under the Xerox Part 373 Permit requirements.

Purpose and Scope of Summary Report

The goal of this RFI Summary Report is to summarize significant findings from the RFI Final Report relative to the nature, extent, and rate of migration of hazardous wastes or constituents in soils, groundwater, surface water, subsurface gas and/or air. As a result of these multimedia analyses, the types of contaminants present, the boundaries of the site-related contamination, and the rate of contaminant movement were assessed. In keeping with the requirements of a summary report, this report expresses the investigation results in non-technical terms wherever possible. The Summary Report is intended to convey the ranges of contaminants initially discovered, where the contaminants were found, the significance of the contamination, and the subsequent reductions of contaminant levels in response to interim corrective measures. Based on the RFI findings, corrective measures are being and implemented by Xerox to remediate the site, and the progress of the remediation is briefly described.

This report summarizes three key documents which have been reviewed and accepted by NYSDEC. The key documents are as follows:

- "RCRA Facility Investigation Final Report, Building 209 Investigative Site, Xerox Corporation, Joseph C. Wilson Center for Technology, Webster, New York", by Haley and Aldrich of New York, dated 4 October 1993.

- "Response to NYSDEC Comments of 12 October, 1994: RCRA Facility Investigation Final Report, Building 209 Investigative Site, Xerox Corporation, Webster, New York", submitted 2 December 1994.

- "Response to NYSDEC Draft Comments of 12 February, 1996: RCRA Facility Final Investigation Report, Building 209 Investigative Site, Xerox Corporation, Webster, New York", submitted 20 March 1996.

Other documents pertaining to the various stages of the site remedial investigation and feasibility study are listed in the references section at the end of this report.

OVERVIEW: BUILDING W-209 INVESTIGATIVE SITE

Site History and Use

The Xerox Joseph C. Wilson Center for Technology is located on Phillips Road in the town of Webster, New York (Figure 1). The Facility is bounded on the north by Schlegel Road, east by Salt Road, south by Conrail Railroad tracks which are adjacent to U.S. Route 104, and west by Phillips Road. The Webster Facility is identified by the NYSDEC RCRA Program as a storage facility and as a result holds RCRA Permit No. NYD00221 1324.

Building W-209 was constructed in 1977 and 1978. Since 1978, the northeast portion of the building has been used for copier refurbishing.

The refurbishing operations used solvent blends for cleaning copiers and parts. The solvent blends were supplied by Inland McKesson Chemical Company, and were "tolled" (redistilled and recycled) to and from the site by Inland during the period from 1978 to 1989. Solvents were stored in two 8,000-gallon above ground storage tanks (SWMU #57) and transported into the building by an underground piping distribution system. Xerox records indicate that solvent blend AP-67, which contained the following mixture of volatile organic compounds (VOCs), was used from 1978 to January 1980:

AP-67:

Aliphatic hydrocarbons (Mineral Spirits)	50%
1,1,1-Trichlorethane	20%
Trichloroethene	15%
Tetrachloroethene	10%
Methylene chloride	5%

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From 1980 to July 1989, solvent blend AP-67-A was used:

AP-67-A:

Aliphatic hydrocarbons (Mineral Spirits)	66.5%
1,1,1-Trichloroethane	20.0%
Methylene chloride	13.5%

Solvent inventory was removed from the bulk tanks at Building W-209 on 20 July 1989. Tank closure and removal was completed under a NYSDEC-approved plan in June 1990. Small-quantity, drum solvent use for spot-cleaning copier parts stopped in 1992.

VOCs were first detected in routine storm sewer samples collected from a drainage ditch near the building in December 1984. There was a reported overflow of the solvent dike area in the late 1970's. VOCs were later found in the site soils during removal of the underground solvent pipelines in February 1986. Xerox began well drilling and groundwater investigations at the site in April 1986.

Description of SWMUs

As part of the RCRA Facility Assessment conducted in 1987, Xerox identified three Solid Waste Management Units (termed SWMUs) at the northeast corner of Building W-209. These SWMUs were related to areas where solvents were either stored and/or used at the site (see Figure 2, SWMU Map). Based on the RCRA Facility Assessment Report dated February 1988, NYSDEC classified one of the SWMUs , Building 209 Turco Carb Tank, as needing no further action. The other two SWMUs, Building 209 AP67A Recirculation Tanks, and Building 209 AP67A Storage Tanks, were identified as requiring further investigation (Xerox Part 373 Permit, Sections E.1 and E.2).

The locations of these three SWMUs are shown in Figure 2. The SWMUs can be described as follows:

> SWMU # 54, Building W-209 Turco Carb Tank, pertained to the location of a former above-ground 5,000-gallon storage tank for petroleum-based solvent cleaning solution. As previously mentioned, this SWMU has met requirements for closure and has been determined by NYSDEC to require no further action.
>
> SWMU # 55, Building W-209 AP67A Recirculation Tank, is the location of former above-ground tanks from where solvent blends were pumped to clean-wash booths inside the building.
>
> SWMU # 57, Building W-209 AP67A Storage Tank, pertains to the location of two former above-ground 8,000-gallon storage tanks used for storing virgin and used solvent. One tank received virgin solvent deliveries, and the other stored used solvent for tolling by Inland.

Underground pipelines conveyed solvent blend from the AP67A storage tanks to the recirculation tanks; from there, solvent was pumped to clean-wash operations inside the plant.

Compounds of Concern

Various organic compounds and the trace metal arsenic were identified in samples collected from the site during the course of the environmental investigations. The samples consisted of soils, stream sediments, surface water, groundwater, and soil gas. The compounds and respective ranges of concentrations detected in soil and groundwater are summarized in Tables 1 and 2, respectively. The compounds detected, and applicable abbreviations, are listed below:

- arsenic
- benzene
- chloroform
- 1,1- dichloroethane (1,1-DCA)
- 1,1-dichloroethene (1,1-DCE)
- 1,2-dichloroethene (1,2-DCE)
- ethyl benzene
- methylene chloride
- mineral spirits (aliphatic hydrocarbon mixture)
- tetrachloroethene (PCE)
- toluene
- 1,1,1-trichloroethane (1,1,1-TCA)
- trichloroethene (TCE)
- vinyl chloride (VC)
- xylenes

With the exception of arsenic, a trace metal, the above compounds are classified as VOCs. These VOCs are commonly used as solvents for cleaning and other industrial purposes.

Several of these constituents were identified in initial storm sewer sampling conducted in December 1984. Later, extensive investigations confirmed the presence, and defined the lateral and vertical extent of the above compounds in the site soil and groundwater. Results of the investigations are discussed in the following sections.

SUMMARY OF INVESTIGATIONS

The chronology of site investigations at Building W-209 can be listed as follows, including the Xerox contractors who performed the work:

- 1984-1989: Surface water and stream sediment sampling & analysis from storm sewer system (Woodward Clyde Consultants; General Testing Corporation)
- 1986: Soil and groundwater sampling/analysis from pipe-trench excavations (General Testing Corporation)
- 1986-1987: Phase I Hydrogeologic Investigations (Woodward Clyde Consultants)

- 1986 - Present: Quarterly groundwater sampling and analysis (General Testing Corporation, now a division of Columbia Analytical Services)
- 1987 Petrex indicator survey (Northeast Research Institute, Inc.)
- 1987-1988: Phase II hydrogeology investigations, pumping tests and numerical modeling (Woodward Clyde Consultants)
- 1988: Site Remediation Feasibility Study (Woodward Clyde Consultants)
- 1990: Vacuum extraction pilot-testing at SWMU #55 (Dames and Moore, Inc.)
- 1990: Intermediate Bedrock-Zone Hydrogeologic Investigations (Haley & Aldrich of New York)
- 1990-Present: 2-PHASE Extraction™ pilot testing , followed by design & installation of current remediation system (Haley & Aldrich of New York)

Throughout the course of the above work, a total of 44 monitoring wells, 34 soil test borings, and 18 extraction wells have been drilled. Eight monitoring wells were later converted to extraction wells. Approximately 122 surface water samples, 97 stream sediment samples, 106 subsurface soil samples, and some 900 groundwater samples have been collected and analyzed. Data from these samples has served to fully characterize the site subsurface conditions and the extent of VOCs. Continued sampling since 1992 has served to quantify the progress of soil and groundwater remediation to date.

HYDROGEOLOGIC SETTING

Regional Geology

The Xerox Webster Facility is within the low-lying Ontario Plain section of the Erie-Ontario Lowlands physiographic province. The area is mostly covered by a mantle of Quaternary age glacial and post-glacial soil deposits overlying approximately 1100 feet of Paleozoic sedimentary rocks deposited on the Precambrian crystalline basement. The region has experienced periods of glaciation and most of the glacial deposits were lain down during the most recent glacial phase which ended about 10,000 years ago (late-Wisconsin time). The glacial deposits typically consist of silt and clay sediments laid down in lakes bordering the glacier (lacustrine deposits), sand and silt outwash deposits (glaciofluvial deposits), and gravelly silt deposits formed beneath the glacier (glacial till deposits). The mantle of soil deposits varies in thickness, and averages about 10 to 12 ft. across the site.

Bedrock underlying the site consists of Lower Silurian age sedimentary rocks. The uppermost rock formation is the Reynales Limestone, which is in turn underlain by the Kodak, Cambria, Thorold, and Grimsby Sandstones. These rocks can be collectively described as thin-bedded limestone, underlain by interbedded sandstone and shale. The deepest rock formation encountered at the site is the Upper Ordovician age Queenston Shale. Regional tectonic uplift has caused the rock strata to dip gently southward at a gradient of approximately 50 feet/mile (about 2-degrees of dip).

Overburden Soil Deposits

Soil deposits identified at the Building W-209 Investigative Site are briefly described in Table 3. In general, the soils consist of fine-grained sand deposited from former pro-glacial lakes and streams, overlying more dense gravelly sand deposits deposited beneath the glacier ice. Some areas of man-placed fill deposits consisting mostly of brown fine sand were also identified above the native soils, and appear to date from building construction. The total thickness of soil deposits encountered at the Building W-209 site varies from about 2 to 20 feet, with an average thickness under the building of about 10 ft. At some exploration locations, certain units are locally absent.

Bedrock

The local bedrock strata beneath Building W-209 consist of approximately 2 to 8 ft. of thin-bedded limestone, underlain by approximately 50 ft. of thin-bedded sandstone and shale. The lower most Queenston Shale formation is approximately 1000-ft. thick and forms the "floor" of the bedrock assemblage. In the Webster area, the Queenston is relatively impermeable.

The top-of-bedrock has been eroded back by glacier action and the erosional surface slopes gradually toward the northwest in the direction of Lake Ontario. Due to the regional dip of the bedrock strata, the erosion has exposed progressively older rocks towards the north. In places, the top-of-bedrock surface is highly weathered. The bedrock formations encountered at the W-209 Investigative Site are described in Table 4, Local Stratigraphic Profile, and a cross-section of the rock strata beneath the site is shown in Figure 3, Geologic Profile.

Bedrock at the site exhibits structural features which include bedding-plane partings and a steep, planar regional joint set. These joints and bedding-plane partings impart a secondary permeability to the bedrock and are the primary routes of groundwater flow through the rock. The predominant regional joint set appears to be oriented towards the north-northwest, and likely influences the local groundwater flow. Beneath the northeast end of Building W-209, an apparent bedrock fracture has been inferred from drilling logs, ground water drawdown patterns, and permeability data. The inferred fracture appears to trend north-northwest between Wells MW-18 and MW-18I. Evidence for the fracturing includes about 2 ft. of vertical offset observed in a distinctive conglomerate marker-bed, high hydraulic conductivity (permeability) at Well MW-18I, and up to 11 ft. of drawdown observed at Well MW-18I during startup of intermediate-bedrock 2-PHASE Extraction™ wells inside the building. The drawdown response is illustrated in Figure 4, Hydrograph of Well MW-18I. The drawdown observed at this well indicates hydraulic connection to the extraction wells, probably through a common bedrock fracture.

Regional Hydrogeology

Lake Ontario forms the base level for the regional groundwater system. Regional groundwater flow is generally towards the north-northwest in the Webster, New York area. Groundwater in the region flows through both the overburden soil deposits and the bedrock. Much of the precipitation over the area is conveyed to streams, rather than into the deep groundwater systems, due to runoff or baseflow. Some precipitation is transported to the water table through the glacially-derived soils. Due to the fine-grained nature of the soils, infiltration through the soils is to slow to moderate over most of the region. Hydraulic conductivity (permeability) of the soils is generally low, resulting in slow shallow groundwater movement. Somewhat higher permeability and groundwater flow rates may occur locally in glacial deposits that have been reworked by wave action or fluvial transport. Soil variability and lower-permeability soil layers may lead to localized areas of perched shallow groundwater or semi-confined groundwater conditions in the underlying bedrock.

Groundwater flow in the bedrock below the glacially-derived soils is largely controlled by fractures. The upper portion of the bedrock, due to weathering and the action of glacial ice, typically has more interconnected fractures and more groundwater flow than the deeper bedrock.

Site-Specific Hydrogeology

Groundwater in the overburden soils, and typically that in the uppermost bedrock, occurs under unconfined/non-artesian conditions, with water table elevations near the ground surface. Groundwater in the bedrock, beneath the upper weathered zone, typically occurs in multiple, semi-confined flow zones, with water levels substantially below the water table, and decreasing in elevation with depth. Overall, natural groundwater flow, when unaffected by remediation activities or man-made structures, is to the north-northwest, with some variation due to spatial variation in the formation permeability. Permanent subsurface features such as utilities and/or conduits may locally affect groundwater flow. Interim remedial activities, such as 2-PHASE Extraction™ at W-209, and groundwater pumping from blasted-bedrock trenches at other locations on the Xerox property, also influence the local groundwater flow directions.

At the Building W-209 site, groundwater flow zones were defined based on the findings of the hydrogeologic investigations, and correspond to the following depth-zones:

Flow Zone	Depth Range
Overburden/Shallow Bedrock	Water table to 7-ft. below top-of-rock
Intermediate-Bedrock zone	10 to 25-ft. below top-of-rock
Deep-Bedrock zone	25 to 30 ft. below top-of-rock

As previously mentioned, depth to bedrock (soil thickness) averages about 10 ft. across the site, so the deep-bedrock zone corresponds to a total depth of about 35 to 40 ft. or more below ground surface.

The water levels in all zones fluctuate by approximately two to four feet seasonally, with the greatest fluctuations observed in the shallow- and intermediate-bedrock zones. Seasonal fluctuations and water levels observed in the overburden and shallow-bedrock wells are similar, indicating that these layers are hydraulically connected. Water levels observed in the intermediate- and deep-bedrock wells show more subdued seasonal fluctuation patterns, and lower elevations relative to ground surface. These data indicate that groundwater recharge to the intermediate- and deep-bedrock zones is restricted. Downward groundwater flow into these zones is interpreted to be controlled by spatial variations in bedrock joints and fractures and appears to diminish with increasing depth. Permeability testing data for the deep-bedrock zone wells indicates very low hydraulic conductivity. Therefore, this zone can be described as hydraulically "tight" and appears to receive minimal groundwater recharge.

Prior to remedial extraction activities, groundwater flowed toward the north-northwest at velocities that can be estimated using a form of Darcy's Law. For example, using the geometric average for shallow-bedrock hydraulic conductivity at the site of 7.3×10^{-4} cm/s, a measured hydraulic gradient on the order of 0.0045 to 0.0066 feet/foot, and an assumed effective porosity of 5%, groundwater in the overburden/shallow-bedrock zone likely traveled on the order of 70 to 100 feet per year towards the north-northwest. Lower flow rates were estimated for the intermediate- and deep-bedrock zones.

Under the current Interim Corrective Measures, groundwater flow conditions have been changed because of drawdown and hydraulic capture by the 2-PHASE Extraction™ well network. Groundwater measurements under the current interim remediation program show dewatering of overburden wells near the target area, and local groundwater capture across the shallow- and intermediate-bedrock zones.

The groundwater drawdown is illustrated by the groundwater contours shown in Figures 5 and 6, Groundwater Contour Plans. These figures show groundwater in the shallow- and intermediate-bedrock zones now flows radially toward the target area, and is hydraulically captured by the 2-PHASE Extraction™ system. The hydraulic capture occurs in response to fluid movement toward areas of high vacuum induced at the 2-PHASE Extraction™ wells.

SUMMARY OF INVESTIGATIVE FINDINGS

Xerox first discovered VOCs at the W-209 site during routine storm-sewer sampling in December 1984. Surface water samples periodically obtained from the drainage ditch adjacent to the east side of Building W-209 were found to contain 0.008 to1.021 parts-per-million (mg/L) total dissolved VOCs. Later sediment samples from the drainage ditch ranged from non-detect results to 8.142 ppm (ug/kg) total VOCs. The levels in the sediments were higher due to the affinity of organic solvent molecules to cling or "adsorb" onto soil particles. Surface water samples collected further downstream of Building W-209 contained the lowest levels of dissolved VOCs, which is primarily attributed to VOC evaporation to the atmosphere. VOCs detected in the storm sewer samples included methylene chloride, 1,1,1-TCA, 1,2-DCE, TCE and PCE. Although arsenic was found in the surface water and sediment samples, it was found at levels consistent with apparent site background concentrations.

Xerox removed the underground solvent pipelines serving Building W-209 in1986 as part of a tank upgrade program. The two existing above-ground 8,000-gallon solvent storage tanks were removed and replaced with tanks of carbon-steel, lined with baked phenolic coating, and new solvent pipelines were installed above-ground. The general area of excavations was between the solvent reclaim area located adjacent to the east wall of Building W-209 (SWMU # 55, Figure 2) and the solvent storage tanks located approximately 100 ft. further east

(SWMU # 57, Figure 2). During excavation and removal of the underground solvent pipelines, a solvent odor from some areas of the soils was noted. Soil and water samples were collected and submitted for laboratory analysis which detected the following VOCs:

• 1,1,1-Trichloroethane	1,390 mg/kg (ppm)
• Tetrachlorethene	1,660 mg/kg
• Trichlorethene	501 mg/kg

Realizing the significance of this data, Xerox notified the National Response Center and the New York State Department of Environmental Conservation on February 6, 1986. Xerox then removed an estimated 12 cubic yards of soil surrounding the pipelines and began additional investigative activities to further identify and characterize the extent of the release.

Starting in April of 1986 and extending into 1987, Woodward Clyde Consultants conducted a Phase I Hydrogeologic Investigation (1987). These investigations included drilling nine soil test borings and installing 30 groundwater monitoring wells. The well locations are shown on Figure 7, Well Location Plan. Compounds detected in the soil and groundwater samples from these and later studies are briefly summarized in Tables 1 (soils) and 2 (groundwater). The drilling explorations were conducted both inside and outside of the building, and encountered soils with total VOC concentrations ranging from 0.007 to 3,307.8 ppm (mg/kg), and groundwater VOC concentrations of non-detect to 1,042.2 ppm (mg/L). The highest VOC concentrations were found at locations near SWMU #55.

Soil-gas surveys of the Building W-209 area were conducted in 1987 by the Petrex Division of Northeast Research Institute. The purpose of the surveys was to assess the lateral size and shape of the VOC plume by testing for VOC vapors in the shallow soils. The Petrex surveys detected DCE, 1,1,1-TCA, TCE, PCE, and hydrocarbon compounds in shallow soil-gas plumes which appeared to extend outside and underneath the northeast end of the building.

Additional studies by Woodward Clyde in 1987 included drilling additional test wells, making water-level measurements and conducting pumping tests to assess hydraulic conductivity, aquifer properties, and groundwater flow at the site. These studies were compiled into an aquifer testing report published in April 1988 which evaluated the feasibility of conventional groundwater pumping as a remedial option. Based on the data, conventional groundwater pumping did not appear to be a viable option for attaining site remediation.

In 1990, Haley & Aldrich conducted an investigation of the intermediate-bedrock aquifer (intermediate-bedrock zone). Four intermediate-bedrock-zone monitoring wells were installed and, together with wells previously-installed by others, were used to define groundwater conditions of the intermediate-bedrock zone. Groundwater flow rates in the intermediate - bedrock zone were calculated to be approximately 2.5 to 32 feet per year towards the north-northwest, except in the region near Wells 209-MW18I, R-103, and SR-94 where higher permeabilities occur and correspondingly higher flow rates of 190 ft/year, or more, were calculated. In addition to the well installations, soil and water samples were collected for lab analysis, water-levels were monitored, and rising-head tests were conducted on the wells to determine permeabilities.

From 1986 to the present, Xerox has conducted quarterly groundwater sampling and analysis at the Investigative Site. The groundwater sampling and analysis has been performed by General Testing Laboratories of Rochester, New York (General Testing recently merged with another company and is now a division of Columbia Analytical Services). The groundwater samples have been routinely analyzed for VOCs by EPA Methods 8010/8020. Analytical results for total VOCs detected in the wells over time are summarized in Table 5. The total VOC concentrations at most of the wells have shown a marked decline since 1992 when Xerox began site remediation measures. VOC concentrations from the 4th Quarter 1995 groundwater sampling event are shown on Figure 8.

MIGRATION PATHWAYS/POTENTIAL IMPACTS

Possible pathways by which volatile organic compounds in concept could, in the absence of effective remedial measures, migrate away from source areas at the site are:

- groundwater transport
- surface-water transport
- vapor diffusion into buildings.

However, 2-PHASE Extraction™ applies deep vacuum suction to the subsurface, removing the contaminants along with groundwater and soil-gas. Application of 2-PHASE Extraction™ causes the groundwater to flow toward, rather than away from contaminant source areas, and thereby limits the potential migration. By lowering the water table, 2-PHASE Extraction™ minimizes groundwater flow to surface water bodies, and it extracts subsurface vapors to remove contaminants adsorbed onto soils.

Vertical and Horizontal Extent of Impact

VOCs in the overburden soils were formerly present at their highest concentrations in an area close to SWMU #55 and beneath the former clean-wash area inside the building. A cross-section of the inferred distribution of VOCs in the SWMU #55 soils prior to beginning the ICM is presented in Figure 9.

VOC concentrations in the groundwater were historically highest in the overburden and shallow-bedrock monitoring wells, and diminished with depth in the intermediate- and deep-bedrock zones. The VOC results from groundwater monitoring wells are shown in the posting maps included as Figures 10, 11, 12, and 13 which are based on 1992 groundwater samples from the respective monitoring zones concurrent with the beginning of the ICM.

Apparent limits of the VOC plume in the overburden and shallow-bedrock are defined by low parts-per-billion results at down gradient monitoring well clusters MW-7 and MW-5 , and up gradient cluster MW-1. The original impact to overburden soil and shallow groundwater was thus limited in its areal extent. Moreover, 2-PHASE Extraction™ has since dewatered soils in the vicinity of SWMUs #55 and #57 allowing increased VOC removal from the soils in the vapor phase.

Dissolved VOCs have been detected at well MW-18I, indicating VOC migration in the intermediate-bedrock zone towards the north-northwest, away from the source areas (Figure 12). A total VOC concentration of approximately 12 ppm (mg/L) was detected in groundwater sampled from Well MW-18I, located about 250 feet northwest of SWMU #55, during the 4th quarter 1992 sampling round (Table 5). Since the implementation of 2-PHASE Extraction™, VOC concentrations in this well have diminished to approximately 0.2 ppm (mg/L). During the same sampling round, VOC concentrations of approximately 1.6 ppm (mg/L) were detected in Well R-103, located about 430 feet to the northwest. These VOC concentrations have similarly declined since the implementation of 2-PHASE Extraction™ to current levels of approximately 0.2 ppm (mg/L). The VOC concentrations found in these wells were interpreted to be related to groundwater migration in the previously-discussed bedrock fracture. However, VOCs detected at Wells R-103 and R-94 may have originated from the Salt Road Complex Investigative Site where similar VOCs have been found.

INTERIM REMEDIATION

Xerox has conducted intensive field investigations at this site in order to assess vertical and horizontal extent of the compounds of concern. Following NYSDEC comments on the investigations performed at the site, Xerox's response with respect to defining the horizontal and vertical extent of VOCs is considered acceptable to the NYSDEC. The next phase of the Xerox Part 373 Permit requires a Corrective Measures Study (CMS) to determine how best to pursue site remediation. NYSDEC has allowed Xerox to pursue a site-wide Corrective Measures Study which collectively addresses the W-209 Investigative Area and other Investigative Areas at the Webster Facility. A Work Plan for the Site-Wide CMS has been submitted for NYSDEC review.

Xerox has proactively implemented 2-PHASE Extraction™ as an Interim Corrective Measure (ICM) for the W-209 Investigative Site, pending NYSDEC approval of the technology as an acceptable Corrective Measure. In 1990, Dames and Moore attempted a preliminary 2-PHASE Extraction™ test at the Investigative Site near SWMU #55. A test well was destroyed during the pilot test, and the equipment was unreliable. Despite the initial difficulties, data suggested the technology would have a beneficial impact on the site. The 2-PHASE Extraction™ operations were resumed after redesign of the equipment to be more reliable.

Since 1992, Haley & Aldrich has been working with Xerox to implement 2-Phase Extraction™ as an Interim Corrective Measure (ICM) for the site. The corrective measures included the installation of 17 additional wells and the conversion of 8 existing monitoring wells to address source remediation at the SWMUs by applying Xerox 2-PHASE Extraction™ technology. The 2-PHASE Extraction™ technology has achieved an approximate 90% reduction in VOCs levels in groundwater at the site (Table 5 and Appendix A). Similar order-of-magnitude reductions in VOC concentrations have been found in soil samples from SWMU #55 and beneath accessible portions of the building interior. Due to hydraulic capture by the 2-PHASE Extraction™ system, no contaminant migration away from the source area is expected during ICM activity.

2-PHASE Extraction™ was selected by Xerox as the best available technology to address the site remediation. Reasons for selection of 2-PHASE Extraction™ included accessing the contamination under the building and the need to establish hydraulic control of the VOC plume. 2-PHASE Extraction™ is a Xerox-patented technology that simultaneously removes both groundwater and vapors from the subsurface under high vacuum and treats the extracted groundwater and vapors by carbon filtration. During the extraction process, most of the VOCs are stripped into the vapor-phase, and absorbed by carbon vessels on the vapor effluent. Water removed by the process requires minimal or no polishing treatment before discharge to the sanitary sewer.

Xerox began implementing 2-PHASE Extraction™ as an ICM during 1990, and the system has been operated successfully on a full-scale basis since August 1992. The initial extraction wells were installed across the overburden and shallow-bedrock zones, and the extraction network was augmented by converting selected overburden and shallow-bedrock monitoring wells to extraction wells. The system was further upgraded in January 1993 through a surface membrane installed over part of the site, which has the effect of extending vacuum influence. In November 1993, Xerox expanded the system by installing 10 additional extraction wells inside the building, including five extraction wells screened in the intermediate-bedrock zone. In 1996, Xerox expanded the system again by installing seven more extraction wells. A network of 26 extraction wells screened across various hydrostratigraphic zones is now in place.

Since the onset of 2-PHASE Extraction™ from the intermediate-bedrock zone wells, VOC concentrations in well MW-18I have diminished to approximately 0.2 ppm (Table 5), and groundwater capture across the intermediate-bedrock plume has been established, as indicated in Figure 5. Groundwater capture at Well MW-18I has limited the lateral migration of VOCs from the source area via this potential pathway.

During the time since Xerox began implementing the ICM, quarterly groundwater analytical data (Table 5) have shown marked declines in VOC concentrations for monitoring wells across the plume. Graphs of VOCs versus time for representative monitoring wells are included in Appendix A. Groundwater capture in the intermediate-bedrock zone by 2-PHASE Extraction™ has also improved groundwater quality in the deep-bedrock zone, as indicated by decreased total-VOC concentrations over time in groundwater sampled from Well 209 MW-18D (Appendix A).

Continuous operation of the 2-PHASE Extraction™ system currently removes 130,000 to 160,000 gallons of groundwater per month. Weekly samples are collected from the extraction system and used to calculate VOC mass removed. A total of approximately 24,720 pounds of VOCs has been removed through the end of August 1996.

The 2-PHASE Extraction™ system installed as an ICM appears effective in significantly reducing the concentration levels of VOCs in the site soils and groundwater, and has implemented hydraulic control of the near-surface groundwater flow regime. These favorable trends indicate that continued operation of the extraction™ system can be anticipated to achieve low enough residuals of VOCs to advance risk-based site closure.

REFERENCES

1981	H&A of New York, 1981, Summary of Geologic Conditions, Rochester, New York, for Combined Sewer Overflow Abatement Program (CSOAP) Phase II, H&A of New York, Rochester, New York, 40 pgs.
June 8, 1987	Woodward Clyde Consultants Interim Report Phase I and II Hydrogeologic Investigation Building 209, Webster, New York
June 26, 1987	Northeast Research Institute, Inc. Report on the Findings of the Petrex Soil Gas Survey and Headspace Water Analyses in the Area in and Around Bldg. 209 at the Xerox facility, Webster, New York, 15 pgs., 5 maps.
November 23, 1987	Northeast Research Institute, Inc. Maps of combined Phase I and II Petrex soil gas survey, Xerox Building 209, Webster, New York.
April 14, 1988	Woodward Clyde Consultants Aquifer Testing and Conceptual Groundwater Recovery Systems at Building 209 Webster, New York
June 24, 1988	Woodward Clyde Consultants Site Remediation Feasibility Study Building 209 Webster, New York
December 26, 1989	Woodward Clyde Consultants Addendum to Interim Report Building 209 Webster, New York
June 22, 1990	H&A of New York Building 209 Investigation Intermediate Bedrock Aquifer Report
August 14, 1990	Brett, C.E., Goodman, W.M., and LoDuca, S.T., 1990, Sequences, Cycles, and Basin Dynamics, in the Silurian of the Appalachian Foreland Basin, in: Aigner, T. and Dott, R. (Eds.), Processes and Patterns in Epeiric Basins, Sedimentary Geology, Vol. No. 69, p. 191-244.

June 1991	H&A of New York Facility Reference Document Xerox Corporation Joseph C. Wilson Center for Technology Webster, New York
June 9, 1992	Xerox Corporation/NYSDEC Module III Corrective Action Requirements for Solid Waste Management Units Xerox Part 373 Permit Webster, New York
September 1992	H&A of New York Building 209 Remediation Installation and Testing of Two-Phase Extraction Well VE-23
February 1993	Radian Corporation Xerox Webster Semi-Annual Report July 1 - December 31, 1992 Groundwater Contour Maps and Contaminant Posting Maps
October 1993	Haley and Aldrich of New York RCRA Facility Investigation Final Report, Building 209 Investigative Site, Xerox Corporation, Joseph C. Wilson Center for Technology, Webster, New York
September 1994	H&A of New York Case Study - Xerox Building 209 2-Phase Vacuum Extraction™ System
December 1994	Haley and Aldrich of New York Response to NYSDEC Comments of 12 October, 1994: RCRA Facility Investigation Final Report, Building 209 Investigative Site, Xerox Corporation, Webster, New York
February 1996	Haley and Aldrich of New York Response to NYSDEC Draft Comments of 12 February, 1996: RCRA Facility Investigation Final Report, Building 209 Investigative Site, Xerox Corporation, Webster, New York

U:\DAE\WP6DOC\XEROX\70096-05\RFISUMRP.WPF

TABLE 1
XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

RANGE OF VOCs AND ARSENIC DETECTED IN SOIL (ppm)

COMPOUNDS	RANGE OF CONCENTRATION
Vinyl Chloride	ND-4.74
Methylene Chloride	ND-0.049
1,1-Dichloroethene	ND-6
1,1-Dichloroethane	ND-0.3
1,2-Dichloroethene (Cis & Trans)	ND-0.086
Chloroform	ND-5.8
1,1,1-Trichloroethane	ND-763
Trichloroethene	ND-560
Tetrachloroethene	ND-1,980
Benzene	ND-0.015
Toluene	ND-132
Total Xylene (o,m,p)	ND-0.116
Mineral Spirits	ND-6,280
Total Volatiles	ND-7,275
Arsenic	0.003-61.00; 511*

Notes:

1. Data presented in milligrams per kilogram (mg/kg), equivalent to parts-per-million (ppm).
2. * A single soil sample from a depth of 10 to 12 ft. had an arsenic level of 511 mg/kg. The reported natural arsenic range for the northeastern United States is < 0.1 to 73 mg/kg (Shacklette, H. T. and Boerngen, J. G. 1984, "Element Concentrations in Soils and Other Surficial Materials of Conterminous United States", U.S. Geological Survey Professional Pape 1270, Unites States Government Printing Office, Washington, D.C., 18 p

TABLE 2
XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

RANGE OF VOCs DETECTED IN GROUNDWATER (ppm)

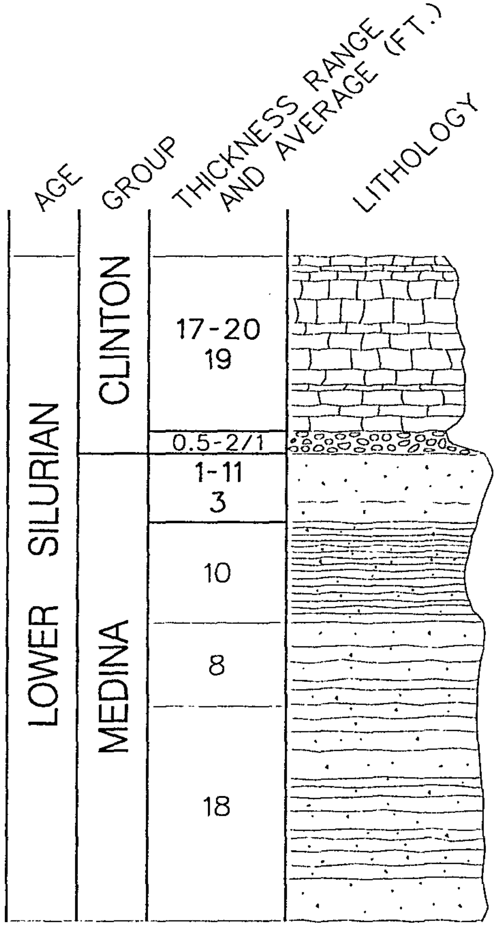
COMPOUNDS	RANGE OF CONCENTRATION
Vinyl Chloride	ND-0.098
Methylene Chloride	ND-740
1,1-Dichloroethene	ND-73.4
1,1-Dichloroethane	ND-40.6
Trans-1,2-Dichloroethene	ND-18.16
Total-1,2-Dichloroethene	ND-12
Chloroform	ND-54
1,2-Dichloroethane	ND-2.4
1,1,1-Trichloroethane	ND-540
Trichloroethene	ND-1,526
Tetrachloroethene	ND-111.8
Benzene	ND-2.6
Toluene	ND-23.8
Ethylbenzene	ND-0.230
Total Xylenes	ND-2.74
Mineral Spirits	ND-5,625
Total Volatiles & Mineral Spirits	ND-5,716

Note:
1. Data presented in milligrams per liter (mg/L), equivalent to parts-per-million (ppm).

TABLE 3
OVERBURDEN STRATIGRAPHY
BUILDING W-209 INVESTIGATIVE SITE

Stratum	Description
FILL DEPOSITS	Medium dense to dense brown fine SAND, with some gravel and construction debris, concrete fragments, reinforcement rods, and decomposing wood material. Includes in some locations black SANDY SILT and SILTY CLAY, and compacted GRAVEL fill. Locally absent in some areas.
LACUSTRINE DEPOSITS	Medium dense to dense laminated gray fine SAND, with silt, and trace coarse to medium sand, trace humic material.
GLACIOFLUVIAL DEPOSITS	Red- to gray-brown SAND, with some silt, varying amounts of gravel, and weak stratification. Possibly stratigraphically equivalent to reworked till in some areas.
REWORKED GLACIAL TILL	Medium dense red-brown coarse to fine SANDY SILT, with gravel, trace clay, cobbles and occaisional boulders. Reworked by wave action. Generally contains a lower percentage of fine-grained sediment than the unaltered glacial till beneath.
GLACIAL TILL	Dense to very dense red-brown gravelly coarse to fine SANDY SILT to SILTY SAND and SILTY or SANDY CLAY, with varying amounts of gravel, cobbles, and boulders.

TABLE 4
LOCAL STRATIGRAPHIC PROFILE
BUILDING W-209 INVESTIGATIVE SITE



FORMATION DESCRIPTION:

REYNALES LIMESTONE - Light to medium gray, medium to fine-grained, thin-bedded, fossiliferous, crystalline LIMESTONE with dark gray, very thin interbedded dolomitic shale. Thin siliceous zones (chert or chalcedony and quartz siltstone) observed. Trace stylolites and secondary gypsum seams at partings.

CONGLOMERATE LAYER - Locally observed in the Webster, New York area, a distinctive gray to red-gray, fine to coarse-grained, thin-bedded limestone CONGLOMERATE containing dark phosphate nodules and weathered hematite seams.

KODAK SANDSTONE - Light gray to green-gray, medium to fine-grained, thick to medium-bedded SANDSTONE. Bioturbated. Historically referred to as the Thorold Sandstone, which is now recognized to be older (see below). A gray-white caliche seam occurs at the basal contact.

CAMBRIA FORMATION - Red-brown, fine-grained, medium to thin-bedded shaly SILTSTONE with gray mottling and bioturbation.[3] This formation has historically been considered the top portion of the Grimsby Sandstone (see below).

THOROLD SANDSTONE - Red-brown, and light gray mottled, fine-grained, medium-bedded SANDSTONE, with bioturbation.[3] Once thought to be equivalent to, or synonymous with, the Kodak Sandstone (see above).

GRIMSBY SANDSTONE - Red-brown, medium to fine-grained, thick to thin-bedded SANDSTONE. Gray and green-gray color mottling. Widely to closely spaced argillaceous partings with occasional gypsum seams. Bioturbated. Basal layer is thick-bedded, fine to coarse-grained conglomerate containing rounded quartz pebbles.

NOTES:

1. Rock descriptions and formation thicknesses obtained from test borings drilled for the Xerox Webster Facility groundwater investigations and the Monroe County Department of Engineering sewer tunnel project.
2. Formation names conform with those proposed by geology staff at University of Rochester and accepted by New York State Geologist.
3. Swirly bedding caused by activity of marine worms.

HALEY & ALDRICH

TABLE 5

XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

SUMMARY OF TOTAL VOLATILE ORGANICS DETECTED IN GROUNDWATER (ppm)

	1986			1987				1988				1989				1990			
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Overburden Zone Wells																			
MW-12S																			
MW-1S																			
MW-2S	635.8	611.62	835.1	608.2	623.6	1832.42	542.88	792.46	584.074	369.8	623.884	835.338	656.9	393.38		682.004			
MW-5S																			
Shallow Bedrock Zone Wells																			
MW-1																			
MW-10	0.0042	0.0041	0.0033	0.37	---	---	---	0.0035	---	---	---	---	---	0.0014		---			
MW-11																			
MW-12																			
MW-13																			
MW-14																			
MW-15																			
MW-16																			
MW-17																			
MW-18			4.048	4.003	0.3645	0.1681	7.49	5.4751	4.5171	1.762	0.7843	0.5947	0.708	3.6546					
MW-19																			
MW-2	151.2	31.857	14.36	2.855	3.38		5.987	15.408	57.594	96.58	3.518	15.824	54.225	19.548		22.97			
MW-20																			
MW-21																			
MW-22																			
MW-23																			
MW-24																			
MW-3																			
MW-4																			
MW-5																			
MW-6																			
MW-7																			
Intermediate Bedrock Zone Wells																			
MW-17I																			
MW-18I			1.9524	2.7433	5.31	1.761	6.995	5.4522	10.008	17.151	9.6166	17.0383	8.5927	7.4313	15.4084	1.3178			
MW-3I																			
R-103												0.6047	0.751			0.5172	1.2148	0.72292	
R-91																			
R-92																			
R-94											0.4912	0.864	1.0028			0.55797	0.7335	0.43077	0.59296
R209-1																			
R209-2																			
R209-3																			
R209-4																			
Deep Bedrock Zone Wells																			
MW-17D																			
MW-18D			0.8754	0.3349	0.297	0.1485	0.3594	0.2153	0.832	1.4259	1.3993	0.5373	1.0383	1.9771	7.047	31.242			
MW-3D																			

Notes:
1. All data expressed in parts per million (ppm) equivalent to micrograms per liter (mg/L).
2. --- indicates well sampled, but volatiles not detected.
3. Blank cell indicates well not yet installed or well not sampled.

TABLE 5

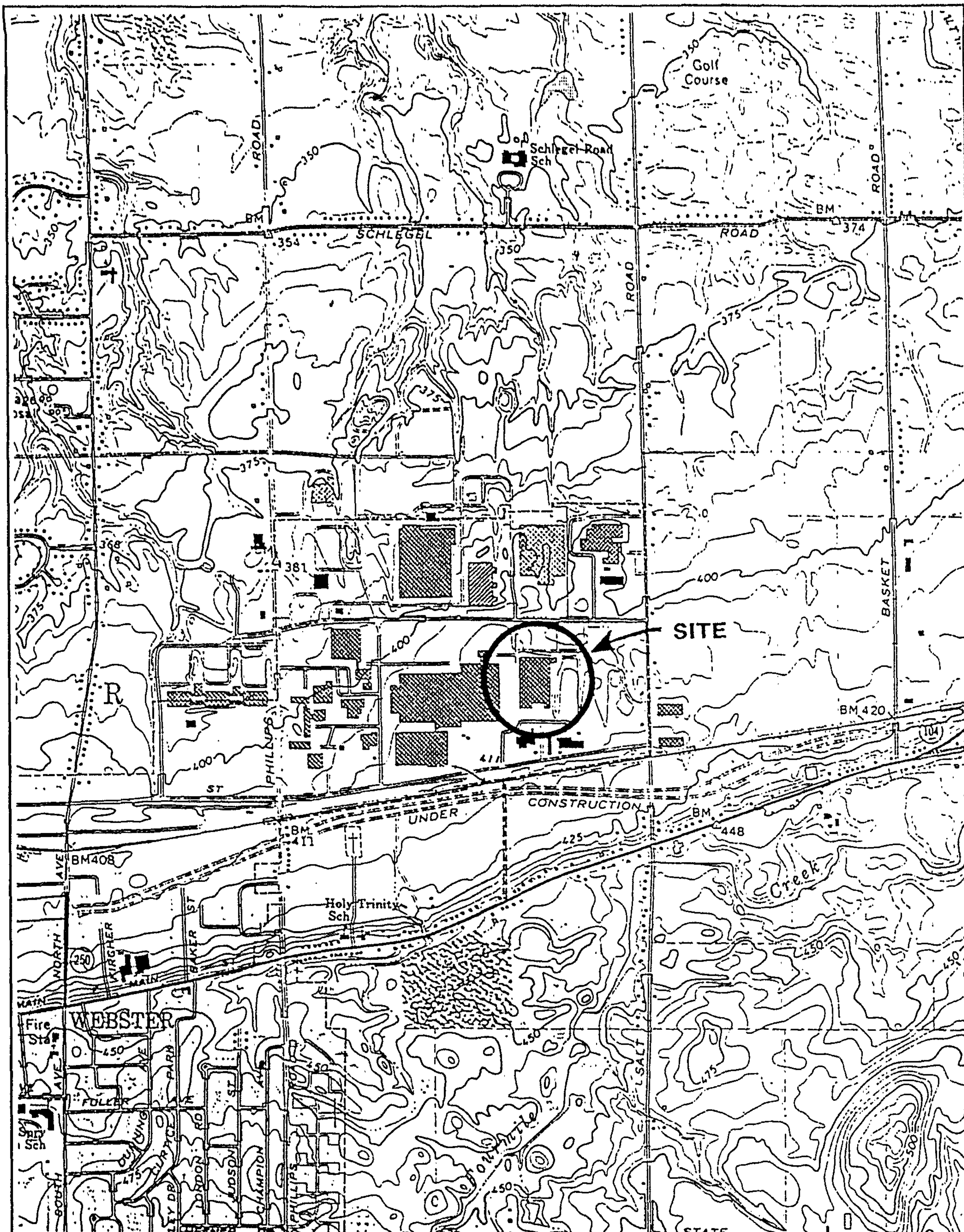
XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

SUMMARY OF TOTAL VOLATILE ORGANICS DETECTED IN GROUNDWATER (ppm)

	1991				1992				1993				1994				1995				1996	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Overburden Zone Wells																						
MW-12S	4.569	91.2	2.991	5.2292	2.305	2.468	5.647	8.159	8.952	25.97			5.224				2.112					
MW-1S	0.03252	0.03684	0.0333	0.03318	0.0217	0.0268	0.0342	1.0095	13.5	50.55	8.048	1.485	19.21		1.364		0.6885				0.302	
MW-2S					232.1	277.37	109.2	98.2	21.33	5.966	1.6429	8.147	8.183				0.4657		0.4764		0.1399	
MW-5S	0.00136	0.00053	0.00013	0.0025	---	---	0.0044	---	---	---	---	---	---	---	---	---			---	---	---	---
Shallow Bedrock Zone Wells																						
MW-1	0.00792	0.00339	0.00076	0.00665	0.0031	0.0011	0.0066	0.0045	0.0224	0.0019	0.0042	---	---		---				---		---	
MW-10	0.0022	---					0.0011				0.028		---	---	0.0011	0.018			---	---	---	---
MW-11	322.335	756.191	540.751	500.065	894	758.6		127.3	42.57	26.4	13.39	12.63	4.412		1.4634		77.0728		0.7308		5.1242	
MW-12		---					---				---			---	---	---			---	---	---	---
MW-13	---	0.00055	0.00175	0.054	0.0012	0.0012	---	0.0026	---	---	---	---							---	---	---	---
MW-14	0.0011	0.00065	---	0.00095	---	---	---	---	---	---	---	---	---	---	---	---	0.0042		---	---	---	---
MW-15	---	0.00087	0.00125	0.0012	---	---	---	---	---	---	---	---	0.0021	---	---	---			---	---	---	---
MW-16		---					0.034							---	---	---			---	---	---	---
MW-17	---	---	---	0.00243	0.0017	---	---	---	0.0026	---	---	---	---	---	---	---			---	---	---	---
MW-18	0.67641	2.29924	1.72818	0.39708	1.826	7.19	0.3523	0.2628	0.2896	0.0782	0.0345	0.011	0.0099		0.0147		0.0043		0.0103		0.0043	
MW-19	0.0011	0.00043	---	0.00317	0.001				---	---	---	---	---		---				---		---	
MW-2	30.8388	26.7524	17.5885	28.764	10.636	28.73	23.33	5.466	14.62	3.69	4.47	3.52	6.47		11.356		2.2972				0.507	
MW-20	---	0.00063					---	---		---	---	---		0.0025	0.0069	---			0.005	---	---	---
MW-21	0.00446	0.01999	0.02159	0.01109	0.0011	0.0261	---	0.002	---	---	0.0012	---	0.0059	0.0035	0.0363	---	0.0046	0.001	0.034	---	---	0.0012
MW-22	---	---	---	0.00594	0.0031	0.0041	---	---	---	---	---	---	---	---	---	---	0.0013		---	---	---	---
MW-23		---					0.1242				0.0487	0.0054	0.0011	0.0952	0.3071	0.0465	0.008	0.1139	0.1407	0.0525	0.0091	0.128
MW-24		---					---				0.0014											
MW-3	1.42267	1.42202	2.4882	20.3119	2.149	3.43	3.397	1.8581	2.586	3.018	1.966	1.923	1.673		2.57		1.135		1.734		1.203	
MW-4	1.67798	3.70167	59.7869	11.0164	2.921	2.442	2.197				0.3202	0.1382	0.4779		0.4441		0.2259		0.7365		0.1362	
MW-5	0.0487	0.02628	0.04493	0.509	0.2815	0.1135	0.0262	0.0303	0.0146	0.0159	0.0293	0.01	0.0023	0.0085	0.0234	0.0159	0.002	0.0094	0.0141	0.015	0.0026	0.0123
MW-6	1.378	1.98498	7.42751	12.3807	2.256	1.9045	8.486	4.494	14.275	3.493	19.445	3.951		4.214	13.861	6.958	1.68	3.235	9.57	13.603	0.978	3.096
MW-7	0.00094	0.00334	0.0038	0.92	0.0051	0.003	0.0019	---	0.0016	0.0016	---	---	0.0021		---						---	
Intermediate Bedrock Zone Wells																						
MW-17I		0.00094					---				---		---	---	---	---		0.0012	---	---	---	---
MW-18I	6.7999	5.9442	2.9101	3.3594	12.509	6.309	4.807	12.3	10.36	10.31	5.129	2.433	1.023		0.2173		0.3297		0.408		0.1969	
MW-3I	0.03015	0.03921	0.05733	0.0134	0.1365	0.3329	0.2621	0.1044	0.0378	0.0478	0.0942	0.0287	0.0045		0.0132		0.0066		0.0175		---	
R-103	0.54731	0.54	0.834	0.77406	0.43	1.286	1.042	1.586	1.241	0.5028	0.985	0.84		0.1415	0.1161	0.0919	0.0771	0.0663	0.185	0.2172	---	0.2158
R-91		0.00036	0.0018																			
R-92		0.00352					---	---		0.0015	---	---	---	---	0.0012	---	0.0012		---	---	---	---
R-94					0.097	0.3417	0.3407	0.3788	0.417	0.3158	0.107	0.1151	0.4455	0.4773	0.306	0.0843	0.0985	0.3208	0.273	0.1767	0.257	0.4646
R209-1	0.5413																					
R209-2	0.00885	0.00734	0.00611	0.02374	0.0057	0.0093	0.0051	0.0066	0.0035	---	0.0013	0.0022	---		0.0013				---		---	
R209-3	0.03712	0.02405	0.02244	0.01882	0.0483	0.0656	0.0424	0.0249	0.044	0.0631	0.0327	0.0842	0.0526	0.0566	0.0673	0.0697	0.033	0.046	0.0783	0.047	0.033	0.0408
R209-4	---	0.0069	0.0044		---	0.0029	---	---	---	---	---	---	0.0027	---	---	---			---	---	---	---
Deep Bedrock Zone Wells																						
MW-17D		0.0003					---				---		---	---	---	---			---	---	---	---
MW-18D	1.7969	1.00651	1.06094	3.3646	1.428	1.713	2.892	3.69	3.098	1.086	2.145	3.864	3.434		1		1.731		1.8		1.073	
MW-3D	0.02577	0.0146	0.03166	0.02521	0.0108	0.0336	0.0598	0.0473	0.0083	0.0154	0.0411	0.0333	0.0046		0.0074				0.0026		---	

Notes:

1. All data expressed in parts per million (ppm) equivalent to micrograms per liter (mg/L).
2. --- indicates well sampled, but volatiles not detected.
3. Blank cell indicates well not yet installed or well not sampled.



LATTITUDE: 43° 16' 30"N LONGITUDE: 77° 24' 23"W

-N-

QUADRANGLE LOCATION: WEBSTER, NEW YORK

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

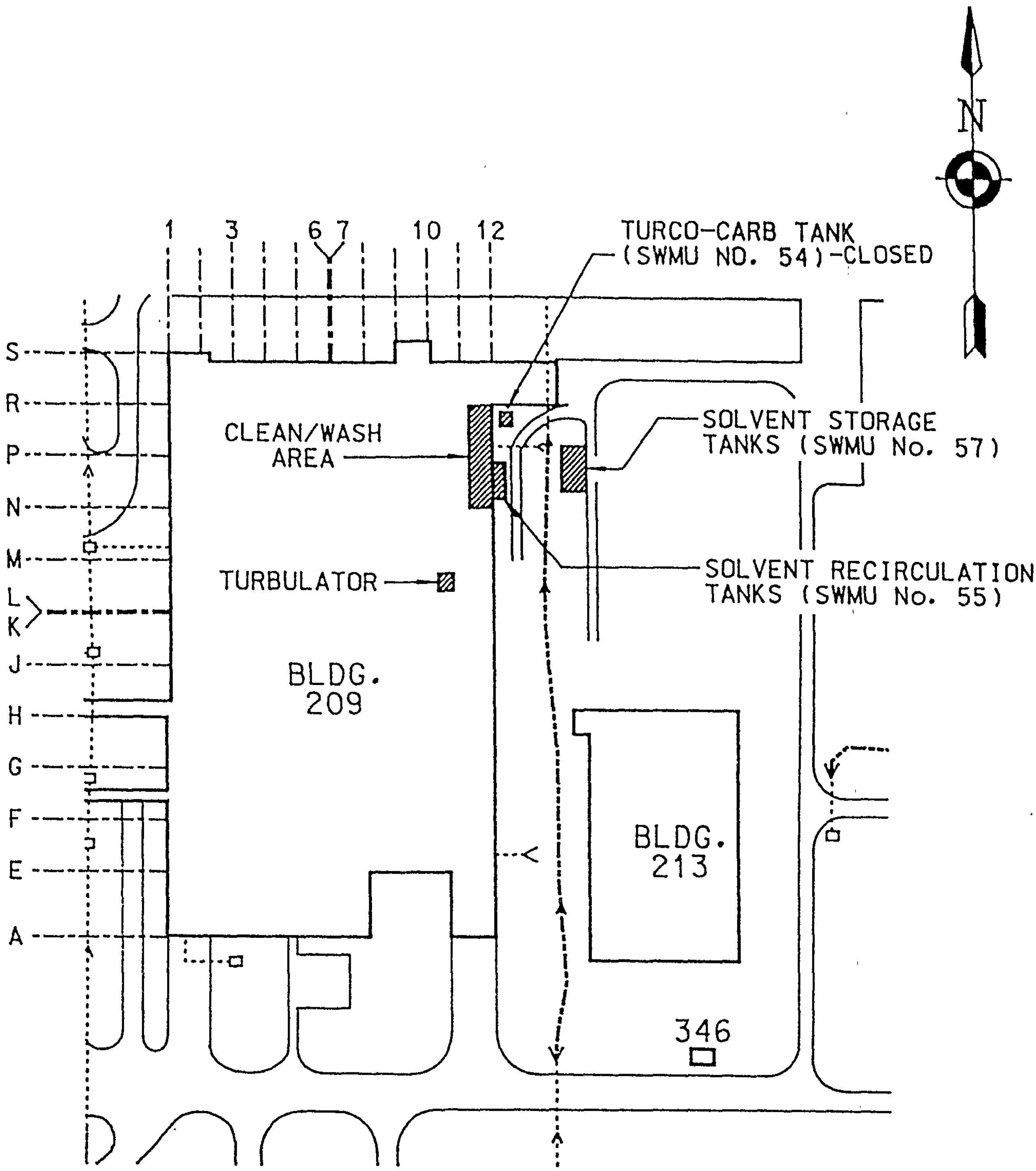
XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

PROJECT LOCUS

SCALE: 1 IN. = 2000 FT. SEPTEMBER 1996

FIGURE 1

70096-057 \ RIL01A



NOTES:

1. SHADED AREAS ARE APPROXIMATE IN SIZE
2. SWMU INDICATES SOLID WASTE MANAGEMENT UNIT.

HALEY & ALDRICH

UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

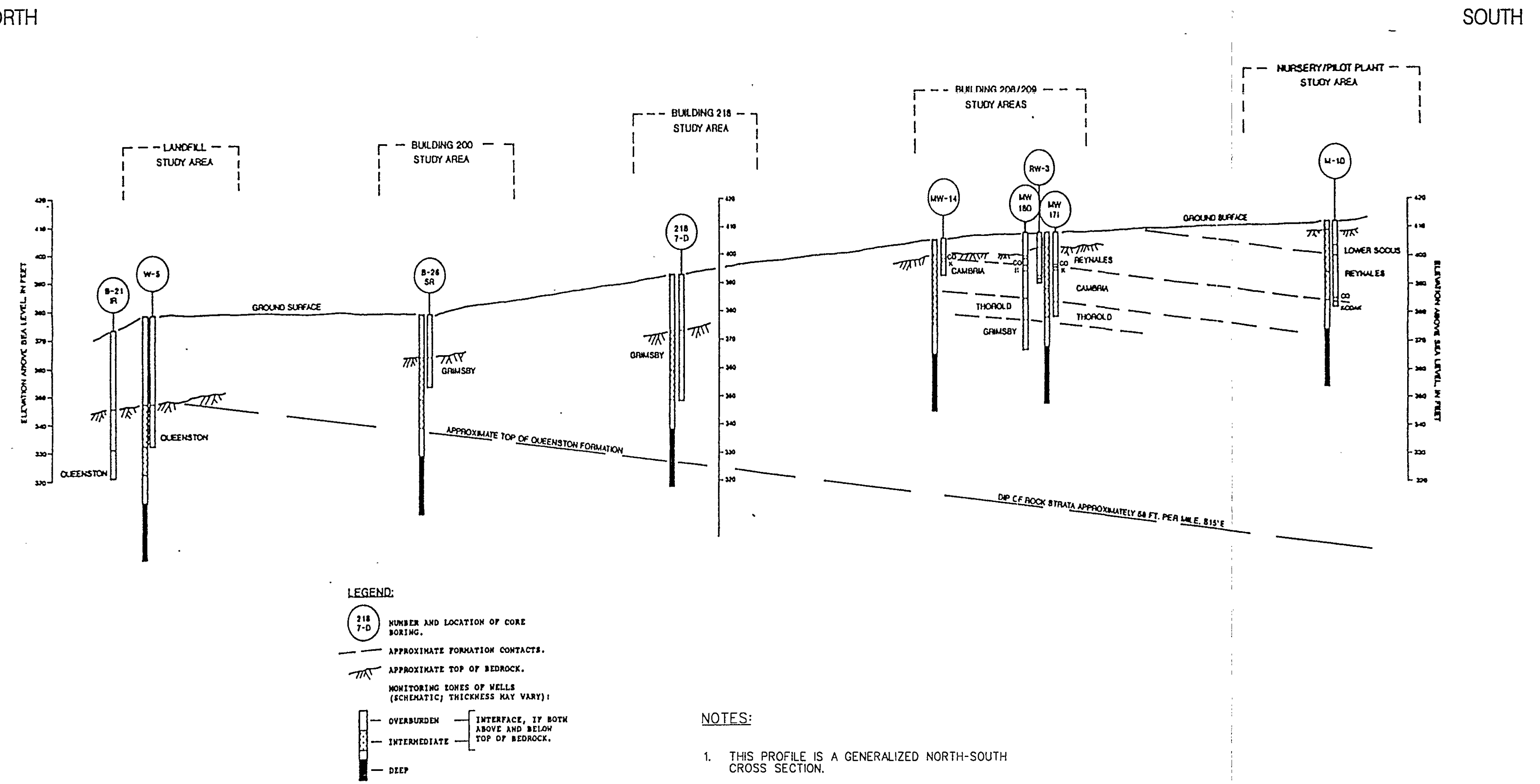
SWMU LOCATION MAP

SCALE: 1"- 200'

SEPTEMBER 1996

70096-057 \ RIW12A

FIGURE 2



NOTES:

1. THIS PROFILE IS A GENERALIZED NORTH-SOUTH CROSS SECTION.
2. CORE BORINGS WERE LOCATED ON THE PROFILE BY TRANSLATING THEM LATERALLY ALONG THE STRIKE OF THE BEDROCK, APPROXIMATELY S15°E.
3. FORMATION CONTACT LINES ARE INFERRED BETWEEN DATA POINTS. ACTUAL VALUES BETWEEN DATA POINTS MAY VARY.
4. ENGINEERING AND GEOLOGICAL CORE BORING DATA WERE OBTAINED FROM XEROX CONSULTANTS' REPORTS.
5. BUILDING STUDY AREAS ARE INDICATED ALONG THE UPPER MARGIN. NOTE THAT EXTENT OF AREA IS APPROXIMATE.

HALEY & ALDRICH
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

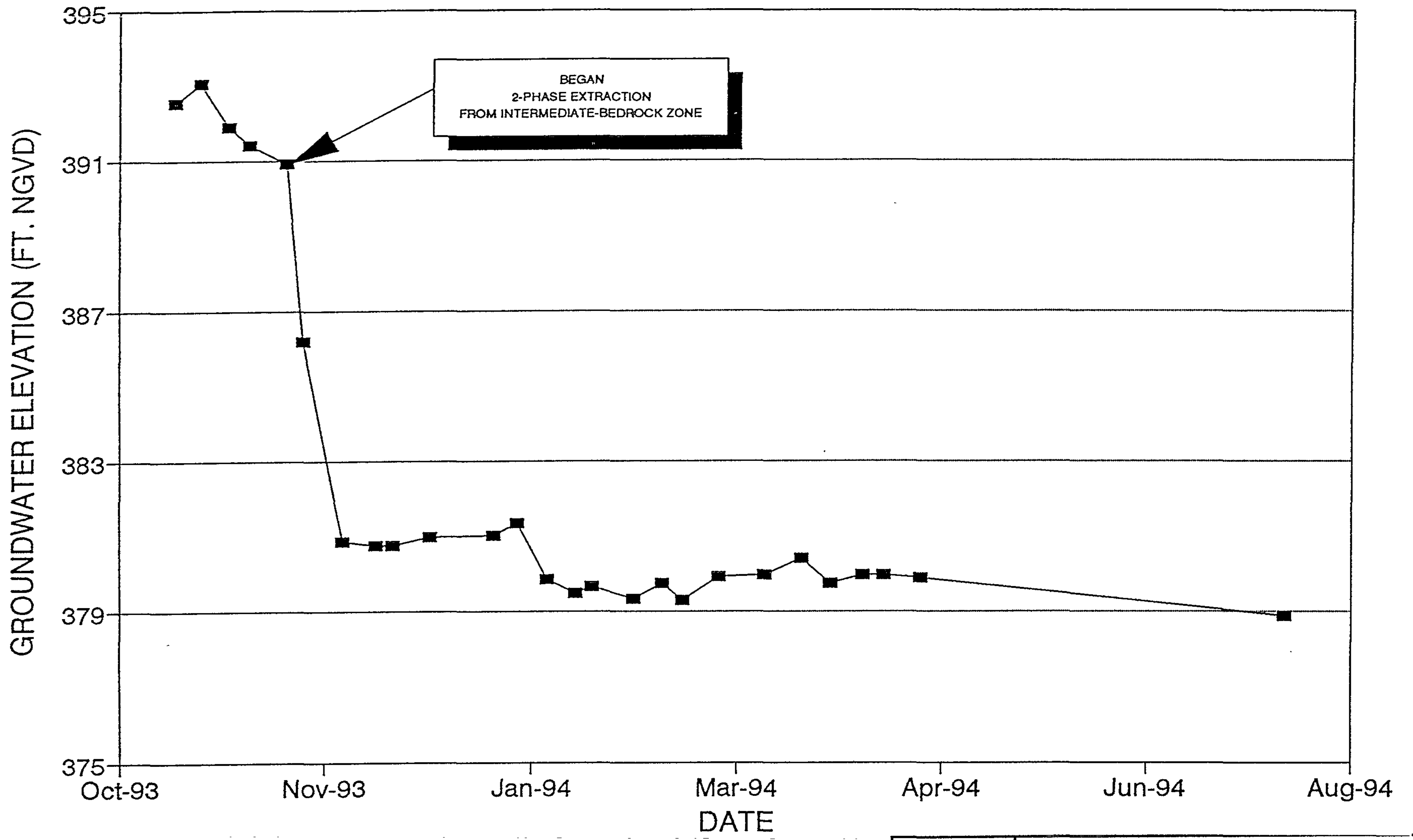
XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

GEOLOGIC PROFILE

SCALE: 1"=200'
SEPTEMBER 1996

FIGURE 3

70096-057 \ RIG14D



HALEY & ALDRICH

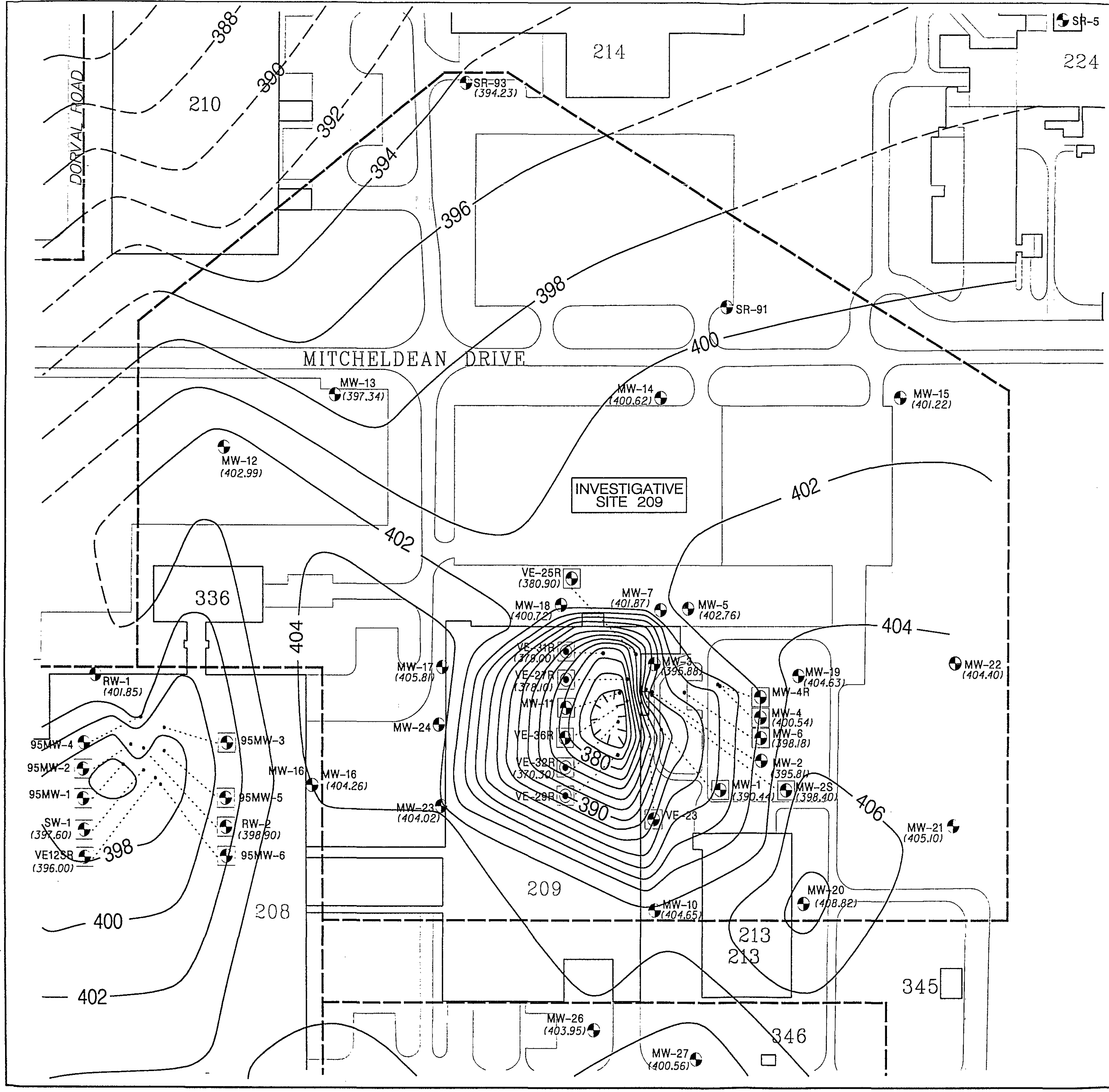
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

XEROX CORPORATION
WEBSTER, NEW YORK
BUILDING W-209 RFI SUMMARY REPORT

WELL HYDROGRAPH
MW-18I

SEPTEMBER 1996

FIGURE 4



LEGEND:

MW-15	WELL NAME
(401.22)	GROUNDWATER ELEVATION
	SHALLOW WELL LOCATION
	ACTIVE 2-PHASE SHALLOW WELL
	ACTIVE 2-PHASE INTERMEDIATE WELL
402	INFERRED CONTOUR OF EQUAL GROUNDWATER ELEVATION (CONTOUR INTERVAL 2 FT.)

NOTES:

1. BASE MAP COMPILED BY H&A OF NEW YORK USING SURVEY DATA PROVIDED BY XEROX CORPORATION.
2. CONTOURS BASED ON LINEAR INTERPOLATION OF WATER LEVEL DATA OBTAINED FROM WELLS IN THE 4th QTR. 1995. ACTUAL GROUNDWATER CONDITIONS WILL VARY SEASONALLY AND WITH GROUNDWATER EXTRACTION RATES.
3. ELEVATIONS SHOWN IN FEET ABOVE MEAN SEA LEVEL REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM

HALEY & ALDRICH
UNDERGROUND ENGINEERING & ENVIRONMENTAL SOLUTIONS

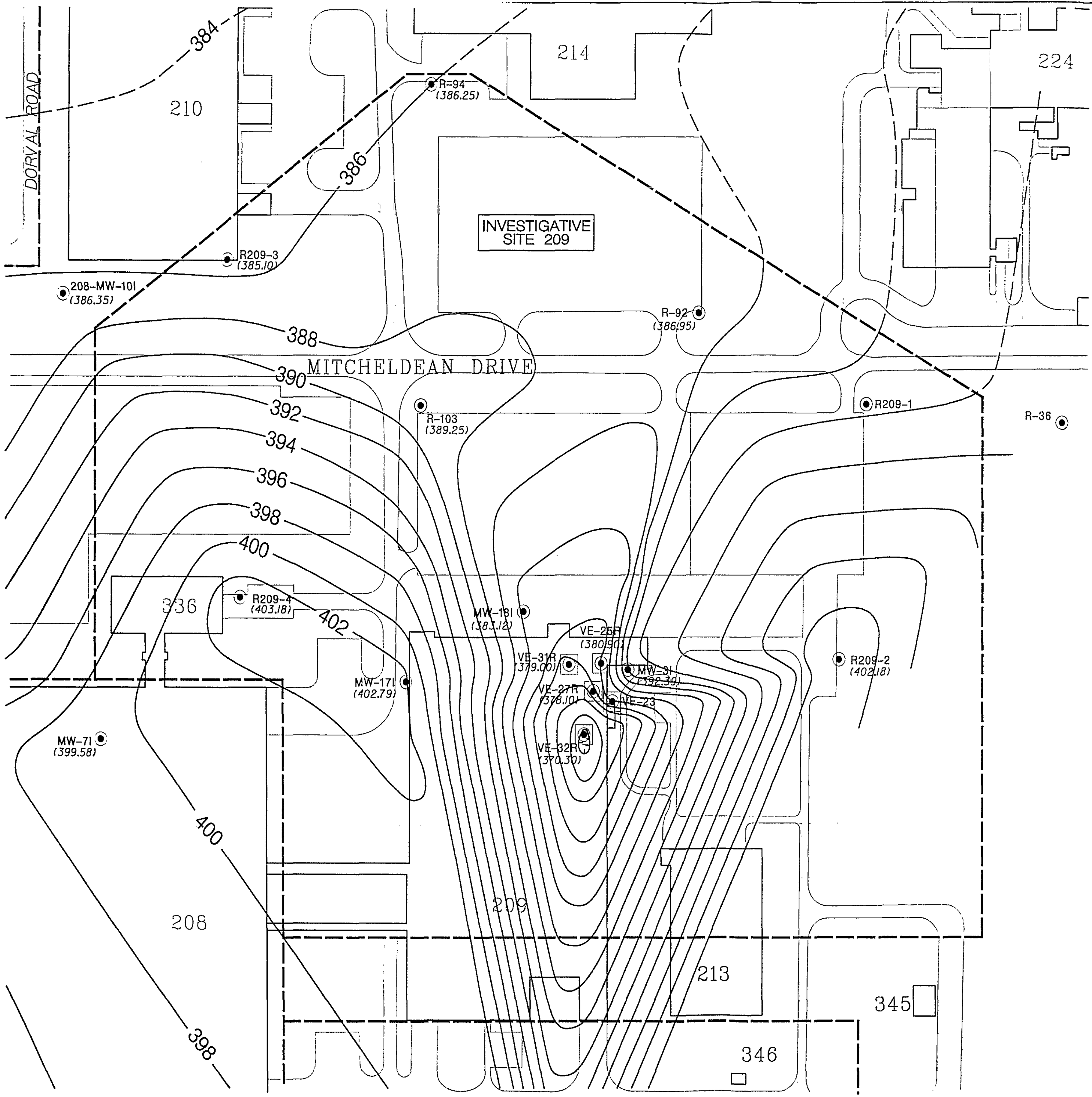
XEROX CORPORATION
WEBSTER, NEW YORK
PROJECT CITY, STATE

SHALLOW BEDROCK ZONE GROUNDWATER CONTOUR PLAN 4th QUARTER 1995

SCALE: 1"=200'
SEPTEMBER 1996

FIGURE 5

70096-057 \ RIC02B



LEGEND:

MW-15	WELL NAME
(401.22)	GROUNDWATER ELEVATION
◉	INTERMEDIATE WELL LOCATION
▣	ACTIVE 2-PHASE INTERMEDIATE WELL
402	INFERRED CONTOUR OF EQUAL GROUNDWATER ELEVATION (CONTOUR INTERVAL 2 FT.)

NOTES:

1. BASE MAP COMPILED BY H&A OF NEW YORK USING SURVEY DATA PROVIDED BY XEROX CORPORATION.
2. CONTOURS BASED ON LINEAR INTERPOLATION OF WATER LEVEL DATA OBTAINED FROM WELLS IN THE 4th QTR. 1995. ACTUAL GROUNDWATER CONDITIONS WILL VARY SEASONALLY AND WITH GROUNDWATER EXTRACTION RATES.
3. ELEVATIONS SHOWN IN FEET ABOVE MEAN SEA LEVEL REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM

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INTERMEDIATE BEDROCK ZONE GROUNDWATER CONTOUR PLAN 4th QUARTER 1995

SCALE: 1"=200'

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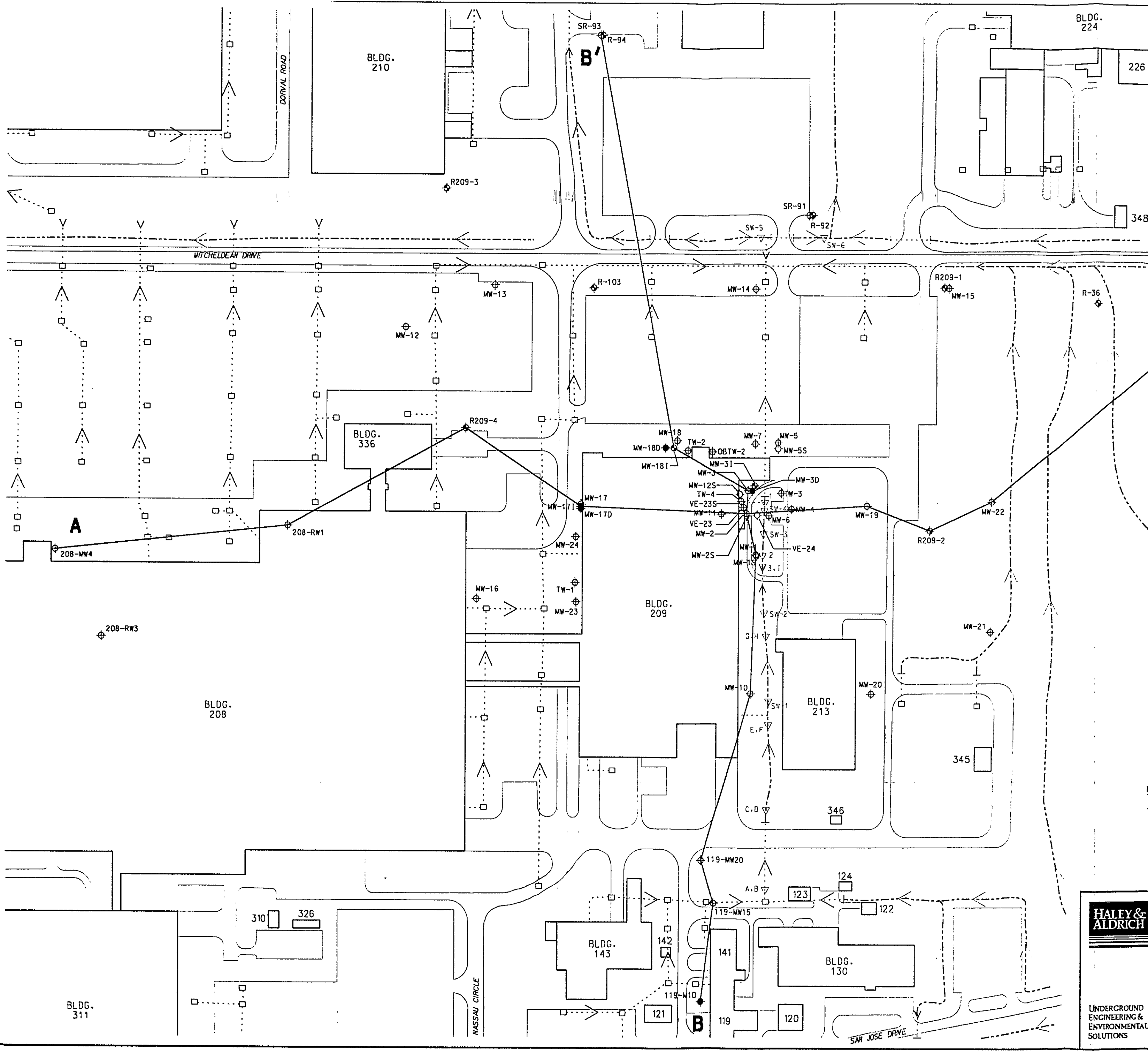
FIGURE 6

70096-057 \ RIC03B



LEGEND:

- MW-5S, VE-23S ◇ OVERBURDEN WELLS
- MW-5, TW-2, OB-TW-2, VE-23 SHALLOW BEDROCK WELL
- MW-18I, R-94, R209-1 INTERMEDIATE BEDROCK WELL
- MW-18D ◆ DEEP BEDROCK WELL
- A' CROSS-SECTION LINE
- ABOVE GROUND SURFACE STREAM
- UNDERGROUND STORM SEWER

NOTES

1. BASE MAP DATA FILE PREPARED BY BERGMANN ASSOCIATES, ROCHESTER, NEW YORK UNDER DIRECT CONTRACT WITH XEROX CORPORATION.
2. SEE FIGURE 14 FOR ROCK CORE PHOTOGRAPHS.

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WELL LOCATION PLAN

SCALE: 1"=240'

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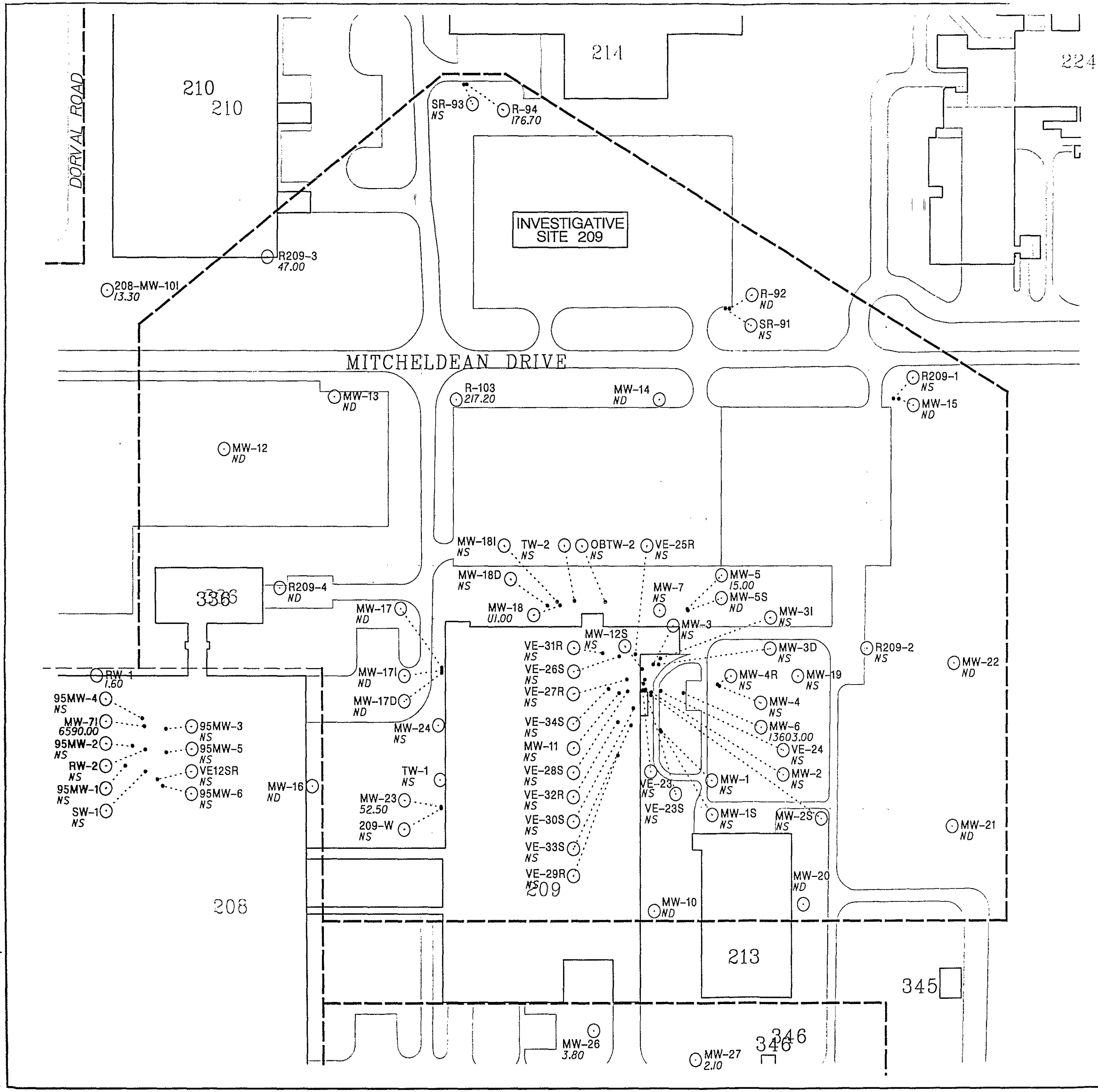
FIGURE 7

70096-057 \ RIW05B



LEGEND:

(dashed box)	INVESTIGATIVE SITE BOUNDARY (APPROXIMATE)
MW-21 ⊙	MONITORING WELL LOCATION AND DESIGNATION
540.00	REPORTED CONTAMINANT CONCENTRATION IN ug/L (ppb)
U2.50	INDICATES COMPOUND NOT DETECTED AT OR ABOVE THE SPECIFIED DETECTION LIMIT (NUMBER SHOWN IS DETECTION LIMIT)
ND	INDICATES NO COMPOUNDS DETECTED
NS	INDICATES WELL WAS NOT SAMPLED

NOTES:

1. BASE MAP COMPILED BY H&A OF NEW YORK USING SURVEY DATA PROVIDED BY XEROX CORPORATION.

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TOTAL VOLATILES
POSTING MAP
4th QUARTER 1995

SCALE: 1"=200'

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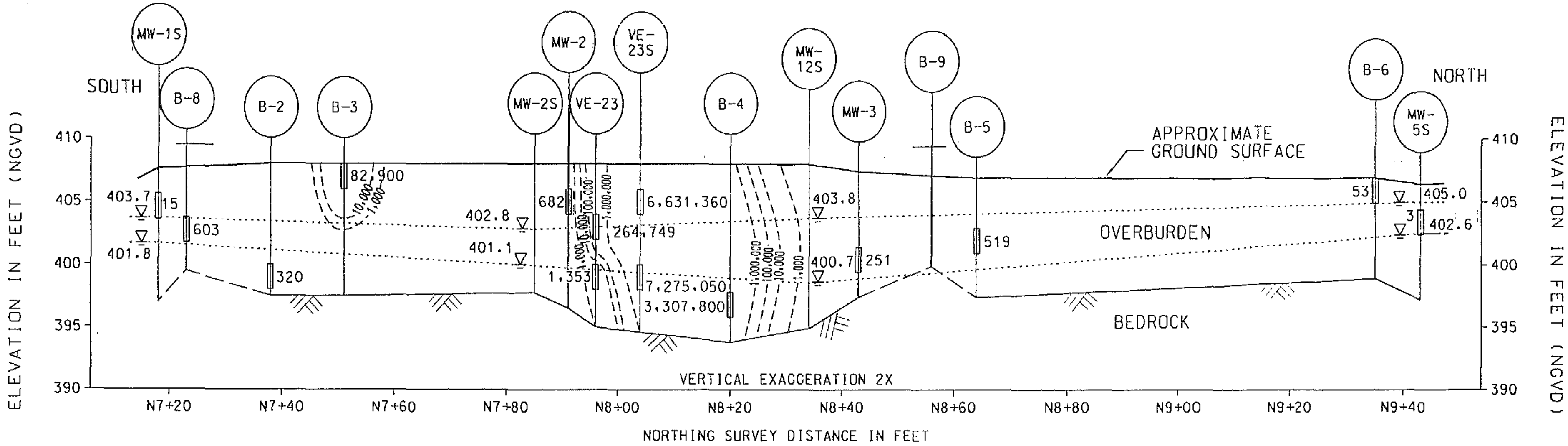
FIGURE 8

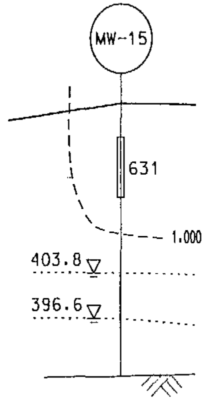
70096-057 \ RIR04B



NOTES:

1. BORINGS B-8 AND B-9 DRILLED INSIDE BUILDING 209 AT FLOORSLAB ELEVATION OF 409.5 FT.
2. SOIL ANALYSIS DATA SUMMARIZED IN TABLE 9.
3. PLAN VIEW OF SOIL BORING LOCATIONS SHOW IN FIGURE 6.
4. SOIL BORING LOGS INCLUDED IN APPENDIX G.
5. GROUNDWATER ELEVATIONS DETERMINED FROM 1991-1992 QUARTERLY MONITORING AT THE AVAILABLE OVERBURDEN MONITORING WELLS. THIRD AND FOURTH QUARTER 1992 DATA OMITTED.
6. REFER TO REPORT TEXT FOR DISCUSSION.
7. THE HYDROGEOLOGIC FEATURES DEPICTED ON THIS FIGURE REPRESENT AN INTERPRETATION OF SUBSURFACE CONDITIONS BASED ON THE FINDINGS OF THE IDENTIFIED EXPLORATIONS. ACTUAL CONDITIONS AT UNEXPLORED LOCATIONS MAY VARY FROM THOSE DEPICTED.

LEGEND:



EXPLORATION NUMBER AND LOCATION

GROUND SURFACE

SOIL SAMPLE INTERVAL & TOTAL VOCS DETECTED BY 601/602 ANALYSIS, TOTAL VOCS SHOWN IN MG/KG (PARTS PER MILLION (PPM))

INFERRED CONTOURS OF VOC CONCENTRATION IN SOIL

OVERBURDEN GROUNDWATER ELEVATIONS SEASONAL HIGH AND LOW MARCH 1991 TO JUNE 1992

APPROXIMATE TOP OF BEDROCK (DASHED FOR INDOOR TEST BORINGS)

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CROSS SECTION OF TOTAL VOC's IN SOIL

VERTICAL SCALE: 1 IN. = 10 FT.
HORIZONTAL SCALE: 1 IN. = 20 FT.

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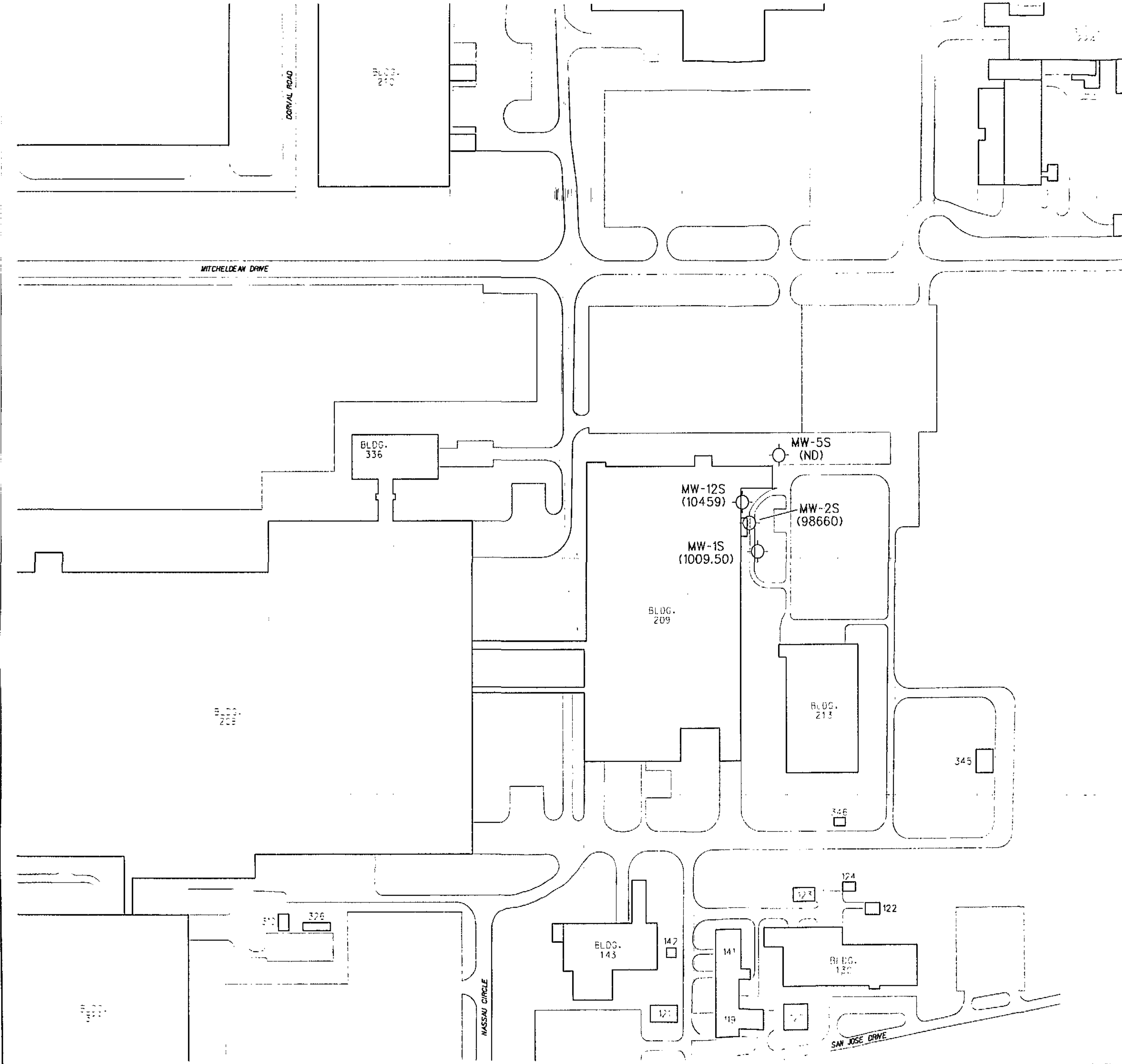
FIGURE 9

70096-057 \ RIG068



LEGEND:

MW-12S OVERBURDEN MONITORING WELL

(10459) (TOTAL VOCS DETECTED IN GROUNDWATER SAMPLE)

(ND) (VOCS NOT DETECTED)

NOTES:

1. SAMPLES COLLECTED BY GENERAL TESTING CORPORATION ON 8 TO 9 DECEMBER 1992.
2. SAMPLES ANALYZED FOR VOCS BY GENERAL TESTING CORPORATION USING EPA METHOD 601/602, AND A GAS CHROMATOGRAPH SCAN FOR MINERAL SPIRITS.

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TOTAL VOC's IN OVERBURDEN WELLS 4th QUARTER 1992

SCALE: 1"=250'

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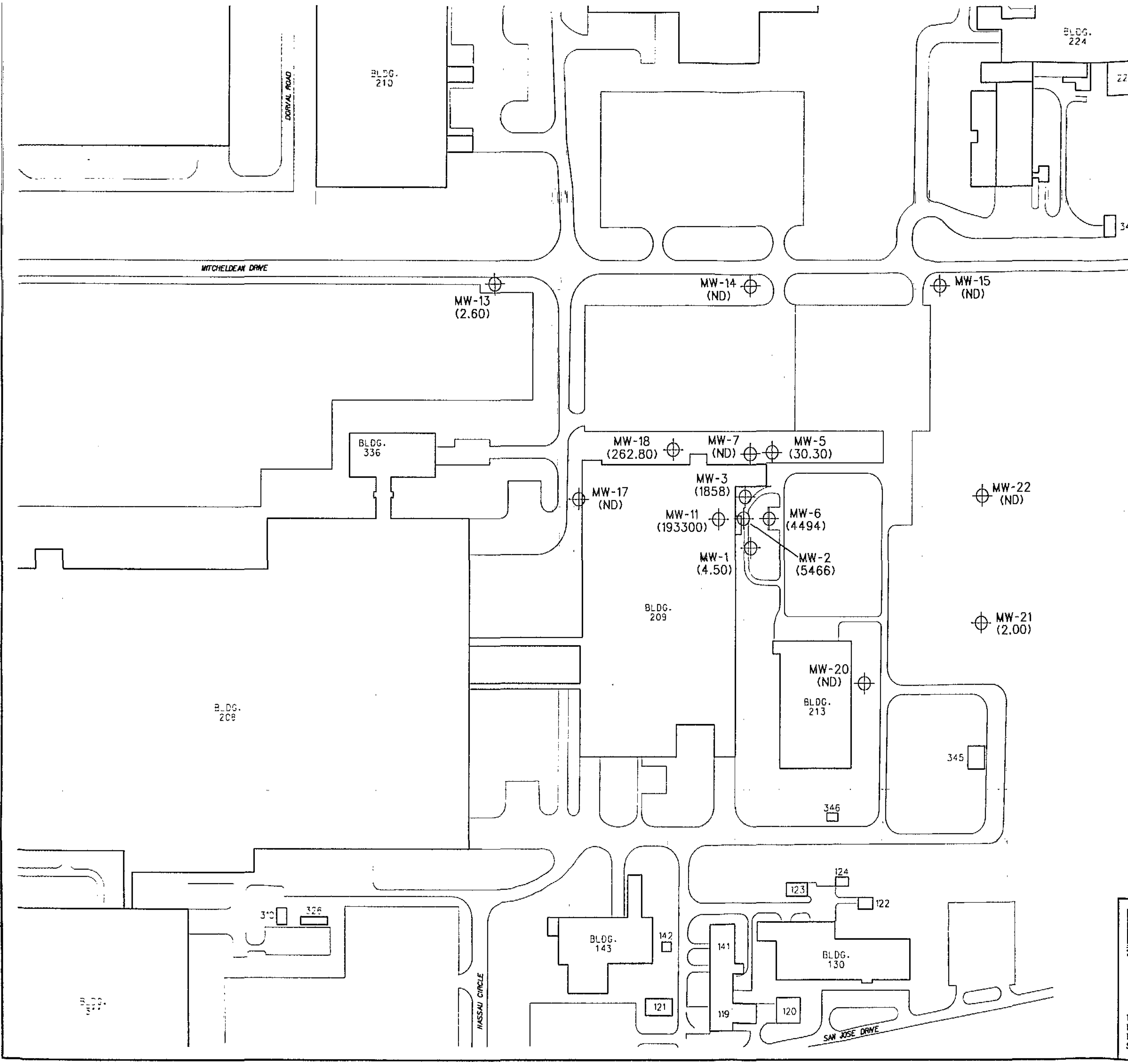
FIGURE 10

70096-057 \ RIW07B



NOTES:

⌖ MW-5 SHALLOW BEDROCK MONITORING WELL

(26.28) (TOTAL VOCS DETECTED IN GROUNDWATER SAMPLE)

(ND) (VOCS NOT DETECTED)

NOTES:

1. GROUNDWATER SAMPLES COLLECTED BY GENERAL TESTING CORPORATION ON 8 TO 9 DECEMBER 1992.
2. SAMPLES ANALYZED FOR VOCS BY GENERAL TESTING CORPORATION USING EPA METHOD 601/602, AND A GAS CHROMATOGRAPH SCAN FOR MINERAL SPIRITS.
3. DATA SHOWN IN UNITS OF UG/L. EQUIVALENT TO PARTS PER BILLION (PPB).

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TOTAL VOC's IN SHALLOW BEDROCK WELLS 4th QUARTER 1992

SCALE: 1" = 250'

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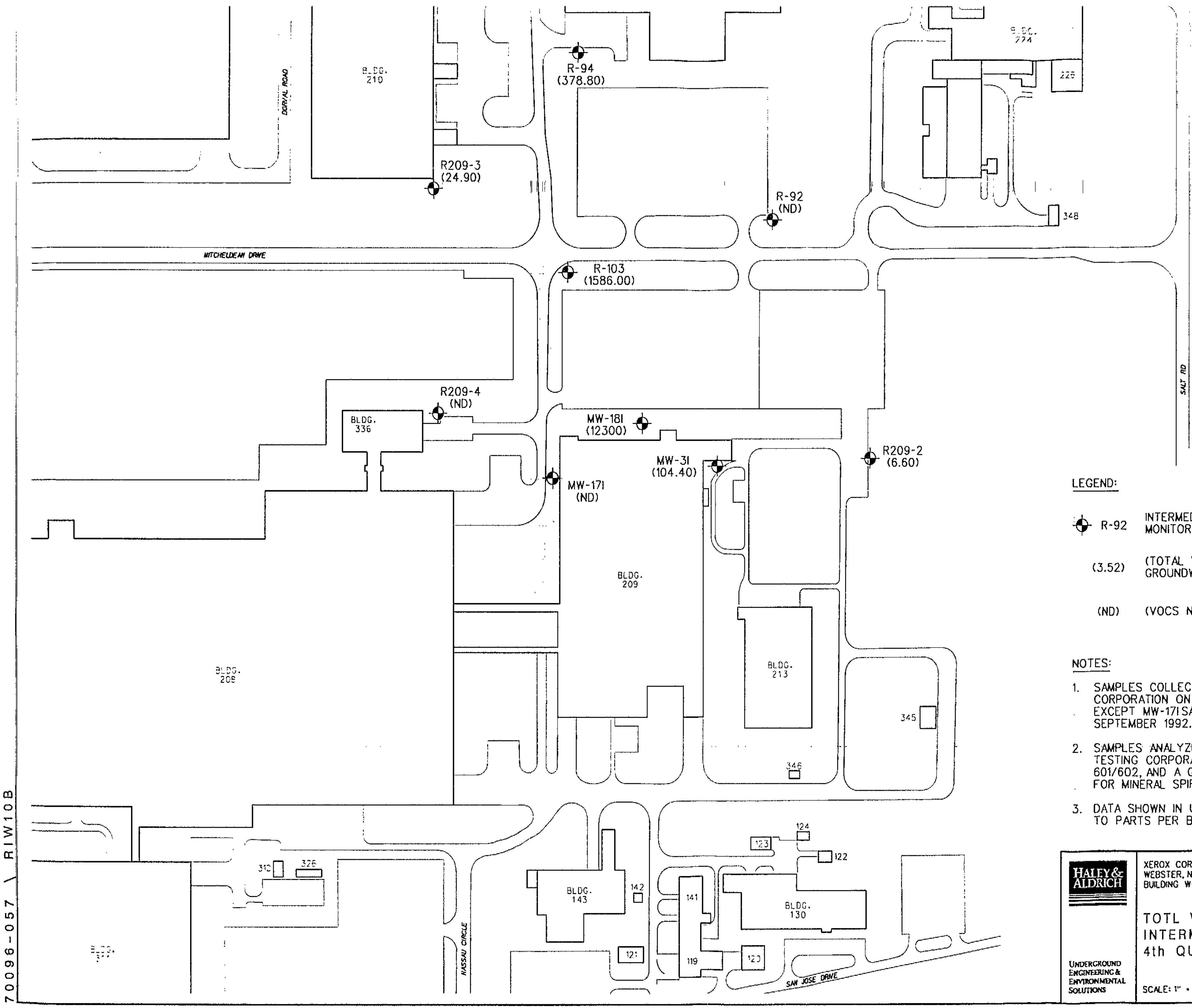
FIGURE 11

70096-057 \ RIW08B



LEGEND:

R-92 INTERMEDIATE BEDROCK MONITORING WELL

(3.52) (TOTAL VOCS DETECTED IN GROUNDWATER SAMPLE)

(ND) (VOCS NOT DETECTED)

NOTES:

1. SAMPLES COLLECTED BY GENERAL TESTING CORPORATION ON 8 TO 9 DECEMBER 1992, EXCEPT MW-17I SAMPLE COLLECTED 17 SEPTEMBER 1992.

2. SAMPLES ANALYZED FOR VOCS BY GENERAL TESTING CORPORATION USING EPA METHOD 601/602, AND A GAS CHROMATOGRAPH SCAN FOR MINERAL SPIRITS.

3. DATA SHOWN IN UNITS OF UG/L, EQUIVALENT TO PARTS PER BILLION (PPB).

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TOTL VOC's IN INTERMEDIATE BEDROCK ZONE 4th QUARTER 1992

SCALE: 1" = 250'

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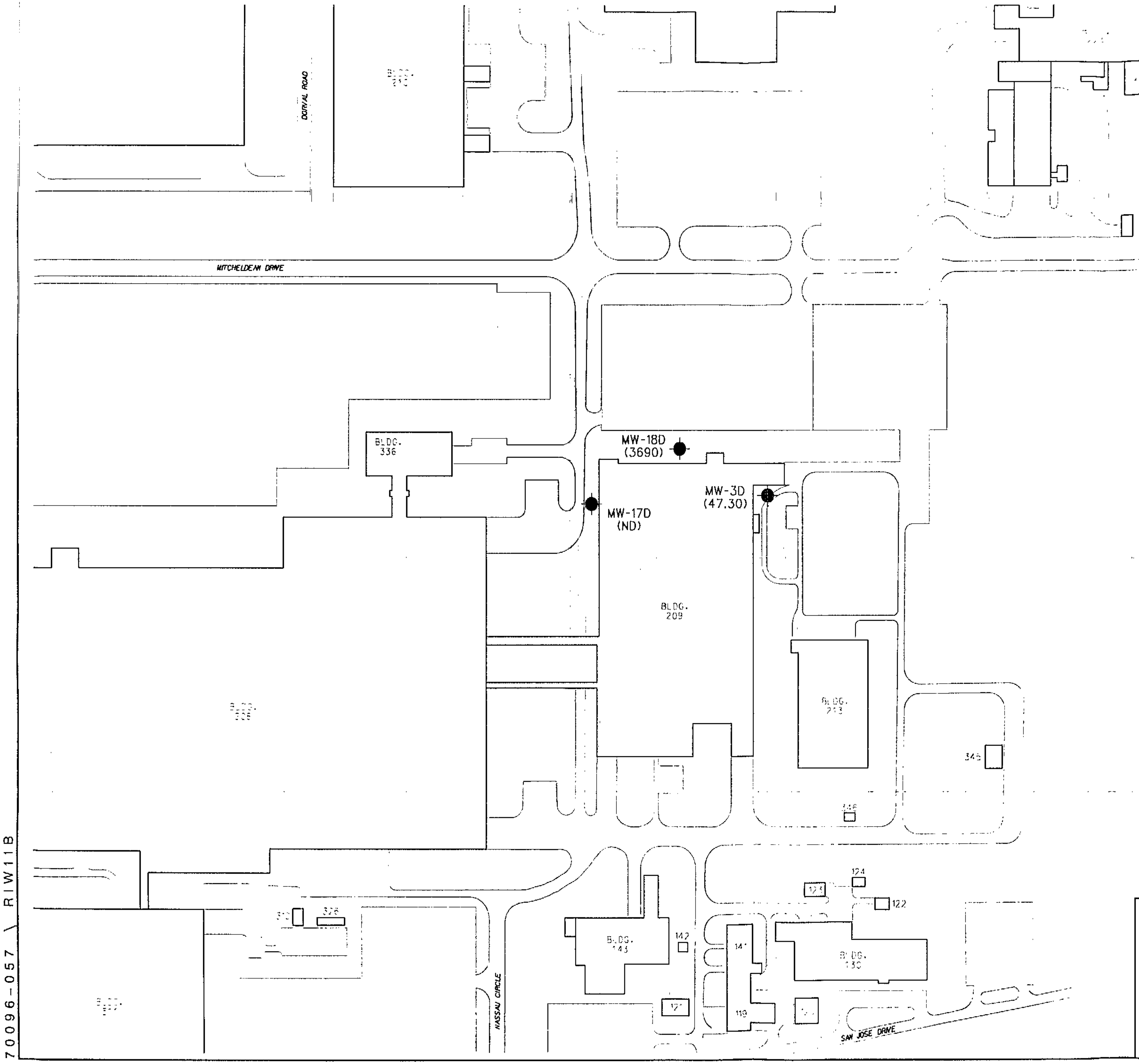
FIGURE 12

70096-057 \ RIW10B



LEGEND:

- MW-18D DEEP BEDROCK MONITORING WELL
- (3690) (TOTAL VOCS DETECTED IN GROUNDWATER SAMPLE)
- (ND) (VOCS NOT DETECTED)

NOTES:

1. SAMPLES COLLECTED BY GENERAL TESTING CORPORATION ON 8 TO 9 DECEMBER 1992, ECEPT MW-17D SAMPLE COLLECTED ON 17 SEPTEMBER 1992.
2. SAMPLES ANALYZED FOR VOCS BY GENERAL TESTING CORPORATION USING EPA METHOD 601/602, AND A GAS CHROMATOGRAPH SCAN FOR MINERAL SPIRITS.
3. DATA SHOWN IN UNITS OF UG/L, EQUIVALENT TO PARTS PER BILLION (PPB).

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TOTAL VOC's IN DEEP BEDROCK WELLS 4th QUARTER 1992

SCALE: 1" = 250'

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FIGURE 13

70096-057 \ RIW11B

APPENDIX A

Graphs of VOCs vs. Time For Selected Monitoring Wells

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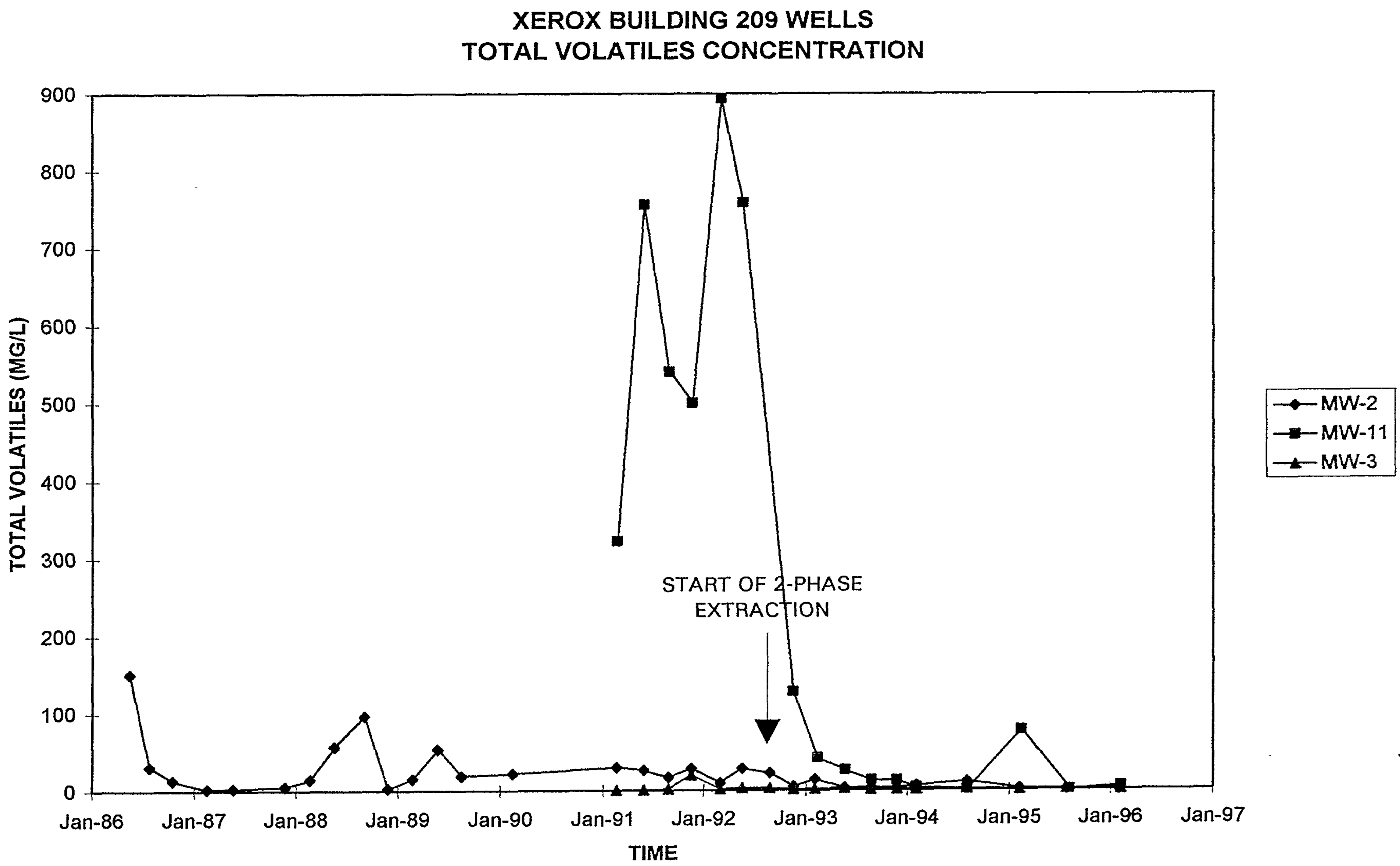
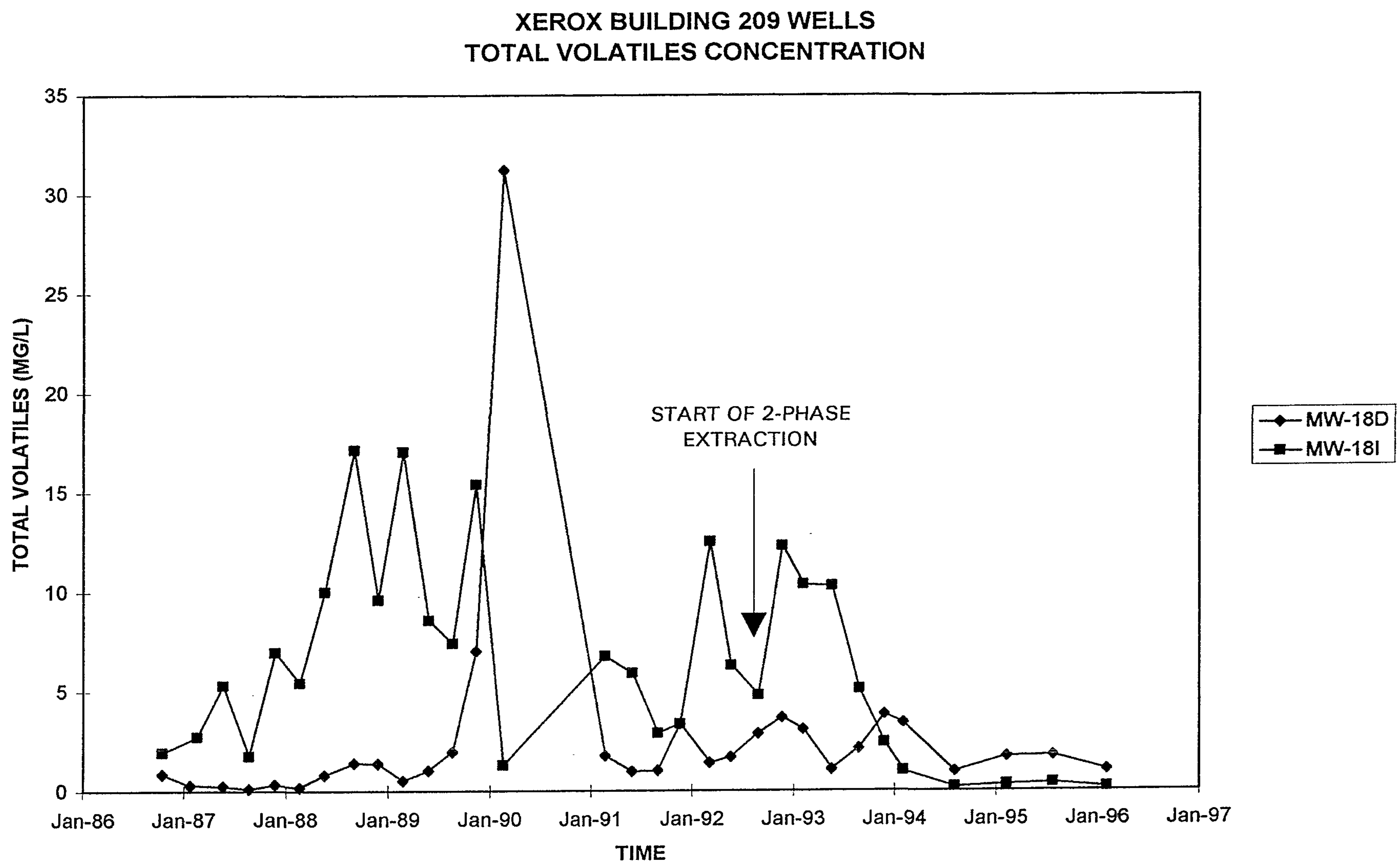
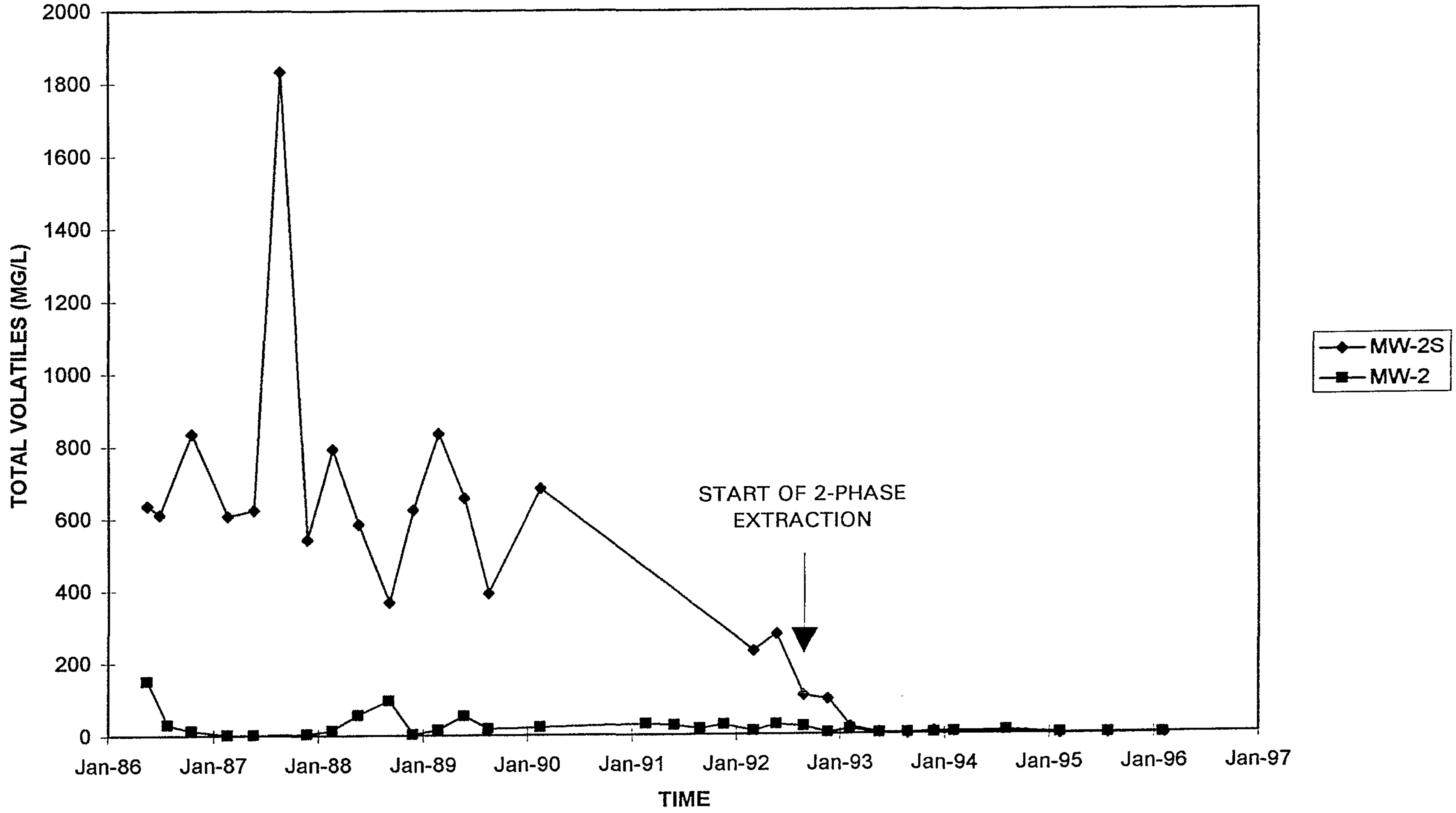

XEROX BUILDING 209 WELLS
TOTAL VOLATILES CONCENTRATION
TOTAL VOLATILES (MG/L)
900
800
700
600
500
400
300
200
100
0
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
TIME
START OF 2-PHASE
EXTRACTION
MW-2
MW-11
MW-3


XEROX BUILDING 209 WELLS
TOTAL VOLATILES CONCENTRATION
TOTAL VOLATILES (MG/L)
35
30
25
20
15
10
5
0
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
TIME
START OF 2-PHASE
EXTRACTION
MW-18D
MW-18I

XEROX BUILDING 209 WELLS
TOTAL VOLATILES CONCENTRATION



XEROX BUILDING 209 WELLS
TOTAL VOLATILES CONCENTRATION