

**RCRA Corrective Action**  
**Environmental Indicator (EI) RCRIS code (CA750)**  
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**Migration of Contaminated Groundwater Under Control**

**Facility Name:** IBM Poughkeepsie  
**Facility Address:** 2455 South Road, Poughkeepsie, New York 12601  
**Facility EPA ID#:** NYD080480734

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available skip to #6 and enter "IN" (more information needed) status code.

**BACKGROUND**

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI's developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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Site Description

The IBM Poughkeepsie facility is located approximately 6 miles south of the City of Poughkeepsie. The site lies between Route 9 and the Hudson River in a mixed residential industrial area. **Figure 1** is the site location map. The plant site, which has been operated by IBM since the 1940's, consists of approximately 423 acres, of which two-thirds is occupied by the manufacturing complex. The facility conducts manufacturing, assembly and testing of computer systems. Electronics research and development activities are also conducted at the facility. Hazardous wastes are generated from photo etching, plating, soldering, cleaning, degreasing and laboratory activities.

Due to accidental releases, breaks in underground pipes and past practices, there have been releases to both soils and groundwater. The most serious releases are volatile organic releases to the groundwater in the manufacturing area of the plant. This has resulted in the Site Gravel groundwater plume. Most releases to soils were immediately cleaned up by the facility and where questions remained, confirmatory soil sampling and analysis was conducted under RCRA authority.

**Potential Threats and Contaminants:**

**Contaminants.**

Impacts to groundwater beneath the site have been the focus of investigation activities and corrective actions at the site. Groundwater chemistry data have been collected from monitoring wells at this site since 1979. The most wide spread concentration of these contaminants is in the Site Gravel plume which appears to have originated largely from activities in the manufacturing area of the plant site. Specific plumes associated with the lower plant are related to specific activities in these areas.

Subsurface soil sampling has been conducted in many areas of the site historically and most recently as part of the RFI at the Former Drum Storage Area and the RFA-Sampling Visit activities for soils at nine Solid Waste Management Units. This sampling activity performed two functions: at those units where corrective action had taken place, the soil samples confirmed that the clean up was to acceptable levels and the entire area was cleaned up. For suspected releases, the sampling confirmed the presence or absence of hazardous constituents at levels of concern.

**Potential Threats From Contaminated Groundwater.**

At this facility, contaminated groundwater would pose a threat if ingested; however there are no known public or private drinking water supply wells impacted by this groundwater. All adjacent housing is on municipal water supply. The State considers all its groundwater to be a potential source of potable water and should be remediated to its Groundwater Quality Protection Standards.

**Cleanup Approach and Progress:**

Since the Poughkeepsie site began monitoring the soil and groundwater conditions beneath the site in the late 1970's, several corrective action elements have been implemented to mitigate the impacts of releases that had already occurred and to provide a higher level of prevention against future releases. Many corrective action projects have been completed at the site and are summarized in this section.

From 1981 to 1986 a total fluids extraction system operated in the vicinity of a Former Burn Pit to depress the water levels and to remove free product found at several groundwater monitoring wells in this area. A new total fluids extraction system was recently installed in the vicinity of this SWMU and has been operating intermittently since late 1997.

Free product, soil and water containing xylene was removed from the area located to the west of Building 004 where a former tank farm was located.

The industrial sewers were upgraded to a new double-walled system with leak detection. The old sewers were suspected of leaking chemicals to the soil and groundwater. Sediment in some pipes and soil around these leaking pipes and manholes were considered to be potential continuing sources. Sediment was flushed from the pipes and in several instances, piping and manholes were removed, together with surrounding soil.

Several projects have been ongoing in the storm sewers to reduce the influx of groundwater containing dissolved chemicals

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into this underground piping. These projects were associated with the storm sewers in Buildings 002, 003, and 004. Several of these strategies have been implemented to reduce volatile organic compound flux to the storm sewer systems, which in turn discharge to an on-site stream (H107) under a SPDES permit.

Long term groundwater extraction has proceeded at two locations in the Site Gravel to control the flux of volatile organic compounds to the on-site stream. These two extraction wells have to date removed over 690 pounds of volatile organic compounds.

Another corrective action, the storm sewer re-routing project, has affected segregation of storm water from groundwater which had collected in the storm sewer system through infiltration. In the area where this storm sewer re-routing has been implemented, groundwater containing dissolved volatile organic compounds at high concentrations was infiltrating into the old storm sewer system. Currently this infiltrated groundwater is collected and pumped to the Industrial Waste Treatment Plant for treatment, while the unaffected storm water is routed in a separate piping system to the storm water discharge point to the on site stream (H107).

Construction of a groundwater interception system has been completed in the area adjoining the Hudson River involving the former burn pit area, antenna drum storage, former building 025, waste oil leach field, building 077 and the overpass area, these are referred to as the group 1,2 & 3 areas (Figure 2). This project is designed to capture contaminated groundwater prior to it entering the Hudson River. A treatment facility was constructed in building 030 to handle the captured water.

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2. Is **groundwater** known or reasonably suspected to be “**contaminated**”<sup>1</sup> above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

If unknown - skip to #8 and enter “IN” status code.

RATIONALE: Groundwater monitoring data collected under the site’s Part 373 Permit indicate exceedences of New York State Groundwater Quality Standards (Part 703).

KEY CONTAMINANTS: Tetrachloroethene; Trichloroethene; 1,1,1-Trichloroethane; 1,2-Dichloroethene; Vinyl Chloride; 1,1-Dichloroethene; Freon 113; Methylene Chloride

<i>Ranges in Concentration in Groundwater (ug/l)</i>					
<i>Site Area Parameter</i>	<i>Part 703 Standard</i>	<i>Group 1</i>	<i>Group 2</i>	<i>Group 3</i>	<i>Site Gravel</i>
Tetrachloroethene	5	ND - 2.8	ND - 7.2	ND - 1.1	ND - 74.7
Trichloroethene	5	ND - 160	ND - 11000	ND - 92.3	ND - 18000
1,1,1-Trichloroethane	5	ND - 19	ND - 18000	ND - 490	ND - 6.6
1,2-Dichloroethene	5	ND - 880	ND - 2700	ND - 410	ND - 12000
Vinyl Chloride	2	ND - 390	ND - 26	ND - 160	ND - 200
1,1-Dichloroethene	5	ND - 12	ND - 670	ND - 13	ND - 4.9
Freon 113	5	ND - 40	ND - 120000	ND - 35	ND - 150
Methylene Chloride	5	ND - 12	ND - 40000	ND	ND

REFERENCES: NYSDEC Part 373 Permit 3-1346-00035/00123 -renewed 10/27/1997  
Annual Groundwater Monitoring Reports - most recent 4/30/2002  
Groundwater RCRA Facility Investigation - 12/12/1997  
Former Antenna Drum Storage Area RCRA Facility Investigation - 12/18/1997

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<sup>1</sup> “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate “levels” (appropriate for the protection of the groundwater resource and its beneficial uses).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?

If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the “existing area of groundwater contamination”<sup>2</sup>)

If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”<sup>2</sup>) - skip to #8 and enter “NO” status code, after providing an explanation.

If unknown - skip to #8 and enter “IN” status code.

**RATIONALE:** Extensive groundwater monitoring data collected at this site indicates the migration of contaminated groundwater within the shallow site gravel aquifer is controlled. Groundwater extraction at two locations, T-8SB and T-315S, began in late 1991 and early 1992, respectively. The site gravel plume originates within the manufacturing area of the site and is limited at its most downgradient point by the on-site stream designated as H-107 (figure 3). Flux calculations for site gravel plume constituents have decreased over time since pumping was implemented. In addition, analysis of chemical concentration trends for site gravel area wells show that most are decreasing, (table 1) and the most recent sampling results from the groundwater-impacted portion of H-107 show no reported detections exceeding New York State Part 703 surface or groundwater water standards.

Investigation of the deep bedrock groundwater zone for the site was completed in 1997 and since that time, extensive sampling of the bedrock aquifer has been conducted. Bedrock groundwater quality data for areas adjacent to the Hudson River, with few exceptions, show predominantly decreasing trends (table 2). Based on noted decreasing trends in concentrations in bedrock monitoring wells adjacent to the Hudson River and startup of a corrective measures implementation (CMI) involving pump and treat to diminish flux from the bedrock aquifer to the Hudson River, the migration of contaminated groundwater is stabilized.

The corrective measures implementation included three areas of the site which were selected for the control of flux from the site bedrock to the Hudson River. These three areas include: the former Waste Oil Leachfield / B077 / Overpass Area; the former Antenna Drum Storage Area / B025 Lower Plant Area and; the former Burn Pit Area (figure 2). The corrective measures implementation, completed during 2000, includes groundwater extraction from ten (10) wells within the three areas with on-site treatment at a centralized location.

As noted in the most recent annual report for this site (2001 calendar year) flux to the Hudson River from the bedrock has decreased from approximately one pound per day to approximately 0.04 pounds per day for volatile organic compounds as a result of the CMI.

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<sup>2</sup> “existing area of contaminated groundwater” is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination and is defined by designated (monitoring) locations proximate to the outer perimeter of “contamination” that can and will be sampled/tested in the future to physically verify that all “contaminated” groundwater remains within this area, and that the further migration of “contaminated” groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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REFERENCES: Groundwater RCRA Facility Investigation - 12/12/1997  
Corrective Measures Study (Groundwater) - 3/31/1999  
Corrective Measures Implementation Report (Groundwater) - 11/15/2000  
Annual Groundwater Monitoring Reports - most recent 4/30/2002

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

If yes - continue after identifying potentially affected surface water bodies.

If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Stream H-107 and the Hudson River.

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration<sup>3</sup> of each contaminant discharging into surface water is less than 10 times their appropriate groundwater “level,” and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or ecosystems at these concentrations)?

  X   If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

\_\_\_\_\_ If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations<sup>3</sup> greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

\_\_\_\_\_ If unknown - enter “IN” status code in #8.

RATIONALE: An extensive surface water sampling program has been ongoing at the site since the late 1970's. Surface water samples have been collected where contaminated groundwater discharges to surface water (site gravel plume to H-107). These data show no parameters exceed the New York State Part 703 Standards for the groundwater constituents of concern (i.e. volatile organic compounds).

Other discharges to H-107 are currently monitored at the ‘end of the pipe’ under the New York State SPDES program. Most recent surface water sampling conducted at H-107 (June 2002) shows no detections above New York State surface water quality standards. Samples are collected from H-107 on a quarterly frequency.

A small area of the Group 1 capture zone still discharges to the Hudson River (figure 4). As of 6/13/2001 there were two wells with concentrations of trichloroethene greater than 10 times the groundwater standard (95.5 and 158 ppb), sampling performed on 11/8/2001 showed the well with the higher level reduced to 94 ppb. However, based on modeling, there is virtually no measurable impact to nearby surface water. A limited flux of approximately 0.04 pounds per day of volatile organic compounds is demonstrated as a result of the recently completed CMI groundwater pump and treat installation. It is expected that since the source area is being captured, concentrations will be further reduced over time.

Other discharges to the Hudson River are currently monitored at the ‘end of the pipe’ under the New York State SPDES program. Current monitoring at these outfalls satisfies all requirements of the SPDES permit for this site and the results are in compliance with limits established in that permit.

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<sup>3</sup> As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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In addition, significant modifications have been made to mitigate infiltration of groundwater into underground storm water piping systems which, in turn, discharge to surface water under a SPDES permit. These modifications have included segregation of dry weather flows with collection and subsequent treatment of this infiltrated groundwater.

REFERENCES: Annual Groundwater Monitoring Reports - most recent 4/30/2002  
RCRA Facility Assessments - various dates  
RCRA Facility Investigations - various dates  
Corrective Measures Study (Groundwater) - 3/31/1999  
Analysis of Sediment Characteristics - 5/1997  
Corrective Measures Implementation (Groundwater) - 11/15/2000  
New York State Department of Environmental Conservation SPDES Permit (NY0005541)

6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented<sup>4</sup>)?

*Not applicable, see #5.*

\_\_\_\_\_ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR  
2) providing or referencing an interim-assessment<sup>5</sup>, appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

\_\_\_\_\_ If no - (the discharge of “contaminated” groundwater can not be shown to be “currently acceptable”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

\_\_\_\_\_ If unknown - skip to #8 and enter “IN” status code.

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<sup>4</sup> Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

<sup>5</sup> The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

  X   If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

       If no - enter "NO" status code in #8.

       If unknown - enter "IN" status code in #8.

RATIONALE: The site's NYSDEC Part 373 permit and Groundwater Monitoring Plan require ongoing long-term monitoring at this site at appropriate locations to continue to monitor groundwater plumes and the performance effectiveness of their associated remedial systems.

REFERENCES: NYSDEC Part 373 Permit - renewed 10/27/1997  
Groundwater Monitoring Plan - 4/18/1997  
Performance Monitoring Reports - Semi-Annual

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

**YE - Yes.** "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the IBM Poughkeepsie facility, EPA ID # NYD 080480734 located at Poughkeepsie, New York. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

**NO - Unacceptable migration of contaminated groundwater is observed or expected.**

**IN - More information is needed to make a determination.**

Approved by (signature) *Keith H. Gronwald* Date September 27, 2002  
(print) Keith H. Gronwald  
(title) Engineering Geologist 2

Supervisor (signature) *Edwin Dassatti* Date 9/27/02  
(print) Edwin Dassatti  
(title) Director, Bureau of Solid Waste and Corrective Action  
(EPA Region or State) NYSDEC

Locations where References may be found:

NYSDEC, 625 Broadway, Albany, NY

IBM Poughkeepsie, 2455 South Road, Poughkeepsie, NY

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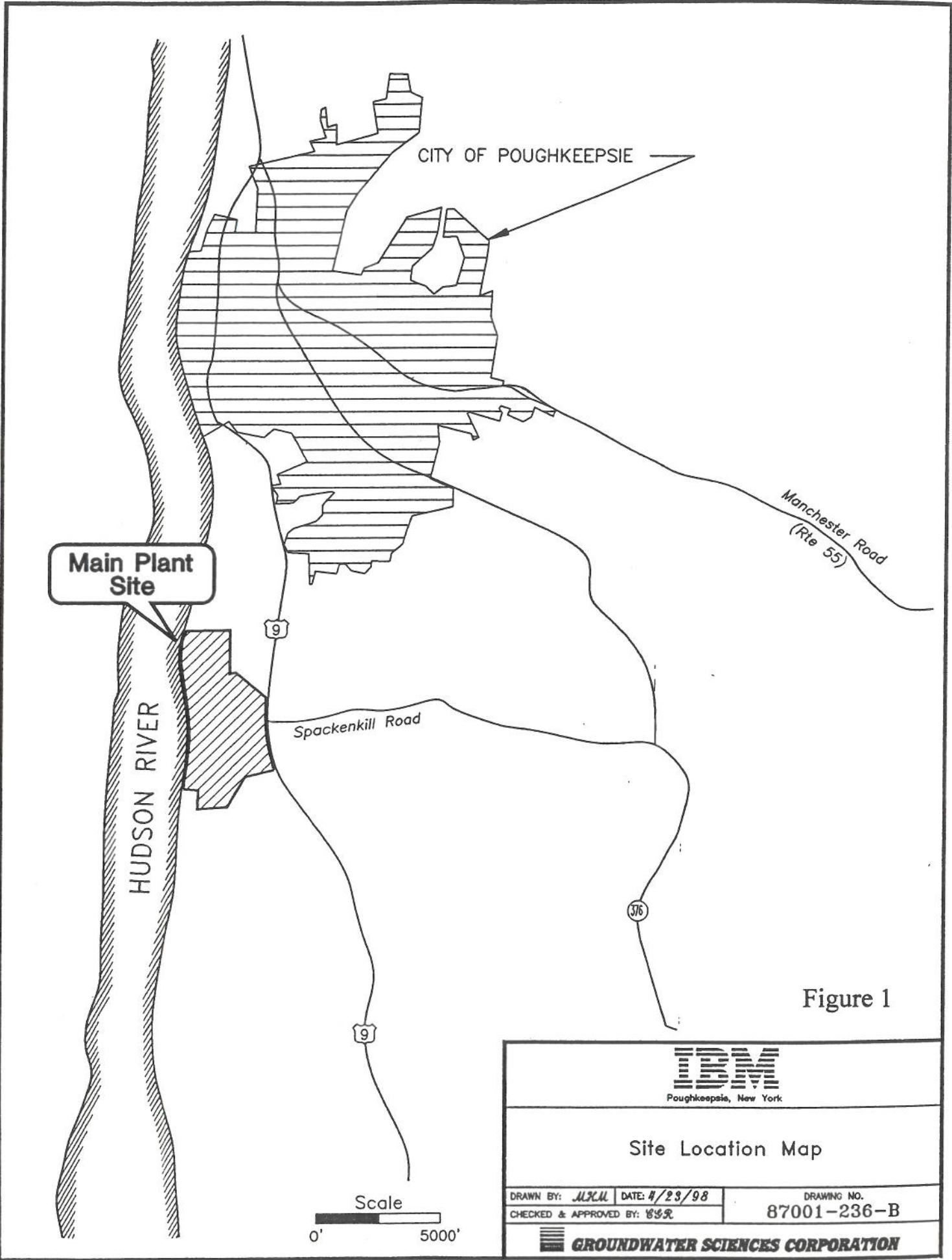


Figure 1

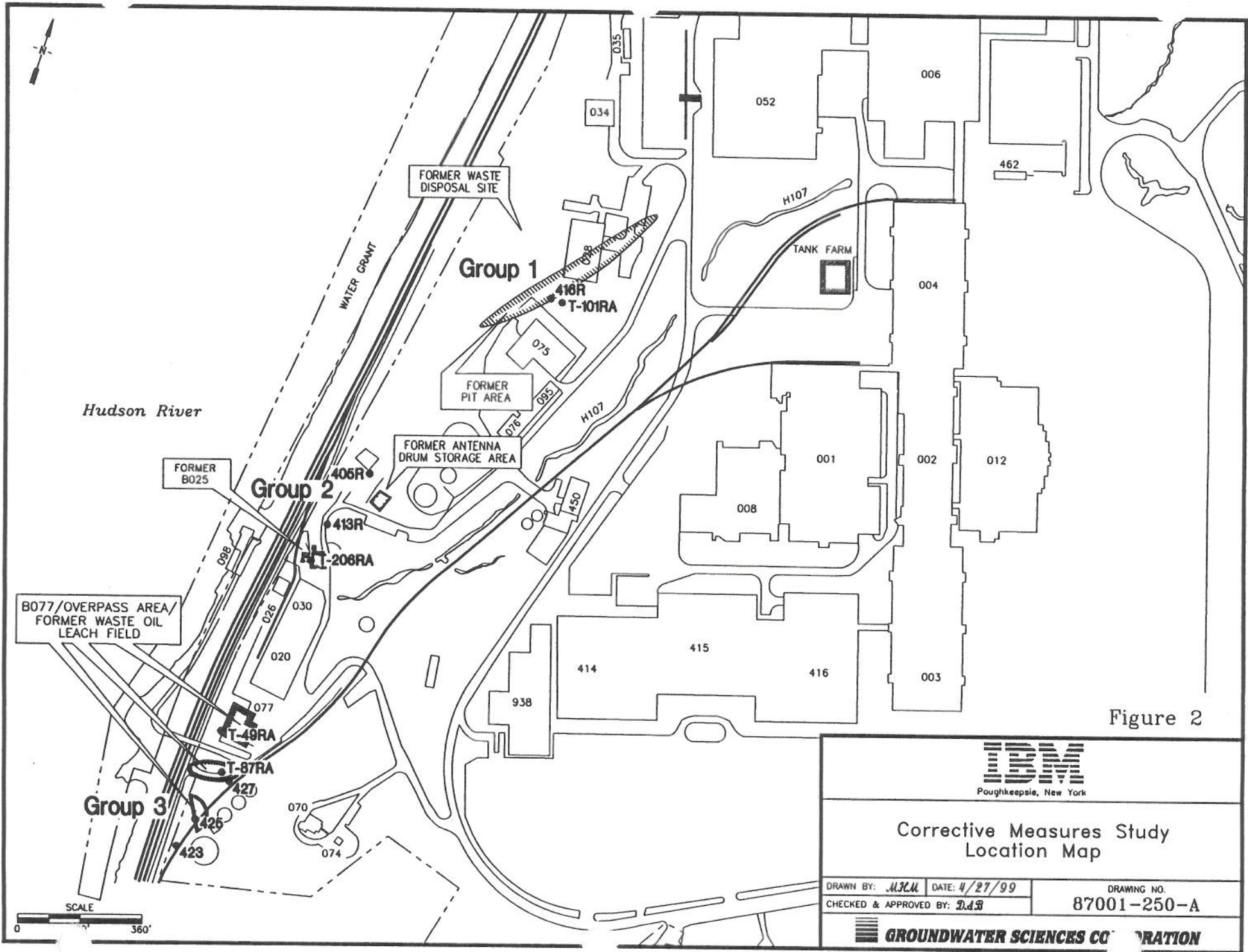
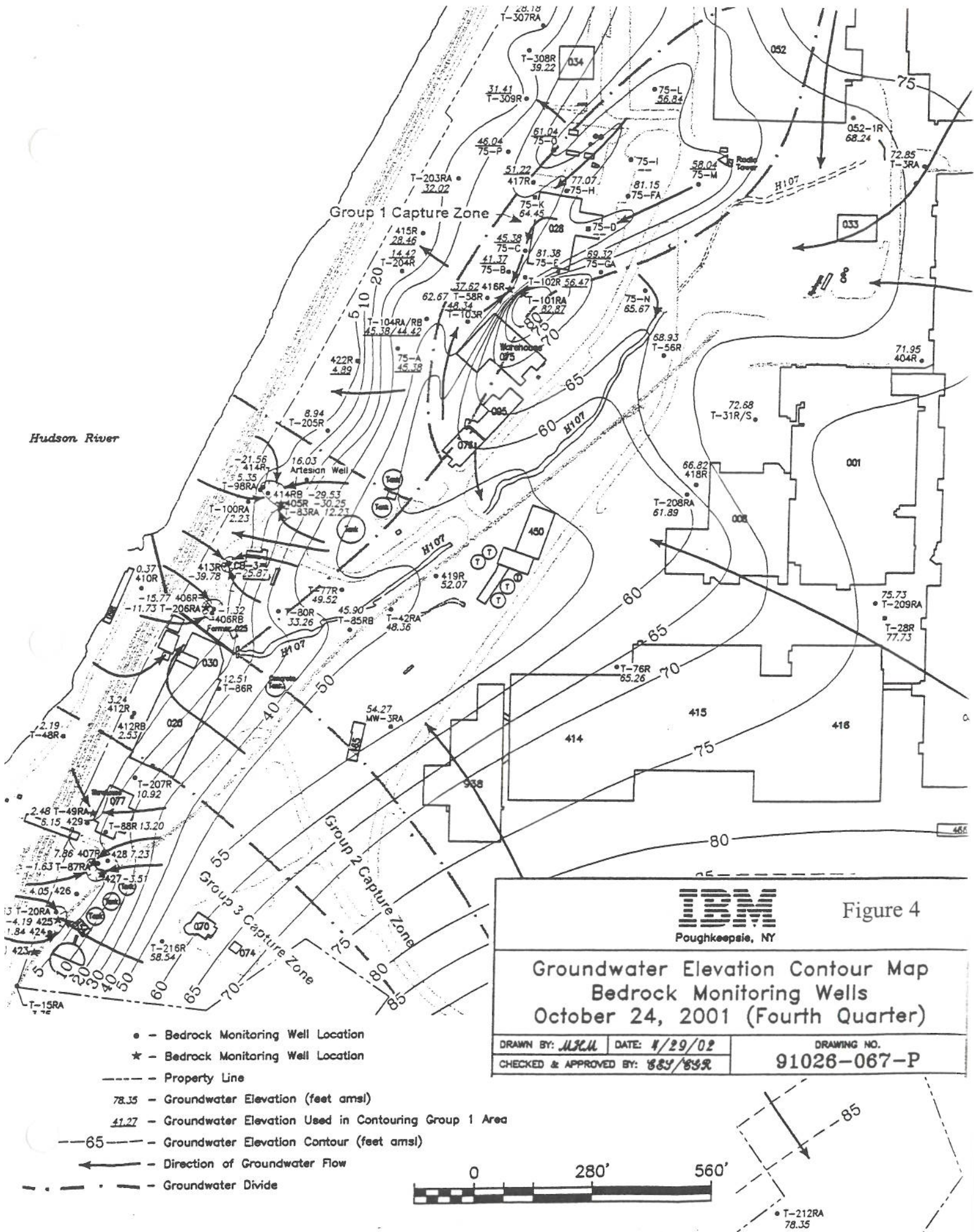


Figure 2



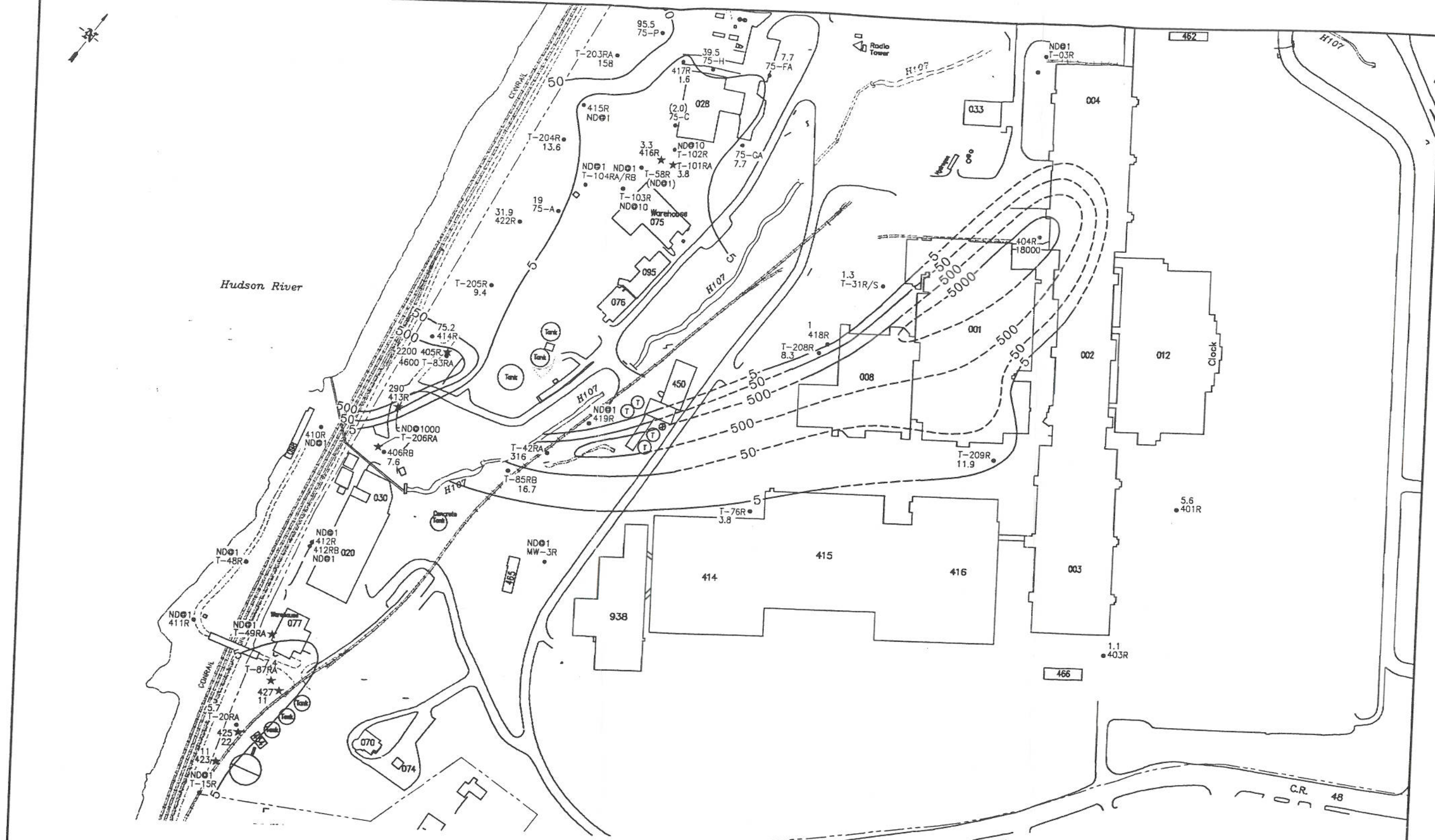
**Table 1 Analysis of Chemical Concentration Trends  
for Site Gravel Area**

<b>Well</b>	<b>Period (to present)</b>	<b>Parameter</b>	<b>Trend</b>	<b>Confidence Level (%)</b>
T-8-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing None	95 --
T-8-SB	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	99 95
T-22-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing None	95 --
T-32-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	95 90
T-41-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Increasing	95 95
T-42-R	3 <sup>rd</sup> Qtr 1993	TCE 1,2-DCE	Decreasing Increasing	95 90
T-57-S	1 <sup>st</sup> Qtr 1992	PCE TCE 1,2-DCE	None Decreasing Increasing	-- 95 --
T-75-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	95 95
T-85-R	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE VC	Increasing Increasing Decreasing	90 95 95
T-93-S	1 <sup>st</sup> Qtr 1992	TCE	Decreasing	95
T-217-S	1 <sup>st</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	95 95
T-314-S	3 <sup>rd</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	95 --
T-315-S	3 <sup>rd</sup> Qtr 1992	TCE 1,2-DCE	Decreasing Decreasing	95 95

The Kendall-Tau Test for trend was used on all data sets.

**Table 2 Analysis of Chemical Concentration Trends  
for Areas Adjacent to the Hudson River**

<b>Area of Investigation</b>	<b>Well</b>	<b>Period (to present)</b>	<b>Parameter</b>	<b>Trend<sup>d</sup></b>	<b>Confidence Level (%)</b>
B077	T-49-RA	1 <sup>st</sup> Qtr 1993	1,2-DCE	Decreasing	95
			Vinyl Chloride	Decreasing	95
Overpass	T-87-RA	2 <sup>nd</sup> Qtr 1994	1,1,1-TCA	Decreasing	95
		3 <sup>rd</sup> Qtr 1994	TCE	Decreasing	95
		3 <sup>rd</sup> Qtr 1994	1,2-DCE	Decreasing	95
Former Antenna Drum Storage Area	T-100-RA	3 <sup>rd</sup> Qtr 1993	TCA-Series	Decreasing	95
		3 <sup>rd</sup> Qtr 1991	TCE-Series	Decreasing	95
	T-83-RA	3 <sup>rd</sup> Qtr 1993	1,1,1-TCA	Decreasing	95
		1 <sup>st</sup> Qtr 1993	TCE	Decreasing	95
Former Burn Pit	75-GA	1 <sup>st</sup> Qtr 1991	TCE	Decreasing	95
			1,2-DCE	Decreasing	95
Former Inactive Waste Disposal Site	T-203-RA	1 <sup>st</sup> Qtr 1990	TCE	Decreasing	95
		2 <sup>nd</sup> Qtr 1990	1,2-DCE	Decreasing	90
Former Waste Oil Leach Field	T-20-SA	2 <sup>nd</sup> Qtr 1993	1,2-DCE	None	--
		4 <sup>th</sup> Qtr 1991	Vinyl Chloride	Decreasing	95
		3 <sup>rd</sup> Qtr 1991	TCE-series	Decreasing	90
	T-20-RA	1 <sup>st</sup> Qtr 1992	TCE	Decreasing	95
			TCE-series	Decreasing	--
		1996 to present	1,2-DCE	Increasing	95
B025	T-206-S	1 <sup>st</sup> Qtr 1991	1,1,1-TCA	Decreasing	95
			1,1-DCA	Decreasing	95
			TCE	Decreasing	90
			1,2-DCE	Decreasing	95
			Vinyl Chloride	Decreasing	95
			TCE-series	Decreasing	95



Notes: 1) All well locations, including exception holes, surveyed by Hayward & Palms Associates, Poughkeepsie, New York.  
 2) Open symbol denotes approximate located or tested monitoring well location; no survey data available, locations derived from historical sources.  
 3) Filled square symbol denotes monitoring well location not yet surveyed.  
 4) Cabling wells inside 0003 and 0004 located by measurements from known locations of building columns.  
 5) Property lines digitized from a Hayward & Palms Associates 8/11/88 update to a map by R.A. Mowat entitled "Property of International Business Machines Corporation-Plant No. 2" dated 2/14/82, revised 12/18/78 and filed as 22d surveying no. 000-5-2073; field surveying was not performed for this mapping project.

— Bedrock Monitoring Well Location (has data for this monitoring period)  
 \* Groundwater Extraction Well  
 --- Property Line  
 --- Trichloroethene Concentration Contour (ug/l)  
 200 - Trichloroethene Concentration (ug/l; 5/1/01 - 6/27/01)  
 (L.O) - Average Concentration (ug/l)  
 ND - Not Detected

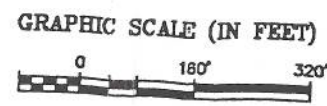


Figure 3

<b>IBM</b> Poughkeepsie, NY	
<b>Trichloroethene Shallow Bedrock Groundwater Concentration Contour Map (ug/l)</b>	
DESIGNED BY: <i>J.E.A.</i> DATE: 8/16/02	DRAWING NO.: TCE_R7
CHECKED & APPROVED BY: <i>J.E.A.</i>	
<b>GROUNDWATER SCIENCES CORPORATION</b>	