Region 2
RCRA Corrective Action
Facility Fact Sheet

Last Update: February 1, 2005

Facility Name: IBM East Fishkill

Facility EPA ID #: NYD00707901

Facility Address: Route 52
Hopewell Junction, New York 12533-0999
Dutchess County

Site Responsibility and Legal Instrument:
New York State 6NYCRR Part 373 Hazardous Waste Management Permit addresses: (1) the storage and management of hazardous waste in containers; (2) the operation and maintenance of the Interim corrective measures for contaminated groundwater; and (3) the monitoring and maintenance of the groundwater monitoring network used to assess the performance of the Interim corrective measures.

Permit Status:
6NYCRR Part 373 Hazardous Waste Permit was issued 09/29/1995 and expired 09/29/2005.

Facility and Release Sources

The 600 acre IBM East Fishkill Facility, as shown on Plate 1, is located approximately 50 miles north of New York City and 10 miles east of the Hudson River. The Facility is bordered by Lime Kiln Road to the east, State Route 52 to the north, U.S. Route 84 to the south and open fields surrounding a creek to the west. The facility is divided into the East and West Complexes which are separated by Gildersleeve Brook, John Jay High School and an electric transmission line. The 430-acre East Complex has been used since 1963 for manufacturing of semiconductor and electronic computing equipment and has about 30 buildings and structures. At this Complex the groundwater is contaminated and subject to an extensive monitoring and remediation program . The 162-acre West Complex housed IBM's semiconductor research and development activities. Groundwater at this Complex is not

contaminated but IBM does maintain a groundwater detection monitoring program. That program assesses the groundwater quality at the West Complex and the effectiveness of the remediation system operating at the East Complex to control contaminant migration. As in 2003, Groundwater sampling was conducted at 179 monitoring wells and groundwater elevations were measured quarterly at 393 HEM Wells (Hydraulic Effectiveness Monitoring).

The IBM East Fishkill Facility's groundwater monitoring program at both Complexes provides the necessary data to manage the water quality problems and the Facility's water supply. Deep bedrock groundwater is pumped from 17 active production wells, nine of which are located on the East Complex (including PW-9 which is used only for water supply emergencies) and the remainder located off-site. Groundwater from the production wells serve as the primary source of water for the Facility. Contaminated groundwater pumped from the East Complex is subject to treatment prior to its use for production and on-site drinking water.

At the East Complex IBM completed several investigations and detected elevated levels of hazardous constituents especially VOCs in the soil and groundwater. Several major sources of releases were identified and remediated including: (1) former underground waste and raw material solvent tank systems; (2) former underground piping systems that transported wastewater with high concentrations of contaminants and spent solvents for recycling between buildings; (3) a former open burning fire-training area where spent solvents were used to start fires; (4) former landfills containing spent solvent hazardous waste mixed with solid waste; and (5) a former solid waste land-based storage area containing debris and other contractor waste materials. These releases have resulted in at least 9 overburden plumes and 4 bedrock plumes under the east complex. However, the continued presence of dense non-aqueous phase liquid (DNAPL) in the deep bedrock from prior solvent releases still remains a constant source of bedrock groundwater contamination at this Complex.

Corrective Action Program.

IBM East Fishkill is currently conducting an Interim Corrective Measures Program to monitor, collect, and treat contaminated groundwater. The current Interim Corrective Measures Program is addressing remedial work in the following seven areas of concern (AOCs) depicted in Plate 1 are as follows; Area A, Area B, Area D, Landfill Area, Southeast Quadrant (SEQ), Building 322 (B/322) Area and Building 330 (B/330) Area.

The Corrective Measures Program involves the operation of six (6) groundwater collection and treatment systems and the monitoring of a previously remediated landfill (Area C). The GW collection and treatment systems are referred to as the Central Carbon, Area (A), Area (B), Area (D), Building 322, Building 330 and the Southeast Quadrant treatment systems and are described below.

The "Key Compounds" (compounds with the highest concentrations and the greatest areal distribution) will be used to determine plume boundaries. The "Key Compounds" are Tetrachloroethene, Vinyl Chloride, Trichloroethene, Freon TF, and cis-1,2-Dichloroethene. The Areas of Concern and their associated "Key Compounds" are contained in Table 1.

Table 1

List of Key Compounds	
Area of Concern	**Key Compound**
Area A	Tetrachloroethene, Trichloroethene, and cis-1,2-Dichloroethene
Area B	Tetrachloroethene
Area C (Landfill)	Tetrachloroethene, Trichloroethene, cis-1,2-Dichloroethene, Vinyl Chloride, and Freon TF
B/330	Tetrachloroethene, Trichloroethene, cis-1,2-Dichloroethene, Vinyl Chloride, and Freon TF
Area D	Tetrachloroethene, Trichloroethene, and cis-1,2-Dichloroethene
B/322	Tetrachloroethene, Trichloroethene, cis-1,2-dichloroethene, Freon TF and Freon 123
South East Quadrant	1,1,2,2-Tetrachloroethene, 1,1,2-Trichloroethene, and cis-1,2-Dichloroethene

In 2002, approximately 6,600 pounds of VOCs were removed from approximately 375 millions gallons of groundwater pumped from the shallow and dep bedrock

remediation areas, Since 1979, approximately 117 tons of VOCs have been removed from approximately 8.3 billion gallons of extracted groundwater.

Deep Bedrock Containment and Treatment System.

The purpose of the on-site deep bedrock production well system and the associated central carbon treatment system is to control and contain contaminated bedrock groundwater thus preventing off-site migration and to treat this groundwater for process and/or potable water use.

The contamination, primarily tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and freon TF, is located in the bedrock underlying the central portion of the facility (B/308, B/309, B/310, B/316, B/320, B/322, B/323, B/330 and B/334). The bedrock formation is the Stockbridge or Wappinger Limestone (Dolostone) formation with a thickness of approximately 1000 feet. The contamination of the bedrock aquifer is primarily associated with chemical handling in Area A and Area C (landfill) and B/330. Contamination found in the bedrock has migrated through the overburden into the bedrock.

This treatment system/containment system consists of nine production wells (PW) which collectively create a large cone of depression within the bedrock aquifer. The result is a controlled influence over the flow of contaminated groundwater in the bedrock toward the production wells. Production Wells 1, 2, 4, 5/5A, 6, 7,23 ans 25 are pumped continuously. Production wells 1, 5/5A, and 6 are pumped to maintain on-site gradients. Production well 9 is only pumped during water supply emergencies. During 2002, IBM pumped approximately 1.2 million gallons of water at day.

Discharge from each of the production wells is pumped through underground piping to the B/316 central carbon system. The central carbon system consists of an influent blend tank and four (4) trains of activated carbon. Each granular activated carbon (GAC) train consists of two (2) 20,000 pound activated carbon units (down flow type) which are operated in series.

Presently, groundwater pumped from PWs 1, 4, 5/5A, 6, 7, 9, 23 and 25 is piped to the influent blend tank and then pumped into the GAC units. The treated groundwater is then delivered to the deionized water system (DI system) and to the raw water storage facilities. The water is then utilized for both process and potable use.

Discharge from production well 2 is treated in a separate GAC system located in

B/316. Two 20,000 pound carbon vessels are available for treating PW-2 water. However, at the present time only one of the carbon vessels is needed to treat the groundwater. The water is then used for process water or discharged to the Industrial Waste facility and/or to a tributary of Gildersleeve Brook (SPDES Permit #NY0005096, outfall #004). Currently all water from PW-2 is being reused or discharged to the industrial waste facility.

Area A Treatment Facility.

The objective of the Area A treatment facility is to contain and treat groundwater contaminated with volatile organic chemicals (VOCs), primarily 1,1,2,2-Tetrachloroethene (PCE), located throughout a glaciolacustrine/till layer in the vicinity of B/308, B/309 and B/310. Contamination in this area resulted from the handling of hazardous constituents from the mid 1960's to the mid 1970's.

Within this area groundwater is collected using a six foot diameter concrete sump which is joined to two 30 foot perforated drains. A 10 gpm suction pump with high-low level sensors removes water from the sump to a solvent separator. From the solvent separator, contaminated groundwater flows by gravity to a 5900 gallon influent storage tank. The contaminated groundwater is pumped via a 30 gpm centrifugal pump to the top of an air stripping tower. The effluent from the stripping tower is pumped to an effluent storage tank. Water from the effluent storage tank flows by gravity to an industrial waste transfer line.

The water is then blended with industrial waste at the industrial waste facility then discharged to the sanitary waste treatment facility. The treated water from the sanitary waste treatment facility is discharged to Gildersleeve Brook (SPDES Permit # NY0005096, outfall #1.

The Area A treatment plant is located within Building 384. As of 2002, the facility processed an average rate of 0.8 gpm. The average influent chemical concentration to the treatment plant averaged 33,000 ug/L. The average effluent concentration from the Area A Treatment Plant is less than 100 ug/L of volatile organic compounds.

Area B Treatment Facility.

The purpose of the Area B treatment facility is to contain and treat groundwater contaminated with PCE in the shallow bedrock adjacent to IBM Gate 4. Contamination in this area is associated with fire training operations from the late 1960's.

The design of the Area B treatment facility incorporates a 1/2 horsepower submersible pump installed in MW-863. Water is pumped from MW-863 through a particulate filter then through two 40 pound activated carbon cylinders. The treated water is then discharged to an upgradient leachfield as designated by plans submitted and approved under IBM's Order on Consent with the NYSDEC.

Currently, the contaminant concentration levels in MW-863 are approximately 1.9 to 8.4 ug/L of PCE and the average flow rate is 0.7 gpm. the effluent concentration is <0.5 ug/L of PCE. The flow rate is adjusted manually such that the amount of particulate material drawn into the well is minimized and a sufficient cone of depression is achieved.

Area D Treatment Facility.

The objective of the Area D treatment facility, is to contain and treat contaminated groundwater in the shallow unconsolidated sediments adjacent to the sanitary wastewater treatment facility. Contamination found in Area D resulted from fire training operations which occurred during the mid 1970's.

The Area D treatment facility utilizes a 1/3 HP submersible pump equipped with high and low level controls installed in MW-032A. The contaminated groundwater is pumped to a sanitary waste manhole and fed into the head end of the sanitary wastewater treatment facility. Here the groundwater is combined with raw sanitary waste and treated industrial waste water. Water from this treatment plant is discharged to Gildersleeve Brook under IBM East Fishkill SPDES permit, outfall number #001.

As of 2002, the contamination levels in the pumped well, MW-32 are PCE less than 2 ug/L, and TCE (1,1,2-Trichloroethene) between 4 to 8 ug/L. The average flow rate from Area D is approximately 1.0 gpm. Two compliance points have been established downgradient of this area at the western perimeter of the East Complex.

Area C Remediation Area (Landfill).

The Area C remediation program involved the removal of a construction debris landfill which had been determined to contain hazardous chemicals, primarily chlorinated hydrocarbons and Freon TF (Trichlorotrifluoroethane). In 1982,

twenty-thousand cubic yards of material was removed and sent off-site to an approved landfill. The excavation was backfilled with clean soil and capped with clay. Contamination from the landfill has penetrated into the bedrock. Production Well #7 is pumped continuously to help contain any migration from the area and monitoring wells are constructed upgradient and downgradient of the landfill. All water discharged from PW-7 is treated with GAC in the Central Carbon System.

Building 330 (B330)

The primary focus of B330 AOC has been the presence of volatile organic compounds (VOCs), primary chlorinated ethenes and lesser concentrations of chlorofluorocarbons in groundwater presently used by IBM for potable and production uses following treatment. The VOC-containing groundwater is derived from six bedrock water supply wells located in, or adjacent to, the B330 AOC and is treated prior to use via carbon adsorption. The most predominant VOCs include tetrachloroethylene (PCE), trichloroethylene (TCE), and cis-dichloroethylene (DCE). Water produced from PW-25 will undergo treatment for removal of VOCs at the Central Carbon Treatment (CCT) located in Building 316. Groundwater produced from this well has been shown to contain higher concentration of VOCs than the other water supply wells, so the separation will eliminate blending of the influent flow with lower concentrations of VOCs, increasing treatment efficiency. Treated water will be used for process water and will not used as a potable water source.

Building 322 (B322)

The overall objective of this groundwater system is to limit the potential migration of the apparent VOC plume toward the Gildersleeve Brook, which represents a potential future exposure point. The PCE-series plume has a southerly component extending in the direction of groundwater flow toward wells 767 and 793 from a source near well 735 at northeast corner of B/322, and a westerly component extending from the same source area toward extraction wells 612 and 617 of the B/322 remediation system. The contaminated groundwater is pumped to a sanitary waste manhole and fed into the head end of the sanitary wastewater treatment facility. Here the groundwater is combined with raw sanitary waste and pretreated industrial waste water before treatment within IBM's B325 treatment facility. Water from this treatment plant is discharged to Gildersleeve Brook under IBM East Fishkill SPDES permit, outfall number #001.

Southeast Quadrant (SEQ)

This AOC is the former IBM East Fishkill contractor storage area. The primary contaminants in this area are 1,1,2,2-Tetrachloroethene, 1,1,2-Trichloroethene, and cis-1,2-Dichloroethene. Contamination in this AOC probably resulted from the handling of hazardous constituents during the 1970s. The overall objective of this groundwater system is to limit the potential migration of the VOC plume toward northward to Lime Kiln Rd in the shallow bedrock. Here, the groundwater is piped to the IBM Central Carbon Treatment Facility located in Building 316 for activated carbon treatment to remove VOCs.. The groundwater is used for potable or process following treatment.

West Complex Detection Monitoring

The objective of the groundwater monitoring program for the West Complex is to detect the presence of hazardous constituents which; (a) potentially could be due to the West Complex facility and/or (b) potentially could flow onsite from offsite as a result of IBM East Fiskill's production wells.

Protocol for Future Expansion

As part of a major expansion of the B/323 manufactuing building, the state asked IBM to evaluate the potential for vapor intrusion of VOCs into the new building. None of the primary contaminants of concern (PCE, TCE, cis-DCE, VC and Freon TF) were observed in the soil samples collected in the vicinity of the proposed building. There were, however, 5-50 ppb of PCE present in the bedrock groundwater beneath (> 100 ft) the building area. Due to the relative depth of the groundwater contamination and based on the design of the building (it will be maintained under positive pressure), IBM concluded that vapor intrusion will not be a concern at the new building.

As part of other future expansion or major construction projects at its East Fishkill facility, IBM will submit a pre-construction soil sampling program workplan for approval to NYSDEC. It should be noted that all activities conducted as part of this workplan will be required to comply with the requirements imposed by the facility's Part 373 permit.

Potential Sites of Environmental Concern

There are two sites of environmental concern a few miles from the IBM East Fishkill

facility: Shenandoah Rd (7 East Hook Cross Rd) and Hopewell Precision.

Shenandoah Rd

A former commercial facility at 7 East Hook Cross Road allegedly dumped the chemical tetrachloroethylene, or PCE, down a drain into the septic system in the 1960s and '70s, contaminating the groundwater. The pollution was discovered in 2000, and the site was named a Superfund site in June 2001. IBM has accepted responsibility for the cleanup.

Hopewell Precision

As of 2002, EPA conducted a sitewide investigation at Hopewell Precision 19 Ryan Road.

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