RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: **IBM East Fishkill Facility**
Facility Address: **2070 Route 52, Hopewell Junction, NY 12533**
Facility EPA ID#: **NYD000707901**

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

   _X_ 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 EIs 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 "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "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 "Current Human Exposures under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

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).

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated"[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	X			Groundwater monitoring: Volatile Organic Contaminants (VOCs).
Air (indoors)[2]		X		Groundwater Data & Johnson-Ettinger Model:VOCs
Surface Soil (e.g., <2 ft)	X			Soil sampling: VOCs but covered.
Surface Water		X		No impact from facility releases.
Sediment		X		No impact from facility releases.
Subsurf. Soil (e.g., >2 ft)	X			Soil sampling: VOCs .
Air (outdoors)		X		No impact from facility releases.

_____ If no (for all media) - skip to #6, and enter "YE", status code after providing or citing appropriate "levels", and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

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. 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 14 active production wells, six of which are located on the East Complex 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.

---

1 "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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

2 Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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. 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.

Soils and Geology

The geology of the area is typified by folded and faulted Paleozoic sedimentary rocks overlain by unconsolidated glacial outwash deposits. Locally, the bedrock consists of Ordovician limestones and dolomites known as the Stockbridge limestone. Where outcrops occur on-site and in the area, the rocks dip 30° to 40° eastward. This rock is heterogeneously faulted and fractured, resulting in zones of high secondary porosity caused by dissolution processes. The bedrock surface at the facility is generally shallow, but very uneven, with elevations ranging from 50 to 250 feet above sea level.

The bedrock is unconformably overlain by Pleistocene glacial deposits. The glacial deposits vary in both thickness and texture. The soils produced by these deposits are generally classified as a silty sand. The soils are said to be sufficiently permeable to allow percolation of surface water and potential contaminants. Finer grained beds and lenses in the sediments produce discontinuous impermeable and semi-permeable layers.

Geology And Groundwater Hydrogeology.

Groundwater at the IBM East Fishkill Facility occurs in saturated zones within the subsurface soil (i.e., overburden) and bedrock. In general, recharge to the bedrock passes through or around the overlying soil units, which include fill, alluvial sands and gravels, and extensive but discontinuous layer of glaciolacustrine silt and clay, and an extensive glacial till. The maximum thickness of these units is 120 feet. Strong vertical flow of groundwater is induced by the six on-site corrective action pumping wells completed in the bedrock.

On the East Complex, seven shallow soil groundwater areas and the deep bedrock groundwater are contaminated with organic contaminants with the latter containing DNAPL. The seven soil groundwater 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. Plate 2 shows the groundwater elevations for portions of the soil water table and large unsaturated areas during the third quarter of 2000 (July) under dynamic conditions of long-term corrective action pumping in the bedrock. The unsaturated soils are generally found in areas that have been dewatered by pumping or that lie on top of buried bedrock ridges or other areas of relatively high bedrock surface elevation. In the northern parts of the East Complex the water table mirrors the surface topography of the silt/clay unit together with several areas of dense till which act as the primary control on soil groundwater flow. These geologic units inhibit vertical flow of soil groundwater into lower units and act as a barrier to vertical contaminant transport. Geologic areas where the subsurface units are not dense allow the soil groundwater to pass into the bedrock. Significant areas of soil groundwater are the zones of perched water that exist in fine-to course-grained alluvial sand that lies above the silt/clay unit in Area A, Area D and B/322 AOCs. Groundwater flow within the alluvial sand and above the silt/clay unit has been calculated to range from 0.03 to 70 feet per day with a median of 0.7 feet/day.

Plate 3 depicts the potentionmetric head distribution in the deep bedrock groundwater system during the third quarter of 2000 (July) under dynamic pumping conditions. This contour map was developed form the deepest bedrock well cluster with screened or open hole interval elevation between 50 and 120 feet amsl correlating with the principal water-bearing zones in the six production wells. The hydraulic characteristics of the fractured bedrock groundwater system are influenced by the bedrock's structural fabric, which generally tends north-south and was created by complex folding, fracturing and faulting. The groundwater flow arrows on Plate 3 represent only generalized flow directions and not the actual flow paths of groundwater "particles." This representation is typical for fractured bedrock aquifers where zones of high fracture connectivity facilitate flow in directions other than those determined by the apparent potentionmetric head distribution. Generally, groundwater flow directions are toward the production wells where steep vertical gradients occur.

Groundwater
Groundwater monitoring data collected under the site's Order on Consent and for the site's 6NYCRR Part 373 permit indicate that Part 703 New York State Groundwater Quality Standards and site specific concentration limits (Table III-9, 6NYCRR Part 373 permit) have been exceeded.

Key Contaminants: tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, vinyl chloride, Freon TF and Freon 123a.

References:
IBM East Fishkill Order on Consent, Case #3-0556; Article 27 ECL, New York State Department of Environmental Conservation, April 27, 1981.
IBM East Fishkill Order on Consent Supplement and Clarification, Case #3-0556; Article 27, ECL, New York State Department of Environmental Conservation, June 19, 1986.
6NYCRR Part 373 Permit, IBM East Fishkill facility, New York State Department of Environmental Conservation, September 29, 1995.
1995 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, July 26, 1996.
1996 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 29, 1997.
1997 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 22, 1998.
1998 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 26, 1999.
1999 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2000.
2000 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2001.
Groundwater RFI Final Report, B/322 Area of Concern, Sanborn Head and Associates, April 11, 1997.
Groundwater RFI Final Report, B/330 Area of Concern, Sanborn Head Engineering, P.C., October 1997.

Air (indoor)
Based upon groundwater concentrations existing beneath and adjacent to site buildings, the Johnson and Ettinger vapor intrusion model was run by a qualified risk assessor for eleven on-site buildings (B/308, B/309, B/310, B/315, B/316, B/320B, B/321, B/322, B/330C, B/330D and B/386). Two years of groundwater data from July 1998 to June 2000 was used. The model was run under the very conservative assumption that the highest concentrations detected beneath or adjacent to each site building considered are present beneath the entire building. (Note: Chemical data from groundwater monitoring wells with a depth to water of 27 feet or less below ground surface was used.) An inhalation exposure/risk model was run using the calculated indoor air concentrations for each of the eleven buildings and for all VOCs detected. The risk model assumed a body weight of 70 kg, an inhalation rate of 6.66m^3/8-hour shift, exposure duration of 25 years, exposure time of 8 hours/shift and exposure frequency of 250 days/year. Based upon these assumptions, all risk modeling results were acceptable.

Key Contaminants: Acetone, benzene, chlorobenzene, 1,2-dichlorobenzene, cis-1,2- dichloroethene, ethylbenzene, Freon11, Freon 12, Freon 123a, Freon TF, tetrachloroethene, trichloroethene, vinyl chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, methylene chloride, toluene, xylenes.

References: Data Evaluation-Risk Assessment completed in March 2001 and revised on September 2001.

Surface Soil (e.g. < 2 ft.)
Comparison of all available surficial soils data to Recommended Soil Cleanup Objective values presented in TAGM 4046 *Determination of Soil Cleanup Objectives and Cleanup Levels* showed four (4) parameters (acetone, methylene chloride, tetrachloroethene, and toluene) which exceeded the TAGM. (Note: For this comparison, soil data from a depth of 0 to 5 feet was used.) An exposure/risk model assessing risks due to inhalation, dermal contact and ingestion was run using maximum concentrations of all hazardous chemicals detected in soils for the maintenance worker and construction worker scenarios. Assumptions for the maintenance worker included body weight of 70 kg, inhalation rate of 20 m^3/shift, an exposure frequency of 250 days/year, exposure duration of 25 years, an exposure time of 8 hours/shift and an ingestion

rate of 50 mg/day. Assumptions for the construction worker included a body weight of 70 kg, an inhalation rate of 20 m^3/shift, an exposure time of 8 hour/shift, an exposure frequency of 112 days/year, exposure duration of 1 year, and an ingestion rate of 50 mg/day. Based upon the risk assessment results, none of the risks for the construction worker or maintenance worker are unacceptable.

Key Contaminants: Acetone, methylene chloride, tetrachloroethene, and toluene

References: Data Evaluation-Risk Assessment completed in March 2001 and revised on September 2001.

Surface Water

Shallow groundwater seasonally discharges to surface water in limited areas of the site via an unregulated central drainage (H-95-9A),and the Gildersleeve Brook (H-95-9). Monthly monitoring of these surface waters at five locations, including IBM's Outfall 001, indicate that VOCs are detected at concentrations below 6NYCRR Part 703 standards for surface water.

Key Contaminants: Tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, vinyl chloride, Freon TF and Freon 123a.

References:

1995 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, July 26, 1996.
1996 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 29, 1997.
1997 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 22, 1998.
1998 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 26, 1999.
1999 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2000.
2000 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2001.
IBM East Fishkill SPDES DMRs and surface water databases.

Sediment

Contamination of sediment is not reasonably suspected given very low concentrations of VOCs detected in surface water.

Key Contaminants: Tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, vinyl chloride, Freon TF and Freon 123a.

Subsurface Soil (e.g. > 2 feet)

A comparison of all available subsurface soils data to the Recommended Soil Cleanup objectives presented in TAGM 4046 *Determination of Soil Cleanup Objectives and Cleanup Levels* was conducted. (Note: For this comparison, soil data from a depth of 5 to 60 feet was used.) This comparison showed that subsurface soil results exceeded TAGM 4046 guidance values for 1,1,1-trichloroethane, 1,2-dichlorobenzene, acetone, methylene chloride, Freon TF, phenol, tetrachloroethene, toluene, trichloroethene, and xylenes.

An exposure/risk model assessing risks due to inhalation, dermal contact and ingestion was run using maximum concentrations of all hazardous chemicals detected in soils for the construction worker scenario. Assumptions for the construction worker included a body weight of 70 kg, an inhalation rate of 20 m^3/shift, an exposure time of 8 hour/shift, an exposure frequency of 112 days/year, exposure duration of 1 year, and an ingestion rate of 50 mg/day. Based upon the risk assessment results, none of the risks for the construction worker are unacceptable.

Key Contaminants: 1,1,1-trichloroethane, 1,2-dichlorobenzene, acetone, methylene chloride, Freon TF, phenol, tetrachloroethene, toluene, trichloroethene, and xylenes.

References: Data Evaluation-Risk Assessment completed in March 2001 and revised on September 2001.

Air (Outdoor)
Prevailing winds and an uncontained volume of air would result in contaminant concentrations in ambient outdoor air significantly less than that calculated for indoor air. It is therefore not reasonable to expect that this medium is contaminated above indoor air risk-based levels.

3. Are there complete pathways between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	NO	NO	NO	NO	NO	NO	NO
~~Air (indoors)~~							
Soil (surface, e.g., <2 ft)	NO	NO	NO	NO	NO	NO	NO
~~Surface Water~~							
~~Sediment~~							
Soil (subsurface e.g., >2 ft)	NO	NO	NO	NO	NO	NO	NO
~~Air (outdoors)~~							

Instructions
Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces (for Media which are not "contaminated") as identified in #2 above.
2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media - Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations, some potential "Contaminated: Media - Human Receptor combinations (Pathways) do not have check spaces ("____"). While these combinations may not be probable in most situations, they may be possible in some settings and should be added as necessary.

____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__X__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Groundwater:

Rationale:
The site uses water from its onsite production wells (PW 1, 4, 5/5A, 6 and 7) for potable use. The central carbon facility is part of a permitted NYSDOH approved facility. This system is monitored extensively and meets all NYSDOH requirements. Therefore the groundwater pathway is incomplete.

References:

1995 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, July 26, 1996.
1996 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 29, 1997.
1997 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 22, 1998.
1998 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 26, 1999.
1999 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2000.
2000 Annual Corrective Action Status Report, Groundwater Sciences Corporation and IBM Environmental Engineering, May 30, 2001.

Indoor Air:

Rationale:
See answer to question 2 above regarding indoor air.

Surface Soils:

Rationale:
See answer to question 2 above regarding exposure to surface soils for maintenance workers and construction workers. Health and safety protocols are in place for site excavation work. In addition, the site is fenced, posted and patrolled to help prevent trespassers from entering the site. The site is not used for recreation or food production.

References: Data Evaluation-Risk Assessment completed in March 2001 and Revised on September 2001.

Subsurface Soils:

Rationale:
See answer to question 2 above regarding exposure to subsurface soils for construction workers. Health and safety protocols are in place for site excavation work In addition, the site is fenced, posted and patrolled to help prevent trespassers from entering the site. The site is not used for food production.

References: Data Evaluation-Risk Assessment completed in March 2001 and revised on September 2001.

4. Can the exposure from any of the complete pathways identified in #3 be reasonably expected to be "significant"[2] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

   _X_ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of

---

[2] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

the complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

_____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Air (indoor)

Rationale:
Based upon groundwater concentrations existing beneath and adjacent to site buildings, the Johnson and Ettinger vapor intrusion model was run by a qualified risk assessor for eleven on-site buildings (B/308, B/309, B/310, B/315, B/316, B/320B, B/321, B/322, B/330C, B/330D and B/386). Two years of groundwater data from July 1998 to June 2000 was used. The model was run under the very conservative assumption that the highest concentrations detected beneath or adjacent to each site building considered are present beneath the entire building. (Note: Chemical data from groundwater monitor wells with a depth to water of 27 feet or less below ground surface was used.) An inhalation exposure/risk model was run using the calculated indoor air concentrations for each of the eleven buildings and for all VOCs detected. The risk model assumed a body weight of 70 kg, an inhalation rate of 6.66 m^3/8-hour shift, exposure duration of 25 years, exposure time of 8 hours/shift and exposure frequency of 250 days/year. Based upon these assumptions, all risk modeling results were acceptable.

Key Contaminants: Acetone, benzene, chlorobenzene, 1,2-dichlorobenzene, cis-1,2- dichloroethene, ethylbenzene, Freon11, Freon 12, Freon 123a, Freon TF, tetrachloroethene, trichloroethene, vinyl chloride, 1,1,1-trichloroethane, 1,1-dichloroethene, methylene chloride, toluene, xylenes.

References: Data Evaluation-Risk Assessment completed in March 2001 and revised on September 2001.

Surface Soil (e.g. < 2 ft.)

Rationale
Comparison of all available surficial soils data to Recommended Soil Cleanup Objective values presented in TAGM 4046 *Determination of Soil Cleanup Objectives and Cleanup Levels* showed four (4) parameters (acetone, methylene chloride, tetrachloroethene, and toluene) which exceeded the TAGM. (Note: For this comparison, soil data from a depth of 0 to 5 feet was used.) An exposure/risk model assessing risks due to inhalation, dermal contact and ingestion was run using maximum concentrations of all hazardous chemicals detected in soils for the maintenance worker and construction worker scenarios. Assumptions for the maintenance worker included body weight of 70 kg, inhalation rate of 20 m^3/shift, an exposure frequency of 250 days/year, exposure duration of 25 years, an exposure time of 8 hours/shift and an ingestion rate of 50 mg/day. Assumptions for the construction worker included a body weight of 70 kg, an inhalation rate of 20 m^3/shift, an exposure time of 8 hour/shift, an exposure frequency of 112 days/year, exposure duration of 1 year, and an ingestion rate of 50 mg/day. Based upon the risk assessment results, none of the risks for the construction worker or maintenance worker are unacceptable.

Key Contaminants: Acetone, methylene chloride, tetrachloroethene, and toluene

References: Data Evaluation-Risk Assessment completed in March 2001.

Subsurface Soil (e.g. > 2 feet)

Rationale:
A comparison of all available subsurface soils data to the Recommended Soil Cleanup objectives presented in TAGM 4046 *Determination of Soil Cleanup Objectives and Cleanup Levels* was conducted. (Note: For this comparison, soil data from a depth of 5 to 60 feet was used.) This comparison showed that subsurface soil results exceeded TAGM 4046 guidance values for 1,1,1-trichloroethane, 1,2-dichlorobenzene, acetone, methylene chloride, Freon TF, phenol, tetrachloroethene, toluene, trichloroethene, and xylenes.

An exposure/risk model assessing risks due to inhalation, dermal contact and ingestion was run using maximum concentrations of all hazardous chemicals detected in soils for the construction worker scenario. Assumptions for the construction worker included a body weight of 70 kg, an inhalation rate of 20 m^3/shift, an exposure time of 8 hour/shift, an exposure frequency of 112 days/year, exposure duration of 1 year, and an ingestion rate of 50 mg/day. Based upon the risk assessment results, none of the risks for the construction worker are unacceptable.

Key Contaminants: 1,1,1-trichloroethane, 1,2-dichlorobenzene, acetone, methylene chloride, Freonh TF, phenol, tetrachloroethene, toluene, trichloroethene, and xylenes.

References: Data Evaluation-Risk Assessment completed in March 2001 and revise on September 2001.

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be "unacceptable") - continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code.

Rationale and Reference(s):

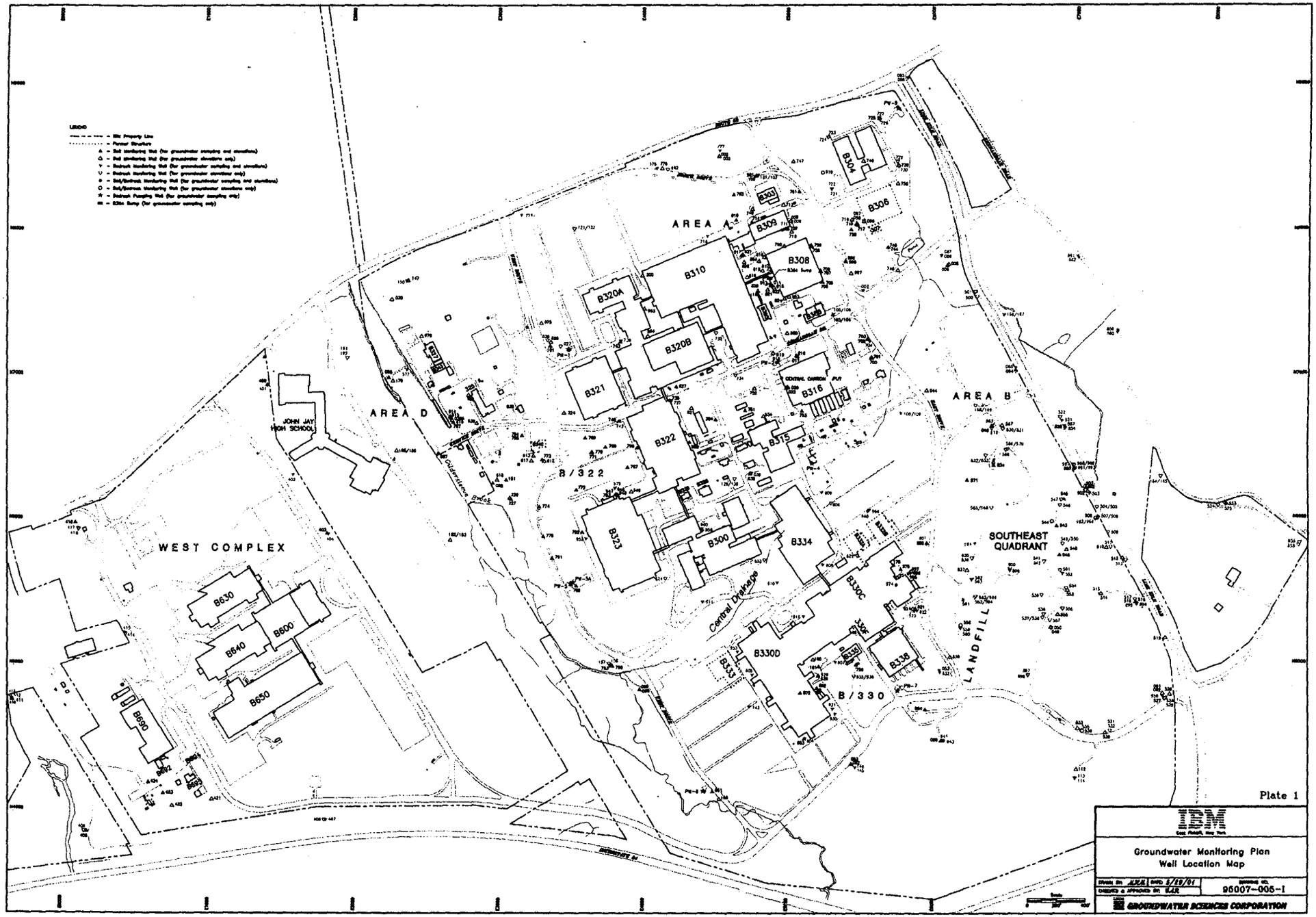
Not applicable, see responses to questions 3 and 4.

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA 725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

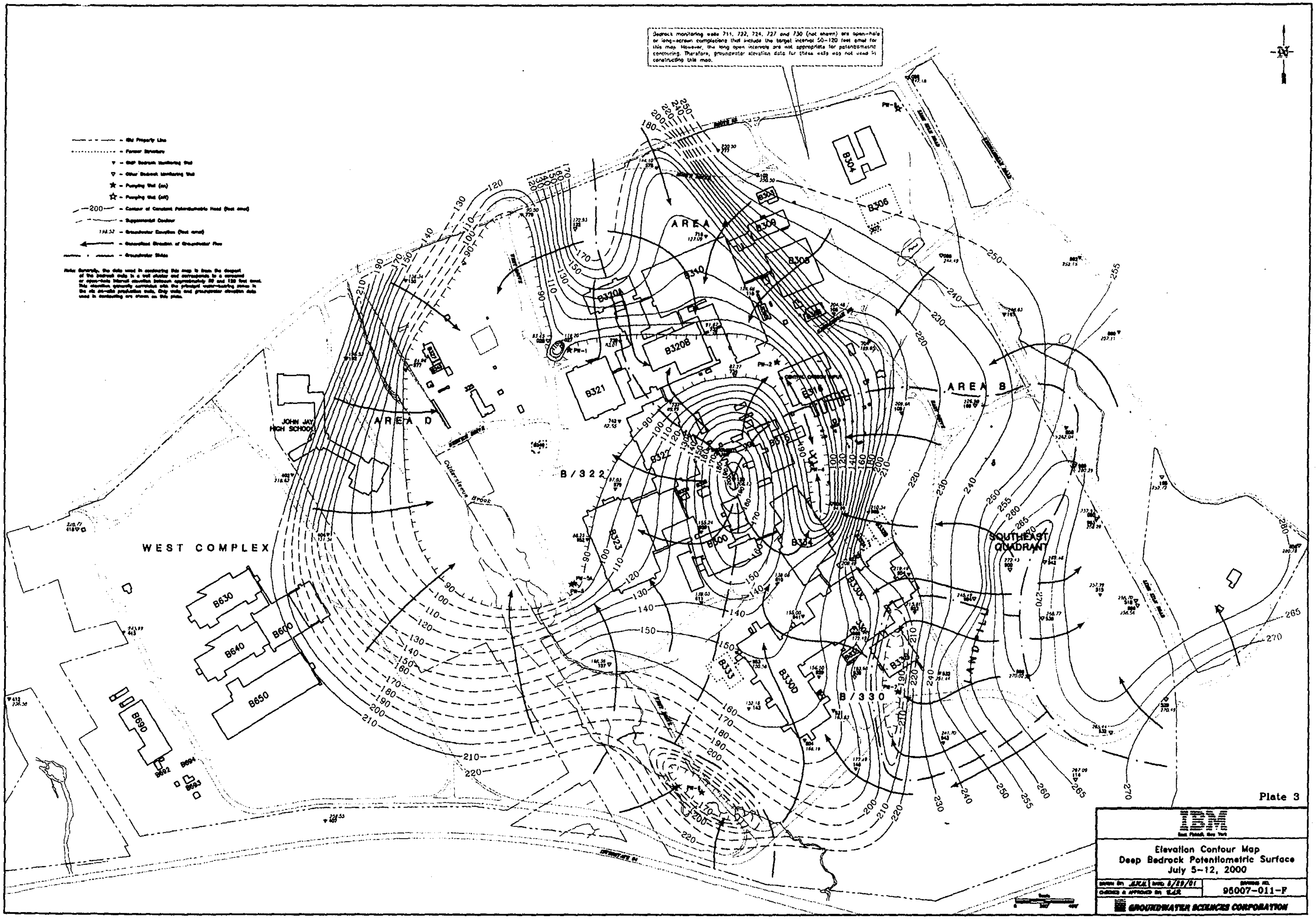
__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the IBM East Fishkill facility, EPA ID# NYD000707901, located at 2070 Route 52, Hopewell Junction, NY 12533 under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

_____ NO - "Current Human Exposures" are NOT "under Control".

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


AREA A
AREA B
AREA D
WEST COMPLEX
SOUTHEAST QUADRANT
LANDFILL
B/322
B/330
B304
B306
B303
B308
B310
B320A
B320B
B321
B316
B322
B315
B323
B300
B334
B330C
B330D
B335
B336
B333
B630
B600
B640
B650
B660
JOHN JAY HIGH SCHOOL
Central Drainage
Plate 1
IBM
East Fishkill, New York
Groundwater Monitoring Plan
Well Location Map
95007-005-1
GROUNDWATER SCIENCES CORPORATION


AREA A
AREA B
AREA D
WEST COMPLEX
SOUTHEAST QUADRANT
BEDROCK RIDGE
LANDFILL
JOHN JAY HIGH SCHOOL
B304
B306
B308
B310
B316
B320
B322
B323
B324
B330
B332
B334
B336
B600
B630
B640
B650
B690
B692
B693
B694
Plate 2
IBM
Elevation Contour Map
Soil Groundwater Table
July 5–12, 2000
DRAWN BY: JLK/AK DATE: 6/29/01
CHECKED & APPROVED BY: RAR
DRAWING NO. 95007-012-F
GROUNDWATER SCIENCES CORPORATION



Bedrock monitoring wells 711, 722, 724, 727 and 730 (not shown) are open-hole or long-screen completions that include the target interval 50-120 feet amsl for this map. However, the long open intervals are not appropriate for potentiometric contouring. Therefore, groundwater elevation data for these wells was not used in constructing this map.
AREA
AREA B
AREA D
JOHN JAY HIGH SCHOOL
B/322
WEST COMPLEX
SOUTHEAST QUADRANT
B/330
LANDFILL
B304
B306
B321
B320B
B320A
B310
B323
B630
B640
B600
B650
B690
PW-1
PW-2
Plate 3
IBM
Elevation Contour Map
Deep Bedrock Potentiometric Surface
July 5-12, 2000
95007-011-F
GROUNDWATER SCIENCES CORPORATION

Approved by: _____ Date: 2-25-02

Henry Wilkie
Environmental Engineer I
New York State Department of Environmental Conservation (NYSDEC)

And

_____ Date: 2-25-02

Steve Kaminski
Chief, Eastern Engineering Section
NYSDEC

Supervisor: _____ Date: 2/25/02

Paul J. Merges
Director, Bureau of Radiation and Hazardous Site Management
NYSDEC

Locations where References may be found:

NYSDEC
Division of Solid and Hazardous Materials
625 Broadway
Albany, NY 12233-7252

Contact telephone and e-mail numbers

Henry Wilkie (518) 402-8601 E-Mail: hjwilkie@gw.dec.state.ny.us

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.