RECORD OF DECISION

Former IBM Endicott Facility
Operable Unit Number 05: Building 57 Area
State Superfund Project
Endicott, Broome County
Site No. 704014
March 2016

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

DECLARATION STATEMENT - RECORD OF DECISION

Former IBM Endicott Facility
Operable Unit Number: 05
State Superfund Project
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Statement of Purpose and Basis

This document presents the remedy for Operable Unit Number: 05: Building 57 Area of the Former IBM Endicott Facility site, a Class 2 inactive hazardous waste disposal site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit Number 05 of the Former IBM Endicott Facility site and the public's input to the proposed remedy presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Description of Selected Remedy

During the course of the investigation certain actions, known as interim remedial measures (IRMs), were undertaken at the above referenced site. An IRM is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the remedial investigation (RI) or feasibility study (FS). The IRMs undertaken at this site are discussed in Section 6.2.

Based on the implementation of the IRMs, the findings of the investigation of this site indicate that the site no longer poses a threat to human health or the environment. Therefore, No Further Action is the selected remedy. The remedy may include continued operation of a remedial system if one was installed during the IRM and the implementation of any prescribed institutional controls/engineering controls (ICs/ECs) that have been identified as being part of the remedy for the site.

The IRMs conducted at the site attained the remediation objectives identified for this site in Section 6.5 for the protection of public health and the environment.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

March 30, 2016	
Date	Robert W. Schick, P.E., Director Division of Environmental Remediation

RECORD OF DECISION

Former IBM Endicott Facility
Endicott, Broome County
Site No. 704014
March 2016

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of hazardous wastes at the site resulted in threats to public health and the environment that were addressed by actions known as interim remedial measures (IRMs), which were undertaken at the site. An IRM is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the remedial investigation (RI) or feasibility study (FS). The IRMs undertaken at this site are discussed in Section 6.2.

Based on the implementation of the IRMs, the findings of the investigation of this site indicate that the site no longer poses a threat to human health or the environment. The IRMs conducted at the site attained the remediation objectives identified for this site, which are presented in Section 6.5, for the protection of public health and the environment. No Further Action is the remedy selected by this Record of Decision (ROD). A No Further Action remedy may include site management, which will include continued operation of any remedial system installed during the IRM and the implementation of any prescribed controls that have been identified as being part of the remedy for the site. This ROD identifies the IRMs conducted and discusses the basis for No Further Action.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held from February 19 to March 20, 2015, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document

repositories:

G. F. Johnson Memorial Library Attn: Reference Librarian 1001 Park Street Endicott, NY 13760 Phone: (607) 757-5350	NYSDEC Attn: Alex Czuhanich 625 Broadway Albany, NY 12233-7017 Phone: (518) 402-9813	NYSDEC Attn: Stephanie Webb 615 Erie Blvd. West Syracuse, NY 13204 Phone: (315) 426-7400

A public meeting was also conducted on March 7, 2016. At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) were presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period was held, during which verbal or written comments were accepted on the proposed remedy.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary section of the ROD.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location:
The former IBM Endicott facility is located in the Village of Endicott and in adjacent portions of the Town of Union in Broome County, New York. The 135-acre facility lies along and on either side of a railroad corridor in the village and in the town. The central portion of the facility is approximately at the intersection of McKinley Avenue and the railroad in the village. Portions of the facility extend westward to Robble Avenue, northward to Watson Boulevard, eastward to Harding Avenue, and southward to south of North Street.

Operable Unit 5 (OU5, the Building 57 Area), the subject of this document, is located at the eastern end of the former IBM facility, immediately east of Hayes Avenue between North Street and Wayne Street. OU5 is entirely within the Town of Union and is the only part of the former IBM site outside the Village of Endicott.

Site Features:
The site includes numerous current and former manufacturing buildings, office buildings, and ancillary support facilities. Paved parking areas are generally located around the periphery of the site buildings. An east-west railroad corridor bisects the facility and several public and private

roadways intersect or transect the facility. Commercial, industrial, and residential areas surround the facility on all sides. The former Endicott Forging facility, a State Superfund site, is adjacent to the southeast portion of the former IBM facility. The Susquehanna River is approximately one mile south of the facility. Brixius Creek, a small tributary to the Susquehanna, passes along the eastern edge of the facility. The facility is served by municipal water supply, sanitary sewers and storm sewers. A private well field also supplies production water for manufacturing purposes.

Operable Unit 5 site features include two contiguous buildings, Buildings 57 and 57A, located north of the railroad, two small parking lot parcels across Wayne Street from Building 57, and the former Parking Lot 26 located south of the railroad.

Current Zoning and Land Use:
The former IBM Endicott facility property is currently zoned Commercial Industrial. The facility is currently owned by Huron Real Estate Associates, LLC, a real estate leasing and property management company. Huron leases manufacturing and office space in the facility to a variety of tenants. Occupancy and use of the facility changes from time to time as tenant needs and availability of leasable space changes. Most of the facility footprint is currently occupied or available for occupancy. An exception is the group of buildings in the oldest portion of the facility (informally known as the Old Group buildings) located along the north side of North Street east of McKinley Avenue. These buildings are not occupied and are not expected to be occupied.

Buildings 57 and 57A (the portion of OU5 north of the railroad) are owned by Huron and are currently being used for manufacturing and warehousing. The Parking Lot 26 area of OU5 (the portion of OU5 south of the railroad) is currently owned by Gault Toyota and is being used as an automobile dealership.

Past Use of the Site:
The site was first developed by the Erie-Lackawanna Railroad around 1850. Additional development occurred beginning in 1901 by predecessors to the Endicott-Johnson Corporation, and beginning in 1904 by predecessors to the IBM Corporation. The site has a history of manufacturing and research and development beginning in the early 1900s.

Early industrial activity was associated primarily with shoe manufacturing by Endicott-Johnson and its predecessors in the western portion of the site. Associated on-site industries related to shoe manufacturing included leather tanning, box container manufacturing, chemical manufacturing, and an iron foundry. The railroad transported raw materials (including chemicals) to the site and finished products from the site. Solvents reportedly used by Endicott-Johnson as a part of its operations included carbon tetrachloride, trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA), methylene chloride, methyl ethyl ketone, toluene, xylene, and mixtures containing aromatics (gasoline, rubber solvent and mineral spirits). Endicott-Johnson ceased manufacturing operations in the village by about 1980.

IBM and its predecessors also operated at the site beginning in the early 1900s in the Old Group buildings east of McKinley Avenue. IBM gradually expanded into areas previously occupied by Endicott-Johnson as the latter company reduced its manufacturing capacity. Mechanical business machines were manufactured by IBM and its predecessors until the 1950s. From the 1950s to the

early 1980s, the facility was engaged primarily in the manufacture of mid-range, mainframe computers. In the early 1980s, operations at the facility primarily shifted to the manufacture of components (circuit cards, circuit panels, and ceramic substrates) in support of other IBM electronics manufacturing activities. The primary solvents used by IBM as part of its mainframe computer and electronic component manufacturing operations included TCE, PCE, TCA, methylene chloride, and Freon 113. The site was sold to Huron Real Estate Associates, LLC in 2002. IBM has reduced its presence and manufacturing capacity at the site since that time.

In Operable Unit 5, the subject of this document, the portion north of the railroad was purchased by IBM in 1941. Building 57 was built about 1949 and Building 57A was built about 1979. The area has been used for manufacturing and/or warehousing since then. The portion of OU5 south of the railroad was purchased by IBM in 1935. The area was generally undeveloped and used for parking until 2011 when it was sold by Huron and developed as an automobile dealership.

Operable Units:
The former IBM Endicott site is divided into seven operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Boundaries of the operable units at the Endicott site are generally defined by the limits of hydraulic capture in the various components of the groundwater remediation program or by convenient geographical features.

The various Operable Units at the former IBM Endicott facility are identified in the Consent Order and are described below. Operable Unit 5 (OU5) is the subject of this document. Records of Decision were issued previously for OUs 3, 4 and 6. Records of Decision will be issued for OUs 1, 2, and 7 in the future. A site location map is attached as Figure 1. An area designation map is attached as Figure 2.

- Operable Unit 1 (OU1), also known as the Railroad Corridor Source Area, is the on-site source area in the main plant area where the bulk of contaminant releases occurred. OU1 generally incorporates the central portion of the facility from the railroad corridor northward.

- Operable Unit 2 (OU2), also known as the North Street Area, is the on-site portion of the main plant area south of the railroad and generally north of North Street.

  For purposes of investigation and remediation, OU1 and OU2 are usually considered together because they are both on-site areas separated only by the railroad. Interim remedial measures are currently in place in OU1 and OU2 while remedial investigations continue.

- Operable Unit 3 (OU3), also known as the Southern Area, is the southern portion of the groundwater plume associated with the OU1 and OU2 source areas. OU3 extends approximately from Monroe Street southward to the Susquehanna River, and from just west of McKinley Avenue to just east of Arthur Avenue.

  For purposes of investigation and remediation, OU3 is generally considered together with

an area identified in the Consent Order as Off-Site Capture Zone A because the two areas are contiguous and together represent the off-site plume area south of the main plant area. Off-Site Capture Zone A is the northern portion of the off-site groundwater plume associated with the OU1 and OU2 on-site source areas. Off-Site Capture Zone A extends approximately from North Street southward to north of Broad Street, and from just west of Jefferson Avenue to just east of McKinley Avenue. The Department selected the remedy for OU3 and Off-Site Capture Zone A in 2015 and the remedy is operating.

- Operable Unit 4 (OU4), also known as the Ideal Cleaners Area, is the source area and groundwater plume associated with the former dry cleaning operation. Operable Unit 4 lies east of Off-Site Capture Zone A and extends southward from North Street to approximately Monroe Street. An area identified in the Consent Order as Off-Site Capture Zone B is part of OU4. Off-Site Capture Zone B is the area of the plume associated with the former Ideal Cleaners and extends from the source area to a line of extraction wells located along Monroe Street between Adams Avenue and the alley east of McKinley Avenue. The Department selected the remedy for OU4 in 2010 and the remedy is operating.

- Operable Unit 5 (OU5), also known as the Building 57 Area, is the source area and groundwater plume associated with Building 57/57A which is separate from and east of the main facility. OU5 includes Building 57/57A east of Hayes Avenue and north of the railroad tracks, as well as a former parking lot (known as Parking Lot 26) south of the railroad tracks.

- Operable Unit 6 (OU6) is the bedrock groundwater plume and includes all facility-related contamination in the bedrock aquifer. The Department selected the remedy for OU6 in 2009 and the remedy is operating.

- Operable Unit 7 (OU7), also known as the Northwestern Area, is the source area and groundwater plume associated with historic releases in this area. OU7 includes the portion of the former IBM facility northwest of the main facility and located west of Oak Hill Avenue and north of the railroad tracks. Interim remedial measures are currently in place in OU7 while remedial investigations continue.

Site Geology and Hydrogeology:
The geology of the site is characterized by a sequence of unconsolidated glacial and post-glacial sediments overlying a buried bedrock valley. Three separate water-bearing units are defined in the vicinity of the site: the Upper Aquifer, the Lower Aquifer, and the Bedrock Aquifer. The Upper Aquifer extends beneath the site and is the water-bearing unit most impacted by site-related contamination. Natural groundwater flow in all three units is to the south, ultimately discharging to the Susquehanna River. Groundwater withdrawals and injections for water supply or remediation purposes have altered the natural flow regime by creating artificial discharge and recharge points. Depth to groundwater in the vicinity of the site varies from about 10 to 40 feet below ground surface under pumping conditions.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, an alternative that restricts the use of the site to commercial use (which allows for industrial use) as described in Part 375-1.8(g) is being evaluated. A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers. The PRPs for the site, documented to date, include:

- IBM Corporation, Endicott Facility
- IBM Corporate Environmental Affairs

The Department and IBM entered into a Consent Order on August 4, 2004 (Administrative Order on Consent No. A7-0502-0104). The Consent Order superseded a Part 373 Resource Conservation and Recovery Act (RCRA) Permit that IBM held for the facility. The Consent Order effectively continues the corrective action requirements of the RCRA Permit and obligates the responsible parties to implement a Site-Wide Source Area Evaluation, as well as Supplemental Remedial Investigations (SRIs), Focused Feasibility Studies (FFSs), and/or Interim Remedial Measures (IRMs) for each Operable Unit as described in the Consent Order. The Order also requires Remedial Design/Remedial Action Work Plans for implementing the selected remedies.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- air
- groundwater
- surface water
- soil
- soil vapor
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminants of concern identified for this Operable Unit at this site are:

Trichloroethene (TCE)	1,1,1-Trichloroethane (TCA)	Freon 113
cis-1,2-Dichloroethene	1,1-Dichloroethane	Freon 123a
Vinyl Chloride	1,1-Dichloroethene	

Based on the investigation results, comparison to the SCGs, and the potential public health and environmental exposure routes, certain media and areas of the site required remediation. These media were addressed by the IRM(s) described in Section 6.2. More complete information can be found in the RI Report and the IRM Construction Completion Report.

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision. The following IRMs have been completed at OU5 based on conditions observed during the RI.

Groundwater Extraction and Treatment

In 1997 IBM began operating a groundwater extraction and treatment system in the Building 57 Area. The system is commonly referred to as a pump-and-treat system and is designed to extract contaminated groundwater and treat it to remove site-related contaminants. The purpose of the system is to shrink the size of the groundwater plume associated with contaminant sources in the Building 57 Area, to reduce contaminant concentrations to below applicable groundwater standards to the extent practicable, and to prevent further migration of site-related contaminants to off-site areas.

The extraction system creates a depression of the water table so that contaminated groundwater is directed toward the extraction well within the plume area. Groundwater is extracted from the subsurface using a well located in the former Parking Lot 26 area of OU5 (now an automobile dealership). Extracted groundwater is then transferred via double-walled underground pipes to IBM's Clark Street Groundwater Treatment Facility (GTF). At the treatment facility, contaminated groundwater is passed through an aerator (an air stripper) to remove VOC contaminants from the water. The effluent airstream from the aerator is passed through treatment vessels containing granular activated carbon to remove the contaminants from the airstream. Treated air is discharged to the atmosphere. Treated water is discharged to the municipal storm sewer system and, ultimately, to the Susquehanna River. A monitoring system is in place to ensure the complete and effective treatment of contaminated groundwater and the effluent airstream from the air stripper prior to discharge.

Soil Excavation

In 2011, approximately 135 cubic yards of VOC-impacted soil was excavated from the former Parking Lot 26 portion of OU5 prior to its redevelopment as an automobile dealership. Excavated soil was disposed of in a permitted secure landfill. Post-excavation sampling for VOCs (the class of contaminants of concern) has documented that the remaining soil in the area of the excavation now meets promulgated Soil Cleanup Objectives for Residential Use.

In-Situ Thermal Treatment

In 2012, IBM conducted in-situ thermal treatment of four contaminant source zones in the interior and exterior of Building 57A. Electrical resistance heating was used to volatilize chlorinated solvents in soil and groundwater and to eliminate the contaminant source zones.

A system of temporary electrodes was installed in the ground in the four identified source zones. Electricity applied to the electrodes flowed between the electrodes and resistance imparted by the soil and groundwater caused the soil between the electrodes to heat up. The heat generated in the soil was sufficient to volatilize the VOC contaminants in the soil and groundwater. Volatilized contaminants were captured below the ground surface by a system of vapor extraction wells and transferred to temporary treatment systems located outside Building 57A. Treatment vessels containing granular activated carbon were used to remove contamination from the vapor stream. Treated vapors were discharged to the atmosphere through a stack located outside Building 57A.

A monitoring program was in place to ensure complete removal of contaminants from the vapor stream prior to discharge. Continuous monitoring of ambient air was also conducted in the thermal treatment area to ensure the contaminant vapors did not escape to the atmosphere from the thermal treatment zones and impact site workers.

Post-treatment sampling for VOCs (the class of contaminants of concern) has documented that the soil in the four thermal treatment areas now meets promulgated Soil Cleanup Objectives for Unrestricted Use.

Vapor Intrusion Mitigation

As an interim remedial measure beginning in 2003, IBM has installed mitigation systems on impacted properties in off-site areas south of the main plant facility, including areas south of OU5. The mitigation systems are sub-slab depressurization systems, or similar engineered systems, to prevent the migration of contaminant vapors into buildings from soil and/or groundwater.

The evaluation of the potential for soil vapor intrusion resulting from the presence of site-related soil and groundwater contamination was evaluated as part of the IBM Groundwater Vapor Project. The extent of the area impacted by vapor intrusion was defined, and property owners within the defined area were offered mitigation systems to address the potential vapor intrusion related exposures. IBM will continue to inspect and maintain the mitigation systems and reimburse property owners for the cost of their operation. Cleanup of the off-site plume should ultimately eliminate the need for these systems, but they will remain in operation, and be maintained by IBM, as long as necessary to preclude site-related exposures.

IBM has an ongoing soil vapor monitoring program in place to track changes in the soil vapor concentrations and to confirm that the established limits of the mitigation area remain protective. IBM also has an ongoing program in place to operate and maintain the mitigation systems and to track properties in the defined area of impact to identify new or modified structures that may require mitigation systems.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU5.

Nature and Extent of Contamination (Note: Operable Unit 5 is the subject of this document.)

Operable Unit 1 (Railroad Corridor Source Area), Soil:
The primary contaminant of concern in OU1 soils is 1,1,1-trichloroethane (TCA). TCA was found at up to 48 parts per million (ppm) at depth (17 feet below ground surface) near the railroad tracks

between Buildings 46 and 48. Trichloroethene (TCE) was detected at 14 ppm in the same location. Groundwater data suggests that inaccessible areas (i.e., beneath Building 47) may have isolated areas of soil contamination resulting from leaks from solvent/waste tanks and/or pipelines.

Operable Unit 1 (Railroad Corridor Source Area), Groundwater:
The primary contaminants of concern in OU1 groundwater are tetrachloroethene (PCE), TCE, TCA, Freon 113, and their respective breakdown products. Highest concentrations of all these are found in the immediate vicinity of the railroad. Highest concentrations are as follows: PCE 12,000 parts per billion (ppb); TCE 1,600 ppb; cis-1,2-DCE (a breakdown product) 16,000 ppb; TCA 88,000 ppb; 1,1-DCA (a breakdown product) 21,000 ppb; Freon-113 4,300 ppb.

Operable Unit 2 (North Street Area), Soil:
The primary contaminant of concern in OU2 soils is TCA. TCA was found at up to 11,000 ppm at depth (17 feet below ground surface) in one localized area north of Building 18 in the vicinity of a former TCA underground storage tank that was removed in 1980. TCE, toluene, and Freon 113 are found in a few localized areas, but at much lower concentrations (less than 100 ppm). Groundwater data suggests that inaccessible areas (i.e., beneath Buildings 18 and 41) may have isolated areas of soil contamination resulting from leaks from solvent/waste tanks and/or pipelines.

Operable Unit 2 (North Street Area), Groundwater:
The primary contaminants of concern in OU2 groundwater are TCE, TCA, and their respective breakdown products. Highest concentrations are found between Buildings 18 and 41. Highest TCE concentration is 15,000 ppb. Highest TCA concentration is 4,200 ppb. Contaminant concentrations decline rapidly south of North Street.

Operable Unit 3 (Southern Area) and Off-Site Capture Zone A, Soil:
OU3 and Off-Site Capture Zone A are off-site areas. There is no site-related soil contamination in off-site areas.

Operable Unit 3 (Southern Area) and Off-Site Capture Zone A, Soil Vapor:
The primary contaminant of concern in OU3 and Off-Site Capture Zone A soil vapor is TCE. Concentrations range from non-detect to 33,000 $\mu g/m^3$. Concentrations are highest near the plant (opposite Building 41 along North Street) and decline with distance to the south. Most areas are less than 350 µg/m3.

Operable Unit 3 (Southern Area) and Off-Site Capture Zone A, Groundwater:
The primary contaminant of concern in OU3 and Off-Site Capture Zone A groundwater is TCE. Concentrations in most areas are below the groundwater standard of 5 ppb. A couple areas have concentrations of 20-30 ppb. In a localized area immediately south of North Street across from Building 18, several wells have TCE concentrations between 1,700 ppb and 13,000 ppb.

Operable Unit 4 (Ideal Cleaners Area), Soil:
Soil contamination in OU4 is not significant. The remedy for OU4 (in-situ thermal treatment) has effectively removed PCE-related contamination from soil. The highest post-treatment PCE concentration in soil was 0.125 ppm.

Operable Unit 4 (Ideal Cleaners Area), Groundwater:
The primary contaminant of concern in OU4 is cis-1,2-DCE, a breakdown product of PCE. PCE has essentially been eliminated from the plume following in-situ thermal treatment of the source zone. Breakdown products are also decreasing in area and concentration. A localized area immediately south of the source zone has residual cis-1,2-DCE concentrations greater than 50 ppb, with one monitoring well showing a concentration of 66 ppb.

Operable Unit 5 (Building 57 Area), Soil:
Soil excavation and thermal treatment IRMs have removed areas of significant soil contamination. All remaining contaminant concentrations are within the allowable limit for residential use. The highest remaining concentrations – 17 ppm (Freon 113), 14 ppm (cis-1,2-DCE), and 8.1 ppm (TCE) – are all at depths greater than 15 feet below ground surface. Other contaminants of concern are all below 0.03 ppm. Soil contamination does not extend beyond the boundaries of OU5.

Operable Unit 5 (Building 57 Area), Soil Vapor and Indoor Air:
Contaminants of concern identified in subslab soil vapor include TCE, cis-1,2-DCE, TCA, DCA, 1,1-DCE, and Freon 113. In indoor air, TCE has been detected above the guideline concentration of 2 $\mu g/m^3$. During the 2005 on-site investigation, concentrations up to 17 $\mu g/m^3$ were detected in the Building 57A warehouse area that is not routinely occupied. In occupied areas of Building 57, TCE was detected at up to 6.1 $\mu g/m^3$ in indoor air. A follow-up assessment of indoor air is currently underway in Building 57/57A and other on-site buildings. As of 2014, in Parking Lot 26 areas of OU5 further to the south along North Street, TCE concentrations up to 1,300 $\mu g/m^3$ were detected in soil vapor at water-table depth (14 feet below ground surface). At shallower, basement level depth at the same location along North Street, TCE concentrations were detected at 27 $\mu g/m^3$ in 2014.

Contamination in soil vapor extends to off-site areas south and east of the former Parking lot 26. To the south, contamination in soil vapor extends approximately 300-400 feet along Delaware Avenue and, to a lesser extent, along Highland Avenue. To the east, soil contamination extends approximately 200-300 feet along Dittrich Street. In off-site areas, the highest TCE concentration detected in soil vapor in 2014 was 460 $\mu g/m^3$ a short distance south of North Street. Some of this contamination is believed to be associated with non-IBM sources near or adjacent to OU5.

Operable Unit 5 (Building 57 Area), Groundwater:
The primary contaminant of concern remaining in OU5 groundwater is Freon 113. One on-site monitoring well within the Freon source area has concentrations up to 7,000 ppb and a nearby off-site monitoring well has concentrations up to 8,700 ppb. Two other monitoring wells have concentrations up to 450 ppb. Other wells are near or below the groundwater standard for Freon 113 which is 5 ppb. Other site-related contaminants (TCE, TCA, and their respective breakdown products) range in concentration from non-detect up to approximately 120 ppb.

Contamination in groundwater extends a short distance to off-site areas generally along the railroad west and southwest of Building 57A. For most contaminants of concern, the highest concentrations in off-site areas are near or slightly above applicable groundwater standards. The exception, as noted above, is Freon 113 which is found at elevated concentrations (8,700 ppb) in one off-site well south of Building 57A and just south of the railroad.

Operable Unit 5 (Building 57 Area), Surface Water:
Sampling conducted in Brixius Creek, which passes along the north side of Building 57/57A, indicates that surface water contamination is not a concern in OU5.

Operable Unit 6 (Bedrock Aquifer), Groundwater:
The primary contaminants of concern in OU6 groundwater (the bedrock aquifer) are TCE and its breakdown products. TCE is found at concentrations up to 1,000 ppb. Breakdown products (primarily cis-1,2-DCE) are found at concentrations up to 1,900 ppb.

Operable Unit 7 (Northwest Area), Soil:
An area of soil contamination that pre-dated IBM's acquisition of the property was removed by IBM upon its purchase of the property in 1984. Excavated soil was contaminated with PCE, TCE, TCA, toluene, and chromium associated with Endicott-Johnson manufacturing activities.

Operable Unit 7 (Northwest Area), Groundwater:
The primary contaminants of concern in OU7 groundwater are TCE, TCA, and their breakdown products. All are relatively small in area and low in concentration. TCE is found in two small, localized areas south of Clark Street at concentrations of 12 ppb and 23 ppb. Other contaminants are generally near the groundwater standard.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure*.

Direct contact with contaminants in soil is unlikely since the majority of the site is an active industrial facility that is covered with buildings and pavement. In addition, access is restricted, further limiting the potential for contact exposures. People are not drinking the contaminated groundwater because the area is served by a public water supply that is routinely tested to ensure that it meets drinking water standards. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the overlying buildings, is referred to as soil vapor intrusion. Soil vapor intrusion and the potential for soil vapor intrusion has been identified in both on- and off-site buildings. The on-site indoor air results indicate that either the air levels are consistent with background indoor air levels and are not of concern or that levels are below or slightly above the NYSDOH air guidelines. In the later, the possibility of health effects in workers exposed to these levels is low, but monitoring within the on-site occupied buildings is on-going. NYSDOH has recommended that reasonable and practical actions be taken to reduce indoor air concentrations within the on-site buildings to the extent that is possible. Mitigation systems (systems that ventilate/remove the air beneath the building) have been and will be installed in all buildings within the off-site defined soil vapor intrusion mitigation area to prevent the indoor air quality from being affected by the contamination in soil vapor beneath the buildings. The responsible party will also

continue to track properties within the soil vapor intrusion mitigation area to identify new or modified buildings that might require mitigation systems.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

Groundwater

RAOs for Public Health Protection:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection:

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.

Soil

RAOs for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation exposure to contaminants volatilizing from soil.

RAOs for Environmental Protection:

- Eliminate contaminant source areas in soil to the extent practicable.

Soil Vapor

RAOs for Public Health Protection:

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings.

SECTION 7: SUMMARY OF SELECTED REMEDY

Based on the results of the investigations, the IRMs that have been performed, and the evaluation presented here, the Department is selecting No Further Action as the remedy for Operable Unit 5, Building 57 Area. This No Further Action remedy includes continued operation of the groundwater extraction and treatment and soil vapor mitigation interim remedial measures, and continued implementation of the institutional and engineering controls as part of the proposed remedy. The

Department believes that this remedy is protective of human health and the environment, and satisfies the remediation objectives described in Section 6.5.

The elements of the proposed remedy, including the IRMs already completed and the institutional and engineering controls, are listed below:

1. Green Remediation – Green remediation principles and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gas and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste.

2. Groundwater Extraction and Treatment – The groundwater extraction and treatment IRM described in Section 6.2 will continue to be implemented to treat contaminants in groundwater and to ensure contaminated groundwater does not migrate off site.

3. Vapor Mitigation – The soil vapor mitigation IRM described in Section 6.2 will continue to be operated and maintained by IBM to ensure contaminants in soil vapor do not migrate into occupied buildings off site

4. In Situ Thermal Treatment – The in situ thermal treatment IRM described in Section 6.2 has been completed.

5. Soil Excavation – The soil excavation IRM described in Section 6.2 has been completed.

6. Institutional Control – Imposition of an institutional control in the form of an environmental easement for the controlled property will be required which will:

    - require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
    - allow the use and development of the controlled property for commercial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
    - restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
    - require compliance with the Department approved Site Management Plan

    Note: All water users in the Village of Endicott and in adjacent areas of the Town of Union served by the village's municipal water supply, including the areas covered by this document, are required by ordinance to be connected to the village's municipal water

supply. This requirement will ensure residents are not exposed to site-related contaminants through drinking water.

7. Engineering Control – Engineering controls for the area that is the subject of this document include the engineered remedial systems for groundwater extraction and treatment and soil vapor monitoring as well as the mitigation systems on off-site structures.

8. Site Management Plan – A Site Management Plan will be required, which will include the following:

    a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

    Institutional Controls: The environmental easement discussed in Paragraph 6 above.

    Engineering Controls: The groundwater extraction and treatment system discussed in Paragraph 2 and the vapor mitigation system discussed in Paragraph 3 above.

    This plan will include, but may not be limited to:

    - an excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
    - descriptions of the provisions of the environmental easement including any land use, groundwater and/or surface water use restrictions;
    - a provision for evaluation of the potential for soil vapor intrusion in existing on-site buildings and in future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
    - provisions for the management and inspection of the identified engineering controls;
    - maintaining site access controls and Department notification; and
    - the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

    b. A Monitoring Plan to assess the performance and effectiveness of the remedy. The plan will include, but may not be limited to:

    - monitoring of groundwater and soil vapor to assess the performance and effectiveness of the remedy;
    - a schedule of monitoring and frequency of submittals to the Department;
    - monitoring for vapor intrusion for any existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

c. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan will include, but may not be limited to:

- procedures for operating and maintaining the remedy;
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

d. An Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, inspection, and reporting of any mechanical or physical components of the active vapor mitigation system(s). The plan includes, but is not limited to:

- procedures for operating and maintaining the system(s); and
- compliance inspection of the system(s) to ensure proper O&M as well as providing the data for any necessary reporting.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

From 1993 to 1995, as part of their Part 373 hazardous waste permit obligations, IBM completed three rounds of groundwater monitoring for Appendix 33 constituents (6 NYCRR 373-2) in selected wells throughout the site, including OU5. Appendix 33 is the promulgated list of all hazardous constituents for which an analytical method is available. In Operable Unit 5 (Building 57 Area), as part of supplemental investigations, groundwater was sampled more widely for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals/cyanide, and total petroleum hydrocarbons (TPHs). Soil was analyzed for VOCs, SVOCs, metals/cyanide, TPHs, pesticides, and PCBs. Soil vapor was analyzed for VOCs and SVOCs. Indoor air and surface water were analyzed for VOCs. As a result of the various sampling and analysis programs, the principal class of contaminants identified in OU5, as elsewhere on the former IBM site, is VOCs.

Contamination in OU5 is or was found in groundwater, soil, and soil vapor. The contaminants are several of the primary industrial solvents used by IBM (TCE, TCA, and Freon 113), as well as some of the degradation products of these primary solvents. The degradation products include: cis-1,2-dichloroethene (cis12DCE) and vinyl chloride, both degradation products of TCE; 1,1-dichloroethane (DCA) and 1,1-dichloroethene (DCE), both degradation products of TCA; and Freon 123a, a degradation product of Freon 113. Of these constituents, Freon 113 has been the most prominent and widespread in OU5. Table 1, below, provides information on the current (2014) concentrations of the various constituents in groundwater in OU5.

Interim remedial measures (IRMs) were effective in reducing or removing the significant contaminant source areas in OU5 soils. Contaminant concentrations in groundwater have generally declined as a result and are expected to continue to decline. Contaminant concentrations in soil vapor are also expected to decline following removal of the source areas and declines in groundwater concentrations.

Waste/Source Areas

As described in the RI reports, waste/source materials were identified on the former IBM site and are impacting groundwater and soil vapor in OU5.

Wastes are defined in 6 NYCRR Part 375-1.2(aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375-1.2(au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental media. Wastes and source areas that were identified at the site include industrial solvents that were spilled in solvent handling areas or leaked from tanks and pipelines.

The wastes identified in OU5 source areas include the primary industrial solvents TCE, TCA, and Freon 113, as well as the degradation products of these primary solvents. Other compounds have been found in OU5 (such as tetrachloroethene, ethylbenzene, toluene, xylene and dichlorobenzene), but they are found infrequently and generally not in significant quantities.

The remedial investigation identified five source areas of contamination in OU5 (see attached Figure 3). Three of these were associated with solvent and waste storage tanks on the south and east sides of Building 57A. These are referred to as the CFC Area, the TCA Area, and the Waste Solvent Area.

A fourth contaminant source area was located beneath the central portion of Building 57A and is referred to as the Building 57A Area. No solvent or waste handling is known to have occurred here and there were no identified releases of solvent or waste beneath the building. Therefore, contamination in this area is believed to have existed prior to the construction of Building 57A around 1979 (the adjacent Building 57 was constructed about 1949). These four source areas – the CFC Area, the TCA Area, the Waste Solvent Area, and the Building 57A Area – were addressed using the thermal treatment IRM described in Section 6.2

The fifth contaminant source area was an area of soil contamination in a low-lying area of the former Parking Lot 26 located south of the railroad. No solvent or waste handling is known to have occurred here and there were no identified releases of solvent or waste in the Parking Lot 26 area. Historical documents identified "inflammable storage" tanks in this area prior to about 1950 and an auto junkyard and automobile repair facilities existed immediately to the east. In addition to IBM, any or all of these potential sources may have contributed to the contamination in this area. This fifth source area – the Parking Lot 26 Area – was addressed using the soil excavation IRM described in Section 6.2.

Contamination was also detected in the subsurface below Building 57. However, for all contaminants of concern, groundwater samples were near or below applicable groundwater standards and soil samples were below Soil Cleanup Objectives for Unrestricted Use, the most stringent standard. Therefore, no remedial action was necessary for this area.

Groundwater

Groundwater samples are collected on a regular schedule from 47 wells located in OU5. Samples are analyzed for volatile organic compounds. Other compounds (discussed above) were not commonly found above applicable SCGs, so sampling for these compounds was discontinued prior to issuance of the consent order. Table 1, below, summarizes the concentrations of contaminants of concern in groundwater in OU5. The Table also provides the applicable groundwater standards for each contaminant, as well as the percentage of sampled wells that exceeded that standard. The data are from the most recent annual groundwater report (2014).

Table 1 - Groundwater

Contaminant	Concentration Range Detected[1] (ppb)[2]	SCG[3] (ppb)	Frequency Exceeding SCG
VOCs			
Trichloroethene (TCE)	ND[4] – 120	5	26%
cis-1,2-Dichloroethene (cis12DCE)	ND – 41	5	21%
Vinyl Chloride	ND – 21	2	9%
1,1,1-Trichloroethane (TCA)	ND – 1.8	5	0%
1,1-Dichloroethane (DCA)	ND – 8.3	5	6%
1,1-Dichloroethene (DCE)	ND – 2.9	5	0%
Freon 113	ND – 8700	5	28%
Freon 123a	ND – 1000	5	32%

Notes:
1. Data are from the most recent round of sampling in 2014 for each OU5 monitoring well
2. ppb = parts per billion, which is equivalent to micrograms per liter (µg/L) in water.
3. SCG = Standard Criteria or Guidance – Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), Surface Water and Groundwater Quality Standards (6 NYCRR Part 703), and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
4. ND = Not Detected at the applicable quantitation limit

The thermal treatment and soil excavation IRMs described in Section 6.2 have eliminated the sources of groundwater contamination in OU5. The groundwater extraction and treatment IRM described in Section 6.2 has removed – and will continue to remove – residual contaminant mass in groundwater and will continue to prevent the spread of contaminated groundwater to other areas.

Contaminant concentrations in OU5 groundwater are significantly lower in most areas than they were prior to implementation of the thermal treatment and soil excavation IRMs, and concentrations are expected to continue to decline because the contaminant source areas have been eliminated or substantially reduced. The proposed continuation of the groundwater extraction and treatment IRM will continue to capture the residual groundwater plume and will facilitate the continued decline in contaminant concentrations.

Soil

Soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals/cyanide, petroleum hydrocarbons, pesticides and PCBs. As described above, six areas of soil contamination were identified during the Remedial Investigation at OU5. In all six, VOCs were the primary class of contaminants identified. Five of these areas were considered source areas for groundwater contamination and these five areas were addressed through implementation of IRMs described in Section 6.2. Contamination in the sixth area – the Building 57 Area – was within applicable SCGs, so no remediation was necessary. Table 2, below, summarizes the concentrations of contaminants of concern remaining in soil in OU5. The Table also provides the applicable SCG for each contaminant, as well as the percentage of sampled wells that exceeded that standard. Following completion of the thermal treatment and soil excavation IRMs, all classes of contaminants are within applicable SCGs for commercial use.

Table 2 - Soil

Contaminant	Concentration Range Detected[1] (ppm)[2]	Unrestricted SCG[3] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted Use SCG[4] (ppm)	Frequency Exceeding Restricted Use SCG
VOCs					
Trichloroethene (TCE)	ND[5] – 8.1	0.47	4%	200	0%
cis-1,2-Dichloroethene (cis12DCE)	ND – 14	0.25	4%	500	0%
Vinyl Chloride	ND – 0.24	0.02	1%	13	0%
1,1,1-Trichloroethane (TCA)	ND	0.68	0%	500	0%
1,1-Dichloroethane (DCA)	ND – 0.27	0.27	0%	240	0%
1,1-Dichloroethene (DCE)	ND – 0.18	0.33	0%	500	0%
Freon 113	ND – 17	-	-	500	0%
Freon 123a	ND – 5.5	-	-	500	0%

Notes:
1. Data are current conditions based on post-IRM sampling
2. ppm = parts per million, which is equivalent to milligrams per kilogram (mg/kg) in soil.
3. Unrestricted SCG = Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
4. Restricted Use SCG = Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Commercial Use, unless otherwise noted.

5. ND = Not Detected at the applicable quantitation limit

Surface Water

Surface water samples were collected from Brixius Creek, a Class C stream that passes along the north and east sides of Buildings 57 and 57A. Samples were collected from locations upstream, downstream and on site, as well as from a storm sewer outfall that discharges to Brixius Creek near the northeast corner of Building 57A. Samples were analyzed for VOCs, the principal class of contaminants at OU5. No contaminants exceeded applicable SCGs for Class C water bodies, so no remedial alternatives were evaluated for surface water.

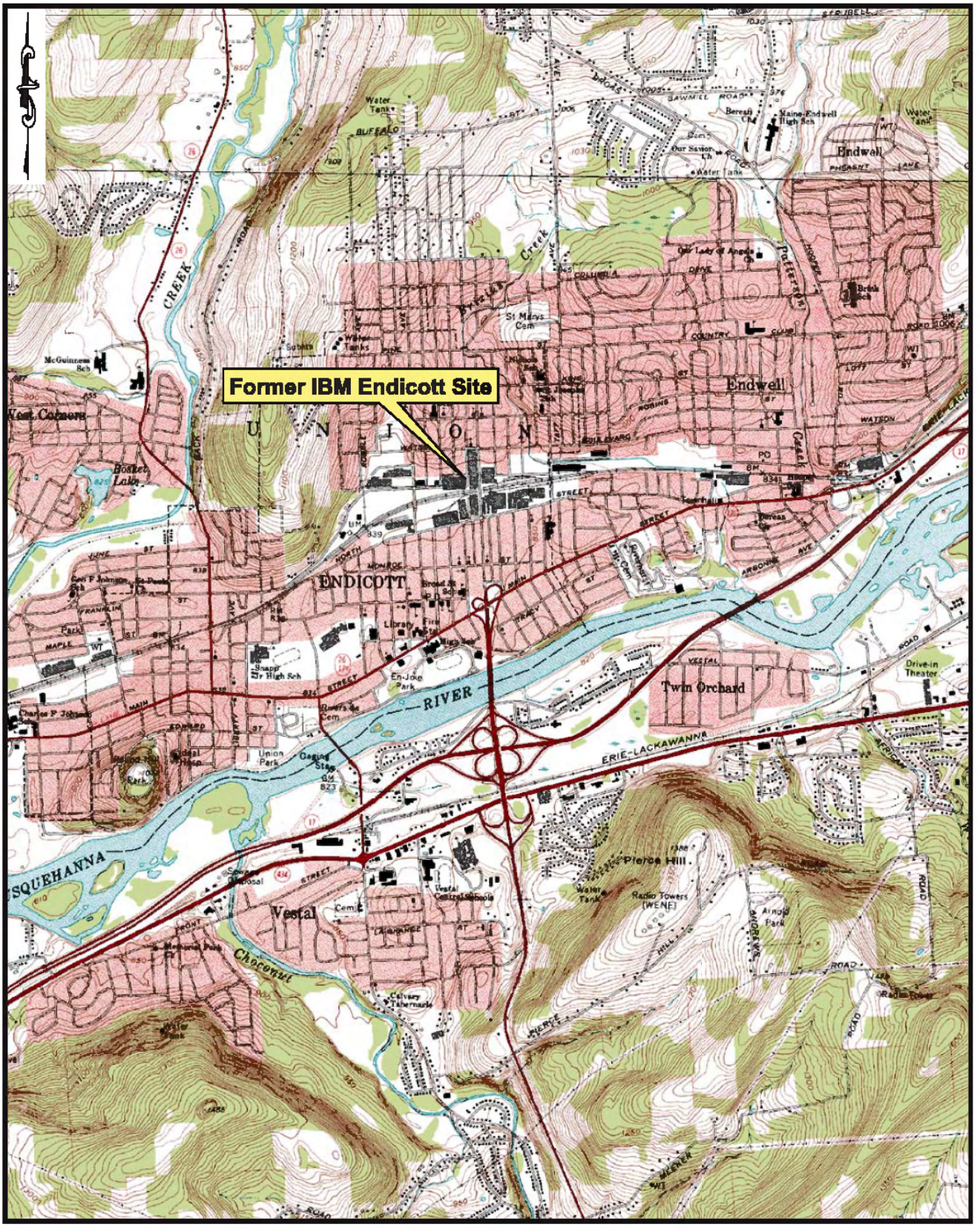
Soil Vapor

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. At this site due to the presence of buildings in the impacted area, samples were collected to evaluate whether actions are needed to address exposures related to soil vapor intrusion.

Contamination in soil vapor was identified in areas generally overlying groundwater and soil contamination. Contaminants of concern identified in soil vapor include TCE, cis12DCE, TCA, DCA, 1,1-DCE, and Freon 113.

Soil Vapor contamination in off-site areas near OU5 identified during the RI was addressed under the Groundwater Vapor Project IRM described in Section 6.2. The evaluation of the potential for soil vapor intrusion resulting from the presence of Site-related groundwater contamination was evaluated in 2003-2005 as part of the IBM Groundwater Vapor Project. The extent of the area impacted by vapor intrusion was defined (see attached Figure 4) and property owners were offered mitigation systems to address the potential vapor intrusion related exposures. Based on the concentration detected, and in comparison with the Soil Vapor Intrusion Guidance (NYSDOH, 2006), soil vapor contamination identified during the RI was addressed during the IRM described in Section 6.2.

Soil vapor contamination in on-site areas of OU5 was evaluated by NYSDEC and NYSDOH in 2005. Based on the concentrations detected in indoor air in Buildings 57 and 57A, the Agencies recommended that reasonable and practical actions be taken to reduce exposures to contaminants present at levels above typical background or air guidelines, and that environmental investigations, operation of the existing remedial measures, and evaluation of other remedial measures be continued. The thermal treatment IRM described in Section 6.2 was effective in removing sources of contamination under and around Buildings 57 and 57A. Elimination of sources of contamination in soil and subsequent reductions in contaminant concentrations in groundwater are expected to reduce the potential for soil vapor and indoor air contamination. A reassessment of indoor air in Buildings 57 and 57A is currently underway and additional actions may be considered.


Former IBM Endicott Site
ENDICOTT
Endwell
Endwell
Twin Orchard
Vestal
RIVER
SUSQUEHANNA
ERIE-LACKAWANNA
Choconut
Pierce Hill
Radio Towers (WENE)
Water Tanks
Water Tank
Union Park
Snapp Jr High Sch
Library
Fire Station
Gaging Station
Sewage Disposal
Vestal Central Schools
Calvary Tabernacle
St Marys Cem
Our Lady of Angels Ch
Our Savior Lth
Bereah Chd
Maine-Endwell High Sch
McGuinness Sch
West Colmore
Boiler Lake
Drive-in Theater
Arnold Park
Radio Tower
Cemetery
Broad St Cem
Rivers de Cem
Charles P Johnson
Gen P Johnson Sch
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Brink Sch
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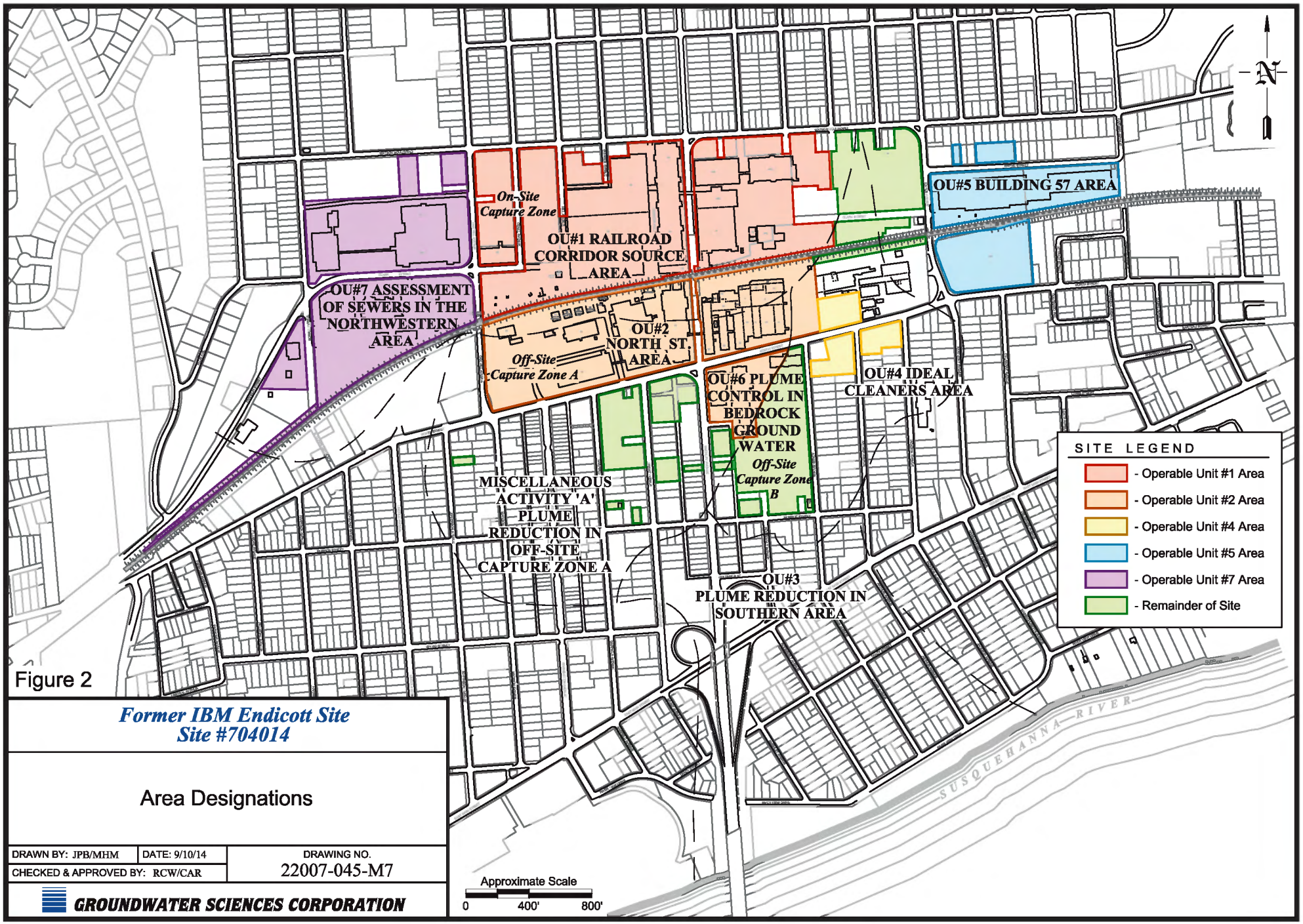

Figure 2

Former IBM Endicott Site
Site #704014

Area Designations

DRAWN BY: JPB/MHM	DATE: 9/10/14	DRAWING NO.
CHECKED & APPROVED BY: RCW/CAR		22007-045-M7

GROUNDWATER SCIENCES CORPORATION

Figure 3

Source Zone Summary

Focused Feasibility Study Report

OU#5/Building 57 Area

Union and Endicott, New York

Drawn By:	C. LaVack
Designed By:	S. Warner
Reviewed By:	J. Ordway
Project No:	2466.03
Date:	February 2015

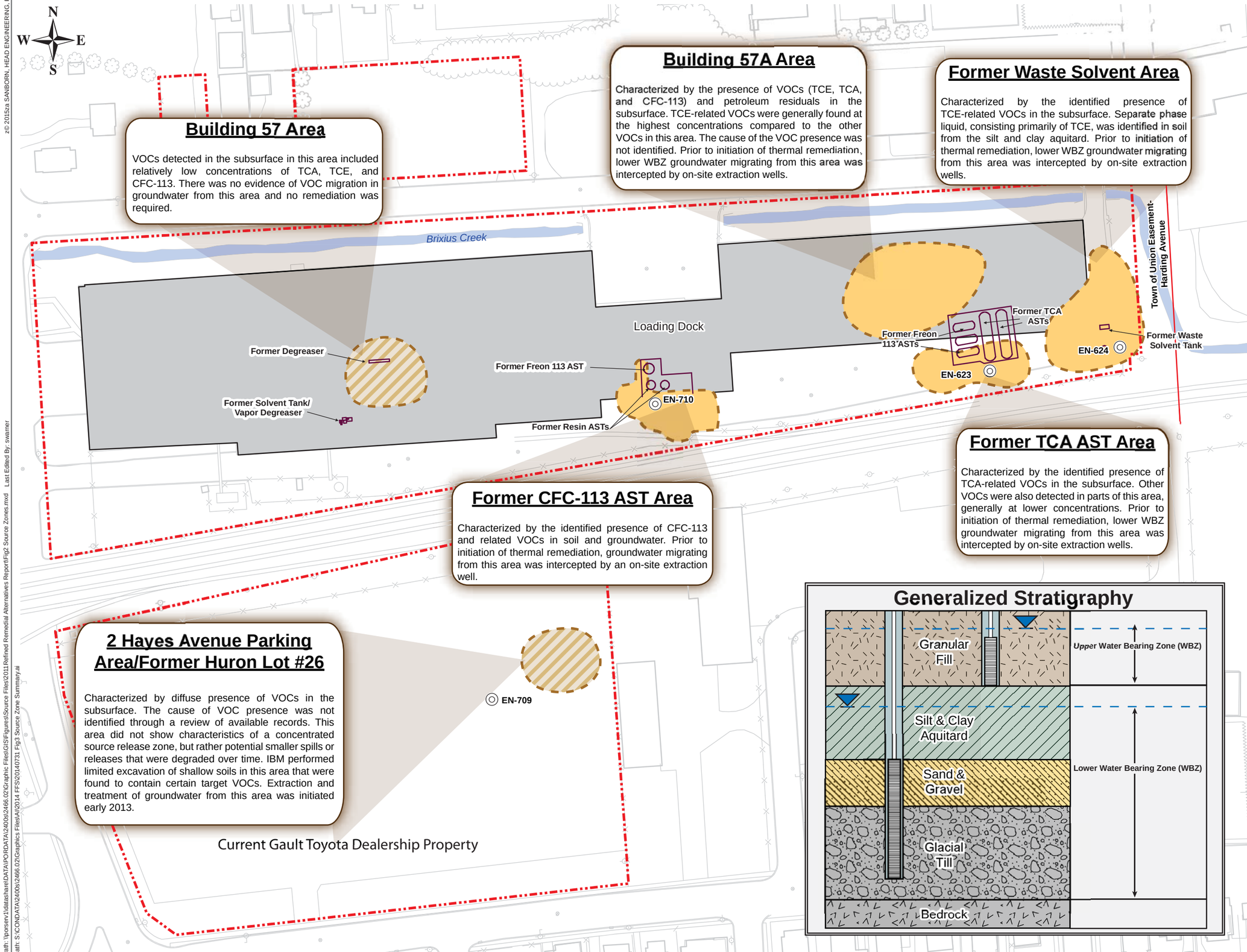

Figure Narrative

This map is intended to provide general information regarding source zones at the Building 57 (OU#5) site. The source zones were identified through a review of historical documents (see September 2005 Source Area Evaluation report prepared by Sanborn, Head Engineering, P.C.), and subsequent exploration and testing.

Please refer to the IRM Completion Report text, tables, and appendices for additional details.

Legend

- Source Zone (thermal treatment area)
- Source Zone (other)
- Groundwater Extraction Well

50 25 0 50 100 Feet

SANBORN HEAD ENGINEERING

z:\ 2015\z\a SANBORN, HEAD ENGINEERING, P.C.
Path: \\porserv1\datashare\DATA\PO\RDATA\2400s\2466.02\Graphic Files\GIS\Figures\Source Files\2011\Refined Remedial Alternatives Report\Fig2 Source Zones.mxd Last Edited By: swarner
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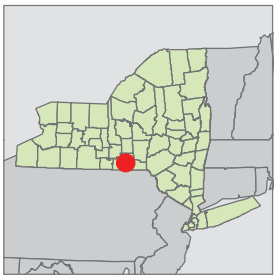

OU#5 Site Boundary

Town/Village Boundary

Limits of ventilation

Drawn By:	C. LaVack
Designed By:	J. Prelwitz
Reviewed By:	J. Ordway
Project No:	2466.03
Date:	February 2015

400 200 0 400 800
Feet

SANBORN HEAD

Figure 4

Location Plan

Downgradient Assessment Report
OU#5 / Building 57 Area

IBM - OU#5
Union and Endicott, New York

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY

Former IBM Endicott Facility
Operable Unit No. 5: Building 57 Area
State Superfund Project
Village of Endicott and Town of Union, Broome County, New York
Site No. 704014

The Proposed Remedial Action Plan (PRAP) for Operable Unit 5 (Building 57 Area) of the former IBM Endicott facility was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on February 19, 2016. The PRAP outlined the remedial measures proposed for the contaminated soil, groundwater and soil vapor at the site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on March 7, 2016, which included a presentation of the remedial investigation and interim remedial measures, as well as a discussion of the proposed remedy for the area listed. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on March 20, 2016.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: Explain why NYSDOH's Guideline for TCE went from 5 $\mu g/m^3$ to 2 $\mu g/m^3$.

RESPONSE 1: DOH revised the guideline based on new toxicity data and risk assessments published since the old guideline was established in 2006. DOH also determined that the TCE concentrations, derived by the United States Environmental Protection Agency (USEPA) to protect the general public, including sensitive groups such as children, from the non-cancer effects (including development and reproductive effects) and cancer effects of TCE, are scientifically robust and health protective. Thus, DOH adopted the USEPA guideline of 2 $\mu g/m^3$ for non-cancer effects as the state guideline.

COMMENT 2: What is the flow direction of Brixius Creek and was sampling conducted north of Watson Boulevard?

RESPONSE 2: The flow direction of Brixius Creek along its course is generally south and east toward the Susquehanna River. Within OU-5, Brixius Creek flows eastward along the north side of Buildings 57 and 57A, then southward along the east side of Building 57A, then eastward again

along the north side of the railroad tracks. The channel of Brixius Creek has clearly been altered by development in the area.

Sampling was not conducted north of Watson Boulevard as part of IBM investigations since IBM did not own or operate facilities there. Sampling and/or other investigations were conducted in areas north of Watson Boulevard as part of the Endicott Area-Wide Study (Site 704038).

COMMENT 3: Can you speak to health studies relative to these solvents, especially in this (Endicott) area? (Note: The commenter was alluding to a NIOSH cancer study for Endicott/IBM workers.)

RESPONSE 3: Several studies have examined the health of local residents and workers in the Endicott area with respect to solvent exposures. Information about the NYSDOH reports are available on its website at:
https://www.health.ny.gov/environmental/investigations/broome/index.htm.

The NIOSH report on workers is available online at:
http://onlinelibrary.wiley.com/doi/10.1002/ajim.22288/abstract.

NIOSH, with assistance from NYSDOH, is also conducting a study of birth defects in the children of workers. That study has not yet been released.

COMMENT 4: Will NYSDOH review the NIOSH study?

RESPONSE 4: NYSDOH reviewed the NIOSH study of workers before it was released. It will also review the NIOSH birth defects study before it is released.

COMMENT 5: Are you aware of studies that suggest it is the grandchildren of individuals exposed to TCE who show health effects?

RESPONSE 5: NYSDOH reviewed the scientific and medical literature on the health effects of TCE and did not find evidence to suggest that the TCE exposure of a grandparent could affect the health of their grandchildren. This type of effect is called a transgenerational effect. NYSDOH found several articles discussing the transgenerational effects of environmental contaminants, but none of the articles we reviewed identified TCE as a chemical that causes transgenerational effects

COMMENT 6: Can you provide an overview of the remedial action plan for OU-5?

RESPONSE 6: The remedy selected for Operable Unit 5 is No Further Action with continued operation of the ongoing interim remedial measures – groundwater extraction and treatment and vapor intrusion mitigation in impacted off-site structures.

COMMENT 7: Where is the groundwater cutoff wall exactly? Was there monitoring done outside of the wall?

RESPONSE 7: The groundwater cutoff wall is located along the western edge of the Building 57A parcel. The wall was placed just inside the property fence line, approximately 30-40 feet west of the south-flowing segment of Brixius Creek.

Brixius Creek was sampled as part of the Remedial Investigation and monitoring wells are located east of the cutoff wall on the opposite side of Brixius Creek, but otherwise no monitoring was conducted outside the cutoff wall during the operation of the in-situ thermal treatment IRM.

COMMENT 8: Regarding Ranney Well contamination, did IBM dump in that area? Any additional sampling there?

RESPONSE 8: The question is unrelated to the OU-5 PRAP. The commenter is referring to one of the Village of Endicott's municipal supply wells located several miles to the west near the old village dump, a separate Superfund site, the Endicott Village Landfill and Wellfield, Site 704008.

COMMENT 9: IBM settled (a class-action lawsuit) for fourteen million dollars. How many properties were affected (by this settlement)?

RESPONSE 9: The question is unrelated to the OU-5 PRAP. The lawsuit in question was between private property owners and IBM. The State was not involved in the lawsuit.

Lenny Seigel, Executive Director, Center for Public Environmental Oversight, Mountain View, California, and James Little, local resident and member of the Western Broome Environmental Stakeholders' Coalition submitted comments via email from James Little dated February 27, 2016 which included the following comments:

COMMENT 10: I've just reviewed the Proposed Remedial Action Plan for IBM's Operable Unit 5 in Endicott. In general, I support the proposal. Remediation thus far is successful. Levels of contamination, including TCE, are low. (This is not true for all the other IBM-Endicott Operable Units.) In similar locations, responsible parties might propose a transition to natural attenuation – that is, turning off the pumps. But here "no further action" means continued groundwater extraction and treatment. The Site Management Plan, Institutional Controls, and other forward-looking elements look good.

The document ends, "A reassessment of indoor air in Buildings 57 and 57A is currently underway and additional actions may be considered." Earlier it states, "Soil vapor intrusion and the potential for soil vapor intrusion has been identified in both on- and off-site buildings. The on-site indoor air results indicate that either the air levels are consistent with background indoor air levels and are not of concern or that levels are below or slightly above the NYSDOH air guidelines. In the latter, the possibility of health effects in workers exposed to these levels is low, but monitoring within the on-site occupied buildings is on-going. NYSDOH has recommended that reasonable and practical actions be taken to reduce indoor air concentrations within the on-site buildings to the extent that is possible." It would be good to get more details about future monitoring as well as the proposal for mitigation. This might be a good place to demonstrate how near-continuous monitoring can overcome the problem of temporal variability. It would be helpful to know whether they plan any mitigation beyond running the HVAC system more often.

RESPONSE 10: The site-wide vapor intrusion reassessment is ongoing. Details of additional monitoring and/or mitigation will be determined following completion of the reassessment.

Frank Roma, a local resident and member of the Western Broome Environmental Stakeholders' Coalition, submitted an email dated March 19, 2016 which included the following comment.

COMMENT 11: Thank you for explaining the plans for Buildings 57 and 57A. The clean-up so far and the plans for the future look good.

RESPONSE 11: Comment noted.

APPENDIX B

Administrative Record

Administrative Record

Former IBM Endicott Facility
Operable Unit No. 5: Building 57 Area
State Superfund Project
Village of Endicott and Town of Union, Broome County, New York
Site No. 704014

1. *Proposed Remedial Action Plan for the Former IBM Endicott Facility, Operable Unit No. 5 (Building 57 Area),* dated February 2016, prepared by the Department.

2. *Order on Consent, Index No. A7-0502-0104*, between the Department and International Business Machines Corporation, executed on August 4, 2004.

3. *Evaluation of Existing Corrective Measures Systems, Village of Endicott / Town of Union, Broome County, New York,* dated April 2004, prepared by Groundwater Sciences, P.C.

4. *Supplemental Groundwater Assessment Final Report – Volume 1, Village of Endicott / Town of Union, Broome County, New York*, dated May 2004, prepared by Groundwater Sciences, P.C.

5. *Supplemental Groundwater Assessment Final Report – Volume 2, Village of Endicott / Town of Union, Broome County, New York*, dated May 2004, prepared by Groundwater Sciences, P.C.

6. *Source Area Evaluation, OU#5: Building 57 Area, Union and Endicott, New York, AOC Index# A7-0502-0104, Site# 704014, Endicott, New York,* dated September 2005, prepared by Sanborn, Head Engineering, P.C.

7. *Report of Findings, Groundwater Extraction and Treatment Testing, Supplemental Remediation Investigations, Operable Unit 5 (Building 57), Endicott and Union, New York,* dated June 2006, prepared by Sanborn, Head Engineering, P.C.

8. *Interim Report of Findings, Initial Remedial Technology Screening, Supplemental Remedial Investigation, Operable Unit 5 (Building 57), Endicott and Union, New York,* dated October 2008, prepared by Sanborn, Head & Associates, Inc.

9. *Post Construction Documentation, Storm Drain Rehabilitation, Building 57A, IBM-Endicott, Endicott, New York,* dated November 2009, prepared by O'Brien & Gere.

10. *Interim Remedial Measure Evaluation Summary Report, Supplemental Remedial Investigation, Operable Unit 5 (Building 57), Endicott and Union, New York,* dated February 2010, prepared by Sanborn, Head Engineering, P.C.

11. *Report of Findings, Supplemental Remedial Investigation, Operable Unit 5 (Building 57), Endicott and Union, New York,* dated March 2010, prepared by Sanborn, Head Engineering, P.C.

12. *In Situ Thermal Desorption Treatability Testing Findings, OU#5/Building 57, Union and Endicott, New York,* dated May 2010, prepared by Sanborn, Head & Associates, Inc.

13. *Report of Findings, Supplemental Groundwater Extraction Testing, OU#5/Building 57, Union and Endicott, New York,* dated July 2010, prepared by Sanborn, Head Engineering, P.C.

14. *Remedial Alternatives Assessment, OU#5/Building 57, Former IBM Facility, Union and Endicott, New York,* dated May 2011, prepared by Sanborn, Head Engineering, P.C.

15. *IRM Completion Report, Lot #26 Excavation, Operable Unit #5/Lot 26 Area, Union and Endwell, NY, Administrative Order on Consent Index # A7-0502-0104, Site # 704014,* dated July 2011, prepared by Sanborn, Head Engineering, P.C.

16. *Building 57 Waste Solvent Area Excavation, Operable Unit #5/Building 57 Area, Former IBM Facility, Union and Endicott, New York, 7-04-014,* dated October 2011, prepared by Sanborn, Head Engineering, P.C.

17. *Building 57 Interim Remedial Measure (IRM) Completion Report, Operable Unit #5/Building 57 Area, Union and Endicott, New York, AOC Index # A7-0502-0104, Site #704014,* dated November 2012, prepared by Sanborn, Head & Associates, Inc.

18. *Bedrock Groundwater Assessment, Report of Findings, Supplemental Remedial Investigation Addendum, Operable Unit #5/Building 57 Area, Union and Endicott, New York,* dated November 2013, prepared by Sanborn, Head & Associates, Inc.

19. *Expanded Capture Zone Assessment (EN-709), Report of Findings, Supplemental Remedial Investigation Addendum, Operable Unit #5/Building 57 Area, Union and Endicott, New York,* dated February 2015, prepared by Sanborn, Head & Associates, Inc.

20. *Focused Feasibility Study, Operable Unit #5/Building 57 Area, Union and Endicott, New York,* dated January 2015, prepared by Sanborn, Head Engineering, P.C.

21. *Combined Groundwater Report for 2014, Order on Consent Index #A7-0502-0104, Site #704014, Village of Endicott / Town of Union, Broome County, New York*, dated April 2015, prepared by Groundwater Sciences, P.C. and Groundwater Sciences Corporation.

22. *Annual Report, Soil Vapor Monitoring through August 2015, Comprehensive Operations, Maintenance, and Monitoring Program, Endicott, New York*, dated November 2015, prepared by Sanborn, Head & Associates, Inc.

23. Email from James Little to Alex Czuhanich (NYSDEC) dated February 27, 2016.

24. Email from Frank Roma to Alex Czuhanich (NYSDEC) dated March 19, 2016.