DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name:	**General Electric Main Plant**
Facility Address:	**1 River Road**
	Schenectady, New York 12345
Facility EPA ID #:	**NYD002084135**

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI 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 "Migration of Contaminated Groundwater Under Control" EI

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

Relationship of EI to Final Remedies

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

Duration / Applicability of EI Determinations

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

EI (CA 750) DETERMINATION

Facility Background Description:

The General Electric (GE) Main Plant facility is located at 1 River Road in the city of Schenectady and the town of Rotterdam, Schenectady County, New York. The property is zoned "heavy industrial" and encompasses approximately 628 acres. The property is bordered to the north and east by Interstate 890; to the south by the Poentic Kill and the Delaware and Hudson Railroad; and to the west by the Poenties Kill, an unnamed wetland, and the Rotterdam Square Mall. Properties to the north, east, and west are zoned for industrial and commercial uses. Properties to the south are zoned for residential use. The residential area is separated from the site by the railroad track and the steep, wooded Bellevue Bluffs, which rise approximately 50 to 100 feet above the site.

The GE Main Plant has been in operation since 1886, when Thomas Edison purchased two vacant factory buildings at the site. The area was originally the Mohawk Flats wetlands and was heavily filled, an activity that continued up until 1947. Initially, landfilling took place south of the Erie Canal. Since 1886, over 240 buildings and other structures have been constructed on the site. Over the years, the plant has manufactured a variety of products, including electrical motors and generators, steam and gas turbines, insulated wire and cable, insulating materials, and microwave tubes.

The surrounding area both currently and historically supports numerous industrial activities, including the Erie Barge Canal's Schenectady Port, handling bulk coal and petroleum products; railroad sidings that linked the Main Plant to the former American Locomotive facility for transport of machine parts; a fuel oil distribution center at the Stark Oil site; a jewelry manufacturer; two major recycling centers for steel, paper, and plastic; a municipal waste transfer station; a maintenance center for an electrical and natural gas utility; numerous automotive service stations; a chemical manufacturing plant for insulated materials; and a sewage treatment plant.

Manufacturing activities are conducted in the central and eastern parts of the property. As of August 2001, approximately 45 buildings were present on site. The western area of the property includes three former landfill areas (Binnie Kill, East, and West Landfills) and wetlands.

GE used the former landfills for disposal of waste and debris beginning in the mid-1940s and continued into the 1980s. Most of the former East Landfill is currently covered with six to eight inches of cover material and is overgrown with vegetation. In some areas, the cover is up to two feet thick. Soil cover at the former West Landfill is generally between two and five inches thick, up to one foot in some areas. GE covered the former Binnie Kill Landfill in 1997 with three feet of clean fill and six inches of topsoil, which is now well vegetated.

Bedrock under the site is composed of shales with some sandstone and siltstone interbeds. The bedrock topography under the site generally slopes to the north. The bedrock is overlain by 80 to 100 feet of the following unconsolidated sedimentary deposits consisting of (in descending order): fill, floodplain deposits, channel fill deposits, glaciolacustrine sediments, deltaic deposits, and glacial till.

The glacial till is found just above the bedrock and forms a relatively thin layer beneath much of the site. Its thickness ranges from zero to about 30 feet across most of the site, with one area reaching 90 feet at the south-central area of the site. The distribution of this layer does not significantly affect groundwater conditions at the site.

The deltaic deposits are the least abundant at the site, and occur only at the western-most end of the property. The deltaic deposits interfinger with the glaciolacustrine sediments east of the Schenectady/Rotterdam well field. The glaciolacustrine sediments, consisting of clay, silt, and sand, were deposited after the retreat of the continental ice sheet, when the area became inundated by glacial Lake Albany.

Channel fill deposits form a permeable, water-bearing unit of river-deposited sands and gravels. This stratigraphic unit transports large volumes of groundwater off site, and is considered the primary water-bearing unit beneath the site. The channel fill deposits are thickest near the Mohawk River and reach 80 feet in places. The most significant groundwater transport mechanism within the channel fill has been identified as the thick band that extends from southwest of Building 285 towards the river.

The floodplain deposits consist of low-permeability, very fine-grained sands, silts, and clays. The floodplain deposits are thickest (up to 30 feet) near former Building 285 and generally thin to the south near Bellevue Bluff.

The fill material was deposited in order to reclaim the floodplain during phases of development on the property and consists of sediments, sands, gravel, cinders, bricks, coal, wood, ash, mica, porcelain, construction debris, and reworked natural material. The fill ranges up to fifty feet thick, with the thickest areas near the former landfills, the wastewater treatment plant, and inside the former Binnie Kill Channel.

Hydrology at the site and in the region of the site is well understood. Groundwater flow at the site is generally from south to north, toward the Mohawk River. The water table contours generally run parallel to the River. A hydrogeologic divide exists to the west of the site, which separates groundwater under the site from the Schenectady/Rotterdam municipal well field that lies 3200 feet west and northwest of the site.

The floodplain and glaciolacustrine layers act as semi-confining layers, due to their lower permeability. Groundwater migrates from the semi-confining layers into the channel fill layer, and to some extent the fill material. Approximately 98 percent of the groundwater that flows toward the river from the site flows through the channel fill, while the other two percent migrates through the fill and floodplain deposits. Flow is mainly horizontal within the fill and channel fill and vertical within the floodplain deposits. While there is a downward gradient from the fill to the channel fill deposits throughout most of the site, there is an upward hydraulic gradient present in two areas: the first is at the north side of the site along the river, and the second is along the Poentic Kill. In these two areas, groundwater migrates upward from the channel fill deposits into the Poentic Kill and Mohawk.

Most of the site is covered with low-permeability surfaces, including pavement, buildings, and various foundations. The site is also graded so that precipitation is directed to storm sewers. Therefore, direct rainfall recharge to the fill material is limited.

Surface water at the site includes unnamed wetlands, the Poentic Kill, the Poenties Kill, and the Mohawk River. The Poentic Kill (previously known as the Tellers Kill) formerly flowed eastward through the East Landfill and discharged to the Mohawk River. In 1947, a new stream channel was excavated to divert the flow to the north of the landfill before it rejoined the natural stream channel near the edge of the property. The Poentic Kill is generally a gaining stream, although it becomes a losing stream across some reaches. The Poenties Kill flows through a poorly defined channel through the wetlands west of the former West Landfill. During wet periods, it flows approximately along the western property line. It passes through a culvert under Old River Road and joins the Poentic near the northern edge of the former landfill area. During development of the adjacent property in the late 1980s, both the Poentic and Poenties Kills were rechanneled near the property line with the construction of flood-control weirs and impoundments.

The Erie Canal was active during early plant operations, but was decommissioned and transformed into a water storage reservoir sometime in the early 20th century. The channel of the former Canal was backfilled in the early 1950s. The Canal was constructed above ground in most places near the Main Plant, with a wall height of approximately 11 feet. The historic Canal does not appear to have been excavated into the floodplain deposits, and the fill beneath the Canal does not appear to be a preferred pathway for transporting contaminants east or west across the site.

The Binnie Kill was an arm of the Mohawk River that ran through the site prior to site development. The channel was 200 to 300 feet wide, and about 25 feet deep below the current ground surface. In the early 1900s, the channel was partitioned and converted into a series of holding ponds for cooling water. In general, the ponds have since been filled with material similar to that used at the rest of the site. One former 80- by 280-foot pond, the last unfilled portion of the channel, located east/northeast of the former Building 259 in Sector R became vegetated and is now classified as a wetland.

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination? **(Note: This determination addresses contaminated media regulated under New York State's Inactive Hazardous Waste Disposal Site Remedial Program.)**

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

   _____ If no - re-evaluate existing data, or

   _____ if data are not available, skip to #8 and check the"IN" status code.

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

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

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

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

Rationale and Reference(s):

Summary of Contamination

The site has been an active manufacturing plant for over a century, and common industrial contaminants are found throughout the site. Site data have been compared to Applicable or Relevant and Appropriate Standards (ARARs) and Standards Criteria and Guidance (SCGs) for conceptual response scenarios. Groundwater and surface water SCGs and surface and subsurface soil cleanup goals are the primary SCGs for the site. Site-specific cleanup goals for two metals and polychlorinated biphenyls (PCBs) were established in the Interim Remedial Measure Work Plan, for the Sector R Holding Pond (3-29-2001), which was approved by the New York State Department of Environmental Conservation (NYSDEC). In this report, cleanup goals for lead were set at 500 mg/kg, for mercury at 10 mg/kg, and for PCBs at 10 mg/kg (with clean cover).

Groundwater

Groundwater is the primary area of concern (AOC) at the site, and the groundwater in the channel fill deposits is the primary component of this AOC. Modeling predicts that most of the contamination at the site is held above the low permeability floodplain deposits. Where present, the floodplain deposits act as a semi-permeable barrier that greatly retards the downward migration of contaminants from the fill to the channel fill groundwater. Groundwater in the fill and floodplain deposits either flows downward into the channel fill deposits, migrates to the Poentic Kill, or converges toward the northern portion of the site. There is a well-defined hydrologic divide to the west of the property boundary, so that the groundwater beneath the site (east of the divide) flows toward the Mohawk River, not towards the Schenectady/Rotterdam well field.

Elevated concentrations of VOCs and semivolatile organic compounds (SVOCs) have been detected in the shallow groundwater (fill and floodplain) at the site. VOCs were found in channel fill or glaciolacustrine deposits at concentrations greater than NYS groundwater standards. Specific areas of groundwater contamination are discussed below. Because of the groundwater divide to the west of the site, the VOCs present in the groundwater do not adversely effect the municipal water supplies. Groundwater data have been compared to NYSDEC SCGs.

Groundwater has been investigated at the site since the early 1980's. An early perimeter groundwater monitoring network was established in 1988. A full Remedial Investigation was intiated under the New York State inactive hazardous waste disposal site program in 1995.

GE's consultants have concluded, based on the RI data from 1999 to present, that groundwater conditions beneath the site promote natural attenuation and biodegradation of the VOCs. This has been confirmed through monitoring of the site's extensive network of monitoring wells.

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[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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

City Water Main Area

In December 1997, the City of Schenectady began replacing 7,500 feet of water main pipe along River Road. Weathered gasoline light non-aqueous phase liquid (LNAPL) was discovered in the excavation trench northwest of Building 81 in Sector H, approximately eight feet below ground surface (bgs) and about three feet above the groundwater. The LNAPL appeared to be limited in area.

Most of the VOCs in the shallow groundwater near the City Water Main area are benzene, toluene, ethylbenzene, and xylenes (BTEX) and other petroleum compounds. Benzene and isopropylbenzene were detected at maximum concentrations of 1,960 parts per billion (ppb) and 130 ppb, respectively from a nearby temporary well in September 2000.

Waste Water Treatment Plant Area

Prior to the 1970s, the area of the facility where the Waste Water Treatment Plant (WWTP) is now located contained unlined sludge basins. Historic operations at the WWTP, including the sludge beds, suggested the possibility of a source area. Floodplain deposits are thin or missing in this area and there is a thick zone of fill beneath the WWTP.

The highest perimeter concentrations of VOCs in groundwater have been detected about 100 feet west of the 96-inch diameter WWTP effluent line. Concentrations have decreased from about 700 ppb in June 1993 to about 360 ppb in August 2000. Vinyl chloride and 1,2-dichloroethene (DCE) were detected at DM-303I in 1999 at 120 ppb and 140 ppb, respectively.

Chlorinated VOCs (dichloroethene and vinyl chloride) and BTEX were found in the shallow groundwater at the southeastern portion of the WWTP. Vinyl chloride, DCE, xylenes, and benzene were found at maximum concentrations of 1,010 ppb, 606 ppb, 187 ppb, and 128 ppb, respectively.

In 2000, the highest total chlorinated VOC concentration in the channel fill deposits at the WWTP area were found just north of the WWTP at 89.2 ppb and included chlorobenzene, DCE, and vinyl chloride. Higher concentrations of total VOCs (up to 360 ppb) were detected downgradient of the WWTP. Concentrations of total VOCs south of the WWTP were detected at 26 ppb. Groundwater with elevated concentrations of chlorinated VOCs has likely migrated along a narrow pathway to reach DM-303I, perhaps via the bedding material of the WWTP effluent line, or another location where the floodplain deposits are missing.

Former Wire Mill Area

The wire mill was operated from 1916 to 1987. There are no channel fill deposits in the area near former Building 109, so the floodplain deposits are directly on top of the glaciolacustrine silts and clays. However, the glaciolacustrine layer is found at the same general elevation as the channel fill, and the two layers are hydrologically connected. This area has been identified as the source of the chlorinated volatile organic compounds (VOCs) found in the channel fill deposits at the northern boundary of the site.

VOCs including trichloroethene (TCE), DCE, and vinyl chloride were detected in the shallow groundwater at maximum concentrations of 101 ppb, 30 ppb, and 45 ppb, respectively. In the deeper groundwater, concentrations of total VOCs, primarily TCE and cis-1,2-DCE, ranged from 1.7 ppb to 8,610 ppb. The source of the VOCs is constrained to an area north of the former Building 109. The highest concentrations run east-west along the road area north of the former Wire Mill. Storm sewer or bedding material may have contributed to the distribution of VOCs from this area.

Former East and West Landfills

Groundwater under the Former East Landfill tends to mound and flow radially from the center towards the Poentic Kill and to the east. The mounding results from the temporarily perched water table above the floodplain deposits. Fill at the southern portion of the former landfill and the former tank farm consists of larger pieces of construction debris, such as concrete slabs and bricks. The groundwater mound and the large void spaces in the fill provide a water source and preferred pathway for seeps.

In the former West Landfill, shallow groundwater flows radially away from three major groundwater mounds towards the Poentic Kill to the south and east, the Poenties Kill to the north, and the wetlands to the west. There are areas in the landfill where the floodplain deposits are thin or missing. In these areas, groundwater can migrate downward from the fill into the channel fill more readily. There is a downward gradient beneath most of the former landfill, except near the Poentic Kill. Throughout most of the former West Landfill, the water table is within the floodplain deposits.

VOCs, primarily BTEX and other petroleum hydrocarbons, have been detected in shallow groundwater in the southern portion of the former East Landfill. Maximum detected concentrations of benzene, ethylbenzene, xylenes, and toluene were 101 ppb; 7,300 ppb; 34,500 ppb; and 73,000 ppb, respectively. Polynuclear aromatic hydrocarbons (PAHs) detected in the southern portion of the landfill included dibenzofuran (maximum concentration 27 ppb), naphthalene (1,100 ppb), fluoranthene (10 ppb), phenanthrene (13 ppb), acenaphthalene (11 ppb), and 2-methylnaphthalene (45 ppb). LNAPL, a combination of No. 4 fuel oil, gasoline, and lubricating oil, and PCBs (4.7 mg/kg) were detected in December 2000 in this same area.

In the former West Landfill, VOCs were detected, including benzene (7.73 ppb), which exceeded the NYSDEC groundwater standard of 1 ppb. Arsenic (73.1 ppb) and antimony (6.12 ppb) also exceeded their groundwater standards of 25 ppb and 3 ppb, respectively.

Building 113/Chip Pad Area

Building 113 is a garage that was used for storage and repair of heavy equipment, located in the northwestern part of the site. Materials used and stored in drums in this building included motor oil, hydraulic fluid, antifreeze, and water-based solvent/detergent. As part of the maintenance procedure, equipment was cleaned prior to repairs via steam cleaning in an area southwest of the building. Wastewater was discharged to the ground surface. A degreaser unit was also used here.

Building 113 was also used for metal chip reclamation from the 1970s until the late 1980s. Metal chips with waste coolant and soil residues were stored on a concrete pad east of the building and on the ground south of the building. Chips are no longer stored here, but the concrete pad is still in place. The former Poentic Kill channel is located beneath this area, and Seep 8 is downgradient of Building 113.

Total VOCs, primarily BTEX (2,560 ppb), chlorobenzenes (115 ppb), and chlorinated VOCs (242 ppb) were detected in shallow groundwater near the Chip Pad Area at Building 113. PAHs detected included: acenaphthalene (31 ppb), dibenzofuran (25 ppb), fluorene (31 ppb), 2-methylnaphthalene (17 ppb), naphthalene (48 ppb), and phenanthrene (34 ppb). Lubricating oil LNAPL with 288 ppb of PCBs was detected at P-PK-5 in March 2001.

Building 49/53 Area

Underground oil tanks and distribution lines were located in the area between Buildings 49 and 53. Fuel oil LNAPL was detected in 1981 on the water table in this area.

PAHs were detected in shallow groundwater in the vicinity of Building 49/53, primarily benzo(b)fluoranthene (11.4 ppb), fluoranthene (14 ppb), pyrene (19.5 ppb), fluorene (25.9 ppb), 2-methylnaphthalene (142 ppb), and phenanthrene (29.8 ppb). PAHs detected north of Building 57 included acenaphthalene (10 ppb), dibenzofuran (12 ppb), fluorene (14 ppb), phenanthrene (14 ppb), and 2-methylnaphthalene (90 ppb). GE's consultants have determined that the main source of fuel oil in the subsurface was underground fuel tanks east of Building 63. Wells GE-104 and GE-115A contained 0.10 feet of free product as recently as August 2001.

Former Stark Oil Facility

The former Stark Oil facility, an oil distribution center, is located just past the far east corner of the Main Plant property. Petroleum products and solvents were stored in underground and aboveground storage tanks and drums, with a storage capacity of 76,500 gallons. A 1987 investigation indicated the presence of VOCs and a 1991 study detected the presence of gasoline and kerosene in groundwater at the former Stark Oil Facility.

Contamination was discovered at this area in 1986. Low levels of tetrachloroethylene (PCE) and DCE were detected in shallow groundwater at the former Stark Oil Facility, but the majority of VOCs detected were BTEX compounds, including benzene (719 μg/L), ethylbenzene (1,190 μg/L), and xylenes (1,360 μg/L). The highest concentrations of BTEX were detected at the northwest corner of the area. Free product was observed in area monitoring wells as recently as February 2001.

Former Insulated Materials Product Section

GE used a variety of industrial materials, including resins and solvents, in the former Insulated Materials Product Section (IMPS) area, which was primarily located near former Buildings 67 and 73, east of Building 81. Groundwater here is approximately 10 feet below ground surface. Groundwater flow is altered in this area by man-made features, such as sewer lines and pipelines. Chlorinated VOCs were detected at one location in the channel fill deposits near the former

IMPS area in 1999.

LNAPL was detected at GE-45 in the early 1980s. VOC concentrations greater than 100 µg/L were found in the channel fill deposits at one location. Concentrations of DCE and vinyl chloride ranged from 3.7 ppb to 248 ppb.

Building 262 Area

Building 262 is located in the north-central portion of the facility and southwest of the WWTP. The buildings in this area have historically been used by the turbine development laboratory and the WWTP. In 1999, VOCs were detected in channel fill deposits northwest of Building 262.

LNAPL was discovered at Building 262 during a foundation study for an addition to the building in 1991. Remedial measures were implemented in 1992. However, VOCs, primarily chlorinated benzenes, were detected northwest of Building 262 in the channel fill (up to 162 ppb) and fill and floodplain deposits (130.5 ppb) as recently as 1999.

Former Binnie Kill Holding Pond

PCBs in groundwater (up to 3.8 ppb) collected from fill material around the holding pond in 1999 have been associated with suspended particles, rather than dissolved contaminants in the groundwater. No PCBs were detected in channel fill groundwater, which screens the channel fill deposits.

Total VOCs in the shallow groundwater near the holding pond area were detected as high as 131 ppb. Benzene (35 ppb), xylenes (22 ppb), and chlorobenzene (71 ppb) exceeded their respective groundwater standards of 1 ppb, 5 ppb, and 5 ppb. In the channel fill groundwater, total VOCs concentrations were 103 ppb, with 1,2-DCE (16 ppb), vinyl chloride (25 ppb), chlorinated benzenes (60 ppb), and benzene (1.75 ppb), exceeding their standards of 5 ppb, 2 ppb, 5 ppb, and 1 ppb. No Priority Pollutant List metals exceeded groundwater standards in this area.

3. Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

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

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

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

Rationale and Reference(s):

The primary concern for area residents is the potential use of groundwater as drinking water source. The site is located over the Schenectady Aquifer, a highly productive sole-source aquifer. The part of the aquifer under the immediate site area is not currently used for public water supply. The City of Schenectady and Town of Rotterdam wellfields are located approximately 3,000 feet to the northeast.

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

Groundwater has been investigated at the site under several programs since the early 1980's. A perimeter groundwater monitoring network along the northern and western boundaries was established in 1988. This was designed to monitor the possible contribution of site contaminants on the municipal wellfields (City of Schenectady and Town of Rotterdam) located to the northwest of the site. A separate Groundwater Divide Study was conducted, beginning in 1991, to survey groundwater flow conditions from the site on a quarterly basis. The results of these long-term studies, which continued until 2000, confirmed the predominant south to north groundwater flow regime and indicated and confirmed the existence of a stable groundwater divide to the west of the former West Landfill.

A full Remedial Investigation was initiated under the New York State inactive hazardous waste disposal site program in 1995. This effort fully characterized the media-based areas of concern, particularly groundwater, as summarized in the Summary of Contamination, above, and more fully in the recently completed Remedial Investigation study (May 2004). As noted, Site-related contamination has impacted the groundwater resource in the fill and floodplain and channel fill aquifers in several areas of the site.

A Feasibility Study was also completed in May 2004. The NYSDEC is currently developing a comprehensive site-wide remedy (a Proposed Remedial Action Plan or PRAP) for the entire Main Plant.

Groundwater contamination conditions, where encountered, have remained very stable throughout several different phases of investigation. The nature of the contaminants is well understood and the contaminated groundwater is contained on-site and is not migrating to residential areas (there are no residential areas immediately adjacent to the site, downgradient hydraulically from the site, or adjacent to on-site surface water bodies). There are no known downgradient receptors of groundwater in the area. Off-site contamination of any kind related to the site (soil, sediment, surface water, or groundwater) has not been found during the course of site investigations.

Based on the results of the Remedial Investigation and a number of years of monitoring data, the groundwater beneath the Main Plant does not flow toward or otherwise affect the City of Schenectady or Town of Rotterdam wellfields located to the northwest of the site. Due to the well-established groundwater divide, groundwater from the site is not currently affecting, nor is it expected to affect in the future, these public wells or any other known drinking water supplies.

Several areas of groundwater contamination noted are associated with the former East and West landfills. These areas are within the footprint of the disposal areas and do not appear to be migrating beyond the landfills, based on the perimeter data and RI data. Given the age and disposal period associated with the landfills, this is not expected to change. The landfills also have been partially closed and covered, including the implementation of a pilot phytoremediation program (agronomic cover, soil buffer and vegetation plantings) to control infiltration and reduce production of leachate.

Several other areas are associated with LNAPL and petroleum product disposal. These include the Building 49/53 area, Stark Oil, City Water Main, and Insulating materials Product Section (IMPS). All of these are localized areas and are currently the subject of active LNAPL collection and treatment programs.

There are two major volatile organic contamination plumes on-site, the former Wire Mill area and the Waste Water Treatment area. The former appears to be confined entirely to the center of the plant property. The WWTP area is adjacent to the northern boundary of the site and the Mohawk River. The plume location and flow data would indicate the potential to discharge into the river, at least in the shallow zone. However, surface water and sediment samples from the Mohawk River do not indicate impacts.

General Electric performed an assessment during the RI to evaluate whether on-going natural processes are attenuating the VOCs in the groundwater. Groundwater samples from selected wells were analyzed for geochemical indicators and dissolved gasses. The geochemical indicators included alkalinity, chloride, dissolved organic carbon (DOC), sulfate, sulfide, nitrates, nitrite, and dissolved iron. The dissolved gases included methane, ethane, and ethene. These geochemical parameters indicate that the subsurface geochemical environment throughout the site promotes natural attenuation.

Since 1991, GE has been collecting groundwater samples from the downgradient margin of the Main Plant, along the Mohawk River. The data from GE's on-going perimeter monitoring program have shown decreasing levels of chlorinated solvents. The concentrations of total VOCs at perimeter wells DM-303I and GE-15 have decreased. Based on the decreasing trend of chlorinated VOCs, the geochemical data, and the USEPA's protocol for evaluating natural attenuation of chlorinated solvents, there is evidence that VOCs detected in the channel fill deposits are degrading and

attenuating under natural conditions.

The analytical data collected during the July 1999 monitoring event indicate that geochemical conditions in the groundwater in the fill and floodplain deposits beneath the former East Landfill Area are also favorable for the attenuation of VOCs and, in all likelihood, PAHs.

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

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

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

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

Rationale and Reference(s):

Based on hydraulic data collected since at least 1991, shallow groundwater does discharge to on-site surface water bodies in several locations. These include the Poenties Kill and the Poentic Kill, streams which flow adjacent to the former West and East landfills, and the Mohawk River which flows west to east along the northern boundary of the site. Areas of groundwater contamination like-wise exist near these surface water bodies. In several areas along the East Landfill boundary with the Poentic Kill, seeps of landfill leachate have been observed.

Contaminants in groundwater do not appear to have adversely affected the quality of surface water in the on-site aquatic habitats, despite indications that shallow groundwater discharges to the Poentic Kill, Poenties Kill and the Mohawk River.

BTEX compounds have been detected in the Poentic Kill, however each compound was below the NYSDEC's surface water standards, near the seeps. In addition, there are concentrations of iron in the Poentic Kill that exceed the NYSDEC's surface water standards. PCBs were not detected in surface water samples from the Poentic Kill. PCVBs have been detected in leachate seeps from the East Landfill, however, these results are related to particulate matter in the seeps and are probably associated with surface soil contamination noted on the landfill, rather than groundwater contamination.

The RI data indicates that the surface water quality in the wetlands, Poentic Kill (not near the seeps), and Poenties Kill, is not impacted by PCBs, VOCs, SVOCs, or metals Iron is the primary contaminant detected. The data, collected as recently as 2003, confirms that surface water quality in the streams is not significantly impacted by site activities.

Since 1999, two rounds of samples, including shallow, intermediate, and deep surface water samples (including those collected at the interface of water column and sediment), were collected at three sampling stations in the Mohawk River near the expected groundwater discharge. No contaminants, particularly VOCs, associated with the site were detected in the Mohawk River. Previous samples, including a limited sediment sampling program, also did not indicate site-related contamination.

An on-going Interim Remedial Measure has been in place since 1999 to address the seeps. Active filtering and carbon treatment and a monitoring system is in place to treat the discharge water from Seeps 2, 3, and 4 before it enters the Kill. A substantive New York State SPDES permit regulates the discharge into the Poentic Kill. The current system seems to be effectively removing PCBs from the seep water, based on monthly data.

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging

contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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

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

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

Rationale and Reference(s):

The concentration of VOCs potentially discharging to the Mohawk River from the Waste Water Treatment Plant area on the northern boundary of the site, based on sampling data from the perimeter wells, may be potentially "significant", as defined under the EPA's Environmental Indicator program. The concentrations of vinyl chloride (120 µg/L) and 1,2-DCE (140 µg/L) at Well DM-303I in 1999 were more than 10 times the groundwater standards of 2 µg/L and 5 µg/L, respectively. However, no site-related VOCs have been detected in the Mohawk River sediment surface water samples, including samples taken deep in the water column at the interface of the water column and bottom materials.

Samples taken over a number of years (1988 to 2003) indicate a stable plume situation; indeed, data from 1999 to present indicates concentrations of volatile organic contaminants are decreasing, potentially due to natural degradation of the contaminants.

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

__X__ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the

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

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

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

discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/ habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

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

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

Rationale and Reference(s):

Large areas of the site, especially in and around the former landfill areas, were found to support a wide array of vegetation and wildlife. Communities of terrestrial flora were found to be diverse and healthy and are not considered to be adversely impacted by site contaminants. Faunal results from the RI and Screening Level Ecological Risk Assessment indicate the potential for adverse affects, primarily due to elevated PCB concentrations in suspended seep particulate matter in seep water coming from upland areas of the former East Landfill (not shallow groundwater). Sediments in the Poentic Kill bottom materials contained levels of PCBs in excess of the New York State sediment screening criteria, but well below the threshold concentration (1 ppm total PCB) that would typically drive sediment removal efforts. Interim Remedial Measures implemented at the seep areas in 1999 are effectively removing the source of PCBs to the sediments. Additionally, significant portions of the former landfills have been partially closed and are the subject of a pilot-study phyto-remedial program discussed above. LNAPL and petroleum-based plume areas are currently being addressed through active collection and treatment of LNAPL

Site contamination has impacted the groundwater resource in the fill and floodplain and channel fill aquifers. Contaminants in groundwater do not appear to have adversely affected the quality of surface water in the on-site aquatic habitats, despite indications that shallow groundwater discharges to the Poentic Kill and Poenties Kill near the former landfills. Off-site contamination (soil, sediment, surface water, or groundwater) was not found during the course of site investigations. No site-related contamination was found in the adjacent Mohawk River.

The NYSDEC is currently developing a site-wide remedial program for the GE Main Plant Site. This plan will include:

Completed or operating Interim Remedial Measures (IRMs) and remedial systems.

- Excavation and off-site disposal of PCB-contaminated surface and subsurface soil at various locations in the manufacturing areas and former landfills.
- Soil or asphalt covers over surface soils in portions of the manufacturing area.
- Agronomic/phytoremediation cover system for closure of the former East and West Landfills.
- Expanded seep collection and treatment systems for the seeps along the former East Landfill.
- Shallow groundwater treatment using air sparging technology for select areas between the former East Landfill and the Poentic Kill.
- Bioremediation (and natural attenuation) of groundwater contamination source areas at several locations, including the VOC along the northern boundary of the site.
- Institutional controls and environmental easements, including access controls and restrictions on the future use of the site property and groundwater.
- Comprehensive post-remedial monitoring program to evaluate the effectiveness of the remedy.
- Periodic review of the effectiveness of the completed remedial actions.

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

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

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

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

Rationale and Reference(s):

Currently, limited data, other than that associated with monitoring of on-going remedial systems, is being collected while the remedial plan is being developed. Extensive data collection ended in 2003, with the completion of the RI. A comprehensive monitoring and maintenance program is planned as part of the future remedial activities at the site. These will include:

- Evaluation of the effectiveness of the agronomic cover system at the site landfills
- Monitoring of the performance of groundwater and source area treatment measures.
- Monitoring of the progress of natural attenuation of contaminants in site groundwater.
- Monitoring of groundwater quality in the channel fill deposits annually at locations approximately one year and three years travel time upgradient from the Mohawk River.
- Monitoring of groundwater quality in the fill and floodplain deposits annually at locations approximately one year and three years travel time upgradient from on-site surface water bodies.
- Monitoring of the quality of surface water in the Poentic Kill and Poenties Kill annually.
- Surveys of biota and wildlife habitats every five years.

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

__X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the `GE Main Plant Site, located on River Road in Schenectady, NY 12345`. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the State becomes aware of significant changes at the facility.

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

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

Completed by _____ Date: 09/25/04

Martin D. Brand
Remedial Project Manager, NYSDEC Div. of Environmental Remediation
(EPA Region II - New York State)

Supervisor Michael J Komoroske Date: 9/29/04

Michael Komoroske, P.E.
Supervisor, Remedial Section C, Remedial Bureau B
NYSDEC, Division of Environmental Remediation
(EPA Region II - New York State)

Bureau: Date: 9/30/04

Edwin Dassatti
Director, Bureau of Hazardous Waste and Radiation Management
NYSDEC, Division of Solid & Hazardous Materials
(USEPA Region II - New York State)

References: Revised Remedial Investigation Report
GE Main Plant, Schenectady, New York
Prepared by URS Corporation for General Electric Company, May 2004

Revised Feasibility Study Report
GE Main Plant, Schenectady, New York
Prepared by URS Corporation for General Electric Company , May 2004

Attachments: Figure 1 Site Location Map
Figure 2 General Site Features

Locations where Supporting Documents may be found:

New York State Department of Environmental Conservation, Central Office
625 Broadway, 8th Floor
Albany, New York 12233-7258

Contact telephone and e-mail numbers

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GRAPHIC SCALE (FEET)

0 0.5 1 MILE

Property Boundary

USGS Schenectady, NY 15' Quadrangle, 1954 (Photorevised 1980)

FIGURE 1-1

SITE LOCATION MAP

GENERAL ELECTRIC COMPANY
MAIN PLANT
SCHENECTADY, NEW YORK

URS

646 PLANK ROAD SUITE 202
CLIFTON PARK, NEW YORK 12065

FIGURE 1

Site Location Map