

Proposed Remedial Action Plan - GE Main Plant - Supporting Information

REMEDIAL INVESTIGATION PROGRAM

The *Revised Remedial Investigation Report (Revised RI Report)*, dated May 30, 2004 documents the findings of the multiple stages of the remedial investigation program, which has proceeded in several stages at the 628-acre Main Plant property.

The RI developed technical information and environmental data for seven site-wide media-based Areas of Concern (AOCs):

- The soils;
- The groundwater;
- The seeps along the Poentic Kill;
- The surface water in the on-site streams and wetlands;
- The sediments in the on-site surface water bodies;
- Ambient air; and
- Site habitats.

In addition to identifying, the nature and extent of on-site contaminants. The investigations focused on the primary pathways that could potentially allow these contaminants to migrate off-site or to otherwise pose a significant threat to either human health or the environment. The data shows that there are two primary migration pathways at the site: the groundwater in the channel fill deposits and the surface water in the two on-site streams.

RESULTS OF INVESTIGATION

The investigative program has been proceeding for more than ten years at the Main Plant. These investigations have generated an extraordinary amount of hydrogeologic and environmental site data. There are now 233 monitoring wells, 79 piezometers, and 23 staff gauges on-site. The site database now consists of 1,050 soil borings, 1,482 groundwater samples, 511 soil samples, 163 surface water samples, 213 sediment samples, 15 biota samples, and 2,066 water level measurements.

Hydrogeology/Geology

The hydrogeology and geology beneath the site has been comprehensively studied and is well understood. The stratigraphic sequence beneath the site, from the surface down, consists of fill material, floodplain deposits, channel fill deposits, glaciolacustrine silts and clay, till, and bedrock.

The thickness of the fill is up to 50 feet. The areas of thickest fill are in the former landfill areas in the western part of the site (as much as 40 feet), beneath the Waste Water Treatment Plant (WWTP) (as much as 30 feet), and within the former Binnie Kill Channel (as much as 50 feet). There are areas at the site where there are no fill deposits. There is perched groundwater within parts of the fill in the former landfill areas.

The floodplain deposits consist of low permeability fine-grained silts and clays. These fine-grained deposits range in thickness from zero to approximately 30 feet. There are areas where the floodplain deposits are thin or absent. These areas are located in either former river channels or previous excavations area.

The channel fill deposits, which are composed of river-deposited sands and gravels, are the primary water-bearing unit beneath GE's property. Approximately 98 percent of the groundwater beneath GE's property migrates through the channel fill deposits.

The glaciolacustrine deposits are composed of material deposited beneath a large regional lake after the last ice age. The material ranges from fine sands to silts and clays.

Throughout most of the site, the water table is in the floodplain deposits and there is a downward hydraulic gradient from the fill, through the floodplain deposits, and into the channel fill deposits. There is an upward hydraulic gradient at the north side of the site, near the Mohawk River, and near the Poentic Kill in the western portion of the site.

A natural hydrologic divide exists within the channel fill deposits west of GE's property. The groundwater beneath the GE site is east of the divide and generally migrates from south to north towards the Mohawk River. Most importantly, over ten years of data confirms that the groundwater beneath the site does not migrate toward the two municipal well fields. The municipal well fields are not impacted by conditions at the Main Plant.

Soil Quality

The soil data collected during the investigation were compared to the NYSDEC's Recommended Soil Cleanup Objectives (RSCOs) in order to identify areas that warrant evaluation in the Feasibility Study (FS).

Volatile Organic Compounds

None of the surface soil samples collected from the site contained concentrations of total volatile organic compounds (VOCs) that exceed the NYSDEC's RSCO of 10 milligram per kilogram (mg/kg) for total VOCs. Benzene, toluene, ethylbenzene, and xylene (BTEX) or other petroleum compounds were found in subsurface soils at concentrations that exceed the NYSDEC's RSCOs near the former IMPS Area, the former East Landfill Area, the City Water Main IRM Area, the WWTP Area, and the former Binnie Kill Channel. Chlorinated solvents were found in subsurface soils at concentrations that exceed the NYSDEC's RSCOs near the former Wire Mill and south of the WWTP Area.

Semi-Volatile Organic Compounds

Only one soil sample exceeded the NYSDEC's RSCO for total semi-volatile organic compounds (SVOCs) of 500 mg/kg. Various individual SVOCs, primarily Polyaromatic hydrocarbons (PAHs), are found throughout much of the site at concentrations that exceed the compound specific NYSDEC RSCOs.

Polychlorinated Biphenyls

The greatest concentration of polychlorinated biphenyls (PCBs) in the surface soil is in the former East Landfill Area. PCBs were found in surface soils at concentrations that exceed the NYSDEC's RSCO of 1.0 mg/kg in eight

areas. These eight areas are the former East Landfill Area (up to 133 mg/kg), near the former Building 259 (up to 76 mg/kg), the WWTP Area (up to 3.8 mg/kg), former Building 29 (up to 31.0 mg/kg), former Building 60 (3.1 mg/kg), Building 84 (1.1 mg/kg), the former West Landfill Area (up to 4.69 mg/kg), and the area near former Building 109 (2.12 mg/kg).

Concentrations of total PCBs in subsurface soils exceeded the NYSDEC's RSCO of 10 mg/kg at five locations. Three of these locations are in the former East Landfill Area. The maximum total PCB concentration in the former East Landfill Area was 146 mg/kg. The other two locations are west of Building 81 (15 mg/kg) and from the former Binnie Kill Channel (12 mg/kg).

Metals

There are concentrations of metals above NYSDEC's RSCOs on the site, most notably in the fill that was used to reclaim the northern portion of the site. Metals are generally only slightly greater than the NYSDEC's RSCOs. Metals found in surface or subsurface soils at concentrations that exceed the NYSDEC's RSCOs include: iron, copper, cobalt, chromium, nickel, selenium, zinc, arsenic, beryllium, barium, cadmium, vanadium, and mercury. There does not appear to be any trend that identifies a particular location or source that correlates with disposal or material handling practices at the site.

Groundwater Quality

There are areas at the site where the groundwater exceeds the NYSDEC's groundwater quality standards. The most notable of these areas are a south-north trending area beneath the center of the site and the southwestern portion of the former East Landfill Area. The RI shows that the contaminants in groundwater at the site do not adversely impact, or pose a threat to, the municipal water supplies.

There is a south-north trending area beneath the center of the site within the permeable channel fill deposits that contains chlorinated VOCs at concentrations that exceed the NYSDEC's groundwater standards. The south-north trending area of chlorinated VOCs in the channel fill deposits originates in two principal areas: south of the wastewater treatment plant (WWTP) and near the former Wire Mill.

There are also two areas within the channel fill beneath the former East Landfill Area where levels of VOCs, particularly BTEX, have the potential to migrate to the Poentic Kill. Beneath the former East Landfill Area, the water table is in the fill above the floodplain deposits. Some of the shallow groundwater flows laterally and appears, as seeps, along the eastern bank of the Poentic Kill. The seeps generally occur near the contact between the fill and the underlying floodplain deposits. PCBs, BTEX, and iron have been found in seep water samples at concentrations that exceed NYSDEC's groundwater standards. GE initiated interim remedial measures in the primary seep area.

Volatile Organic Compounds

The investigations have identified six primary areas of elevated VOC concentrations.

The City Water Main interim remedial measure (IRM) Area (BTEX and petroleum hydrocarbons in the fill groundwater);

The WWTP Area (Chlorinated VOCs and BTEX in the fill/floodplain and channel fill groundwater);
The former Wire Mill Area (Chlorinated VOCs in the floodplain and channel fill groundwater);
The southwestern portion of the Former East Landfill Area (BTEX in the fill/floodplain and channel fill groundwater); and
The former Chip Pad Area (BTEX and chlorinated VOCs in the fill/floodplain and channel fill groundwater).
The former Stark Oil Facility (BTEX in the fill/floodplain groundwater)

These six areas, and other lesser areas (such as well GE-15 along the western property boundary, the former IMPS Area, and the former Building 285 parking lot) are locations at the site where VOCs have been found in the groundwater at concentrations that exceed NYSDEC's groundwater standards.

Natural Attenuation of VOCs in Groundwater

Data was collected during the RI to evaluate whether ongoing 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 ongoing 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.

Polychlorinated Biphenyls

The most recent data shows that PCBs are not present in the groundwater in the channel fill deposits. Where detected in shallow groundwater, PCBs were found in groundwater samples from wells that screen the fill or the fill-floodplain contact. The detection of PCBs in groundwater samples was limited to only four locations: the former Binnie Kill Channel, Building 49/53 Area, the former East Landfill Area, and the former Chip Pad. However, LNAPL that contains PCBs has been found in all four areas where PCBs have been detected in the shallow groundwater.

Semivolatile Organic Compounds

Only bis(2-ethylhexyl)phthalate was detected in groundwater from the channel fill at concentrations greater than the NYSDEC's groundwater standard (5 µg/L). PAHs were detected in shallow groundwater at concentrations that exceed the NYSDEC's groundwater standards in the former East Landfill Area, near the former Chip Pad, near Building 49/53, and in the former Binnie Kill Channel.

Metals

Metals have been found in the groundwater beneath the site. The overall groundwater quality does not appear to be significantly impacted by metals. The few metals at concentrations that exceed NYSDEC's groundwater standards are found regionally at high concentrations in the groundwater.

Based on comparisons of total and dissolved analyses, metals are believed to be primarily associated with suspended particles in the groundwater samples. Only antimony, arsenic, iron, manganese, magnesium, barium, mercury, selenium, sodium, and cadmium were found at concentrations that exceed the NYSDEC's groundwater standards in both total and dissolved samples from the fill and floodplain groundwater. Only antimony, arsenic, cadmium, iron, magnesium, manganese, sodium, and thallium exceed the NYSDEC's groundwater standards in the groundwater from the channel fill deposits in both total and dissolved samples.

Summary of Groundwater Quality

Based on the current data set, it appears that there are several shallow areas that contribute VOCs to the groundwater beneath the site. The areas near the former Wire Mill and the WWTP are, or were, the mostly likely contributor of a large percentage of the chlorinated solvents found in the channel deposits beneath the site. At the former Wire Mill Area, the primary contaminant is TCE and the associated daughter products.

Surface Water Quality

There are two on-site streams: the Poentic Kill and the Poenties Kill. Both streams generally flow north and northeast through the western portion of the site and eventually empty into the Mohawk River. There are two wetlands: one west and one south of the former West Landfill Area.

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. However, based on mass loading rates from the seeps, it is estimated that, if not abated, the seeps could add concentrations of PCBs into the Poentic Kill that may possibly exceed the NYSDEC's surface water standard for the protection of wildlife.

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 (other than iron). The data confirms that surface water quality in the streams is not significantly impacted by a century of manufacturing and industrial activities.

Two rounds of samples, including shallow, intermediate, and deep surface water samples, were collected at three sampling stations in the Mohawk River. None of the VOCs associated with the site were detected in the Mohawk River.

Sediment Quality

During this investigation, concentrations of PCBs and metals that are above the NYSDEC's RSCO were found in the former Sector R Holding Pond. GE completed a NYSDEC-approved IRM to remove impacted sediments

from the former Holding Pond. These impacted sediments have been removed and new fill was placed throughout the Holding Pond. Thus, the pathway between PCBs and metals in surface sediments has been removed.

There were a total of sixteen sediment samples collected from the Poentic Kill, Poenties Kill, and wetlands in 2000. These samples were analyzed for PCBs, B/N SVOCs, and metals. Seven of the sixteen sediment samples contained PCBs. Where detected, the total PCB concentration ranged from 0.127 mg/kg to 0.783 mg/kg, which are above the NYSDEC's sediment screening criteria. PAHs and metals were also detected in sediments at concentrations that exceed the NYSDEC's sediment screening criteria.

Habitat

The habitats and associated ecological communities at the Main Plant range from relatively diverse assemblages of plants and animals in wetland and terrestrial areas that are on and border the former landfill areas, to less diverse assembles of opportunistic species that inhabit some areas that are in a transitional stage of forest development. The habitat areas include state-protected plant species or variants. In addition, 81 species of birds and nine species of mammals were also recorded at the site in 1995 and 1996.

Both vertebrates (fish and frog) and invertebrates (crayfish) were collected and analyzed for PCBs. Where detected, the total concentrations of PCBs in two crayfish samples ranged from 0.2 mg/kg to 0.209 mg/kg. The total PCB concentration in a frog sample was 0.26 mg/kg. The total PCBs in fish samples ranged from 0.0529 mg/kg to 4.92 mg/kg. The highest PCB concentrations were found in fish collected near the seeps. A NYSDEC-approved IRM has been implemented to address the contribution of PCBs from the seeps and, thus, abate an exposure pathway to the biota.

Ambient Air

VOCs are not present in surface soils over large portions of the site. Thus, there is little likelihood of VOCs in ambient air. In addition, the 1999 screening-level Human Health Risk Assessment (HHRA) concluded that the conditions at the site do not pose significant risks to employees, trespassers, construction workers, potential future recreational users, or residents. The HHRA did consider inhalation exposure pathways. The 1999 HHRA was provided as Appendix H in the *Zone 1 Remedial Investigation Report*.

