2. SUMMARY OF HONEYWELL AND OTHER INDUSTRIAL FACILITIES AND ENVIRONMENTAL INVESTIGATIONS

The various Honeywell and other industrial facilities and related areas near Onondaga Lake are briefly described in this chapter, and the major Honeywell environmental investigations that are being conducted are summarized. Additional factors related to the potential transport pathways from the Honeywell upland and tributary sites and non-Honeywell sites to Onondaga Lake are also summarized. Additional information related to these facilities and potential sources of contamination are found in Appendix G of this BERA and in Chapter 4 of the Onondaga Lake Remedial Investigation (RI) report (TAMS, 2002b).

2.1 Overview of Honeywell Facilities and Operations

Honeywell's predecessor companies began manufacturing operations in Solvay, New York, in the late 1800s (Figure 2-1). Natural deposits of salt and limestone were the primary reasons for locating the facilities in Solvay. The Solvay Process Company, founded in 1881, used the ammonia soda (Solvay) process to produce soda ash, a product used in a variety of applications such as neutralization, detergent, and industrial chemicals manufacturing and glass manufacturing. Honeywell (through its predecessor corporation, AlliedSignal) subsequently expanded the operation to three locations known as the Main Plant, the Willis Avenue Plant, and the Bridge Street Plant. These three locations are collectively described as the Syracuse Works in this report. The Syracuse Works closed in 1986. Figure 2-2 shows periods of production and production milestones for major product lines at the Syracuse Works.

The Syracuse Works had three major product lines, as follows:

- **Soda Ash** – The soda ash product line primarily produced light and dense soda ash (Na_2CO_3) and a variety of related products, including sodium bicarbonate ($NaHCO_3$, or baking soda), sodium nitrite ($NaNO_2$), ammonium bicarbonate (NH_4HCO_3), ammonium chloride (NH_4Cl), calcium chloride ($CaCl_2$), sodium sesquicarbonate ($Na_2CO_3 \bullet NaHCO_3 \bullet 2H_2O$, or "snowflake"), and caustic soda (NaOH).

- **Chlor-alkali** – The chlor-alkali product line primarily produced liquid chlorine, caustic soda (NaOH), and caustic potash (KOH). In addition, potassium carbonate (K_2CO_3) and potassium bicarbonate ($KHCO_3$) were produced by carbonating caustic potash. Hydrogen gas was produced as a byproduct of the chlor-alkali process and was used in the manufacture of hydrogen peroxide (H_2O_2) and as a fuel in the power section of the Main Plant.

- **Benzene, Toluene, Xylenes, and Chlorinated Benzenes** – The benzene, toluene, and xylenes product line produced benzene, toluene, and xylenes; heavy hydrocarbons (tars); and naphthalene. The chlorinated benzenes product line

produced chlorobenzene, liquid and crystal paradichlorobenzene, liquid and emulsified orthodichlorobenzene, and trichlorobenzenes. Hydrochloric or muriatic acid (HCl) was a marketed byproduct of the chlorinated benzene product line and was also used to lower the pH of feed brine in the chlor-alkali processes.

The Main Plant manufactured soda ash (and related products); benzene, toluene, and xylenes; and naphthalene, whereas the Willis Avenue plant manufactured chlorinated benzenes and chlor-alkali products. The Bridge Street plant produced chlor-alkali products and hydrogen peroxide.

In addition to the three main product lines, Honeywell facilities produced coke and producer gas (a mixture of carbon monoxide, nitrogen, hydrogen, methane, carbon dioxide, and oxygen) for a limited time and generated electricity and steam for use in the manufacturing processes. Several products (i.e., nitric and picric acids; salicylic acid and methylsalicylate; benzyl chloride, benzoic acid, benzaldehyde, and phthalic anhydride; phenol; and hydrogen peroxide) were manufactured for only short periods as either start-up operations that were later relocated or as part of a pilot plant or developmental laboratory activity.

Details about the raw materials, manufacturing processes, and waste materials associated with each of the Honeywell products and activities are presented in the Site History Report (PTI, 1992d). Waste management is also discussed in PTI (1992d) and Blasland & Bouck (1989). Honeywell operated under a variety of National Pollutant Discharge Elimination System (NPDES) and State Pollutant Discharge Elimination System (SPDES) permits.

The wastewater from the Bridge Street plant was discharged to the West Flume, a tributary to Geddes Brook, which in turn is a tributary of Ninemile Creek. Both Geddes Brook and Ninemile Creek are the subject of a separate RI/FS being conducted by Honeywell and NYSDEC. The wastewater from the Main Plant and the Willis Avenue plant was discharged to Onondaga Lake (e.g., via the East Flume; see RI Chapter 4, Section 4.5.1 [TAMS, 2002b]). The East Flume is currently being further evaluated as part of the Wastebed B/Harbor Brook RI/FS being conducted by Honeywell.

The Syracuse Works relied on the use of vast, unlined wastebeds (Solvay Wastebeds) located in the towns of Solvay and Galeville and the city of Syracuse. The locations and designations of the Solvay Wastebeds are shown in Figure 2-3. Initial waste disposal practices consisted of filling wetland areas adjacent to Onondaga Lake. Later, wastebeds designed specifically for Solvay waste disposal were built using containment dikes constructed of materials including native soils, Solvay waste, and cinders or (along the lakeshore) piles and sheeting (Blasland, Bouck & Lee [BBL], 1990).

Several areas near the south end of Onondaga Lake (Wastebeds A through M) contain evidence of Solvay waste disposal (Blasland & Bouck, 1989). Disposal in Wastebeds A through E ceased by 1926, although they received some other materials (e.g., tar residues, sewage sludge) in later years. In particular, Wastebed B between the East Flume and Harbor Brook received significant amounts of Solvay and organic waste either by direct disposal or on-site migration of organic contaminants (TAMS, 2002b). Wastebeds F through M are currently occupied by numerous industrial and commercial structures. Of

these, according to Honeywell, only Wastebeds F through H appear to have served as Solvay Wastebeds. Waste material in Wastebeds I through M is probably related to later filling operations associated with road construction (Blasland & Bouck, 1989).

Wastebeds 1 through 8 were used for Solvay waste disposal until 1944. These wastebeds were subsequently transferred to New York State. Disposal in Wastebeds 9 through 11 occurred from 1944 to 1968, and included disposal of Solvay waste, brine purification sediments, and boiler water purification wastes.

Disposal in Wastebeds 12 through 15 began in 1950 and continued until 1986, when the Syracuse facilities were closed. These beds received Solvay waste, brine purification sediments, treated mercury cell wastewater, boiler water purification wastes, and boiler bottom wastes and fly ash. During 1986, the Onondaga County Department of Water Environment Protection (OCDWEP) disposed of liquid sewage sludge (3 to 5 percent solids) and dewatered sludge in Wastebeds 15 and 12, respectively.

The Semet Residue Ponds were disposal lagoons for organic wastes from the Willis Avenue plant. The lagoons were hollowed out of the already-existing Solvay Wastebed A, and filled with approximately 80 million gallons of the tarry residue. The dikes bordering the ponds were reportedly built from fill materials including concrete rubble, old electrolytic cell parts, ashes, cinders, soil, Solvay waste, bricks, stone, etc. (O'Brien & Gere, 1991).

The Wastebed B/Harbor Brook and Willis Avenue Ballfield sites (Figure 2-1) are two additional Honeywell sites that are also currently undergoing investigation. The Wastebed B/Harbor Brook site consists of three areas, including:

- The Lakeshore Area, which was designated as Wastebed B, and received Solvay waste and other industrial wastes from approximately 1908 to 1926, along with additional material in the 1950s.

- The Penn-Can property, which has historically been, and is currently, used for production and storage of asphalt products.

- The CSX Railroad Area, which is located south of the Penn-Can property.

The East Flume and the lower reach of Harbor Brook are also part of the Wastebed B/Harbor Brook site. Previous environmental investigations conducted along Harbor Brook and its vicinity in 1996 and 1997 indicated that mercury, benzene, toluene, ethylbenzene, and xylenes (BTEX), chlorinated benzenes, and polycyclic aromatic hydrocarbon (PAH) compounds are present within the sediments in the lower reach of the brook. Subsequent investigations revealed the presence of non-aqueous phase liquids (NAPLs) on the site and in the lower reach of Harbor Brook. The Willis Avenue Ballfield site, which is the northwest and central portion of Wastebed C, received Solvay waste between approximately 1908 and 1926 (Blasland & Bouck, 1989). The western portion of the Willis Avenue Ballfield site was utilized as a baseball

field in the 1960s and 1970s, and possibly as a landfill for Honeywell wastes and debris in the 1940s (O'Brien & Gere, 2000).

The Mathews Avenue Landfill site situated in the Geddes Brook watershed was used by Honeywell as a construction and demolition debris disposal site. A preliminary site assessment (PSA) will be performed at the site.

Based on a review of historic aerial photographs taken from at least 1938 until sometime between 1951 and 1959, NYSDEC has identified that large amounts of Honeywell wastes appear to have been discharged directly to the lake, and, later through the East Flume (TAMS, 2002b). The direct discharge to the lake built up into a delta of waste deposits through which the East Flume now flows. Based on analysis of sediment core samples, these combined wastes included the calcite-contaminated Solvay wastes plus mercury, PAHs, diphenylethanes (including 1-phenyl-1-[2,4-dimethylphenyl]-ethane [PXE] and 1-phenyl-1-[4-methylphenyl]-ethane [PTE]), chlorinated benzenes, and dioxins/furans. At that time, the waste deposits covered approximately 65 acres of the lake bottom (a further discussion of this in-lake waste disposal is provided in Chapter 4 of the RI [TAMS, 2002b]).

Honeywell, in cooperation with Onondaga County, dredged sediments contaminated with mercury from the delta of Ninemile Creek in Onondaga Lake in the late 1960s. The sediments were disposed of in basins constructed in wetlands along the shoreline of the lake just north of the mouth of Ninemile Creek (adjacent to what is now Wetland SYW-10). The location of these basins, referred to as the dredge spoils area, is shown on Figure 2-1 (a further discussion of the dredge spoils area is provided in Chapters 4 and 5 of the RI [TAMS, 2002b]) (A. Labuz, pers. comm., 2000).

2.2 Summary of Non-Honeywell Sources

While Honeywell sites have been important contributors of contaminants to the lake, there are, nevertheless, other industrial facilities in the Onondaga Lake watershed that have, or may have, impacted Onondaga Lake.

There are numerous industrial sites that potentially contributed contamination to Ley Creek, including several landfills, foundries, and other industrial facilities. In addition, the General Motors – former Inland Fisher Guide (GM–IFG) facility is a known contributor of contamination to Ley Creek. The GM–IFG and Ley Creek Deferred Media site, which includes contaminated groundwater associated with the Ley Creek PCBs Dredgings site and surface water and sediments in Ley Creek between Townline Road and Route 11, is being investigated under a separate RI/FS. Ley Creek, below Route 11 near the Town of Salina Landfill, was rerouted in the 1970s. Due to this rerouting, a section of Ley Creek became cut off from the Ley Creek flow (the Old Ley Creek Channel). The sediments and banks of this channel are contaminated with polychlorinated biphenyls (PCBs) and metals (e.g., chromium, cadmium, copper, lead, zinc, and nickel). An RI/FS order is being negotiated with GM for the Old Ley Creek Channel site.

The lakefront area between Ley Creek and Harbor Brook contains several facilities or former facilities that potentially contributed contamination to the lake or Onondaga Creek, including:

- The Oil City area.
- The former Niagara Mohawk Power Corporation manufactured gas plant (MGP) located on Hiawatha Boulevard at the current location of the Metropolitan Syracuse Sewage Treatment Plant (Metro) plant on the south bank of the mouth of Onondaga Creek.
- The former Niagara Mohawk Power Corporation MGP located on Onondaga Creek at Erie Boulevard.
- Metro.
- The American Bag and Metal site on Onondaga Creek.
- Roth Steel near Harbor Brook.

North of Tributary 5A is the Crucible Lake Pump Station disposal site at Crucible Bay. Other industrial facilities, including the Maestri 2 site, may have potentially contributed to contamination in lower Ninemile Creek. Separate RI/FS or other environmental reports have been completed or are currently being prepared for these sites. To the extent that contamination is reaching or has reached Onondaga Lake from these upland sites, the ecological risk associated with that contamination within the boundaries of the Onondaga Lake site is evaluated as part of this BERA.

In the early 1800s, Onondaga Lake was receiving untreated industrial and domestic wastes. Around the turn of the twentieth century, a combined sewer system, a single system that transmits a combination of domestic and industrial flows as well as stormwater originating from various sources, was installed that discharged into tributaries and ultimately the lake.

The first primary sewage treatment facility in the Syracuse area was constructed in 1925 at the southern end of Onondaga Lake. An additional major treatment plant was built in 1940 on Ley Creek. During the 1950s, Onondaga County established a sewer district that encompassed the City of Syracuse and some surrounding suburban areas. A new primary treatment plant, the Onondaga County Metropolitan Syracuse Wastewater Treatment Plant (Metro), was constructed in 1960 with a 50 million gallons per day (mgd) design capacity (Onondaga Lake Management Conference [OLMC], 1993).

The Metro sewage treatment plant, which serves the city of Syracuse and several surrounding towns, is currently permitted (NY-0027081) to discharge an average of 80 mgd through its main outfall to Onondaga Lake. The plant provides tertiary treatment for flows up to 120 mgd. For combined stormwater and

industrial/domestic sewage flow up to 220 mgd, the incremental flow above 120 mgd receives primary treatment and seasonal chlorination prior to discharge into the lake through a second outfall.

The sewers contain hydraulic relief structures otherwise known as combined sewer overflows (CSOs), which have historically allowed diluted sewage (due to the mixing of stormwater and sewage) to discharge to several tributaries of Onondaga Lake during high flow events. In 1985, Phase I of a program to abate CSOs was implemented. The second phase of the CSO abatement program began in 1990. Additional abatement activities associated with the CSOs are underway as discussed below.

In January 1998, an Amended Consent Judgment (ACJ) (88-CV-0066) was executed by NYSDEC, the State Attorney General, Atlantic States Legal Foundation, and Onondaga County. The ACJ evolves from a 1989 Judgment on Consent (88-CV-0066) settling litigation between the State of New York and the county relating to state and federal water pollution control regulations.

The ACJ, which is designed to improve the water quality of Onondaga Lake, specifically includes a listing of over 30 projects to be undertaken by Onondaga County over a 15-year period. Although completion of the entire project is not required until 2012, many of these county projects are scheduled for completion by 2009 (OCDWEP, 2002b) .

The projects may be grouped into three categories, including:

- Improvement and upgrading of the county's main sewage treatment plant (Metro).
- Eliminating and/or decreasing the effects of the CSOs on the lake and its tributaries.
- Performance of a lake and tributary monitoring program designed to evaluate the effects of the improvement projects on the water quality of the lake and its tributaries.

2.3 Summary of Honeywell's Environmental Investigations

Since closing the Syracuse Works in 1986, Honeywell has been conducting a variety of environmental investigations with the oversight of NYSDEC. The details of each of the major investigations described below are presented in Appendix G, Review of Other Honeywell Sites and Source Areas, including site location, site history, media sampled, maximum detected concentrations of COCs, ecological evaluations, and potential for offsite migration of COCs. Brief summaries of these investigations include:

- **Willis Avenue Chlorobenzene Site** – This investigation addresses the Willis Avenue Plant area and other related areas of study (including the Petroleum Storage Area, the Chlorobenzene Hot Spots Area, and Tributary 5A). The revised RI report was submitted to NYSDEC in October 2002 (O'Brien & Gere,

2002) and is currently under review. The ecological risk assessment for the Willis Avenue site is in progress. A screening-level ecological assessment was submitted to NYSDEC in July 1999 and revised screening tables were submitted in March 2001. A BERA work plan was submitted to NYSDEC in August 1999 and a supplemental biota sampling work plan was submitted in June 2001.

- **Semet Residue Ponds** – This investigation addresses the Semet Residue Ponds. The RI report was submitted to NYSDEC in 1991 (O'Brien & Gere, 1991) and was approved in August 1995. A series of treatability tests were also conducted after approval of the RI and results were reported in O'Brien & Gere (1996, 1997). An FS was submitted to NYSDEC in June 1999 (O'Brien & Gere, 1999b). The proposed plan for the site was issued on January 19, 2002, and the Record of Decision (ROD) was issued on March 28, 2002.

- **LCP Bridge Street Site** – This site is comprised of two separate sites, or operable units (OUs). The OU-1 investigation addresses the former LCP Bridge Street facility and the West Flume, a tributary of Geddes Brook. The draft RI report was submitted to NYSDEC in October 1997 (Gradient and Parsons, 1997), and was subsequently revised and issued as a final report by NYSDEC in August 1998 (NYSDEC/TAMS, 1998a). The draft FS was submitted to NYSDEC in June 1999 (Parsons and Gradient, 1999), a ROD was issued in September 2000 (NYSDEC, 2000b), and a remedial design work plan was approved by NYSDEC on September 18, 2002. An RI/FS is currently underway at the second operable unit (OU-2).

- **Geddes Brook and Ninemile Creek** – This investigation addresses Geddes Brook and the lower reaches of Ninemile Creek, including sediments and floodplain soils. Revised versions of the HHRA, BERA, and RI reports were submitted to NYSDEC in November 2001 (Exponent, 2001d,e,f), rejected by NYSDEC on February 15, 2002, and are currently being rewritten by NYSDEC/TAMS.

- **Wastebeds 1 through 15** – This investigation addresses the wastebeds created by Honeywell along the shorelines of Onondaga Lake and Ninemile Creek. A revised hydrogeologic assessment report for the wastebeds was submitted to NYSDEC in April 1989 (Blasland & Bouck, 1989), and an FS was completed in February 1990 (BBL, 1990). More recently, a supplemental site investigation for Wastebeds 9 through 15 along Ninemile Creek (preliminary site assessment [PSA] complete, Class 2 site) was submitted to NYSDEC in September 1998 (BBL, 1998).

- **Wastebed B/Harbor Brook Site** – A PSA and an RI/FS work plan have been submitted to NYSDEC. Honeywell is currently conducting the RI and associated ecological evaluations (see Section 2.1 for additional information on site areas).

- **Willis Avenue Ballfield Site** – A PSA and an RI/FS work plan have been submitted to NYSDEC. Honeywell is currently conducting the RI and associated ecological evaluations (see Section 2.1 for additional information on site areas).

- **Mathews Avenue Landfill** – The work plan for the PSA for this site was approved by NYSDEC in December 2002.

2.4 Summary of Transport Pathways from Honeywell and Other Sites

From the standpoint of the Onondaga Lake BERA, the most important concern regarding these upland and tributary sites is the potential for offsite migration of COCs and transport to the lake. Based on the information presented in Appendix G and RI Chapter 4 (TAMS, 2002b), the following potential pathways exist for transport of COCs from Honeywell and non-Honeywell sites to Onondaga Lake:

- **Willis Avenue Chlorobenzene Site** – Groundwater and NAPL discharge directly into the lake, as well as surface water transport via the East Flume and Tributary 5A (i.e., following groundwater discharge from the site to those two tributaries). This site is a source of mercury, BTEX, chlorinated benzenes, PAHs, PCBs, and dioxin/furans to the lake.

- **Semet Residue Ponds** – Groundwater and potential NAPL discharge along the lake shoreline, as well as surface water transport via Tributary 5A (i.e., following groundwater discharge from the site to that tributary). This site is a source of mercury, BTEX, naphthalene, and PAHs to the lake.

- **LCP Bridge Street Site** – Surface water transport via Ninemile Creek (i.e., following groundwater discharge from the site to the West Flume and subsequent surface water transport to Geddes Brook and then to Ninemile Creek). This site is a source of mercury, copper, lead, hexachlorobenzene, DDT, benzene, PCBs, and chlorinated solvents to the West Flume and areas downstream.

- **Geddes Brook and Ninemile Creek** – Surface water transport via Ninemile Creek.

- **Wastebeds 1 through 15** – Surface water transport via Ninemile Creek (i.e., following groundwater discharge and surface water transport from the site to the creek) and groundwater discharge from Wastebeds 1 through 8 to Onondaga

Lake. The wastebeds are a source of inorganics, mercury, BTEX, PAHs, and phenols to the lake.

- **Wastebed B/Harbor Brook** – Groundwater and NAPL discharge along the lake shoreline, as well as surface water and NAPL transport via Harbor Brook, and erosion from the shoreline. This site is a source of mercury, BTEX, chlorinated benzenes, PAHs, and phenols to the lake.

- **Honeywell In-Lake Waste Deposit Area** – Wind-induced erosion and resuspension from waste material at the sediment surface, as well as diffusion, bioturbation, and direct contact with biota.

- **Dredge Spoils Area** – This lakeshore area will be further investigated as part of a separate OU. It is currently unknown whether or not this area is a source of contamination to the lake from the dredged material being in direct contact with the local groundwater.

- **Ley Creek** – Ley Creek has received a wide range of contaminants, principally in the form of heavy metals other than mercury and PCBs. These contaminants are also found in the sediments around the mouth of Ley Creek, indicating a contribution from this tributary.

- **Onondaga Creek** – In addition to its sediment load, the creek runs through the city of Syracuse and receives contaminants associated with urban runoff. The American Bag and Metal site is located on both banks of Onondaga Creek and, in the course of a PSA, PCBs were found in the soils on this site, but contaminant migration appears to be minimal. The Niagara Mohawk Erie Boulevard former coal gasification plant, which could also be a source of BTEX or PAHs to the lake, is also located on Onondaga Creek.

- **Oil City** – Industrial compounds utilized and stored in the area included the bulk storage of fuel-related hydrocarbons and the limited location and storage of synthetic organic chemicals and PCBs (Perkins and Romanowicz, 1996). Part of the Oil City area known as the Clark property was remediated under a 1994 ROD that included the installation of a groundwater collection and treatment system for chlorinated and non-chlorinated hydrocarbons, and installation of a containment cell. These contaminants could have historically migrated to the lake or Onondaga Creek. Sediment properties offshore of Oil City contain high levels of PAHs with a pattern that is distinct relative to the naphthalene-dominated pattern at and near the Honeywell sites.

- **Metro and Immediate Area** – Metro, the sewage treatment plant serving the city of Syracuse and certain suburbs, is located on the shore of Onondaga Lake between Onondaga Creek and Harbor Brook. Historically, the Metro facility used wastewater from the Honeywell facilities in order to control phosphorous discharges. It is likely that this use also carried mercury contamination to the Metro facility, making the Metro discharge an inadvertent source of mercury to the lake. Besides the mercury-related discharges, it should be noted that Metro was built on the site of a former MGP (Niagara Mohawk Hiawatha Boulevard site). Residue from such plants typically includes BTEX, PAHs, and cyanides. There is a possibility that these residuals were released into the groundwater at the site, or into the lake, although no evidence of ongoing release has been seen to date. Immediately adjacent to the Metro plant is Roth Steel, which could be a source of metals or PCBs.

- **Sawmill Creek and Bloody Brook** – Sawmill Creek runs through primarily open land and parkland, along with some transportation rights-of-way, and appears not to be a source of COCs to the lake. Bloody Brook runs primarily through a suburban area, some major transportation rights-of-way, and the industrial complex currently owned by Lockheed Martin (Electronics Park). The historic discharges from Electronics Park have contaminated Bloody Brook with cadmium. The sediments and some floodplain areas are to be addressed by removal in a voluntary action conducted by Lockheed Martin and Onondaga County.

As shown by the summaries of potential transport pathways of COCs to Onondaga Lake, the most likely pathways include groundwater discharge along the lake shoreline (i.e., from the Willis Avenue Chlorobenzene site, the Wastebed B/Harbor Brook site, and the Semet Residue Ponds site); resuspension of wastes in the lake; and surface water transport via the East Flume, Tributary 5A, Harbor Brook, and Ninemile Creek.

Groundwater discharges to the lake are currently being evaluated as part of the investigations for the Willis Avenue Chlorobenzene site and the Wastebed B/Harbor Brook site. Other contaminant sources to the lake include Metro, Ley Creek, the Crucible Materials Corporation (via Tributary 5A), and Oil City. A quantitative discussion of fluxes to the lake can be found in Chapter 6 of the RI report (TAMS, 2002b).