

**Consolidated Edison Co. of
New York, Inc.**

Long Island City, New York



**Manufactured Gas Plant Site
History Research Report for the
Astoria Gas Works, 21st Street
and 20th Avenue, Astoria, New
York**

**ENSR Corporation
January 2003
Document Number 01869-048-104**

CONTENTS

<u>1.0 INTRODUCTION</u>	1-1
<u>1.1 Preface</u>	1-1
<u>1.2 Objective and Scope of Work</u>	1-1
<u>1.3 Significant Assumptions</u>	1-3
<u>2.0 PROPERTY DESCRIPTION</u>	2-1
<u>2.1 Property Description</u>	2-1
<u>2.2 Adjoining Property Description and Usage</u>	2-2
<u>3.0 CURRENT SITE OPERATIONS AND OWNERSHIP</u>	3-1
<u>3.1 Site Ownership</u>	3-1
<u>3.2 Site Operations</u>	3-1
<u>3.3 Site Reconnaissance and Areas of Potential Concern</u>	3-1
<u>4.0 SITE SETTING AND DEMOGRAPHY</u>	4-1
<u>4.1 Topography</u>	4-1
<u>4.2 Demography</u>	4-1
<u>4.3 Surface Water and Drainage</u>	4-2
<u>4.4 Geology</u>	4-2
<u>4.5 Hydrogeology</u>	4-3
<u>5.0 PAST OWNERSHIP</u>	5-1
<u>6.0 PAST SITE OPERATIONS</u>	6-1
<u>6.1 Site Operations</u>	6-1
<u>6.1.1 Fire Insurance Maps</u>	6-6
<u>6.1.2 Brown's Directories</u>	6-28

6.1.3 Public Service Commission Reports	6-30
6.1.4 Chain-of-Title Reports	6-31
6.1.5 Additional Historical Sources	6-31
7.0 SITE REGULATORY INFORMATION	7-1
7.1 Federal and State Database Review	7-1
7.2 Federal Agency Records	7-3
7.3 State Agency Records	7-4
7.4 Local Agency Records	7-4
8.0 POTENTIAL RECEPTORS	8-1
8.1 Local Groundwater Use and Surface Waters	8-1
8.2 Other Potential Sensitive Receptors	8-1
9.0 DISCUSSION AND CONCLUSIONS	9-1
10.0 SUMMARY OF HISTORICAL RESEARCH FINDINGS	10-1
11.0 REFERENCES.....	11-1

FIGURES

1. Site Location Map
2. Site Plan – Current
3. Quadrant Layout Map
4. Historic Use Composite Map
5. Tax Map

APPENDICIES

- A. Site Photographs
- B. Chain of Title Report
- C. Sanborn Insurance Maps
- D. Brown's Directories of North American Gas Companies
- E. Public Service Commission Report (1907)
- F. Environmental Data Resource (EDR) Report
- G. History Research Report Checklist

1.0 INTRODUCTION

1.1 Preface

ENSR International (ENSR) was retained by Consolidated Edison Company of New York, Inc. (Con Edison) on March 11, 2002, to conduct site history research for the former Manufactured Gas Plant (MGP) site located on the Astoria Generating Station property at 21st Street and 20th Avenue in Astoria, New York hereinafter referred to as subject property. The “subject property” consists of an approximately 124-acre parcel that is part of a larger 316-acre site (identified as Block 850 and Lot 1) containing an industrial and power generating facility currently owned and operated by Con Edison. The larger 316-acre parcel is situated northeast of 20th Avenue extending from the East River to approximately 1,950 feet northwest of Luyster Creek. A power generating facility operated by New York Power Authority (NYPA), identified as Block 850 Lot 100, and Reliant Energy identified as Block 850 Lot 50 bind the subject property to the west and northwest, beyond which is the East River. The Astoria generating station’s gas turbine facility which is operated by NRG Energy, identified as Block 850 Lot 200 and oil storage area operated by Reliant Energy identified as Block 850 Lot 300, bind the subject property to the north and northeast. Luyster Creek binds the subject property to the east. Figure 1 provides a Site Location Map showing the site location, local topography, and surrounding areas. Figure 2 provides a site plan depicting the current site layout with property boundaries. Current tax block and lot designations are included in Figure 5.

For the purposes of this report, the MGP historic research was conducted on the 124-acre portion of the larger property on which historic MGP operations were conducted. To aid in the discussion of the site and potential issues of concern, and due to the size and complexity of the subject property, ENSR has subdivided the subject property and abutting properties’ areas into six quadrants. Discussions with regards to each quadrant will be referenced as Quadrant 1, Quadrant 2, Quadrant 3, etc. Figure 3 depicts the approximate locations of the six quadrants with regards to the subject property.

1.2 Objective and Scope of Work

The objective of the Astoria Generating Station MGP Site History Research was to gather historical information on the former MGP sites operated by Con Edison and/or its predecessor companies, and to assess potential impacts associated with these properties. Con Edison intends to utilize the MGP Site history research to prioritize investigation and remedial activities at these sites. In order to achieve this objective, the following activities were performed in accordance with ENSR’s proposal dated August 20, 2001 and Con Edison’s final scope of work:

1. Reviewed Brown’s Directories of North American and International Gas Companies (Brown’s Directories) for statistical information from MGP companies. Where available, data gathered included the following: plant ownership and management, size of gas plant, amount of gas

manufactured and sold, number and size of gas holders, tar production and sales, and type of gas manufacturing process.

2. Reviewed Public Service Commission Reports, Statistics of Public Service Corporations, subsequently known as Statistics of Gas and Electric Companies and Statistics of Light, Heat and Power Companies.
3. Reviewed Sanborn Insurance Maps. Information gathered from the Sanborn Insurance Maps were superimposed on the current site plans for this project (Figure 4).
4. Reviewed 50-year Chain-of-title reports. Chain-of-title reports for all of the sites were ordered through Commonwealth Land Title Company as requested by Con Edison.
5. Reviewed appropriate and readily available documents at Federal, State and Local governmental agencies and departments as necessary, including United States Environmental Protection Agency (USEPA), New York State Department of Environmental Conservation (NYSDEC), Clerk's Office, Building Department, Engineering Department, Tax Assessor's Office, Health Department and Fire Department. Where available, site information relative to the following was obtained: historical ownership, property usage, environmental permits, hazardous waste generator status, violations, underground storage tanks, hazardous material or petroleum spills, and soil and groundwater sampling data. Building Department records were also evaluated to determine whether significant MGP contamination may have been encountered or removed during any site redevelopment.

Relative to the USEPA and NYSDEC document review, ENSR submitted a Freedom of Information Act (FOIA) request to both agencies for the above-mentioned information. ENSR requested a copy of the USEPA's files, however, according to the USEPA, the agency does not contain files for properties prior to 1970, thus the agency has no files for the subject property. The NYSDEC has not responded to the FOIA request, however, and information received will be reviewed and submitted as the supplemental report.

6. Conducted searches for relevant site information at the following locations as necessary: Westchester County Public Library, the New York Public Library, and local historical societies. Reviewed other potentially relevant information sources such as National Wetlands Inventory maps, USGS topographic maps, Cole's Cross Reference Directories and aerial photographs.
7. At Con Edison's request, ENSR reviewed Con Edison's files for the subject property in the Property Department and Real Estate Department located at Con Edison, 4 Irving Place, New York, NY.
8. Based on information collected in the above tasks, ENSR identified former non-MGP related site operations, along with potentially associated waste streams and contaminants. The following

information with regard to historical site activities was noted: types of operations, and locations of associated structures, equipment and processes.

9. Inferred the types of hazardous materials that potentially could have been stored, used or disposed at the site based on each identified historical operation.
10. Provided a general review of regional and site-specific geology and hydrogeology, including information on wetlands, local drinking water supply, aquifers, depth to bedrock and general stratigraphy.
11. Based on research information collected, described the type and general layout(s) of the MGP operations and potential MGP wastes associated with these types of facilities using commercially available publications.
12. Conducted a visual inspection of each of the MGP properties in order to identify current conditions, with particular regards to potential present contributing sources of contamination; identification of locations, if any, of regulated material storage and underground storage tanks.

1.3 Significant Assumptions

In addition, this MGP Historical Research focused specifically on the 124-acre parcel. It should be noted that some of the former MGP structures and operations were not located on the subject property, but rather on the adjacent NYPA, and Reliant Energy properties to the north and northwest (Quadrants 1 and 3 and Quadrants 3 and 5), respectively. According to a review of Sanborn Fire Insurance Maps, these structures, located on the NYPA property to the north, northeast and northwest of the subject property in Quadrants 1 and 3, included a coke storage building, several coke pockets, a power house, a cyanogen plant and a light oil plant that included oil and tar tanks, and a waste pit and storage house. Structures located on the Reliant Energy property northwest of the subject property in Quadrants 3 and 5, include coke filters and tar tanks, ammonia and acid tanks, a liquefied petroleum plant, a salt water pump house, control houses, a tunnel head house, and booster houses. At the time of the site inspection, ENSR was not provided by Con Edison access to non-Con Edison owned areas formerly containing MGP operations. However, according to Con Edison, the former MGP operations and associated responsibilities for cleanup of these areas of MGP operation are designated to the current owners and were assumed at the time of acquisition. Based on the fact that these former MGP areas are not currently owned or maintained by Con Edison, they are *not* considered a part of the subject property and were not inspected by ENSR as part of this investigation.

2.0 PROPERTY DESCRIPTION

2.1 Property Description

The subject property, containing former MGP operations, is located at 21st Street and 20th Avenue in Astoria, New York. The subject property consists of an approximately 124-acre parcel situated within a larger 316-acre site containing industrial and power generating facilities. The larger 316-acre parcel is situated along the northeast side of 20th Avenue extending from the East River to approximately 1,950 feet northwest of Luyster Creek, and is identified as Block 850 and Lot 1. The subject property is situated in the central portion of the larger 316-acre parcel, with the northeastern and northwestern boundaries situated approximately 900 feet southwest and 870 feet southeast of the East River. The southeastern boundary of the subject property is situated approximately 780 feet northwest of Luyster Creek and the southwestern boundary is situated directly northeast of 20th Avenue.

The location and extent of the former MGP operations at the subject property were determined through review of historical Fire Insurance Maps, previous reports, information provided by Con Edison, and additional research. Currently, the subject property contains portions of a larger industrial and power generating facility identified as the Astoria Generating Station. The Astoria Generating Station currently generates electricity at three steam-electric generating units with a total electric capacity of approximately 1.1 million kilowatts, and 20 gas turbines with a total electrical capacity of approximately 0.6 million kilowatts. Electricity generated from the Astoria Generating Station is transmitted via substations and switching stations within the Con Edison system in New York City and Westchester County. In addition to portions of the electrical power generation areas, there are several other structures and operations that are part of the larger power generating facility, which are located within the subject property boundaries (The Gas Age, February 1919). These structures include:

- Central Wastewater Treatment Facility (CWTF);
- Transportation Building;
- Central Storage Warehouse;
- Chemical Laboratory;
- An electrical substation; and
- Several equipment and material storage yards.

Figure 2 provides a Site Plan of the subject property, which depicts current site features and boundaries.

2.2 Adjoining Property Description and Usage

As previously mentioned, the subject property occupies a portion of the larger Astoria Generating Station. Based on the research conducted and the historical information reviewed, the portions of the Astoria Generating Station that border the subject property to the east, southeast, south, and southwest are not believed to have contained MGP operations.

A number of developed industrial and residential areas encompass the subject property. The NRG Energy power-generating station (Quadrant 2) borders the subject property to the northeast. The NRG property includes the Gas Turbine Facility, which contains aboveground and mounded tanks containing fuel oils used for power generation. Beyond NRG's property is a small parcel of land owned by Reliant Energy, which includes the Astoria Oil Storage Depot, in which additional fuel oils used for power generation are stored in aboveground and mounded tanks.

The remaining portions of the Astoria Generating Station that border the subject property to the east include a Liquefied Natural Gas (LNG) facility (Quadrant 2). The LNG facility liquefies and stores natural gas for distribution to Con Edison gas customers, and also provides repair and maintenance to transformers (within the Astoria Transformer Shop (ATS)), vehicles (within the Transportation Building (Building #137)) and associated equipment used in the Con Edison system. The other portions of the generating station that border the subject property to the southwest, include a property owned by National Envelope Corporation, Luyster Creek (also known as Steinway Creek), a cable storage yard and the Astoria East Substation (Quadrants 4 and 6). The North and East Storage Yards, the Astoria Transformer Shop and yard, which are all parts of the larger generating station (Quadrant 6) border the subject property to the south and southeast, beyond which are ball fields that are currently leased to the Federation of Italian-American Organizations of Queens (FIAS) and the Immaculate Conception Youth Organization (ICYO) (Quadrant 6). The fields combined consist of approximately 384,000 square feet of land. Additionally, 20th Avenue borders the subject property to the south, southwest, and west, beyond which is a large residential and commercial area. New York Power Authority's (NYPA) and Reliant Energy power-generating stations border the subject property to the north and northwest (Quadrants 1, 3 and 5), beyond which is the East River, a tidally influenced salt-water channel connecting Long Island Sound with the Hudson River Estuary and the Atlantic Ocean. The location of the subject property and surrounding areas are shown in Figure 2.

3.0 CURRENT SITE OPERATIONS AND OWNERSHIP

3.1 Site Ownership

Con Edison currently owns the subject property. The subject property is part of a larger power-generation facility, which is operated by Con Edison. According to Con Edison, there are no planned changes in future land uses at this time. At the time of ENSR's site inspection, there were no indications of future land use.

3.2 Site Operations

Portions of the Astoria Generating Station, one of the largest power generating facilities in the Con Edison system, currently occupy the subject property. Presently, a variety of power generation and maintenance activities and operations are conducted on the subject property. Primarily, the generating station generates electricity using oil and gas-fired steam electric generating units and gas turbines by burning fossil fuels and transmits the electricity (via substations and switching stations) to various portions of the Con Edison system in New York City and Westchester County.

In addition to power generation, the generating station serves as the primary storage and maintenance facility for equipment and materials in the Con Edison system. The Transportation Building (Building #137), located in Quadrant 6 (within the subject property boundaries) is used for vehicle maintenance and miscellaneous repairs associated with equipment used in the Con Edison system. Additionally, the subject property includes a Central Wastewater Treatment Facility (CWTF) (Quadrant 6), a chemical laboratory (Quadrant 6), a large warehouse (Building #136) (Quadrant 4), a transformer storage yard (Quadrant 5) and several administrative office buildings (throughout Quadrants 5 and 6). A site plan, which delineates these areas, is provided in Figure 2.

3.3 Site Reconnaissance and Areas of Potential Concern

ENSR conducted a site inspection on April 7, 2002, and were accompanied by Con Edison personnel. Due to the size and complexity of the current site operations, ENSR did not access all of the current structures on the subject property. In addition, only a limited inspection was conducted on the abutting properties due to restricted access to these areas that were not owned by Con Edison. As previously stated, according to Con Edison, the former MGP operations and associated responsibilities for cleanup of the former MGP operational areas are designated to the current owners and were assumed at the time of acquisition. Based on the fact that these former MGP areas are not currently owned or maintained by Con Edison, they are *not* considered a part of the subject property and were not inspected as part of this investigation. Appendix A provides representative site photographs taken during the site reconnaissance.

The subject property includes approximately 124 acres situated in the central portion of the larger 316-acre parcel. Paved surfaces and subject property buildings cover approximately 70 percent of the subject property. Gravel and landscaped areas and a small pond occupy the remaining areas. The small pond, identified as Blue Dog Lake, was observed in the central portion of subject property in Quadrant 4.

According to Con Edison personnel and the historical information reviewed by ENSR, former MGP operational structures were demolished, leveled and paved over at the subject property; therefore, they were not inspected during the site visit. Although there were no former MGP structures observed during the inspection, several areas of the subject property contained evidence of former MGP operations such as, remnants and/or waste impacts to soil and groundwater. Specifically three coal tar seeps, were observed in paved and unpaved areas within the pipe yard area and surrounding area, in Quadrant 4. Areas exhibiting coal tar seepage are considered a current potential for exposure to impacted media. Additionally, during the past six to seven years, coal tar seeps have been observed coming up through the ground surface during summer months. According to facility personnel, the seeps are typically one-foot in diameter, when discovered at the ground surface. Facility information indicates that most of the residuals and byproducts associated with the former manufactured gas operation were sold and removed off-site rather than disposed of on-site (ENSR,1994). According to a subject property gas-manufacturing plant site questionnaire, coal tar seeps have been documented in the surface and subsurface conditions on and off the subject property, and observed to be seeping into the Consolidated Edison gas main tunnel, which runs underneath the East River in Quadrant 5 (Consolidated Edison, February 2002). Precise locations of seeps within the tunnel were unknown and could not be provided by Con Edison. Appendix A includes photo documentation of the coal tar seeps observed during ENSR's site inspection. Figure 4 indicates the locations of the coal tar seeps observed during ENSR's inspection.

4.0 SITE SETTING AND DEMOGRAPHY

4.1 Topography

The subject property is situated in the northwestern part of Queens County, which is characterized by low rolling hills overlooking and extending into the East River between various salt-water bays. The largest of these bays, Flushing Bay, is located approximately two miles east of the subject property. A relatively narrow ridge, ranging in elevation from 160 to 260 feet above mean sea level, trends about east-northeast in the central part of Queens County. This ridge, located approximately six miles southeast of the subject property, is part of the Harbor Hill Terminal Moraine, which marks the furthest advance of the Wisconsin Glaciation in this area. A plain slopes gently southward from the ridge to the Atlantic Ocean. Flushing Meadow, a large flat-bottomed valley, extends northward from this ridge to Flushing Bay on the East River (ENSR, 1994).

The subject property lies in a relatively flat area approximately 870 feet northeast of the East River. According to USGS maps (USGS Water-Supply Paper 2001-A), the northern halves of the abutting properties in Quadrants 1 and 2 lie on fill material. Fill material, typically consisting of construction and demolition debris mixed with sand, gravel, rock, and cinders, has been used historically in the region to extend and reinforce shorelines and to eliminate swampy areas. The overall elevation of the subject property and the surrounding properties ranges from approximately 8 feet above mean sea level (amsl) along the East River, to approximately 35 feet amsl along 20th Avenue (ENSR, 1994).

4.2 Demography

According to the New York City Department of Planning's web site, which contains the 2000 census data, the total population of the borough of Queens is 2,229,379. Queens covers an area of 112 square miles. The subject property is located within Queens Community District 1, which contains a total population of 211,220 (US Census Data, 2000). The NYC Planning Commission designates the subject property as zoned M3-1, a manufacturing district.

Demography in the vicinity of the subject property within District 1 includes 88,606 White Nonhispanic; 57,692 Hispanic origin; 27,399 Asian or Pacific Islander Nonhispanic; 21,581 Black/African American Nonhispanic; 12,368 Nonhispanic of two or more races; 3,099 some other Nonhispanic race; and 475 American Indian and Alaska Native. In 2000, the median age was 35.4 years of which 77.2% were 18 years and older, 73.4% were 21 years and older, 17.7% were 62 years and older and 14.8% were 65 years and older. The average household size in 2000 was 2.81 people and 68.2% considered family households (families), and 31.8% categorized as non-family households.

4.3 Surface Water and Drainage

Although local surface waters are classified as suitable for recreational boating and fishing, few recreational activities occur on the East River and other area waters, because of the highly industrial nature of the area. Water depths of the East River in the immediate area of the shorelines range from 8 feet to 68 feet. The average depth of water in Luyster Creek is approximately 11 feet (ENSR, 1994). According to the New York State Department of Environmental Conservation (NYSDEC), surface water classification for the East River is class "I" described as saline surface waters which are best suited for secondary contact recreation and fishing, and shall be suitable for fish propagation and survival. Luster Creek (formerly known as Steinway Creek) is classified as class "SD", which is described as saline surface waters, which are best used for fishing, and can be suitable for fish survival (NYSDEC).

Due to the highly developed nature of the subject property, a substantial portion of precipitation runs off paved surfaces to storm sewers on site and along 20th Avenue. Although much of the subject property is paved, some precipitation infiltrates the ground surface in unpaved areas. A small area on the west side of Luyster Creek is indicated as a marsh on the USGS topographic map of the area. It is unclear, however, how much precipitation enters Luyster Creek directly as runoff from the surrounding areas. (ENSR, 1994).

4.4 Geology

According to USGS geologic maps (USGS Water-Supply Paper 2001-A), the northern halves of the abutting properties in Quadrants 1 and 2 lie on fill materials, while the central portion of the subject property is situated on glacial till (ground moraine). The boundary between these surficial materials is generally reflected in the site topography, with the higher site elevations corresponding to areas overlying glacial till. The fill materials in the northern halves of Quadrants 1 and 2 probably overlie shore and salt marsh deposits (organic silt, peat, and clay), as fill materials were generally used to extend and reinforce shorelines and to eliminate swampy areas (ENSR, 1994).

According to soil boring logs from previous investigations on the subject property which lies within Quadrant 6 (Geraghty and Miller, 1981), the subsurface materials consist of fine sand and silt, with varying amounts of fill near the surface. According to the Final PR/VSI Report, boring logs for the central portion of the subject property (near the Former 25,000 Gallon USTs - SWMUs 55 and 56) indicate the surface soils consist of seven to eight feet of clay and silt fill, underlain by about two feet of peat or organic silt. Soil boring logs from previous investigations in Quadrant 2 (Miller Environmental Group, 1993), indicate the subsurface materials consist primarily of coal ash and slag, mixed with silt, sand, gravel, brick fragments, cinders, wood, and other debris (ENSR, 1994).

The bedrock underlying the majority of the subject property and surrounding properties are mapped as Member A of the Fordham Gneiss (USGS, 1992). This Middle Proterozoic Age rock unit is described

as a pinkish-white to salmon-red and medium-gray banded muscovite-biotite-plagioclase-microcline-quartz gneiss. An outcrop of this bedrock unit is present on the surrounding property in Quadrant 2 between the Hell's Gate and Triborough bridges on the east bank of the East River. This unit is considered to be a metamorphic aureole (a thermally altered zone) around the intrusive Yonkers Gneiss. Bedrock underlying the eastern edge of Quadrant 2 (including the LNG Storage Tank) is mapped as the Hartland formation, which consists of mica-quartz schists, granite, and amphibolite interlayered with pegmatite, amphibolite, and coarse granoblastic-textured amphibolite gneiss. According to previous investigations, boring logs for the subject property and vicinity indicate that the depth to bedrock at the site ranges from 35 feet to 45 feet below the ground surface (ENSR, 1994).

The two bedrock units underlying the subject property and surrounding properties are separated by Cameron's Line, which runs along 31st Street and past the northwest side of the LNG Storage Tank in Quadrant 2 before veering eastward towards Rikers Island. Cameron's Line is a major regional northeast-striking fault with an eastward-dipping surface. Evidence of thrusting exists along Cameron's Line, with younger allochthonous rock units on the east side thrust westward over older autochthonous rock units. This thrusting is thought to have occurred during the early phase of Taconian deformation in the Ordovician Period. Similar periods of deformation have also resulted in the creation of northeast-trending asymmetric folds. The site is also located on the axis of an antiform fold (ENSR, 1994).

4.5 Hydrogeology

Only the southern portion of the subject property and abutting property in Quadrant 6 are underlain by the Upper Glacial Aquifer in the Brooklyn/Queens Aquifer System. The Upper Glacial Aquifer in this location consists of glacial till (ground moraine). The unconsolidated sediments and glacial till aquifer underlying the subject property are approximately 35 to 45 feet thick, and rest directly upon the bedrock surface (ENSR, 1994). According to the New York State Department of Environmental Conservation (NYSDEC), groundwater water classification for the Astoria vicinity of Queens County, is classified as class "GA", for fresh groundwater.

Based on previous subsurface investigations at the subject property and surrounding properties, groundwater is generally encountered at depths between three and nine feet below the ground surface. The general direction of groundwater flow most likely follows the site topography from the south central portion of the site towards the East River (north and northwest) and towards Luyster Creek (northeast). The rate and direction of groundwater flow at the site may also be tidally influenced by fluctuations in the level of the East River (and Luyster Creek). The difference between mean high water and mean low water is approximately 6 feet (ENSR, 1994).

5.0 PAST OWNERSHIP

The subject property has been owned and/or operated by Con Edison or its predecessor companies since the late 1890's and has been operated in some form of power generation since the early 1900's. Astoria Light, Heat and Power Company acquired the vacant property in 1899. Deed records indicate that Astoria Light, Heat and Power Company received the deed to "a large tract of land and land under water at Long Island opposite Hell Gate" from Mr. John D. Crimmins in 1899. Astoria Light, Heat and Power Company was merged into Consolidated Edison Company of New York, Inc., previously called Consolidated Gas Company, in 1936 (ENSR, 1994).

Con Edison sold various associated tracts of land to the Power Authority of the State of New York (since renamed New York Power Authority (NYPA)) in 1974. NYPA renamed their facility the "Poletti Power Project", which is currently the northeastern and northwestern abutting property (Quadrant 1 and 3). Other parcels of the larger site were leased to different parties over time, however details of these acquisitions were not included in ENSR's research. The following table summarizes the ownership history for the subject property. Appendix B includes a copy of the 50-year chain-of-title report for the subject property.

The historical chain of title report for the subject property was prepared by Commonwealth Land Title Company. Deed information for the years prior to 1974 was maintained for the larger 316-acre parcel (identified originally as Block 850 Lot 1) which is bounded by 20th Avenue on the south, the Luyster Creek on the east, and the East River on the north and west. Therefore, the following deed descriptions are not specific to the subject property but rather to the larger 316-acre parcel. According to the chain of title, several private owners owned the larger 316-acre parcel from 1899 to 1906. A portion of the larger 316-acre parcel was acquired by Consolidated Edison of New York on July 18, 1902. This portion of the larger parcel was most likely a portion of the subject property (MGP). A property owner entity identified as, The Letters Patent from the People of the State of New York, owned portions of the larger 316-acre parcel between 1904 and 1969. A deed dated September 27, 1916 indicated that Astoria Light, Heat and Power Company acquired a portion of the larger 316-acre parcel, and Electric Power Research Institute owned a portion of the larger 316-acre parcel in September 22, 1989. A deed dated December 13, 1974 indicated that Con Edison owned a portion of the larger 316-acre parcel and was in title to the majority of the larger parcel through July 9, 2002. However, Consolidated Edison Company of New York sold several portions of the larger 316-acre parcel to New York Power Authority on December 13, 1974 (identified as Block 850 Lot 100); to Astoria Generating Company L.P. on August 20, 1999 (identified as Block 850 Lots 50 and 300); and to Astoria Gas Turbine Power LLC on June 25, 1999 (identified as Block 850 Lot 200). No other pertinent information was provided in the chain of title report.

Table 5-1 presents a summary of site ownership history.

Historical Ownership Information Table 5-1		
Source	Year	Owner
Sanborn Fire Insurance Map	1898	Unknown. Site vacant and undeveloped
Chain of Title (Commonwealth)	1902	Consolidated Gas Company
Brown's Directories	1906- 1936	Astoria Light, Heat and Power Co.
Public Service Commission Report	1907	Astoria Light, Heat and Power Co.
Chain of Title (Commonwealth)	1916	Astoria Light, Heat and Power Company
Sanborn Fire Insurance Maps	1915 and 1936	Astoria Light, Heat and Power Co.
Brown's Directories	1937- 1963	Consolidated Edison Company of New York
Sanborn Fire Insurance Maps	1948, 1950, 1967, 1976, 1977, 1985, 1986, 1990 and 1996	Consolidated Edison Company of New York
Unidentified Insurance Map	1967	Consolidated Edison Company of New York
Chain of Title (Commonwealth)	1974-2002	Consolidated Edison Company of New York

6.0 PAST SITE OPERATIONS

6.1 Site Operations

ENSR compiled the following site operation history for the subject property, based on Sanborn Fire Insurance Maps, Public Service Commission Reports, Brown's Directories, Title Searches, additional historical information obtained from New York City Libraries and Con Edison property and archived records. Figure 4 provides a Historic Use Composite Map depicting former MGP operations and structures, superimposed over current structures.

OVERVIEW OF PAST OPERATIONS

MGP site operations began at the subject property between 1906 and 1907 during which time the subject property was owned and operated as an oven gas plant by Astoria Light, Heat and Power Company. According to the Brown's Directories, Astoria Light, Heat and Power Company, a subsidiary of the Consolidated Gas Company of N.Y., operated the facility from 1906 to 1937. During the 1920's, the subject property was considered the world's largest gas manufacturing plant, producing up to 86 million cubic feet of gas per day (Consolidated Edison, February 2002). During this time, Consolidated Gas Company of N.Y. assumed control of MGP operations and ownership. At the time of the acquisition by Con Edison in 1936, MGP operations were subsequently enlarged and modified to include water gas, producer gas, and LP-Air process capability. Con Edison operated the coal gasification plant on the subject property for approximately 25 years ending in the early 1960's, in addition to the 30 years during which Astoria Light, Heat and Power Company operated the MGP. The MGP located on the subject property was the first central plant not located Manhattan, to supply New York City with gas and later electricity (Progressive Age, April 1905). In 1919, the plant had a daily rated capacity of 45,000,000 cubic feet, including 20,000,000 cubic feet of coal gas and 25,000,000 cubic feet of water gas. (The Gas Age, April 1919) Records indicate that the MGP located on the subject property utilized a variety of gas manufacturing processes over the years; however, available information on these manufactured gas operations is limited.

Typical structures and buildings associated with the former MGP operations included the following:

- Reactor shells (generator, carburetor and superheater) within a building, with water seal and scrubber also.
- Purifier boxes (i.e., oxide boxes)
- Tar wells (concrete sump used to store by-product tar)
- Gas storage and relief holders
- Oil tanks (used to store carbureting oil)
- Coal bins

- Oxide storage bins for both fresh and spent oxide material
- Tar distillation and by-product recovery facilities (ENSR, 1994)
- Acid tanks

MGP operations were centered in the present location of the central storage warehouse (Building 136) and extended northeastward towards the current NRG gas-turbine complex (Quadrant 2) northwestward towards Reliant Energy's Generating Station and the New York Power Authority's Polletti Electric Generating Station (Quadrants 1, 3, and 5), and southward and westward to the current settling tanks (the former gas holders) in Quadrants 5 and 6. As can be seen in Figure 4, the MGP during the years of operation (1906-1961) consisted of inclined and horizontal retort houses, a primary gas generator house and associated structures. These associated structures included the light oil scrubbing facilities, compressor buildings, purifiers and associated tar management facilities. The majority of the former MGP structures (the retort houses, boiler house, extractor houses and exhaustor houses) were concentrated within the footprint of the area currently occupied by the Astoria West Substation, an extensive maintenance supply warehouse (Building #136), and outdoor storage and parking areas (Quadrants 3 and 4). These areas are designated as the subject property (Consolidated Edison, no date).

In addition to the typical MGP structures that were located at the subject property, various portions of the subject property were utilized for the processing and storage of by-products and process material associated with manufactured gas operations. By-products included coal, coke, oxide, ammonia and other byproduct liquors, tars and light oil. Tar processing equipment, including two (2) 400,000-gallon storage tanks, separators, pumps and piping were located in the present location of the northwest corner of the Pipe Yard in Quadrant 4. Various purifier houses, scrubbers, condensers, sampling houses, and associated structures were located throughout the southeastern portion of Quadrant 3, the northwestern portion of Quadrant 4, the southeastern portion of Quadrant 5 and the southwestern portion of Quadrant 6. Facility records and personnel have indicated that on-site materials, primarily coal, was transported via a series of narrow gauge railroad track systems and conveyors, which traversed the subject property directly north of the location of the manufactured gas operations in Quadrant 1 (ENSR, 1994).

The MGP was originally built upon 376 acres of land (Around the System, October 1936). Before construction of the MGP began, extensive grading was conducted in June 1903 to address the great irregularities in the natural grade of the property. Grading involved the removal of approximately 485,000 cubic yards of earth from the high ridges on the subject property and the re-application of the removed earth onto the low-lying portions of the property. Bulkheads and railways were constructed immediately after the property was graded. The inclined and horizontal retort houses, boiler house, exhaustor house and tar extractor houses located in Quadrants 3, 4, and 5, which were the center of operations at the MGP, were built between 1904 and 1905 (Progressive Age, April 1905). The powerhouse building, located in Quadrant 4, was constructed in 1905 and was situated near the northern and northwestern boundaries of the subject property in Quadrant 3 and extended partially

onto the abutting NYPA property. According to a construction outline obtained from Con Edison's Property Record Department, the first 15,000,000 cubic foot gas holder at the subject property was constructed in 1907 and the second 15,000,000 cubic foot gasholder was constructed in 1922 (Quadrants 5 and 6) (Consolidated Edison, no date). The gasholders were constructed in concrete subsurface tanks 300 feet in diameter, 48 feet deep, and 224 feet tall, which were at the time considered the largest gas holders in the world. A gas main, which was 14,965 feet long and ran from Astoria to Ravenswood was completed in January 1906. The Astoria gas main tunnel was constructed in 1913 and extended under the East River to the lower Bronx (Around the System, October 1936). Additionally, two 72-inch cast iron gas mains that run from Astoria under the East River to Port Morris totaled 10,327 feet in length were laid in November 1915. All the gas main tunnels connecting to the subject property were located off the subject property. The coal storage bridge located at the subject property (Quadrant 1) was the largest traveling bridge in the world for handling of materials. The bridge was a cantilever type, which was 603 feet long and 103 feet to the top of the tower, and could store coal to a height of 46 feet. A 7-ton bucket was suspended from the man-trolley that ran on a track 64 feet above the ground, which traveled the entire length of the bridge (The Gas Age, April 1919). Coal was delivered to the plant by self-unloading boats and trains along the bulkheads and piers in Quadrants 1 and 2. According to the Sanborn Maps, coal was stored in a large area, which spanned across the northwestern abutting property in the southwestern portion of Quadrants 1 and 2.

BY-PRODUCTS

The manufacturing of gas created a number of by-products including tars, sludges, tar liquors, ammonia liquors, spent iron oxide, ash slag, clinkers, off-grade coal, coke, and dust. According to facility personnel, by-products resulting from the subject property's manufactured gas operations were mainly sold for recycling or other purposes. Historical information dating back to 1936 indicate the contractual sale of residuals, including light oils, coal tars, heavy water gas tar and heavy water gas road tar, light water gas tar and by-products. Brown's directories indicated a great deal of the by-products such as coke, tar, coal gas tar, water gas coal tar, water gas heavy tar, heavy tar, light oils, drip oils, cyanogens, ammonia and spent oxides were generated at the subject property and were re-sold or used as fuel. Details of the quantities of each of the by-products generated at the subject property are included in Section 6.1.2 of this report.

In 1935, the subject property produced approximately 3,500,000 gallons of light oil a year from water gas operations. Approximately 175,000 tons of coke was used at the plant a year. In order to maximize operation of the existing coal gas equipment located at the subject property in 1935, 365,000 tons of coal a year was required, with a total of 56,000,000 gallons of heavy oil being used a year. The MGP was also equipped to receive and store oil from large ocean tank steamers, which unloaded materials along the bulkheads that were located in the northeastern portions of Quadrants 1 and 2, along the East River (Consolidated Edison February 2002).

Toluol and Carbon

In addition to the general by-products generated at the subject property, toluol and carbon were also produced at the subject property. Beginning in 1918, as part of the World War I effort, the Astoria facility operated a facility for the extraction of toluol (a byproduct of coal and water gas manufacture). During this time period, plants were designed and built for U.S.A. Ordinance Department in support of the war efforts. Toluol, which was recovered from by-product coke plants, was used in preparing the off-site manufacture of Tri-Nitro-Toluol (TNT), which was employed in various capacities by naval and military establishments (The Gas Age, February 1919). During this period, the subject property was reportedly the largest producer of toluol in the country. The chemistry laboratory located on the subject property in the southern portion of Quadrant 6 was commissioned as a general testing station for all toluol, benzol, and solvent naphtha produced nationally by the U.S. government plants.

The two light oil production facilities associated with the production of toluol, are depicted in Figure 4. Based on historical information, one of these facilities was dedicated to toluol production from water gas production and the other from coal gas production. One facility was located on the northwest portion of Quadrant 3 in the present location of NYPA's Poletti Power Project. The other facility was located within an area directly south of the former generator house in Quadrant 6. It is believed that the term "light oil", as referred to, was toluol. Facility records indicate that the light oil production process involved two continuous stills that extracted light oil from wash oil, a by-product of the gas manufacturing process. The stills had a daily capacity to process up to 70,000 gallons of wash oil, resulting in the production of up to 5000 gallons of light oil per day (ENSR, 1994). Storage tanks were located in separate concrete enclosures for the high and low flashpoint oils. To prevent losses of products during the warm weather, the vents from all of the product tanks were connected to a small reflux condenser located on the light oil storage vent, which collected the condensate. Steam lines for flooding the tanks in case of a fire were connected to all of the storage tanks. These structures are depicted in the northwestern and southwestern portions of Quadrant 3, outside of the subject property boundaries (The Gas Age, April 1919). In 1918, approximately 1,022,272 gallons of light oil, 459,866 gallons of benzol, and 262,476 gallons of toluol was recovered (The Gas Age, February 1919).

In addition to toluol, carbon was also manufactured at the subject property. A total average quantity of carbon produced on one year's operation was 6,433,741 pounds. According to sources, a majority of the material used in the canisters of the gas masks used in the war for the American Expeditionary Forces and allied countries was produced at subject property (The Gas Age, February 1919).

MGP WASTE STORAGE AND DISPOSAL

Details and information regarding waste disposal practices at the subject property during the MGP operations were not determined in ENSR's research, however based on an analysis of fire insurance maps, historical articles and personnel interviews, the following general disposal summary was compiled.

During the past six to seven years, coal tar seeps have been observed periodically at the ground surface during summer months. According to facility personnel, the seeps were approximately one-foot in diameter, when discovered at the ground surface.

Based on a review of historical maps and aerial photographs, Blue Dog Lake, located in the southeastern portion of Quadrant 4, formerly extended further north than its present boundaries, and has been referred to as "tar pond". Employee interviews revealed that the lake was dredged and the dredged material was used to fill the northern edge of the Lake. However, the date of the dredging was unknown. Employee interviews also indicated that Blue Dog Lake was utilized as a waste disposal area. The by-products disposed of in the lake were unidentified based on the research conducted. In addition, a fire fighting training school was located in the current location of the Pipe Yard, adjacent to Blue Dog Lake. Con Edison employees stated that fire training consisted of burning oil, which was poured into vaults or directly onto the ground and ignited and extinguished (ENSR, 1994).

As previously stated, many by-products were handled throughout the subject property during the MGP operations. Figure 4 identifies the approximate location of the by-products generated and stored at the MGP. These by-products included former coke and ash pockets, cyanogen, ammonia and oil tanks, and a tar extractor and pump house (where tar produced from the gasification of coal process was believed to be stored). Exact locations of these disposal and storage areas are included in Section 6.1.1 of this report.

RETIREMENT OF MGP OPERATIONS

The plant's oven gas and producer gas works were retired in 1935 and 1939, respectively. In addition, the plant's LP-Air process works were retired in 1951, and the water gas works were retired in 1961. There was no indication of whether the term "retired" indicated demolition or cessation of operation from the sources reviewed (Consolidated Edison, February 2002). The concrete in-ground foundations of the plant's former two 15-million cubic-foot aboveground gasholders that were located along 20th Avenue, now currently form the east and west settling basins of Con Edison's Central Wastewater Treatment Facility located in the western portion of Quadrant 6 and southern portion of Quadrant 5, respectively (Consolidated Edison, February 2002).

The retirement of several MGP capacities at the Astoria plant began in December 1935 (Consolidated Edison, no date). The following summarizes the retirement dates and approximate yearly output of the various processes retired between 1935 and 1961, according to a MGP site questionnaire and construction outline (Consolidated Edison, no date) retrieved from Con Edison's records and Reliant Energy:

Approximate Yearly:

<u>Process</u>	<u>Date Retired</u>	<u>Output (MCF/year)</u>
Retort Process	December 1935	10,000
Retort Process	August 1939	10,000
LP-Air Process	March 1951	15,000
Oil-Gasification Process	March 1961	61,000
Water gas Process	June 1961	48,000
Oil-Gasification Process	June 1961	61,000

According to the questionnaire, portions of these processes were located on the subject property in Quadrant 3, 4, 5, and 6. Some portions of these processes were situated outside subject property boundaries, specifically on the abutting property currently owned by New York Power Authority.

Between 1936 and 1948, portions of the gas plant structures were retired. In 1953, a new coal-fired Astoria generating station was constructed along the East River shoreline on the northwestern abutting property in Quadrant 3, west of the area formerly occupied by the gas plant (the subject property). The original 1905 powerhouse was idled in the 1950's, and modifications were undertaken around 1960 to reuse the building as a sintering building. The sintering process used coal ash by-product from the coal burned at the power plant to manufacture porous cellular nodules for concrete (Progressive Age, April 1905).

During the 1950's MGP plants were almost completely phased out of operation when the petroleum and natural gas pipeline, distribution, and manufacturing infrastructure became widely established (Environmental Research and Technology, Inc., 1984). Facility records indicate that manufactured gas operations completely ceased at the subject property in 1961. The gas manufacturing plant was imploded and backfilled in the same year. According to a construction outline obtained from Con Edison's Property Record Department, the two gasholders were retired in September 1975, after which they were converted into the current settling basins located in the southwestern portion of the subject property in Quadrants 5 and 6 (Consolidated Edison, no date).

6.1.1 Fire Insurance Maps

ENSR was provided with Sanborn Fire Insurance Maps for the subject property dated 1898, 1915, 1936, 1950, 1977, 1986, 1996 from Environmental Data Resources, Inc. (EDR). In addition, ENSR was provided with Sanborn Fire Insurance Maps for the subject property dated 1948, 1967, 1976, 1985, and 1990 by Consolidated Edison and an unidentified fire insurance map for the subject property dated 1967. Appendix C provides copies of the representative Sanborn Fire Insurance Maps obtained for the subject property from EDR.

Figure 4 includes a Historic Use Composite Map, which includes an overlay containing former MGP structures and operations and dates.

The following descriptions present a summary of the Sanborn Fire Insurance Map history:

6.1.1.1 1898 SANBORN MAP

Subject Property

The portions of Quadrant 3, 4, 5, and 6 that fall within the subject property boundary are largely undeveloped, with the exception of a small, one-story dwelling which is located in the southwest portion of the subject property in Quadrant 5. The eastern portions of Quadrants 4 and 6 of the subject property are not depicted in this map.

Adjoining Properties

Quadrant 1:

- A pier;
- Two unidentified buildings;
- One 2-story "Summer Hotel";
- Autohouse.

Quadrants 2, 3 and 6:

- No structures depicted.

Quadrant 5:

- Two 1-2 -story "Summer Hotels";
- One-story storage building;
- Autohouse;
- Stable;

- Pier;
- One story dwelling;
- Two unidentified buildings.

The abutting properties located beyond 20th Avenue are undeveloped and no structures are present.

6.1.1.2 1915 SANBORN MAP (All six Quadrants identified as “Astoria Light, Heat and Power Co. Gas Plant”)

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

- Four buildings identified as “coke pockets”, two of which connect to overhead pipe trestles which extend into Quadrant 5;
- “Inclined retort house”, which contains a series of retorts, and eight brick chimneys;
- “Horizontal retort house and gallery”, which contains a series of retorts, and six brick chimneys;
- Two 1-5 -story “coal elevators”;
- One-story “tar pump house”;
- 75,000-gallon “water tank”;
- One-story “hose house”;
- A building identified as “coal sampling house.”

Quadrant 4:

- 4-5-story “Generator house”, which contains four elevators, 12 vertical ASTs and offices;
- One-story building identified as “Storage of fire emergency maintenance”;
- One-story building identified as “circulating pump house”;

- Five horizontal condensers;
- A building identified as "water gas tar separators", which contains four vertical ASTs, two horizontal ASTs, and areas designated as "pits";
- 1,000,000 cubic foot gas holder;
- 450,000-gallon tar emulsion AST;
- One-story office;
- One-story "carpenter building";
- One-story "scale house."

Quadrant 5:

- Two "tar extractor houses";
- Building identified as "boiler house", which contains a brick chimney and two horizontal boilers;
- Two 1-story "condenser houses";
- Two 2-3-story "purifier houses";
- Two-story "pump house";
- An "exhauster house";
- 1-2-story "meter house";
- 15,000,000 cubic foot gas holder;
- One-story dwelling.

Quadrant 6:

- Eight scrubbers;

- Eight purifiers;
- 1-2-story "meter house";
- 1-2-story "boiler house", which contains a brick chimney, and two horizontal boilers;
- Building identified as an "exhauster house";
- Building identified as a "machine shop and locker rooms";
- Building identified as "tar extractor house";
- Building identified as a "restaurant";
- Two-story "wash and locker room";
- A building identified as a garage;
- One-story "hose house";
- Four unidentified buildings;
- Remaining portions of the subject property and abutting properties within this quadrant are not depicted on this map.

Adjoining Properties

Quadrant 1:

- Two piers;
- A rapid coal unloader;
- A traveling coal storage bridge which extended northeastward;
- One-story "Rigging loft and locker rooms";
- 1-2-story "powerhouse", which included four horizontal boilers and a brick chimney.

Quadrant 2:

- A rapid coal unloader;
- One-story unidentified building;
- Southeastern portions of Quadrant are not depicted on the map.

Quadrant 3:

- 1-2-story "By-products recovery plant";
- One-story building containing "locker rooms";
- One-story building identified as "pipe fittings";
- An unidentified building;
- Six vertical aboveground storage tanks (ASTs), two identified as "water tanks", and two identified as "storage tanks";
- "Print house";
- 1-2-story stable.

Quadrant 4:

- Abutting properties are not depicted within this quadrant and map.

Quadrant 5:

- One dwelling.
- One-story "engine room, offices, carpenter shop, machine shop", and elevated runway and shaft and nine unidentified buildings. These buildings were identified as "temporary buildings";
- Two 100,000-gallon tar ASTs;
- Two tar ASTs;

- Two ammonia ASTs;
- A “hose” house;
- Building identified as “tar pump.”

Quadrant 6:

- Abutting properties are not depicted within this quadrant and map.

The abutting properties located beyond 20th Avenue are not depicted on this map.

6.1.1.3 1936 SANBORN MAP (All six Quadrants identified as “Astoria Light, Heat and Power Co. Gas Plant”)

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

Same configuration as in 1915 map.

Quadrant 4:

Same configuration as 1915 Map, with the following additions:

- 4-5-story “generator house and offices”, which contains two elevators, 12 vertical ASTs and an area designated “coal pockets and coal elevators.” This structure connected by a coal bridge to a two coal elevators and another coal elevator and coal pockets area;
- 2-4-story “boiler house, ”which contains four horizontal steam boilers;
- 1-4-story “generator house”, which contains two elevators, 12 vertical “waste heat boilers”, and six horizontal steam boilers;
- Six additional condensers;
- One additional 450,000 gallon “tar emulsion” vertical AST;
- Four vertical oil ASTs;

- One additional 1,000,000 cubic foot gas holder;
- One-story "pump house", which includes an area identified as "tar block separators";
- One-story "tar pump house";
- 1,000,000 gallon vertical water AST;
- 480,000 gallon vertical tar AST;
- One to two-story "storage building";
- Two-story "ash conveyor", which connects to a one-story "ash house";
- One-story "storehouse and garage";
- One-story structure identified as "tar separators";
- Two one-story unidentified buildings.

Quadrant 5:

Same configuration as 1915 Map, with the following additions:

- A structure identified as "tar emulsion tanks";
- One-story "toluol plant."

Quadrant 6:

Same configuration as 1915 Map, with the following additions:

- Eight purifiers;
- Two 1-2-story buildings identified as "purifiers";
- Building identified as a "machine shop and locker rooms";
- Building identified as a "restaurant and mess hall";

- 1-2- story "water gas tar extractor house";
- One-story "pump house";
- Four vertical oil ASTs;
- 1-2-story "riveting shop";
- One-story "printers shed";
- One-story "print shop";
- Two one-story "hose house";
- 15,000,000 cubic foot gas holder;
- One-story "chemical laboratory";
- Remaining portions of the subject property and abutting properties within this quadrant are not depicted on this map.

Adjoining Properties

Quadrant 1:

Same configuration as 1915 Map.

Quadrant 2:

Same configuration as 1915 Map.

Quadrant 3:

Same configuration as 1915 Map, with the following additions:

- Building previously identified as "Cyanogen and by products recovery plant";
- One-story "locker room and storage room";

- One-story building identified as “acid tank”;
- Two unidentified buildings;

Area within Quadrant 3 identified as “Formerly US Government Toluol Plant”, which includes the following structures:

- 1-4-story “storage house, still house and lime storage”
- A unidentified building containing a vertical AST and area designated “condensers”;
- A building identified “settling basins”;
- Two vertical oil ASTs;
- One horizontal oil AST;
- Unidentified building containing six vertical oil ASTs and six vertical toluol ASTs;
- One-story “laboratory.”

Quadrant 4:

Same configuration as 1915 map.

Quadrant 5:

- One-story “booster house”;
- An additional one-story “hose house”;
- 1-2-story “tunnel head house,” which contains an elevator;
- One-story “control house”, which includes an area designated as “oil cooled transformers”;
- One-story “high water tension switch house”;
- One-story “gate house”;

- One-story "salt water pump house";

Quadrant 6:

Same configuration as 1915 map.

6.1.1.4 1948 SANBORN MAP (All six Quadrants identified as "Consolidated Edison Co. of N.Y. Inc.")

Subject Property (only includes Quadrants 3, 4, 5, and 6)

The 1948 map only depicts structures on the subject property in Quad 4, and portions of the subject property in Quads 3, 5 and 6.

Quadrant 3:

- One-story "hose house";
- A vertical tar AST;
- One-story unidentified building.

Quadrant 4:

Same configuration as 1936 map with the following additions:

- Two-one story "tar pump houses";
- Remaining portions of the quadrant are not depicted on this map.

Quadrant 5:

- Three 1-2-story storage buildings;
- 1-2-story "compressor and storage" building;
- Remaining portions of this quadrant are not depicted on this map.

Quadrant 6:

Same configuration as 1936 map.

Adjoining Properties

Quadrant 1:

- A traveling coal storage bridge;
- Remaining portions of quadrant are not depicted on this map.

Quadrant 2, 3, 4, 5, and 6:

- Abutting properties are not depicted on this map.

The abutting properties located beyond 20th Avenue are not depicted on this map.

6.1.1.5 1950 SANBORN MAP (All six Quadrants identified as "Consolidated Edison Co. of N.Y. Inc.")

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

Same configuration as 1936 map with the following addition:

- A vertical tar AST.

Quadrant 4:

Same configuration as 1948 map with the following additions:

- 4-5-story "generator house and offices", which contains two elevators, 12 vertical ASTs and area designated "coal pockets and coal elevators", This structure is connected by a coal bridge to a two inclined coal elevators, another coal elevator and coal pocket area and coal conveyor which extends to a generating house (described below);
- 3-4-story "generator house", which contains an elevator and conveyor;
- Two horizontal "regeneration ASTs";

- 1-4-story "generator house", which contains two elevators, 12 vertical "waste heat boilers", and six horizontal steam boilers;
- Three additional condensers;
- One-story "tar pump house";
- Two-story "ash conveyor", which connects to a one-story building identified as "ash pockets", which contains three vertical ASTs;
- Two horizontal "coke filters" ASTs;
- One-story "tar pump house";
- Four horizontal ASTs;
- Three 14,000 gallon vertical "tar processing" ASTs;
- One-story "construction office and shop";
- A "tar oil pump house";
- One-story "fire shed";
- 1-2-story "truck repair";
- Two 1-story "storage" buildings;
- One-story "store room";
- A "hose house";
- Five unidentified buildings.

Quadrant 5:

Same configuration as 1936 map with the following addition:

- Unidentified building which includes an area designated "naphthalene";

Quadrant 6:

Same configuration as 1936 map with the following addition:

- Four vertical naphthalene ASTs;

Adjoining Properties

Quadrant 1:

Same configuration as 1936 map.

Quadrant 2:

Same configuration as 1936 map.

Quadrant 3:

Same configuration as 1936 map with the following additions:

Area within Quadrant 3 identified as "Light Oil Plant", which includes the following structures:

- 1-4-story "still house, pre-cast shop, and locker room";
- A unidentified building containing a vertical AST and area designated "condensers", containing an additional vertical AST;
- A vertical "cooler" AST;
- One-story "fuel pump house";
- One horizontal oil AST;
- Unidentified building containing two vertical sulfuric acid ASTs, four vertical cyanogen ASTs and six vertical toluol ASTs;
- One-story "former pump house";
- One-story office;

- Two structures identified as “coke filters”;
- One-story “fog nozzle.”

Quadrant 4:

Same configuration as 1936 map.

Quadrant 5:

Same configuration as 1936 map with the following additions:

- One-story “booster and electrical compressor house”;
- One-story “pump house”, which is connected to an enclosed diked area containing 18 horizontal ASTs and designated “Liquefied Petroleum Plant.”

Quadrant 6:

Same configuration as 1936 map with the following additions:

- 1-2-story “shops” building, which contains a areas designated “spray booth” and lockers;
- Dust collection area;
- Building identified as “transformer yard”;
- Building identified as “oil tanks”;
- One-story “ gate house”;
- An unidentified building.

The abutting properties located beyond 20th Avenue are not depicted on this map.

6.1.1.6 1967 SANBORN MAP (All six quadrants as identified as “Consolidated?? Edison Company of N. Y., Inc.”)

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

- Two 1-story “cable equipment” buildings;
- One-story “control hose.”

Quadrant 4:

- 1-2-story “maintenance supply warehouse”, which includes a drum storage area, a craneway, an office and loading area;
- Two unidentified vertical ASTs.

Quadrant 5:

- 1-3-story “field office”;
- 1-3-story “store house”;
- 15,000,000 cubic foot gas holder;
- Two 1-story “meter houses”;
- Two unidentified buildings.

Quadrant 6:

- Two-story “mess hall”;
- One-story “control house”;
- A “chemical laboratory”;
- One-story “gate house”;
- Three unidentified buildings;
- 15,000,000 cubic foot gas holder.

Adjoining Properties

Quadrant 1:

- 1-3-story unidentified “plant” building;
- An unidentified building.

Quadrant 2:

- This quadrant is not depicted on this map.

Quadrant 3 and 5:

- A conveyor loading pit and house;
- Building containing six transformers;
- A “breaker house sub station”;
- Two 5-story breaker houses;
- One “transfer house, traveling coal tower and machine room”;
- A coal unloading dock;
- Two “screen well houses”, one of which contains “hydrogen tanks”;
- A large generating station that includes several generation houses, eight horizontal boilers, several transformers, pump houses, meter houses, administrative buildings, precipitators and ASTs.

Quadrant 4:

- Abutting properties are not depicted within this quadrant and on this map.

Quadrant 6:

- Abutting properties are not depicted within this quadrant and on this map.

The abutting properties located beyond 20th Avenue are not depicted on this map.

6.1.1.7 1967 UNIDENTIFIED FIRE INSURANCE MAP (All six quadrants as identified as “Consolidated?? Edison Company of N. Y., Inc.”)

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

- Area designated “Astoria West Substation”, which contains two 1-story “oil storage houses”, a building identified as “metal clad cubicles, air compressors, and tanks”, and 15 1-story “oil pump houses”;
- Two buildings identified as “metal clad cubicles”;
- Eight 1-story “oil pump houses”;
- Seven “sulfur hexafluoride breakers”;
- One-story “oil pump house”, which contains a 600 gallon AST and heat exchangers;
- Three 1-story “circulating oil pump houses”;
- Two 1-story “pressure maintenance pump houses.”

Quadrant 4:

- Two 1-story warehouses that include offices, an oil drum area, shipping and receiving areas, a craneway, a cable cutting area, and gas cylinder storage;
- Transformer storage areas;
- Fire training school grounds;
- An unidentified pond;
- Paved transportation and parking areas;
- The remaining portions of this quadrant are not depicted on this map.

Quadrant 5:

- 15,000,000 cubic foot gas holder;
- Two 1-story "water meter houses";
- "Atmospheric sampling house";
- "Drip oil tank pit area";
- A storehouse and gate house.

Quadrant 6:

- 15,000,000 cubic foot gas holder;
- One-story "control house and regulator room";
- Two-story chemical laboratory building;
- Two-story transport building, that includes a boiler room, lube pits and a car wash;
- Paved parking areas.

Adjoining PropertiesQuadrant 1:

- A large portion of the quadrant is identified as a "coal storage yard," which extends from Quadrant 2;
- A large area designated as "Fly Ash Sintering Plant", which includes a one to three story "sintering building", which connects to a "dust collector" and a "raw fly ash silo", a stack, a conveyor, "reclaim tunnel", a "crusher building", and four "truck load out bins."

Quadrant 2:

- An embankment which contains two 25,000-gallon, horizontal, “purge oil” ASTs;
- One-story “oil pump house”;
- One-story “oil sampling house”;
- One vertical unidentified AST;
- A large area designated “coal storage yard.”

Quadrant 3 and 5:

- A conveyor loading pit and house;
- Building containing six transformers
- A breaker house sub station;
- Two 5-story breaker houses;
- One “transfer house, traveling coal tower and machine room”;
- A coal unloading dock;
- Two “screen well houses”, one of which contains “hydrogen tanks”;
- A large generating station that includes several generation houses, eight horizontal boilers, several transformers, pump houses, meter houses, administrative buildings, precipitators and ASTs.

Quadrant 4:

- Abutting properties are not depicted within this quadrant and map.

Quadrant 6:

- A gas station;
- Cable, transformer, storage and conduit storage areas;

- One-story “transformer repairs” shop building which includes a “print spray booth, sand blast pit, paint drip tanks and oil conditions”;
- “Oil products storage house”;
- Remaining portions of this quadrant are not depicted on this map.

The abutting properties located beyond 20th Avenue include car garages, apartments, and dwellings.

6.1.1.8 1976, 1977, 1985, 1986, 1990, and 1996 SANBORN MAPs (All six quadrants as identified as “Consolidated?? Edison Company of N. Y., Inc.”)

Subject Property (only includes Quadrants 3, 4, 5, and 6)

Quadrant 3:

- Two cable equipment houses and a control house;

Quadrant 4:

- A “maintenance supply warehouse and office”;
- Two 14,000 gallon unidentified ASTs;
- Remaining portions of this quadrant are not depicted on this map.

Quadrant 5:

- 15,000,000-cubic foot gas holder;
- A “meter house” and a “water meter house”;
- Two unidentified 1-story buildings.

Quadrant 6:

- Two-story “office and garage” building;
- Chemical laboratory;
- A “meter house”, and a “gate house”;
- A unidentified building;
- Remaining portions of quadrant are not depicts on this map.

Adjoining Properties

Quadrant 1:

- One-story “Foster Wheeler office” building;
- Two warehouses;
- A vertical unidentified AST.

Quadrant 2:

- Five vertical unidentified ASTs designated “oil tank farm”;
- Remaining portions of Quadrant 2 are not depicted on this map.

Quadrant 3 and 5:

- A large generating station that includes several generation houses, eight horizontal boilers, several transformers, pump houses, meter houses, administrative buildings, precipitators and ASTs.

Quadrant 4:

- Abutting properties are not depicted on this map.

Quadrant 6:

- Abutting properties are not depicted on this map.

The abutting properties located beyond 20th Avenue are not depicted on this map.

6.1.2 Brown's Directories

Brown's Directories were obtained and reviewed by ENSR for the years 1906 through 1963 (see Appendix D for Brown's Directory). Brown's Directories were compiled and reviewed for statistical information from former MGP operations. According to the directories, Astoria Light, Heat and Power Company operated the subject property between 1906 and 1936 (see table in Section 5.0 for historic ownership information). Under the ownership of Astoria Light, Heat and Power Company, coal gas (horizontal and inclined), Lowe, Williamson, (types of manufacturing processes) and carburetted water gas were manufactured at the facility. An analysis of this information was conducted by dividing the types of process of manufacture into five groups as they relate to specific intervals of time. For instance, between 1908 and 1913, coal was listed, as the only process of manufacture and Astoria Light, Heat and Power Company was operating solely as a manufacturing company and not distributing. Approximate quantities of gas and by-products generated were not included in the directories for the years prior to 1908.

Between 1914 and 1921, coal gas and Lowe (Williamson), a carburetted water gas process of manufacture, capable of making fuel gas from water (as steam) and enriched for candlepower by light "oils" recovered from gas-making residual tars, were manufactured at the subject property. According to annual production rates, approximately $28,590.17 \times 10^6$ cubic feet (c.f.) of coal gas and $43,902.51 \times 10^6$ c.f. of water gas were produced between the years of 1915 and 1921. Production rates were not provided for the year of 1914. At this time, only one of the gasholders was in use, which had a capacity of 15 million c.f. By-product generation information, such as coke, tar, coal gas tar, water gas tar quantities, etc. were not included for the years prior to 1918. However, between the years of 1919 and 1921, coke production was reported to be approximately 718,519 tons, and tar production was approximately 13,100,639 gallons. A comparison for the amount of each by-product produced within this time period to the amounts of each by-product sold, indicated that the following percentages of the generated amounts per by-product were sold and used as fuel:

- 92% of the tar produced was sold (1919 to 1920); and
- 98% of the ammonia produced was sold (1919 to 1920).

The amounts of fuel used during these years were not included in the directories and some comparisons were excluded due to the information not included or not practically reviewable. In addition, directory notes indicate that as of 1913, the subject property was a subsidiary of Consolidated Gas Company of N.Y.

According to the directories, coal gas, which was produced through horizontal and inclined processes at this time, and carburetted water gas were generated at the subject property between 1922 and 1927. According to annual production rates, approximately $33,719.17 \times 10^6$ c.f. of coal gas and $70,274.29 \times 10^6$ c.f. of water gas were produced between the years of 1922 and 1927. During 1922, only the one gasholder was in use at a capacity of 15 million c.f. In 1923, the gas holding capacity of the facility increased to 32 million c.f. 1923 through 1926 and to 30 million c.f. in 1927, which indicates that two gas holders were in operation, at 15 million c.f. each. Between the years of 1922 and 1927, coke production was reported to be approximately 2,328,884 tons, coal gas tar production at 35,524,476 tons, water gas tar production at 48,950,000 gallons, drip oil production at 1,820,553 gallons, and ammonia production at 16,944,359 pounds. Between 1924 and 1927, cyanogen production was approximately at 2,794,843 gallons, carbon at 436,172 pounds, and ammonia sulphate production at 33,321,418 pounds. A comparison of the amount of each by-product produced within this time period to the amounts of each by-product sold and fuel used, indicated that the following percentages of the generated amounts per by-product were sold and used as fuel:

- 16% of the coke produced was sold (1922 to 1926);
- 34.12% of the water gas tar produced was sold (1922 to 1926);
- 53% of the ammonia produced was sold (1922-1926);
- 99% of the cyanogen produced was sold (1924 to 1926); and
- 2.7% of carbon produced was sold (1926).

Some comparisons were excluded due to the information not included or not practically reviewable. In reviewing the reported quantities of fuel used, it was determined that approximately 3,002,780 gross tons of coal was carbonized (between 1922 and 1927), 375,095 tons of coke was used as fuel (1927), and 262,438,025 gallons of gas oil was used as fuel (1922 to 1927). According to the 1927 directory notes, the subject property was supplying gas to the City of New York and the Borough of Queens.

According to the Brown's directories, coal gas, which was produced through horizontal and inclined processes at this time, carburetted water gas, and Lowe and Williamson (types of water gas manufacturing processes) were generated at the facility between 1928 and 1936. According to annual production rates, approximately $31,241.15 \times 10^6$ c.f. of coal gas and $131,636.65 \times 10^6$ c.f. of water gas were produced between the years of 1928 and 1936. Of the two 15 million c.f. gas holders known to be in operation at this time, the gas holder's capacity was reported at only 30,000 c.f. for 1928 to 1929 and in 1932. The gasholder's capacity was at 30 million c.f. from 1930 to 1931. Information regarding gas holders capacities was not provided for 1933 to 1936. Between the years 1928 and 1936, coke production was reported to be approximately 2,317,444 tons, coal gas tar production at 37,324,953 gallons, ammonia production at 5,349,004 pounds, and ammonia sulphate production at 44,447,503 pounds. Water gas tar production was reported at approximately 40,106,209 gallons (1928-1931), light oils production at 9,221,292 gallons (1930-1936), and drip oil production at 518,324 gallons (1928-1934). Information regarding quantities sold were not included in the Directories. In reviewing

the reported quantities of fuel used, it was determined that approximately 3,255,971 gross tons of coal was carbonized (between 1928 and 1936), 1,331,880 tons of coke was used as fuel (1928-1931), and 25,579,627 gallons of water gas tar was used as fuel (1927-1931). According to the Directory notes for 1927 through 1936, the facility was supplying gas to the City of New York and the Borough of Queens. In addition, information that was not practically reviewable was excluded from this summary.

In 1937, Consolidated Edison Company of New York assumed ownership of the subject property and throughout 1963, when the directories end. Water gas was the only process of manufacture conducted at the subject property between 1937 and 1948. Approximately $142,033.37 \times 10^6$ c.f. of water gas was produced between 1937 and 1946. According to the directories, coal gas was not manufactured at the facility after 1936, which is when MGP operations began to cease. Information after 1946 is not included in the directories. Directory notes indicate that the subject property was a subsidiary of Consolidated Edison Company of New York from 1913 through 1936, at which time, the facility merged with Consolidated Edison.

6.1.3 Public Service Commission Reports

According to a Public Service Commission report dated June 30, 1907, the Astoria Light, Heat and Power Company started supplying coal gas beginning on December 3, 1906, during which the facility's total daily capacity was 20,000,000 c.f. A total of 1,030 retorts were operating with a 15-million c.f. gasholder undergoing construction. The information provided in the report includes statistical information for a seven-month operational period. During the seven month period from June 30, 1907, through December 31, 1907, the facility received 113,143.60 tons of gas coals, of which 97,450.07 tons were carbonized, 19.48 was used for fuel and 15,674.05 were on hand at the facility as of June 30, 1907. Approximately 3,197.59 tons of boiler fuel was received and used within this time period. Within the seven-month period, by-products generated at the facility included coke, coal tar gas, ammoniacal liquor and other residuals such as carbon. The following is a summary of the quantities generated, sold, used for fuel and kept on hand at the facility within this time period:

- 75,294 net tons of coke were produced, of which 29% was used (21,978 tons), 68% was sold (50,783 tons) and 3% was kept on hand at the facility;
- 1,301,350 gallons of coal gas tar were produced, of which 87% was sold (1,137, 251 gallons), and 13% was kept on hand at the facility (164,099 gallons);
- 3,749,133 gallons of ammoniacal liquor were produced, of which, 81% was sold (3,027,903 gallons), and 19% was kept on hand at the facility (721,230 gallons); and
- 37,640 gallons of other residuals such as carbon were produced and kept on hand at the facility.

Appendix E contains a copy of the 1906 Public Service Commission report.

6.1.4 Chain-of-Title Reports

A 50-year chain-of-title report was obtained from Commonwealth Land Title Company and the information is included in Section 5.0. The chain-of-title report is included as Appendix B.

6.1.5 Additional Historical Sources

ENSR conducted historical research “as necessary” at Con Edison’s Real Estate and Property department records at 4 Irving Place, New York, N.Y., in addition to the Science, Business, industry N.Y. Library. A description of ENSR’s findings from the research conducted has been incorporated into Section 6.1.

7.0 SITE REGULATORY INFORMATION

7.1 Federal and State Database Review

As part of ENSR's investigation of the subject property, a search of various governmental databases was conducted by Environmental Data Resources (EDR) of Southport, Connecticut, and reviewed by ENSR. Appendix F provides a copy of the EDR database report.

The following federal and state contamination related databases were searched for the area surrounding the subject property; the various search distances used are noted in parenthesis:

- NPL: for existing Superfund sites on the National Priorities List (1.0 mile of the subject property).
- Proposed NPL: for proposed Superfund sites on the National Priorities List (1.0 mile of the subject property).
- CERCLIS: for abandoned, uncontrolled or inactive hazardous waste sites reported to the U.S. EPA. (0.5 mile).
- CERC-NFRAP: for CERCLIS sites that have been designated "No further Remedial Action Planned" and have been removed from CERCLIS (0.25 mile).
- CORRACTS: for hazardous waste handlers with RCRA corrective action activity (1.0 mile).
- RCRIS/TSD: reported sites that treat, store and/or dispose of hazardous waste and subject to the federal RCRA regulations (0.5 mile).
- RCRIS/LQG: for reported large quantity generators of hazardous waste (0.25 mile).
- RCRIS/SQG: for reported small quantity generators of hazardous waste (0.25 mile).
- ERNS: for sites reporting spills to the U.S. EPA and/or the U.S. Coast Guard under various federal regulations (target property).
- SHWS: for identified hazardous waste sites designated under various state regulations (1.0 mile).

- SWF/LF: for identified solid waste facilities and landfill sites designated under various state regulations (0.5 mile).
- LTANKS: for leaking underground storage tanks reported to the state under various state regulations (0.5 mile).
- UST: for underground storage tanks registered on the property under various state regulations (0.25 mile).
- CBS AST: for facilities storing hazardous substances in above ground tanks with capacities greater than 185 gallons and/or USTs of any size (0.25 mile).
- MOSF AST & UST: facilities with petroleum storage capabilities of 400,000 gallons or greater (0.5 mile).
- VCP: for sites under the State Voluntary Cleanup Program (0.5-mile).
- SWTIRE: for sites on the State Registered Waste Tire & Facility List (0.5 mile).
- SWRCY: for sites on the Registered Recycling Facility List (0.5-mile).
- FINDS: for sites that are regulated or tracked by the EPA for a variety of programs (target property).
- Coal Gas: for existence and location of former manufactured gas sites (1.0 mile).

Based on the density and industrial nature of the subject property and surrounding area, database listings, which appear on the subject property and abutting properties have the greatest potential to impact environmental conditions at the subject property. All of the current listings refer to regulatory status, reporting and compliance activity, registered tanks, and reported releases, which occurred from 1986 through the present. None of the database listings refer to historic MGP operations at the subject property, with the exception of the Coal Gas site. Facilities identified at the subject property address and abutting properties are discussed below.

Subject Property

The subject property address at 20th Avenue and 21st Street is identified with three different facility names and associated database listings. Astoria Central Treatment Facility/Con Ed is identified in the FINDS, RCRIS-LQG, RCRIS-TSD, CORRACTS, CERC-NFRAP and LTANKS databases. Astoria West Sub-Station is identified in the LTANKS, NY Spills and UST databases and Consolidated Edison

Facility is identified in the CBS-AST database. A total of three releases are reported in the database and include a 20,000-gallon overflow of oil from a barge to a tank, a 2-gallon dielectric fluid spill due to a tank valve failure and a 15-gallon overflow of waste oil from one tanker to another. The dielectric fluid spill and waste oil spill cases received regulatory closure. The 20,000-gallon tank overflow incident occurred on July 20, 1986 and is reported as Case #8602570. Reported information indicates that cleanup ceased on July 25, 1986. No closure date or additional information was available. Based on the presence of regulatory oversight from the NYSDEC, type of release (tank overfill) and date of release, this incident is not expected to present a continued concern to environmental conditions at the subject property.

The subject property address was also identified in the orphan summary list in the LTANK database, however, due to insufficient address information the listings could not be accurately located and detailed information regarding the listings was not available for review. The subject property was also listed on the Coal Gas database under the name "Astoria Heights, Heat & Power Co." However, due to poor or inadequate information, the site was not mapped and no other details were provided.

Surrounding Properties

Adjoining properties to the north (Astoria Complex, Astoria Gas Turbines), northwest (Charles Poletti Power Project/NY Power Authority), southeast (Astoria Sub-Station, North Queens Central Substation) and west (Astoria Generating Station, Astoria Transformer Yard) were identified in the RCRIS-LQG, LTANKS, UST, MOSF-UST and AST databases. A total of 17 releases are reported in the database report, most of which refer to small quantities (less than 50-gallons) of petroleum products, dielectric fluid, hydraulic oil, antifreeze, kerosene, waste oil, fuel oil and diesel fuel released to the surface during tank overfilling or equipment failure. Sixteen of these incidents have received regulatory closure; however, one incident reported at the Charles Poletti Power Project facility (adjoining property to northwest) remains open. This incident was a gasoline release discovered during a UST removal on September 3, 1998, Spill #9806832, which indicated soil contamination and holes in the UST. No closure date or current status information was reported. According to Federal regulations, owners and operators of sites impacted by contamination from documented off-site sources will not be held liable if historic on-site operations did not have the potential to cause the contamination. Based on the presence of regulatory oversight by NYSDEC at this facility and a documented responsible party, this incident is not expected to impact environmental conditions at the subject property.

7.2 Federal Agency Records

ENSR submitted a Freedom of Information Act (FOIA) request to the Environmental Protection Agency (EPA) for the subject property. According to the EPA, they maintain information for sites existing prior to 1970. However, based on the fact that MGP operations were conducted at the subject property until the 1960's, it would not be likely that the EPA does not have any information regarding the former

MGP operations. Information received after the date of this report will be included in an addendum letter.

7.3 State Agency Records

ENSR submitted a FOIA request to the NY State Department of Environmental Conservation (NYSDEC). No response to our request has been received as of the date of this report. Any relevant information pertaining to the subject property obtained from the NYSDEC will be included in an addendum letter.

7.4 Local Agency Records

ENSR submitted FOIA requests to the NY City Fire Department, New York City Department of Environmental Protection (NYCDEP), New York City Department of Building, and the New York City Environmental Investigations Department (Health Department). No information has been received with regard to the subject property at this time. Any relevant information pertaining to the subject property obtained from the above agencies will be included in an addendum letter.

8.0 POTENTIAL RECEPTORS

8.1 Local Groundwater Use and Surface Waters

Groundwater supply systems were developed for the Queens and Kings County areas in the 1880s. By 1947, however, severe salt-water encroachment had occurred in many of these areas due to excessive groundwater pumping. By this time, the public groundwater supply in Kings County (Brooklyn) had been replaced by the New York City municipal water supply, derived primarily from surface water reservoirs in upstate New York. By 1974, only one water supply company (the Jamaica Water Supply Company) continued to pump groundwater in Queens County. The Jamaica Water Supply Company, which continues to pump groundwater in the southeastern part of Queens County, currently supplies drinking water (approximately 30 million gallons per day) to about eight percent of the New York City population (ENSR, 1994).

Due to shortfalls in the New York City water supply system, renewed interest has been expressed in the groundwater aquifers underlying Kings and Queens Counties. An investigation of the groundwater quality in Brooklyn and Queens (Brooklyn/Queens Groundwater Quality Investigation, Dec. 1988) was recently conducted by NYSDEC. It was determined, however, that a more comprehensive study was needed prior to determining whether the Brooklyn/Queens Aquifer Systems is a viable future water supply source (ENSR, 1994).

Groundwater in the vicinity of the subject property is not used for drinking water purposes. Residents of the area are connected to the New York City public water supply system. Groundwater pumping of production wells occurs at off-site locations in the site vicinity for both industrial cooling and process purposes. There are currently seventeen (17) on-site groundwater monitoring wells located on the subject property and abutting areas which encompass the Con Edison Astoria Facility.

8.2 Other Potential Sensitive Receptors

Several sensitive receptors were identified within the immediate area of the subject property. Ball fields that are currently leased to the Federation of Italian-American Organizations of Queens (FIAS) and the Immaculate Conception Youth Organization (ICYO) are located on the southeastern abutting property in the eastern side of Quadrant 6. The fields combined consist of approximately 384,000 square feet of land and are located approximately 900 feet southeast of the subject property. The Mamie Fay School was identified within 1,320 feet southwest of the subject property. Other potential receptors could include site workers breaching the ground surface in areas where product seeps have been identified. There is the potential for site workers, in addition to visitors to encounter existing and/or future product seeps through direct contact and/or inhalation of volatile components. No other sensitive receptors were identified in the vicinity of the subject property. ENSR did not identify any evidence of contamination or seepage of contamination on any of the abutting properties with regard to

former MGP facilities. In addition, information regarding buildings within the vicinity of the subject property that contain basements was not included in ENSR's research, however it is assumed that based on the proximity to the surrounding water bodies and approximate depth to water, that many of the buildings in the vicinity of the subject property would not contain a basement. (N.Y.C. Board of Education)

9.0 DISCUSSION AND CONCLUSIONS

ENSR International (ENSR) was retained by Consolidated Edison Company of New York, Inc. (Con Edison) on March 11, 2002, to conduct Site History Research for the former Manufactured Gas Plant (MGP) site located on the Astoria Generating Station property at 21st Street and 20th Avenue in Astoria, New York. The objective of the MGP Site History Research was to gather historical information on the former MGP site operated by Con Edison and/or its predecessor companies, and to assess any potential impacts associated with these properties.

ENSR's scope of work for this site included the following:

- Review of Con Ed Property and Real Estate Files;
- Review of Brown's Directories of North American and International Gas Companies;
- Review of Public Service Commission Reports;
- Review of Sanborn Insurance Maps dated 1898, 1915, 1936, 1950, 1977, 1986, 1996 from Environmental Data Resources, Inc. (EDR). In addition, ENSR was provided with Sanborn Fire Insurance Maps for the subject property dated 1944, 1967, 1976, 1985, and 1990 by Consolidated Edison and an unidentified fire insurance map for the subject property dated 1967.
- Review of a 50-year Chain-of-Title report;
- Review of records at the NY City Science Industry and Business Library at 34th and Madison in NYC;
- Submittal of FOIA letters to the USEPA Region II, NY City Fire Department, NY City Department of Buildings, NY City Environmental Investigations Department (Health Department), and NYSDEC;
- Review of an environmental database search report prepared by EDR, and
- A site reconnaissance of the subject property.

Based on the scope of work performed, the following conclusions have been made:

- The former MGP site (the subject property) consists of an approximately 124-acre parcel that is part of a larger 316-acre site containing an industrial and power generating facility currently owned and operated by Con Edison. The location of the former MGP operations ("subject property") and

the extent were determined through review of historical Fire Insurance Maps, previous reports, information provided by Con Edison and additional research.

- The subject property was operated as a coal gas and water gas MGP site from 1906 to 1961.
- The MGP site ceased operations in 1961 and MGP structures were demolished, leveled, backfilled and paved over. There were no former MGP structures located at the subject property after 1961, with the exception of the former gas holders, which were converted into the current settling basins located in the southwestern portions of Quadrants 5 and 6.
- Former MGP structures identified on the subject property from Sanborn Insurance Maps included two 15,000,000 cubic foot gasholders along the northeasterly side of 20th Avenue, and southwestern portions of Quadrants 5 and 6. There were also inclined and horizontal retort houses, coal elevators, tar pump houses, water tanks, coal sampling houses and coke pockets located in the southeasterly portion of Quadrant 3. The primary generator house, associated pump houses, several condensers, gas tar separators and smaller 1,000,000 c.f. gas holders were located in the northeasterly portion of Quadrant 4. Former MGP structures located in the southwesterly portion of Quadrant 5, included tar extractor, boiler, purifier, meter, pump and condenser houses, and a 15,000,000 c.f. gas holder. Scrubbers, purifiers, tar extractor, meter, exhauster, and boiler houses and a 15,000,000 c.f. were located in the southwesterly portion of Quadrant 6.
- According to a Public Service Commission report dated June 30, 1907, the Astoria Light, Heat and Power Company started supplying coal gas beginning on December 3, 1906, during which time the facility's total daily capacity was 20,000,000 c.f. A total of 1,030 retorts were operating with a 15 million c.f. gas holder undergoing construction. The information provided in the report includes statistical information for a seven-month operational period. By-products generated at the facility included:
 - 75,294 net tons of coke was produced, of which 29% was used (21,978 tons), 68% was sold (50,783 tons) and 3% was kept on hand at the facility;
 - 1,301,350 gallons of coal gas tar was produced, of which 87% was sold (1,137, 251 gallons), and 13% was kept on hand at the facility (164,099 gallons);
 - 3,749,133 gallons of ammoniacal liquor was produced, of which, 81% was sold (3,027,903 gallons), and 19% was kept on hand at the facility (721,230 gallons);
 - 37,640 gallons of other residuals such as carbon were produced and kept on hand at the facility.

- The subject property currently contains portions of a larger industrial and power generating facility identified as the Astoria Generating Station. In addition to electrical power generation, several other Con Edison operations are located within the subject property boundaries (ENSR, 1994). These are as follows:
 - Central Wastewater Treatment Facility (CWTF);
 - Transportation Building;
 - Central Storage Warehouse;
 - Chemical Laboratory;
 - An electrical substation; and
 - Several equipment and material storage yards.
- During ENSR's 2002 site reconnaissance, evidence of MGP by-products was observed at the subject property. Specifically, three coal tar seeps, were observed in paved and unpaved areas in Quadrant 4, within the pipe yard area and adjacent areas. Areas exhibiting coal tar seepage are considered a current potential for exposure to impacted media.

10.0 SUMMARY OF HISTORICAL RESEARCH FINDINGS

For the purposes of prioritizing Con Edison's MGP sites by utilizing a qualitative ranking system, the following information is listed with regards to key factors dictating potential risk from the former operations.

- According to the information provided and the site reconnaissance, Con Edison owns and controls access and site usage of the subject property.
- The relative size of the subject property is approximately 124 acres.
- Indication of plans of re-development or future land uses was not observed at the subject property. (The subject property currently occupies portions of a larger generating facility).
- The potential for direct exposure to impacted subsurface conditions and potential volatilization exposure pathways to workers are high.
- There is not a potential for site actions that could be triggered by other regulatory means.
- Several sensitive receptors were identified within the immediate area of the subject property. Ball fields that are currently leased to the Federation of Italian-American Organizations of Queens (FIAS) and the Immaculate Conception Youth Organization (ICYO) are located on the southeastern abutting property in the eastern side of Quadrant 6. The northeastern and northwestern boundaries of the subject property are situated approximately 900 feet southwest and 870 feet southeast of the East River. The southeastern boundary of the subject property is situated approximately 780 feet northwest of Luyster Creek. The Mamie Fay School was identified within 1,320 feet of the subject property. No other sensitive receptors were identified in the vicinity of the subject property (N.Y.C. Board of Education).
- ENSR did not identify any evidence of contamination or seepage of contamination on any of the abutting sites with regard to former MGP facilities.
- ENSR did not observe ongoing or obvious impacts to surface waters on or in the vicinity of the subject property. However, based the observation of three coal tar seeps and a review of former MGP disposal practices, surface waters and subsurface conditions may potentially be impacted.
- No substantial impacts from other site uses at the subject property that would result in a lower priority for the MGP site were identified.

11.0 REFERENCES

Around the System. A Modern Fuel for a Modern City-Serving New York: Electricity (vol. 1), pp.1-4, October 1936.

Around the System. System Rallies to Restore Service as hurricane rips Overhead Lines, (vol. 9), pp.1-2, October 1944.

A. T. Kearney, Inc. Final PR/VSİ Report for the Consolidated Edison Company Astoria Facility, March 1991.

Brown's Directories of North America and International Gas Companies for the years 1906 through 1963.

Commonwealth Land Title Search Company, title search information for Block 850 and Lot 1.

Consolidated Edison of New York, Construction Outline of Two Gasholders at the Astoria facility and Site Questionnaire, 4 Irving Place, New York, no date.

Consolidated Edison of New York, Fire Insurance Map for the subject property, 4 Irving Place, New York, dated 1967.

Consolidated Edison of New York, Voluntary Cleanup Program Application, Attachment I, February 28, 2002.

ENSR Corporation. Description of Current Conditions Report, Astoria Generating Facility, Consolidated Edison Company of New York, Inc., 1994.

Environmental Data Resources (EDR) Inc. of Southport Ct. Report of Astoria Gas Works, 21st Street/20th Avenue, Astoria, N.Y. 11105 Inquiry Number 744777.5s March 13, 2002.

Environmental Research and Technology, Inc. Handbook of Manufactured Gas Plant Sites. Utility Solid Waste Activities Group and Edison Electric Institute: 1984.

Geraghty and Miller, Inc., Installation of Wells at the Astoria Generating Station, April, 1981.

Miller Environmental Group. Subsurface Investigation Report, Astoria Gas Turbine Facility, Consolidated Edison Company of New York, Inc., October, 1993.

New York City Board of Education: http://www.nycenet.edu/dist_sch/dist/default.asp?Dist=84

New York City Science, Business, and Industry Library, historic articles.

New York Department of City Planning, Demography Profile based on 1990-2000 census, August 20, 2001, <http://www.nyc.gov/html/dcp/html/census/pop2000.html>.

New York State Department of Environmental Conservation, Classifications-Surface Waters and Groundwaters, January 2000, <http://www.dec.state.ny.us/website/regs/701.htm> and http://www.dec.state.ny.us/website/dow/prop_reg/855.html.

Progressive Age. New Gas Plant at Astoria, for Consolidated Gas Company of New York-Sections I-XI, (4/15/05, 5/1/05, 6/1/05, 6/15/05, 7/1/05, 8/1/05). pp. 194-95, pp. 204-235, pp. 269-276, pp. 303-04, pp. 334-369, pp. 392-94).

Public Service Commission Report First District - Report for June 30, 1907, Light and Power Statistics, pp. 621-22, 624, 647, 649. 650-51.

Sanborn Fire Insurance Maps for the subject property obtained from Consolidated Edison dated 1948, 1967, 1976, 1985, and 1990.

Sanborn Insurance Maps for the subject property supplied by EDR for years 1898, 1915, 1936, 1950, 1977, 1986, 1996

The Gas Age. Toluol Recovery Operation in Greater New York, (vol. XLIII), pp. 175-80, February 15, 1919.

The Gas Age. The Largest Gas Utility Company in the World (vol. XLIII), pp. 335-38, April 15, 1919.

Unidentified Article obtained from Con Edison Property Records during records investigation conducted on April 6, 2002.

United States Geological Survey, Bedrock and Engineering Geologic Maps of Bronx County and Parts of New York and Queens Counties, New York (U.S.G.S. Maps I-2003), Charles A. Baskerville, 1992.

United States Geological Survey 7.5 Minute Topographic Map, Central Park , NY –NJ Quadrangle, dated 1966, photorevised 1979.