2.2 NEARBY INDUSTRIAL, TRANSPORTATION AND MILITARY FACILITIES

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Item in Section 2.2:

> A COL applicant that references the U.S. EPR design certification will provide site-specific information related to the identification of potential hazards stemming from nearby industrial, transportation, and military facilities within the site vicinity, including an evaluation of potential accidents (such as explosions, toxic chemicals, and fires).

This COL Item is addressed as follows:

{This section also establishes whether the effects of potential accidents in the vicinity of the Nine Mile Point 3 Nuclear Power Plant (NMP3NPP) site from present and projected industrial, transportation, and military installations and operations should be used as design basis events for plant design parameters related to the selected accidents.

Significant facilities and activities within 5 mi (8 km) and major airports within 10 mi (16 km) of the NMP3NPP site were identified. These facilities and activities, and significant facilities at greater distances, were evaluated in accordance with Regulatory Guide 1.206 (NRC, 2007b), Regulatory Guide 1.91 (NRC, 1978a), Regulatory Guide 4.7 (NRC, 1998), and relevant sections of both 10 CFR Part 100 (CFR, 2007d) and 10 CFR Part 50 (CFR, 2007b).

2.2.1 LOCATION AND ROUTES

The investigation of potential external hazard facilities and operations within 5 mi (8 km) of the NMP3NPP site identified seven significant industrial facilities; one helipad; and two natural gas pipelines for further evaluation. Nine Mile Point (NMP) Unit 1 and Unit 2, and its associated on-site chemical storage facilities were identified as an internal hazard for further evaluation. An evaluation of major transportation routes within the vicinity of the NMP3NPP site identified: one railroad; two state and five county highways with commercial traffic; and a navigable waterway for further evaluation.

Figure 2.2-1 is a site vicinity map that shows the location of the following facilities and transportation routes within 5 mi (8 km) of the NMP3NPP site:

- James A. FitzPatrick Nuclear Power Plant (JAFNPP)
- Independence Station (operated by Sithe/Independence Power Partners, L.P.)
- Novelis Corporation (formerly Alcan Inc.)
- Oswego Wire
- Great Lakes Veneer
- Northland Filter
- NMP Unit 1 and Unit 2
- NMP Unit 2 Helipad

- National Grid Natural Gas Pipelines
- CSXT Railroad
- State Route 104
- State Route 104B
- County Route 1
- County Route 1A
- County Route 29
- County Route 51
- County Route 63

An evaluation of nearby facilities and transportation routes between 5 and 10 mi (8 and 16 km) of the NMP3NPP site identified five natural gas pipelines; one airport; three state routes with commercial traffic; and one international harbor. These nearby facilities, transportation and risk and habor are:

- Natural Grid Gas Pipelines
- Kingdom Field Airport
- State Route 481
- State Route 3
- Oswego Harbor
- NMP Unit 2 Helipad
- Kingdom Field Airport

Figure 2.2-2 illustrates the following identified airports and airway routes within 10 miles (16km) of the NMP3NPP site.

There are no identified facilities, routes, or activities greater than 10 mi (16 km) from the NMP3NPP site that represent hazards of sufficient significance to be included for further evaluation.

2.2.2 DESCRIPTIONS

Descriptions of the industrial, transportation, and military facilities located in the vicinity of the NMP3NPP site are provided in this section. The facilities described include those facilities identified in Section 2.2.1 that could represent potential hazards for the NMP3NPP site.

Section 2.2.2.1 through 2.2.2.8 are added as a supplement to the U.S. EPR FSAR.

2.2.2.1 Description of Facilities

In accordance with 10 CFR 50.34 (CFR, 2007c) and Regulatory Guide 1.206 (NRC, 2007b), seven facilities were identified for review: NMP Unit 1 and Unit 2, JAFNPP, Independence Station (operated by Sithe/Independence Power Partners, L.P.), and Novelis Corporation (formerly Alcan Inc.), Oswego Wire, Great Lakes Veneer, and Northland Filter.

Table 2.2-1 provides a concise description of these facilities, including the primary functions and major products, as well as the number of persons employed (Operation Oswego County, 2007). A more detailed description is provided in Section 2.2.2.2.1 through Section 2.2.2.2.7.

2.2.2.2 Description of Products and Materials

A more detailed description of each of these facilities, including a description of the products and materials regularly manufactured stored, used, or transported is provided in the subsequent sections. The chemiclas identifited for possible analysis and their locations associated with NMP Unit 1 and Unit 2 are presented in Table 2.2-2 and Table 2.2-6. The analysis of these chemicals is addressed in Section 2.2.3, and the disposition of hazards associated with these chemicals is summarized in Table 2.2-5 and Table 2.2-6.

2.2.2.2.1 NMP Unit 1 and Unit 2

The corner of the existing NMP Unit 2 reactor building is located approximately 1,826 feet (557 m) north and 1,566 feet (477 m) east of the NMP3NPP reactor building. NMP Unit 1and Unit 2 are both boiling water reactors (BWRs) licensed by the NRC. NMP Unit 1 has a generating capacity of 565 MWe and has been in commercial operation since 1969. NMP Unit 2 has a generating capacity of 1,120 MWe and has been in commercial operation since 1988 (NRC, 2008b) (NRC, 2008c). The chemicals identified for possible analysis and their locations associated with NMP Unit 1 and Unit 2 are presented in Table 2.2-2.

2.2.2.2.2 James A. FitzPatrick Nuclear Power Plant

The James A. FitzPatrick Nuclear Power Plant (JAFNPP) is located approximately 0.9 mi (1.4 km) east of the Nine Mile Point Nuclear Station (NMPNS) site. JAFNPP is a boiling water reactor (BWR) licensed by the NRC. The unit has a generating capacity of 813 MWe and has been in commercial operation since 1974. (NRC, 2008a)The chemicals identified for possible analysis and their locations associated with the JAFNPP are presented in Table 2.2-6.

2.2.2.2.3 Independence Station (operated by Sithe/Independence Power Partners, L.P.)

The Independence Station (operated by Sithe/Independence Power Partners, L.P.) cogeneration facility is located approximately 2.1 mi (3.4 km) southwest of the NMP3NPP site. The station consists of four combined cycle units that burn natural gas, with a combined net generating capacity of 1,064 MW. The station has been in commercial operation since 1994 (Dynegy, 2008). The chemicals identified for possible analysis, their locations, and disposition of hazards associated with these chemicals, associated with the Independence Station are presented in Table 2.2-6.

2.2.2.2.4 Novelis Corporation (formerly Alcan Inc.)

The Novelis (formerly Alcan Inc.) facility is located approximately 2.4 mi (3.9 km) southwest of the NMP3NPP site. The activities at this site include aluminum scrap remelting, ingot casting, and hot and cold aluminum rolling (Novelis, 2008).The chemicals identified for possible analysis, and their locations, and disposition of hazards associated with these chemicals, associated with the Novelis are presented in Table 2.2-2.

2.2.2.2.5 Oswego Wire

The Oswego Wire facility is located approximately 3.6 mi (5.79 km) southwest of the NMP3NPP site. Oswego Wire produces bare and tinned copper wire and electroplated, hot dipped and nickel plated copper wire. It also produces copper coated steel and cadmium copper along with other specialty items (Oswego Wire, 2008). The chemicals identified for possible analysis, and their locations, and disposition of hazards associated with these chemicals, associated with the Novelis Corporation are presented in Table 2.2-6.

2.2.2.2.6 Great Lakes Veneer

The Great Lakes Veneer facility is located approximately 4.0 mi(6.64 km) southwest of the NMP3NPP site. Great Lakes Veneer manufactures hardwood lumber and is a broker of slicer and rotary logs (Great Lakes Veneer, 2008). The chemicals identified for possible analysis, and their locations, and disposition of hazards associated with these chemicals, associated with Great Lakes Veneer are presented in Table 2.2-6

2.2.2.2.7 Northland Filter

The Northland Filter facility is located approximately 4.2 mi(6.67 km) southwest of NMPNS site. Northland Filter designs and manufactures air filters and filtration equipment (Northland Filter, 2008). The chemicals identifited for possible analysis, and their locations, and disposition of hazards associated with these chemicals, associated with Northland Filter are presented in Table 2.2-6.

2.2.2.3 Pipelines

Two natural gas distribution pipelines operated by National Grid are located within 5 mi (8 km) of the NMP3NPP site as depicted in Figure 2.2-1. More detailed information about these two pipelines, including size, age, operating pressure, depth of burial, and isolation valve type and location descriptions, is included in Table 2.2-11.

The two natural gas pipelines operated by National Grid are located south and southwest, respectively, of the NMP3NPP site. The pipelines run parallel until approximately 4.5 mi (7.2 km) southwest of NMP3NPP, and then the pipelines diverge to serve two separate locations. One pipeline, Pipeline 58, travels west and then north to Indeck Energy's Indeck-Oswego Energy Center combined cycle plant, which is located 4.8 mi (7.8 km) southwest of NMP3NPP. The other pipeline, Pipeline 63, travels north and then east to the Independence Station. The National Grid Pipeline 63 is the closest pipeline to the NMP3NPP site and is located approximately 2.2 mi (3.5 km) southwest of the NMP3NPP site at the nearest approach. The National Grid pipelines within the vicinity of NMP3NPP carry natural gas and are not expected to carry a different product in the future.

There are five remaining pipelines containing natural gas within 10 miles but outside the 5 miles. They are all operated by National Grid and are not expected to carry a different product in the future. More detailed information about these two pipelines, including size, age, operating pressure, depth of burial, and isolation valve type and location descriptions, is included in Table 2.2-11.

2.2.2.4 Description of Waterways

NMP3NPP will be located about 1,290 ft (393 m) from the south bank of Lake Ontario and approximately 6.0 mi (9.7 km) east of the Oswego River at the nearest approach. Both Lake Ontario and the Oswego River are home to many marinas and facilities along their shores. Oswego Harbor is a facility located at the intersection of the two navigable waterways which may contribute to the transportation of potentially hazardous cargo within the vicinity of the NMP3NPP site. Oswego Harbor is located on the south bank of Lake Ontario, approximately 5.9 mi (9.5 km) west of the NMP3NPP site. More detailed information about the transportation of potentially hazardous materials as a result of this port is presented in the following section.

Lake Ontario covers approximately 4.7 million acres (1.9 million hectares) and is bordered by New York and the Province of Ontario, Canada. The depth of the lake ranges from 21 to 27 feet at the harbor entrance; the entrance is approximately 750 feet wide (USACOE, 2008a) (USACOE, 2008b) (Oswego County, 2006).

The harbor connects the Oswego River to Lake Ontario. The river is 23.7 mi (38.1 km) long and 14 ft (4 m) deep. The river stretches from Lake Ontario to Three Rivers Point near Three Rivers Junction, NY. In 1828, the Oswego Canal was built alongside the river; the canal eventually became part of the New York State Canal System, which includes the Erie Canal. Originally seven locks were constructed as part of the canal, with the lock located nearest to the NMP3NPP site, Lock 8, approximately 6.2 mi (10.0 km) southwest of the site. Only one lock remains intact. The canal is no longer used for transportation of barges and personal watercrafts are the only crafts that typically use the canal (Oswego County, 2006).

Navigable waterways are represented by the U.S. Army Corps of Engineers as those waters with a depth greater than the 47 ft (14.3 m) contour (USACE, 2006). Applying this definition, the NMP3NPP intake structure will be within 71 ft (22 m) of a navigable waterway. The intake structure for NMP3NPP will be situated in an area that is set back from the shoreline north of the NMP3NPP power block. The intake structure will be approximately 112 ft (34.1 m) long by 206 ft (62.8 m) wide structure with a dredged earthen bottom at approximate elevation 222 ft 5 in MSL (67.8 m msl) with vertical walls extending to approximate elevation 302 ft MSL (92 m msl).

2.2.2.4.1 Oswego Harbor

The Oswego Harbor consists of 280 acres of outer harbor and 3,000 feet of Federal Channel in the Oswego River (USACE, 2008a). The nearest passage of commercial vessels to NMP3NPP occurs when navigating on Lake Ontario to and from the Oswego Harbor. Cargo data specific to Lake Ontario is not available; however, data for the Oswego Harbor is published by the U.S. Army Corps of Engineers (USACE, 2008b). It is unknown what fraction of cargo is transported past the NMP3NPP site.

There were a total of 633,000 tons (574,000 MT) of commodities recorded for vessels to and from the Oswego Harbor during 2006. These commodities included: residual fuel oil (123,000 tons (112,000 MT)); asphalt, tar, and pitch (18,000 tons (16,000 MT)); petroleum coke (98,000 tons (89,000 MT)); crude materials, inedible, except fuels (29,000 tons (26,000 MT); cement and concrete manufactured goods (336,000 tons (305,000 MT)); aluminum manufactured goods (14,000 tons (13,000 MT)); fabricated metal products manufactured goods (9,000 tons (8,000 MT)); and manufactured equipment, machinery and products (5,000 tons (4,500 MT)).
Table 2.2-3 details the total quantities of materials identified as potential hazards transported on freight traffic, inbound and outbound, for the Oswego Harbor (USACE, 2008b).

2.2.2.5 Highways

Lake Road (or County Route 1A) runs immediately south of the site and is used as the only entrance to the site. Lake Road turns into County Route 1 southwest of the site, and connects to State Route 104 via several roads, including County Route 63 directly and Lakeview Road indirectly. Other major roads within five miles of the site are State Route 104B and County Routes 29 and 51. Three state routes including 48, 481, and 3 are between 5 miles and 10 miles of the site.

The closest approach of State Route 104 is approximately 3.4 mi (5.5 km) to the south. The closest approach of State Route 481 is approximately 3.4 mi (5.5 km) to the south.The closest approach of County Route 63 is approximately 3.8 mi (6.1 km) to the southwest. The closest approach of Lakeview Road is approximately 0.4 mi (0.6 km) to the southwest. The closest approach of State Route 104B is approximately 5.0 mi (8.0 km) to the southeast. The closest approach of County Route 29 is approximately 1.5 mi (2.4 km) to the east. The closest approach of County Route 51 is approximately 3.9 mi (6.3 km) to the southeast. State Route 481 is located approximately 6.2 mi (10.0 km) southwest of the NMP3NPP site. State Route 48 is located approximately 6.0 mi (9.7 km) southwest of the NMP3NPP site. State Route 3 is located approximately 8.6 mi (13.0 km) east of the NMP3NPP site (ESRI, 2008).

Information is not available about the materials transported on the roads in the vicinity of NMP3NPP; therefore, Superfund Amendments and Reauthorization Act (SARA) Title III, Tier II reports for facilities within five miles of NMP3NPP and the results of a survey completed by Sargent & Lundy LLC were reviewed to determine chemicals that may be transported in the vicinity of NMP3NPP. However, when considering the locations of the facilities that may receive shipments of hazardous materials, normal delivery routes would be away from the NMP3NPP site; therefore, no hazardous materials are expected to be transported along Lakeview Road or east of the intersection of Rikers Beach Road and County Route 1A due to the lack of facilities in those areas. Non-plant traffic is not allowed on Lake Road (or County Route 1A) from west of the NMP3NPP site to east of JAFNPP; therefore, no hazardous materials are expected to be transported along Lake Road near the NMP3NPP site.

2.2.2.6 Railroads

One railroad is located approximately 0.48 mi (0.77 km) east of the site at its nearest approach. The CSXT Railroad runs south of the site from Oswego, NY. A spur that turns north of the main line used to serve NMP Unit 1 and Unit 2 and JAFNPP, but have since been abandoned and disabled by paving over the portion of the main railroad tracks that cross Lakeview Road. Although the tracks would be reactivated for construction, the tracks will not resume operation for any of the units after construction is completed. It appears that the railroad is still operational up to Novelis, the railroad appears to be disabled all points east of Novelis up to Pulaski, NY.

2.2.2.7 Aircraft and Airway Hazards

Regulatory Guide 1.70 (NRC, 1978b), Regulatory Guide 1.206 (NRC, 2007b), and NUREG-0800 (NRC, 2007a) require that the risks due to aircraft hazards are sufficiently low. In accordance with Regulatory Guide 1.206 and Regulatory Guide 1.70, one helipad was identified within a 5 mi (8 km) radius of the NMP3NPP site. Additionally, Regulatory Guide 4.7 (NRC, 1998) requires that major airports within 10 mi (16 km) be identified. In the vicinity of the NMP3NPP site, there is one airport (Kingdom Field Airport) located within 5 to 10 mi (8 to 16 km).

More detailed descriptions of the helipad and airport are presented in the subsequent sections, including distance and direction from the site, number and type of aircraft based at the airport, largest type of aircraft likely to land at the airport facility, runway orientation and length, runway composition, and yearly operations where available. Information pertaining to airports located within 10 mi (16 km) of the site is presented in tabular form in Table 2.2-4 (AirNav, 2008) (FAA, 2007). An evaluation of the closest major airports in the region is also presented in this table to ascertain whether these airports are or may be of significance in the future.

2.2.2.7.1 Airports

2.2.2.7.1.1 NMP Unit 2 Helipad

NMP Unit 2 Helipad is owned by Constellation Energy and is located just east of the existing cooling tower on the site. This helipad is privately owned and is located approximately 0.75 mi (1.21 km) east of the NMP3NPP site. The helipad is 48 feet (15 m) long by 48 feet (15 m) wide and has asphalt surface. No aircraft are based at the field. If necessary, NMP3NPP will use this helipad as well. The exact number of operations per year by aircraft type is not available, but it is probable that the helipad was not used from 1998 to 2008. Flying patterns are not available for this helipad. The helipad requires permission to land and use is considered sporadic; therefore, further evaluation is not warranted.

2.2.2.7.1.2 Kingdom Field Airport

Kingdom Field Airport is a privately owned airport for personal use located approximately 7.9 mi (12.7 km) south-southwest of the NMP3NPP site. Runway 17/35, which runs in a north-northwest to south-southeast direction, is 1,650 feet (503 m) long by 70 feet (21 m) wide and is turf. One aircraft is based at the airport, which is a single engine aircraft. The number of operations per year by aircraft type, flying patterns, and future plans are not available for this airport. However, this airport requires permission to land; therefore, use is considered sporadic; therefore, further evaluation is not warranted. (AirNav, 2008)

2.2.2.7.2 Aircraft and Airways

Regulatory Guide 1.70, Regulatory Guide 1.206, and NUREG-0800 indicate that the risks due to aircraft hazards should be sufficiently low. Further, aircraft accidents that could lead to radiological consequences in excess of the exposure guidelines of 10 CFR 50.34(a)(1) with a probability of occurrence greater than 1E-7 per year should be considered in the design of the plant.

NUREG-0800, Section 3.5.1.6 provides a three part acceptance criteria test for concluding the probability of aircraft accidents to be less than 1E-7 per year: (A) meeting (i) plant-to-airport distance and (ii) projected annual number of operations criteria; (B) plant is at least 5 mi (8 km) from military training routes; and (C) plant is at least 2.0 statute mi (3.2 km) beyond the nearest edge of a federal airway.

The nearest public airport is Oswego County Airport, which is located 11.4 mi (18.3 km) from the center of containment for NMP3NPP. The length of longest runway at this airport is about one mile. (AirNav, 2008) The safety-related plant items are well within 0.5 mi (0.8 km) of the containment center. Conservatively, consider a separation distance of 9.9 mi (15.9 km) (calculated by subtracting the length of the longest runway and the buffer around the safety-related plant items from the distance of the airport to the center of containment). At these separation distances, the limit of number of annual operations from proximity criterion (A)(i) of the acceptance criteria section of Section 3.5.1.6 is 49,005 operations per year. As Table 2.2-4 shows, the projected number of annual operations at this airport through 2025 is 20,550 operations (FAA, 2007). The 2025 projected number of annual operations is less than the screening number of 49,005 operations for this airport. For the other public airports in

Table 2.2-4, the separation distance is greater than that for the Oswego County Airport. The screening number of annual operations increases with the distance squared, and the data in the table shows that in terms of best available information (that is, either the 2025 projection of number of annual operations or the latest available number of operations), the separation criteria of Section 3.5.1.6 will be met by all listed public airports in Table 2.2-4.

The NMP3NPP site plans to use the helicopter landing pad of NMP Unit 2. Section 2.2.3.1.7 of the NMP Unit 2 USAR (NMP2, 1998) states that on the basis of an evaluation using the approach described in Section 3.5.1.6 and utilizing the presence of conservatisms in the evaluation, the probability of a helicopter crash causing radiological releases in excess of guidelines of 10 CFR 100 is below 1×10^{-7} per year. This conclusion is expected to remain applicable to NMP3NPP without evaluation because any NMP3NPP air traffic will use the NMP Unit 2 Helipad.

The centerline of the federal airway nearest to NMP3NPP is V483 at 21.4 mi (34.4 km) from the containment center (FAA, 2008). The width of a federal airway is typically 8 nautical mi (14.8 km), with 4 nautical mi (7.4 km) on each side of the centerline. When airway width is considered, the airway does not pass closer than 2 statute mi (3.2 km) from the NMP3NPP center of containment, even when the 0.5 mi (0.8 km) safety buffer is considered. Therefore, the limit of 2 statue miles in proximity criterion (C) in acceptance criteria section of Section 3.5.1.6 is met.

The centerline of the military training route nearest to NMP3NPP is IR801 at 13.6 mi (21.9 km) from the containment center (FAA, 2008). Considering that the width of training route is the same as the width of federal airway (8 nautical mi (14.8 km)), and using the 0.5 mi (0.8 km) safety buffer for distance from the containment center to any safety-related item, the separation from the edge of training route is 7.6 mi (12.2 km). This meets the separation distance limit of 5 statute mi in proximity criteria (B) in the acceptance criteria section of Section 3.5.1.6. Per the proximity criteria (B), the number of operations should not exceed 1,000 per year. Through correspondence with the FAA, the FAA confirmed that the expected number of operations is well below 1,000 operations per year for the military training route and the military operations areas within the vicinity of NMP3NPP.

Due to the level of operations of the nearby airport and helipad and the distance to nearby airways and training routes, the NMP3NPP site passes the three part acceptance criteria test. Therefore, the impact frequency calculation is not necessary for the NMP3NPP site.

2.2.2.8 Projections of Industrial Growth

According to the Oswego County Comprehensive Plan, manufacturing is the foundation of Oswego County, and the plan outlines several strategies to maintain the large manufacturing presence in the county. As of 1995, approximately 1% of Oswego County was zoned as industrial. Most of the industries are focused on the energy and recycling sectors. Other industries in the county include food processing, paper/packaging, metals, and machinery(Oswego County, 1997).

There are several industrial parks within Oswego County, with at least two large parks with room for new development within 5 mi (8 km) of NMP3NPP: the Lake Ontario Industrial Park and the Independence Industrial Park. The Lake Ontario Industrial Park covers approximately 57 acres (23 hectares) and is located approximately 1.8 mi (2.9 km) from the NMP3NPP site. Only one facility is located within the park, Northland Filter, and the majority of the park is not yet developed. The Independence Industrial Park covers approximately 140 acres (57 hectares) and is located approximately 4.0 mi (6.4 km) from the NMP3NPP site. Parcels available for development are located northeast and southeast of the Independence Station. Both industrial parks have access to the CSXT railroad(Operation Oswego County, 2008a) (Operation Oswego County, 2008b).

The county comprehensive plan establishes an objective to "develop and support the development of industrial…employment sites…which are compatible with existing land use patterns." The plan then details a strategy to continue developing the infrastructure and facilities needed to attract business to the Lake Ontario Industrial Park. Another plan strategy is to target industrial development opportunities that can use their water resources(Oswego County, 1997).

While the plan does not specifically state any projections of industrial growth, it can be inferred that the comprehensive plan encourages industrial development, especially where the land is already zoned as industrial. Therefore, a potential exists that more industrial facilities will be constructed at the two existing industrial parks near the NMP3NPP site. However, the plan also acknowledges decreasing industries is a nationwide trend. The comprehensive plan does not indicate any future projections of major military or transportation facilities specifically located within the vicinity of the NMP3NPP site with the exception of the construction of NMP3NPP site (Oswego County, 1997).}

2.2.3 EVALUATION OF POTENTIAL ACCIDENTS

The U.S. EPR FSAR includes the following COL Item in Section 2.3:

> A COL applicant that references the U.S. EPR design certification will provide information concerning site-specific evaluations to determine the consequences that potential accidents at nearby industrial, transportation, and military facilities could have on the site. The information provided by the COL applicant will include specific changes made to the U.S. EPR design to qualify the design of the site against potential external accidents with an unacceptable probability of severe consequences.

This COL Item is addressed as follows:

{On the basis of the information provided in Section 2.2.1 and Section 2.2.2, the potential accidents to be considered as design-basis events and the potential effects of those accidents on the nuclear plant, in terms of design parameters (e.g., overpressure, missile energies) or physical phenomena (e.g., impact, flammable or toxic clouds) were identified in accordance with 10 CFR 20 (CFR, 2007a), 10 CFR 52.79(a)(1)(vi) (CFR, 2007g), 10 CFR 50.34 (CFR, 2007c), 10 CFR 100.20 (CFR, 2007e) 10 CFR 100.21 (CFR, 2007f), Regulatory Guide 1.70 (NRC, 1978b), Regulatory Guide 1.78 (NRC, 2001), Regulatory Guide 1.91 (NRC, 1978a), Regulatory Guide 1.206 (NRC, 2007b), and Regulatory Guide 4.7 (NRC, 1998). The events are discussed in the following sections.

Sections 2.2.3.1 and 2.2.3.2 are added as a supplement to the U.S. EPR FSAR.

2.2.3.1 Determination of Design-Basis Events

Design-basis events internal and external to the nuclear plant are defined as those accidents that have a probability of occurrence on the order of magnitude of 1E-7 per year, or greater, with the potential consequences serious enough to affect the safety of the plant to the extent that the guidelines in 10 CFR Part 100 (CFR, 2007d) could be exceeded. The following accident categories were considered in selecting design-basis events: explosions, flammable vapor clouds (delayed ignition), toxic chemicals, fires, collisions with intake structure, liquid spills, and radiological hazards. The postulated accidents that would result in a chemical release were analyzed at the following locations:

- Nearby transportation routes such as local roads, Oswego Harbor, nearby railroads, and nearby natural gas pipelines
- Nearby chemical and fuel storage facilities (industry facilities in the towns of Oswego and Scriba)
- Adjacent site chemical storage (NMP Unit 1 and Unit 2) and on-site chemical storage

2.2.3.1.1 Explosions

Accidents involving detonations of high explosives, munitions, chemicals, or liquid and gaseous fuels were considered for facilities and activities in the vicinity of the plant or on-site, where such materials are processed, stored, used, or transported in quantity. The effects of explosions are a concern in analyzing structural response to blast pressures. The effects of blast pressure from explosions from nearby railways, highways, navigable waterways, or facilities to critical plant structures were evaluated to determine if the explosion would have an adverse effect on plant operation or would prevent a safe shutdown.

The allowable and actual distances of hazardous chemicals transported or stored were determined in accordance with NRC Regulatory Guide 1.91, Revision 1, Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants (NRC, 1978a). Regulatory Guide 1.91 cites 1 psi (6.9 kPa) as a conservative value of peak positive incident overpressure, below which no significant damage would be expected. Regulatory Guide 1.91 defines this safe distance by the relationship $R \geq kW^{1/3}$ where R is the distance in feet from an exploding charge of W pounds of TNT; and the value k is a constant. The TNT mass equivalent, W, was determined following guidance in Regulatory Guide 1.91(NRC, 1978a), where the equivalent mass of TNT is defined as 240% of the mass of the explosive chemical. For non-hydrocarbons, an equation from the Fire Protection Engineering Handbook (SFPE, 1995) comparing the heats of combustion to TNT was also used to determine the TNT mass equivalent. A second method, also using the idea of TNT equivalence, based equations in NUREG/CR-2462 (NRC, 1983) was also used to determine the allowable distance. The limiting explosive standoff distance between the Regulatory Guide 1.91 method and the NUREG/CR-2462 method is the distance listed below and in Table 2.2-8.

Conservative assumptions were used to determine a safe distance, or minimum separation distance, required for an explosion to have less than 1 psi (6.9 kPa) peak incident pressure. When the heat of combustion method was used, an explosion yield factor of 10 percent was applied. The yield factor is an estimation of the available combustion energy released during the explosion as well as a measure of the explosion confinement (NRC, 2004a). Use of a 10 percent yield is conservative because it is the highest in the range of expected yields based on testing results (SFPE, 1995).:

- For atmospheric liquids (i.e., diesel) the storage vessel was assumed to contain the full volume of fuel vapors. This is conservative because this scenario produces the maximum flammable mass given that it is the fuel vapor, not the liquid fuel that explodes (NRC, 2004a). These assumptions are consistent with those used in Chapter 15 of NUREG-1805 (NRC, 2004a).
- For compressed or (liquefied) gases (i.e., propane, hydrogen), it was conservatively assumed that the entire content of the storage vessel will be between the upper and

lower explosive limits, given that the instantaneous depressurization of the vessel would result in vapor concentrations throughout the explosive range at varying pressures and temperatures that could not be assumed. Therefore, the entire content of the storage vessel was considered as the flammable mass.

The adjacent site and on-site chemicals (Table 2.2-5), nearby facilities chemicals (Table 2.2-6), and hazardous materials potentially transported on roads or railroads (Table 2.2-3 and Table 2.2-7) were evaluated to ascertain which hazardous materials had the potential to explode, thereby requiring further analysis. The effects of selected explosion events are summarized in Table 2.2-8 and in the following sections relative to the release source.

Pipelines

There is one bounding natural gas pipelines in the vicinity of NMP3NPP. This pipeline is operated by National Grid, and is 2.2 miles from NMP3NPP at its closest point. An explosion at the break point of this pipeline would involve a much smaller amount of mass than a delayed ignition vapor cloud explosion. Therefore an explosion at the break point is bounded by the delayed ignition vapor cloud explosion discussed in Section 2.2.3.1.2. It is concluded that damaging overpressures from an explosion from a rupture in the natural gas pipelines would not adversely affect the operations of NMP3NPP.

Waterway Traffic

Lake Ontario is the only waterway within 5 miles of NMP3NPP. Oswego Harbor is more than 5 miles from the NMP3NPP site, and the nearest passage of commercial vessels to NMP3NPP occurs when navigating to and from the City of Oswego harbor. Therefore, no releases or explosions are analyzed for any boats or barges.

Highways

Table 2.2-7 details the hazardous materials potentially transported on nearby roads. The material that was identified for further analysis for explosive potential was gasoline. The maximum quantity of the gasoline assumed to be transported on the roadway was 80,000 pounds (36,287 kg) (CFR, 1998).

Lake Road will be blocked by a security checkpoint, and will no longer be open going near NMP Unit 1 and Unit 2. Therefore there will be no through traffic on this road, and only deliveries will be made. The only chemicals that will be transported on the nearby roads will be those going to or from the nearby facilities.

The instance of gasoline in a truck is bounded by a worst case instance of gasoline assuming the mass of gasoline present at Novelis at JAFNPP (See the Nearby Facilities section below). Therefore, an explosion involving potentially transported hazardous materials on local roads, would not adversely affect operation of NMP3NPP.

On-site Chemicals

NMP3NPP is located in close proximity to the existing NMP Unit 1 and Unit 2, and their associated chemical storage locations. The hazardous materials stored at the NMP Unit 1 and Unit 2 site that were identified for further analysis with regard to explosive potential were hydrogen and diesel.

A conservative analysis using TNT equivalency methods as described in Section 2.2.3.1.1 was used to determine safe distances for the storage of the identified hazardous materials.

The results using this methodology indicate that the minimum separation distances (i.e., safe distances) are less than the shortest distance from any safety-related NMP3NPP structure to the storage location of the identified chemicals. Therefore, an explosion of any of these hazardous materials evaluated would not adversely affect operation of NMP3NPP.

The safe distance for the hydrogen is 0.34 miles; and for diesel is 0.08 miles. The NMP Unit 1 and Unit 2 hydrogen tank is roughly 0.42 miles, and the NMP Unit 1 and Unit 2 diesel storage tank is roughly 0.53 miles from the nearest safety-related structure for NMP3NPP (Table 2.2-8).

Two materials at NMP Unit 1 and Unit 2 were identified for further analysis with regard to an explosive overpressure resulting from a boiling liquid expanding vapor cloud explosion (BLEVE). A rupture of a storage tank of liquid nitrogen or liquid oxygen would cause a large fraction of the mass of gas to flash to vapor, sending an overpressure wave. The safe standoff distance of a BLEVE of the liquid nitrogen tank is 0.22 miles, and for the liquid oxygen tank is 0.11 miles (Table 2.2-8). This is less than the actual distance of 0.38 miles for the nitrogen tank and 0.57 miles for the oxygen tank.

The hazardous materials stored on-site at NMP3NPP that were identified for further analysis with regard to explosive potential were diesel, dimethylamine, gasoline, hydrazine, hydrogen, argon-methane, and Spectrus CT1300.

The safe distance for the diesel is 1626 feet; for the dimethylamine (2% solution) is 290 feet; for the gasoline is 412 feet; for the hydrazine (35% solution) is 805 feet; for the hydrogen tank (48.05 pounds) is 271 feet; for the argon-methane mixture is 164 feet; for the hydrogen cylinder (1.45 pounds) is 78 feet; and for the CT1300 is 322 feet. These chemicals will all be further than these standoff distances from the nearest NMP3NPP safety related building. These results are summarized in Table 2.2-8.

One material at NMP3NPP was identified for further analysis with regard to an explosive overpressure resulting from a boiling liquid expanding vapor cloud explosion (BLEVE). A rupture of a storage tank of liquid nitrogen would cause a large fraction of the mass of nitrogen to flash to vapor, sending an overpressure wave. The safe standoff distance for this BLEVE of the liquid nitrogen tank is 360 feet (Table 2.2-8).

Nearby Facilities

There are two additional off-site facilities that store explosive chemicals that were identified for further analysis. The hazardous materials stored at nearby facilities that were identified for further analysis with regard to explosive potential were: gasoline stored at JAFNPP and at Novelis Corporation, and propane stored at Novelis Corporation.

A conservative analysis using TNT equivalency methods as described in Section 2.2.3.1.1 was used to determine safe distances for the storage of the identified hazardous materials.

The results using this methodology indicate that the minimum separation distances (i.e., safe distances) are less than the shortest distance from any safety-related NMP3NPP structure to the storage location of the identified chemicals. Therefore, an explosion of any of these hazardous materials evaluated would not adversely affect operation of NMP3NPP.

For the chemicals at Novelis Corporation, the safe distance for the mass of propane is 1.78 miles; and for the mass of gasoline is 0.78 miles. For the mass of gasoline at JAFNPP, the safe distance is 0.34 miles. Novelis Corporation is 2.20 miles, and JAFNPP is 0.80 miles from the nearest safety-related structure of NMP3NPP (Table 2.2-8).

Railways

The nearest railroad to the NMP3NPP site is a side rail spur to Novelis Corporation. The only chemicals on this railroad will be those transported to and from Novelis. Therefore all rail chemicals are bounded by the chemicals stored at the Novelis facility.

Therefore, an explosion from any of the hazardous materials transported by railroad that were evaluated would not adversely affect operation of NMP3NPP.

Explosion Related Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 per year. Regulatory Guide 1.91 (NRC, 1978a) cites 1 psi (6.9 kPa) as a conservative value of peak positive incident overpressure, below which no significant damage would be expected. Safety-related NMP3NPP structures are designed to withstand a peak positive overpressure of at least 1 psi without loss of function.

The analyses presented in this section demonstrate that a 1 psi (6.9 kPa) peak positive overpressure will not be exceeded at a safety-related structure for any of the postulated explosion event scenarios. As a result, postulated explosion event scenarios will not result in severe consequences.

2.2.3.1.2 Flammable Vapor Clouds (Delayed Ignition)

Flammable gases in the liquid or gaseous state can form an unconfined vapor cloud that could drift toward the plant before ignition occurs. When a flammable chemical is released into the atmosphere and forms a vapor cloud it disperses as it travels downwind. The parts of the cloud where the concentration is within the flammable range, between the lower and upper flammability limits, may burn if the cloud encounters an ignition source. The speed at which the flame front moves through the cloud determines whether it is a deflagration or a detonation. If the cloud burns fast enough to create a detonation an explosive force is generated.

The potentially on-site chemicals are shown in Table 2.2-5. Hazardous materials potentially transported on nearby roads, railways, or waterways are shown on Table 2.2-3 and Table 2.2-7, and hazardous materials at nearby facilities are shown on Table 2.2-5 and Table 2.2-6. These chemicals were evaluated to ascertain which hazardous materials had the potential to form a flammable vapor cloud or vapor cloud explosion. For those chemicals with an identified flammability range, the Areal Locations of Hazardous Atmospheres (ALOHA) air dispersion model was used to determine the distances where the vapor cloud may exist between the upper flammability limit (UFL) and the lower flammability limit (LFL), presenting the possibility of ignition and potential thermal radiation effects (ALOHA, 2007).

The identified chemicals were also evaluated to determine the possible effects of a flammable vapor cloud explosion. ALOHA was used to model the worst case accidental vapor cloud explosion, including the safe distances and overpressure effects at the nearest safety-related NMP3NPP structure. To model the worst case in ALOHA, ignition by detonation was chosen for the ignition source. The safe distance was measured as the distance from the spill site to the location where the pressure wave is at 1 psi (6.9 kPa) overpressure.

Conservative assumptions were used in both ALOHA analyses with regard to meteorological inputs and identified scenarios. The following meteorological assumptions were used as inputs to the computer model, ALOHA: Pasquill stability class F (stable), with a wind speed of 1 m/sec;

ambient temperature of 25°C; relative humidity 50%; cloud cover 50%; and an atmospheric pressure of 1 atmosphere. Pasquill Stability class F represents the most limiting 5% of meteorological conditions observed at a majority of nuclear plant sites. For each of the identified chemicals, it was conservatively assumed that the entire contents of the vessel leaked forming a 1 cm thick puddle, or that entire contents were released instantaneously as a gas This provides a significant surface area to maximize evaporation and the formation of a vapor cloud in the case of liquid releases, and maximizes the peak concentration in the case of gas releases.

Using ALOHA is conservative, however, should the results not meet the acceptance criteria, additional mitigating factors (plume rise, plume meander, etc.) are considered in the analysis. The Safety Evaluation Report related to the construction of Hartsfield Nuclear Power Plants concluded that "the state of knowledge concerning the chemical reactions of natural gas mixed with air is sufficiently well established to form a basis for the judgment that the detonation of an unconfined natural gas dispersal in air is not a credible event" (NRC, 1976). If it can be shown that the vapor cloud rises to an elevation such that the concentration is below the lower flammable limit at the highest point of the plant structures, the cloud will be completely unconfined, and a vapor cloud detonation will not occur. Also, at that elevation there will be no credible ignition source. In addition, Regulatory Guide 1.145 indicates that meander can be considered in calculating the concentration at a point (NRC, 1982). To determine if the vapor cloud will be below the LEL at all plant structures, a plume buoyancy model and a plume meander model were used.

The analyzed effects of flammable vapor clouds and vapor cloud explosions from internal and external sources are summarized in Table 2.2-9 and are described in the following sections relative to the release source.

Pipelines

National Grid operates a pipeline corridor that passes within the vicinity of the NMP3NPP site. At its closest distance, this pipeline is approximately 2.22 mi (3.57 km) from NMP3NPP.

A limiting pipeline (24" ID, 960 psig natural gas) was analyzed using the methods detailed above including plume buoyancy and meander. The maximum concentration of natural gas at any NMP3NPP structure following a rupture of the National Grid pipeline is 1.59%. This is less than the lower flammable limit for natural gas, 5%. In addition, because the concentrations are below the LEL at all NMP3NPP safety related structures, a delayed flammable vapor cloud ignition can not occur, and therefore there will be no explosive overpressure. The results of flammable vapor cloud ignition analyses are summarized in Table 2.2-9.

Waterway Traffic

Lake Ontario is the only waterway within 5 miles of NMP3NPP. Oswego Harbor is more than 5 miles from the NMP3NPP site, and the nearest passage of commercial vessels to NMP3NPP occurs when navigating to and from the City of Oswego harbor. Therefore, no delayed vapor cloud explosions are analyzed for any boats or barges.

The results of flammable vapor cloud ignition and explosion analyses are summarized in Table 2.2-9.

Highways

Table 2.2-3 and Table 2.2-7 details the hazardous materials potentially transported on nearby roads. The material that was identified for further analysis for explosive potential was gasoline.

The maximum quantity of the gasoline assumed to be transported on the roadway was 80,000 pounds (36,287 kg) (CFR, 1998).

Lake Road will be blocked by a security checkpoint, and will no longer be open going near NMP Unit 1 and Unit 2. Therefore there will be no through traffic on this road, and only deliveries will be made. The only chemicals that will be transported on the nearby roads will be those going to or from the nearby facilities.

The instance of gasoline in a truck is bounded by a worst case instance of gasoline assuming the mass of gasoline present at Novelis and JAFNPP (See the Nearby Facilities section below). Therefore, a delayed vapor cloud ignition explosion involving potentially transported hazardous materials on local roads, would not adversely affect operation of NMP3NPP.

The results of flammable vapor cloud ignition and explosion analyses are summarized in Table 2.2-9.

On-site Chemicals

NMP3NPP is located in close proximity to the existing NMP Unit 1 and Unit 2 and the associated chemical storage locations. The hazardous material stored at the NMP Unit 1 and Unit 2 site that was identified for further analysis with regard to the potential of delayed ignition and explosion of flammable vapor clouds was hydrogen.

As previously described, the ALOHA dispersion model was used to determine the distance a vapor cloud can travel before reaching the LEL boundary (i.e., the point at which a vapor cloud explosion can not happen) once a vapor cloud has formed from release of the identified chemical. The concentration of hydrogen at any NMP3NPP structure is 2.38%. This is less than the lower explosive limit for hydrogen, 4%. In addition, because the concentration is below the LEL, a delayed flammable vapor cloud ignition can not occur, and therefore there will be no explosive overpressure. The results of flammable vapor cloud ignition analyses are summarized in Table 2.2-9.

A vapor cloud explosion analysis was also performed using the methodology previously described to obtain minimum separation distances (i.e., safe distances) for the identified chemicals. The results indicate that the minimum separation distance (i.e., the distance required for an explosion to have less than a 1 psi (6.9 kPa) peak incident pressure) is less than the shortest distance between a safety-related NMP3NPP structure and the storage location of these chemicals.

From above, a flammable vapor cloud ignition or vapor cloud explosion of hydrogen will not occur; therefore flammable vapor cloud ignitions of chemicals stored at NMP Unit 1 and Unit 2 would not adversely affect the safe operation of NMP3NPP.

The hazardous materials on-site that were identified for further analysis with regard to the potential of delayed ignition and explosion of flammable vapor clouds were dimethylamine, gasoline, hydrogen and argon-methane.

The minimum separation distance for the dimethylamine is 291 feet; for the gasoline is 1,323 feet, for the hydrogen tank (48.05 pounds) is 990 feet; for the argon-methane mixture is 258 feet; and for the hydrogen cylinder is (1.45 pounds) is 219 feet.

The results of flammable vapor cloud ignition and explosion analyses are summarized in Table 2.2-9.

Nearby Facilities

There are two additional off-site facilities that store explosive chemicals that are identified for further analysis. The hazardous materials stored at nearby facilities that were identified for further analysis with regard to explosive potential were: gasoline stored at James A. FitzPatrick Nuclear Power Plant (JAFNPP) and at Novelis Corporation, and propane stored at Novelis Corporation. The methodology presented previously was used for determining the safe distance for vapor cloud ignition and delayed vapor cloud explosion.

The minimum separation distance for the bounding mass of gasoline at either location is 0.42 miles. This is less than the distance that both JAFNPP and Novelis Corporation are from any NMP3NPP safety related structure, 0.80 miles and 2.20 miles respectively. The minimum separation distance for the propane is 1.7 miles. This is less than the distance between Novelis Corporation and any NMP3NPP safety related structure, 2.20 miles. Because the minimum separation distance for a delayed vapor cloud explosion is less than the distance from the source to the nearest NMP3NPP safety related structure, the concentration of these chemicals will be less than the LEL at all NMP3NPP safety related structures.

The results of flammable vapor cloud ignition and explosion analyses are summarized in Table 2.2-9.

Railways

The nearest railroad to the NMPNS site is a side rail spur to Novelis Corporation. The only chemicals on this railroad will be those transported to and from Novelis. Therefore all rail chemicals are bounded by the chemicals at Novelis, and all delayed ignition vapor cloud explosions will be bounded by those in the Nearby Facilities section.

The results of flammable vapor cloud ignition and explosion analyses are summarized in Table 2.2-9.

Flammable Vapor Cloud (Delayed Ignition) Related Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 occurrences per year. Regulatory Guide 1.91 (NRC, 1978a) cites 1 psi (6.9 kPa) as a conservative value of peak positive incident overpressure, below which no significant damage would be expected. Safety-related NMP3NPP structures are designed to withstand a peak positive overpressure of at least 1 psi without loss of function.

The analyses presented in this section demonstrate that a 1 psi (6.9 kPa) peak positive overpressure will not be exceeded at a safety-related structure for any of the postulated flammable vapor cloud, delayed ignition event scenarios.

2.2.3.1.3 Toxic Chemicals

Accidents involving the release of toxic chemicals from on-site storage facilities and nearby mobile and stationary sources were considered. Toxic chemicals known to be present on site or in the vicinity of the NMP3NPP site, or to be frequently transported in the vicinity were evaluated. NRC Regulatory Guide 1.78, Revision 1, Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release (NRC, 2001), requires evaluation of control room habitability after a postulated external release of hazardous chemicals from mobile or stationary sources, off-site or on-site.

The potential adjacent site or on-site chemicals are identified in Table 2.2-5, hazardous materials potentially transported on nearby roads, railroads, or waterways are identified in Table 2.2-3 and Table 2.2-7. Hazardous materials at nearby facilities are identified in Table 2.2-6. These chemicals were evaluated to ascertain which hazardous materials were analyzed with respect to their potential to form a toxic vapor cloud after an accidental release.

The first screening of hazardous chemiclas follows an equation from Regulatory Guide 1.78 (NRC, 2001). This equation uses the toxicity limit of the chemical, the control room conditions, the weather conditions, and the storage distance to determine a maximum allowable mass of the chemical. If this mass is greater than the actual mass then the chemical is screened out as not posing a hazardous threat to the main control room (MCR) operators. Those chemicals that do not meet this mass limit are further analyzed below.

The ALOHA model was used to determine the maximum distance various postulated vapor clouds would travel before they dispersed enough to fall below the associated National Institute of Occupational Safety and Health (NIOSH) defined Immediately Dangerous to Life and Health (IDLH) threshold values. The ALOHA model was also used to predict the post-release chemical concentrations in the control room to ensure that under a worst case scenario event the control room operators will have sufficient time to take appropriate action.

The IDLH is defined by the NIOSH as a situation that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment. The IDLHs determined by NIOSH are established such that workers are able to escape such an environment without suffering permanent health damage.

Meteorological assumptions were used to determine chemical concentrations: Pasquill stability class F (stable), with a wind speed of 1 m/sec; ambient temperature of 25°C; relative humidity of 50%; cloud cover, 50%; and an atmospheric pressure of 1 atmosphere. For sources that are described using the ALOHA model, a control room air exchange rate of 0.3 air changes per hour was used. This air exchange rate was calculated from the control room volume and the rate of air intake. U.S. EPR FSAR Section 9.4.1 provides a description of the Control Room HVAC System. Under normal operation, outside air is brought in through two air intakes in order to maintain the control room envelope at a positive pressure. The control room envelope has a volume of approximately 200,000 ft^3 and the flow rate of outside air through the two air intakes is as much as 1000 cfm (total). Using this information results in an effective air change rate (based on outside air) of:

$$(1000\text{ cfm} * 60) / 200{,}000\text{ ft}^3 = 0.3\text{ air changes per hour} \qquad \text{Eq. 2.2.3-1}$$

In addition, Regulatory Guide 1.78 states that if the toxic gas can be detected within two minutes of reaching the IDLH, the MCR operators will have enough time to don a respirator (NRC, 2001).

The effects of toxic chemical releases from internal and external sources are summarized in Table 2.2-10 and are described in the following sections relative to the release source.

<u>Pipelines</u>

National Grid operates a pipeline corridor that passes within the vicinity of the NMP3NPP site. At its closest distance, this pipeline passes within approximately 2.22 mi (3.57 km) of NMP3NPP. The 24" National Grid pipeline carries natural gas.

From NUREG/CR-6624, for explosive chemicals, where the IDLH is not otherwise specified, the IDLH should be taken as 10% of the lower explosive limit (NRC, 1999). Because of this, 5,000 ppm is used as the IDLH for natural gas. Natural gas concentrations were determined at the control room following the rupture in the National Grid pipeline. The maximum concentration of natural gas in the main control room following the release was calculated to be greater than 1,000 ppm. However, more than two minutes will elapse between the time when the concentration of natural gas in the main control room reaches the odor threshold (20 ppm for odorized natural gas) and the time when the concentration reaches the IDLH. Because of this, the main control room operators will have the expected two minutes to don a respirator.

The identified chemicals had analyzed consequences that were below the guidance provided in 10 CFR Part 100. Therefore, toxic vapor clouds resulting from ruptures of nearby pipelines will not adversely affect the safe operation of NMP3NPP. The effects of toxic chemical releases are summarized in Table 2.2-10.

Waterway Traffic

Lake Ontario is the only waterway within 5 miles of NMP3NPP. Oswego Harbor is more than 5 miles from the NMP3NPP site, and the nearest passage of commercial vessels to NMP3NPP occurs when navigating to and from the City of Oswego harbor. Therefore, no toxic chemical releases are analyzed for any boats or barges.

Highways

Lake Road will be blocked by a security checkpoint, and will no longer be open going near the NMP Unit 1 and Unit 2. Therefore there will be no through traffic on this road, and only deliveries will be made. The only chemicals that will be transported on the nearby roads will be those going to or from the nearby facilities.

There are no hazardous materials potentially transported roads near NMP3NPP that were identified for further analysis with regard to the potential of forming a toxic vapor cloud after an accidental release. All toxic chemicals are those that are delivered to or from the nearby facilities, and are bounded by these instances. Therefore, toxic vapor clouds resulting from chemical spills on nearby roads will not adversely affect the safe operation of NMP3NPP. The effects of toxic chemical releases are summarized in Table 2.2-10.

On-Site Chemicals Storage

The hazardous material stored at NMP Unit 1 and Unit 2 that was identified for further analysis with regard to the potential for the formation of toxic vapor clouds after an accidental release is sodium bisulfite. It was conservatively assumed that the maximum mass of sulfur and oxygen in the sodium bisulfite disassociated instantaneously into sulfur dioxide. Sulfur dioxide is used because it is more hazardous, and because sodium bisulfite dissociates into sulfur dioxide at standard pressures and temperatures. The largest tank of sodium bisulfite contains 54,000 pounds of sodium bisulfite.

As described in Section 2.2.3.1.3, the identified hazardous material was analyzed utilizing the ALOHA dispersion model to determine whether the formed vapor cloud will reach the control room intake and what the concentration of the toxic chemical will be in the main control room after an accidental release.

Sulfur dioxide gas concentrations were determined at the control room after a release of the largest vessel. The maximum concentration of sulfur dioxide in the main control room following the release was calculated to be 62.6 ppm. This is less than the IDLH for sulfur dioxide, 100 ppm. Therefore, toxic vapor clouds resulting from chemical spills of adjacent site chemicals will not adversely affect the safe operation of NMP3NPP.

The hazardous on-site chemicals that were identified for further analysis with regard to toxicity are ammonium hydroxide, dimethylamine, gasoline, hydrazine, hydrogen, liquid nitrogen, argon, argon-methane mixture, nitrogen gas, oxygen, Depositrol BL5323, and sodium bisulfite. These chemicals were analyzed in ALOHA in order to determine the minimum safe distance. The minimum distance is safe if: a) the concentration will not be greater than the IDLH, or b) more than two minutes will elapse between the time when the concentration in the MCR reaches the odor threshold and when the concentration reaches the IDLH.

The minimum safe distance from the MCR air intakes for the dimethylamine is 33 feet; for the gasoline is 343 feet; for the hydrogen tank (48.05 pounds) is 173 feet; for the liquid nitrogen is 375 feet, for the argon-methane mixture is 33 feet; for the hydrogen cylinder (1.45 pounds) is 33 feet; for the nitrogen gas is 33 feet; for the oxygen is 33 feet; and for the sodium bisulfite is 479 feet. The Depositrol BL5323 is bounded by gasoline, and the standoff distance is therefore 343 feet. Each of these chemicals will always be further from the MCR air intakes than these standoff distances.

Spectrus CT1300 is an additional chemical that is potentially toxic if used in sufficient quantities. The Spectrus CT1300 can be used for zebra mussel removal as long as one of the two following conditions is met. First, the CT1300 that is used can be brought in containers smaller than 20 pounds, or second, during the entire time that CT1300 is on-site from delivery to application, station personnel dealing with the CT1300 will be in direct contact with the MCR operators such that the MCR HVAC system can be isolated if a spill occurs.

The hydrazine and ammonium hydroxide will be stored greater than 4,500 feet from the main control room air intakes. At this distance, the peak MCR concentration of hydrazine is 0.327 ppm and the peak concentration at the intakes is 1.96 ppm. The ammonium hydroxide tank will have a 20 foot diameter berm around it. At this distance and with the berm, the peak concentration of ammonia in the MCR is 10.6 ppm and the peak concentration at the intakes is 71.4 ppm.

The effects of toxic chemical releases are summarized in Table 2.2-10.

Nearby Facilities

The only chemical stored at a nearby facility that was identified for further analysis with regard to the potential for the formation of toxic vapor clouds after an accidental release is resin that is stored at James A. FitzPatrick Nuclear Power Plant (JAFNPP). The primary toxic chemical in the resin is styrene; therefore it was assumed that the entire mass of resin was styrene. The amount of resin was listed as being less than 1,000,000 pounds at the JAFNPP.

The identified hazardous material was analyzed utilizing the ALOHA dispersion model to determine whether the formed vapor cloud will reach the control room intake and what the concentration of the toxic chemical will be in the main control room after an accidental release.

Styrene concentrations were determined at the control room after a release of the largest vessel. The maximum concentration of styrene in the main control room following the release was calculated to be 80.3 ppm. This is less than the IDLH for styrene, 700 ppm. Therefore, toxic vapor clouds resulting from spills of chemicals at nearby facilities will not adversely affect the safe operation of NMP3NPP. The effects of toxic chemical releases are summarized in Table 2.2-10.

Railways

The nearest railroad to the NMP3NPP site is a side rail spur to Novelis Corporation. The only chemicals on this railroad will be those transported to and from Novelis. Therefore all rail chemicals are bounded by the chemicals at Novelis, and all toxic vapor clouds will be bounded by those in the Nearby Facilities section.

Toxic vapor clouds resulting from spills of chemicals that are transported by railways in the vicinity of NMP3NPP will not adversely affect the safe operation of NMP3NPP. The effects of toxic chemical releases are summarized in Table 2.2-10.

Toxic Chemical Related Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 per year. The analyses presented in this section demonstrate that toxic chemical concentrations that could present an immediate hazard to plant personnel will not result from postulated chemical releases. For natural gas, it was demonstrated that the main control room operators will have more than two minutes to don a respirator, meeting the acceptance criteria from Regulatory Guide 1.78 (NRC, 2001).

2.2.3.1.4 Fires

Accidents leading to high heat fluxes or smoke, and non-flammable gas or chemical bearing clouds from the release of materials, as the consequence of fires in the vicinity of the plant were considered. Fires in adjacent industrial plants and storage facilities, oil and gas pipelines, brush and forest fires, and fires from transportation accidents were evaluated as events that could lead to high heat fluxes or to the formation of such clouds.

The chemical releases that were analyzed for potentially leading to high heat fluxes at NMP3NPP safety related buildings were: a hydrogen tank boiling liquid expanding vapor explosion (BLEVE) on the NMPNS site, a gasoline pool fire due to a spill at James A. FitzPatrick Nuclear Power Plant (JAFNPP) and at Novelis Corporation, a propane tank BLEVE from a tank at Novelis, and the jet fire caused by the rupturing of the National Grid natural gas pipeline.

Of these instances, the highest heat flux into a NMP3NPP safety related building is 2.63 kW/m^2 resulting from the hydrogen tank BLEVE, however the fireball will fully burn in 7 seconds, so the total heat transfer to the building is limited. The jet fire from the 24" National Grid pipeline will have a radiative heat flux of 0.0289 kW/m^2 and will continue until the pipeline is isolated. The rest of the chemical fires are bounded either in terms of time or intensity by these two instances.

According to the National Fire Protection Association (NFPA) Standard 1144, Standard for Reducing Structure Ignition Hazards from Wildland Fire, a defensible space is an area that is typically defined as having a width of at least 30 ft (9.14 m) between an improved property and a potential wildland fire where combustible materials and vegetation have been removed to reduce the potential for fire on improved property spreading to wildland fuels or to provide a safe working area for fire fighters protecting life and improved property from wildland fire. A minimum distance for fuel modification should be 30 ft (9 m) from structures. Studies of structural ignition from radiant heat indicate that ignitions are unlikely to occur from burning vegetation beyond 120 ft (36.6 m) from a structure. Therefore, clearing of vegetation and thinning of trees to a distance of 120 ft (36.6 m) from a dwelling, as in a zoned Firewise landscape, will prevent ignition of a structure from the radiant heat from a flame front in a high-risk ecosystem. (NFPA, 2008)

The NMP3NPP site will be sufficiently cleared of brush, forest, woodland prior to construction and operation. However, the stand of trees located between the NMP3NPP site and the Ontario Bible Camp located approximately 1,550 ft (472 m) to the west of NMP3NPP will remain intact. These cleared zones are of sufficient size to afford substantial protection in the event of a fire, and it is not expected that there would be any hazardous effects from fires or heat fluxes associated with wild fires, fires in adjacent industrial plants or from on-site storage facilities.

Fire Related Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 occurrences per year. The use of cleared fuel breaks around safety-related NMP3NPP structures will ensure that external fire related impacts will not have severe consequences.

2.2.3.1.5 Collisions with Intake Structure

Because NMP3NPP is located on a navigable lake, an evaluation was performed which considered the probability and potential effects of impact on the plant cooling water intake tunnels, intake structure and enclosed pumps. The U.S. EPR system design contains a circulating water system/auxiliary cooling water system, and an Essential Service Water System. Makeup water for the Circulating Water System is supplied from Lake Ontario via pumps. Makeup water for the Circulating Water System/ auxiliary cooling water system is pumped through a common header from the intake structure to the cooling tower basins.

The Essential service water is used for normal operations, refueling, shutdown/cool down, anticipated operational events, design basis events, and severe accidents. Makeup water to the Essential Service Water System is normally supplied from the Raw Water Supply System. Under post-accident conditions, lasting longer than 72 hours, makeup water is supplied from the Ultimate Heat Sink (UHS) makeup water system. The UHS makeup pumps are housed in the Makeup Water Intake Structure. The forebay of the UHS Makeup Water Intake Structure is safety related and is shared with the Circulating Water System and the Raw Water Supply System. The non-safety related intake structure houses the circulating water system makeup pumps and the raw water supply system pumps.

The NMP3NPP intake structure is situated in an area with a grade elevation of 270.0 ft (82.3 m) that is set back approximately 60 ft (18 m) from the Lake Ontario shoreline, and located southwest of the intake structures for NMP Unit 1 and Unit 2. The intake structure is approximately 112 ft (34 m) long, by 206ft (63 m) wide, with the top of the concrete base mat at elevation 225 ft and 5 in (68.7 m), which is 18 ft and 7 in (5.6 m) below the top of rock elevation of 244.0 ft (74.4 m). Therefore, the NMP3NPP intake structure is well protected from a collision with lake vessels.

The forebay for the intake structure is supplied with lake water from two 15 ft (5 m) diameter underground safety-related intake tunnels: tunnel A and tunnel B. Tunnel A extends approximately 1,167 ft (356 m) from the intake structure to the underwater intake grating, and 1,583 ft (482 m) from the intake structure to the underwater blowdown discharge diffusers. Tunnel B extends approximately 1,275 ft (389 m) from the intake structure to the underwater intake grating. Tunnel B does not contain a blowdown line.

The horizontal sections of both tunnels A and B are buried below the 220.0 ft (67.1 m) local lake bed elevation, with the tops of the intake gratings of both tunnels at elevation 229.5 ft (70.0 m). This is 14.5 ft (4.4 m) below the Lake Ontario minimum controlled lake level during navigation season, of 244.0 ft (73.2 m). The tunnel A blowdown discharge diffuser extends approximately 4 ft (1 m) above the local lake bed elevation of 204.0 ft (62.3 m).

The intake gratings for tunnels A and B are separated from each other by a lateral distance of approximately 368 ft (112 m).

Intake Structure Collision Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 occurrences per year. The location of the NMP3NPP intake structure is set back far enough from the Lake Ontario shoreline to minimize the possibility of damage due to collision with large vessels. In addition, it is founded on rock, and is large enough to minimize damage due to collisions with smaller, high-speed craft. Oswego Harbor is located approximately 5.9 mi (9.5 km) southwest of NMP3NPP. This port is the easternmost port on Lake Ontario, and deep draft commercial ships are not expected to travel near the vicinity of the intakes. Only small boats and barges may pass close to the vicinity of the safety-related intake. Commercial barges have maximum drafts in the range of 11 ft (3 m) to 14 ft (4 m). The safety-related ultimate heat sink makeup water intake grating is 14.5 ft (4.4 m) below the Lake Ontario minimum controlled water level during navigation season, so the potential for damage to the intake tunnel gratings due to collisions with vessels is minimal. Therefore, severe consequences will not result from vessel impacts with the NMP3NPP intake structure and the associated intake tunnels.

2.2.3.1.6 Liquid Spills

The accidental release of oil or liquids that may be corrosive, cryogenic, or coagulant were considered to determine if the potential exists for such liquids to be drawn into the plant's intake structure and circulating water system or otherwise affect the plant's safe operation. The NMP3NPP Ultimate Heat Sink (UHS) makeup pumps, Raw Water Supply System (RWSS) pumps, and Circulating Water System (CWS) makeup pumps draw water through intake tunnels from submerged concrete structures at approximate elevation 220 ft msl (67 m msl) in Lake Ontario. Present at the forebay of the intake structure is a curtain wall that prevents any floating pollutants, such as petroleum products, from reaching the intake pumps suction.

In assessing the chemicals that are transported on Lake Ontario which may spill into the waterway, other than asphalt, each of the chemical liquids have a specific gravity of less than one, meaning they will float on the surface of the Lake Ontario water. Therefore, these liquids if spilled would not only be diluted by the large quantity of Lake Ontario water, but would float on the surface and consequently would not likely be drawn into the intake system.

In the unlikely event of an asphalt spill into Lake Ontario, the asphalt would solidify in the intake system and would collect in the trench at the end of the intake tunnels. Any asphalt that reached the intake structure would be removed by the bar grating or traveling screen in the intake structure system.

Liquid Spill Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 occurrences per year. In the case of liquid spills, the location of the NMP3NPP intake structure is well protected. With the exception of asphalt, the identified chemicals would either be sufficiently diluted before reaching the safety-related NMP3NPP UHS makeup intake structure or would not reach the intake structure. Asphalt would be collected in a trench at the end of the intake tunnels or removed by the traveling screens on the intake structure if required. In each case, there would be no significant damage to the safety-related NMP3NPP UHS makeup intake structure. As a result, liquid spills will not result in severe consequences.

2.2.3.1.7 Radiological Hazards

The release of radioactive material from NMP Unit 1 and Unit 2 and the James A. FitzPatrick Nuclear Plant (JAFNPP) as a result of normal operations or an unanticipated event would not threaten the safety of the plant or personnel at NMP3NPP. The control room habitability system for the U.S. EPR provides the capability to detect and protect main control room personnel from external fire, smoke, and airborne radioactivity. In addition, safety-related structures, systems, and components for the U.S. EPR have been designed to withstand the effects of radiological events and the consequential releases that would bound the contamination from a release from either of these potential sources.

Radiological Hazard Impacts Affecting the U.S. EPR Design

The U.S. EPR design is acceptable for any site when reasonable qualitative arguments can demonstrate that the realistic probability of severe consequences from any external accident is less than 1E-6 occurrences per year. In the case of radiological hazards, the control room habitability system for the U.S. EPR provides the capability to detect and protect main control room personnel from external fire, smoke, and airborne radioactivity. In addition, safety-related structures, systems, and components for the U.S. EPR have been designed to withstand the effects of radiological events and the consequential releases that would bound the contamination from a release from either of these potential sources. As a result, radiological hazards will not result in severe consequences.

2.2.3.2 Effects of Design-Basis Events

As concluded in the previous sections, there are no events that require further analysis for consideration as a design-basis for the NMP3NPP site.}

2.2.4 REFERENCES

{**Airnav, 2008.** Airnav.com, Website: http://www.airnav.com/airports/, Date accessed: March 2008.

ALOHA, 2007. Areal Locations of Hazardous Atmospheres (ALOHA) Version 5.4.1, NOAA, February 2007, Website: http://www.epa.gov/ceppo/cameo/aloha.htm.

CFR, 1970. Tank Car Capacity and Gross Weight Limitation, Title 49, Code of Federal Regulations, Part 179.13, 1970.

CFR, 1998. Truck Size and Weight, Route Designations - Length, Width and Weight Limitations, Title 23, Code of Federal Regulations, Part 658.17, 1998.

CFR, 2007a. Standards for Protection Against Radiation, Title 10, Code of Federal Regulations, Part 20, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007b. Domestic Licensing of Production and Utilization Facilities, Title 10, Code of Federal Regulations, Part 50, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007c. Contents of Applications; Technical Information, Title 10, Code of Federal Regulations, Part 50.34, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007d. Reactor Site Criteria, Title 10, Code of Federal Regulations, Part 100, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007e. Factors to be Considered when Evaluating Sites, Title 10, Code of Federal Regulations, Part 100.20, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007f. Non-seismic Site Criteria, Title 10, Code of Federal Regulations, Part 100.21, U. S. Nuclear Regulatory Commission, 2007.

CFR, 2007g. Contents of Applications; Technical Information in Final Safety Analysis Report, Title 10, Code of Federal Regulations, Part 52.79, U. S. Nuclear Regulatory Commission, 2007.

Dynegy, 2008. Power Generation Facilities, Dynegy, 2008, Website: http://www.dynegy.com/about_dynegy/power_generation_facilities.asp, Date accessed: May 2008.

ESRI, 2008. ArcView, version 9.2, November 2006, Dates accessed: May and June 2008.

FAA, 2007. FAA Terminal Area Forecast: National Forecast 2007 - Airport Operations, Federal Aviation Administration, Website: http://aspm.faa.gov/main/taf.asp, Date accessed: May 2008.

FAA, 2008. New York Sectional and Terminal Aeronautical Chart East, Federal Aviation Administration, National Aeronautical Charting Office, May 2008.

FMIC, 2005. Guidelines for Evaluating the Effects of Vapor Cloud Explosions Using a TNT Equivalency Method, Factory Mutual Insurance Company, May 2005.

Military, 2008. Millitary.com Installation Guide, Website: http://benefits.military.com/misc/installations/Browse_Location.jsp, Date accessed: February 2008.

NFPA, 2008. Standard 1144, Standard for Reducing Structure Ignition Hazards from Wildland Fire, National Fire Protection Association, 2008.

NMP2, 1998. NMP2 USAR, Constellation Energy, 1998

Novelis, 2008. Locations, Novelis, Inc., 2008, Website: http://www.novelis.com/Internet/en-US/AboutUs/Locations.htm, Date accessed: May 2008.

NRC, 1976. Safety Evaluation Report Related to Construction of Hartsfield Nuclear Plants Units A1, A2, B1 and B2, NUREG-0014, U.S. Nuclear Regulatory Commission, April 1976.

NRC, 1978a. Evaluations of Explosions Postulated To Occur on Transportation Routes Near Nuclear Power Plants, Regulatory Guide 1.91, Revision 1, U. S. Nuclear Regulatory Commission, February, 1978.

NRC, 1978b. Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, Regulatory Guide 1.70, Revision 3, U. S. Nuclear Regulatory Commission, November, 1978.

NRC, 1982. Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants, Regulatory Guide 1.145, U.S. Nuclear Regulatory Commission, November 1982.

NRC, 1983. Capacity of Nuclear Power Plant Structures to Resist Blast Loadings, Nuclear Regulatory Commission, 1983.

NRC, 1998. General Site Suitability Criteria for Nuclear Power Stations, Regulatory Guide 4.7, Revision 2, U. S. Nuclear Regulatory Commission, April, 1998.

NRC, 1999. Recommendations for Revision of Regulatory Guide 1.78, NUREG/CR-6624, U.S. Nuclear Regulatory Commission, November, 1999.

NRC, 2001. Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release, Regulatory Guide 1.78, Revision 1, U. S. Nuclear Regulatory Commission, December, 2001.

NRC, 2004a. Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program, NUREG-1805, U. S. Nuclear Regulatory Commission, December 2004.

NRC, 2007a. Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, NUREG-0800, U. S. Nuclear Regulatory Commission, March 2007.

NRC, 2007b. Combined License Applications for Nuclear Power Plants, Regulatory Guide 1.206, Revision 0, U. S. Nuclear Regulatory Commission, April, 2007.

NRC, 2008a. FitzPatrick, U.S. Nuclear Regulatory Commission, February 14, 2008, Website: http://www.nrc.gov/info-finder/reactor/fitz.html, Date accessed: May 2008.

NRC, 2008b. Nine Mile Point 1, U.S. Nuclear Regulatory Commission, February 14, 2008, Website: http://www.nrc.gov/info-finder/reactor/nmp1.html, Date accessed: May 2008.

NRC, 2008c. Nine Mile Point 2, U.S. Nuclear Regulatory Commission, February 14, 2008, Website: http://www.nrc.gov/info-finder/reactor/nmp2.html, Date accessed: May 2008.

Operation Oswego County, 2007. 2007 Oswego County Industrial Directory, Operation Oswego County, Website: www.oswegocounty.org/pdfs/2007%20Industrial%20Directory.pdf, Date accessed: May 2008.

Operation Oswego County, 2008a. Independence Industrial Park, Operation Oswego County, Website: http://www.oswegocounty.org/pdfs/Independence%20Ind%20Park.pdf, Date accessed: May 2008.

Operation Oswego County, 2008b. Lake Ontario Industrial Park, Operation Oswego County, Website: http://www.oswegocounty.org/pdfs/Lake%20Ontario%20Ind%20Park.pdf, Date accessed: May 2008.

Oswego County, 1997. Oswego County Comprehensive Plan, Oswego County, 1997 Website: http://www.co.oswego.ny.us/pdf/compplan.pdf, Date accessed: May 2008.

Oswego County, 2006. Canalling the Oswego River, Oswego County, December 2006, Website: http://www.visitoswegocounty.com/Files/Brochures/Canalling.pdf, Date accessed: May 2008.

SFPE, 1995. The SFPE Handbook of Fire Protection Engineering, National Fire Protection Association and the Society of Fire Protection Engineers, 1995.

USACE, 2006. National Waterway Network (line), U.S. Army Corps of Engineers, Navigation Data Center, 2006.

USACE, 2008a. Oswego Harbor, NY, U.S. Army Corps of Engineers, Great Lakes Navigation System, 2008.

USACE, 2008b. Waterborne Commerce of the United States, Calendar Year 2006, Part 3-Waterways and Harbors Great Lakes, IWR-WCUS-06-3, U.S. Army Corps of Engineers, Institute for Water Resources, 2008.}

Table 2.2-1—{Description of Facilities, Products, and Materials}

Site	Concise Description	Primary Function	Number of persons employed	Major Products or Materials
Nine Mile Point (NMP) Unit 1 an Unit 2	NMP Unit 1 and Unit 2 are a 565 MWe General Electric Type 2 and a 1,120 MWe General Electric Type 5, respectively, boiling pressurized water reactors licensed by the Nuclear Regulatory Commission.	Nuclear Power Generator	1,000	Electrical Power
James A. FitzPatrick Nuclear Power Plant (JAFNPP)	The JAFNPP unit is an 813 MWe General Electric Type 4 boiling pressurized water reactor licensed by the Nuclear Regulatory Commission.	Nuclear Power Generator	700	Electrical Power
Independence Station (operated by Sithe/Independence Power Partners, L.P.)	A 1,064 MW natural gas-fired cogeneration plant.	Energy Generator	45	Electrical Power
Novelis Corporation (formerly Alcan Inc.)	Manufacturer of rolled aluminum.	Manufacturing	690	Aluminum
Oswego Wire	Manufacturer of copper wire.	Manufacturing	220	Copper
Great Lakes Veneer	Brokers of slicer and roatry veneer logs and manufacturers of hardwood lumber.	Manufacturing	61	Hardwoods
Northland Filter	Manufacturer of industrial air filters.	Manufacturing	17	Air Filters

Table 2.2-2—{Nine Mile Point Unit 1 and Unit 2 Chemical Storage}

Material	Toxicity Limit (IDLH) ppm	Largest Container Amount	Location
NMP Unit 1 and Unit 2			
Carbon Dioxide	40,000	<100,000 lbs	Turbine Bldgs
Diesel Fuel	not toxic threat	<10,000,000 lbs	Turbine, Control & Screenwell Bldgs, Diesel Fuel Storage Tanks
Hydrogen	4,000	<10,000 lbs	Turbine & Reactor Bldgs, Hydrogen / Oxygen Storage Area
Nitrogen, Liquid	69,200	<1,000,000 lbs	Reactor, & Screenwell Bldgs
Oxygen, Liquid	683,700	<100,000 lbs	Hydrogen / Oxygen Storage Area
Sodium Bisulfite Solution	100	54,000 lbs	U2 Screenwell Bldg
Sodium Hypochlorite	10	<100,000 lbs	Screenwell Bldgs
Sodium Hypochlorite	10	<100,000 lbs	Chemical Injection Bldg
NMP3NPP			
Ammonium Hydroxide (28% solution)	300	12000 gal (32,000 l)	Potential On-site Chemical at NMP3NPP
Diesel Fuel	not toxic threat	125,000 gal (4.7E5 l)	Potential On-site Chemical at NMP3NPP
Dimethylamine (2% solution)	500	350 gal (1300 l)	Potential On-site Chemical at NMP3NPP
Gasoline	500	4,000 gal (15,000 l)	Potential On-site Chemical at NMP3NPP
Hydrazine (35% solution)	50	350 gal (1300 l)	Potential On-site Chemical at NMP3NPP
Hydrogen Tank	4,000	51.1 cu ft at 2450 psig, -20 to 200F	Potential On-site Chemical at NMP3NPP
Liquid Nitrogen	69,200	11,300 gal (42,800 l) sat liquid at -250 F	Potential On-site Chemical at NMP3NPP
Sodium Hypochlorite	10	12,000 gal (38,600 l)	Potential On-site Chemical at NMP3NPP
Argon	69,200	270 scf (7.65 Nm^3) (1)	Potential On-site Chemical at NMP3NPP
Argon-Methane (considered Methane)	5,000	282 scf (7.99 Nm^3) (1)	Potential On-site Chemical at NMP3NPP
Hydrogen Cylinder	4,000	278 scf (7.87 Nm^3) (1)	Potential On-site Chemical at NMP3NPP
Nitrogen Gas	69,200	235 scf (6.65 Nm^3) (1)	Potential On-site Chemical at NMP3NPP
Oxygen	683,700	282 scf (7.99 Nm^3) (1)	Potential On-site Chemical at NMP3NPP
Deposit Control Agent BL5323	-	1,000 gal	Potential On-site Chemical at NMP3NPP
Sodium Bisulfite (38% solution)	100 as SO_2	500 gal	Potential On-site Chemical at NMP3NPP
Spectrus CT1300	-	600 lbs	Potential On-site Chemical at NMP3NPP

Notes:

1 Quantities for compressed gas cylinders are reported at standard temperature and pressure (68°F and 14.7 psia)

IDLH: Immediately Dangerous to Life and Health threshold value.

STEL: Short Term Exposure Limit threshold value. This is more conservative than IDLH.

Table 2.2-3—{Hazardous Chemical Railway, Road, or Waterway Freight}

Material	Toxicity Limit (IDLH) ppm	Transportation Method	Amount lbs (kg)
Gasoline (Note 1)	500 (STEL)	Truck on Roadways	80,0000 (36,290 kg)

Notes:

1 All other chemicals that are transported on nearby railroads or roads are being transported to or from the facility that will use that chemical. Therefore these chemicals are bounded by the instances of the chemical at that facility.

IDLH: Immediately Dangerous to Life and Health threshold value.

STEL: Short Term Exposure Limit threshold value. This is more conservative than IDLH.

Table 2.2-4—{Aircraft Operations - Significance Factors}

Airport	Number of Annual Operations	Distance from NMP3NPP Site	Annual Operations Threshold (Note 1)
NMP Unit 2 Heliport	Sporadic	0.75 mi 1.21 km	281
Kingdom Field Airport	Sporadic	7.9 mi 12.7 km	31,537
Oswego County Airport	20,550 (2006) 20,550 (2025 projected)	11.4 mi 18.3 km	129,844
Syracuse Hancock International Airport	247,243 (2006) 280,470 (2025 projected)	32.0 mi 51.5 km	1,023,859
Watertown International Airport	51,000 (2006) 51,000 (2025 projected)	38.4 mi 61.8 km	1,477,895
Wheeler-Sack AAF Airport	110,000 (2006) 175,000 (2025 projected)	51.0 mi 82.1 km	2,599,909
Greater Rochester International Airport	280,973 (2006) 338,418 (2025 projected)	68.7 mi 110.6 km	4,721,710

Notes

1 Per NUREG-0800 (NRC, 2007a), Section 3.5.1.6, if the plant-to-airport distance (D) is between 5 and 10 statute mi, then the annual operations threshold is calculated by $500 \times D^2$ or if the plant-to-airport distance (D) is greater than 10 statute mi, then the annual operations threshold is calculated by $1000 \times D^2$.

Table 2.2-5—{Chemical Disposition}
(Page 1 of 2)

Material	Toxicity Limit (IDLH) ppm	Flammability/ Explosive Limits	Explosion Hazard?	Disposition
NMP Unit 1 and Unit 2				
Carbon Dioxide	40,000	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Diesel Fuel	not toxic threat (Note 1)	0.7%-6%	Confined (Note 2)	Explosion Analysis
Hydrogen	4,000	4%-75%	Vapor/confined (Note 2)	Flammability Analysis/ Explosion Analyses
Nitrogen, Liquid	69,200	Not Flammable	BLEVE Analysis	Meets Reg. Guide 1.78 Limit
Oxygen, Liquid	683,700	Not Flammable	BLEVE Analysis	Meets Reg. Guide 1.78 Limit
Sodium bisulfite solution	100	Not Flammable	No	Toxicity Analysis
Sodium Hypochlorite (Screenwell Bldgs)	10	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Sodium Hypochlorite (Chemical Injection Bldg)	10	Not Flammable	No	Meets Reg. Guide 1.78 Limit
NMP3NPP				
Ammonium Hydroxide (28% solution)	300	Not Flammable	No	Flammability Analysis Explosion Analysis Toxicity Analysis
Diesel Fuel	not toxic threat (Note 1)	0.7%-6%	Confined (Note 2)	Explosion Analysis
Dimethylamine (2% solution)	500	2.8%-14.4%	Vapor/Confined (Note 2)	Flammability Analysis Explosion Analysis Toxicity Analysis
Gasoline	500	1.4%-7.6%	Vapor/Confined (Note 2)	Flammability Analysis Explosion Analysis Toxicity Analysis
Hydrazine (35% solution)	50	9.3%-83.4%	Confined (Note 2)	Toxicity/ Explosion Analysis
Hydrogen Tank	4,000	4%-75%	Vapor/Confined (Note 2)	Flammability Analysis Explosion Analysis Toxicity Analysis
Liquid Nitrogen	69,200	Not Flammable	No	Toxicity/BLEVE Explosion Analysis
Sodium Hypochlorite	10 as Cl_2	Not Applicable	No	Toxicity Analysis
Argon	69,200	Not Flammable	No	Toxicity Analysis
Argon-Methane (considered Methane)	5,000	4.4%-16.5%	Vapor/Confined (Note 2)	Flammability Analysis Explosion Analysis Toxicity Analysis
Hydrogen Cylinder	4,000	4%-75%	Vapor/Confined (Note 2)	Flammability Analysis Explosion Analysis Toxicity Analysis
Nitrogen Gas	69,200	Not Flammable	No	Toxicity Analysis
Oxygen	683,700	Not Flammable	No	Toxicity Analysis

Table 2.2-5—{Chemical Disposition}
(Page 2 of 2)

Material	Toxicity Limit (IDLH) ppm	Flammability/ Explosive Limits	Explosion Hazard?	Disposition
Deposit Control Agent BL5323	-	Not Flammable	No	Toxicity Analysis
Sodium Bisulfite (38% solution)	100 as SO_2	Not Flammable	No	Toxicity Analysis
Spectrus CT1300	-	As Ethanol	Analyze	Flammability Analysis Explosion Analysis Toxicity Analysis

Notes:

1 Chemicals with vapor pressures less than 10 mm Hg at 100 °F are not considered toxic or delayed vapor explosion hazards. The chemical will not enter the atmosphere fast enough to reach high enough concentrations to effect people or lead to delayed explosions.

2 There are two types of explosion analyses: stationary confined explosions and delayed ignition vapor cloud explosions. The diesel is only analyzed for a stationary confined explosion, while hydrogen is analyzed for both types of explosion.

Table 2.2-6—{Hazardous Material, Nearby Facilities, Disposition}
(Page 1 of 2)

Material	Amount	Bounding Location	Toxicity Limit (IDLH)	Flammable/ Explosive Limits	Explosion Hazard?	Disposition (Note 1)
James A. FitzPatrick						
Carbon Dioxide	<100,000 lbs	0.95 mi (1.53 km)	40,000 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Gasoline	<10,000 lbs	0.95 mi (1.53 km)	500 ppm STEL	1.4%-7.6%	Analyze (Note 2)	Flammability Analysis Explosion Analysis Toxicity Meets Reg. Guide 1.78 Limit
Hydrogen	<10,000 lbs)	0.95 mi (1.53 km)	4,000 ppm	4%-75%	Bounded	Meets Reg. Guide 1.78 Limit
Nitrogen	<100,000 lbs	0.95 mi (1.53 km)	69,200 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Oxygen	<100,000 lbs	0.95 mi (1.53 km)	683,700 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Sodium Hypochlorite	2,142 lbs	0.95 mi (1.53 km)	30 mg/m^3	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Styrene (in Resin)	<1,000,000 lbs	0.95 mi (1.53km)	700 ppm	1.1%-6.1%	Bounded	Toxicity Analysis
Independence						
Ammonium Hydroxide	87,282 lbs	2.1 mi (3.38 km)	300 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Nalco 356	9,900 lbs	2.1 mi (3.38 km)	10 ppm	1.5%-9.4%	Bounded	Meets Reg. Guide 1.78 Limit
Sodium Hypochlorite	3,856 lbs	2.1 mi (3.38 km)	30 mg/m^3	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Novelis						
Propane	<1,000,000 lbs	2.3 mi (3.70 km)	2,100 ppm	2%-9.5%	Analyze (Note 2)	Flammability Analysis Explosion Analysis Toxicity Meets Reg. Guide 1.78 Limit
Argon	<100,000 lbs	2.3 mi (3.70 km)	69,200 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Chlorine	<10,000 lbs	2.3 mi (3.70 km)	30 mg/m^3	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Gasoline	<100,000 lbs	2.3 mi (3.70 km)	500 ppm STEL	1.4%-7.6%	Analyze (Note 2)	Flammability Analysis Explosion Analysis ToxicityAnalysis
Oswego Wire						
Relubro Scum Buster (Ethylene Glycol Butyl Ether)	<10,000 lbs	3.6 mi (5.79 km)	700 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Nitric Acid	<10,000 lbs	3.6 mi (5.79 km)	25 ppm	not Flammable	No	Meets Reg. Guide 1.78 Limit
WA-33 CPD (Ethylene Glycol Butyl Ether)	<10,000 lbs	3.6 mi (5.79 km)	700 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit

Table 2.2-6—{Hazardous Material, Nearby Facilities, Disposition}
(Page 2 of 2)

Material	Amount	Bounding Location	Toxicity Limit (IDLH)	Flammable/ Explosive Limits	Explosion Hazard?	Disposition (Note 1)
Great Lakes Veneer						
Sodium Bisulfite	72 gallons	4.0 mi (6.44 km)	100 ppm	Not Flammable	No	Meets Reg. Guide 1.78 Limit
Northland Filter						
DC13071 Silaprene Adhesive	55 gallons	4.2 mi (6.76 km)	50 mg/m^3	Not Flammable	No	Meets Reg. Guide 1.78 Limit

Notes:

1 Chemicals with vapor pressures less than 10 mm Hg at 100 °F are not considered toxic or delayed vapor explosion hazards. The chemical will not enter the atmosphere fast enough to reach high enough concentrations to effect people or lead to delayed explosions.

2 There are two types of explosion analyses: stationary confined explosions and delayed ignition vapor cloud explosions. Gasoline and propane are analyzed for both types of explosion.

Table 2.2-7—{Hazardous Material, Transported Chemicals, Disposition}

Material	Transportation Route	Toxicity Limit ppm	Flammability	Explosion Hazard?	Disposition
Gasoline (Note 1)	Truck on Roads	500 STEL	1.4%-7.6%	Bounded (Note 2)	Bounded (Note 2)

Notes:

1 All other chemicals that are transported on nearby railroads or roads are being transported to or from the facility that will use that chemical. Therefore these chemicals are bounded by the instances of the chemical at that facility.

2 The instance of a gasoline truck is bounded by the gasoline instance using the bounding instance of gasoline from the nearby facilities: the mass of gasoline at Novelis and the distance to James A. FitzPatrick Nuclear Power Plant (Table 2.2-6).

Table 2.2-8—{Explosion Event Analysis}

Pollutant Evaluated	Quantity	Distance to a NMP3NPP Safety Related Structure	Distance to 1 psid Peak Overpressure
Nine Mile Point Unit 1 and Unit 2			
Hydrogen	10,000 lbs	0.42 miles	0.34 miles (Note 2)
Diesel	2,500 gallon	0.53 miles	0.08 miles(Note 1)
Oxygen BLEVE	100,000 lbs	0.57 miles	0.11 miles
Nitrogen BLEVE	1,000,000 lbs	0.38 miles	0.22 miles
James A. FitzPatrick Nuclear Power Plant			
Gasoline	10,000 lbs	0.80 miles	0.34 miles(Note 1)
Novelis			
Gasoline	100,000 lbs	2.20 miles	0.78 miles(Note 1)
Propane	1,000,000 lbs	2.20 miles	1.78 miles(Note 2)
NMP3NPP			
Diesel Fuel	125,000 gallons	Note 3	1626 ft (Note 1)
Dimethylamine (2% solution)	58 lbs	Note 3	290 ft (Note 4)
Gasoline	4,000 gallons	Note 3	412 ft(Note 1)
Hydrazine (35% Solution)	1,019 lbs	Note 3	805 ft (Note 4)
Hydrogen	48.05 lbs	Note 3	271 ft (Note 2)
Argon-Methane (considered Methane)	11.8 lbs	Note 3	164 ft(Note 2)
Hydrogen	1.45 lbs	Note 3	78 ft (Note 2)
Liquid Nitrogen	11,300 gallons	Note 3	360 ft (Note 2)
SpectrusCT1300 (as Ethanol)	600 lbs	Note 3	322 ft (Note 2)

Notes:

1 For atmospheric liquids, the storage vessel was assumed to contain 100% chemical vapor at atmospheric pressure.
2 For compressed or liquefied gasses, the entire content of the storage vessel was conservatively assumed as the explosive mass.
3 The storage distance for on-site chemicals will be selected such that each chemical is further from any safety related building than the standoff distance in this table.
4 For some chemicals in an aqueous solution, the entire mass of the chemical in solution was used as the explosive mass.

Table 2.2-9—{Flammable Vapor Cloud Events (Delayed Ignition) and Vapor Cloud Explosion Analysis}

Pollutant Evaluated	Quantity (lbs)	Distance to a NMP3NPP Safety Related Structure	Distance to 1 psid Peak Overpressure	Maximum Pollutant Concentration at NMP3NPP Structures (Note 3)
Nine Mile Point Unit 1 and Unit 2				
Hydrogen	10,000	0.42 miles	Note 3	2.38%
James A. FitzPatrick Nuclear Power Plant				
Gasoline	10,000	0.80 miles	0.42 miles	-
Novelis				
Gasoline	100,000	2.20 miles	0.42 miles	-
Propane	1,000,000	2.20 miles	1.7 miles	-
National Grid 24” Pipeline				
Natural Gas/ Methane	Pipeline	2.07 miles	Note 3	1.59%
NMP3NPP				
Dimethylamine (2% solution)	58	Note 4	291 feet	-
Gasoline	18,647	Note 4	1323 feet	-
Hydrogen	48.05	Note 4	990 feet	-
Argon-Methane (considered Methane)	11.8	Note 4	258 feet	-
Hydrogen	1.45	Note 4	219 feet	-

Notes:

1. For atmospheric liquids, the storage vessel was assumed to contain 100% chemical vapor at atmospheric pressure.
2. For compressed or liquefied gassed, the entire content of the storage vessel was conservatively assumed as the explosive mass.
3. For lighter than air gasses such as hydrogen and natural gas, if it could be shown that the chemical plume would rise high enough such that the concentration of the chemical at NMP3NPP will always be below the LEL, then it is assumed that a vapor cloud explosion can not occur. There would be no ignition source, and detonation of an unconfined vapor cloud will not occur.
4. The storage distance for on-site chemicals will be selected such that each chemical is further from any safety related building than the standoff distance in this table.

Table 2.2-10—{Toxic Vapor Cloud Analysis}

Pollutant Evaluated	Quantity (lbs)	Distance to the NMP3NPP MCR Air Intakes	Peak Concentration at the Air Intakes ppm	Peak MCR Concentration ppm
Nine Mile Point Unit 1 & Unit 2				
Sodium Bisulfite	54,000	3,050 ft	2,420	62.6
James A FitzPatrick Nuclear Power Plant				
Styrene (in Resin)	1,000,000	4,816 ft	2,740	80.3
National Grid 24" Pipeline				
Natural Gas/ Methane	Pipeline	11,521 ft	>30,000	>1,000 (Note 1)
NMP3NPP				
Ammonium Hydroxide (28% solution)	8,500 (gallons of Solution)	>4,500 ft (Note 2)	71.4	>10.6
Dimethylamine (2% solution)	58	>33 ft (Note 2)	80,800	381
Gasoline	18,647	>343 ft (Note 2)	82,000	500
Hydrazine (35% solution)	1,019	>4,500 ft (Note 2)	1.96	>0.327
Hydrogen Tank	48.05	>173 ft (Note 2)	803,000	4,000
Liquid Nitrogen	53,181	>375 ft (Note 2)	Note 3	69,000
Argon	28	>33 ft (Note 2)	<69,200	<69,200
Argon-Methane (considered Methane)	11.8	>33 ft (Note 2)	669,000	3,300
Hydrogen Cylinder	1.45	>33 ft (Note 2)	659,000	3,250
Nitrogen Gas	17.1	>33 ft (Note 2)	557,000	2,740
Oxygen	23.4	>33 ft (Note 2)	<683,700	<683,700
Deposit Control Agent BL5323	1,000 (gallons of Solution)	>343 ft (Note 2)	See Section 2.2.3.1.3	See Section 2.2.3.1.3
Sodium Bisulfite	2,102	>479 ft (Note 2)	11,600	100
Spectrus CT1300	600	See Section 2.2.3.1.3	See Section 2.2.3.1.3	See Section 2.2.3.1.3

Notes:

1. More than two minutes elapse between the time when the chemical concentration reaches the odor threshold and the IDLH. Therefore a trained MCR operator will have enough time to don a respirator, per Regulatory Guide 1.78.
2. Each of the chemicals on-site at NMP3NPP will be stored at a distance further from the MCR air intakes than the distances in this table. These distances are the minimum allowable: the concentrations listed for each chemical is the maximum given this worst case distance.
3. For the near field effects of large gas releases, ALOHA may report the concentration larger than 1,000,000 ppm.

Table 2.2-11—{Description of Pipelines}

Pipeline	Size (inches)	Fluid Carried	Age (years)	Maximum Allowable Operating Pressure (psi)	Depth of Burial (inches)	Isolation Valves	
						Location	Type
National Grid 63	24	Natural Gas	14	800	36	Approximately every 3.5 miles	Ball
National Grid 58	12	Natural Gas	18	960	36	Approximately every 5 miles	Ball
National Grid 33	10	Natural Gas	54	300	30	Approximately every 7 miles	Plug
National Grid 34	10	Natural Gas	56	300	24	Approximately every 6 miles	Plug
National Grid 39	12	Natural Gas	49	473	30	Approximately every 13 miles	Plug
National Grid 51	12	Natural Gas	41	300	30	Approximately every 6 miles	Plug
National Grid 55	16	Natural Gas	23	300	36	Approximately every 3.25 miles	Plug

Figure 2.2-1—{5 mi (8 km) Site Vicinity Map}

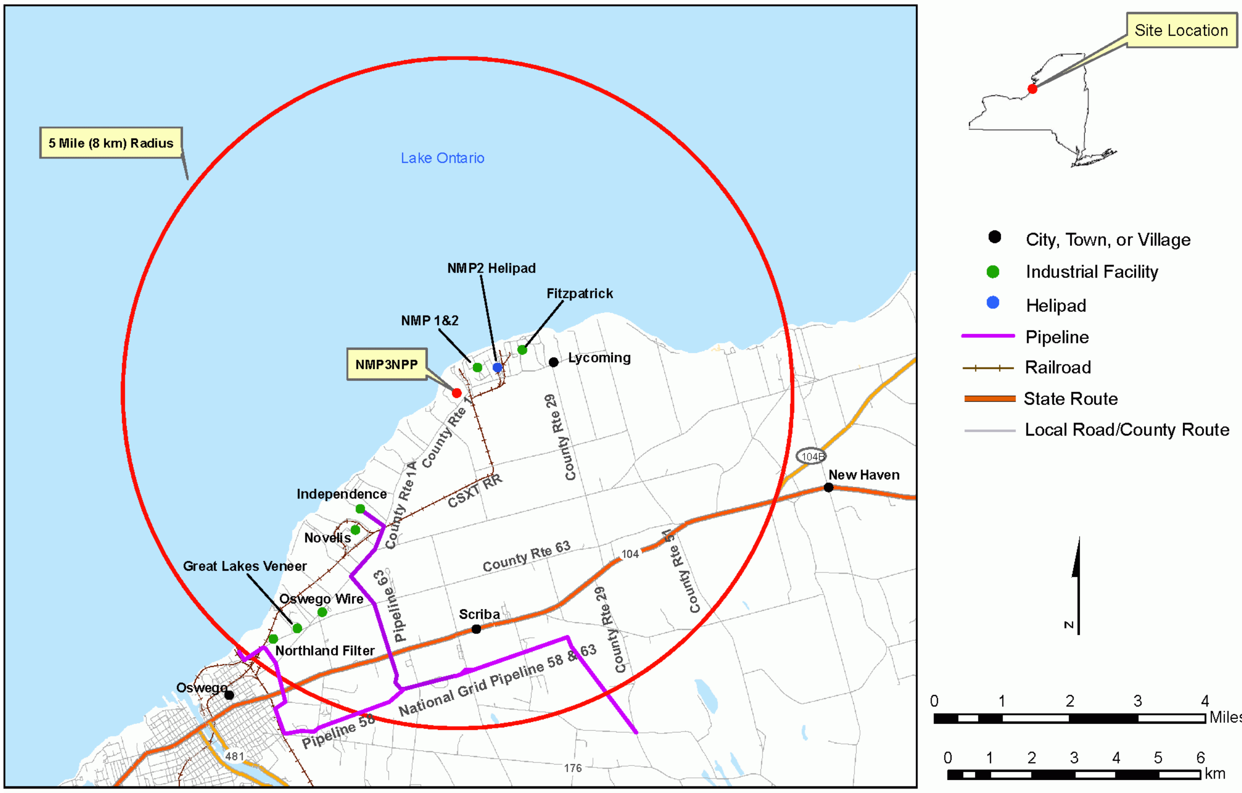

Figure 2.2-2—{Airports and Airway Routes within 10 mi (16 km) of the NMP3NPP Site}