4.0 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

4.1 LAND USE IMPACTS

This section describes the impacts of site preparation and construction to the Nine Mile Point 3 Nuclear Power Plant (NMP3NPP) site and the surrounding area. Section 4.1.1 describes impacts to the site and vicinity. Section 4.1.2 describes impacts that could occur along transmission lines. Section 4.1.3 describes impacts to historic and cultural resources at the site.

4.1.1 THE SITE AND VICINITY

Land use in the vicinty of the NMP3NPP site is presented in Table 2.2-1 and shown on Figure 2.2-1. The land use categories are consistent with USGS land use/cover categories. Land use/cover within the 6 mi (10 km) site vicinity is presented in Table 2.2-2 and shown on Figure 2.2-2. Highways and utility right-of-ways that cross the site and vicinity are shown on Figure 2.2-5 and Figure 2.2-6.

4.1.1.1 The Site

NMP3NPP is located on the Nine Mile Point Nuclear Station (NMPNS) property, which encompasses approximately 900 acres (364 hectares). NMP3NPP and its supporting facilities will be located west of and adjacent to Nine Mile Point (NMP) Unit 1 and Unit 2, which are also located on the NMPNS property. Construction of a new facility will result in alterations of land use, mostly forest and wetland areas. However, some of the area for a new facility within the proposed construction area footprint was previously altered during the construction of the existing units.

The NMPNS acreage was purchased for and used by Constellation Energy for the purpose of generating electricity. The proposed action of the construction and operation of an additional power unit does not alter the site's general use. The NMP3NPP site will conform to all applicable local, state, and federal land use requirements and restrictions as they pertain to the proposed action. The use of the NMP3NPP site conforms with the stated goal of the Oswego County comprehensive plan to concentrate infrastructure and development in employment centers.

The Town of Scriba is currently in the planning process for approving existing land use and zoning ordinances. Through regulation, the federal, state, and county governments attempt to limit potential environmental impacts to coastal areas including the shores of Lake Ontario. The NMP3NPP site would follow all local, state, and federal requirements that pertain to the State of New York's Coastal Zone. These federal-level zoning restrictions require Constellation to comply with Section 307(c)(3)(A) of the Coastal Zone Management Act (16 USC 1456(c)(3)(A)). During construction, site activities are required to be authorized by the agencies and programs listed in Table 1.3-1. There are no recognized Native American Tribal Land use plans that would have jurisdiction over the NMP3NPP site or within the vicinity of the NMP3NPP site that could impact the NMP3NPP site.

There are no Wild and Scenic Rivers on the NMP3NPP site; therefore construction will not affect these resources.

Table 4.1-1 provides an estimate of the land areas that would be disturbed during construction of NMP3NPP and supporting facilities, including on-site transmission facilities and temporary features such as laydown areas, and topsoil stockpiles. The disturbed areas and their present land uses are shown in Figure 4.3-1. Of the approximately 309.1 acres that will be impacted during construction, approximately 224.7 acres (91 hectares) will be permanently dedicated to NMP3NPP and its supporting facilities, and lost to other uses until after decommissioning, and approximately 84.4 acres (34.2 hectares) would be temporarily impacted. Acreage not containing permanent structures would be reclaimed to the maximum extent possible.

As discussed in Section 4.3.1.1, an estimated 207.5 acre (84.0 hectares) of mixed deciduous forest would be lost during construction activities, approximately 52.8 acres (21.4 hectares) of which would be temporary. Additional information is provided on Table 4.3-1.

Section 2.2.1 describes the land areas that are devoted to major uses within the NMP3NPP site boundary and the NMP3NPP site vicinity. These areas are depicted on Figure 2.2-1 and Figure 2.2-2, respectively. In addition, Section 2.2.1 describes the highways and utility right-of-way that cross the NMP3NPP site and vicinity. The footprint for the unit and supporting facilities will be partially located on land and facilities associated with the Energy Information Center, Learning Center, meteorological tower and abandoned recreational fields. These areas are not open to the public; thus, there would be no impact to public recreation areas as the result of the proposed action. Nine Mile Point 3 Nuclear Project, LLC and UniStar Nuclear Operating Services are not aware of any federal action in the area that would have cumulatively significant land use impacts.

Heavy equipment and reactor components would be barged to the Port of Oswego and transported to the NMP3NPP site using either rail or roadways. A new construction delivery road and a new access road, approximately 1.7 mi (2.7 km) long and 1.2 mi (1.9 km) long, respectively, would be constructed from Miner Road to the construction site providing access to the construction areas, minimizing any potential traffic congestion to the existing units.

The new intake and discharge would be located in the 100-year coastal floodplain. With those exceptions, construction activities would be outside the 500 year floodplain in areas designated as areas of minimal flooding.

The proposed location of NMP3NPP and supporting facilities contains 109 acres (44 hectares) of inactive farmland, none of which categorized as prime farmland soils or unique farmland soils. The NMP3NPP site itself is predominantly rangeland and forest land with areas categorized as "developed" in the vicinity of the areas of current NMP Unit 1 and Unit 2 operational facilities. In addition, the only known mineral deposits currently being extracted in Oswego County are sand and gravel as described in Section 2.2.1.2. There are no known economic mineral deposits on the NMP3NPP site.

The proposed construction activities would result in the permanent loss, through filling, of approximately 65.8 acres (26.6 hectares) of non-tidal wetland habitat and approximately 24.9 acres (10.1 hectares) of non-tidal wetland buffer. Section 4.3.1.3 provides a detailed discussion of construction impacts to wetlands.

Construction would also permanently impact 10,000 ft^2 (929 m^2)of Lake Ontario aquatic habitat. Temporary impacts would be limited as no dredging is required. Section 4.3.2.2 provides a detailed discussion of construction impacts within Lake Ontario.

In the event the construction of NMP3NPP is not completed, a Site Redress Plan describing the return of the site to preconstruction conditions will be prepared.

It is concluded that the changes in land use to the NMP3NPP site and vicinity of the NMP3NPP site from construction of the new unit would be SMALL. As noted above, the proposed action does not alter the site's general use, conforms to all applicable local, state, and federal land use requirements and restrictions, the stated goal of the Oswego County comprehensive plan to concentrate infrastructure and development in employment centers .

4.1.1.2 The Vicinity

Land in the vicinity of the NMP3NPP site is rural with development generally occurring in town centers per current Oswego County zoning and planning requirements. Land use within 6 miles (10 km) of the site is predominantly agricultural and rangeland, plus Lake Ontario, as described in Figure 2.2-2 and Table 2.2-2.

The construction activities that would degrade the visual aesthetics of the land would include those activities potentially seen from the new construction access road as well as those seen from Lake Ontario. Because of the unpopulated nature of the area surrounding the proposed site, it is unlikely that construction activities for the proposed facilities could be seen directly from the adjacent highway, with the exception of the activities to build or upgrade the NMPNS site access road. Because a portion of the NMPNS site already contains NMP Unit 1 and Unit 2, visual impacts from the proposed project would be similar to existing site conditions.

Section 4.4.2.4 provides the details on potential population impacts due to construction activities. The majority of the temporary construction workforce would probably live outside of Oswego County and Onondaga County. These workers would commute or find temporary housing in Oswego County or Onondaga County. No other land use changes in the vicinity would likely occur as a result of construction workforce related population changes.

Thus, impacts to land use in the vicinity of NMP3NPP would be SMALL, and not require mitigation.

4.1.2 TRANSMISSION CORRIDORS AND OFF-SITE AREAS

NMP3NPP will not require the addition of any new off-site rights-of-way. As discussed in Section 2.2.2.2, the proposed NMP3NPP construction activities would include the following transmission system changes:

- One new 345 kV switchyard will be built for NMP3NPP site. This switchyard will be connected by a 345kV line from the Clay substation, a 345kV line from the Scriba substation, and a 345 kV line from the NMP Unit 1 switchyard,
- The existing 345 kV line from Clay will be disconnected from NMP Unit 1 and connected to the new NMP3NPP switchyard,
- The new NMP3NPP switchyard will be connected to the NMP Unit 1 switchyard,
- The new NMP3NPP switchyard will be connected to Scriba switchyard by a 345 kV transmission line.

Breaker upgrades and associated modifications would also be required at other substations. An area transmission map is presented in Figure 1.2-5.

No new off-site corridors or widening of existing corridors are required. However, the existing lines will require upgrades. The actions associated with these upgrades will generate heavy truck and equipment traffic for the duration of the upgrade project. Impacts to vegetation within the corridor are likely as a result of the upgrade project. Most of the existing transmission line passes through towns with no zoning ordinances; the exception is Mexico;

The Town of Scriba is in the process of developing land use and zoning ordinances. However, all federal, state, and local regulations and requirements including those that deal with construction impacts, and those regulations pertaining to the Coastal Zone Management Program, which includes the Lake Ontario Coastal Zone Area, would be complied with.

Most of the existing transmission line passes through towns with no zoning ordinances; the exception is Mexico; The Town of Scriba is in the process of developing land use and zoning ordinances. However, all federal, state, and local regulations and requirements including those that deal with construction impacts, and those regulations pertaining to the Coastal Zone Management Program, which includes the Lake Ontario Coastal Zone Area, would be complied with.

There are no Wild and Scenic Rivers near the transmission system site, therefore construction will not affect these resources.

There are no federal actions that would have cumulatively significant land use impacts within the vicinity and region of the NMP3NPP site activity and off-site areas as described in Section 2.8.

Because there are no new off-site transmission corridors, it is concluded that there will be no impacts to the off-site transmission corridor lands associated with the proposed construction of NMP3NPP, with the exception of the impacts to vegetation from the line upgrades as described above. The proposed on-site transmission line connector corridor would be located on land already in use to generate electric power. No new off-site access roads of modifications to existing off-site roads are currently anticipated.

4.1.3 HISTORIC PROPERTIES

Table 2.5-38 lists resources within the archaeological Area of Potential Effect (APE) for the construction of NMP3NPP that have been recommended as potentially eligible for listing on the National Register of Historic Places (NRHP) in the Phase I Archaeological Survey Report. The report has been submitted to the New York State Historic Preservation Office (NY SHPO) at the New York Office of Parks, Recreation and Historic Preservation (OPRHP) for review and concurrence with the eligibility recommendations.

As described in Section 2.5.3, the Phase I Archaeological Survey of the area identified eight historic archaeological sites, four of which are recommended as potentially eligible for inclusion on the NRHP. No prehistoric archaeological sties were identified. A review of available information prior to the Phase I field investigation found no archaeological sites or historic architectural structures that had been previously recorded within the archaeological APE or within the NMPNS site. No historic architectural structures were found within the archaeological APE during the field investigation. Previously recorded archaeological resources and historic architectural structures within 16 km (10 miles) of the proposed site are shown on Tables 2.5-35 and Table 2.5-36, in accordance with NUREG 1555 (NRC, 1999).

Ground disturbing activities would occur to construct the permanent components of NMP3NPP, including the power block, cooling tower, switchyard, and permanent access roads, as well as within the existing transmission line corridor and railroad bed. Construction support areas would be temporarily disturbed, and include laydown, stockpile, and heavy equipment parking areas, the batch plant and temporary access roads. Once construction is completed, these construction support areas would be restored.

The preliminary assessment of adverse effects to the four potentially eligible NRHP resources from project construction activities is as follows. Because there are no standing structures within the construction area for NMP3NPP, there would be no direct physical impacts to historic architectural resources. However, it is likely that the four archaeological sites identified as potentially eligible would be heavily damaged by indirect construction activities and use, thereby resulting in an adverse effect to those resources. Construction activities will be managed to minimize encroachment on any sites potentially found. Appropriate disposition of historical sites that cannot be avoided will be determined in conjunction the New York state SHPO.

A survey to identify historic architectural resources on the NMPNS Site and within the five-mile radial topographic viewshed of the proposed NMP3NPP project will be conducted in late fall, when the leaves are off the trees to maximize visibility (see Section 2.5.3). Those historic architectural structures determined eligible for inclusion on the NRHP and within the topographic viewshed will be assessed for potential visual impacts during the winter of 2009. Construction noise and vibrations could also affect the settings and possibly the integrity of nearby NRHP-eligible structures, if any are identified during the historic architectural survey. No previously recorded NRHP-eligible structures are within or adjacent to the NMPNS site at present.

Consultation with Native American tribes about the NMP3NPP project has been initiated, as described in Section 2.5.3. This consultation could result in changes to the recommended NRHP eligibility of the eight archaeological sites identified within the archaeological APE. No traditional cultural properties were identified on or in the vicinity of the NMP3NPP site by the NY SHPO during a consultation meeting on June 3, 2008 (see Section 2.5.3). Consultations are continuing with the federally-recognized Onondaga Nation, the only tribal nation identified by NY SHPO staff as having interest in the vicinity of the project area, and other tribal nations contacted by UniStar Nuclear Operating Services (see Section 2.5.3).

Phase II archaeological investigations and SHPO consultation would occur on potentially eligible archaeological resources that are located within the proposed project area and cannot be avoided, to gather more information to determine eligibility. Upon completion of Phase II investigations and consultations, assessments of effect on the NRHP-eligible resources on the project site would be determined and consultation conducted with SHPO to identify measures to avoid, minimize, or mitigate any adverse effects, to comply with Section 106 of the National Historic Preservation Act (USC, 2007a).

Construction of the intake and discharge structures for NMP3NPP will disturb limited areas of the lake floor of Lake Ontario on the northwest portion of the NMPNS site. The tunnels will be directionally drilled from shore so no lake bottom should be disturbed along the tunnel route. Disturbance will be limited to the locations of the structures themselves. These areas, including 100-foot radial buffers around each structure, were inspected by divers for shipwrecks, debris fields or manmade features that could be indicative of shipwrecks. None were observed. Due to the high energy environment which has swept the bedrock largely clean of overlying sediments at these locations, there is little potential for buried cultural resources. Therefore, there will be no construction impacts to submerged cultural resources, subject to SHPO concurrence with the findings in Phase I Archaeological Survey Report.

With construction activities, there is always the possibility for inadvertent discovery of previously unknown cultural resources or human remains. Prior to initiation of land disturbing activities, procedures will be developed which include actions to project cultural, historic or paleontological resources or human remains in the vent of a discovery. These procedures will comply with applicable federal and state laws. These laws include the National Historic Preservation Act (USC, 2007a), the Native American Graves Protection and Repatriation Act (CFR, 1995), and the New York State Historic Preservation Office at the New York Office of Parks, Recreation and Historic Preservation's Human Remains Discovery Protocol (OPRHP, 2008).

If the historic archaeological sites identified within the archaeological APE of NMP3NPP cannot be avoided, then Phase II investigations would be conducted to determine eligibility for the NRHP. Upon completion of the Phase II investigations and SHPO consultation, assessment of effect on National Register-eligible resources located in the archaeological APE would be determined.

If historic architectural structures are identified that are determined NRHP-eligible and are within the APEs for potential visual, noise and fugitive dust due to project construction, then the resources will be assessed for those effects, in consultation with the SHPO.

If adverse effects are found, then measures for avoidance, minimization or mitigation would be developed in consultation with the SHPO, to comply with Section 106 of the National Historic Preservation Act (USC, 2007a). Any identified measures would be delineated in a Memorandum of Agreement between NRC, the SHPO, UniStar Nuclear Operating Services, and the Advisory Council on Historic Preservation.

4.1.4 REFERENCES

CFR, 1995. Title 43 Code of Federal Regulations, Part 10, Native American Graves Protection and Repatriation Act, 1995.

NRC, 1999. NUREG 1555, U.S. Nuclear Regulatory Commission, Environmental Standard Review Plan, Chapter 2.5.3 Historic Properties, 1999.

OPRHP, 2008. New York State Office of Parks, Recreation and Historic Preservation. Human Remains Discovery Protocol. 2008

USC, 2007a. Title16, United States Code, Part 470, National Historic Preservation Act, 2007.

USC, 2007b. Title 33, United States Code, Part 1251, Federal Water Pollution Control Act, 2007.

Table 4.1-1—Estimated U.S. EPR Acreage Requirements For NMP3NPP

Construction Area	Construction Acreage (hectares)	Dominant Current Land Use
Power Block	48.1 (19.5)	Forested with wetlands
Switchyard and Connector Transmission Lines	35.3 (14.3)	Forest, old field, and existing development
Cooling Tower	16.6 (6.7)	Forested with wetlands and existing development
Haul Roads and Rail Road	26.8 (10.8)	Forested with wetlands
Access Road	13.0 (5.3)	Maintained transmission line right-of-way (ROW), with wetlands
Permanent Parking	22.5 (9.1)	Forested with wetlands
Meteorological Tower	4.0 (1.6)	Forested
Stormwater Ponds	15.5 (6.3)	Forested with wetlands
Other Permanent Buildings	33.2 (13.5)	Forested with wetlands
Unspecified	9.7 (3.9)	Forested with wetlands
Total Acreage of Permanent Disturbance	224.7 (91.0)	
Construction Laydown	39.2 (15.9)	Forested or maintained lawn
Batch Plant	17.1 (6.9)	Forested with wetlands
Topsoil Disposal Area	28.1 (11.4)	Forested or maintained lawn
Total Acreage of Temporary Disturbance	84.4, (34.2)	
Total Land Area Required	**309.1, (125.2)**	

4.2 WATER-RELATED IMPACTS

The following sections describe potential hydrologic alterations and water use impacts resulting from the construction of NMP3NPP. Section 4.2.1 describes the hydrologic alterations resulting from construction activities including the physical effects of these alterations on other users, the best management practices to minimize any adverse impacts and how the project will comply with the applicable federal, state and local standards and regulations. Section 4.2.2 describes the potential changes in water quality and an evaluation of the impacts resulting from construction activities on water quality, availability and use.

4.2.1 HYDROLOGIC ALTERATIONS

This section discusses the proposed construction activities including site preparation, the resulting hydrologic alterations and physical effects of these activities on other water users, best management practices to minimize adverse impacts, and compliance with applicable federal, state and local environmental regulations.

4.2.1.1 Description of Surface Water Bodies and Groundwater Aquifiers

The NMPNS site covers an area of approximately 900 acres (364 hectares) and is located on the southeastern shore of Lake Ontario in Scriba, New York as shown in Figure 2.1-2. Additional details on the NMP3NPP site location and surrounding area are provided in Section 2.1.

The site topography is fairly flat, ranging from approximately 280 to 260 feet (85 to 79 m) above mean sea level (msl). At the lake shore there is a small bluff that drops from the site to the lake elevation of approximately 245 feet (75 m) above msl. The NMP3NPP site is drained by relatively short intermittent and perennial streams. In addition to Lake Ontario, four watercourses are present on the site.

Surface Water Bodies

The surface water bodies within the hydrologic system at NMPNS that may be affected by the construction and operation of NMP3NPP are shown in Figure 2.3-10. Proposed disturbed areas by Subarea are depicted in Figure 4.2-1. All stormwater runoff from the project area flows into Lake Ontario, either from direct surface runoff or from the following on-site watercourses:

- The Subarea A stream (Lakeview Creek) drains the majority of the site watershed, including the south and western portions of the site. Proposed facilities in this drainage area include new roads, temporary and permanent parking, portions of the new switchyard/transmission line, haul road/railroad, construction laydown areas, topsoil disposal areas, modular assembly area, unclassified area, and the relocated meteorology tower. 104.9 acres (42.5 hectares) would be disturbed in this drainage area.

- The Subarea B unnamed stream that drains the area north-central portion of the study area and its contributing watershed would be heavily disturbed. The cooling tower, portions of the switchyard and transmission line, the concrete batch plant, topsoil disposal areas and various associated roads and buildings would be constructed in this drainage area. 85.8 acres (34.7 hectares) would be disturbed.

- The Subarea C unnamed blue-lined channel that drains the northeastern portion of the site will include a construction laydown area and relocated firing range. 11.3 acres (4.6 hectares) would be disturbed.

- The Subarea D unnamed stream that drains northwestern portion of the site and its contributing watershed would be heavily disturbed. The cooling tower, nuclear island, portions for the switchyard/transmission line, stormwater ponds, concrete batch plant, permanent parking, power block, construction laydown, and various associated roads and buildings would be constructed in this drainage area. 106.9 acres (43.3 hectares) would be disturbed.

Each of these watercourses includes significant adjacent wetland areas. Additional details on the surface water drainage and hydrology are also presented in Section 2.3.1 and the Wetland Delineation Report.

Groundwater Aquifers

The local aquifer systems that could be impacted by project construction activities at the NMP3NPP site are, from shallow to deep: Unlithified Sediments, Oswego Sandstone, Pulaski Formation, and Whetstone Gulf Formation. Groundwater recharge in the NMP3NPP site vicinity most likely occurs as a result of infiltration of precipitation and local seepage from ponds and wetlands through the unconsolidated deposits and bedrock outcrops (NMP, 2004). Due to the low permeability of the surficial soils in the vicinity of the site, most of the precipitation runs off toward the Lake. The Oswego Sandstone is recharged by seepage from the unconsolidated deposits and local outcrops located to the south and southeast of the NMP3NPP site. Recharge of the lower zones of rock beneath the surface occurs through outcrops upgradient to the NMP3NPP site, or possibly through fractures. Further details of the hydrogeology of the site are presented in Section 2.3.1.

4.2.1.2 Construction Activities

The following construction activities will take place that may alter site hydrology:

Clearing, Grubbing, and Grading

Spoils, backfill borrow, and topsoil storage areas will be established on parts of the NMP3NPP property. Clearing and grubbing of the site begins with harvesting trees, vegetation removal, and disposal of tree stumps. Topsoil will be moved to a storage area (for later use) in preparation for excavation. The general plant area including the switchyard and cooling tower area will be brought to plant grade in preparation for foundation excavation and installation. As described in Section 4.1, approximately 308.9 acres (125.1 hectares) of land will be cleared for road, facility construction, laydown and parking uses. Table 4.2-1 shows disturbed areas by project component.

Road Construction

A new construction delivery road will be built adjacent to the existing railroad to access the NMP3NPP construction area. Approximately 3.1mi (5.0 km) of road will be built to accommodate construction vehicle traffic and material deliveries into the construction area. New roads would be constructed throughout the facility as shown in Figure 4.2-1. All roadways wil have a longitudinal slope of between 0% and 3% and will be designed to conform with American Associateion of State Highway and Transportaion Oficials (AASHTO) requirements. The existing railroad tracks would be refurbished and extended to the site.

In order to permit separation of construction and operating plant traffic, improvements will be made to an existing road and a new security checkpoint will be built for the NMP Unit 1 and Unit 2 staff. This road will connect Burt Minor Road to Lake Road along the existing transmission corridor.

Temporary Utilities

Temporary utilities include above-ground and underground infrastructure for power, communications, potable water, wastewater and waste treatment facilities, fire protection, and for construction gas and air systems.

Temporary Construction Facilities

Temporary construction facilities include parking lots, offices, warehouses, sanitary toilets, a changing area, a training area, and personnel access facilities. The site of the proposed concrete batch plant includes the cement storage silos, the batch plant and areas for aggregate unloading and storage.

Parking, Laydown, Fabrication, and Shop Preparation Areas

The parking, laydown, fabrication and shop areas include preparation of the parking and laydown areas by grading and stabilizing the surface with gravel. The shop and fabrication areas include the concrete slabs for formwork, laydown, module assembly, equipment parking and maintenance, and fuel and lubricant storage. Concrete pads for cranes and crane assembly will be installed.

Underground Installations

Concurrent with the power block earthworks, the initial non-safety-related underground fire protection, water supply, sanitary and hydrogen gas piping, and electrical power and lighting duct banks will be installed and backfilled. These installations will continue as construction progresses.

Intake and Outfall

Intake and discharge facilities will be constructed by tunneling from shore. Excavation for the intake and discharge structures, erection of pump houses, and installation of mechanical, piping, and electrical systems continue through site preparation into plant construction. Excavated material will be transported to on-site spoils areas located outside the boundaries of designated wetlands.

Power Block Earthwork (Excavation)

The deepest excavations in the power block area are for the NMP3NPP reactor and auxiliary building foundations that extend to approximately 49 ft (15 m) below plant grade. The excavations will take place concurrent with the installation of any required dewatering systems, slope protection and retaining wall systems. At a minimum, drainage sumps will be installed at the bottom of the excavations from which surface drainage and groundwater infiltration will be pumped to a stormwater discharge point. During construction period, construction effluents and stormwater runoff will be monitored as required in the stormwater pollution prevention plan (as part of the State Pollutant Discharge Elimination System (SPDES) permit) and other applicable permits obtained for construction. Excavated material will be transferred to the spoils and backfill borrow storage areas. Acceptable material from the excavations will be stored and reused as structural backfill.

Power Block Earthwork (Backfill)

The installation of suitable backfill to support structures or systems occurs as part of the site preparation activities. Backfill material will come from the concrete batch plant, on-site borrow pit and storage areas, or off-site sources. Excavated areas will be backfilled to reach the initial level of the building foundation grade. Backfill will continue to be placed around the foundation as the building rises from the excavation until final plant grade is reached.

Nuclear Island Base Mat Foundations

The deepest foundations in the power block are installed early in the construction sequence. Detailed steps include: installation of the grounding grid, mud-mat concrete work surface, reinforcing steel and civil, electrical, mechanical/piping embedded items, forming, and concrete placement and curing.

Transmission Corridors

A new transmission substation/switchyard will be installed on the NMPNS site adjacent to the power block area for NMP3NPP. A new on-site transmission corridor will be installed on the NMPNS site connecting the NMP3NPP switchyard to the existing NMP Unit 1 and Unit 2 switchyard. Tower foundations will be installed as well as an access road running along the corridor.

Off-site Areas

No off-site areas will be impacted by the construction activities for NMP3NPP. The existing off-site transmission corridor and towers will be utilized for NMP3NPP.

4.2.1.3 Water Sources and Amounts Needed for Construction

It is estimated that a peak water demand of up to approximately 1,200 gpm (4,500 lpm) will be required for NMP3NPP construction activities (demands include those for construction personnel, concrete manufacturing, dust control, hydro testing and flushing, and filling tanks and piping). Average construction demand would be less and is estimated at 250 gpm (950 lpm) or 360,000 gpd (1,363,000 lpd) of water during the construction phase. The potential sources of water for construction include water drawn directly from Lake Ontario, local municipal water, and off-site water trucked to the construction site. Table 4.2-2 shows the estimated amounts of water needed by construction year.

4.2.1.4 Surface Water Bodies Receiving Construction Effluents that Could Affect Water Quality

The surface water bodies that could receive construction effluents during NMP3NPP construction are Lake Ontario and the three on-site watercourses described in Section 4.2.1.1.

Several temporary impoundments are planned to catch stormwater and sediment runoff from the various construction areas. Modeling of the runoff from the probable maximum flood (PMF) during plant operation bounds the possible runoff amounts, characteristics, and impacts that might occur during construction due to unpaved surfaces allowing for greater stormwater infiltration into the ground. The impoundments will be sized so as to prevent fast flowing, sediment laden stormwater from reaching the streams or Lake Ontario prior to allowing the sediments to settle out. The flow velocities will be minimized to prevent erosion of stream banks. The allowable flow rates and physical characteristics of stormwater runoff will be specified in the state discharge permit.

The all-season, 1- hour “point” Probable Maximum Precipitation (PMP) of 16.0 in (40.6 cm) results in a total PMF peak flow rate of about 7,000 cfs (198 m^3/s) from the site drainage area of approximately 0.32 square miles (0.83km). The total drainage area was further subdivided to account for two separate basin outflow locations. Basin 1 drains generally to the west-northwest and into Lake Ontario and has a peak flow rate of approximately 3,970 cfs (112

m^3/s). Basin 2 drains generally to the west-northwest and into Lake Ontario and has a PMF peak flow rate of approximately 3030 cfs (93 m^3/s).

The PMF peak flood flow rate is approximately 19,000 cfs (538 m^3/s) for the entire Lakeview Creek watershed (extending to Lake Ontario). The results of the analysis indicated a maximum PMP elevation in the vicinity of the power block (safety-related structures) as about 268.5 ft (81.8 m) or approximately 2.5 ft (0.8 m) below the finished floor elevation of the safety-related structures. Therefore, the safety-related structures are not expected to flood due to the Lakeview Creek PMF.

4.2.1.5 Construction Impacts

Construction of NMP3NPP with its associated facilities will impact several of the current drainages at the NMPNS site. Runoff from the finished grade of the NMP3NPP power block, switchyard, cooling tower, parking areas and permanent laydown areas will be directed into stormwater impoundments.

The planned construction stormwater impoundments will be unlined basins with a simple earth-fill closure on the downstream end and will include a piping system that will direct any discharge to the adjacent watercourses.

Construction impacts to the existing surface water bodies are summarized as follows:

- Increasing runoff from the approximately 293.8 acres (118.9 hectares) of impervious and relatively impervious surfaces;
- Infilling and eliminating most of the Subarea D watercourse and 106.9 acres (43.3 hectares) of the total 124.1 acres (50.2 hectares) contributing drainage area;
- Wetlands removal fill and hydrologic disruptions; and
- Potential increased loadings from sediment, nutrient, contaminants from construction related fuels and chemicals, and increasing temperature for runoff into the on-site streams and Lake Ontario.

These impacts to surface water bodies are LARGE, primarily due to the loss of wetlands and wetland buffers, and require mitigation. The mitigation measures associated with the wetlands and wetland buffers are described in Section 4.3.1.4.

4.2.1.6 Pre-Construction Activities and Impacts

Pre-construction activities at the NMP3NPP site will primarily entail clearing and grading of the site, construction of roads and infrastructure, and construction of support structures. A comparative evaluation of the relative impacts of these pre-construction activities to those identified for construction activities in ER Section 10.1 and ER Table 10.1-1 did not identify any new impact categories, adverse impacts, or mitigation measures during pre-construction that were not already identified for construction, and there were no identified impact categories, adverse impacts, or mitigation measures for construction that were not also relevant to pre-construction. Areas considered in the evaluation of pre-construction impacts included: land use, hydrologic and water use, aquatic ecology, terrestrial ecology, socioeconomics, radiological, atmospheric and meteorological, environmental justice, and non-radiological health impacts.

Although the scope of impact categories, adverse impacts, and mitigation measures for pre-construction activties is the same as those identified for construction, some of the impacts identified for construction will be reduced during pre-construction due to the comparatively smaller level of effort and smaller workforce that will be in place during pre-construction. For example, because of the limited scope of work that is authorized during pre-construction, the quantity of concrete that can be poured during pre-construction is only a small portion of what will be poured during construction. As a result, hydrologic and water use impacts will be less during pre-construction.

In general, the completion of pre-construction activities will result in a corresponding reduction in the cumulative impact of construction activities that is commensurate with the amount of pre-construction work that is completed and therefore removed from the scope of construction activities.

4.2.1.7 Identification of Surface Water and Groundwater Users

There are no users of on-site surface water. Lakeview Creek flows off-site to the northwest where it enters a pond used for recreation at the Ontario Bible Camp. Lake Ontario has many users, including commercial and recreational fishing as discussed in Section 2.3.2.

Groundwater users in the vicinity of the NMP3NPP site are identified in Section 2.3.2. As described in Section 2.3.2, the nearest public groundwater system to NMP3NPP is owned by the Village of Mexico, approximately 10 mi (16 km) to the east southeast (USEPA, 2008).

4.2.1.8 Proposed Practices to Limit or Minimize Hydrologic Alterations

New York State Department of Environmental Conservation (DEC) regulates the implementation controls to minimize or eliminate impacts on waterbodies from construction activities (NYSDEC, 2003). The following actions will be used to limit or minimize expected hydrologic alterations:

Implementation of best management practices (BMPs) such as;

- Maintaining clean working areas;
- Removing excess debris and trash from construction areas;
- Properly containing and cleaning up all fuel and chemical spills;
- Installing erosion prevention devices in areas with exposed soils;
- Installing sediment control devices at the edges of construction areas;
- Retaining and controlling stormwater and wash-down water on-site; and
- Implementation of a Stormwater Pollution Prevention Plan (SWPPP).

Monitoring of stormwater runoff will be performed as designated in the stormwater pollution prevention plan in order to comply with the SPDES permit and other applicable permits obtained for the construction.

4.2.1.9 Compliance with Applicable Hydrological Standards and Regulations

The regulations guiding the implementation of Best Management Practices (BMPs) are provided by the New York Department of Environmental Conservation (NYSDEC, 2005). These regulations contain BMP installation instructions and typical construction activities which require BMPs. Monitoring of construction effluents and stormwater runoff will be performed as required in the stormwater pollution prevention plan, SPDES permit, and other applicable permits obtained for the construction.

4.2.1.10 Best Management Practices

The following BMPs will be implemented as part of the SWPPP and the state-required Erosion and Sediment Control Plan:

- Controlling site runoff through both structural and nonstructural control measures;
- Monitoring runoff, groundwater, and surface water bodies for contaminants;
- Implementing controls, such as a spill prevention program, to protect against accidental discharge of contaminants such as fuel spills, other fluids and solids that could degrade groundwater.

Monitoring of construction effluents and stormwater runoff would be performed as required in the stormwater management plan, SPDES permit, and other applicable permits obtained for the construction.

In addition, NMP3NPP will comply with the requirements and conditions of the various permits issued to support construction. Environmental compliance personnel will monitor construction activities and provide direction to add, modify or replace site practices to ensure compliance with hydrological standards and regulations.

In summary, the impact to hydrology is MODERATE due to design of the surface water retention systems and use of best management practices to control surface water runoff.

4.2.2 WATER USE IMPACTS

This section discusses the proposed construction activities and resulting hydrologic alterations that could impact water use, an evaluation of potential changes in water quality resulting from construction activities and hydrologic changes, an evaluation of proposed practices to minimize adverse impacts, and compliance with applicable federal, state and local environmental regulations.

4.2.2.1 Description of the Site and Vicinity Water Bodies

The NMPNS site covers an area of approximately 921 acres (373 hectares), and is located on the southeastern shoreline of Lake Ontario in Oswego County, New York as shown in Figure 2.1-2. Additional details on the NMP3NPP site location and surrounding area are provided in Section 2.1.

The surface water bodies, as shown in Figure 2.3-1, within the hydrologic system at the NMP3NPP site that may be affected by the construction and operation of NMP3NPP are discussed in Section 4.2.1.1.

Additional details on the surface water drainage and hydrology are presented in Section 2.3.1 and the Wetland Delineation Report.

The aquifers that could be impacted by project construction activities at the NMP3NPP site include the unconfined and deep confined aquifers. The unconfined aquifer is composed of glacial till and fill material (unlithified sediments) and the upper portion of Oswego Sandstone beneath the soil. Confined aquifers include the transition zone between Oswego Sandstone and Pulaski Unit A, and Pulaski Unit B. These, and the other aquifers in the regional groundwater system, are described in Section 2.3.1 and Section 2.3.2. No aquifers near the site are considered "sole source" aquifers.

4.2.2.2 Hydrologic Alterations and Related Construction Activities

Construction of NMP3NPP will impact existing surface water bodies either indirectly by modifying runoff rates and direction or directly by filling of surface water bodies. Construction activities will increase runoff from the approximately 232 acres (94 hectares) of impervious and relatively impervious surfaces for the NMP3NPP power block pad, cooling tower pad, switchyard, permanent laydown, and parking areas. In addition, construction of NMP3NPP will permanently remove some of the existing surface water bodies. Based on the wetlands investigation the impacts to wetlands from the construction of NMP3NPP has been identified as described in Section 4.3. Construction impacts to the existing surface water bodies are summarized as follows:

- Infilling and eliminating the man-made pond located northeast of the abandoned baseball field;
- Infilling the unnamed stream located north as well as the associated beaver pond south of the current meteorological tower and north of Lake Road for the relocation of a road northeast of the proposed site;
- The infilling and elimination or alternation of the old quarry pond northeast of the past construction laydown area;
- Direct impacts to the Lakeview Creek from the creation of a road and construction supply rail that will cross over the stream south of the proposed site and possibly by the placement of a topsoil disposal area near the creek;
- Additionally, several wetlands that drain into the stream will be filled for the creation of roads, rails, construction laydown areas, construction and permanent parking, and stormwater pond #3; and
- Possibly increasing the sediment loads into the proposed impoundments and downstream reaches.

The effect of the site terrain alteration on the overall 4240 acres (1716 hectares) watershed drainage configuration is not anticipated to be significant in that the flow and direction of Lakewood Creek and the Subarea C watercourses described in Section 2.3 will remain substantially the same. The downstream area of the smaller Subarea B and D watersheds will undergo substantial topographic modification and increase in impervious surfaces; however, a Stormwater Management System has been prepared to include features such as detention ponds to mitigate these effects.

The hydrologic alterations to groundwater that could result from the project related construction activities are:

- Creation of a local and temporary depression in the unconfined aquifer potentiometric surface due to dewatering for foundation excavations;

- Disruption of current unconfined aquifer recharge and discharge areas by plant construction. Recharge areas including wetlands and unconsolidated deposits would be cleared and graded; bedrock areas could be blasted and removed; the various streams could be backfilled and construction areas would be covered by less permeable materials and graded, resulting in increased runoff to constructed detention ponds;

- Stormwater runoff from the flat, non-vegetated foundation pads, switchyard and laydown areas would be directed and concentrated into new impoundments that could affect recharge to the unconsolidated aquifer. Since the impoundments are unlined, they could act as smaller, focused recharge areas and might increase the amount of water recharging the unconsolidated aquifer; and

- Impacts to groundwater supply are expected to be minimal as there is no planned groundwater use for construction.

A further discussion of related construction activities is provided in Section 4.2.1.2.

4.2.2.3 Physical Effects of Hydrologic Alterations

Impacts from the construction of NMP3NPP are similar to those associated with any large construction project. The construction activities that could produce hydrologic alterations to surface water bodies and groundwater aquifers are presented in Section 4.2.1.2. The potentially affected surface water bodies and groundwater aquifers are described in Section 4.2.1.4. The potential construction effects on surface water bodies and groundwater aquifers are presented in Section 4.2.1.5.

Surface Water Impacts

Because of the potential for impacting surface water resources, a number of environmental permits are needed prior to initiating construction. Table 1.3-1 in Chapter 1 provides a list of construction-related consultations and permits that have to be obtained prior to initiating construction activities. Table 4.2-1shows the acreage of disturbed land based on the type of construction activity (i.e. grading and covering the cooling draft tower).

The construction activities expected to produce the greatest impacts on the surface water bodies occur from:

- Reducing the available infiltration area;

- Grading and the subsequent covering of the 48.1 acre (19.5 hectare) NMP3NPP power block foundation;

- Grading and covering of the 16.6 acre (6.7 hectare) NMP3NPP mechanical draft cooling tower pad;

- Grading and covering of the 35.3 acre (14.3 hectare) NMP3NPP switchyard/transmission lines;

- Vegetation removal and grading of 89.6 acres (36.3 hectares) for temporary construction laydown areas, concrete batch plant, offices, parking, warehouses, and shop preparation areas;
- Creation of impoundments (stormwater retention ponds) covering 15.1 acres (6.1 hectares); and
- Eliminating reaches and branches of streams.

Site grading and new building foundations will cover and reduce existing infiltration and recharge areas. Runoff will be directed to new impoundments, altering the unconsolidated aquifer recharge areas. Possible increases in runoff volume and velocity in the unnamed streams may cause erosion and adversely affect riparian habitat if not controlled.

Dewatering for the proposed foundation excavations could also impact surface water bodies. Effluent from the dewatering system, and any stormwater accumulating during the excavation, would be pumped to a stormwater discharge point or into on-site impoundments. If pollutants (e.g., oil, hydraulic fluid, concrete slurry) exist in these effluents from construction activities, they could enter the impoundments, downstream channel sections, or other surface water bodies and ultimately Lake Ontario. Monitoring of construction effluents and stormwater runoff along with BMP maintenance would be performed as delineated in the SPDES General Permit for Stormwater associated with construction activity and other applicable permits obtained for the construction. Depending on the design of the stormwater impoundments and discharge systems, outflow rates into the surface streams could be altered.

All water bodies within the NMP3NPP site boundary could have the potential to indirectly receive untreated construction effluents. The water bodies listed in Section 4.2.1.1 are potentially subject to receiving untreated construction effluents directly. It will be necessary to implement proper BMPs under state regulations such as a SPDES General Permit for Stormwater associated with construction activity and associated stormwater pollution prevention plan (SWPPP). Table 1.3-1 lists and presents additional information on the federal, state and local authorizations associated with this project.

If proper BMPs are implemented under these permits, treated construction effluents could be released to the site water bodies without significant adverse impacts. Flow rates for untreated construction effluents will depend upon the usage of water during site construction activities and the amount of precipitation contacting construction debris during construction activities. Flow rates and physical characteristics of the construction effluents are discussed in Section 4.2.1.3. A quantitative calculation and evaluation of the construction effluents and runoff will be done as part of the state construction permit process. BMPs would be implemented to control runoff, soil erosion, and sediment transport. Good housekeeping practices and engineering controls will be implemented to prevent and contain accidental spills of fuels, lubricants, oily wastes, sanitary wastes, etc.

BMPs will beimplemented in accordance with the SWPPP, as described in Section 4.2.1.8 and Section 4.2.2.10. Environmental control systems installed to minimize impacts related to construction activities will comply with all federal, state and local environmental regulations and requirements. Once the initial controls are in place, they are maintained through the completion of construction and during plant operation, as needed.

Impacts to surface waters from construction water withdrawals will be small. Water will be withdrawn from Lake Ontario during construction, as described in Section 4.2.2.4. Impacts to the lake will be negligible given the large size of the lake. In addition, water withdrawn as a result of dewatering will be returned to the lake. Although dewatering activities could potentially impact on-site streams and wetlands by locally lowering the groundwater table, the amount of projected groundwater to be withdrawn is small and the construction period is temporary. No surface water will be used from on-site streams and wetlands. Surface water withdrawal during construction is not anticipated to impact deep aquifers, given the lack of hydraulic interconnection between the overlying unconsolidated aquifers and the underlying bedrock units (NYSDEC, 2005).

Overall construction impacts on surface water use are anticipated to be LARGE, primarily due to the loss of wetlands, wetland buffers, and stream reaches, and will require mitigation. The mitigation measures associated with wetlands and wetland buffers are described in Section 4.3.1. After implementation of mitigation measures, construction surface water use impacts are anticipated to be MODERATE.

Groundwater Impacts

Depending on the design of the stormwater impoundments and discharge systems, outflow velocity and volume in the unnamed streams could change, and change the volume of water available to infiltrate and recharge the unconsolidated aquifer.

Groundwater withdrawals for construction needs are expected to be minimal, with the exception of dewatering activities for the foundation.

The hydrologic alterations that could be produced in the groundwater aquifers are expected to be localized and possibly temporary. Most of the effects are expected to occur in the uppermost or unconsolidated aquifer. Any effects in the deeper aquifers are expected to be minor, due to minimal groundwater withdrawals.

The construction activities listed in Section 4.2.1.2 that are expected to produce the greatest impacts on the unconsolidated aquifer are related to:

- Changing the existing recharge and discharge areas, especially wetlands with groundwater recharge as a principal valuable function;
- Possibly changing the amount of runoff available for infiltration; and
- Dewatering of foundation excavations during construction.

Site grading and leveling for the building foundations and laydown areas will cover and possibly eliminate existing recharge areas. Runoff from the graded areas will be directed to several proposed impoundments, possibly creating new "focused" recharge areas. Runoff velocity may be increased in the channels downstream of the impoundments, which could decrease the amount of runoff available for infiltration and recharge. Fine-grained sediments could settle out in the impoundments and channels and create less-permeable areas for infiltration and recharge. These changes affect local recharge to the unconsolidated aquifer. Impacts on the deeper aquifers are likely to be SMALL.

Foundation dewatering during construction will result in a small but measurable impact to the overlying unconsolidated aquifer. The deepest excavations anticipated are for the proposed reactor and auxiliary building foundations, and extend approximately 49 ft (15 m) below plant grade. The hydrologic alterations are expected to be localized and temporary. Dewatering will be required only during construction. As described above, the deep aquifer is unlikely to be impacted given its lack of connection to the overlying unconsolidated aquifer. Impacts, if any, to the deeper aquifers are anticipated to be SMALL due to the minimal hydraulic connection between aquifers. The dewatering system and activities are not expected to have any significant impact on the deeper aquifers because recharge areas are distant from the NMP3NPP site (Oswego Sandstone recharge areas are unconsolidated soils and rocky outcrops to the south and southeast of NMPNS; deeper aquifers are recharged through outcrops downgradient of NMPNS or through fractures). Effluent from the dewatering system will be pumped to a stormwater discharge point. Monitoring of construction effluents and stormwater runoff will be performed as required in the stormwater pollution prevention plan, SPDES permit, and other applicable permits obtained for the construction.

The locally lowered unconsolidated aquifer water level would be expected to eventually recover after the dewatering and other subsurface construction activities are complete. Although it would be altered by buildings and paved areas, rainwater is still allowed to infiltrate in other plant areas to recharge the aquifer.

The impact to groundwater is SMALL and localized, changes to the unconsolidated aquifer water level are expected to eventually recover once construction is complete.

4.2.2.4 Water Quantities Available to Other Users

As described in Section 2.3.2.1.2, surface water withdrawals in Oswego County are primarily from Lake Ontario. Sixty-four percent of residents within a 30 mile (48 km) radius from NMP3NPP rely on surface water withdrawals from Lake Ontario for their potable water supply. Most of the public water suppliers are operating with excess design capacity. As a result, Oswego County has an excess water supply capacity of approximately 6 mgd (23 million lpd). This would be adequate to provide water for construction and for the in-migrating work force, which at its peak will reach 3,950 and require 355,500 gpd (1,345,714 lpd).

Water required for NMP3NPP construction is estimated at 22.1 to 41.6 million gallons annually (183.5 to 157.6 million liters) as shown in Table 4.2-2. This water will be provided by the Oswego Water System, which obtains its water from Lake Ontario. The allowable withdrawal allocation for the city of Oswego is 62.5 mgd (237 million lpd). The full design capacity of the water plant is 20.1 mpd (76.1 million lpd), although 8 million gallons (30 million liters) is reserved for another industry Constellation, 2004).

Groundwater use and trends in Oswego County and at the NMP3NPP site are presented in Section 2.3.2.2 and in Section 2.4.12 of the Final Safety Analysis Report. The locally lowered unconsolidated aquifer water level would be expected to eventually recover after the dewatering and other subsurface construction activities are complete and, therefore, the groundwater impacts expected from foundation dewatering or other construction activities are SMALL and will not impact any local users.

4.2.2.5 Water Bodies Receiving Construction Effluents

The surface water bodies directly downstream of the proposed construction activities could be impacted during clearing, grubbing, and grading. Locations of surface water and its users that could be impacted by construction activities are provided in Section 4.2.1.4.

Since most of the water for construction would be used for consumptive uses such as grading, soil compaction, dust control, and concrete mixing, little infiltration would be expected. Any effluents that might infiltrate could potentially recharge the unconsolidated aquifer.

If contaminants enter the surface water bodies unchecked, there would be a potential for infiltration and subsequent groundwater contamination. If contaminants do enter groundwater, they may potentially impact the quality of water withdrawn for industrial and commercial applications as well as private groundwater wells for potable water.

Any construction effluents infiltrating into the subsurface could potentially reach the unconsolidated aquifer if they are of sufficient volume and concentration. However, groundwater flow is no more than a few yards (meters) annually because of the low hydraulic conductivity, reducing potential for infiltration.

It is possible that this groundwater could discharge locally at seeps or springs. Any possible impacts on deeper aquifers would also depend on the infiltrating volume and the hydrologic connection with the unconsolidated aquifer.

The composition of possible construction effluents that could infiltrate into the unconsolidated aquifer would depend on several factors related to the physical nature of the effluent material, i.e., solids versus liquids, solubility, vapor pressure, mobility, compound stability, reactivity in the surface and subsurface environments, dilution, and migration distance to groundwater. It is expected that proper housekeeping and spill management practices would minimize potential releases and volumes and physically contain any releases. Pesticides and herbicides are expected to be applied in limited site areas for insect and weed/brush control.

Several impoundments are planned to catch stormwater and sediment runoff from the various construction areas. Modeling of the runoff from the probable maximum flood (PMF) during plant operation bounds the possible runoff amounts, characteristics, and impacts that might occur during construction due to unpaved surfaces during construction allowing for greater stormwater infiltration to ground. The impoundments will be sized so as to prevent fast flowing, sediment laden stormwater from reaching the streams or Lake Ontario prior to allowing the sediments to settle out. The flow velocities will be minimized to prevent erosion of creek and stream banks. The allowable flow rates and physical characteristics of stormwater runoff will be specified in state discharge permits.

The maximum high water elevation of Lake Ontario is 246 ft (75 m) NGVD 29, which is below the 301 ft (91.7 m) NGVD 29 near the southern end of the developed portion of the site. The safety-related structures in the NMP3NPP power block consist of two service water cooling tower structures located in the northeast corner, two service water cooling tower structures located in the southwest corner, emergency diesel generator buildings located east and west of the reactor complex and the reactor complex, which consists of the containment building, fuel building, and safeguards building. The entrances (e.g., first floor elevation) to each of these structures are located at Elevation 271.0 ft (82.6 m) msl for each structure. The maximum computed PMP water level in the power block area is Elevation 269.5 ft (82.1 m) msl, 1.5 ft (0.5 m) below the finished first floor elevation.

4.2.2.6 Baseline Water Quality Data

Baseline water quality data for surface water bodies is provided and discussed in Section 2.3.3. A summary of the water quality data for NMPNS surface water is presented in Table 2.3-15. Baseline water quality data for groundwater is provided in Section 2.3.3.

4.2.2.7 Potential Changes to Surface Water and Groundwater Quality

The following section describes the potential water quality impacts resulting from the construction of NMP3NPP.

The NMP3NPP site will be supplied by municipal water supplies. All water currently used on-site is provided by the Oswego Water System, which obtains its water from Lake Ontario. There are no groundwater supply wells on-site. Domestic wells within 2 mi (3.2 km) are listed in Table 2.3-8.

Potential Changes to Surface Water Quality

Any potential surface water quality impacts are associated with the site clearing and grading activities.

The addition of sediment and organic debris to the local streams resulting from clearing, grubbing, and grading could decrease water quality. Organic debris could dam or clog existing streams, increase sediment deposition, and increase potential for future flooding. Organic debris decomposing in streams can cause dissolved oxygen and pH imbalances and subsequent releases of other organic and inorganic compounds from the stream sediments. Sediment laden waters are prone to reduced oxygen levels, algal growth, and increases in pathogens. If heavy metals or chemical compounds, such as fuel or other vehicle fluids, spill and/or wash into surface waters, there could be a direct toxicity to aquatic organisms. These potential pollutant releases could impact aquatic species and in turn affect the recreational aspects associated with fishing, canoeing, or swimming in downstream areas, such as at the recreational impoundment at the Ontario Bible Camp.

The water bodies downstream of the proposed construction areas could be directly and indirectly affected by construction activities on-site. Construction debris residing on the pads and temporary staging areas could mix with construction wash-down water or stormwater, exit the site via untreated runoff and produce chemical reactions adverse to downstream ecology. Possible contaminants include: sediment, alkaline byproducts from concrete production, concrete sealants, acidic byproducts, heavy metals, nutrients, solvents, and hydrocarbons (fuels, oils, and greases). There could be a high potential for contaminants to mix with site wash-down water or rainwater/precipitation runoff and be washed downstream into surface water bodies existing on the NMP3NPP site due to the persistent nature of local precipitation. There could also be the potential for spills within the construction areas consisting of fuels, solvents, sealants, paints, or glues. Construction dusts not suppressed could drift outside of the construction zones and contaminate nearby water supplies. If these contaminants enter the surface water bodies unchecked there could be a potential for infiltration and subsequent groundwater contamination.

The proposed removal of on-site wetlands could reduce the ability of microbiotic organisms and fauna to naturally attenuate contaminants and pollutants produced on-site.

The impacts to surface water quality downstream of the construction site are MODERATE due to the use of BMPs to control dust, runoff, and spills as described in Sections 4.2.1.8, 4.2.1.9, 4.2.1.10, and 4.2.2.11.

Potential Changes to Groundwater Quality

Construction dewatering is accomplished by conventional open sumps and pumps in the bottom of excavations in rock and at the toe of soil slopes. A layer of crushed stone is placed over the lower portions of cut soil slopes as needed to prevent erosion due to seepage. Sumps and drains are constructed to maintain the groundwater level below the level of active excavation backfilling and foundation construction. The top of the Oswego Sandstone bedrock may be groute to reduce groundwater seepage through fractures from Lake Ontario into the pump house excavation. All surface runoff and construction dewatering water is directed to the on-site stormwater detention basins prior to discharge.

Dewatering for the foundation excavations may increase the oxidation of some sedimentary constituents by placing them in direct contact with the atmosphere. The oxides might have an increased solubility and could migrate down gradient when the potentiometric head is reestablished following construction completion. Possible impacts to the unconsolidated aquifer water quality would be SMALL and decrease with migration and dilution.

4.2.2.8 Surface Water and Groundwater Users

Surface water users downstream of the site may experience impacts from potential water quality changes if construction effluent concentrations and volumes are large enough and the release enters directly into a surface water body bypassing the overflow catch basins and retention ponds. The only surface water user that could be impacted in the event of a release is the recreational pond at the Ontario Bible Camp, located immediately upstream of the Lakeview Creek outlet to Lake Ontario.

Groundwater users in vicinity of the NMP3NPP site are identified in Section 2.3.2. There are approximately 102 private wells in a 2-mile (3.2km) radius of NMP3NPP.

4.2.2.9 Predicted Impacts on Water Users

The impact of potential increased sediment loads in site runoff during construction would result in SMALL or no impacts to surface water users and affected areas.

Construction dewatering activities may alter groundwater levels locally, but groundwater users in the region are significantly distal to the project such that there will be no anticipated impacts on local users. No groundwater from NMP3NPP will be used for construction

Potential construction effluent impacts on aquifer groundwater quality would first be manifested in the unconsolidated aquifer. Construction activities are only expected to produce limited and temporary impacts in the unconsolidated aquifer. As described in Section 2.3.1, the unconsolidated aquifer is not used as a potable water source on the NMP3NPP site, although there are approximately 102 wells in a 2 mile (3.2 km) radius around the site, most of which are abandoned or using deeper aquifers. Therefore, potential groundwater quality changes would not be expected to have any impact on possible users. Potential impacts to the deeper aquifers are dependant on the nature of the hydraulic connection between aquifers described in Section 4.2.1.1. The dewatering system and activities are not expected to have any significant impact on the deeper aquifers because recharge areas are distant from the NMPNS site (Oswego Sandstone recharge areas are unconsolidated soils and rocky outcrops to the south and southeast of NMPNS; deeper aquifers are recharged through outcrops downgradient of NMPNS or through fractures). Groundwater quality impacts on users of the deeper aquifer users are SMALL due to dilution and other contaminant attenuation effects that could occur along any effluent plume migration path.

There are no sole source aquifers in the vicinity of the NMP3NPP site. The closest sole source aquifer, Tug Hill, is at its closest point, 18 mi (29 km) from the NMP3NPP site. Thus, the addition of NMP3NPP is not an impact any sole source aquifer.

4.2.2.10 Measures to Control Construction Related Impacts

The following measures will be taken to avoid runoff from the construction areas entering and potentially impacting downstream surface water bodies and groundwater, as applicable:

- Implementation of a SWPPP;

- Controlling runoff and potential spills using dikes, earthen berms, seeded ditches, and impoundments;
- Monitoring for contaminants within construction area impoundments and impoundments downstream of disturbed areas;
- Implementation of BMPs to protect against accidental discharge of contaminants (fuel spills, other fluids and solids that could degrade groundwater and surface water resources); and,
- Performing additional on-site surface and groundwater monitoring compared to established water quality benchmarks and historical site data.

Following the acquisition of the required permits and authorizations, site preparation activities will include the installation or establishment of environmental controls to assist in controlling construction impacts to groundwater. These environmental controls include:

- Coffer Dams;
- Stormwater management systems;
- Spill containment controls;
- Silt screens;
- Settling basins; and
- Dust suppression systems.

These controls assist in protecting the unconsolidated aquifer by minimizing the potential for construction effluents to infiltrate directly into the subsurface or to carry possible contaminants to aquifer recharge areas.

Mitigation measures for construction activities in the area of the new intake structure and discharge outfall include water quality monitoring in accordance with any permit requirements.

Additional measures to minimize or contain accidental releases of contaminants will be the establishment, maintenance, and monitoring of:

- Solid waste storage areas;
- Backfill borrow, spoils, and topsoil storage areas; and
- Site drainage patterns.

Existing groundwater wells will be monitored to assess gradient changes toward the excavation dewatering areas and potential groundwater quantity and quality changes.

Construction groundwater use impacts are expected to be minimal with the exception of dewatering of the Unit 3 site.

As explained in Section 4.2.2.7, any contamination that might be introduced into the unconsolidated aquifer would be attenuated by the time it might reach deeper aquifers.

4.2.2.11 Consultation with Federal, State and Local Environmental Organizations

The regulations guiding the implementation of Best Management Practices (BMPs) are provided by the New York Department of Environmental Conservation (NYDEC, 2007). These regulations contain BMP use guidance and typical construction activities which require BMPs. Monitoring of construction effluents and stormwater runoff would be performed as required in the stormwater pollution prevention plan to comply with the SPDES permit, and other applicable permits obtained for the construction. The integrated permitting process for the applicable environmental permits will proceed concurrently with NRC review of the combined license application.

4.2.2.12 Compliance with Water Quality and Water Use Standards and Regulations

The regulations guiding the implementation of water quality and water use standards and regulations are provided by the New York Department of Environmental Conservation (NYSDEC, 2007). These regulations contain water quality and water use standards that must be adhered to during construction. In addition, site specific permits for various construction activities will contain conditions that must be complied with for the duration of the permitted activity.

4.2.2.13 Water Quality Requirements for Aquatic Ecosystems and Domestic Users

Section 4.3.2 discusses information pertaining to water quality requirements for aquatic ecosystems.

Domestic users of groundwater will meet the state water quality standards for potable water systems.

4.2.2.14 References

Constellation, 2004. Nine Mile Point Nuclear Station Unit 2 Updated Safety Analysis Report. Revision 16. October, 2004.

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NYDEC, 2007. Construction Stormwater Toolbox, Website: http://www.dec.ny.gov/chemical/8694.html, Date accessed: June 10, 2008.

USEPA, 2008. Safe Drinking Water Information System (SDWIS). List of Water Systems in SDWIS, Oswego County, NY. United States Environmental Protection Agency, 2008, Website: http://oaspub.epa.gov. Date accessed: June 2, 2008.

Table 4.2-1—NMP3NPP Disturbance Area by Project Component

Type	Component	Acres	Hectares
Permanent	Access Road	2.6	1.1
Permanent	Access Road	11.0	4.4
Permanent	Cooling Tower	16.6	6.7
Permanent	Haul Road/Railroad	18.6	7.5
Permanent	Haul Road/Railroad	6.2	2.5
Permanent	Haul Road/Railroad	0.8	0.3
Permanent	Haul Road/Railroad	0.8	0.3
Permanent	Met. Tower	4.0	1.6
Permanent	Other	2.9	1.2
Permanent	Other	1.4	0.6
Permanent	Other	23.2	9.4
Permanent	Other	5.7	2.3
Permanent	Permanent Parking	22.5	9.1
Permanent	Power Block	48.1	19.5
Permanent	Stormwater Ponds	4.3	1.7
Permanent	Stormwater Ponds	4.0	1.6
Permanent	Stormwater Ponds	6.9	2.8
Permanent	Switchyard/Trans.	29.9	12.1
Permanent	Switchyard/Trans.	0.3	0.1
Permanent	Switchyard/Trans.	5.1	2.0
Temporary	Batch Plant	17.1	6.9
Temporary	Construction Laydown	9.9	4.0
Temporary	Construction Laydown	1.9	0.8
Temporary	Construction Laydown	0.6	0.3
Temporary	Construction Laydown	10.2	4.1
Temporary	Construction Laydown	16.6	6.7
Temporary	Topsoil Disposal	8.2	3.3
Temporary	Topsoil Disposal	8.6	3.5
Temporary	Topsoil Disposal	6.2	2.5
Temporary	Topsoil Disposal	5.0	2.0
Unknown	Unclassified	9.6	3.9
Total Disturbed Area		**308.9**	**125.1**

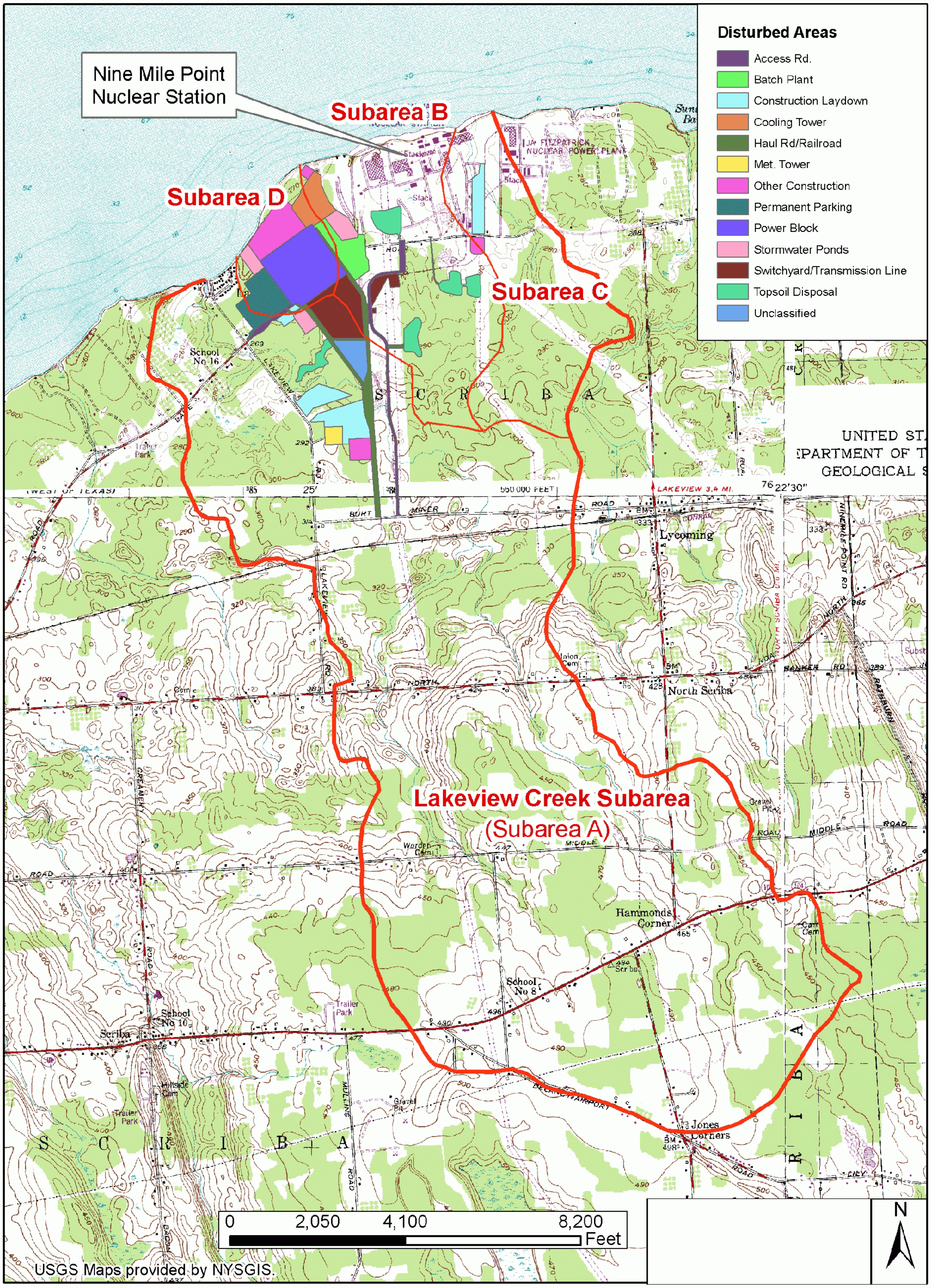
Table 4.2-2—Estimated Amounts of Fresh Water by Construction Year for NMP3NPP

Construction Year	1	2	3	4	5
People	8,555,000 gal[(a)] (32,365,000 L)[(a)]	34,200,000 gal[(b)] (129,461,000 L)[(b)]	34,200,000 gal[(b)] (129,461,000 L)[(b)]	34,200,000 gal [(b)] (129,461,000 L)[(b)]	
Concrete mixing and curing [(c)]	2,219,844 gal (8,403,000 L)	2,219,844 gal (8,403,000 L)	2,219,844 gal (8,403,000 L)	2,219,844 gal (8,403,000 L)	
Dust Control[(d)]	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	11,400,000 gal (43,154,000 L)	
Subtotal	22,169,844 gal (83,922,000 L)	47,819,844 gal (181,018,000 L)	47,819,844 gal (181,018,000 L)	47,819,844 gal (181,018,000 L)	31,879,896 gal[(e)] (120,678,667 L)[(e)]

Notes:

(a) Estimated at 1000 persons using 30 gal (113.6 L) per day for 285 days per year
(b) Estimated at 4,000 persons using 30 gal (113.6 L) per day for 285 days per year
(c) Estimated at 6,700 cubic yards (5,122.5 m^3) per month using 27.61 gal (104.5 L) per cubic yard and 12 months per year.
(d) Estimated at 40,000 gal (151,400 L) per day for 285 days per year.
(e) Estimated at two-thirds of the amount used in any year 2 through 5.

Figure 4.2-1—Watershed Subarea Boundaries with Proposed Disturbed Areas



4.3 ECOLOGICAL IMPACT

4.3.1 TERRESTRIAL ECOSYSTEMS

This section describes the impacts of construction on the terrestrial ecosystem. Figure 2.1-1 shows the boundary of the Owner Controlled Area (OCA) and the footprint of the major buildings to be constructed. Construction would require the permanent or temporary disturbance of approximately 309 acres (125 hectares) of terrestrial habitat on the NMP3NPP site as shown in Figure 4.3-1. This area is assumed to be the maximum area of soil to be exposed at any time. Approximately 224.7 acres 91.0 hectares) of the affected terrestrial habitat would be permanently converted to structures, pavement, or other intensively-maintained exterior grounds to accommodate the proposed power block, cooling tower, switchyard, roadways, retention basins, and permanent parking lots. The remaining disturbed area of approximately 84 acres (34 hectares) would be only temporarily disturbed to accommodate the batch plant, temporary construction laydown areas, and topsoil storage. The temporarily disturbed habitats would be restored to a naturally vegetated condition once construction activities are complete. The permanent loss of terrestrial habitat is small compared to the 4,465,899 acres (1,807,285 hectares) in the region as shown in Table 2.2-6. Approximately 66.01 acres (26.71 hectares) of the permanently lost habitat is wetlands compared to 1,091,944 acres (441,894 hectares) of wetlands in the region as shown in Table 2.2-6.

Constructing the proposed facilities will not be possible without adversely impacting terrestrial resources present on the site, including wetlands, wetland buffers designated by the State of New York and habitat for three state-listed species of concern that are known to or that may breed on-site. However, the proposed project includes all practical measures to minimize impacts. The construction footprint was designed to avoid impacts to wetlands and wetland buffers designated by the State of New York to the extent possible. Construction activities will start after the State of New York issues the appropriate permits to start clearing and grading of the site. Activities to construct non safety-related systems and structures are expected to begin September 2010. Construction is expected to be complete by May 2016.

4.3.1.1 Vegetation

Plant Communities and Habitats:

Clearing and grubbing would result in the vegetation losses shown in Figure 4.3-1 and summarized in Table 4.3-1 and Table 4.3-2. The losses would include approximately 212.2 acres (82.7 hectares) of forest cover, including:

- Approximately 70.5 acres (28.6 hectares) of Successional Hardwood Forest,
- Approximately 64.9 acres (26.3 hectares) of Beech-Maple Mesic Forest,
- Approximately 8.6 acres (3.5 hectares) of Beech-Maple Rich Mesic Forest,
- Approximately 63.5 acres (25.7 hectares) of wetland forest, and
- Approximately 4.7 acres (1.9 hectares) of wetland forest/scrub-shrub.
- The losses would also include approximately 78.2 acres (31.7 hectares) of non-forested habitats, including:
- Approximately 7.0 acres (2.8 hectares) of scrub-shrub vegetation,

- Approximately 0.1 acres (0.01 hectares) of shallow water with emergent vegetation.
- Approximately 31.2 acres (12.6 hectares) of old field vegetation,
- Approximately 12.0 acres (4.9 hectares) of infrequently mowed areas, and
- Approximately 25.6 acres (10.4 hectares) of lawn.

As indicated in Table 2.4-1 forested uplands and forested wetlands are the most common cover types on the NMP3NPP Site. None of the cover types at the site are regionally uncommon (NYSDEC, 2002).

The boundaries of vegetated areas subject to clearing and grubbing will be prominently marked prior to site preparation. Merchantable timber within marked areas may be harvested prior to site preparation. Merchantable timber is present in varying proportions throughout the mature second growth forest cover types Remaining trees will then be felled. Stumps, shrubs, and saplings will be grubbed, and groundcover and leaf litter will be cleared to prepare the land surface for grading. Felled trees, stumps, and other woody material would be disposed of by chipping and reuse of the wood chips, and/or sent to an off-site disposal area. Opportunities to recycle woody material for use elsewhere on the NMP3NPP site or for use by the public may be considered. Recycling opportunities could include cutting logs into firewood, using wood chips to mulch landscaped areas, using logs to line pathways, piling logs and brush in open fields to improve terrestrial wildlife habitat, and placing stumps (root wads) in wetland mitigation areas, or within stream channels to prevent bank erosion and enhance aquatic habitat.

Because of the need for grading broad contiguous areas of land to construct the power block, switchyard, and cooling tower, there will be no practicable opportunities to preserve individual trees within those areas. Silt fences will be erected around the perimeter of the construction footprint to reduce the potential for sedimentation of adjoining vegetated areas. Detailed specifications for the silt fences and vegetative stabilization will be presented in a Stormwater Pollution Prevention Plan (SWPPP) to be approved by the NYSDEC prior to site disturbance. Soil piles will be vegetated, covered with plastic, or bermed until removed during backfill and final grading activities. Monitoring of construction effluents and storm water runoff will be performed as required by the SWPPP, the SPDES permit, and other applicable permits obtained for construction.

Important Habitats:

The habitats on the NMP3NPP site that meet the criteria of important under NUREG-1555 (NRC, 1999) are forested wetlands, scrub-shrub wetlands, and emergent wetlands, all of which are protected under federal law, and some of which are protected under state regulations as well. The construction footprint was designed to minimize encroachment into these important habitats. However, site preparation will result in the permanent loss (filling) of approximately 60.7 acres (24.6 hectares) of wetland habitats, including approximately 48.8 acres (19.8 hectares) of forested wetlands, approximately 2.3 acres (0.9 hectares) of forested/scrub-shrub wetlands, approximately 6.6 acres (2.7 hectares) of scrub-shrub wetlands, and approximately 1.3 acres (0.5 hectares) of emergent wetlands. Wetland impacts are discussed in more detail in Section 4.3.1.3.

Important Plant Species:

Green Ash (Fraxinus pennsylvanica), Sugar Maple (Acer saccharum), American Beech (Fagus grandifolia), Silky Dogwood (Cornus amomum), and Poison Ivy (Toxicodendron radicans) were identified in Section 2.4.1 as important because they are key contributors to the overall structure and ecological function of forested plant communities on the NMP3NPP site. These species are common in the vicinity.

Green Ash is a fast growing tree that is dominant in the forested wetland areas at the site. Sugar Maple is moderate to slow growing and is dominant in successional upland areas and in areas of Beech-Maple Mesic Forest. It is also considered a commercially valuable species. American Beech is a slow growing tree that is also dominant in areas of Beech-Maple Mesic Forest. Trees and saplings at the site were generally observed to be approximately 30 to 70 feet tall. Several decades would likely be required before any replacement trees would attain these sizes. Therefore, the loss of trees, even in areas of only temporary disturbance where forest vegetation can be replanted, would be a long term, effectively permanent impact. However, forest cover types similar to the forest found at NMP3NPP are common in the vicinity of the site. The loss of this forest stand and the individual trees it contains would have only slight effect on the local populations of these species. Therefore, the impacts to these species would be SMALL, and would not require mitigation.

Shrub and herbaceous cover lost to permanent structures are also permanent. However, following temporary disturbance, these cover types can generally be restored to a pre-disturbance state in a few years through a combination of replanting, reemergence from the seed bank and re-colonization from similar habitats on nearby lands. Silky Dogwood and Poison Ivy were observed in many wetland areas of the site, with Poison Ivy also predominating in areas of Successional Hardwood Forest. These species are relatively fast growing, and are adapted to open light regimes; therefore, it is anticipated they would rapidly grow back in areas of temporary disturbance. Because these species are common and grow readily on disturbed sites, impacts to them would be SMALL, and would not require mitigation.

Trillium (Trillium sp.), baneberry (Actaea sp.), ground cedar (Diphasiastrum sp.), and native fern species (including Cinnamon Fern (Osmunda cinnamomea), Interrupted Fern (Osmunda claytoniana), Royal Fern (Osmunda regalis), Christmas Fern (Polystichum acrostichoides), Lady Fern (Athyrium filix-femina), woodfern (Dryopteris spinulosa complex), and Marsh Fern (Thelypteris palustris) are considered important plant species because they are listed as Exploitably Vulnerable by the New York Natural Heritage Program. These species are protected by the State of New York due to concerns about over-collection.

Trillium and baneberry were observed within the area of Beech-Maple Rich Mesic Forest. The entire Rich Forest area and all the plants it contains will be lost to construction. Ground cedar was observed within the existing transmission corridor and may be impacted during construction of the access road. Native fern species were scattered throughout upland and wetland areas of the site, including areas of proposed work. Most ferns also require forested conditions and will not regenerate in any temporarily disturbed areas unless those areas are returned to a mature forest cover type. However, there are only a limited number of individuals representing these Exploitably Vulnerable species at the NMP3NPP site. Therefore, impacts to these species as a whole would be SMALL, and would not require mitigation. No state or federally endangered or threatened plant species were identified on the site.

4.3.1.2 Fauna

The vegetation losses summarized in Table 4.3-1 and Table 4.3-2 will reduce the habitat available to mammals, birds, and other fauna that inhabit the NMP3NPP site and its surroundings. Most of the smaller, less mobile fauna such as small mammals, turtles, snakes, and amphibians will be killed displaced during the process of clearing, grubbing, and grading. Birds and other larger, more mobile fauna will be displaced to adjoining terrestrial habitats, which could experience temporary increases in population density of certain species. If the increases exceed the carrying capacity of those habitats, the habitats could experience degradation and the displaced fauna could compete with other fauna for food and cover, resulting in a die-off of individuals until populations decline to below the carrying capacity. Because the construction of the power block and its supporting infrastructure requires the permanent removal of the existing natural cover present on the site, impacts due to habitat loss must be considered unavoidable and irreversible.

Construction activities will also impact the remaining habitats adjacent to the NMP3NPP site during the construction phase. Impacts will derive from noise generated by construction activities, activity (i.e., movements by people, equipment, and vehicles), and the physical presence of vehicles bringing people and supplies to and from the construction site. Noises that are sudden, loud, and occur unpredictably will have the greatest impacts. However, all noise is expected to attenuate below the 80 to 85 dBA threshold at which wildlife life behavior is most affected, within 158 ft (48 m) of the site.

Impacts which are perceived visually will be attenuated by the dense forest vegetation that surrounds the site. Impacts due to the physical presence of vehicles and heavy equipment are restricted to the vehicle's immediate locality, but include collisions by wildlife species that may result in injury or death. However, this type of mortality is generally believed to be compensatory, rather then additive for species with moderate to large populations (Bennett, 1991), and is unlikely to have long-term effects on animal populations in the habitats surrounding the NMP3NPP site. The potential for collisions by birds with elevated construction equipment (e.g., cranes) is low because the activity and noise associated with this equipment will deter resident and migrating birds for using the construction area, although poor aviation conditions (i.e., low ceiling, fog) may occasionally create conditions where some migrating birds do collide with this type of equipment.

Potential impacts to specific fauna species observed during on-site surveys and identified in Section 2.4.1 as important under NUREG-1555 (NRC, 1999) are discussed below.

White-tail Deer: White-tail Deer (Odocoileus virginianus), which are identified in Section 2.4.1 as important because of their recreational value to hunters, are present throughout the NMP3NPP site and throughout New York. When deer populations exceed the carrying capacity of forested habitats shrubs and saplings can be killed or stunted by over-browsing. Deer browsing at the NMP3NPP site is currently moderate. Displaced deer can be expected to cause greater browsing and trampling of the understory of forested areas surrounding the proposed construction. The potential for increased browsing by displaced deer could be at least partially reduced if hunting activity increases in response to the increased deer populations in the vicinity of the NMP3NPP site. The potential loss of a few individuals and a limited amount of habitat will have not have a detectable effect on the local population of species that is adaptable to a wide range of habitat conditions. Therefore, impact to this species would be SMALL, and would not require mitigation.

Beaver: Beaver, which are identified in Section 2.4.1 as important because of their role in shaping the structure an function of ecosystems, were never directly observed on-site, although recent sign was noted throughout the site. This species is abundant throughout New York State, and is adaptable to a wide variety of habitat conditions, so long as water and woody plants are available to provide food and cover. Although the construction of NMP3NPP will result in the loss of good quality beaver habitat, wetlands and forests are abundant in the vicinity of the NMP3NPP, and the relatively small reduction in the amount of habitat for the local beaver population beaver will cause only a SMALL impact to this species.

Northern Leopard and Pickerel Frogs: The Northern Leopard frog (Rana pipiens) and the pickerel frog (R. palustris), identified in Section 2.4.1 as important due to their potential to act as indicators of ecosystem function, are present throughout the NMP3NPP wetlands. These two species depend on permanent aquatic habitats for over-wintering and reproduction, and use adjacent upland habitats extensively during the summer months. Development of NMP3NPP will result in the loss of wetlands that serve as over-wintering and breeding areas significant to local frog populations, in turn causing a decrease in the frog population.

If construction of NMP3NPP creates secondary or indirect impacts (e.g., negative changes in water regime, water quality, or upland habitat quality) that extend beyond the foot print of the project area, the population losses to these two species could be commensurately larger. Loss of individuals and habitat within the immediate footprint of the proposed project would be a MODERATE impact, a measurable loss at the local level, but without a destabilizing effect on the local ecosystem. Secondary or indirect impacts as a result of project development that reduced habitat quality outside of the project footprint and consequently reduced frog populations outside of the project footprint would be a LARGE impact that could potentially impact ecosystem function. Frogs are an important prey item for many other species. These types of impacts illustrate the role of these species as ecosystem indicators, and would require mitigation.

Pied-billed Grebe: The Pied-billed Grebe (Podilymbus podiceps) meets the criteria of important because of its status as a state-listed threatened species. As described in Section 2.4.1, the population of this species in the Northeast is small, but appears stable. This species was identified as present on the NMP3NPP site in the open-water wetland areas east of the transmission line right-of-way (ROW). This area will not be subject to any direct impacts from the construction of NMP3NPP. Because the construction delivery track and new access road cross wetlands and waterways that are hydrologically connected to this wetland area, the potential for indirect impacts exists. Appropriate design of all wetland and water way crossings will prevent long-term indirect effects due to altered hydrology, while best management practices during construction will prevent short-term indirect effects due to erosion or siltation, and consequently any impacts that occur to this species would be SMALL. No other mitigation is needed to prevent impacts to this species.

Osprey: Osprey (Pandion haliaetus) meets the criteria of important because of its status as a state-listed Species of Special Concern. A pair of breeding Osprey was present at the NMPNS site, in both the 2007 and successfully fledged at least two young in the 2008 nesting seasons, using a nest built on one of the transmission line towers adjacent to the proposed access road ROW (Figure 2.4-4). Osprey tend to return and reuse nests from previous years. The nest site will be subject to disturbance during construction of the new access road for NMP Units 1 and 2. Although osprey are known to be tolerant of moderate amounts of human induced disturbance, the resident birds are likely to be displaced by active construction.

Depending on the response of the resident birds to construction of the project, impacts to this pair could range from SMALL (minor changes in behavior that do not lead to nest failure) to LARGE (nest abandonment). The NYSDEP may request that construction activities be timed to minimize disturbance to the nest site during the active nesting period. Once construction is complete, the resident birds may acclimate to the activity associated with the new road, so long as construction does not materially alter either the nest site or the food resources (adjacent wetlands) that initially attracted the birds. As described in Section 2.4.1, the Osprey population in western New York State is stable, and the impact of NMP3NPP on the population as a whole would be SMALL.

Golden-winged warbler: The Golden-winged Warbler (Vermivora chrysoptera) meets the criteria of important because of its status as a state-listed Species of Special Concern. As described in Section 2.4.1, this species is currently undergoing a range-wide population decline due to loss of habitat. This species was identified as present on the NMP3NPP site in a park-like area (open grassy areas mixed with shrubs and trees) located within the footprint of the proposed power block (Figure 2.4-4). This habitat patch will be eliminated by construction of the project. However, if the initial grading/grubbing of the site occurs during the non-breeding season (September-April), this migratory species will not be present on site, and will not be directly harmed. Other potentially suitable areas of habitat for breeding Golden-winged Warblers exists in other locations on-site, primarily within the transmission line ROW. Most migratory avian species return to the same locations to breed each year. The individuals using the eliminated habitat patch are likely to relocate to other suitable habitat area in the vicinity of the site after construction commences. The impact to this species would be small, and would not require mitigation.

Grasshopper Sparrow: The Grasshopper Sparrow (Ammodramus savannarum) meets the criteria of important because of its status as a state-listed species of special concern. As described in Section 2.4.1, this species is currently undergoing a population decline in the Northeast due to a loss of habitat. This species was identified as present on the NMP3NPP site in an open, grassy area located at the northern end of the transmission line ROW (Figure 2.4-4). This location is structurally suitable for Grasshopper Sparrows but marginal in terms of its size and there are no other areas of habitat on-site that meet the structure and size criteria for breeding grasshopper sparrows. Although no structures are proposed within this area, it is likely to be used as a staging area during construction, and remain otherwise unsuitable for grasshopper sparrows post-construction. If the initial grading/grubbing of the site occurs during the non-breeding season (September-April), this migratory species will not be present on site, and will not be directly harmed. Any Grasshopper Sparrows returning to the NMP3NPP site to breed will have to seek suitable habitat elsewhere in the vicinity. The impact to this species would be SMALL, and would not require mitigation.

Bird Collisions: Birds strikes on a variety of manmade objects, including cooling towers, are a known source of avian mortality. Nocturnal migrants suffer the majority of the avian mortality caused by collision with cooling towers; locally resident birds, who are generally active during daylight hours only, strike cooling towers rarely (NRC, 1996). Therefore, although no data on bird-strikes have been collected for the NMP Unit 2 cooling tower, it is reasonable to assume that the substantial populations of locally resident birds in the area surrounding then NMP3NPP site are not at risk for striking the proposed NMP3NPP cooling tower. Likewise, migrants passing through the area would be expected to strike the NMP3NPP tower occasionally, especially during period of adverse aviation conditions (e.g. fog, low ceiling).

The NMP3NPP cooling tower is not expected to cause substantial bird mortality due to collisions. Although infrequent bird collisions are likely, as discussed above, the overall mortality potentially resulting from bird collisions with cooling towers in general is reported to have only minor impacts on bird species populations. A review of the literature for avian collision mortality associated with all types of man-made objects as well as the monitoring studies conducted at six nuclear power plants concluded that (1) avian mortality associated with cooling towers is a very small part of the total mortality and (2) local bird populations are not being significantly reduced (NRC, 1996).

Measures such as reducing the lighting on the cooling tower to the minimum required by the Federal Aviation Administration and using flashing lights instead of floodlights have been shown to be effective in reducing the incidence of bird collisions (Ogden, 1996). No other mitigation appears to be necessary to prevent substantial adverse impacts to bird populations caused by collisions with the cooling towers.

The construction of the on-site transmission lines could injure birds if they collide with the new conductors or towers or by electrocution if birds with large wingspans contact more than one conductor (i.e., cross phases). However, the transmission line connections will be constructed in, and adjoining other developed areas, and would not fragment natural bird habitats. Regularly occurring noise from human activity will also discourage frequent visitation by birds. The new towers would not be higher that the existing towers on the NMP3NPP site, and thus would be no more likely to increase bird collisions than the existing towers. The any avian collision impacts would be small and not require mitigation.

No new off-site transmission corridors and no off-site areas are impacted since no changes are required to the existing transmission lines or towers.

4.3.1.3 Wetlands

Figure 4.3-1 depicts the extent and type of wetlands that will be impacted by permanent or temporary construction activities. The construction footprint for the proposed facilities has been designed to minimize encroachment into areas delineated as wetlands or other waters of the U.S. However, construction of the proposed facilities would not be possible without permanently filling approximately 3549 linear feet (1081 m) of intermittent and perennial stream channels and approximately 66.01 acres (26.7 hectares) of the delineated wetland areas. The project would therefore require an Individual Permit under Section 404 of the Federal Water Pollution Control Act (USC, 2007) from the Buffalo District of the U.S. Army Corps of Engineers (USACE).

Freshwater wetlands mapped by NYSDEC are regulated under Article 24 of New York State's Freshwater Wetlands Act. Article 24 regulates draining, filling, construction, pollution or any activity that substantially impairs any of the functions and values provided by wetlands. Jurisdictional wetlands are generally 12.4 acres (5.0 hectares) or larger, although smaller wetlands that have been determined to have unusual importance locally are also protected. The project will require a permit for work within 100 ft (30.5 m) of an Article 24 wetland that infringes on or significantly affects the wetland. Both USACE and NYSDEC require compensatory mitigation for the loss of wetland resources. Proposed wetland mitigation measures are discussed in Section 4.3.1.6.

Most of the permanent wetland impacts Figure 4.3-2 would take place in Wetland Assessment Areas A, AA, B, BB, C, CC, D, and DD and are described in the Wetland Investigation Report (AREVA, 2008). Portions of Wetland Assessment Areas EE/FF/GG, MM, and JJ/WW, PP/QQ, RR, SS, TT/YY, and UU/VV would also be permanently impacted. Temporary impacts would occur to portions of Wetland Assessment Areas A, EE/FF/GG, and KK. No part of Wetland Assessment Areas E, HH, JJ/WW, and XX would be directly impacted. Impacts to each of the affected wetland assessment areas are described below, and include a discussion of wetland functions and values which were identified during the field delineations of the NMP3NPP wetland areas. The functions and values assigned to each wetland are defined in the U.S. Army Corps of Engineers Wetland Functions and Values guidance document (USACE, 1999).

NYDEC Regulated Wetland Buffer Zones

There are a total of 183.1 acres (74.2 ha) of NYDEC regulated wetland buffers within the Wetlands Study Area. These buffers are associated with Wetland Assessment Areas D, EE/FF/GG, JJ/WW, KK, PP/QQ, RR, SS, TT, UU/VV, and YY. A total of 9.6 acres (3.9 ha) of the buffer area will be temporarily impacted during construction, and 24.9 acres (10.1 ha) will be permanently impacted. Impacts to the buffer are present as a whole, rather then by Wetland Impact Assessment Area as the configuration of the wetland areas within the study area prevents buffer areas from being discretely assigned to a single Wetland Assessment Area, Impact to wetland buffer by project component are listed in Table 4.3-1.

Wetland Assessment Area A:

Construction of the power block, water treatment facility, cooling tower, roads, and Stormwater Pond #2 will fill 25.9 acres (10.5 hectares) of forested wetland in Wetland Assessment Area A, and 1801 linear feet (549 m) of intermittent stream channel, including a ponded area of the stream, located south of the existing meteorological tower. In addition, construction of a concrete batch plant will temporarily disturb 5.6 acres (2.3 hectares) of forested wetland in this assessment area.

Eight functions were identified for Wetland Assessment Area A: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, production export, sediment/shoreline stabilization, and wildlife habitat. No values were identified for this assessment area. Of the functions observed, floodflow alteration, sediment/toxicant reduction, nutrient removal, sediment/shoreline stabilization, and wildlife habitat were considered principal. Given that all of Wetland Assessment Area A will be disturbed, and most of this wetland will be permanently filled, the identified functions will be lost, resulting in a decrease in quality wildlife habitat and other important functions in the local area.

Wetland Assessment Area AA:

Grading to construct the switchyard and vegetation removal associated with construction of new transmission line corridor will permanently impact the entire 2.1 acres (0.8 hectares) of forested/scrub-shrub wetland that constitutes Wetland Assessment Area AA. One function (wildlife habitat) and no values were identified for this assessment area. Wildlife habitat was not considered to be a principal function. The affected area currently receives runoff from the shooting range, and has no apparent connection to other wetland systems. Given these factors, and the relatively small size of this wetland area, the loss of Wetland Assessment Area AA represents a minimal loss of wetland functions and values.

Wetland Assessment Area B:

Construction of the power block, permanent parking areas, and Stormwater Pond No. 1 will fill 14.4 acres (5.8 hectares) of Wetland Assessment Area B. This area consists of forested wetland, and includes 815 linear feet (248 m) of intermittent stream channel that will be filled and eliminated. Eight functions were identified for Wetland Assessment Area B: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, production export, sediment/shoreline stabilization, and wildlife habitat. In addition, the function and values assessment identified one value, uniqueness/heritage, based on the presence of a perennial stream within this assessment area. Of the functions/values identified, the following were categorized as principal: groundwater recharge/discharge, floodflow alteration, sediment/toxicant reduction, nutrient removal, sediment/shoreline stabilization, and wildlife habitat. The proposed work will result in the loss of approximately 80% of Wetland Assessment Area B, and consequently will cause a substantial reduction in the functions and values associated with this wetland area.

Wetland Assessment Area BB:

The construction of roads and railroad tracks will require the filling of almost all of Wetland Assessment Area BB. The impacted area consists of approximately 3.2 acres (1.3 hectares) of forested/scrub-shrub wetland. Wildlife habitat was the only function and no values were identified for this assessment area. Wildlife habitat was identified as a principal function based on several factors, including high density of vegetation, the presence of wildlife food sources, and high use or potential use by avian species. Consequently, the loss of Wetland Assessment Area BB will reduce the local availability of quality wildlife habitat.

Wetland Assessment Area C:

Wetland Assessment Area C, which consists of a man-made pond occupying 0.1 acres (>0.1 hectares), will be filled and eliminated by construction of the power block. Wildlife habitat as the only function and no values were identified for Wetland Assessment Area C. The Wildlife habitat function was not reported to be principal. Given that this wetland is apparently man-made, and given its limited wildlife habitat value, the loss of Wetland Assessment Area C is not anticipated to result in a substantial reduction in wetland functions/values in the local area.

Wetland Assessment Area CC:

Grading for construction of the power block and switchyard will require filling Wetland Assessment Area CC, eliminating 1.0 acres (0.4 hectares) of scrub-shrub wetland. Wildlife habitat was identified as the only function and no values were identified for this assessment area. Wetland Assessment Area CC consists of an isolated scrub-shrub wetland that receives runoff from Lake Road and from adjacent developed areas. However, wildlife habitat was reported to be a principal function provided by this area based on the observation of plant/animal indicator species and animal signs. Therefore, the loss of Wetland Assessment Area CC will reduce the local availability of quality wildlife habitat.

Wetland Assessment Area D:

Construction will require filling all of Wetland Assessment Area D, consisting of 0.3 acres (0.1 hectares) of state-regulated, forested wetland. Wildlife habitat was the only function/value identified for this assessment area, and was not identified as a principal function. Given the small size of Wetland Assessment Area D, and its limited habitat value, its loss is not anticipated to result in a substantial reduction in the local availability of quality wildlife habitat.

Wetland Assessment Area DD:

Construction will require filling all of Wetland Assessment Area DD, which comprises 0.9 acres (0.4 hectares) of forested wetland. Wildlife habitat was the only function and no values were identified for this assessment area. Wildlife habitat was not considered to be a principal function. Given the limited functions and values associated with this wetland assessment area, the loss of this area is not anticipated to result in a substantial reduction in wetland functions in the local area.

Wetland Assessment Area EE/FF/GG:

Construction of roads and a stormwater pond, and other unspecified construction will fill 7.6 acres (3.1 hectares) of state-regulated forested wetland in Wetland Assessment Area EE/FF/GG, including portions of a vernal pool and a man-made pond, and 933 linear feet (284m) of perennial stream channel. The wetland functions and values assessment identified seven functions (groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, sediment/shoreline stabilization, and wildlife habitat) and one value (visual quality/aesthetics) associated with Wetland Assessment Area EE/FF/GG. All of these functions/values were considered to be principal except sediment/shoreline stabilization and visual quality/aesthetics. Given the relatively small proportion of Wetland Assessment Area EE/FF/GG that will be impacted, the existing functions/values will generally be preserved. However, some locally important wildlife habitat will be lost from the filling of a vernal pool.

Wetland Assessment Area KK:

Construction will temporarily impact 0.9 acres (0.4 hectares) of state-regulated forested wetland within Wetland Assessment Area KK. The wetland functions and values assessment identified wildlife habitat as the only function for Wetland Assessment Area KK, and no values were identified. None of the functions were identified as principal. The clearing of trees within this area will result in a long term, alteration to wildlife habitat. However, given the relatively small size of this area and its limited wildlife habitat value, the proposed work will not substantially reduce the local availability of quality wildlife habitat.

Wetland Assessment Area MM:

Wetland Assessment Area MM contains a total of 15.0 acres (6.1 hectares) of shrub-scrub wetland. The construction of roadways in the eastern portion of the site will require the filling of 3.4 acres (1.4 hectares) of this Wetland Assessment Area. Two functions, groundwater recharge/discharge and wildlife habitat, and no values were identified for this wetland assessment area. Wildlife habitat was identified as a principal function based on several factors, including high density of vegetation, and high use or potential use by avian species. Although most of this Wetland Assessment Area will be preserved, the quality of wildlife habitat will be reduced due to fragmentation from the roadway.

Wetland Assessment Area PP/QQ:

Wetland Assessment Area PP/QQ contains a total of 8.6 acres (3.5 hectares) of state-regulated shrub-scrub wetland, and approximately 0.73 acres (0.30 hectares) will be filled for construction of roadway. Based on the wetland functions and values assessment, Wetland Assessment Area PP/QQ provides two functions (groundwater recharge/discharge and wildlife habitat) and no values. Wildlife habitat was identified as a principal function based on several factors, including the presence of surrounding upland wildlife habitat, the high density of vegetation in the wetland, and the high use or potential use of this area by avian species Most of this wetland assessment area will be preserved; however the proposed roadway will result in some fragmentation of wildlife habitat.

Wetland Assessment Area RR:

Wetland Assessment Area RR contains a total of 0.3 acres (0.1 hectares) of state-regulated shrub-scrub wetland, and roadway construction will fill 0.1 acres (>0.1 hectares) of it. The wetland functions and values assessment identified three functions (floodflow alteration, nutrient removal, and wildlife habitat) and no values for this assessment area. None of the functions were considered principal. Although the proposed impacts will result in some decline in the functions of this wetland assessment area, they are not anticipated to result in a substantial reduction in wetland functions/values in the local area.

Wetland Assessment Area SS:

Wetland Assessment Area SS contains a total of 1.4 acres (0.6 hectares) of state-regulated shrub-scrub wetland, and Roadway construction in the eastern portion of the site will permanently impact 0.4 acres (0.2 hectares). Two functions were identified for Wetland Assessment Area SS: fish/shellfish habitat and wildlife habitat. In addition, one value, uniqueness/heritage, was identified given the proximity of this area to a perennial stream. Of the functions/values identified, only wildlife habitat was categorized as principal, based on connection of this wetland with other wetland systems and the observation of plant/animal indicator species and animal signs. Impacts to Wetland Assessment Area SS will limited to the western portion of this area, but there will be some decline in the wetland functions and values of this area and some reduction in the quality of wildlife habitat in the local area. Therefore, there will be some decline in the wetland functions and values of this area and some reduction in the quality of wildlife habitat in the local area.

Wetland Assessment Area TT/YY

Wetland Assessment Area TT/YY contains a total of 3.4 acres (1.4 hectares) of state-regulated emergent marsh. Approximately 0.3 acres (0.1 hectares) of wetland and 260 linear feet (79 m) of perennial stream channel will be filled for construction of roadway in Wetland Assessment Area TT/YY. Seven functions were identified for Wetland Assessment Area TT/YY: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, sediment/shoreline stabilization, and wildlife habitat. In addition, one value, uniqueness/heritage, was identified, based on the presence of a perennial stream within this assessment area. Of the functions/values identified, the following four were categorized as principal: fish/shellfish habitat, sediment/toxicant reduction, sediment/shoreline stabilization, and wildlife habitat. Impacts will be limited to the eastern portion of Wetland Assessment Area TT/YY Because only a small portion of the wetland will be filled, Wetland Assessment Area TT/YY will still retain its functions/values, although at a reduced level.

Wetland Assessment Area UU/VV

Wetland Assessment Area UU/VV contains a total of 2.4 acres (0.9 hectares) of state-regulated emergent marsh. Roadway construction will permanently impact 0.3 acres (0.1 hectares) of state-regulated emergent marsh and 61 linear feet (19 m) of perennial stream channel in Wetland Assessment Area UU/VV. Wetland Assessment Area UU/VV is part of a large wetland area that extends off-site to the east. This assessment area includes only the portion of the wetland area that is located on-site. According to the wetland functions and values assessment, Wetland Assessment Area UU/VV provides the following seven functions, all of which are considered principal: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, production export, and wildlife habitat. In addition, two values (uniqueness/heritage and visual quality/aesthetics) are associated with this area, although not considered principal. The impacts to Wetland Assessment Area UU/VV will be confined to the western most portions of the wetland. Given the limited impacts that are proposed in this area and the large size of the adjoining off-site wetlands that will remain, the loss of wetland functions and values will be minimal.

Additional Wetland Assessment Areas

An additional 10.3 acres (4.2 hectares) of wetlands were delineated in the northeastern portion of the Study Area, but their functions and values were not characterized. Therefore, these wetlands are denoted as "Unclassified" in Figure 2.4-1. A total of 1.7 acres (0.7 hectares) of this wetland type will be permanently filled by construction of the project.

Summary of Impacts to Wetland Functions and Values

The project will permanently or temporarily impact approximately 74.9 acres (30.3 hectares) of wetlands. Ten functions and values will be affected: groundwater recharge/discharge, floodflow alteration, fish/shellfish habitat, sediment/toxicant reduction, nutrient removal, production export, sediment/shoreline stabilization, wildlife habitat, uniqueness/heritage and visual quality/aesthetics. The functions that will be most affected from the loss of wetlands at the site are wildlife habitat, sediment/toxicant reduction, floodflow alteration, nutrient removal, and sediment/shoreline stabilization. These were considered principal functions in most of the wetland assessment areas that will be impacted. Each of these functions was identified as principal for more than half of the total wetland acres that will be impacted. No wetland values were identified as principal in any of the wetland assessment areas. Impacts to the wetlands on the NMP3NPP site as a result of project construction are LARGE; the effects are clearly noticeable and would have a destabilizing effect on the functions that these wetlands currently serve, and potentially on other wetlands hydrologically connected to the NMP3NPP site. Because of the magnitude of these impacts the NYDEC and USACOE permits needed to construct the project will require a substantial mitigation commitment. In order to issue a permit, the regulatory agencies will require that the net effect of the mitigation reduce the impacts to a SMALL level. The required mitigation must compensate for the lost functions, and to minimize indirect affects to adjacent wetland lands and uplands. Potential mitigation approaches are discussed below in general terms, but will be specified in the terms of the NYDEC and USACOE permits.

4.3.1.4 Other Projects Within the Area with Potential Impacts

There are two planned, non-federal actions in the region with the potential to impact resources in the region. These projects include a proposed new coal gasification plant located in the Town of Scriba and the NMP Unit 2 power uprate. As discussed in Section 2.8, it is reasonable to conclude that any cumulative environmental impacts involving these projects and the proposed NMP3NPP facility would be SMALL.

4.3.1.5 Consultation

Affected federal, state and Regional agencies will be contacted regarding the potential impacts to the terrestrial ecosystem resulting from plant construction. The New York Natural Heritage Program (NYNHP), operated by the New York Department of Environmental Services, was consulted for information on known occurrences of federally-listed and state-listed threatened, endangered, or special status species and critical habitats (NYSDEC, 2008) Additionally, the USFWS NY Field Office's (NYFO) website (USFWS, 2008) was consulted for a listing of all species with federal status known to occur in Oswego County. Subsequent to the check of the website, contact was made with USFWS NYFO personnel, regarding the status of bog turtles in the vicinity of NMP3NPP. A survey to determine bog-turtle habitat suitability on-site was recommended and the survey was conducted in July 2008, and no suitable habitat for bog turtles was observed. Additional consultation with USFWS will be required as part of the project's permitting phase, as well as to meet the requirements of the Fish and Wildlife Coordination Act of 1958 and the Migratory Bird Treaty Act (CFR, 1989)

4.3.1.6 Mitigation Measures

Opportunities for mitigating unavoidable impacts to terrestrial ecosystems involve restoration of natural habitats temporarily disturbed by construction, creation of new habitat types in formerly disturbed areas, as well as enhancement of undisturbed natural habitats. Mitigation plans will be developed in consultation with the applicable federal, state and local resource agencies and will be implemented on the NMP3NPP site to the extent practicable. The description of mitigation measures is addressed below for fauna, uplands, and wetland areas.

Fauna:

Mortality of amphibians, reptiles and small mammals is unavoidable, but starting at the center of the site and working out to edges would give some individuals the opportunity to escape the construction area into adjacent habitats that will be undisturbed. Measures designed to reduce impacts to wildlife species that met the criteria of important under NUREG-1555 (NRC, 1999) are described in the discussion of each species in Section 4.3.1.2.

Upland Areas:

Mitigation of temporary and permanent impacts to upland areas Table 4.3-1 will consist of reforestation were appropriate, as well as development of other natural vegetation types. Ongoing vegetation management in the transmission line ROW will keep the unforested upland that is not impacted by the construction of NMP3NPP as shrubby, old field habitat, maintaining site biodiversity and providing potentially suitable golden-winged warbler nesting habitat.

If areas are available for reforestation, the process will be designed to ultimately generate a mixed deciduous forest. Up to 52.8 acres (21.4 hectares) are potentially available for reforestation. Northern hardwood forest is the climax vegetation, i.e., the permanently-sustaining vegetation that would result following an extended period without disturbance, for uplands in the Lake Ontario coastal zone, including Oswego County. Reforested areas would be designed to ultimately yield a cover of mature deciduous forest.

An optimal mix of trees for planting would include species present in the existing deciduous forest that are tolerant of full sunlight, relatively fast growing, easily transplanted and widely available as nursery stock. Shade tolerant trees, as well as understory and groundcover vegetation typical of local deciduous forests would likely become established over time via natural re-colonization processes. The floristic composition of the stands will gradually approach that of the existing deciduous forest on the NMP3NPP site, a process that could require more than 100 years. Sugar maple, beech, and other shade-tolerant climax species would be expected to voluntarily establish in the shade of the stand as their nuts are dispersed naturally by squirrels and other wildlife. Poison ivy, the most common ground cover species at NMP3NPP would be expected to rapidly re-establish itself in these regenerating stands, due to its tolerance for a wide range of growing conditions and the large seed bank on-site. Other ground cover species would be expected to re-establish only slowly, as they have narrow growth requirements and are relatively uncommon on-site, limiting the available seed bank.

The exact locations and habitat types replanted at on-site mitigation locations will be determined at a later date. Field surveys will be needed during construction activities to determine the most appropriate areas to use for on-site mitigation to compensate for impacted forested and other naturally vegetated areas (meadows, shrub/scrub). As stated previously, mitigation plans will be developed in consultation with the State and local resource agencies.

Wetlands:

Wetland mitigation in New York is driven primarily by conditions established by the USACE and NYSDEC in permits issued under Section 404 of the Federal Water Pollution Control Act (USC, 2007) and 24 of New York State's Freshwater Wetlands Act. All compensatory mitigation proposed as part of the NMP3NPP project will conform to requirements of the USACE and U.S. Environmental Protection Agency's March 2008 final national guidance on compensatory wetland mitigation (USACE/USEPA, 2008). Mitigation meeting the standards of this 2008 national policy should fulfill the requirements for mitigation of both the USACE and the NYSDEC.

Wetland mitigation follows a sequencing process beginning with avoidance of wetland impacts, then minimization of wetland impacts, and lastly compensatory mitigation to offset impacts. The proposed facilities have been sited, and the proposed construction has been configured, to avoid encroaching into wetlands and a surrounding 100 ft (30.5 meter) wide buffer to the extent possible. Other factors such as keeping NRC-required buffers within the NMP3NPP site boundaries, and situating the power block close to the existing NMP Unit 1 and

Unit 2 were considered; hence the wetland impacts detailed above must be considered unavoidable.

Several measures will be taken to minimize the unavoidable adverse effects to wetlands. The use of silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices as described in Section 2.3.3 would reduce the risk of sediment runoff into intact wetlands adjoining the areas of fill. The proposed stormwater retention basins would be unlined impoundments, vegetated with regionally indigenous wetland grasses and herbs, with simple earth-fill closure on the down stream end and could include discharge piping to the adjacent watercourses.

Mitigation will compensate for the loss of the particular wetland types that will be impacted and for the loss of the functions and values associated with those wetlands. The types of wetlands at the site were classified using the U.S. Fish & Wildlife Service's Coward classification system (USACE, 1987), and include forested, scrub-shrub, emergent marsh, and open water (Figure 4.3-1). Most of the impacted wetlands are forested. Therefore, mitigation areas as provided in compensation for the proposed impacts will be designed to provide predominantly palustrine forested wetland conditions over time, and will include smaller components of scrub-shrub, emergent, and open water wetlands as well as upland habitat.

The functions and values provided by the impacted and partly impacted wetlands are summarized in Section 4.3.1.3, and include wildlife habitat, sediment/toxicant reduction, floodflow alteration, nutrient removal, sediment/shoreline stabilization, uniqueness/heritage and visual quality/aesthetics. The compensatory wetland mitigation areas will be designed to provide the same functions and values as those lost in the impacted areas.

As wetland impacts are further refined and evaluated, a comprehensive wetland mitigation plan will be prepared, including plans, graphics, and text descriptions of the proposed compensatory wetlands. This may require extensive land survey and hydrologic monitoring of ground and surface waters at the candidate mitigation sites. The Section 404 permit application filed with the USACE and the Article 24 permit filed with the NYSDEC will contain a wetlands mitigation plan and a means for long term maintenance of mitigated wetlands as well as a method to monitor their success or failure. Mitigation plans will be developed in consultation with the federal, state and local resource agencies.

To the extent possible, on-site, in-kind mitigation will be provided to offset permitted wetland impacts. However, land in the NMP3NPP Owner Controlled Area that is potentially available and suitable for on-site mitigation may provide only 10 to 20% of the total required mitigation for the NMP3NPP project. Therefore, on-site mitigation will need to be supplemented with one or more mitigation alternatives to compensate for proposed impacts. Potential mitigation alternatives include the following:

Off-Site Mitigation: Compensatory wetland mitigation away from the NMP3NPP site. If acquired within the same watershed as the site, off-site mitigation may provide an acceptable method of compensation. Mitigation ratios are typically increased with distance from the original wetland impact.

Restoration and Enhancement: Active restoration of degraded wetlands. Approximately 2 to 3 acres (1 to 1.5 hectares) of degraded wetlands are available for restoration at the NMP3NPP site. Included in this area are wetlands that are dominated by the invasive Common Reed (Phragmites australis). Eradicating Common Reed and restoring regionally indigenous wetland vegetation in these areas would enhance the ecological integrity of the local environment. In addition, several stream channels in some peripheral parts of the NMP3NPP site have become scoured by runoff. Eroding channel banks could be stabilized and runoff could be diverted from streams to improve these areas. Off-site wetlands could also be restored and enhanced.

Wetland/Upland Preservation: Up to several hundred acres (one hundred hectares) of land east of the NMP3NPP site within the Owner Controlled Area could potentially be used to offset direct wetland impacts through preservation or through a combination of preservation and wetland creation.

In Lieu Fees: In lieu fee programs involve direct payment of money to an escrow account, which the regulatory agency may then disburse for other wetland restoration and enhancement programs or any number of potential wetland preservation and restoration uses, including research. This mitigation alternative is unlikely to be used, as it is not established or generally accepted in the State of New York and is not likely to be widely supported by regulators.

Wetland Mitigation Banking: Wetland mitigation banks are wetland areas designed, created, and maintained in perpetuity solely for the purpose of providing compensatory mitigation. Although wetland mitigation banks are not an established or currently accepted practice in New York, they will be considered given that the 2008 national guidance on compensatory wetlands mitigation focuses extensively on the use of mitigation banks given their high success rates.

4.3.1.7 SUMMARY

Considering all mitigation measures described above, the net level of unavoidable adverse impacts on terrestrial ecology as a whole from construction of the NMP3NPP project is expected to be SMALL.

4.3.2 AQUATIC ECOSYSTEMS

This section provides an assessment of the potential impact construction activities will have on aquatic ecosystems on-site. As described in Section 4.2.2.2, construction of NMP3NPP will permanently destroy some of the existing surface water bodies. A total of 0.58 acres (0.28 hectares) of on-site water bodies, 2644.6 linear feet (806.1 m) of intermittent and 932.6 linear feet (284.3 m) of permanent stream channel stand to be impacted by the construction of NMP3NPP. Construction impacts to the existing surface water bodies are summarized as follows:

The permanent loss of affected aquatic habitat of 0.58 acres (0.28 hectares) is small compared to the 161.8 acres (66.5 hectares). Figure 4.3-3 shows the land to be cleared, the waste disposal area and the construction zone. A topographic map is provided as Figure 2.3-16 showing the important aquatic habitats, including the areas along waterbodies that will be affected. A similar analysis is discussed for wetlands in Section 4.3.1.

4.3.2.1 Impacts to Impoundments and Streams

The construction footprint of NMP3NPP includes many separate wetland and surface water areas. The effects of construction to on-site wetlands are described in Section 4.3.1. Construction effects to aquatic habitats in the immediate area range from temporary disturbance to complete elimination. The following surface water bodies will be affected by construction activities:

- Lakeview Creek, draining subarea A in the watershed (Figure 2.3-16)

- Intermittent unnamed stream and associated pond south of existing meteorological tower north of Lake Road drainage subarea D in the watershed (Figure 2.3-16)
- Unnamed stream draining subarea C in the watershed (Figure 2.3-16)
- Beaver pond, located south of the existing meteorological tower.
- Pond, possibly man-made, located at the southeast corner of the abandoned baseball field north of Lake Road.
- Pond, remnant of old rock quarry located south of Lake Road near a former construction laydown area.
- Lake Ontario.

As described in Section 4.2.2.2, construction of NMP3NPP will permanently destroy some of the existing surface water bodies. Based on the Site Utilization Plot Plan and the wetlands report it is possible to determine which wetlands will be impacted by the construction of NMP3NPP. Construction impacts to the existing surface water bodies are summarized as follows:

- Increasing runoff from the creation of impervious and relatively impervious surfaces 161.8 acres (66.5 hectares) for the NMP3NPP power block pad, cooling tower pad, switchyard, laydown, and parking areas;
- Infilling and eliminating the man-made pond located northeast of the abandoned baseball field (labeled as wetland 'A' in the wetlands report under the proposed containment structure;
- Infilling and eliminating the unnamed stream located north (subarea D) as well as the associated beaver pond south of the current meteorological tower and north of Lake Road (listed as wetlands 'A' and 'B' in the wetlands report for the relocation of a road northeast of the proposed plant, the mechanical draft cooling tower, construction offices and warehouses, construction office parking, and stormwater pond #1;
- The infilling and elimination or alternation of the old quarry pond northeast of the past construction laydown area (labeled wetlands due to the placement of the switchyard or the transmission lines and associated right-of-way;
- Lakeview Creek will potentially be impacted directly by the creation of a road and construction supply rail that will cross over the stream south of the proposed plant and potentially by the placement of a topsoil disposal area near the stream. Additionally, several wetlands that drain into the stream will be destroyed for the creation of roads, rails, construction laydown areas, construction and permanent parking, and stormwater pond #3;
- Wetlands removal and disruptions; and
- Possibly increasing the sediment loads into the proposed impoundments and downstream reaches.

The effect of the site grading plan on the overall watershed drainage configuration is not anticipated to be significant in that the flow and direction of Lakeview Creek and the subarea C watercourse will remain substantially the same. The downstream area of the smaller subarea D watershed will undergo substantial topographic modification and increase in impervious surfaces; however, a Stormwater Management System has been prepared to include features such as detention ponds to mitigate these effects.

Several drainages and impoundments at the NMPNS site will be moderately to severely impacted. It is possible that some sediment will be deposited in wetlands, including impoundments and stream channels, with rainfall runoff during and immediately following construction. Best construction management practices will reduce the amount of erosion and sedimentation associated with construction, however, and would limit impacts to aquatic communities in down-gradient water bodies. Although unlikely, it is also possible that excavated soil placed in the proposed spoils and overflow storage area will be disturbed and move with runoff into streams on site.

When a surface water body is filled by construction activities, impacts to aquatic life are expected. If the water body has an outlet, and the disturbance is gradual rather than abrupt, some fish may relocate. Oftentimes, however, construction impacts to small impoundments or stream reaches result in loss of the fish, invertebrates, and their habitat.

As discussed in Section 2.4.2, field studies for determining of the aquatic species present in on-site water bodies were conducted in June, 2008. These studies revealed that the majority of the species present on-site are common and not currently under federal or state protection.

Table 2.4-2 provides a list of important species and habitats found in the vicinity of NMPNS. Several important species are of interest due to their commercial or recreational value or for their value to the overall health of the ecosystem. The evaluation of Lakeview Creek and on-site ponds was conducted in June 2008 to determine the water quality, fish and aquatic insect species present. The only important species identified was rainbow trout. Young of the year (YOY) rainbow trout were captured at sampling sites 2 and 3 establishing that adult fish from Lake Ontario are using this stream for spawning habitat. Rainbow trout are valued as a sport fish in this region and despite naturally reproducing populations the population is maintained primarily through stocking (Stewart, 2002).

The functions and values of the individual wetlands to be destroyed or affected by construction are described in the final wetlands report and in Section 4.3.1. Overall, the primary function and value of the wetlands north and south of Lake Road are flood storage and conveyance, erosion control/water quality, groundwater discharge and wildlife habitat. Overall, the primary function and value of the wetlands north and south of Lake Road were as flood storage and conveyance, and erosion control/water quality. The value of aquatic species habitat was listed but the extent is not determined.

Aquatic life may be adversely impacted due to the following construction activities:

- Increased runoff from an estimated 100 acres (40.5 hectares) of permanent and temporarily disturbed areas during construction of the power block pad, the cooling tower pad, and the switchyard;
- Constructing stormwater pond #2, located northeast of the proposed power block, with associated discharge structures and outlet piping to the unnamed stream draining subarea Dto Lake Ontario.

- Constructing stormwater pond #1 and 3, located northwest and south of proposed power block respectively, with associated discharge structures and outlet piping draining into wetlands, B and EE/FF, respectively.

- Constructing combined wastewater detention pond and the associated discharge structures and outlet piping located north of the proposed power block.

- Disposing topsoil in areas located near Lakeview Creek (as well as wetlands EE/FF could increase sedimentation of the stream in the event of storm runoff. Additional topsoil disposal areas near the unnamed stream draining into Lake Ontario could also be subjected to sedimentation.

- Wetlands removal and associated impacts; and

- Increased sediment loads into the downstream reaches of Lakeview Creek.

Proposed construction activities that will potentially affect on-site water bodies are described in Section 4.2. During construction, effects to aquatic ecosystems may result from sedimentation (due to erosion of surface soil) and, to a lesser extent, spills of petroleum products. A report on human impacts to stream water quality listed siltation as the primary cause of stream degradation by a wide margin. In a 1982 nationwide survey by the U.S. Fish and Wildlife Service on impacts to stream fisheries, sedimentation was named the most important factor (Waters, 1995).

Three major groups of aquatic organisms are typically affected by the deposition of sediment in streams: (1) aquatic plants, (2) benthic macroinvertebrates, and (3) fish. The effects of excess sediment in streams, including sediment generated by construction activities, are influenced by particle size. Finer particles may remain suspended, blocking the light needed for primary producers, photosynthesis, and initiating a cascade of subsequent effects. Turbidity associated with suspended sediments may reduce photosynthetic activity in both periphyton and rooted aquatic plants. Suspended particles may also interfere with respiration in invertebrates and newly hatched fish, or reduce their feeding efficiency by lowering visibility. Slightly larger particles fall out of suspension to the stream bed, where they can smother eggs and developing fry, fill interstitial gaps, or degrade the quality of spawning grounds. As the gaps in the substrate are filled, there is a decrease in invertebrates such as Ephemeroptera, Plecoptera, and Trichoptera that indicate better water quality and habitat, and an increase in invertebrates such as oligochaetes and chironomids that are more tolerant of poor water quality. Such changes in the benthic community assemblage result in a loss of fish forage, and a subsequent reduction in fish populations (Waters, 1995).

Construction sites contribute to erosion, which can lead to sedimentation in streams. Construction-related activities such as excavation, grading for drainage during and after construction, temporary storage of soil piles, and use of heavy machinery all disturb vegetation and expose soil to erosive forces. Reducing the length of time that disturbed soil is exposed to the weather is an effective way of controlling excess erosion and sedimentation.

Preventing on-site erosion by covering disturbed areas with straw or matting is also a preferred method of controlling sedimentation. When erosion cannot be prevented entirely, intercepting and retaining sediment before it reaches a stream is a high priority.

Several measures will be taken to minimize the unavoidable adverse effects to the aquatic ecology. The use of silt fences, temporary and permanent vegetative stabilization, and other soil erosion and sediment control practices will reduce the risk of sediment runoff into intact wetlands adjoining the areas of fill. The stormwater retention basins will be unlined impoundments, vegetated with regionally indigenous wetland grasses and herbs, with simple earth-fill closure on the downstream end and will include discharge piping to the adjacent watercourses.

Construction impacts to water resources will be avoided or minimized through best management practices and good construction engineering practices. As described in Section 2.3.3, a Stormwater Pollution Prevention Plan, which provides explicit specifications to control soil erosion and sediment intrusion into wetlands, streams and waterways will be prepared and followed.

4.3.2.2 Impacts to Lake Ontario

As discussed in Section 2.4.2, Lake Ontario is considered an important habitat for the majority of the species identified in the area. However, none of the important species in the vicinity of NMPNS are endemic to the immediate area. All of them are found throughout the lake or in other locations along the southern shoreline. As discussed in Section 2.4.2, Lake Ontario is considered an important habitat for the majority of the species identified in the area. However, none of the important species in the vicinity of NMPNS are endemic to the immediate area. All of them are found throughout the lake or in other locations along the southern shoreline. Dive surveys to evaluate the presence submerged aquatic vegetation (SAV) and benthic invertebrates in the vicinity of the intake and discharge areas were completed in June 2008. No vascular SAV was found although Cladophora was present. The bottom habitat is hard substrate composed mainly of ledge and boulder. The dominant members of the benthic community are guagga mussels (Drissena bugensis) as well as oligochaetes and chironomids. All species were common to the area and none are considered unusual.

There are no federally managed fish species in Lake Ontario nor are there any habitats that have been deemed critical or important by the federal government or the New York State government in this area that would affect aquatic species on site (NMP, 2004).

While no federally protected species other than the occasional transient individual are determined to be present in the vicinity of NMPNS, there were five NY state species under different degrees of protection that might be present in the area. These threatened and endangered species include the endangered round whitefish (Prosopium cylindraceum) and deepwater sculpin (Myoxocephalus thompsonii), the threatened lake chubsucker (Erimyzon sucetta) and lake sturgeon (Acipenser fulvescens), and the redfin shiner (Lythurus umbratilis), which is listed as a species of concern. The only record of any of these species being captured at or in the vicinity of NMPNS are from 1975. One redfin shiner was captured during impingement sampling at NMP Unit 1 and Unit 2 and one lake chubsucker was captured at the mouth of the Salmon River, 6 mi (9.66 km) northeast of NMPNS. This information along with letters from the USFWS and NYSDEC stating NMPNS did not contain important habitats or populations of listed species led NMPNS to declare the impact to be SMALL, and mitigation unwarranted for the continued operation of the plant (NMP, 2004).

With implementation of the Stormwater Management Plan permanent drainage features and the Stormwater Pollution Prevention Plan Best Management Practices, no significant effects of sedimentation or runoff into Lake Ontario are expected. However, construction of the intake structure and discharge pipeline will cause some disturbance to Lake Ontario. There will be no dredging associated with the construction of the intake and discharge structures as the bottom is composed mainly of hard substrate and directional drilling will be required to construct the tunnels. Construction and deployment of the intake and discharge structures will likely involve a construction barge and subsequent anchoring. A vertical shaft will be constructed to meet the horizontal directional drill. The effect of this contruction will likely temporarily disturb the benthic invertebrate species living in the immediate intake/discharge areas.

No threatened or endangered species are expected to be affected by the proposed drilling as none are known to inhabit the areas except as transient individuals and none have been captured in the impingement and entrainment sampling at Units 1 and 2 during 2007. One redfin shiner was captured during sampling at Units 1 and 2 in 1975. While this species is state listed as a species of concern, none have been captured since and the only known populations in the Lake Ontario watershed are on the western shoreline (NMP, 2004)(NYSDEC, 2008).

The assemblage of aquatic species present near the NMPNS site varies throughout the year, due to spawning and migration patterns of individual fish and invertebrate species, as described in Section 2.4.2. The season of the year in which drilling and construction occur would determine to a large extent the impact on specific aquatic resources within Lake Ontario. The overall affect will be assessed when the aquatic species and habitat around the intake and discharge areas are examined and the finalized construction plans are disclosed.

4.3.2.3 Impacts on the Transmission Corridor and Off-site Areas

The new transmission lines do not cross over any on-site water bodies. Two isolated wetlands and one contiguous wetland are projected to be affected by the transmission facility or the transmission line construction.

Transmission line construction will be limited to on-site construction of short connections from the new switchyard to the existing transmission line that runs north to south and is east of the proposed power block. Construction of a transmission line from the NMP3NPP switchyard to the existing 345 kV transmission line on the NMPNS site will require clearing the scrub-shrub wetlands designated as AA in the wetlands report. The full extent of the acreage cleared and grading will be determined in the final construction plans. The transmission line is needed to convey electric power generated by the NMP3NPP power block to existing transmission lines that connect to the regional power grid.

The on-site transmission corridor for NMP3NPP is within the construction area. The information provided above pertaining to control of erosion and sedimentation applies to streams and wetlands within the transmission corridor.

On-site streams studies were conducted as described in 4.3.2 to determine the water quality, fish and aquatic insect species, "important" species, and any critical habitat in the affected water bodies. No incremental effect on aquatic resources beyond what currently occurs within the transmission corridor is expected for the construction of NMP3NPP.

The existing off-site transmission corridor will be used for NMP3NPP. No new transmission corridors and no off-site areas are impacted since no off-site changes are required.

4.3.2.4 Summary

Construction activities that may cause erosion that could lead to harmful deposition in aquatic water bodies would be (1) of relatively short duration, (2) permitted and overseen by state and federal regulators, and (3) guided by an approved Stormwater Pollution Prevention Plan. Any small spills of construction-related hazardous fluids, such as petroleum products, would also be mitigated by implementation of the Stormwater Pollution Prevention Plan. Some sensitive habitats occur within the area expected to be affected by construction activities. A total of 0.58

acres (0.23 hectares) of on-site water bodies, 2644.6 linear feet (806.1 m) of intermittent and 932.6 linear feet (284.3 m) of permanent stream channel will be physically modified. The majority of the aquatic species located on site are common and not protected by federal or the NY state government. No important habitats were located within the proposed NMP3NPP site. The only important species identified was rainbow trout in Lakeview Creek. Rainbow trout are intolerant of habitat degradation in the Northeast and might be impacted by construction activities that affect Lakeview Creek. The effect of directional drilling for the intake and discharge structures in the lake will likely disturb the benthic invertebrates species living in the immediate intake/discharge areas. Anticipated impacts to aquatic ecosystems from construction activities will be MODERATE in on-site impoundments and streams, and SMALL in the transmission corridor and Lake Ontario.

4.3.3 REFERENCES

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Table 4.3-1—Areas of Natural Communities Impacted by Construction (Acres)

(Page 1 of 2)

		Permanent Losses											Temporary Losses				
Resources Type	**Total Amount Present in Study Area**	**Switch- yard and Trans**	**Perm Parking**	**Cooling Tower**	**Met Tower**	**Storm- water Ponds**	**Railroad and Haul Roads**	**Access Road**	**Other Perm. Buildings**	**Un- specified**	**Power Block**	**Total Perm. Losses**	**Batch Plant**	**Topsoil Disposal Areas**	**Constr. Laydown**	**Total Temp. Losses**	**Total Disturbed Area**
Developed	**32.4**	2.8	0.2	3.1	0.0	0.6	0.1	1.4	1.7	0.0	1.7	**11.5**	1.1	0.0	0.0	**1.1**	**12.6**
Lawn	**51.6**	0.0	0.0	1.2	0.0	2.4	0.0	0.0	0.6	0.0	0.0	**4.2**	3.3	8.2	9.9	**21.4**	**25.6**
Infrequently Mowed	**12.7**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	2.1	**12.0**	0.0	0.0	0.0	**0.0**	**12.0**
Old Field	**114.1**	16.0	0.0	0.0	0.0	0.0	2.8	6.8	2.9	0.0	0.8	**29.4**	0.7	1.1	0.0	**1.8**	**31.2**
Successional Forest	**91.3**	9.7	8.6	5.1	0.0	0.0	6.6	1.3	3.5	0.1	28.0	**62.7**	4.8	0.0	3.0	**7.8**	**70.5**
Mesic Forest	**101.7**	0.6	9.1	0.0	4.0	4.8	4.7	0.0	4.7	1.2	0.0	**29.2**	0.0	14.5	21.2	**35.7**	**64.9**
Rich Mesic Forest	**8.6**	1.4	0.0	0.0	0.0	0.0	0.8	0.0		6.4	0.0	**8.6**	0.0	0.0	0.0	**0.0**	**8.6**
Total Upland	**412.4**	**30.5**	**17.8**	**9.3**	**4.0**	**7.8**	**15.1**	**9.5**	**23.3**	**7.7**	**32.5**	**157.6**	**9.8**	**23.9**	**34.1**	**67.7**	**225.3**
Forested	**113.0**	0.0	4.7	6.0	0.0	7.3	9.9	0.1	9.9	1.5	14.9	**54.2**	4.8	0.0	4.5	**9.3**	**63.5**
Forested/ Scrub-shrub	**5.3**	2.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	**2.3**	2.4	0.0	0.0	**2.4**	**4.7**
Scrub-shrub	**30.2**	2.1	0.0	0.0	0.0	0.0	0.4	3.2	0.0	0.0	0.6	**6.3**	0.0	0.0	0.7	**0.7**	**7.0**
Emergent	**8.7**	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	**0.6**	0.0	0.0	0.0	**0.0**	**0.6**
Open Water/Emergent	**0.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.1**	0.0	0.0	0.0	**0.0**	**0.1**
Open Water	**0.6**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	**0.6**	0.0	0.0	0.0	**0.0**	**0.6**
Unclassified Wetland	**10.3**	0.0	0.0	1.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	**1.7**	0.0	0.0	0.0	**0.0**	**1.7**
Total Wetland	**168.2**	**4.2**	**4.7**	**7.3**	**0.0**	**7.7**	**11.0**	**3.3**	**9.9**	**2.1**	**15.6**	**65.8**	**7.3**	**0.0**	**5.2**	**12.4**	**78.2**
Unclassified Habitat	**29.2**	0.6	0.0	0.0	0.0	0.0	0.6	0.1	0.0	0.0	0.0	**1.4**	0.0	4.2	0.0	**4.2**	**5.6**
Total Unclassified	**29.2**	**0.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.6**	**0.1**	**0.0**	**0.0**	**0.0**	**1.4**	**0.0**	**4.2**	**0.0**	**4.2**	**5.6**

Table 4.3-1—Areas of Natural Communities Impacted by Construction (Acres)

(Page 2 of 2)

		Permanent Losses											Temporary Losses				
Resources Type	**Total Amount Present in Study Area**	**Switch- yard and Trans**	**Perm Parking**	**Cooling Tower**	**Met Tower**	**Storm- water Ponds**	**Railroad and Haul Roads**	**Access Road**	**Other Perm. Buildings**	**Un- specified**	**Power Block**	**Total Perm. Losses**	**Batch Plant**	**Topsoil Disposal Areas**	**Constr. Laydown**	**Total Temp. Losses**	**Total Disturbed Area**
STUDY AREA TOTAL	**609.8**	**35.3**	**22.5**	**16.6**	**4.0**	**15.5**	**26.8**	**13.0**	**33.2**	**9.7**	**48.1**	**224.7**	**17.1**	**28.1**	**39.2**	**84.4**	**309.1**
NY State Wetland Buffer	**96.5**	0.7	2.2	0.0	0.2	2.8	6.9	5.0	2.3	4.3	0.6	**24.9**	0.0	0.0	9.6	**9.6**	**34.5**
Total Wetland Bufer	**96.5**	**0.7**	**2.2**	**0.0**	**0.2**	**2.8**	**6.9**	**5.0**	**2.3**	**4.3**	**0.6**	**24.9**	**0.0**	**0.0**	**9.6**	**9.6**	**34.5**
	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	**ft**	ft	ft	ft	**ft**	**ft**
Perennial Stream	**9531.0**	0.0	0.0	0.0	0.0	0.0	611.0	322.0	0.0	0.0	0.0	**933.0**	0.0	0.0	0.0	**0.0**	**933.0**
Intermittent Stream	**3247.0**	0.0	0.0	731.0	0.0	416.0	0.0	0.0	1402.0	0.0	67.0	**2616.0**	0.0	0.0	0.0	**0.0**	**2616.0**
Total Stream	**12778.0**	**0.0**	**0.0**	**731.0**	**0.0**	**416.0**	**611.0**	**322.0**	**1402.0**	**0.0**	**67.0**	**3549.0**	**0.0**	**0.0**	**0.0**	**0.0**	**3549.0**

Table 4.3-2— Areas of Natural Communities Impacted by Construction (Hectares)

(Page 1 of 2)

		Permanent Losses											Temporary Losses				
Resources Type	**Total Amount Present in Study Area**	**Switch- yard and Trans**	**Perm Parking**	**Cooling Tower**	**Met Tower**	**Storm- water Ponds**	**Railroad and Haul Roads**	**Access Road**	**Other Perm. Buildings**	**Un- specified**	**Power Block**	**Total Perm. Losses**	**Batch Plant**	**Topsoil Disposal Areas**	**Constr. Laydown**	**Total Temp. Losses**	**Total Disturbed Area**
Developed	**13.1**	1.1	0.1	1.3	0.0	0.2	0.0	0.6	0.7	0.0	0.7	**4.7**	0.4	0.0	0.0	**0.4**	**0.0**
Lawn	**20.9**	0.0	0.0	0.5	0.0	1.0	0.0	0.0	0.2	0.0	0.0	**1.7**	1.3	3.3	4.0	**8.7**	**10.4**
Infrequently Mowed	**5.1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.8	**4.9**	0.0	0.0	0.0	**0.0**	**4.9**
Old Field	**46.2**	6.5	0.0	0.0	0.0	0.0	1.2	2.8	1.2	0.0	0.3	**11.9**	0.3	0.4	0.0	**0.7**	**12.6**
Successional Forest	**37.0**	3.9	3.5	2.1	0.0	0.0	2.7	0.5	1.4	0.0	11.3	**25.4**	1.9	0.0	1.2	**3.1**	**28.6**
Mesic Forest	**41.2**	0.2	3.7	0.0	1.6	1.9	1.9	0.0	1.9	0.5	0.0	**11.8**	0.0	5.9	8.6	**14.5**	**26.3**
Rich Mesic Forest	**3.5**	0.6	0.0	0.0	0.0	0.0	0.3	0.0	0.0	2.6	0.0	**3.5**	0.0	0.0	0.0	**0.0**	**3.5**
Total Upland	**167.0**	**12.3**	**7.2**	**3.8**	**1.6**	**3.2**	**6.1**	**3.9**	**9.4**	**3.1**	**13.2**	**63.8**	**4.0**	**9.7**	**13.8**	**27.4**	**91.3**
Forested	**45.8**	0.0	1.9	2.4	0.0	2.9	4.0	0.0	4.0	0.6	6.0	**22.0**	2.0	0.0	1.8	**3.8**	**25.7**
Forested/ Scrub-shrub	**2.1**	0.9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.9**	1.0	0.0	0.0	**1.0**	**1.9**
Scrub-shrub	**12.2**	0.8	0.0	0.0	0.0	0.0	0.2	1.3	0.0	0.0	0.2	**2.5**	0.0	0.0	0.3	**0.3**	**2.8**
Emergent	**3.5**	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	**0.2**	0.0	0.0	0.0	**0.0**	**0.2**
Open Water/Emergent	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**	**0.0**
Open Water	**0.2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	**0.2**	0.0	0.0	0.0	**0.0**	**0.2**
Unclassified Wetland	**4.2**	0.0	0.0	0.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	**0.7**	0.0	0.0	0.0	**0.0**	**0.7**
Total Wetland	**68.1**	**1.7**	**1.9**	**2.9**	**0.0**	**3.1**	**4.5**	**1.4**	**4.0**	**0.8**	**6.3**	**26.6**	**2.9**	**0.0**	**2.1**	**5.0**	**31.7**
Unclassified Habitat	**11.8**	0.2	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	**0.6**	0.0	1.7	0.0	**1.7**	**2.3**
Total Unclassified	**11.8**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.1**	**0.0**	**0.0**	**0.0**	**0.6**	**0.0**	**1.7**	**0.0**	**1.7**	**2.3**

Table 4.3-2— Areas of Natural Communities Impacted by Construction (Hectares)

(Page 2 of 2)

		Permanent Losses											Temporary Losses				
Resources Type	**Total Amount Present in Study Area**	**Switch- yard and Trans**	**Perm Parking**	**Cooling Tower**	**Met Tower**	**Storm- water Ponds**	**Railroad and Haul Roads**	**Access Road**	**Other Perm. Buildings**	**Un- specified**	**Power Block**	**Total Perm. Losses**	**Batch Plant**	**Topsoil Disposal Areas**	**Constr. Laydown**	**Total Temp. Losses**	**Total Disturbed Area**
STUDY AREA TOTAL	**247.0**	**14.3**	**9.1**	**6.7**	**1.6**	**6.3**	**10.8**	**5.3**	**13.5**	**3.9**	**19.5**	**91.0**	**6.9**	**11.4**	**15.9**	**34.2**	**125.2**
NY State Wetland Buffer	**39.1**	0.3	0.9	0.0	0.1	1.1	2.8	2.0	0.9	1.7	0.2	**10.1**	0.0	0.0	3.9	**3.9**	**14.0**
Total Wetland Bufer	**39.1**	**0.3**	**0.9**	**0.0**	**0.1**	**1.1**	**2.8**	**2.0**	**0.9**	**1.7**	**0.2**	**10.1**	**0.0**	**0.0**	**3.9**	**3.9**	**14.0**
	m	m	m	m	m	m	m	m	m	m	m	**m**	m	m	m	**m**	**m**
Perennial Stream	**2905.0**	0.0	0.0	0.0	0.0	0.0	186.2	98.1	0.0	0.0	0.0	**284.4**	0.0	0.0	0.0	**0.0**	**284.4**
Intermittent Stream	**989.7**	0.0	0.0	222.8	0.0	126.8	0.0	0.0	427.3	0.0	0.0	**797.4**	0.0	0.0	0.0	**0.0**	**797.4**
Total Stream	**3894.7**	**0.0**	**0.0**	**222.8**	**0.0**	**126.8**	**186.2**	**98.1**	**427.3**	**0.0**	**0.0**	**1081.7**	**0.0**	**0.0**	**0.0**	**0.0**	**1081.7**

Table 4.3-3—Areas of Wetlands and Wetland Buffers Impacted By Construction

(Page 1 of 2)

Wetland Name	Wetland Type	Total Wetland Area		Temporarily Impacted		Permanently Impacted		Total Area Impacted	
		Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares
kk	Emergent	0.3	0.1	0.9	0.4	0.0	0.0	0.9	0.4
TT/YY	Emergent	3.4	1.4	0.0	0.0	0.3	0.1	0.3	0.1
XX	Emergent	4.6	1.9	0.0	0.0	0.0	0.0	0.0	0.0
UU/VV	Emergent	0.5	0.2	1.0	0.4	1.0	0.4	2.0	0.8
	Total:	**8.8**	**3.6**	**1.9**	**0.8**	**1.3**	**0.5**	**3.2**	**1.3**
A	Forested	31.6	12.8	5.6	2.3	25.9	10.5	31.5	12.7
B	Forested	18.0	7.3	0.0	0.0	14.4	5.8	14.4	5.8
D	Forested	0.3	0.1	0.0	0.0	0.3	0.1	0.3	0.1
DD	Forested	0.9	0.4	0.3	0.1	0.6	0.3	0.9	0.4
E	Forested	2.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0
EE/FF/GG	Forested	41.4	16.8	4.0	1.6	7.6	3.1	11.6	4.7
HH	Forested	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
JJ/WW	Forested	16.7	6.8	0.0	0.0	0.0	0.0	0.0	0.0
KK	Forested	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0
	Total:	**113.1**	**45.8**	**9.9**	**4.0**	**48.8**	**19.8**	**58.7**	**23.8**
AA	Forested /Shrub-scrub	2.1	0.8	0.0	0.0	2.1	0.8	2.1	0.8
BB	Forested /Shrub-scrub	3.2	1.3	2.4	1.0	0.2	0.1	2.6	1.1
	Total:	**5.3**	**2.2**	**2.4**	**1.0**	**2.3**	**0.9**	**4.7**	**1.9**
EE/FF	Open Water	0.6	0.2	0.0	0.0	0.1	0.0	0.1	0.0
	Total:	**0.6**	**0.2**	**0.0**	**0.0**	**0.1**	**0.0**	**0.1**	**0.0**
C	Open Water / Emergent	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0
	Total:	**0.1**	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**	**0.1**	**0.0**
CC	Shrub/scrub	1.0	0.4	0.0	0.0	1.0	0.4	1.0	0.4
JJ/WW	Shrub/scrub	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MM	Shrub/scrub	15.0	6.1	0.0	0.0	3.4	1.4	3.4	1.4
PP/QQ*	Shrub/scrub	8.6	3.5	0.0	0.0	1.3	0.5	1.3	0.5
RR	Shrub/scrub	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.0
SS*	Shrub/scrub	1.4	0.6	0.0	0.0	0.4	0.2	0.4	0.2
UU/VV*	Shrub/scrub	1.9	0.7	0.0	0.0	0.3	0.1	0.3	0.1
	Total:	**30.1**	**11.4**	**0.0**	**0.0**	**6.6**	**2.7**	**6.6**	**2.7**
Unamed	Unclassified wetland	10.3	4.2	0.0	0.0	1.7	0.7	1.7	0.7

Table 4.3-3—Areas of Wetlands and Wetland Buffers Impacted By Construction
(Page 2 of 2)

Wetland Name	Wetland Type	Total Wetland Area		Temporarily Impacted		Permanently Impacted		Total Area Impacted	
		Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares
	Total:	**10.3**	**4.2**	**0.0**	**0.0**	**1.7**	**0.7**	**1.7**	**0.7**
	Wetland Total:	**168.2**	**67.3**	**14.2**	**5.7**	**60.7**	**24.6**	**74.9**	**30.3**
	NYS Regulated Buffer:	96.5	39.1	9.6	3.9	24.9	10.1	34.5	14.0
	Total Regulated Buffer:	**96.5**	**39.1**	**9.6**	**3.9**	**24.9**	**10.1**	**34.5**	**14.0**
Grand Total of Regulated Area:		**264.7**	**107.2**	**23.8**	**9.6**	**85.6**	**34.7**	**109.4**	**44.3**

Figure 4.3-1—Impact to Plant Communities

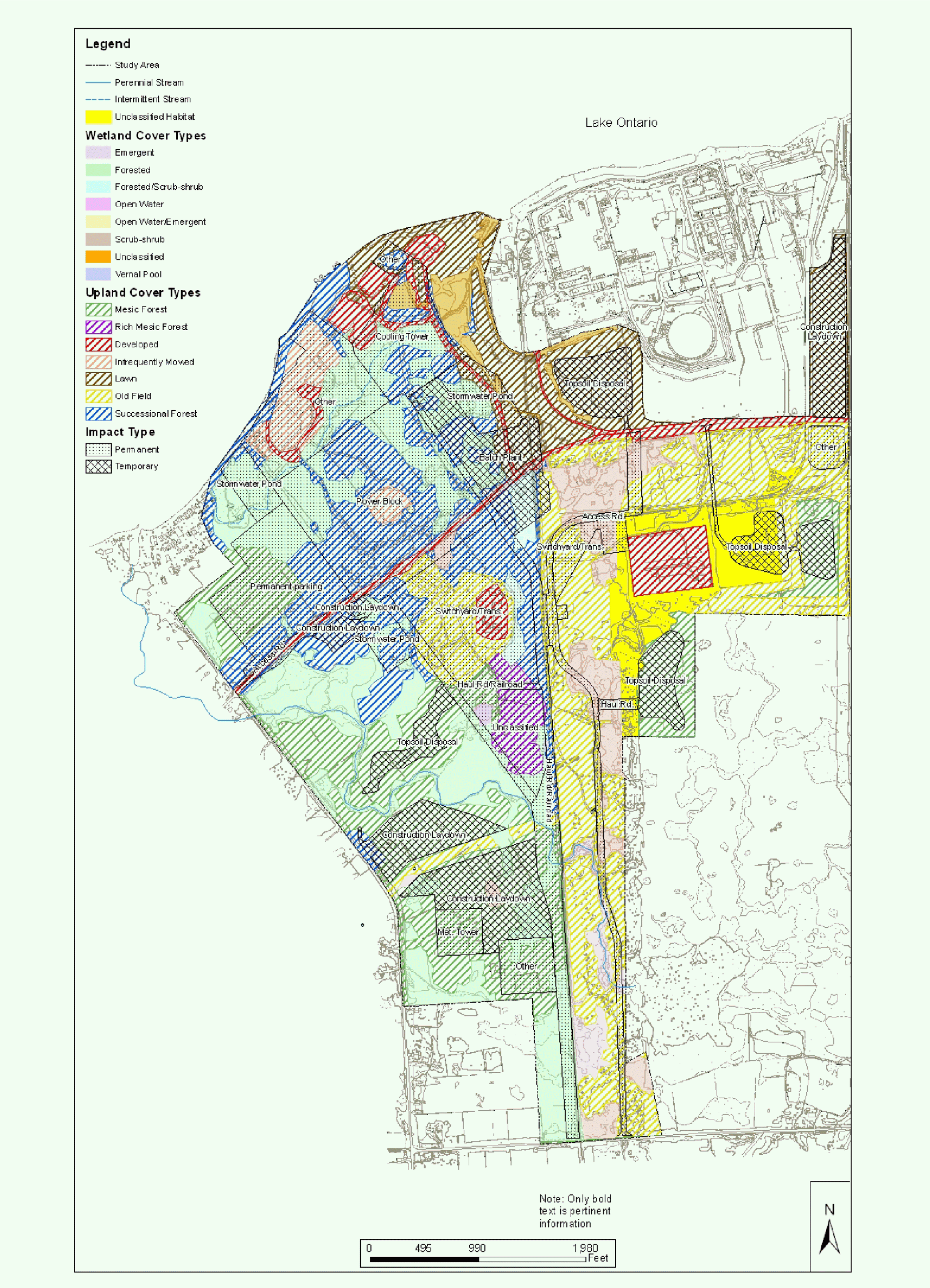


Figure 4.3-2—Wetland Assement Areas

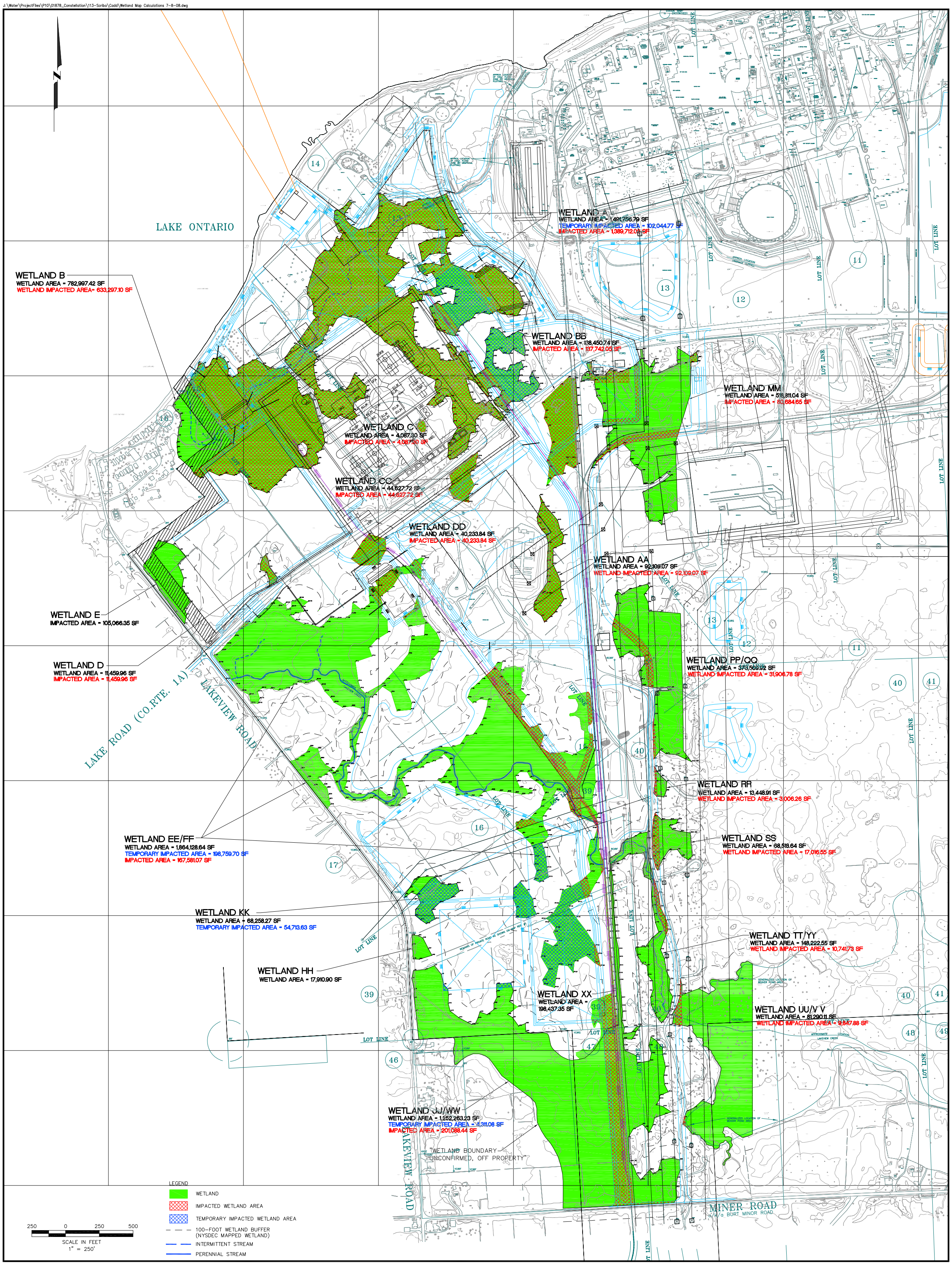
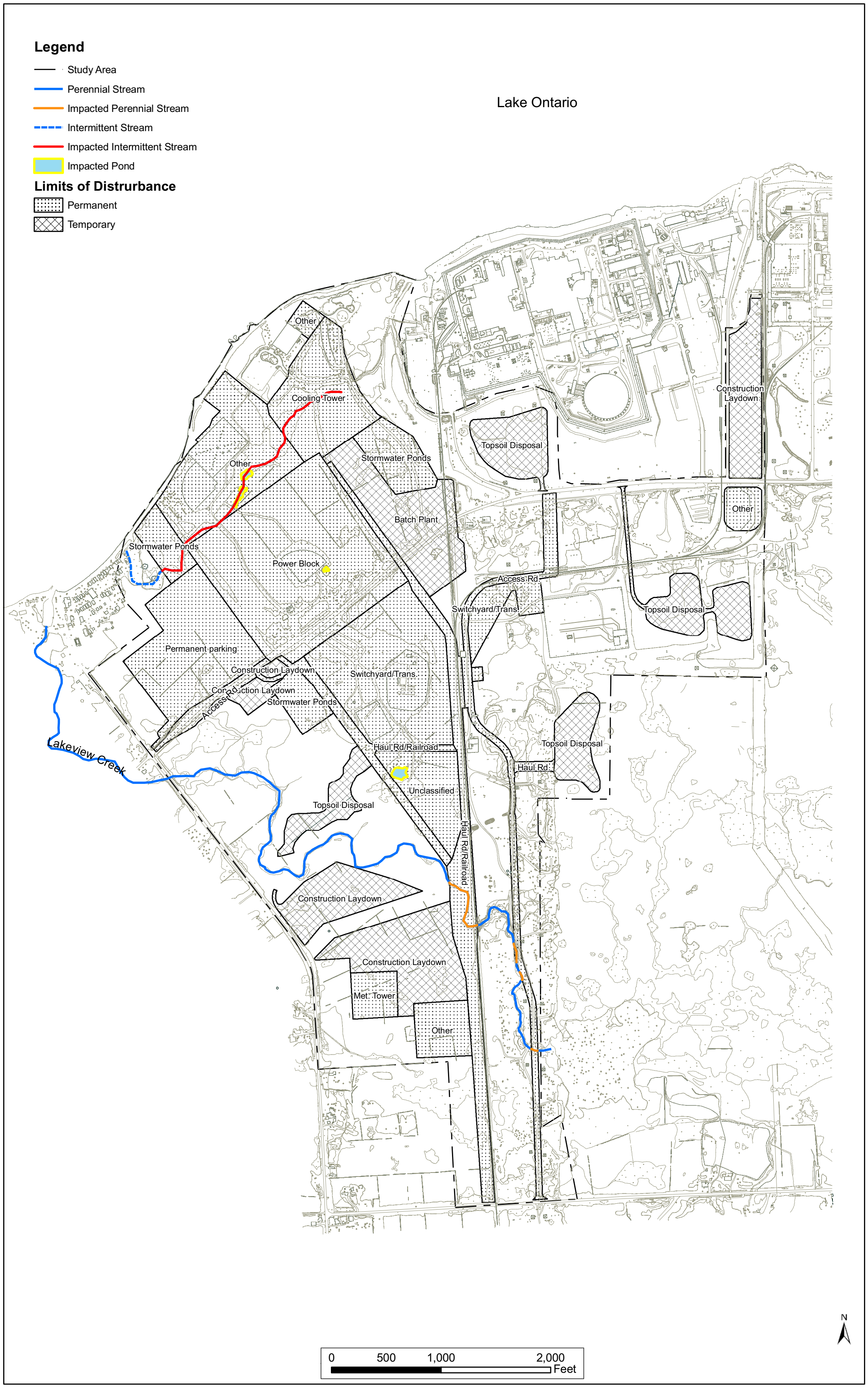


Figure 4.3-3—Site Alterations with Respect to Aquatic Resources



4.4 SOCIOECONOMIC IMPACTS

4.4.1 PHYSICAL IMPACTS

Construction activities at the NMP3NPP site will cause temporary and generally localized physical impacts such as increased noise, vehicle exhaust, and dust. This section addresses these potential impacts as they might affect people (the local public and workers), buildings, transportation routes, and the aesthetics of areas located near the plant site.

A description of the NMP3NPP site, location and surrounding community characteristics is provided in Sections 2.1, 2.2, and 2.5. Chapter 3 describes the proposed facility including its external appearance.

As discussed below, the NMP3NPP site is located in a rural area, relatively remote from nearby population centers and communities. As a result, the potential for direct physical impacts to the surrounding communities from plant construction is expected to be SMALL.

4.4.1.1 The Public and Workers

People who work at or live near the NMP3NPP site will be subject to physical impacts resulting from construction activities. On-site construction workers will be impacted the most, with workers at the existing adjacent operating units subject to slightly reduced, similar impacts. People living or working adjacent to the site will be impacted significantly less due to site access controls and distance from the construction site where most activities will occur. Transient populations and recreational visitors will be impacted the least for similar reasons and the limited exposure to any impacts of construction.

4.4.1.2 Noise

Section 2.7 provides information and data related to the background noise levels that exist at the construction site.

Noise levels in the site area will increase during construction primarily due to the operation of vehicles; earth moving, materials-handling, and impact equipment; and other tools.

Typical noise levels from equipment that is likely to be used during construction are provided in Table 4.4-1 (Beranek, 1971). On-site noise levels that workers will be exposed to are controlled through appropriate training, personnel protective equipment, periodic health and safety monitoring, and industry good practices. Good practices such as maintenance of noise limiting devices on vehicles and equipment, and controlling access to high noise areas, duration of emission, or shielding high noise sources near their origin will limit the adverse effects of noise on workers. Non-routine activities with potential to adversely impact noise levels such as blasting will be conducted during weekday business hours and utilize good industry practices that further limit adverse effects.

The exposure of the public to adverse effects of noise from construction activities will be reduced at the source by many of the same measures described above and the additional distance, interposing terrain, and vegetation which provide noise attenuation. While there are no state or local noise ordinances found for the site area, the New York State Department of Environmental Conservation (NYSDEC) published a guideline for evaluating potential community impacts from any new noise source based on the perceptibility of the new source above the existing ambient sound level (NYSDEC, 2001). The guideline states that "Increases from 3-6 dBA may have potential for adverse noise impact only in cases where the most sensitive receptors are present." Cumulative increases of between 3 and 5 dBA are generally regarded as negligible or hardly audible. Thus, a cumulative increase in the total ambient sound level of 6 dBA or less is unlikely to constitute an adverse community impact.

The U.S. Environmental Protection Agency (EPA) developed human health noise guidelines to protect against hearing loss and annoyance and established an outdoor activities guideline of 55 dBA (A-weighted decibel) (USEPA, 1974). The U.S. Department of Housing and Urban Development (HUD) adopted the EPA guidelines in its noise and abatement and control regulations as a goal for outdoor exposure in residential areas. Sites with a Day/Night Average Sound Level (Ldn) of 65 dBA and below are acceptable (NRC, 2007c). An incremental increase of 5 dBA above existing baseline conditions is generally considered to result in an impact to the surrounding area.

As discussed in Section 2.7.7, to determine ambient noise levels in the vicinity of the NMP3NPP site, surveys were conducted during the leaf-off and leaf-on seasonal conditions. The leaf-off survey was performed over a 13 day period from October 31 to November 13, 2007. The baseline noise levels were (LA90 Metric), measured at six locations including one adjacent to the Unit 2 cooling tower and others located at locations that best represent the nearest residences. Average noise levels (LA50 values) at the five stations representing nearby residences ranged from 32 to 39 dBA. Levels at the six sampling locations, based on the LA90 metric (quasi-steady state) ranged from 29 to 37 dBA. The highest noise levels were found at sampling location one (1) but did not exceed 60 dBA. The leaf-on noise survey was performed over a 13 day period from June 13 through June 25, 2008. Results were similar although uniformly lower. The LA50 noise levels ranged from 31 to 34 dBA at the residence locations and the LA90 values ranged from 28 to 32 dBA. Residential land uses, indicated that sound levels were typical of 'Very Quiet to Quiet Suburban Residential areas (i.e., in the 29 to 37 dBA range).

Typically, noise generated by construction equipment decreases by approximately 6 dBA for each doubling of distance (Harris, 1979). So, if the maximum noise levels produced by construction are 90 dBA at a reference distance of 50 feet (15 m), then at 100 ft (30 m) that noise level would be reduced to 84 dBA. Because the nearest residence is located about 1,900 ft (580 m) to the west, the noise effects from construction are expected to be at levels that produce a SMALL impact.

Traffic noise in the local area will increase as additional workers commute, and materials and waste are transported to and from the construction site. Noise impacts will occur primarily during shift changes and will not be extraordinary given the source and nature of vehicle noise and the normally varying nature of transient vehicle noise levels. Additionally, localized impacts will be reduced as distance from the construction site increases and traffic diverges outward.

In summary, good noise control practices on the construction site, and the additional attenuation provided by the distance between the public and the site, will limit noise effects to the public and workers during construction so that its impact will be small and temporary. Construction noise generation is directly linked with the conduct of construction activities which will be end as the facility enters operation.

4.4.1.3 Dust and Other Air Emissions

Construction activities will result in increased air emissions. Fugitive dust and fine particulate matter will be generated during earth moving and material handling activities. Vehicles and engine-driven equipment (e.g., generators and compressors) will generate combustion product emissions such as carbon monoxide, oxides of nitrogen, and to a lesser extent, sulfur dioxides. Painting, coating and similar operations will also generate emissions from the use of volatile organic compounds (VOCs).

To limit and mitigate releases, emission-specific strategies, plans and measures will be developed and implemented to ensure compliance within the applicable regulatory limits defined by the primary and secondary National Ambient Air Quality Standards in 40 CFR 50 (CFR, 2007c) and the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61 (CFR, 2007d). Air quality and release permits and operating certificates will be secured where required.

For example, a dust control program will be incorporated into the Storm Water Pollution Prevention Plan. A routine vehicle and equipment inspection and maintenance program will be established to minimize air pollution emissions. Emissions will be monitored in locations where air emissions could exceed limits (e.g. the concrete batch plant).

The New York State Department of Labor implements occupational health and safety regulations that set limits to protect workers from adverse conditions including air emissions. If localized emissions result in limits being exceeded, corrective and protective measures will be implemented to reduce emissions (or otherwise protect workers in some cases) in accordance with the applicable regulations.

Based on data provided in Section 2.7.7 for the year 2006, Oswego County, New York is currently designated an attainment area under the National Ambient Air Quality Standards for particulate matter (PM2.5), sulfur dioxide, nitrogen dioxide, carbon dioxide, and ozone (1-hour and 8-hour). The nearest Class I area is Lye Brook Wilderness, Green Mountain National Park in Vermont, but this area is more than 124 miles (200 km) away, and thus requires no action.

Implementation of controls and limits at the source of emissions on the construction site will result in reduction of impacts off-site. For example, the dust control program will limit dust due to construction activities to the extent that it is not expected to reach site boundaries.

Transportation and other off-site activities will result in emissions due largely to use of vehicles. Activities will generally be conducted on improved surfaces and any related fugitive dust emissions will be minimized. As with noise, impacts will be reduced as distance from the site increases.

In summary, air emission impacts from construction are expected to be small because emissions will be controlled at the sources where practicable, maintained within established regulatory limits that were designed to minimize impacts, and distance between the construction site and the public will limit off-site exposures. Construction air emissions impacts are temporary because they will only occur during the actual use of the specific construction equipment or conduct of specific construction activities, and surfaces will be stabilized upon completion of construction activities.

4.4.1.4 Buildings

The primary buildings in the immediate area with the potential to experience impacts from construction include the residences located approximately 1,466.5 ft (447 m) to the west of the site and those structures associated with NMP Unit 1 and Unit 2, which are located approximately 3,000 ft (914.4 m) and 3,600 ft (1,097 m), respectively, to the east (see Section 3.1). Related information about historic properties and the impacts of construction on them is provided in Sections 2.5.3 and 4.1.3.

Many existing on-site NMPNS site buildings were constructed to meet seismic qualification criteria, which make them resistant to the potential effects of vibration and shock that could occur during construction of NMP3NPP. Other on-site facilities were constructed to the appropriate building codes and standards, which include consideration of seismic loads. Regardless of the applicable design standard, construction activities would be planned, reviewed, and conducted in a manner that would ensure no adverse effect on the operating nuclear units, and that other buildings are adequately protected from adverse impacts.

Construction activities are not expected to affect off-site buildings due to their distance from the construction site. Off-site vibrations are limited by state regulations and compliance with those regulations will further prevent mechanical interaction with the off-site facilities.

Many existing on-site buildings related to safety of the existing facility were constructed to meet seismic qualification criteria which make them resistant to the effects of vibration and shock similar to that which could occur during construction. Other on-site facilities were constructed to the appropriate building codes and standards which include consideration of seismic loads. Regardless of the applicable design standard, construction activities will be planned, reviewed, and conducted in a manner that ensures no adverse effect on the operating nuclear units and that buildings are adequately protected from adverse impact.

Construction activities are not expected to affect off-site buildings due to their distance from the construction site. Off-site vibrations are limited by state regulations and compliance with those regulations will further prevent mechanical interaction with the off-site facilities (NTSDOT, 2007).

The impact of construction activities on nearby buildings will be small and temporary because of the design of on-site building and the administrative programs that will ensure no adverse interaction with the operating units, while off-site buildings are located at greater distances that isolate them from potential interaction.

4.4.1.5 Transportation Routes

The major transportation routes in the area are described in Section 2.5.1.

Construction workers would use Seneca Street/Lake Road, County Road 1, Country Road 29, and Routes 48, and New York Route 104 and 481 to commute to work, which would substantially increase traffic during peak construction periods and traffic would be at its greatest during shift changes. Additionally, public roadways would be used to transport construction materials and equipment to the site, although heavy equipment and plant components would be brought in by rail. The impact on area transportation resources would generally decrease with increased distance from the site as various routes were taken by personal vehicles.

As a result of the expected increase in traffic around the site, a traffic study was performed to assess potential impact to the level of service (LOS) provided by existing roads that allow access to the NMP3NPP. LOS is an ordinal scale that is defined from A to F with "A" being the best level of service. Table 4.4-10 and Table 4.4-11 provide the predicted LOS based on an assumed worst case condition represented by commuting times. As expected, the major concern identified in study was the traffic related to construction staff and the daily peak travel periods and patterns in and around the start and end of the day shift. The concentration of construction workers during morning and evening would substantially reduce the LOS, ultimately resulting in the need for requiring mitigation at those intersections currently without signals.

As a result, additional mitigation during the construction period is anticipated. In addition to the potential signalization at the affected intersections, a new access road is planned from Miner Road to the construction site minimizing any potential traffic congestion at the existing units. Heavy equipment and reactor components would be barged to the Port of Oswego and transported to the NMPNS site using either rail or roadways. Additional mitigation options that would be considered include staggered shift changes and increased vehicle capacity.

4.4.1.6 Aesthetics

Construction activities generally would not be visible from points outside the NMP3NPP. Construction activities that might affect visual aesthetics would largely be limited to those seen from Lake Ontario, the new construction access road, and from Lake Road and County Road 1, which pass to the southwest and south of the site. Some residential properties located west and south of the site are expected to experience the most direct aesthetic impacts.

As detailed and illustrated in Section 3.1, the proposed building structures that might impact the aesthetic qualities of the area as they reach the tree line during construction are the reactor building, turbine hall, and the mechanical draft cooling tower. Of the buildings listed, the reactor building, at 190 feet (57.9m) above grade, would be the highest structure. The reactor vent stack would rise approximately 203 ft (62.0 m) above grade. The mechanical draft cooling tower will be 164 feet high. Most other new buildings would not be visible because they would be obscured by the taller structures and would generally exist below the tree line of the heavily forested areas on-site. Visibility of the NMP3NPP structures from the east would be obscured by the structures associated with NMP Unit 1 and Unit 2 and the James A. Fitzpatrick Nuclear Power Plant (JAFNPP). Topographical features of the surrounding area will also help to screen new plant structures. The new intake structure pump house would be visible to recreational users of Lake Ontario but its appearance would be consistent with the structures at NMP Units 1 and 2.

To limit and mitigate aesthetic impacts, the following design and layout concepts would be included (Section 3.1):

- Preserving most woodlands on-site.
- Selecting a low point in the topography to create the lowest visual profile for the new plant.
- Construction of new buildings similar in size, shape and material to existing buildings.
- Minimizing tree removal by locating the concrete batch plant, construction lay-down areas, parking areas, construction offices and warehouses in either cleared fields or lightly forested areas.
- Transporting excavated and dredged material to an on-site spoils area outside designated wetlands.
- Construction of a new access road providing direct access to the operating units.

The existing transmission line corridor will be used to provide power from NMP3NPP to the grid. No new off-site lines will be needed further limiting aesthetic impacts.

Construction and dredging activities associated with the offshore intake and discharge structures may result in additional turbidity within Lake Ontario in the immediate vicinity. However, construction of the intake and discharge piping will be by way of tunneling thereby limiting disturbance of benthic sediments. Measures to control sediment transport on land that may contribute to turbidity in on-site surface waters will be managed using Best

Management Practices, requirements of the Construction General Permit and implementation of the Stormwater Pollution Prevention Plan (SWPPP).

As a result of these actions, and the additional restoration measures discussed in Sections 3.1 and 4.6 the aesthetic impacts of NMP3NPP construction are expected to be small and temporary.

4.4.1.7 Reference

CFR, 2007a. Title 40, Code of Federal Regulations, Part 50, National Primary and Secondary Ambient Air Quality Standards, 2007.

CFR, 2007b. Title 40, Code of Federal Regulations, Part 61, Standards for Performance for New Stationary Sources, 2007.

CFR, 2007c. Title 24, Code of Federal Regulations, Part 51, Subpart B Noise Abatement and Control, 2007.

Harris, 1979. Handbook of Noise Control, 2nd edition. McGraw-Hill, San Francisco, California. 1979.

NYSDEC, 2001. Assessing and Mitigating Noise Impacts. New York Department of Environmental Conservation, Program policy, issuing authority: Environmental Conservation Law Articles 3, 8, 23 and 27. October 6, 2000, Revised February 2, 2001.

NYSDOT, 2007. Procedures for Blasting. Geotechnical Engineering Manual GEM-22, Rev. 1, Geotechnical Engineering Bureau, New York State Department of Transportation, April 2007.

USEPA, 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, PB 550/9-74-004. U.S. Environmental Protection Agency, U.S. Government Printing Office, Washington, D.C.

USEPA, 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. NTID300.1. U.S. Environmental Protection Agency, U.S. Government Printing Office, Washington, D.C. 337 pp.

4.4.2 SOCIAL AND ECONOMIC IMPACTS

This analysis presents information about the potential impacts to key social and economic characteristics that could arise from the construction of the power plant at the NMP3NPP site. The analysis was conducted for the 50 mi (80 km) comparative geographic area and for the region of influence (ROI, Oswego County and Onondaga County, New York), where appropriate and as described in Section 2.5.2. The discussion focuses on potential impacts to population settlement patterns, housing, employment and income, tax revenue generation, and public services and facilities.

4.4.2.1 Study Methods

Changes in regional employment can result in impacts to the region's social and economic systems. An estimate of direct full-time equivalent (FTE) personnel that would be needed to construct the new unit was developed by Unistar. "Direct" jobs are those new construction employment positions that would be located on the NMP3NPP site.

"Indirect jobs" are positions that created at locations other than the NMP3NPP site as a result of the purchases of construction materials and equipment, and the new direct worker spending patterns in the ROI. Examples of indirect jobs that could be generated include carpenters and other construction jobs, barbers, restaurant personnel, gas station and auto repairs jobs, convenience store cashiers, drying cleaning and laundry jobs, and so forth. To estimate indirect employment that would be generated by construction of the power plant, a regional multiplier was generated by the RIMS II software and provided by the Regional Economic Analysis Division of the U. S. Bureau of Economic Analysis (BEA, 2008). This model, based upon the construction industry in the ROI, generated a multiplier of 1.4407 indirect jobs created for each direct job in the ROI. This multiplier was then applied to the estimated peak number of new direct FTE workers to estimate the peak number of indirect jobs that would be created in the ROI.

This analysis evaluates two potential in-migration impact scenarios for the construction workforce: an assumed 20% of the peak construction workforce moving into the ROI with their families for the duration of construction; and 35% moving into the ROI. These scenarios were selected because they are representative of the range of in-migration levels that the NRC found in studies they conducted in 1981 of nuclear power plant construction workforces. The NRC (1981) conducted a study of 28 surveys of construction workforce characteristics for 13 nuclear power plants. They found that 17% to 34% of the total construction workforces at most of these nuclear power plants (the 75th percentile) had moved their families into the study areas for each power plant.

The NRC then conducted a more detailed analysis of in-migrants and found that the most common in-migration levels (again for the 75th percentile) for the construction/labor portion of the workforce ranged from 11% to 29%. Additionally, an analysis of the craft labor portion of the workforce showed that pipe fitters, electricians, iron workers, boilermakers, and operating engineers were the most likely non-managerial staff to in-migrate into an area, and general laborers, carpenters, and other types of construction workers were the least likely to in-migrate (NRC, 1981).

For managerial and clerical staff, the in-migration levels ranged from 40% to 58%. Of the managerial staff alone (i.e., excluding clerical staff), most sites had in-migration rates of 58% to 76% (NRC, 1981).

The potential demographic, housing, and public services and facilities impacts are only discussed for the two county ROI, because those impacts are an integral part of, and derive from the impacts of, the in-migrating construction workforce. Impacts to employment and tax revenues are discussed for the 50 mi (80 km) comparative geographic area and the ROI, because of the construction labor pool that would be drawn from, and the collection and distribution of income and sales tax revenues throughout the state.

4.4.2.2 Construction Labor Force Needs, Composition and Estimates

4.4.2.2.1 Labor Force Availability and Potential Composition

There would be an estimated maximum 3,950-FTE person construction workforce for NMP3NPP from 2010 to 2016, representing a significant increase in the overall employment opportunities for construction workers. In comparison, Oswego County had 4,476 construction jobs in 2006 and Onondaga County had 10,808 construction jobs (USCB, 2006c-d). As shown in Table 4.4-2, this peak is estimated to last for about 12 months, from about the third quarter of the fourth year of construction into about the second quarter of the fifth year. Over the course of the entire construction period, staffing needs are estimated to increase relatively steadily from the third quarter of the first year until the peak is reached. Once the peak has passed, the staff levels again would drop steadily until the last 5 months of construction, when employment levels would drop significantly.

Relatively recent studies have shown that the availability of qualified workers to construct the power plant might be limited, particularly if several nuclear power plants are built concurrently nationwide. Competition for this labor could increase the size of the geographic area, beyond the northeastern seaboard, from which the direct construction labor force would have to be drawn for NMP3NPP. In its study of the construction labor pool for nuclear power plants, the U.S. Department of Energy (USDOE, 2004a) stated that, "A shortage of qualified labor appears to be a looming problem . . . . The availability of labor for new nuclear power plant construction in the United States is a significant concern."

These workforce restrictions are most likely to occur with "managers, who tend to be older and close to retirement, and skilled workers in high-demand, high-tech jobs" (USDOE, 2004a). The USDOE (2005) anticipates that qualified boilermakers, pipe fitters, electricians, and ironworkers might be in short supply in some local labor markets. Labor force restrictions can be exacerbated by the fact that portions of the labor force might have to have special certifications for the type of work that they are doing, and because they might have to pass NRC background checks. (USDOE, 2004a) DOE also found that, "recruiting for some nuclear specialists (e.g., health physicists, radiation protection technicians, nuclear QA engineers/technicians, welders with nuclear certification, etc.) may be more difficult due to the limited number of qualified people within these fields" (USDOE, 2004b). However, meeting these needs can be accomplished by hiring traveling crafts workers from other jurisdictions or regions of the country, which is a typical practice in the construction industry.

Estimates about the composition of the NMP3NPP construction workforce (i.e., types of personnel needed) have not been developed for the power plant. However, existing studies of other nuclear power plant construction sites provide an indication about the potential composition of the NMP3NPP construction workforce. As shown in Table 4.4-3 (USDOE, 2005), during the peak construction period an estimated 67% (2,635) of the construction workforce could be craft labor. Other less prevalent construction personnel could include about 8% (328) of UniStar's operation and maintenance staff, 7% (265) site indirect labor, and 6% (229) Nuclear Steam Supply System vendor and subcontractor personnel.

In reviewing only the potential craft labor force component of the entire construction workforce (see Table 4.4-4, USDOE, 2005), the greatest levels of employment during the peak of construction could be about 18% (474) electricians and instrument fitters, 18% (474) iron workers, 17% (448) pipe fitters, 10% (264) carpenters, and 10% (264) of general laborers. Table 4.4-5 (GIF, 2005) shows the percentage of each of these craft labor categories that would be needed during seven phases of construction. Carpenters, general laborers, and iron workers would comprise the greatest proportions of the workforce during the concrete formwork, rebar installation, and concrete pouring phase of construction. Iron workers would continue to constitute the greatest portion of the workforce during the installation of structural steel and miscellaneous iron work. General laborers and operating engineers would be most needed during the earthwork and clearing of the site, including excavation and backfilling. The installation of mechanical equipment would primarily require pipe fitters and millwrights. Pipe fitters would also be the primary craft labor category working during installation of piping. Electricians would be the most prevalent during installation of the power plant instrumentation and the electrical systems (GIF, 2005).

4.4.2.3 Demography

As state above, it is estimated that a peak of 3,950 FTE employees would be required to construct NMP3NPP. As shown in Table 4.4-6 (BEA, 2008; USCB, 2000a-b) and Table 4.4-7 (BEA, 2008; USCB, 2000a-b) under the 20% in-migration scenario, an estimated peak of 750 construction workers would migrate into the ROI along with about 1,207 family members, for a total of 1,957. Of these, the total estimated direct in-migration would be about 1,511 people (77.2%) into Oswego County and 445 people (22.7%) into Onondaga County. Under the 35% in-migration scenario, an estimated peak of 1,312 direct workers would migrate into the ROI along with about 2,112 family members, for a total of 3,424 people. Of these, the total estimated peak in-migration would be about 2,645 people (77.2%) into Oswego County and 779 people (22.7%) into Onondaga County.

In addition, it is estimated that a maximum of 1,080 indirect jobs would be created within the ROI under the 20% scenario and 1,890 indirect workforce jobs would be created under the 35% scenario (multiplying 3,750 ROI peak direct workers by the BEA indirect employment multiplier of 1.4407, BEA, 2008). Under both scenarios, many of these indirect jobs located within the ROI could be filled by the spouses of the direct workforce. As shown in Table 4.4-6 and Table 4.4-7, under the 20% in-migration scenario an estimated 618 indirect jobs would be filled by spouses and others of the NMP3NPP construction workforce and 462 would be filled by other indirect in-migrants. Under the 35% scenario, 1,082 indirect jobs would be filled by spouses/others and 809 would be filled by other additional indirect in-migrants.

An in-migration of up to 2,755 people into the ROI under the 20% scenario, or up to 4,820 people under the 35% scenario, would only represent a 0.5% to 0.8% increase in the total ROI population of 579,854 people in 2006 (USCB, 2006a-b). Because these percentage changes are small, it is concluded that the impacts to population levels in the ROI would be SMALL, and would not require mitigation.

Figure 4.4-1 shows the overlapping 50 mi (80 km) zones for three nuclear power plant sites, with four units, surrounding the NMP3NPP site. The other power plants include NMP Unit 1 and Unit 2 just to the east of the NMP3NPP site, JAFNPP somewhat further to the southeast (its 50mi [80 km] radius is displayed as the same as NMPNS because of their closeness to each other and the scale of the figure), and R.E. Ginna to the west/southwest. As can be seen in the figure, the NMP3NPP site 50 mi (80 km) radius overlaps essentially with the first three units, and somewhat with the Ginna facility. Table 4.4-8 (Constellation, 2004; NRC 2008) shows that the cumulative effect of a proportion of the construction workforce originating from within 50 mi (80 km) of NMP3NPP and potentially drawing employees from these other four power plant units, or significantly adding to the total employment levels for these types of facilities in these areas, would be MODERATE, and could require mitigation for associated traffic and other impacts.

4.4.2.4 Housing

The in-migrating construction workforce would likely either rent or purchase existing homes, or would rent apartments and townhouses. Non-migrating (i.e., weekly or monthly) workers would likely stay in area hotels, motels, bed and breakfasts (B&Bs), or at area campgrounds and recreational vehicle (RV) parks. Of the estimated 750 households migrating into the ROI to construct NMP3NPP under the 20% scenario and the 1,312 households under the 35% scenario, it is estimated that 579 to 1,013 households (77%) would reside in Oswego County and 171 to 299 (23%) would reside in Onondaga County. This would represent a maximum of 3.3% to 5.8% of the 22,789 total housing units vacant in the ROI in 2000 (USCB, 2000c-d; see Section 2.5.2). It would represent 2.8% to 4.9% of the 27,034 units vacant in 2006 (USCB, 2006e-f). Thus, the ROI, and each county within it, have enough housing units available to meet the needs of the workforce, based upon 2000 and 2006 housing information.

In addition to the above housing units, there are a total of 33 apartment and townhouse complexes providing one to three bedroom rental units within a 30 mi (46 km) radius in the ROI. Most of these facilities are located in Oswego County, including 21 apartment and townhouse complexes. These rental complexes could be used to house part of the in-migrating workforce and might be a viable option to purchasing more costly single-family homes.

Weekly or monthly commuters might elect to stay at one of the 126 hotels/motels/B&Bs facilities, providing more than 1,621 rooms and 96 cabins/apartments for rent within a 30 mi (46 km) radius in the ROI (all facilities were not identified within Onondaga County, because of the numerous facilities located in Syracuse and elsewhere in the county). Oswego County has 122 hotel/motel facilities with over 1,621 rooms and Onondaga County has 4 facilities. Because the hotels and motels are operating at or near capacity 80% or more during the summer months, and completely booked during special community events on weekends and the September and October fishing seasons (see Section 2.5.2), the portions of the workforce that might want to stay on a weekly or monthly basis and then commute home might compete with existing users. During the remainder of the year, enough units would likely be available (25% to 50% of total units) to meet the needs of the weekly or monthly commuters.

Because significantly more housing units are available than would be needed, the in-migrating workforce alone should not result in an increase in the demand for housing, or in increases in housing prices or rental rates. Also, construction is not scheduled to begin until 2010, providing adequate time for private developers to construct additional new homes and apartment complexes if the economy in the ROI expands, in general, and demand warrants it. In addition, for about seven months out of the year there are noticeable quantities of vacant motel and hotel units that could be used by weekly and monthly commuters. Thus, because of the available housing, it is concluded that the impacts to area housing would be SMALL, and would not require mitigation.

4.4.2.5 Employment and Income

4.4.2.5.1 50 mi (80 km) Comparative Geographic Area

As stated above, it is estimated that a peak of 3,950 direct construction employees would build NMP3NPP. Under the 20% peak in-migration scenario described above, it is implicit that the remaining 80% (3,160) either would be commuting from a reasonable distance on a daily basis or would stay at area hotels/motels and would be weekly/monthly commuters to the job site. Under the 35% in-migration scenario, an estimated 65% (2,570) of the peak direct construction workers would be daily or weekly/monthly commuters. The greatest proportion of these workers would likely commute from within or near the Syracuse, Rochester, and New York, New York metropolitan areas. However, a portion of these workers also would likely originate from throughout the northeastern and the remainder of the United States. The greater the distance that they would commute, and the longer that they are employed on the construction site, the more likely they would be to commute from home on a weekly or monthly basis and stay in area motels, or to become in-migrants into the ROI, as described in the housing section above. Because the employment opportunities would be spread over the 50 mi (80 km) radius, and an even larger geographic area and basis of comparison outside of the region, the beneficial impacts would be SMALL, and would not require mitigation.

It is estimated that the direct construction workforce would receive average salaries of $34.00/hour/worker (two-thirds of the estimated $50 per hour, including benefits), or about

$70,720 annually. This would result in an annual salary expenditure in the state of New York of $279.3 million for the peak construction workforce of 3,950 people. It is estimated that the 50 mi (80 km) radius and the state, excluding the two county ROI, would experience a $226.2 million increase in annual wages from the direct workforce under the 20% scenario (i.e., 80% of the construction workforce in the 50 mi (80 km) area) and $186.5 million under the 35% scenario (i.e., 65% of the construction workforce in the 50 mi (80 km) area). Again, because the employment income would be spread over the 50 mi (80 km) radius, and an even larger geographic area and basis of comparison outside of the region, the beneficial impacts would be SMALL, and would not require mitigation.

4.4.2.5.2 Two-County Region of Influence

Direct construction workforce employment is already discussed in the demographic section above. In addition to the 3,950 direct workforce, a peak of 1,080 indirect workforce jobs would be created in the ROI under the 20% scenario and 1,890 indirect jobs would be created under the 35% scenario (see Table 4.4-6 and Table 4.4-7). This would result in a peak increase of 1,830 to 3,202 employed people in the ROI, depending upon the scenario selected. The peak increase in employment would range from 1,413 to 2,473 people in Oswego County and 417 to 729 people in Onondaga County. Unemployed or underemployed members of the labor force could benefit from these increased employment opportunities, to the extent that they have the craft skills required (e.g., laborers, carpenters, electricians, plumbers, welders) and are hired as part of the construction workforce. These increases would result in a noticeable but small impact to the area economy, representing a maximum 4.1% increase in the 59,667 total civilian labor force in Oswego County in 2000 and 0.3% in the 228,026 total civilian labor force in Onondaga County (USCB, 2000e-f).

The average annual construction salary of $70,720, for the direct workforce, residing in Oswego County, would be significantly more than the $50,209 mean earnings in Oswego County in 2006 and the $61,782 mean earnings in Onondaga County (USCB, 2006c-d). Based upon the peak 35% scenario in-migration levels, Oswego County would experience an estimated $71.7 million increase in annual income during peak construction and Onondaga County would receive an estimated $21.1 million annually.

In addition, the working spouses and others of the direct construction workers, who filled indirect jobs created by the power plant, would contribute substantially to individual household incomes. Assuming that the average indirect worker earned $50,209 annually, the mean earnings in Oswego County in 2006, the 1,080 indirect workers under the 20% scenario would generate $54.2 million in additional annual salaries within the ROI, and the 1,890 in indirect workers under the 35% scenario would generate $94.9 million in additional annual salaries. The additional direct and indirect workforce income would result in additional expenditures and economic activity in the ROI. Because of the overall significant number of construction and indirect jobs that would be created and the existing lower income levels found in the ROI, the beneficial impacts to employment and income from construction of the NMP3NPP facility would be SMALL, and would not require mitigation.

4.4.2.6 Tax Revenue Generation

4.4.2.6.1 50 mi (80 km) Comparative Geographic Area

State income taxes would be generated by the in-migrating residents, although the amount cannot be estimated because of the variability of investment income, retirement contributions, tax deductions taken, applicable tax brackets, and other factors. It is estimated that the 50 mi (80 km) radius and the state, excluding the two county ROI, would experience a $226.2 million increase in annual wages from the direct workforce under the 20% scenario (i.e., 80% of the construction workforce in the 50 mi (80 km) area) and under the 35% scenario (i.e., 65% of the construction workforce in the 50 mi (80 km) area). Relative to the existing total wages for the region and the 50 mi (80 km) radius, it is concluded that the potential increase in state income taxes represent a SMALL economic benefit.

Additional sales taxes also would be generated by the power plant and the in-migrating residents. UniStar would directly purchase materials (see Table 4.4-9), equipment, and outside services, which would generate additional state sales taxes. Also, in-migrating residents would generate additional sales tax revenues from their daily purchases. The amount of increased sales tax revenues generated by the in-migrating residents would depend upon their retail purchasing patterns, but would only represent a SMALL benefit to this revenue stream for the region and the 50 mi (80 km) radius.

Overall, although all tax revenues generated by the NMP3NPP and the related workforce would be substantial in absolute dollars, as described above, they would be relatively small compared to the overall tax base in the region and the state of New York. Thus, it is concluded that the overall beneficial impacts to state tax revenues would be SMALL.

4.4.2.6.2 Two-County Region of Influence

In 2007, Constellation paid about $25.4 million in Oswego County real estate taxes for NMP Unit 1 and Unit 2. NMP3NPP would pay property taxes in Oswego County. It is estimated that annual property tax payments would be approximately [ ] million beginning in 2018. These payments would represent a [ ] increase in property tax revenues for Oswego County when compared to property tax revenues for 2006, which were [ ], and a [ ] increase in total revenues for Oswego County, which in 2006 were $163.1 million (see Table 2.5-28). These increased real estate tax revenues would either provide additional revenues for existing public facility and service needs or for new needs generated by the power plant and associated workforce. The increased revenues also could help to maintain or reduce future taxes paid by existing non-project related businesses and residents, to the extent that project-related payments provide tax revenues that exceed the public facility and service needs created by NMP3NPP. It is concluded that these increased power plant real estate tax revenues would be a LARGE economic benefit to Oswego County.

Additional county income taxes would be generated by the in-migrating residents, although the amount cannot be estimated because of the variability of investment income, retirement contributions, tax deductions taken, applicable tax brackets, and other factors. It is estimated that annual wages in the two-county region for direct workforce will increase by $26.6 million, and annual wages due to indirect workforce will increase by $29.4 million, for a increase in annual wages of $56.0 million. Oswego County would experience a $20.6 million increase in annual wages from the direct workforce and $22.7 million increase in indirect workforce wages, for a total of $43.2 million. Onondaga County would experience an estimated annual increase of $6.0 million from the direct workforce and $6.7 million in indirect workforce wages, for a total of $12.7 million. Relative to the existing total wages for the ROI, it is concluded that the potential increase in state income taxes represent a SMALL economic benefit to the jurisdictions.

As indicated above, additional sales taxes also would be generated by the power plant and the in-migrating residents. The amount of increased sales tax revenues generated by the in migrating residents would depend upon their retail purchasing patterns, but would only represent a SMALL benefit to this revenue stream for Oswego County and Onondaga County. Overall, although all tax revenues generated by the NMP3NPP and the related workforce would be substantial in absolute dollar terms as described above, they would be relatively small compared to the overall tax base in the ROI. Thus, it is concluded that the overall beneficial impacts to tax revenues would be SMALL.

4.4.2.7 Land Values

Studies have found varying impacts to residential and commercial land values for facilities that are visible and have greater perceived risks such as nuclear power plant sites, potentially less visible but also greater perceived risks of contaminated and brownfield sites, highly visible but lower perceived risk sites such as transmission lines, and for highly visible but low perceived human risk sites such as windfarm energy facilities.

Other studies of potential impacts to property values have had varied results, depending on the type of facility being studied, including facilities that are more visible and could have greater risks such as nuclear power plants, facilities that are potentially less visible but also have greater risks such as landfills and hazardous waste sites, and highly visible facilities but with potentially less perceived risk such as electrical transmission lines and windfarm facilities. For instance, a Maryland Department of Natural Resources (MDNR, 2006) study of the effects of large industrial facilities showed that residential property values were not adversely affected by their proximity to the Calvert Cliffs Nuclear Power Plant site. Overall, Maryland power plants have not been observed to have negative impacts on surrounding property values. This lack of impact is partially attributed to impact mitigation fees imposed in Maryland Power Plant Research Program (PPRP) conditions stipulated in Certificates of Public Convenience and Necessity (CPCNs) (MDNR, 2006). Similarly, studies of the property value impacts of the Three Mile Island nuclear power plant accident showed that nearby residences were not significantly affected by the accident (Gamble, 1982; as cited by RESI, 2004).

However, studies of the impacts to residential property values from low-level radioactive waste landfills in Ohio (Smolen, 1992), from leaks at a nuclear facility in Ohio (Miller, 1992; as cited by Reichert, 1997), and along potential nuclear shipment routes in Nevada (Urban Environmental Research, 2002) show that these facilities and activities have a negative impact on housing values within a limited distance from the facility, typically within 3 miles. Even within this limited distance, the impacts on property values decrease rather quickly as one gets farther from the facility.

Evaluations of potentially less visible but also perceived greater risk facilities such as hazardous waste and Superfund sites (e.g., underground storage tanks, existing and former manufacturing facilities, and so forth) generally show similar results. A study of underground storage tanks in Ohio showed that proximity to non-leaking or unregistered leaking tanks did not affect property values, but registered leaking tanks affected property values within 300 feet of the sites (Simons, 1997). Studies of Superfund sites in Ohio (Reichert, 1997), Texas (Kohlhase, 1991; as cited by Reichert, 1997) (Dale et al., 1997) (McCluskey, 1999), Pennsylvania (Erickson, 2001), and the southeastern United States (Ho, 2004) showed that property values were negatively affected by the facilities. The negative impacts were particularly noticeable during periods with significant media coverage and public concern, with the properties close to the facilities most affected. Again, the greater the distance from the facilities, the less the impacts on property values. Also, once there was a reduction in media attention and public concern, or after site cleanup, property values sometimes recovered from their losses. Similar results were found for landfills in Ohio (Hite, 2001; as cited by Ho, 2004) and Maryland (Thayer, 1992).

Electrical transmission lines and windfarm facilities can be highly visible but might have a smaller perceived risk to area residents than nuclear and hazardous waste facilities. Although three early studies (Blinder, 1979) (Brown, 1976) (Kinnard, 1984; as cited by Delaney,1992) found that tall electrical transmission lines did not affect nearby residential or agricultural property values, later studies (Colwell, 1979; as cited by Delaney, 1992) showed that they did have a negative effect on property values. The most common reason given by one study was the visual impact of the transmission line, followed by the perceived health risk (Delaney, 1992). One study (Colwell, 1990) showed that over time the negative impacts to property values decreased, indicating a reduced concern about the facilities (Blinder, 1979; Brown, 1976; Colwell, 1990;Colwell, 1979; Delaney, 1992).

Studies of potential impacts to property values from windfarm facilities have had mixed results. A study of an existing windfarm in New York (Hoen, 2006) and a potential windfarm facility in Illinois (Poletti, 2007) showed that there was no impact to nearby residential property values. However, another study (Sterzinger et al., 2003) of impacts at existing facilities showed that property values increased faster near the facilities than in control areas, likely because of the perception that they represented "green" benefits to the environment (Hoen, 200; Poletti, 2007; Sterziner, 2003).

Overall, these studies show that the impacts of various types of facilities can have a negative impact on residential property values, typically within 1 to 3 miles of a facility. However, they also show that the impacts might be less where other facilities already exist, and over time these negative impacts could decrease. The estimated 12 full-time leased residences at the Ontario Bible Camp, the nearest of which is 1,467 feet (447 m) from the proposed NMP3NPP facility, would likely see reduced property values. These residents have expressed concern about the potential impacts of NMP3NPP on their property values. Because there are three existing nuclear power plant units east and southeast of the NMP3NPP site and they have been there for a number of years, the overall impacts to land values likely would be SMALL and would not require mitigation.

4.4.2.8 Public Services

Although an increase in population levels from the NMP3NPP construction workforces could place additional demands on area doctors and hospitals, with two hospitals in Oswego County and another five hospitals in Onondaga County (see Section 2.5.2) it appears that the two county ROI has enough capacity to accommodate the increased demand, and impacts from construction of the NMP3NPP facility would likely be SMALL. According to a representative from Oswego Hospital, plans for expansion already are being discussed that would accommodate the additional in-migrating population. For this reason, the construction of the facility would not affect the services of the hospital. No impacts would occur to area political and social structures. However, the increased population levels could place some additional daily demands on constrained police services, fire suppression and EMS services, and schools. Impacts to these services are discussed below.

4.4.2.8.1 Police

As discussed in Section 2.5.2, the Oswego County Sheriff's Department, with 77 full-time equivalent (FTE) staff in fiscal year (FY) 2008, and the municipal police departments in the county. Representatives from the Fulton Police Department (FPD, 2008) indicated that meeting their law enforcement needs can be difficult with the existing budget, but at this time they do not have needs for additional staff or facilities. However, they did identify a current need to upgrade existing communications equipment, computers, and weapons. Other departments may not have sufficient staff levels to simultaneously respond to a potential emergency and off-site evacuation in the event of an emergency. The departments might need additional funding, staff, facilities, and equipment. Agency representatives (FPD, 2008) have indicated that construction of NMP3NPP and the potential additional in-migrating construction workforce, daily commuters, and weekly/monthly commuters might create a need for additional traffic enforcement officers and vehicles. Thus, most law enforcement departments in Oswego County might be able to meet the new demands placed upon them, with some adjustments, and the overall effect of the project on county agencies is estimated to be SMALL, and not require mitigation.

Similarly, the Onondaga County Sheriff's Office, with 304 FTE staff (267 were enforcement officers) in FY 2008, and municipal police departments in the county likely have the typical need for additional staff. Agency representatives (OCSD, 2008) have indicated that they currently have capital/facility needs, such as a new headquarters, jail, heliport, and evidence facility. However, they do not have staffing needs at this time. When asked about potential impacts of construction of the NMP3NPP facility, the representative indicated that the only additional needs that they might have beyond the existing ones are potential additional specialized response personnel and equipment to respond to the particular needs of NMP3NPP. Thus, the overall effect of the project on county agencies is estimated to be SMALL, and not require mitigation.

4.4.2.8.2 EMS and Fire Suppression Services

As discussed in Section 2.5.2, Oswego County has 1,048 active firefighters in the two professional fire departments in the cities of Oswego and Fulton, and in the 24 volunteer fire departments with a total of 32 stations. A representative of the Oswego City Fire Department suggested that with the construction of a new unit, additional emergency medical services would be needed. The current ambulance fleet would not be able to handle additional runs that could result from the construction. This need is in addition to the existing desire for upgrades to equipment and more storage space and personnel to accommodate the numerous calls within Oswego. Furthermore, representatives of the Fulton Fire Department (FFD, 2008) have indicated that they have existing needs for additional funding to finance broad needs for new facilities, the addition of 2 to 3 firefighters to each of its two stations, new firefighting vehicles, and a new rescue boat. Construction of NMP3NPP and the associated increase in traffic would place additional strains on the department and increase all of these needs.

Onondaga County has 49 fire departments with 83 stations and 2,604 active firefighters and appears to be doing an excellent job of meeting the needs of its residents. Thus, both jurisdictions appear to be doing an excellent job of meeting the needs of their residents. Construction of the power plant generally would not create additional needs beyond those that already exist. However, Emergency Management office staff would be affected by having to conduct emergency planning activities for the new power plant.

These fire and emergency response departments would be supplemented by a NMP3NPP on-site emergency response team, which would include a fire brigade. The NMP3NPP staff would also include an on-site emergency response team and emergency medical technician (EMT) responders. An emergency management plan would be developed for NMP3NPP, similar to that which already exists for NMP Unit 1 and Unit 2. The plan would address UniStar Nuclear Operating Services and agency responsibilities, reporting procedures, actions to be taken, and other items should an emergency occur at NMP3NPP.

Existing fire and law enforcement services in Oswego County and Onondaga County appear to be adequate to meet current daily needs within their jurisdictions. As described in Section 4.4.2.6 above, the significant new tax revenues generated in Oswego County by construction of NMP3NPP would provide additional funding to expand or improve services and equipment to meet the additional daily demands created by the plant. Onondaga County would also experience increased revenues from construction of the power plant, but to a much lesser extent. However, some departments still might not have enough staff and equipment to respond to an emergency situation, including off-site evacuation. Detailed discussions about non-radiological accidents can be found in Section 5.12.2 and radiological impacts are discussed in Sections 5.4 and 7.0. Because the NMP3NPP facility would not likely significantly increase the needs for these services, it is concluded that there would be a SMALL impact on the fire and law enforcement departments, and no mitigation would be required.

4.4.2.8.3 Educational System

As described above, an estimated 815 to 1,426 new households would in-migrate into Oswego County for construction of NMP3NPP. These households would include an estimated 500 children under the 20% in-migration scenario to 870 children under the 35% in-migration scenario (assuming a total of 0.61 children per household, not all of which would be school-aged.). These additional students would represent an increase of 2.1% to 3.7% to the 23,569 students enrolled in the county in the 2005-2006 school year. The estimated $78.3 million in increased annual real estate taxes that would be paid to Oswego County by UniStar during construction of NMP3NPP, which include levies for the Oswego County Public School System, would provide additional funds to meet the educational needs of children for the in-migrating construction workforce. If enrollment levels were to increase as a result of constructing the power plant, the district might seek assistance in recruiting additional teachers and could install modular classrooms.

The Oswego City School District (COSD, 2008) has been experiencing budget and associated staff reductions over the past several years. Representatives of the City School District indicated that if lost funding and staff could be replaced, construction related in-migration for NMP3NPP might not place additional requirements on the system, or additional staff and supplies/other consumables could then be added as needed. The Fulton City School District (FCSD, 2008) has indicated that their current staffing, equipment, and other needs are being met, but they have budgeted to add five classrooms to the high school in 2009 because most facilities are operating near or at capacity. Potential in-migration from construction of NMP3NPP could require the addition of staff, classrooms, and other supplies for the school district. Thus, based upon discussions with the city school systems in Oswego County, it appears that additional staff, some classrooms, and supplies/consumables might be needed to meet NMP3NPP construction in-migration needs, depending upon where workers and their families reside. Potential increased needs would occur over several years as the workforce moves into the area, allowing some time to adjust to the new needs. Thus, tax revenues could increase to meet part or all of these new needs, but the revenues might not be realized until after the additional demands are placed on these school systems. Despite the delay, it is concluded that the impacts to these school systems would be MODERATE, and could require mitigation.

The in-migration of an estimated 241 to 421 new households into the county from construction of the NMP3NPP could place greater demands on the Onondaga County Public School System. These households would include an estimated 150 children under the 20% in-migration scenario to 260 children under the 35% in-migration scenario (again assuming a total of 0.61 children per household, not all of which would be school-aged). These additional students would represent an increase of 0.2% to 0.3% to the 76,074 students enrolled in the county in the 2005-2006 school year. Although the school district would receive some additional funding from real estate taxes generated by these new households (likely to be minimal because adequate housing units are already available in the county and those units are already being taxed), it would not receive additional funding directly from the power plant because NMP3NPP does not pay property taxes to Onondaga County. Because there would be minimal additional demands placed on the Onondaga County Public School System, the impacts of the power plant would be SMALL, and no mitigation would be required.

4.4.2.9 Public Facilities

As discussed above, there is a sufficient quantity of vacant housing units in Oswego County and Onondaga County to meet the housing needs of the in-migrating direct construction workforce for NMP3NPP, so no new housing units would likely be required. The excess capacity in the water and sewage services and the lack of new construction resulting from the power plant would result in no effects to those services. Although an increase in the population would likely place additional demands on area transportation and recreational facilities, the facilities appear to have enough capacity to accommodate the increased demand and impacts would likely be SMALL. Area highways and roads would have increased traffic levels, particularly during shift changes at the NMP3NPP, resulting in a MODERATE traffic impact. These impacts are described in more detail below.

4.4.2.9.1 Transportation

Table 4.4-10 and Table 4.4-11provide the predicted levels of service (LOSs) based upon an assumed worst-case condition represented by commuting times. As expected, the major concern identified in study was the traffic related to construction staff and the daily peak travel periods and patterns in and around the start and end of the day shift. The concentration of construction workers during morning and evening peaks would substantially reduce the LOSs in some of the intersections evaluated. For instance, the currently unsignalized intersections of Lakeview/Lake Road (CR1A), County Road 1/County Road 1A, County Road 29/New York 104, and New York 104/New York 104B would be reduced from morning and evening peak LOSs of "A" to "C," to morning and evening LOSs of "F" (the lowest value than can be assigned). In addition, the currently signalized New York 104/Route 48 intersection would be reduced from a LOS of "C" during the pm peak commuting period to "E". These impacts would ultimately result in the need for mitigation at those intersections, including:

- Lakeview/Lake Road (CR1A) - signalization and the addition of turn lanes
- County Road 1/County Road 1A - signalization
- County Road 29/New York 104 - signalization and the addition of turn lanes
- New York 104/New York 104B - signalization
- New York 104/Route 48 - re-designation and removal of parking on NY104 westbound

Additional mitigation options that would be considered include staggered shift changes and increased vehicle capacity.

A new access road would be constructed from Lake Street/County Road 1A to NMP3NPP, and would be located to the west of the existing NMPNS access road. Also, an existing, but abandoned, railroad line located south/southeast of the NMP3NPP site would be refurbished/rebuilt and used to haul materials to the site. All new heavy equipment and reactor components would be barged to the Port of Oswego and then shipped to the NMP3NPP site via the upgraded rail line, or shipped directly to the site by rail. Other materials would be transported to NMP3NPP construction area via the new access road (see Section 4.1.1). Thus, the shipment of construction-related materials to the site should have a SMALL impact to transportation, and would not require mitigation.

However, there would be a major increase in small vehicular traffic from the construction workforce during shift changes. Thus, overall, it is concluded that the impacts to transportation would be MAJOR, and would require mitigation.

4.4.2.9.2 Area-Wide and Recreational Aesthetics

The NMP3NPP site is currently partly forested and partly cleared land. NMP3NPP would be built west of NMP Unit 1 and Unit 2, approximately 1,260 ft (384 m) from Lake Ontario and at least 1,467 ft (447 m) from the Ontario Bible Camp property located northwest of the site. The Camp is comprised of residences and cottages on the east side of Lakeview Road and about 40 acres (16 ha) of land on the west side of the road that are used for various types of activities. The Camp has not only 12 leased residences on-site but also provides recreational opportunities to adults and children during June and July. Weekend retreats can include as many as 8 to 10 couples and children's camps can have as many as 50 attendees at one time, with a total of about 150 attendees over the entire summer. Representatives of the Ontario Bible Camp have indicated that they have concerns about potential noise, visual, and security impacts from NMP3NPP, and also to its potential effects on boat access to/from Lake Ontario. Construction of a sound barrier wall, similar to those constructed between highways and housing developments, and a vegetative buffer zone between the site, the Ontario Bible camp, and along Lakeview Road could be constructed and maintained to mitigate these potential impacts.

Once project development had progressed further, some project facilities would become more visible from a much greater distance. The tallest structures would include the Reactor Building that would rise about 230 ft (70 m) above grade, the vent stack that would rise 203 ft (62 m), and the Mechanical Draft Cooling Tower that would rise 177 ft (54 m) above grade. The exterior finishes of the new plant buildings would be compatible in color and texture to those of the existing plant buildings, to blend in with the surrounding area. This would provide a consistent, overall appearance, architecturally integrating the two plants. Thus, the visual impacts of these structures to other area residents and transportation facilities (e.g., Lake Street/County Road 1A) would be minimal for much of construction, and only to the extent that those off-site facilities are used.

NMP Unit 2 has a cooling tower, so a visible steam plume is currently created. The steam plume generated by the NMP3NPP cooling tower would be visible to area residents, recreational users in the surrounding area, travelers along Lake Street/County Road 1A. It is estimated that the average plume length would range from 2.5 mi (4.0 km) in the fall season to 3.7 mi (6.0 km) in the spring season, and its average height would range from 2,017 ft (611 m) in the fall season to 2,983 ft (903 m) in the spring. Thus, the plume would not introduce a new element to the visual landscape, so the additional visual impacts from NMP3NPP would be SMALL.

Because only existing off-site transmission corridors, or proposed transmission corridors that are unrelated to project construction, would be used to accommodate the increased generation from NMP3NPP, no new off-site transmission lines would be built to service the plant and only new, short on-site interconnections or line relocations would be required.

Because no new housing units or developments would likely be built to meet NMP3NPP in-migrating construction workforce needs, there would be no visual impacts to existing residents or users in the ROI from these facilities.

Because construction activities would not be visible for much of the construction period, and the tallest structures would be minimally visible to area users, it is concluded that the impacts to area-wide and recreational aesthetics would be SMALL, and would not require mitigation.

4.4.2.10 References

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4.4.3 ENVIRONMENTAL JUSTICE IMPACTS

This section describes the potential disproportionate adverse socioeconomic, cultural, environmental, and other impacts that construction of NMP3NPP could have on low income and minority populations within two geographic areas. The first geographic areas is a 50 mi (80 km) radius of the NMP3NPP power plant, where there is a potential for disproportionate employment, income, and radiological impacts, compared to the general population (NRC, 1999). This analysis also evaluates potential impacts within the region of influence (ROI), most of which is encompassed within a 20 mi (32 km) radius of the power plant site, where more localized potential additional impacts could occur to transportation/traffic, aesthetics, recreation, and other resources, compared to the general population. It also highlights the degree to which each of these populations would disproportionately benefit from construction of the proposed power plant, again compared to the entire population is also discussed.

Section 2.5.1 provides details about the general population characteristics of the study area. Section 2.5.4 provides details about the number and locations of minority and low income populations within a 50 mi (80 km) radius of the NMP3NPP site, and subsistence uses.

4.4.3.1 Minority and Low Income Populations and Activities

Oswego County and Onondaga County have been defined as the ROI because 94.9% of the current NMPNS operational workforce resides there (UNS, 2008), and it is assumed that the construction workforce for NMP3NPP would also primarily reside in and impact this geographic area. Because the power plant site is currently located on lands owned by Constellation, and on-site access to these lands is restricted, no minority or low income residences would be removed or relocated within the ROI. Additionally, the distance of the plant from area residents, in general, is great enough so that these populations would only be affected minimally by construction of the power plant (i.e., noise, air quality, transportation, and other disturbances from the footprint of the facility) and, in any event, would be similar to those to the general population.

4.4.3.1.1 50 Mile (80 km) Comparative Geographic Area

Employment and Income

There would be an estimated maximum 3,950 person workforce constructing the NMP3NPP power plant from 2010 to 2016 as noted in Section 1.2.7 (AREVA 2007 and 2008), representing a 12% increase in the overall employment opportunities (see Section 2.5.2) for construction workers in the 50 mi (80 km) comparative geographic area, in which there are a total of 32,307 construction workers in the 10 county area in 2000 (USCB, 2000a-j); and a minor increase in the state, where a total of 433,787 construction workers were employed in 2000 (USCB, 2000k). Unemployed or underemployed members of minority and particularly low income groups could benefit from increased employment opportunities, to the extent that they have the craft skills required (e.g., laborers, carpenters, electricians, plumbers, welders), are hired as part of the construction workforce, and have adequate transportation to access the construction site.

The greatest concentrations of minority populations within the comparative geographic area primarily reside in Syracuse, in Onondaga County, and also towards the outer portions of the 50 mi (80 km) radius (see Section 2.5.4) including: Onondaga County, which is located southeast of the NMP3NPP site with 73 aggregate minority census block groups; Jefferson County, which is located northeast of the site with 7 aggregate groups; and Cayuga County, which is located southwest of the site with 1 aggregate group. Similarly, the greatest concentrations of low income populations are located in: Onondaga County with 51 census block groups; Cayuga County with 5 census block groups; Jefferson County with 3 census block groups; Oswego County with 2 census block groups; and Wayne County with 1 census block group (see Section 2.5.4). Given that the peak construction workforce would represent about 12.2% of the construction workforce in the 50 mi (80 km) radius in 2000, and 0.9% of the construction workforce in the state of New York (see Section 2.5.2), the beneficial impacts of these potential new employment opportunities likely would be SMALL.

Because of the demand for skilled construction workers for NMP3NPP, low income and minority construction workers from the comparative geographic area that are currently employed could realize increased income levels, to the extent that they leave lower paying jobs to work on the NMP3NPP. As discussed in Sections 2.5.2 and 4.4.2, the NMP3NPP construction workforce average annual salary would be about $70,720, compared to the mean earnings of $76,384 in New York in 2006 (USCB, 2006c). The beneficial impacts of these increased income levels for low income and minority populations likely would be SMALL.

There are no unique minority or low income populations within the comparative geographic area that would likely be disproportionately adversely impacted by the construction of the proposed power plant, because they are located more than 30 mi (48 km, or outside of the ROI) from the NMP3NPP site where no environmental impacts (e.g., noise, air quality, water quality, changes in habitat, aesthetic, transportation, etc.) would likely occur.

4.4.3.1.2 Two-County Region of Influence

Employment and Income

Unemployed or underemployed members of minority and low income groups within the ROI could benefit from increased employment opportunities, to the extent that they have the craft skills required (e.g., laborers, carpenters, electricians, plumbers, welders) and are hired as part of the construction workforce. The beneficial impacts of increased employment opportunities are likely to be more noticeable for minority and low income populations within the ROI, because of the potential hiring levels relative to the smaller existing ROI construction workforce (see Section 2.5.2), which would represent 29.9% of the 13,205 construction workforce and 1.5% of the total workforce base of 269,853 employed civilians in the ROI in 2000 (USCB, 2000b and c). The minority and low income populations located within the ROI primarily reside in Syracuse, which is about 30 mi (48 km) from the NMP3NPP site (see Section 2.5.4). Because of the overall number of construction jobs that would be created, the beneficial impacts of these potential new employment opportunities likely would be MODERATE.

In addition, impacts on area businesses, and potentially related increased opportunities to obtain higher paying indirect jobs, could be realized from increased economic activity resulting from NMP3NPP 's purchase of materials from businesses within the ROI. The beneficial impacts of these potential new indirect employment opportunities likely would be SMALL.

As stated in Sections 2.5.2 and 4.4.2, because of the overall number of construction jobs that would be created and lower income levels found in the ROI, the beneficial impacts of these potential new employment opportunities likely would be SMALL.

4.4.3.2 Housing

As stated in Section 4.4.2.4, the in-migrating construction workforce would likely either rent or purchase existing homes, or would rent apartments and townhouses. It is estimated that the housing demand associated with in-migrating workers would only represent a maximum of 3.3% to 5.8% of the 22,789 total housing units vacant in the ROI in 2000 (USCB, 2000c-d; see Section 2.5.2), or 2.8% to 4.9% of the 27,034 units vacant in 2006 (USCB, 2006e-f). Because the ROI has significantly more housing units available than would be needed to support the in-migrating workforce, NMP3NPP construction activities should not result in an increase in the demand for housing, or in increases in housing prices or rental rates. Thus, because of theample availability housing, it is concluded that the impacts to area housing would not represent a disproportionate impact to minority or low income populations.

4.4.3.3 Subsistence Activities

The types and levels of subsistence activities occurring in the two county ROI (i.e., Oswego County and Onondaga County) are described in Section 2.5.4. As discussed in this section, wildlife and fish harvesting may be important parts of the food gathering activities for minority and low income residents. Lake Ontario sediments would be disturbed and turbidity would likely increase during construction of the water intake and outfall for the NMP3NPP. These activities could disturb current subsistence catch rates of resident finfish (e.g., brown, rainbow, and lake trout; chinook and coho salmon; walleye; limited summer runs of Skamania River steelhead and Atlantic salmon; largemouth and smallmouth bass; northern pike; yellow perch; channel catfish; and other species) to the extent that they are occurring near the NMP3NPP site. Because the active fisheries for salmonid species occur in the nearby rivers, the catch rates of these species should be unaffected by construction activities related to NMP3NPP. As a result, the impacts would likely be SMALL for all members of the general public and, thus, would not represent a disproportionate impact to minority or low income populations.

As stated in Sections 2.4.1.2.1 and 4.3.1.2, white-tail deer, turkey, pheasant, rabbit, squirrel, waterfowl, and other wildlife populations are abundant throughout New York, including those areas in the vicinity of the NMP3NPP site. These populations represent a valuable resource for hunters. Construction of the NMP3NPP project might affect habitat for some of these species, but adequate similar habitat should be available in the surrounding area, so that overall population and harvest levels would not be affected.

In addition, it is assumed that collection of plants for ceremonial purposes and as a food source (i.e., culturally significant plants, berries, or other vegetation) could be occurring in the two county region of influence. Again, minority and low income populations might be conducting these collection activities in the vicinity of the NMP3NPP site, or could be harvesting greater quantities of plants, than the general population. However, construction activities would likely have SMALL impacts for all members of the general public, and would therefore not result in a disproportionate impact to minority or low income populations.

For safety and security reasons the general public is not allowed uncontrolled access to the NMP3NPP site. Thus, no ceremonial or subsistence gathering of culturally significant plants, berries, or other vegetation occurs on the site and no impacts would occur.

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Table 4.4-1—Typical Noise from Construction Equipment and Operations, at 50 ft (15 m)]

Type of Equipment	Noise Level in dBA at 50 ft (15 m)
Bulldozer	80
Front Loader	72-84
Jack Hammer or Rock Drill	81-98
Crane with Headache Ball	75-87
Backhoe	72-93
Scraper and Grader	80-93
Electrical Generator	71-82
Concrete Pump	81-83
Concrete Vibrator	76
Concrete and Dump Trucks	83-90
Air Compressor	74-87
Pile Drivers (Peaks)	95-106
Pneumatic Tools	81-98
Roller (Compactor)	73-75
Saws	73-82

Note:

dBA = A-weighted decibel

Table 4.4-2—Estimated Average Monthly FTE Construction Workers, by Construction Year/Quarter at the NMP3NPP

Year / Quarter of Construction	Average FTE Construction Workforce	Shift 1 (60%)	Shift 2 (35%)	Shift 3 (5%)
Year 1:				
1	350	200-570	0-333	0-48
2	800	200-570	0-333	0-48
3	1,250	660-1,020	385-595	55-85
4	1,600	660-1,020	385-595	55-85
Year 2:				
1	1,900	1,080-1,380	630-805	90-115
2	2,200	1,080-1,380	630-805	90-115
3	2,500	1,440-1,740	840-1,015	120-145
4	2,800	1,440-1,740	840-1,015	120-145
Year 3:				
1	3,050	1,800-1,950	1,050-1,138	150-163
2	3,200	1,800-1,950	1,050-1,138	150-163
3	3,350	1,980-2,130	1,155-1,243	165-178
4	3,500	1,980-2,130	1,155-1,243	165-178
Year 4:				
1	3,683	2,160-2,370	1,260-1,383	180-198
2	3,867	2,160-2,370	1,260-1,383	180-198
3	3,950	2,370	1,383	198
4	3,950	2,370	1,383	198
Year 5:				
1	3,950	2,370-2,310	1,383-1,348	198-193
2	3,917	2,370-2,310	1,383-1,348	198-193
3	3,700	2,280-1,980	1,330-1,155	190-165
4	3,400	2,280-1,980	1,330-1,155	190-165
Year 6:				
1	3,050	1,920-840	1,120-490	160-70
2	1,967	1,920-840	1,120-490	160-70
3*	768*	600-0	350-0	50-0

Notes

The third "quarter" of construction year 6 has only two months; the length of the total construction period is estimated to be 68 months.

Table 4.4-3—Total Peak On-Site Nuclear Plant Construction Labor Force Requirements (based on an average of single power plants)

Personnel Description	DOE Percent of Total Peak Personnel, Average Single Unit	DOE Peak Total Personnel, Average Single Unit (1)	Estimated NMP3NPP Total Peak Workforce Composition
Craft Labor	66.7%	1,600	2,635
Craft Supervision	3.3	80	130
Site Indirect Labor	6.7	160	265
Quality Control Inspectors	1.7	40	67
NSSS Vendor and Subcontractor Staffs	5.8	140	229
EPC Contractor's Managers, Engineers, and Schedulers	4.2	100	166
Owner's O&M Staff	8.3	200	328
Start-Up Personnel	2.5	60	99
NRC Inspectors	0.8	20	32
Total Peak Construction Labor Force	**100.0%**	**2,400**	**3,950**

Notes:

EPC = Engineering, Procurement, and Construction
O&M = operation and maintenance
n/a = not applicable
NRC = Nuclear Regulatory Commission
NSSS = Nuclear Steam Supply System
Percentages and numbers may total slightly more or less than the Total due to rounding.

Source: USDOE, 2005

Table 4.4-4—Peak On-Site Nuclear Power Plant Construction Craft Force Requirements (based on an average of single power plants)

Craft Personnel Description	DOE Percent of Peak Craft Labor Personnel, Average Single Unit	DOE Peak Craft Labor Personnel, Average Single Unit	Estimated NMP3NPP Peak Craft Workforce Composition
Boilermakers	4.0%	60	105
Carpenters	10.0	160	264
Electricians/Instrument Fitters	18.0	290	474
Iron Workers	18.0	290	474
Insulators	2.0	30	53
Laborers	10.0	160	264
Masons	2.0	30	53
Millwrights	3.0	50	79
Operating Engineers	8.0	130	211
Painters	2.0	30	53
Pipefitters	17.0	270	448
Sheetmetal Workers	3.0	50	79
Teamsters	3.0	50	79
Total Craft Labor Force	100.0%	1,600	2,635

Note:

Percentages and numbers may total slightly more or less than the Total due to rounding

Table 4.4-5— Nuclear Power Plant Craft Labor Force Composition by Phases of Construction (in percent)

Craft Labor	Percentage of Craft Labor Force by Construction Phase						
	Concrete Formwork, Rebar, Embeds, Concrete	Structural Strength Steel, Misc. Iron & Architectural	Earthwork Clearing, Excavation, Backfill	Mechanical Equipment Installation	Piping Installation	Instrument Installation	Electrical Installation
Boilermakers				15			
Carpenters	40	5					2
Electricians/ Instrument Fitters						70	96
Iron Workers	20	75		10			
Laborers	30	5	60				1
Millwrights				25			
Operating Engineers	5	15	35	12	15	2	1
Pipefitters				35	80	28	
Teamsters			5	3	5		
Others	5						
Total Percentage of Craft Labor Force	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: GIF, 2005

Table 4.4-6—Estimates of In-Migrating Construction Workforces in Oswego County and Onondaga County, 20% Scenario, from 2010 to 2016

In-migration Characteristics	Oswego County	Onondaga County	Total ROI
Direct Workforce:			
Maximum Direct Workforce			3,950
Percent of Current NMP Unit 1 and Unit 2 Workforce Distribution	73.3%	21.6%	94.9%
Maximum Direct Workforce in the ROI	2,895	853	3,749
Estimated In-migrating Direct Workforce (@20% in-migration)	579	171	750
In-migrating Direct Workforce Population (@2.61 people/household)	1,511	445	1,957
Indirect Workforce:			
Estimated Distribution of Peak Direct Workforce	579	171	750
Peak Indirect Workforce (@1.4407 BEA employment multiplier)	834	246	1,080
Indirect Workforce Needs Met by Direct Workforce Spouses and Others (@51.2% working females 16 years old and older)	477	141	618
Remaining, Unmet Indirect Workforce Need	357	105	462
In-migrating Indirect Workforce Population (@51.2% working spouses/others and 2.61 people /household)	616	182	798
Total In-migrating Direct and Indirect Workforce People:	**2,127**	**627**	**2,755**

Notes:

Source:

The Bureau of Economic Analysis estimated a 1.4407 direct/indirect employment multiplier for construction in the two-county RO(BE, 2008).

U.S. Census Bureau census data indicates that the state of New York had 2.61 people per household (USCB, 2000a).

U.S. Census Bureau census data indicates that, within the state of New York, 51.2% of households had a working female 16 years old or older (assumed to be a spouse and others for this analysis) (USCB, 2006).

Table 4.4-7—Estimates of In-Migrating Construction Workforces in Oswego County and Onondaga County, 35% Scenario, from 2010 to 2016

In-migration Characteristics	Oswego County	Onondaga County	Total ROI
Direct Workforce:			
Maximum Direct Workforce			3,950
Percent of Current NMP Unit 1 and Unit Workforce Distribution	73.3%	21.6%	94.9%
Maximum Direct Workforce in the ROI	2,895	853	3,749
Estimated In-migrating Direct Workforce (@35% in-migration)	1,013	299	1,312
In-migrating Direct Workforce Population (@2.61 people/household)	2,645	779	3,424
Indirect Workforce:			
Estimated Distribution of Peak Direct Workforce	1,013	299	1,312
Peak Indirect Workforce (@1.4407 BEA employment multiplier)	1,460	430	1,890
Indirect Workforce Needs Met by Direct Workforce Spouses and Others (@51.2% working females 16 years old and older)	835	246	1,082
Remaining, Unmet Indirect Workforce Need	625	184	809
In-migrating Indirect Workforce Population (@51.2% working spouses/others and 2.61 people /household)	1,078	318	1,396
Total In-migrating Direct and Indirect Workforce People:	**3,723**	**1,097**	**4,820**

Notes:

Source:

The Bureau of Economic Analysis estimated a 1.4407 direct/indirect employment multiplier for construction in the two-county RO(BE, 2008).

U.S. Census Bureau census data indicates that the state of New York had 2.61 people per household (USCB, 2000a).

U.S. Census Bureau census data indicates that, within the state of New York, 51.2% of households had a working female 16 years old or older (assumed to be a spouse and others for this analysis) (USCB, 2006).

Table 4.4-8—Total Workforce Potential During NMP3NPP Construction, NMP Unit 1 and Unit 2 Operations, JAFNPP Operations, and Outage Periods

Workforce Groups	Workforce Potential	Cumulative Total
NMP Unit 1 and Unit 2 Operations and Outage[1]		
Units 1 & 2 Operations	1,006	
Units 1 & 2 Outage Workers (on alternating years)	1,000 - 1,250	
Max. Existing Operational Workforce	2,256	2,256
JAFNPP Operation[2]		
Operation	716	2,972
Outage Workers (every 24 months)	700-900	3,872
Max. Existing Operational Workforce	1,616	
Combined NMP Unit 1, Unit 2 and JAFNPP Operations		
Normal Operations at all plants	1,722	
Normal Operations plus outages at two plants	3,872	
NMP3NPP Construction		
Peak NMP3NPP Direct Construction Workforce Accessing Site Daily	3,950 [3]	
Cumulative NMP Unit 1, Unit 2 and JAFNPP Operations, plus Peak Direct Construction Workforce		5,672
Cumulative NMP Unit 1, Unit 2 and JAFNPP Operations, Outages for two plants, plus Peak Direct Construction Workforce		7,822
Indirect In-Migration (35% scenario)	3,508[4]	
Cumulative Peak Operations, Outage Construction, and Indirect Workforces/Families		11,330

Notes:

1 NMPNS outage employment was obtained from (Constellation, 2004). Outage workforces would be rotated across years so that an outage would occur for only one unit at a time.
2 The JAFNPP operational and outage employment was obtained from (NRC, 2008).
3 This is the estimated peak construction workforce that would access the NMP3NPP site on a daily basis.
4 Under the 35% scenario, a maximum of 1,312 of the peak construction workers; 2,112 indirect workers/family members (assumed to be spouses and children), and 1,396 other additional indirect workers and their family members would in-migrate into the ROI.

Table 4.4-9—U.S. EPR Estimated Tons and Truckloads of Construction Materials, Single Unit

Estimated Minimum Requirements	Estimated Tons / Metric Tons	Estimated Truckloads
	Civil Material	
Concrete:		
Cement		
Sand		
Aggregate		
Steel:		
Rebar		
Structural Steel		
Miscellaneous Steel		
Mod Steel		
Steel Liner		
Embedded Steel		
Siding & Roofing		
Construction Debris:		
Piping and Mechanical Material		
Large and Small Bore Pipe		
Large Bore Hangers		
Nuclear Island EM Package		
Turbine Island and BOP		
Consumables		
Electrical Equipment		
Conduit		
Cable Tray		
Power & Control Wire		
NI Electrical Equipment		
TI Electrical Equipment		
Totals		

Note:

n/a = not available

Table 4.4-10—Intersection LOS: Projected Conditions During Construction

Intersection	Type of Intersection	Future No-Build		Future Build	
		AM	PM	AM	PM
Lakeview and Lake Road (CR1A)	Unsignalized	B	C	F	F
CR1 and CR1A	Unsignalized	A	B	F	F
CR29 and NY104	Unsignalized	B	C	F	F
NY104 and NY104B	Unsignalized	A	B	F	F
NY104 and Route 481	Signalized	A	B	A	B
NY104 and Route 48	Signalized	B	C	A*	E
Utica Street and Route 481	Signalized	A	C	A	C
Utica Street and Route 48	Signalized	B	C	B	C

Note: The peak hour for this intersection under the Future No-build scenario is different from the construction scenario.

Table 4.4-11—Projected Traffic Conditions During Construction

Intersection	Type	Construction	
		Morning Peak	Evening Peak
Lakeview and Lake Road (CR1A)	Unsignalized	F	F
CR1 And CR1A	Unsignalized	F	F
CR 29 and NY 104	Unsignalized	F	F
NY 104 and NY 104B	Unsignalized	F	F
NY 104 and RT 481	Signalized	A	B
NY 104 and RT 481	Signalized	A	E
Utica St. and RT 481	Signalized	A	C
Utica St and RT 48	Signalized	B	C

Figure 4.4-1—Cumulative Overlapping 50 mi (80 km) Zones for Nuclear Power Plants Surrounding NMP3NPP

4.5 RADIATION EXPOSURE TO CONSTRUCTION WORKERS

This section discusses the radiological exposure of construction workers building Nine Mile Point 3 Nuclear Power Planr (NMP3NPP) resulting from the normal operation of NMP Units 1 & 2 and JAFNPP.

4.5.1 SITE LAYOUT

The physical location of NMP3NPP relative to the existing JAFNPP and NMP Unit 1 and Unit 2 sites is presented in Figure 4.5-1. NMP3NPP will be located southwest of the existing NMP Unit 1 and Unit 2. A more detailed view of the NMP3NPP site is shown in Figure 4.5-2.

4.5.2 RADIATION SOURCES AT NMP3NPP

During the construction of NMP3NPP, the construction workers will be exposed to radiation sources from the routine operation of NMP Unit 1 and Unit 2 and JAFNPP. Sources that have the potential to expose construction workers are listed in Table 4.5-3. They are characterized as to location, inventory, shielding, and typical local dose rates. They are also characterized in terms of potential to expose NMP3NPP construction workers. Only those with significant potential are analyzed in detail. Interior, shielded sources are not included. Table 4.5-4 gives the locations of these sources in plant coordinates.

All gaseous effluents flow out of the NMP Unit 1 and Unit 2 and JAFNPP stacks, vents and ground release points. The releases are reported annually to the NRC. Doses to the general population are also reported annually.

Effluents from the liquid waste disposal system produce small amounts of radioactivity in the discharge to Lake Ontario. They are not significant sources of exposure to NMP3NPP workers (see Table 4.5-3.)

There are three main sources of direct radiation that have a significant impact on NMP3NPP construction workers: gaseous effluents, Independent Spent Fuel Storage Facilities (ISFSIs), and Turbine Buildings. There are two sources identified that are not significant contributors to construction worker dose. These are listed in Table 4.5-3 along with a brief discussion.

4.5.3 HISTORICAL DOSE RATES

The historical measured and calculated dose rates that were used to estimate worker dose are presented below.

The historical annual dose rates for NMP Unit 1 and Unit 2 and JAFNPP as reported to the NRC are summarized in Table 4.5-5.

4.5.3.1 Gaseous and Liquid Effluent Historical Measurements

The doses listed in Table 4.5-5 are the historical doses to public due to the release of gaseous and liquid effluents from NMP Unit 1 and Unit 2 and JAFNPP and are calculated in accordance with the existing NMP Unit 1 and Unit 2 Off-Site Dose Calculation manual (ODCM). The maximum individual doses are from historical NMP Unit 1 and Unit 2 Annual Radiological Monitoring Program Annual Reports. While these off-site doses provide perspective on the variation of effluent releases through the history of the operation of NMP Unit 1 and Unit 2, on-site workers will be exposed to fewer pathways. For example, workers will not ingest food (edible plants or fish) grown in effluent streams as part of their work activity. Therefore, only external and inhalation pathways will be considered in the calculation of dose to workers.

4.5.4 PROJECTED DOSE RATES AT NMP3NPP

4.5.4.1 Gaseous Dose Rates

Gaseous effluents flow out of the NMP Unit 1, Unit 2 and JAFNPP stacks and vents. The releases are reported annually to the NRC. Doses to the general population are also reported annually. It was conservatively assumed that all three units had identical stack heights, equal to the shortest stack height, which is 350 feet. It was also assumed that gaseous effluents from vents were released at ground level.

The annual dose rate from gaseous effluents to construction workers on the NMP3NPP site is bounded by the following equation:

$$\dot{D}(r, j) = \sum_{k=1}^{3} \sum_{i=1}^{2} C_{i,k} f(r_{i,k})$$ Equation 4.5.4-1

where,

$\dot{D}(r, j) =$ dose rate of type j, (mrem/yr) at location r (feet),

i = release type (vent, stack),

j= dose type (TEDE, external total body (TB-ext), external skin (Skin-ext), and organ dose from iodines and particulates (Organ-I&P)),

k= plant (NMP Unit 1, NMP Unit 2, JAFNPP),

$C_{i,k}(j)$= dose type coefficient for the given release type at the given plant, summarized in Table 4.5-6,

$r_{i,k}$= distance from the given release point to the target = $\sqrt{(N - N_s)^2 + (E - E_s)^2}$,

N,E = receptor location in plant grid (feet),

N_s,E_s= release source location on plant grid (feet) as given in Table 4.5-4 and

$f_i(r_{i,k})$ = atmospheric dispersion factor, at a point $r_{i,k}$ (sec/m^3)

$f_1(r_{1,k}) = Ar_{i,k}^{B}$ for Ground Release Equation 4.5.4-2

$$f_2(r_{2,k}) = \frac{a + br_{i,k}}{1 + cr_{i,k} + dr_{i,k}^2}$$ for Elevated Release Equation 4.5.4-3

Fitting Parameters: A=175; B=-1.94; a= 9.53E-07; b=3.79E-11; c= -2.00E-04; d=1.07E-07

The dispersion factor models used in the above equations are based on annual average, undecayed, undepleted ground level and elevated χ/Q s from NMPNS & JAFNPP site meteorology for the years 2001 to 2006 as illustrated in Figure 4.5-5 and Figure 4.5-6. The equation also assumes the most limiting gaseous effluent releases from the period 2001 to 2006. The model is based upon 100% occupancy. The χ/Q data for NMPNS and JAFNPP for years 2001 to 2006 that was used in developing the bounding atmospheric dispersion factor models (Equations 4.5.4.-2 and 4.5.4-3) are given in Table 4.5-7 to Table 4.5-9.

The dose rates were calculated for an on-site location with a known χ/Q for the years 2001 through 2006 according to the Regulatory Guide 1.109 (NRC, 1977) method with Total Effective Dose Equivalent (TEDE) calculations according to Federal Guidance Reports 11 (USEPA, 1988) and 12 (USEPA, 1993). The gaseous releases used in the calculation are shown in Table 4.5-10 to Table 4.5-15. The calculated annual Total Effective Dose Equivalent (TEDE) doses from ground and elevated releases at NMP Unit 1 and Unit 2 and JAFNPP for years 2001 to 2006 are listed in Table 4.5-16.

4.5.4.2 Liquid Dose Rates

The projected dose at the shoreline to a construction worker with a 2200 hours/year occupancy rate is 2.19 mrem/yr . For a person with a full-time occupancy (8760 hr/yr), the dose rate is 8.73 mrem/yr. This represents the maximum recent year dose contribution from each plant per Table 4.5-17, and is based on releases and dilutions in Table 4.5-18 through Table 4.5-23 (Constellation, 2001a). Table 4.5-24 through Table 4.5-26 list the individual plant dose contributions by year, with the total contribution from all three plants summarized in Table 4.5-27.

4.5.4.3 Direct Dose Rates

There are five main direct sources of radiation between the NMPNS and JAFNPP reactors. This includes Nitrogen 16 in the turbines of the three BWRs, namely, NMP Unit 1, Unit 2 and JAFNPP, the Independent Spent Fuel Storage Installation at JAFNPP, which has been operating since 2002, and the proposed Independent Spent Fuel Storage Installation to be built on the NMPNS site, which is scheduled to begin fuel loading in 201. The design of the proposed NMPNS Independent Spent Fuel Storage Installation has yet to be finalized.

The dose rate contribution from each of the four current direct sources (i.e., the N-16 from NMP Unit 1, Unit 2 and JAFNPP and the JAFNPP Independent Spent Fuel Storage Installation) were estimated using dose-distance relationships of the form:

$$DR(mrem/yr) = c\omega e^{-\mu r}$$ Equation 4.5.7-1,

Where:

$$\omega = \pi\left(1 - \frac{r}{\sqrt{r^2 + R^2}}\right)$$ Equation 4.5.7-2

The constants c_j of these equations were found by way of least squares fitting of data from TLDs, i, and sources, j. The total direct dose rate at a specific location would therefore be:

$$DR_i = c_{background} + \sum_{j=1}^{4} c_j \omega_{ij} e^{-\mu_j r}$$ Equation 4.5.7-3

where

ω is the solid angle subtended by the source at the location of interest (Sr) r is distance from center of source to dose point (ft)

The c coefficients, which are listed in Table 4.5-28, were derived by fitting the dose rate data from 38 TLDs to Equation 4.5.7-1. The values of μ and R, which are different for each type of source, were fitted empirically to measurement and simulation data. The μ and R values for the Independent Spent Fuel Storage Installation were derived by fitting Equations 4.5.7-1 and 4.5.7-2 to dose versus distance curves from an MCNP simulation of a similar Independent Spent Fuel Storage Installation at a different plant. The values of μ and R for the N-16 sources are based on the same general approach. The μ and R values for N-16 in a BWR turbine were derived by fitting Equations 4.5.7-1 and 4.5.7-2 to dose versus distance curves from an MCNP simulation of a BWR turbine hall at a different plant. The MCNP simulation had been calibrated to field measurements.

It was assumed that the only sources whose contribution varies appreciably with position were the N-16 sources in the turbines and the Independent Spent Fuel Storage Installation sources. All other sources, such as natural background and TLD response from effluent gases, were assumed to be constant over the entire site.

TLD locations and responses that were used in the analysis were taken from Figure 4.5-7. The measurements are listed in Table 4.5-29. The locations of the TLDs, within the state plane coordinate system, are listed in Table 4.5-30. The TLD coordinates were derived by overlaying Figure 4.5-7 with a plan of the site that was marked with a coordinate grid.

The constant term in Equation 4.5.7-3, $c_{background}$, was estimated at 56.7 mR/year (0.49 mGy/yr). This matched the background measured by TLDs in the vicinity of the site, which is approximately 60 mrem per year as reported on page 5-9 of (Constellation, 2006a). The fit was tested by calculating the dose rates at each TLD based upon the derived set of coefficients and then comparing the calculated to the measured TLD dose rates. Table 4.5-31 shows that the ratio of calculated to measured values for the 38 TLDs ranged between 0.61 and 1.74 for TLDs 3 and I11, respectively.

Time Equation for JAF Independent Spent Fuel Storage Installation

Up to this point in the discussion, the dose rate from the JAF Independent Spent Fuel Storage Installation is for the year 2007 when the TLD measurements were made. Given that more casks are expected to be loaded in the future, a relationship between dose and time for the JAF Independent Spent Fuel Storage Installation was developed based upon historic variations in TLD doses and historic loadings.

The historical measured exposures surrounding the JAF Independent Spent Fuel Storage Installation were used to estimate the projected exposure given the projected addition of casks. The loading history is given in Table 4.5-32. The TLD locations are in Figure 4.5-8. The historical TLD readings and the average of all the Independent Spent Fuel Storage Installation TLDs are given in Figure 4.5-9 and Table 4.5-33. The historical and anticipated cask loading through the construction period (up to 2015) of the JAF Independent Spent Fuel Storage Installation is given in Table 4.5-34. The term "cask-years" in Table 4.5-34 represents the product of the number of casks by their associated storage time for the loading year of interest (i.e., one cask installed in June would represent 0.5 cask-years). Figure 4.5-10 and Table 4.5-34 show that there is a relationship between dose and cask load (number of casks).

Assuming a background of 56.7 mR/yr, no radioactive decay, and that the exposure (burnup), enrichment, and decay of fuel bundles loaded into casks in subsequent years through 2015 will be comparable to the inventory of casks received to date at the Independent Spent Fuel

Storage Installation (between 2001 and 2007), a simple relationship between doses in 2007 and future doses was derived. Namely, the exposure is proportional to the number of casks placed on the Independent Spent Fuel Storage Installation. This results in the ratios of annual exposure in future years to 2007 exposure from the JAF Independent Spent Fuel Storage Installation. These ratios were used to adjust dose rates calculated by the Independent Spent Fuel Storage Installation equation for future years up to 2015. The ratios are presented in Table 4.5-35.

Proposed NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation

The fifth source, an Independent Spent Fuel Storage Installation to serve both the NMP Unit 1 and Unit 2 reactors has yet to be designed and loaded. This facility is anticipated to be loaded with 40 casks starting in the year 2011 . It is also assumed that the annual loading rate at NMPNS will be twice that of the JAFNPP Independent Spent Fuel Storage Installation, simply proportional to the number of plants served. The workers will be exposed for a period of years, during which both Independent Spent Fuel Storage Facilities will continue to be loaded with increasing amounts of fuel. It is assumed that the JAFNPP Independent Spent Fuel Storage Installation will be loaded with six new casks every four years, and, given that the NMPNS site serves two BWRs, it was assumed that its Independent Spent Fuel Storage Installation will be loaded with six new casks every two years after the initial load of 40 in 2011.

A model used to estimate the correlation between cask-loading and exposure rate was developed by performing a least squares fit of the annual exposure rates around the JAF ISFSI, as provided in Table 4.5-33, in relation to the cask loading as given in Table 4.5-34. The resulting correlation is:

$$\text{Exposure Rate} = (13.984\ \text{mR/yr})\ (\text{Cask-Loading}) + (71.168\ \text{mR/hr}) + (\text{background})$$

Equation 4.5.7-4

Table 4.5-36 provides the estimated annual exposure directly surrounding the Independent Spent Fuel Storage Installation and provides ratios of the exposure from its initial 2011 loading. The estimated annual exposure for the NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation was based on the TLD data from 2001 - 2007 from the JAFNPP Independent Spent Fuel Storage Installation. Values were calculated by multiplying the 13.984 mR/hr (0.12 mGy/hr) per cask-year by the cask loading.

Table 4.5-37 provides the equation coefficients for the proposed NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation assuming 40 casks in the year 2011. The coefficients "μ" and "R" were equivalent to those coefficients calculated for the JAFNPP Independent Spent Fuel Storage Installation in Table 4.5-36. The coefficient "c" was adjusted to that coefficient calculation for the JAFNPP Independent Spent Fuel Storage Installation in Table 4.5-28, based on cask loading. The resulting coefficient "c" was calculated as 905.42 mrem/yr (9.05 mSv/yr) [203.72 mrem/yr x (40 casks / 9 casks)].

4.5.4.4 Construction Worker Dose Estimates

Dose rates from all sources combined were calculated for each 100 x 100 foot square on the plant grid. These dose rates were in terms of mrem/year. For purposes of dose rate calculations a 100% occupancy is assumed. (For purposes of collective dose calculations the occupancy for construction workers is 2,200 hours per year.) The dose rates were the sum of the dose rate from the three main sources; gaseous effluents, the Independent Spent Fuel Storage Facilities, and the Turbine Buildings. The dose rates, assuming full time occupancy, are shown in Figure 4.5-4 for the year 2015, the last year of construction. It is this year that the dose rate will be greatest, primarily because the Independent Spent Fuel Storage Facilities will have the largest number of Independent Spent Fuel Storage casks. In the calculations, no credit is taken for any additional shielding other than that present in measured doses.

The collective dose is the sum of all doses received by all workers. It is a measure of population risk. The number of on-site workers (in terms of Full Time Equivalents), their location by zone and associated occupancy fraction are given in Table 4.5-38 and Table 4.5-39. The details of the collective dose calculations are given in the following discussion.

The equation for dose rate during year t at location x,y on the plant grid is:

$$\dot{D}_{x,y} = \dot{D}_{gas} + \dot{D}_{ISFSI} + \dot{D}_{N16}$$

where the terms are explained in the ER subsections.

The equation for the average dose rate in a zone is:

$$\overline{\dot{D}}_Z = \frac{1}{N_Z} \sum_{(\text{all x,y in Z})} \dot{D}_{x,y}$$

where N_z is the number of squares in the zone.

The equation for collective dose for the construction period is:

$$D = \frac{2200}{8760} \sum_t \sum_Z \overline{\dot{D}}_Z FTE_{Z,t}$$

where

$$\frac{2200}{8760} = \text{fraction of work hours per year}$$

$$\overline{\dot{D}}_Z = \text{average dose rate in zone, Z.}$$

$$FTE_{Z,t} = \text{Full Time Equivalents in zone Z during year t.}$$

The equation for full time equivalents is:

$$FTE_{Z,t} = P_Z \text{ Census}_t$$

where $P_Z = \text{probability of worker in zone, Z}$

$\text{Census}_t = \text{FTE of workers on site in year t.}$

The probability of a worker in each zone, P_Z, reflects the average construction worker and is based on an approximation of how much time the average worker spends in each zone. For example, the time spent in the parking lot and road is low, in the construction area is high, in the offices is less. These are estimates based on construction experience (Table 4.5-38).

The spatial distribution of zones on the site is shown in Figure 4.5-3. The figure is annotated with red letters indicating a zone code. There are many locations where construction workers are not expected to be, so they are not marked in the figure. Those zones that are marked were chosen because of planned activities at those locations, for example, the parking lots, roads, and the construction area.

4.5.5 COMPLIANCE WITH DOSE RATE REGULATIONS

NMP3NPP construction workers are, for the purposes of radiation protection, members of the general public. This means that the annual dose limits are considerably lower (i.e., 100 mrem/year (1 mSv/yr)) than that of a radiation worker, which is 5 rem/yr (50 mSv/yr). The construction workers (with the exception of certain specialty contractors loading fuel or using industrial radiation sources for radiography) do not work with radiation sources.

There are three regulations that govern dose rates to members of the general public. Dose rate limits to the public are provided in 10 CFR 20.1301 (NRC, 2007c), 10 CFR 20.1302 (NRC, 2007a), and 10 CFR 50, Appendix I (NRC, 2007b). Compliance with 10 CFR 20.1302 is discussed in Section 4.5.10. The design objectives of 10 CFR 50, Appendix I apply relative to maintaining dose as low as is reasonably achievable (ALARA) for construction workers. Also, 40 CFR 190 applies because it is referred to in 10 CFR 20.1301. Note that 10 CFR sections 20.1001through 20.1204 do not apply to the construction workers as they are considered members of the general public and not radiation workers.

4.5.5.1 10 CFR 20.1301

The 10 CFR 20.1301 regulations limit annual doses from licensed operations to individual members of the public to 100 mrem (1 mSv) total effective dose equivalent (TEDE). In addition, the dose rate from external sources to unrestricted areas must be less than 2 mrem (20 µSv) in any one hour. This applies to the public both outside and within controlled areas. Given that the relevant sources are relatively constant in time, the hourly limit is met if the annual limit is met.

4.5.5.2 10 CFR 50, Appendix I

The 10 CFR 50, Appendix I criteria apply only to effluents. The purpose of the criteria is to assure adequate design of effluent controls (in this case at NMP Units 1 and Unit 2, and JAFNPP). The annual limits for liquid effluents are 3 mrem (30 µSv) to the total body and 10 mrem (100 µSv) to any organ.

For gaseous effluents, the annual limits with respect to people (with occupancy credit allowed) are 5 mrem (50 µSv) to the total body and 15 mrem (150 µSv) to organs including skin.

Table 4.5-1 shows that the most limiting criteria are met for liquid and gaseous effluents with regard to NMP3NPP construction workers. Note that NMP3NPP occupational zones, during construction, are treated, for purposes of these criteria, as unrestricted areas.

4.5.5.3 40 CFR 190

The 40 CFR 190 (USEPA, 2007) criteria apply to annual doses, called dose rate here because the units are in mrem per year, received by members of the general public exposed to nuclear fuel cycle operations, i.e., nuclear power plants. Therefore, these regulations apply to NMP3NPP construction workers on the plant site just as they apply to members of the general public who live off-site. The most limiting part of the regulations states, "The annual dose equivalent (shall) not exceed 25 millirem (per year) to the whole body."

Table 4.5-2 shows the maximum dose rates in all the construction zones, which are based on an occupancy time of 2200 hours. The use of 2,200 hours assumes that the worker takes 2 weeks vacation or sick time per year, works 40 hours per week for 50 weeks per year, and works 10% overtime per year. The maximum dose rate for the Laydown area was estimated to be 55.9 mrem/yr in year 2015 (Table 4.5-40), due to its close proximity to the proposed NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation. However, the ALARA program described in Section 4.5.10 will not allow workers to linger or work full shifts at these locations. The maximum dose rates for all other construction zones are less than 23 mrem/year (0.23 mSievert/year). Therefore, given the requirements of the ALARA program, the dose limits of 40 CFR 190 will be met for all construction workers.

4.5.6 COLLECTIVE DOSES TO NMP3NPP WORKERS

The collective dose is the sum of all doses received by all workers. It is a measure of population risk. The total worker collective dose for the combined years of construction is 12.5 person-rem (Table 4.5-40). This is a best estimate based upon the worker census, occupancy projections and maximum zone dose rates shown in Table 4.5-38, Table 4.5-39 and Table 4.5-40. The breakdown of collective dose by construction year and occupancy zone is given in Table 4.5-40. This assumes 2200 hours per year occupancy for each worker.

4.5.7 RADIATION PROTECTION AND ALARA PROGRAM

Due to the exposures from NMP Unit 1, Unit 2 and JAFNPP normal operations, there will be a Radiation Protection and ALARA program for NMP3NPP construction workers. This program will meet the guidance of Regulatory Guide 8.8 (NRC, 1978) to maintain individual and collective radiation exposures ALARA. This program will also meet the requirements of 10 CFR 20.1302 (NRC, 2007a). Because the construction workers are not radiation workers, but are, for the purposes of radiation protection, members of the general public, individual monitoring and training of construction workers on NMP3NPP is not required. Construction workers will be treated, for purposes of radiation protection, as if they are members of the general public in unrestricted areas. However, they are exposed to effluent radioactivity and direct radiation sources from NMP Unit 1, Unit 2 and JAFNPP. The most important reason for implementing the ALARA program is that these source levels may vary over time from the projections made here. There may also be additional sources, unaccounted for by the above projections. Some features of the NMP3NPP Construction ALARA Program will be:

- The NMP3NPP ALARA Program will be incorporated into the NMPNS Site ALARA Committee. The Committee will meet quarterly, will review monitoring, and review worker dose rate and dose projections. The Committee will be empowered to stop work if the "general public" status of any construction worker is jeopardized. The Committee will publish a dose and dose rate report for construction workers.

- The Site Radiation Protection personnel will report to the Committee. The Radiation Protection Department will be in charge of radiation monitoring, worker census, source census and use this data to project worker doses and dose rates on a monthly basis into the next quarter and will report to the Committee.

- The NMP Unit 1 and Unit 2 ODCM and other NMP Unit 1 and Unit 2 processes such as the Interim Fuel Storage loading process, will be updated to link dose-important NMP Unit 1 and Unit 2 activities to projected NMP3NPP construction worker ALARA dose.

- The Committee will establish a radiation monitoring program to assure 40 CFR 190 regulations are met for NMP3NPP Construction workers. It is expected that monitoring will require either special instruments and/or measurements closer to sources and projected by calculation further out to where workers will be.

- The Committee will require, before any high dose rate evolutions, such as the transport of fuel to the Interim Fuel Storage Facility, that the NMP3NPP ALARA evaluation be revised.
- Consumption of edible plants growing on-site or fishing on-site will not be allowed.
- The program will survey the radiation levels in construction areas and will survey radioactive materials in effluents released to construction areas to demonstrate compliance with dose limits for NMP3NPP workers.
- The program will comply with the annual dose limit in 10 CFR 20.1301(NRC, 2007c) by measurement or calculation to verify that the total effective dose equivalent to the individual worker likely to receive the highest dose from any on-site operation does not exceed the annual dose limit.

4.5.8 REFERENCES

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NRC 2007c. Title 10, Code of Federal Regulations, Part 20.1301, Dose Limits for Individual Members of the Public, 2007.

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USEPA, 1993. External Exposure to Radionuclides in Air, Water, and Soil, Federal Guidance Report No. 12, Document Number EPA-402-R-93-08 1, U.S. Environmental Protection Agency, September 1993.

USEPA, 2007. Title 40, Code of Federal Regulations, Part 190, Environmental Radiation Protection Standards for Nuclear Power Operations, 2007.

Table 4.5-1—10 CFR 50 Appendix I Dose Assessment for Limiting Location (2200 hour Occupancy)

Dose Type	Calculated	Limit
External Whole Body (mrem/yr) (mSv/yr)	4.41 (4.41E-02)	5 (5E-02)
External Skin (mrem/yr) (mSv/yr)	11.65 (1.17E-01)	15 (1.5E-01)
Organ Dose (mrem/yr) (mSv/yr)	0.58 (5.8E-03)	15 (1.5E-01)
Whole Body/Organ(1) (mrem/yr) (mSv/yr)	2.19 (2.19E-02)	3 (3E-02)

Note

1. This dose assessment is from the liquid pathway. Since only direct radiation from contaminated shoreline is considered for this evaluation, the result applies to both whole body and organ.

Table 4.5-2—Worker Doses for 2015 with 2200 hour Occupancy Times

Zone	Description	Whole Body (mrem/yr) (mSv/yr)	Organ (mrem/yr) (mSv/yr)	Thyroid (mrem/yr) (mSv/yr)	TEDE (mrem/yr) (mSv/yr)
Regulation		40 CFR 190			10 CFR 20
B	Batch Plant	5.15 (5.15E-02)	5.18 (5.18E-02)	5.15 (5.15E-02)	5.22 (5.22E-02)
C	Construction on Main Structures	0.99 (9.92E-03)	1.02 (1.02E-02)	1.00 (9.96E-03)	1.03 (1.03E-02)
L	Laydown	22.93 (2.29E-01)	23.05 (2.30E-01)	23.00 (2.30E-01)	22.37 (2.24E-01)
O	Office/Trailer	0.40 (3.97E-03)	0.41 (4.13E-03)	0.40 (4.00E-03)	0.42 (4.19E-03)
P	Parking	0.30 (2.95E-03)	0.31 (3.08E-03)	0.30 (2.98E-03)	0.31 (3.11E-03)
R	Roads	10.64 (1.06E-01)	10.68 (1.07E-01)	10.65 (1.06E-01)	10.73 (1.07E-01)
S	Shoreline	2.68 (2.68E-02)	2.70 (2.70E-02)	2.68 (2.68E-02)	2.71 (2.71E-02)
T	Tower/Basin	6.51 (6.51E-02)	6.55 (6.55E-02)	6.52 (6.52E-02)	6.59 (6.59E-02)
W	Warehouse	0.36 (3.64E-03)	0.38 (3.79E-03)	0.37 (3.67E-03)	0.38 (3.85E-03)
MAXIMUM		23 (2.29E-01)	23 (2.30E-01)	23 (2.3E-01)	22 (2.2E-01)
LIMIT		25 (2.5E-01)	25 (2.5E-01)	75 (7.5E-01)	100 (1.0E+00)

Table 4.5-3— Exterior Radiation Source List from NMP Unit 1, Unit 2 and JAFNPP

Source	Location	Radioactive Inventory	Shielding	Typical Dose Rates
Stack NMP Unit1	East of NMP Unit 1 reactor bldg	Gaseous effluents	n.a.- airborne	Off-site dose typically less than a few mrem/yr
Stack NMP Unit 2	North East of NMP Unit 2 reactor bldg	Gaseous effluents	n.a.- airborne	Off-site dose typically less than a few mrem/yr
Stack JAFNPP	South of JAF reactor bldg	Gaseous effluents	n.a.- airborne	Off-site dose typically less than 1 mrem/yr
Emergency Condenser Vents NMP Unit1	North Side of NMP Unit 1 Reactor Building	Gaseous effluents	n.a.- airborne	Off-site dose typically less than a few mrem/yr
RB/RW Vent NMP Unit 2	West of NMP Unit 2 Reactor Bldg	Gaseous effluents	n.a.- airborne	Off-site dose typically less than a few mrem/yr
Vent JAFNPP	North side of JAF reactor bldg roof (reactor, refuel & turbine bldgs.) and North of Turbine bldg roof (Radwaste bldg)	Gaseous effluents	n.a.- airborne	Off-site dose typically less than 1 mrem/yr
NMP Unit1 Liquid Discharge	440 ft from shoreline	Liquid effluents	n.a.- waterborne	Off-site dose typically less than a few mrem/yr
NMP Unit2 Liquid Discharge	1400 ft from shoreline	Liquid effluents	n.a.- waterborne	Off-site dose typically less than a few mrem/yr
JAFNPP Liquid Discharge	1400 ft from shoreline	Liquid effluents	n.a.- waterborne	Off-site dose typically less than 1 mrem/yr
JAFNPP ISFSI	ISFSI Pad at JAF	Spent fuel	Vented concrete bunkers	20 mrem/month at perimeter fence
Turbine Building NMP Unit 1	Middle of NMP Unit 1 Structures	N-16	Variety of shields built into structure	< 20 μrem/hr on outside wall / <10 mrem/hr Roof (2)
Turbine Building NMP Unit 2	West of NMP Unit 2 Containment	N-16	Variety of shields built into structure	< 20 μrem/hr on outside wall / <20 mrem/hr Roof (2)
Turbine Building JAF	North of JAF Structures	N-16	Variety of shields built into structure	6 – 8 mRem/yr wall /< 50 mrem/hr Roof (3)
Cold Storage (1)	East of NMP Unit 2 Reactor bldg	Storage of outage equipment	Unknown	~ 0.1 mrem /hr exterior
Condensate Storage (1)	North of NMP Unit 2 reactor bldg			~ 0.1 mrem /hr exterior

Notes:

1. These sources have minimal impact of the NMP3NPP construction area. The source terms for these were averaged in with the much larger ^{16}N and ISFSI sources.

Table 4.5-4— Interior Radiation Source Locations

Site	Source	Coordinates	
		N (ft) (m)	E (ft) (m)
NMP Unit 1	Stack	1,283,300 (391,150)	545,950 (166,406)
	Vent	1,283,100 (391,089)	545,900 (166,390)
	Turbine Hall	1,283,000 (391,058)	545,900 (166,390)
	ISFSI (Proposed)	1,282,450 (390,891)	545,100 (166,146)
NMP Unit 2	Stack	1,283,775 (391,295)	547,110 (166,759)
	Vent	1,283,150 (391,104)	546,590 (166,601)
	Turbine Hall	1,283,150 (391,104)	546590 (166,601)
	ISFSI (Proposed)	1,282,450 (390,891)	545,100 (166,146)
JAFNPP	Stack	1,283,450 (391,196)	549,200 (167,396)
	Vent	1,283,710 (391,275)	549,180 (167,390)
	Turbine Hall	1,283,850 (391,317)	549,050 (167,350)
	ISFSI	1,283,078 (391,082)	548,628 (167,222)

Note:

These positions were scaled from the sketch given in Figure 4.5-1

Table 4.5-5—Historical Off-site Doses for NMP Unit 1, Unit 2 and JAFNPP Site and Comparison to 40 CFR 190 Limits

	Dose in mrem/year			Dose as Fraction of 40CFR190 Limits		
Year	**Whole Body[a]**	**Thyroid**	**Limiting Organ**	**Whole Body**	**Thyroid**	**Limiting Organ**
2007	1.52E+00	9.32E-02	9.32E-02[c]	6.08E-02	1.24E-03	3.73E-03
2006	2.01E+00	9.28E-02	9.28E-02[c]	8.04E-02	1.24E-03	3.71E-03
2005	1.51E+00	1.55E-01	1.55E-01[c]	6.04E-02	2.07E-03	6.20E-03
2004	1.80E-01	1.12E-01	1.12E-01[c]	7.20E-03	1.49E-03	4.48E-03
2003	1.90E+00	4.21E-02	4.21E-02[c]	7.60E-02	5.61E-04	1.68E-03
2002	3.60E-02	6.10E-02	6.10E-02[c]	1.44E-03	8.13E-04	2.44E-03
2001	2.45E-01	3.25E-01	3.25E-01[c]	9.80E-03	4.33E-03	1.30E-02
2000	5.90E-01	6.10E-01	6.10E-01[c]	2.36E-02	8.13E-03	2.44E-02
1999	4.20E-02	4.20E-02	4.20E-02[c]	1.68E-03	5.60E-04	1.68E-03
1998	8.70E-02	9.20E-02	9.20E-02[c]	3.48E-03	1.23E-03	3.68E-03
1997	7.60E-02	8.30E-02	8.30E-02[c]	3.04E-03	1.11E-03	3.32E-03
1996	7.22E-02	8.24E-02	8.24E-02[c]	2.89E-03	1.10E-03	3.30E-03
1995	7.79E-02	7.05E-02	7.05E-02[c]	3.12E-03	9.40E-04	2.82E-03
1994	2.55E-02	6.14E-02	6.14E-02[c]	1.02E-03	8.19E-04	2.46E-03
1993	3.97E-02	1.67E-01	1.67E-01[c]	1.59E-03	2.23E-03	6.68E-03
1992	7.62E-02	1.31E-01[b]	1.31E-01[d]	3.05E-03	1.75E-03	5.24E-03
1991	2.57E-02	1.92E-01	1.92E-01[c]	1.03E-03	2.56E-03	7.68E-03
1990	1.50E-02	6.78E-02	6.78E-02[c]	6.00E-04	9.04E-04	2.71E-03
1989	3.61E-02	4.86E-02[f]	4.86E-02[e]	1.44E-03	6.48E-04	1.94E-03
1988	1.30E-02	2.00E-01	2.00E-01[c]	5.20E-04	2.67E-03	8.00E-03

a Direct radiation is included in Whole Body dose.
b The maximum organ dose for this year was to the bone. This dose was conservatively also assigned to the thyroid, which was not given in the report.
c The limiting organ for this year was the thyroid.
d The limiting organ for this year was the bone.
e The limiting organ for this year was the liver.
f The maximum organ dose for this year was to the child liver. This dose was conservatively also assigned to the thyroid, which was not given in the report.

Table 4.5-6—Gaseous Dose Rate Type and Coefficients (mrem-m^3/sec-yr)

Regulation		10 CFR 20	10 CFR 50 Appendix I			40 CFR 190		
Plant	**Release**	**TEDE**	**WB-x**	**Skin-x**	**Organ-I**	**WB**	**Organ**	**Thyroid**
NMP Unit 1	**Stack**	1.22E+05	6.53E+04	7.69E+04	7.68E+04	6.72E+04	7.69E+04	6.95E+05
	Vent	2.73E+03	4.50E+01	5.36E+01	3.76E+03	3.76E+03	3.76E+03	3.76E+03
NMP Unit 2	**Stack**	2.70E+04	3.16E+04	4.44E+04	3.12E+03	3.30E+04	3.34E+04	3.34E+04
	Vent	2.25E+04	1.21E+04	1.43E+04	1.43E+04	1.23E+04	1.43E+04	1.23E+04
JAFNPP	**Stack**	4.67E+05	5.82E+05	9.89E+05	4.67E+03	5.82E+05	5.86E+05	5.86E+05
	Vent	5.43E+04	6.76E+04	1.89E+05	3.12E+03	6.79E+04	6.91E+04	6.91E+04

Table 4.5-7— Historical Annual Average Ground Release χ/Q (sec/m^3) 2001-2006

Dist (miles)	0.06	0.12	0.31	0.50	0.62	0.75	0.93	1.24	1.5	1.55	1.86	2.49	2.50	3.50	4.50
Dist (m)	**100**	**200**	**500**	**805**	**1000**	**1200**	**1500**	**2000**	**2414**	**2500**	**3000**	**4000**	**4023**	**5633**	**7242**
Dist (ft)	**328**	**656**	**1640**	**2640**	**3282**	**3937**	**4921**	**6562**	**7920**	**8202**	**9843**	**13123**	**13200**	**18480**	**23760**
SSE	2.07E-04	5.64E-05	1.04E-05	4.39E-06	2.97E-06	2.15E-06	1.21E-06	5.83E-07	3.66E-07	3.35E-07	2.21E-07	1.15E-07	1.14E-07	5.85E-08	3.67E-08
S	2.37E-04	6.47E-05	1.20E-05	5.08E-06	3.44E-06	2.49E-06	1.41E-06	6.76E-07	4.25E-07	3.89E-07	2.56E-07	1.34E-07	1.32E-07	6.78E-08	4.26E-08
SSW	3.02E-04	8.18E-05	1.54E-05	6.57E-06	4.47E-06	3.25E-06	1.83E-06	8.80E-07	5.53E-07	5.06E-07	3.32E-07	1.73E-07	1.71E-07	8.72E-08	5.45E-08
SW	3.96E-04	1.07E-04	2.05E-05	8.78E-06	5.99E-06	4.36E-06	2.46E-06	1.18E-06	7.44E-07	6.81E-07	4.48E-07	2.33E-07	2.30E-07	1.18E-07	7.35E-08
WSW	3.19E-04	8.70E-05	1.68E-05	7.23E-06	4.95E-06	3.60E-06	2.04E-06	9.82E-07	6.19E-07	5.67E-07	3.74E-07	1.96E-07	1.93E-07	9.94E-08	6.24E-08
W	4.66E-04	1.29E-04	2.49E-05	1.07E-05	7.31E-06	5.31E-06	3.01E-06	1.46E-06	9.20E-07	8.43E-07	5.58E-07	2.94E-07	2.91E-07	1.51E-07	9.54E-08
WNW	8.77E-04	2.44E-04	4.71E-05	2.02E-05	1.37E-05	9.97E-06	5.65E-06	2.74E-06	1.74E-06	1.59E-06	1.05E-06	5.58E-07	5.52E-07	2.88E-07	1.83E-07
NW	1.51E-03	4.25E-04	8.20E-05	3.51E-05	2.38E-05	1.72E-05	9.77E-06	4.75E-06	3.02E-06	2.77E-06	1.84E-06	9.78E-07	9.68E-07	5.09E-07	3.25E-07
NNW	1.28E-03	3.61E-04	6.98E-05	2.99E-05	2.02E-05	1.47E-05	8.32E-06	4.05E-06	2.57E-06	2.36E-06	1.57E-06	8.36E-07	8.26E-07	4.35E-07	2.78E-07

Table 4.5-8—Historical Annual Average Elevated Release χ/Q (sec/m^3) 2001-2006[a]

Dist (miles)	0.06	0.12	0.31	0.50	0.62	0.75	0.93	1.24	1.5	1.55	1.86	2.49	2.50	3.50	4.50
Dist (m)	**100**	**200**	**500**	**805**	**1000**	**1200**	**1500**	**2000**	**2414**	**2500**	**3000**	**4000**	**4023**	**5633**	**7242**
Dist (ft)	**328**	**656**	**1640**	**2640**	**3281**	**3937**	**4921**	**6562**	**7920**	**8202**	**9843**	**13123**	**13200**	**18480**	**23760**
SSE	7.25E-18	7.05E-10	1.64E-07	1.09E-07	9.24E-08	7.68E-08	5.51E-08	6.70E-08	5.20E-08	4.94E-08	3.88E-08	3.19E-08	3.16E-08	2.28E-08	1.56E-08
S	5.78E-20	1.79E-10	1.20E-07	8.43E-08	8.32E-08	7.14E-08	5.28E-08	7.30E-08	5.80E-08	5.53E-08	4.43E-08	3.88E-08	3.85E-08	2.90E-08	2.01E-08
SSW	2.14E-19	1.75E-10	7.62E-08	6.48E-08	6.96E-08	6.60E-08	5.38E-08	7.16E-08	5.97E-08	5.73E-08	4.76E-08	4.86E-08	4.82E-08	3.14E-08	2.19E-08
SW	1.10E-21	8.19E-12	1.34E-08	1.40E-08	1.77E-08	1.97E-08	1.91E-08	2.49E-08	2.42E-08	2.38E-08	2.26E-08	2.63E-08	2.61E-08	2.31E-08	1.84E-08
WSW	2.24E-22	2.31E-12	1.69E-09	2.75E-09	3.15E-09	3.57E-09	3.75E-09	5.77E-09	6.61E-09	6.72E-09	7.36E-09	7.44E-09	7.44E-09	6.79E-09	6.25E-09
W	4.19E-22	2.81E-12	2.76E-09	3.43E-09	3.78E-09	4.24E-09	4.46E-09	5.20E-09	5.76E-09	5.82E-09	6.24E-09	6.20E-09	6.20E-09	5.63E-09	4.89E-09
WNW	1.68E-23	3.70E-12	7.48E-09	8.39E-09	9.14E-09	1.01E-08	1.02E-08	1.11E-08	1.17E-08	1.17E-08	1.19E-08	1.11E-08	1.10E-08	9.38E-09	7.82E-09
NW	2.82E-22	1.38E-11	2.31E-08	2.58E-08	2.64E-08	2.73E-08	2.56E-08	2.57E-08	2.60E-08	2.59E-08	2.58E-08	2.33E-08	2.32E-08	1.93E-08	1.59E-08
NNW	3.50E-22	1.27E-11	1.76E-08	2.40E-08	2.57E-08	2.66E-08	2.39E-08	2.24E-08	2.21E-08	2.19E-08	2.16E-08	1.96E-08	1.95E-08	1.65E-08	1.38E-08

Note:

a. Calculated using a stack height of 350 ft, which is the lowest of the stack heights for NMP Unit 1, Unit 2 and JAFNPP.

Table 4.5-9—Historical Annual Average Elevated Release Gamma χ/Q (sec/m^3) 2001 – 2006[a]

Dist (miles)	0.06	0.12	0.31	0.50	0.62	0.75	0.93	1.24	1.5	1.55	1.86	2.49	2.50	3.50	4.50
Dist (m)	**100**	**200**	**500**	**805**	**1000**	**1200**	**1500**	**2000**	**2414**	**2500**	**3000**	**4000**	**4023**	**5633**	**7242**
Dist (ft)	**328**	**656**	**1640**	**2640**	**3280**	**3937**	**4921**	**6562**	**7920**	**8202**	**9843**	**13123**	**13200**	**18480**	**23760**
SSE	3.36E-07	3.40E-07	3.71E-07	2.70E-07	2.30E-07	1.88E-07	1.26E-07	1.03E-07	7.27E-08	6.79E-08	4.94E-08	3.35E-08	3.32E-08	2.12E-08	1.44E-08
S	3.22E-07	3.25E-07	3.57E-07	2.76E-07	2.65E-07	2.20E-07	1.47E-07	1.25E-07	8.83E-08	8.25E-08	6.03E-08	4.17E-08	4.13E-08	2.68E-08	1.83E-08
SSW	4.04E-07	4.05E-07	4.36E-07	3.47E-07	3.18E-07	2.68E-07	1.82E-07	1.41E-07	1.01E-07	9.45E-08	6.98E-08	5.24E-08	5.20E-08	3.14E-08	2.15E-08
SW	3.14E-07	3.10E-07	3.27E-07	2.73E-07	2.44E-07	2.07E-07	1.42E-07	9.76E-08	7.13E-08	6.70E-08	5.06E-08	3.84E-08	3.81E-08	2.66E-08	1.95E-08
WSW	2.39E-07	2.35E-07	2.42E-07	1.99E-07	1.63E-07	1.38E-07	9.32E-08	6.12E-08	4.46E-08	4.19E-08	3.17E-08	2.05E-08	2.04E-08	1.32E-08	1.00E-08
W	2.38E-07	2.35E-07	2.42E-07	1.98E-07	1.62E-07	1.36E-07	9.23E-08	5.57E-08	4.05E-08	3.81E-08	2.88E-08	1.86E-08	1.84E-08	1.19E-08	8.74E-09
WNW	2.87E-07	2.85E-07	2.98E-07	2.48E-07	2.04E-07	1.73E-07	1.18E-07	7.20E-08	5.27E-08	4.96E-08	3.77E-08	2.45E-08	2.43E-08	1.57E-08	1.15E-08
NW	5.27E-07	5.28E-07	5.58E-07	4.58E-07	3.77E-07	3.20E-07	2.18E-07	1.33E-07	9.75E-08	9.17E-08	6.97E-08	4.51E-08	4.48E-08	2.89E-08	2.10E-08
NNW	5.36E-07	5.37E-07	5.64E-07	4.58E-07	3.76E-07	3.19E-07	2.16E-07	1.31E-07	9.53E-08	8.96E-08	6.76E-08	4.35E-08	4.32E-08	2.77E-08	2.02E-08

Note:

Calculated using a stack height of 350 ft, which is the lowest of the stack heights for NMP Unit 1, Unit 2 and JAFNPP.

Table 4.5-10—Historical Gaseous Release Data for NMP Unit 1 Stack (2001-2006) [Ci/yr (Bq/yr)] (Constellation, 2001a, 2001b, 2002a, 2003b, 2004a, 2005a, 2006c)

Nuclide	2001	2002	2003	2004	2005	2006
H 3	8.29E+01	2.33E+01	2.18E+01	3.37E+01	4.19E+01	2.91E+01
	(3.07E+12)	(8.61E+11)	(8.07E+11)	(1.25E+12)	(1.55E+12)	(1.08E+12)
Cr 51	3.30E-04	0.00E+00	3.16E-04	6.77E-04	2.11E-04	0.00E+00
	(1.22E+07)	(0.00E+00)	(1.17E+07)	(2.50E+07)	(7.80E+06)	(0.00E+00)
Mn 54	2.36E-03	3.68E-04	8.19E-04	1.15E-03	2.97E-04	8.23E-05
	(8.72E+07)	(1.36E+07)	(3.03E+07)	(4.25E+07)	(1.10E+07)	(3.05E+06)
Co 58	3.23E-04	6.70E-05	1.08E-04	1.68E-04	8.42E-05	1.45E-04
	(1.20E+07)	(2.48E+06)	(4.00E+06)	(6.23E+06)	(3.12E+06)	(5.37E+06)
Co 60	6.54E-03	1.00E-03	3.03E-03	4.12E-03	2.89E-03	2.01E-03
	(2.42E+08)	(3.71E+07)	(1.12E+08)	(1.52E+08)	(1.07E+08)	(7.44E+07)
Fe 55	3.15E-03	1.35E-03	1.02E-03	8.30E-04	2.06E-04	1.71E-03
	(1.16E+08)	(5.00E+07)	(3.77E+07)	(3.07E+07)	(7.62E+06)	(6.33E+07)
Fe 59	1.18E-04	0.00E+00	3.65E-05	6.55E-05	0.00E+00	0.00E+00
	(4.37E+06)	(0.00E+00)	(1.35E+06)	(2.42E+06)	(0.00E+00)	(0.00E+00)
Zn 65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-04
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(6.25E+06)
Kr 85m	1.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(5.11E+08)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Sr 89	1.22E-03	6.55E-04	1.62E-04	5.25E-05	0.00E+00	1.63E-05
	(4.50E+07)	(2.42E+07)	(5.99E+06)	(1.94E+06)	(0.00E+00)	(6.03E+05)
Sr 90	1.32E-04	1.56E-06	0.00E+00	0.00E+00	0.00E+00	5.20E-06
	(4.90E+06)	(5.76E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(1.92E+05)
I 131	2.70E-03	1.62E-03	4.13E-04	6.28E-04	1.26E-03	1.19E-03
	(9.99E+07)	(5.99E+07)	(1.53E+07)	(2.32E+07)	(4.65E+07)	(4.38E+07)
I 133	1.83E-02	7.30E-03	1.32E-04	3.99E-04	2.92E-03	4.33E-03
	(6.77E+08)	(2.70E+08)	(4.88E+06)	(1.48E+07)	(1.08E+08)	(1.60E+08)
Xe 133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+01
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.20E+11)
Xe 135	9.21E-01	0.00E+00	3.44E-01	1.54E+00	6.35E-01	8.34E-01
	(3.41E+10)	(0.00E+00)	(1.27E+10)	(5.70E+10)	(2.35E+10)	(3.09E+10)
Xe 138	0.00E+00	2.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(1.07E+11)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Cs 137	5.24E-06	2.66E-05	2.49E-05	3.12E-05	1.62E-05	1.66E-05
	(1.94E+05)	(9.85E+05)	(9.22E+05)	(1.16E+06)	(5.98E+05)	(6.14E+05)
Ba 140	1.99E-05	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(7.36E+05)	(6.15E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Nd 147	2.59E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(9.58E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)

Table 4.5-11—Historical Gaseous Release Data for NMP Unit 1 Vent (2001-2006) [Ci/yr (Bq/yr)(Constellation, 2001a, 2001b, 2002a, 2003b, 2004a, 2005a, 2006c)]

Nuclide	2001	2002	2003	2004	2005	2006
H 3	4.35E+01	8.04E+00	1.63E+02	1.31E+01	9.27E+00	5.27E+00
	(1.61E+12)	(2.97E+11)	(6.03E+12)	(4.85E+11)	(3.43E+11)	(1.95E+11)
Cr 51	3.32E-09	0.00E+00	2.23E-08	0.00E+00	0.00E+00	0.00E+00
	(1.23E+02)	(0.00E+00)	(8.25E+02)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Mn 54	5.95E-08	0.00E+00	2.28E-06	2.58E-08	0.00E+00	0.00E+00
	(2.20E+03)	(0.00E+00)	(8.43E+04)	(9.55E+02)	(0.00E+00)	(0.00E+00)
Co 58	1.51E-08	0.00E+00	3.93E-07	3.06E-08	0.00E+00	0.00E+00
	(5.58E+02)	(0.00E+00)	(1.45E+04)	(1.13E+03)	(0.00E+00)	(0.00E+00)
Co 60	4.39E-07	0.00E+00	4.34E-06	8.10E-08	0.00E+00	0.00E+00
	(1.62E+04)	(0.00E+00)	(1.61E+05)	(3.00E+03)	(0.00E+00)	(0.00E+00)
Fe 55	3.15E-03	1.35E-03	1.02E-03	0.00E+00	2.06E-04	1.71E-03
	(1.16E+08)	(5.00E+07)	(3.77E+07)	(0.00E+00)	(7.62E+06)	(6.33E+07)
Fe 59	1.79E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(6.62E+02)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Sr 89	4.28E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(1.58E+03)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Sr 90	5.36E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(1.98E+02)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
I 131	0.00E+00	0.00E+00	0.00E+00	1.32E-08	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(4.88E+02)	(0.00E+00)	(0.00E+00)
I 133	1.02E-08	0.00E+00	0.00E+00	1.20E-07	0.00E+00	0.00E+00
	(3.77E+02)	(0.00E+00)	(0.00E+00)	(4.44E+03)	(0.00E+00)	(0.00E+00)
Xe 133	4.24E-05	1.05E-04	1.35E-02	1.23E-03	0.00E+00	1.26E-03
	(1.57E+06)	(3.89E+06)	(4.98E+08)	(4.56E+07)	(0.00E+00)	(4.66E+07)
Xe 133m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Xe 135	1.94E-03	2.63E-04	5.92E-03	1.67E-03	5.68E-05	2.48E-05
	(7.18E+07)	(9.73E+06)	(2.19E+08)	(6.17E+07)	(2.10E+06)	(9.18E+05)
Cs 137	0.00E+00	0.00E+00	2.04E-07	1.74E-09	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(7.55E+03)	(6.44E+01)	(0.00E+00)	(0.00E+00)

Table 4.5-12—Historical Gaseous Release Data for NMP Unit 2 Stack (2001-2006) [Ci/yr (Bq/yr)(Constellation, 2001c, 2002b, 2003a, 2004b, 2005b, 2006c)]

(Page 1 of 2)

Nuclide	2001	2002	2003	2004	2005	2006
H 3	2.36E+01	2.44E+01	4.32E+01	3.92E+01	6.43E+01	3.09E+01
	(8.72E+11)	(9.02E+11)	(1.60E+12)	(1.45E+12)	(2.38E+12)	(1.14E+12)
Ar 41	4.47E-01	5.52E-01	4.56E-01	2.09E-01	1.78E-01	5.12E-03
	(1.65E+10)	(2.04E+10)	(1.69E+10)	(7.73E+09)	(6.60E+09)	(1.89E+08)
Cr 51	0.00E+00	0.00E+00	2.08E-04	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(7.70E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Mn 54	4.00E-05	1.82E-05	8.20E-05	1.11E-06	0.00E+00	2.88E-05
	(1.48E+06)	(6.75E+05)	(3.03E+06)	(4.11E+04)	(0.00E+00)	(1.07E+06)
Co 58	0.00E+00	3.72E-06	2.35E-05	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(1.38E+05)	(8.70E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Co 60	9.99E-05	1.37E-04	1.96E-04	3.95E-05	5.96E-05	4.26E-05
	(3.70E+06)	(5.05E+06)	(7.24E+06)	(1.46E+06)	(2.21E+06)	(1.58E+06)
Fe 55	8.31E-05	4.01E-05	0.00E+00	0.00E+00	0.00E+00	2.47E-04
	(3.07E+06)	(1.48E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(9.13E+06)
Fe 59	0.00E+00	0.00E+00	3.66E-05	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(1.35E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Zn 65	5.01E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(1.85E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Kr 85m	3.52E+00	5.04E+00	4.29E+01	1.35E+01	4.82E+01	1.66E+01
	(1.30E+11)	(1.86E+11)	(1.59E+12)	(5.00E+11)	(1.78E+12)	(6.13E+11)
Kr 87	4.57E-01	1.74E-01	1.36E+00	0.00E+00	1.67E+00	6.67E-01
	(1.69E+10)	(6.44E+09)	(5.03E+10)	(0.00E+00)	(6.18E+10)	(2.47E+10)
Kr 88	3.83E+00	2.19E+00	4.50E+01	1.41E+01	6.08E+01	2.19E+01
	(1.42E+11)	(8.11E+10)	(1.66E+12)	(5.20E+11)	(2.25E+12)	(8.10E+11)
Sr 89	1.39E-05	7.54E-06	0.00E+00	0.00E+00	0.00E+00	1.55E-05
	(5.14E+05)	(2.79E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.73E+05)
Sr 90	4.54E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-06
	(1.68E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(8.29E+04)
Zr 95	0.00E+00	1.97E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(7.29E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Ag 110m	2.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(7.55E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
I 131	5.79E-04	3.18E-04	3.05E-04	9.86E-05	4.22E-04	2.63E-04
	(2.14E+07)	(1.18E+07)	(1.13E+07)	(3.65E+06)	(1.56E+07)	(9.75E+06)
I 133	4.43E-03	1.65E-03	5.75E-04	3.14E-04	3.21E-03	4.99E-04
	(1.64E+08)	(6.11E+07)	(2.13E+07)	(1.16E+07)	(1.19E+08)	(1.85E+07)
Xe 133	8.70E-02	1.16E+00	1.40E+02	2.71E+01	6.38E+01	3.30E+01
	(3.22E+09)	(4.29E+10)	(5.17E+12)	(1.00E+12)	(2.36E+12)	(1.22E+12)
Xe 133m	0.00E+00	0.00E+00	4.40E-01	0.00E+00	0.00E+00	1.57E-01
	(0.00E+00)	(0.00E+00)	(1.63E+10)	(0.00E+00)	(0.00E+00)	(5.81E+09)
Xe 135	7.50E-01	6.65E-01	1.17E+01	8.15E-01	0.00E+00	2.92E+00
	(2.78E+10)	(2.46E+10)	(4.33E+11)	(3.02E+10)	(0.00E+00)	(1.08E+11)
Xe 135m	1.44E+00	5.40E-01	1.31E+00	1.82E-01	0.00E+00	5.69E-01
	(5.34E+10)	(2.00E+10)	(4.85E+10)	(6.73E+09)	(0.00E+00)	(2.11E+10)
Xe 137	9.89E+00	1.97E+00	2.48E+00	4.14E-02	0.00E+00	0.00E+00
	(3.66E+11)	(7.30E+10)	(9.18E+10)	(1.53E+09)	(0.00E+00)	(0.00E+00)
Xe 138	5.78E+00	1.64E+00	4.69E+00	1.23E-01	0.00E+00	7.72E-01
	(2.14E+11)	(6.08E+10)	(1.74E+11)	(4.55E+09)	(0.00E+00)	(2.86E+10)

Table 4.5-12—Historical Gaseous Release Data for NMP Unit 2 Stack (2001-2006)
[Ci/yr (Bq/yr)(Constellation, 2001c, 2002b, 2003a, 2004b, 2005b, 2006c)]
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Nuclide	2001	2002	2003	2004	2005	2006
Cs 134	0.00E+00	0.00E+00	0.00E+00	2.30E-06	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(8.51E+04)	(0.00E+00)	(0.00E+00)
Mo 99	1.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(6.33E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Xe 138	5.78E+00	1.64E+00	4.69E+00	1.23E-01	0.00E+00	7.72E-01
	(2.14E+11)	(6.08E+10)	(1.74E+11)	(4.55E+09)	(0.00E+00)	(2.86E+10)
Cs 134	0.00E+00	0.00E+00	0.00E+00	2.30E-06	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(8.51E+04)	(0.00E+00)	(0.00E+00)
Mo 99	1.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(6.33E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)

Table 4.5-13—Historical Gaseous Release Data for NMP Unit 2 Vent (2001-2006) [Ci/yr (Bq/yr)(Constellation, 2001c, 2002b, 2003a, 2004b, 2005b, 2006c)]

Nuclide	2001	2002	2003	2004	2005	2006
H 3	5.15E+00	6.07E+00	2.30E+01	3.75E+01	6.97E+01	1.83E+01
	(1.90E+11)	(2.25E+11)	(8.52E+11)	(1.39E+12)	(2.58E+12)	(6.79E+11)
Cr 51	4.86E-04	0.00E+00	0.00E+00	6.60E-05	0.00E+00	0.00E+00
	(1.80E+07)	(0.00E+00)	(0.00E+00)	(2.44E+06)	(0.00E+00)	(0.00E+00)
Mn 54	6.97E-04	7.48E-04	1.65E-04	3.39E-04	2.91E-05	6.96E-05
	(2.58E+07)	(2.77E+07)	(6.10E+06)	(1.25E+07)	(1.08E+06)	(2.58E+06)
Co 58	1.02E-04	2.13E-05	8.22E-06	0.00E+00	0.00E+00	0.00E+00
	(3.77E+06)	(7.89E+05)	(3.04E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Co 60	9.70E-04	1.19E-03	5.14E-04	8.18E-04	3.15E-04	2.38E-04
	(3.59E+07)	(4.38E+07)	(1.90E+07)	(3.03E+07)	(1.16E+07)	(8.80E+06)
Fe 55	3.44E-03	9.81E-04	3.28E-04	0.00E+00	0.00E+00	2.18E-03
	(1.27E+08)	(3.63E+07)	(1.21E+07)	(0.00E+00)	(0.00E+00)	(8.08E+07)
Fe 59	2.38E-04	3.90E-05	4.58E-05	2.41E-05	0.00E+00	0.00E+00
	(8.80E+06)	(1.44E+06)	(1.69E+06)	(8.92E+05)	(0.00E+00)	(0.00E+00)
Zn 65	1.08E-04	1.34E-04	0.00E+00	0.00E+00	0.00E+00	7.87E-05
	(4.00E+06)	(4.95E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.91E+06)
Kr 85	0.00E+00	2.83E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(1.05E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Sr 89	2.67E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-05
	(9.88E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(1.51E+06)
Sr 90	3.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.42E-06
	(1.22E+06)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.75E+05)
Ag 110m	1.86E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(6.88E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
I 131	0.00E+00	4.45E-05	4.80E-06	1.29E-04	1.85E-05	1.57E-05
	(0.00E+00)	(1.65E+06)	(1.78E+05)	(4.77E+06)	(6.83E+05)	(5.81E+05)
I 133	0.00E+00	3.76E-05	0.00E+00	0.00E+00	3.34E-05	0.00E+00
	(0.00E+00)	(1.39E+06)	(0.00E+00)	(0.00E+00)	(1.24E+06)	(0.00E+00)
Xe 133m	0.00E+00	0.00E+00	2.62E-01	6.13E+00	0.00E+00	5.78E-01
	(0.00E+00)	(0.00E+00)	(9.69E+09)	(2.27E+11)	(0.00E+00)	(2.14E+10)
Cs 134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-06
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.58E+05)
Cs 137	4.47E-06	2.79E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(1.65E+05)	(1.03E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Mo 99	0.00E+00	8.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(3.27E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)

Table 4.5-14— Historical Gaseous Release Data for JAF Stack (2001-2006) [Ci/yr (Bq/yr)](Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)
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Nuclide	2001	2002	2003	2004	2005	2006
H 3	4.08E+00	3.12E+00	4.17E+00	2.93E+00	2.63E+00	2.96E+00
	(1.51E+11)	(1.15E+11)	(1.54E+11)	(1.08E+11)	(9.72E+10)	(1.10E+11)
Ar 41	2.51E+01	2.16E+01	1.38E+01	1.38E+01	9.61E+00	7.59E+00
	(9.28E+11)	(7.99E+11)	(2.36E+12)	(5.11E+11)	(3.56E+11)	(2.81E+11)
Cr 51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-05	1.56E-06
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.81E+05)	(5.77E+04)
Mn 54	3.41E-07	2.50E-06	3.52E-07	0.00E+00	6.69E-07	8.83E-07
	(1.26E+04)	(9.27E+04)	(1.30E+04)	(0.00E+00)	(2.48E+04)	(3.27E+04)
Co 60	2.63E-07	6.14E-07	0.00E+00	0.00E+00	0.00E+00	4.34E-07
	(9.72E+03)	(2.27E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(1.61E+04)
Kr 85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E+01
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.00E+11)
Kr 85m	3.63E+00	8.59E+00	3.50E+00	2.02E+02	5.12E+02	1.87E+02
	(1.34E+11)	(3.18E+11)	(1.29E+11)	(7.48E+12)	(1.89E+13)	(6.92E+12)
Kr 87	5.53E-01	1.66E+01	4.99E-01	2.06E+01	4.20E+02	1.22E+01
	(2.05E+10)	(6.15E+11)	(1.85E+10)	(7.64E+11)	(1.55E+13)	(4.50E+11)
Kr 88	1.09E+00	1.97E+01	2.61E+00	2.18E+02	8.22E+02	1.69E+02
	(4.03E+10)	(7.29E+11)	(9.67E+10)	(8.06E+12)	(3.04E+13)	(6.24E+12)
Kr 89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.53E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.05E+11)
Sr 89	3.89E-06	2.87E-06	2.12E-06	2.02E-04	2.21E-04	4.36E-04
	(1.44E+05)	(1.06E+05)	(7.84E+04)	(7.49E+06)	(8.19E+06)	(1.61E+07)
Sr 90	1.11E-07	6.61E-04	5.13E-08	6.30E-07	5.31E-07	1.51E-06
	(4.11E+03)	(2.45E+07)	(1.90E+03)	(2.33E+04)	(1.96E+04)	(5.60E+04)
Nb 95	2.24E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(8.29E+05)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
I 131	2.24E+00	1.24E-04	3.30E-05	8.95E-04	7.00E-03	1.24E-03
	(8.29E+10)	(4.60E+06)	(1.22E+06)	(3.31E+07)	(2.59E+08)	(4.58E+07)
I 133	6.98E-06	8.71E-04	1.59E-05	2.29E-03	2.44E-02	2.27E-03
	(2.58E+05)	(3.22E+07)	(5.88E+05)	(8.48E+07)	(9.03E+08)	(8.39E+07)
I 135	0.00E+00	9.52E-04	0.00E+00	5.00E-04	1.41E-02	1.47E-03
	(0.00E+00)	(3.52E+07)	(0.00E+00)	(1.85E+07)	(5.23E+08)	(5.45E+07)
Xe 133	1.55E+00	3.76E+00	7.60E-01	3.01E+02	3.61E+02	2.07E+02
	(5.75E+10)	(1.39E+11)	(2.81E+10)	(1.11E+13)	(1.33E+13)	(7.66E+12)
Xe 133m	0.00E+00	0.00E+00	0.00E+00	1.43E+00	4.13E-01	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.29E+10)	(1.53E+10)	(0.00E+00)
Xe 135	5.06E-01	2.67E+01	4.44E-01	4.52E+01	7.82E+02	5.93E+00
	(1.87E+10)	(9.87E+11)	(1.64E+10)	(1.67E+12)	(2.89E+13)	(2.19E+11)
Xe 135m	4.09E-01	2.44E+00	2.21E-01	1.21E+01	2.49E+02	2.28E+01
	(1.51E+10)	(9.01E+10)	(8.19E+09)	(4.48E+11)	(9.20E+12)	(8.44E+11)
Xe 137	0.00E+00	1.61E-01	0.00E+00	2.33E+01	8.52E+01	1.13E+02
	(0.00E+00)	(5.96E+09)	(0.00E+00)	(8.63E+11)	(3.15E+12)	(4.19E+12)
Xe 138	1.16E+00	7.98E+00	8.14E-01	3.78E+01	7.88E+01	6.85E+01
	(4.29E+10)	(2.95E+11)	(3.01E+10)	(1.40E+12)	(2.92E+12)	(2.53E+12)
Cs 136	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-07	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.31E+04)	(0.00E+00)
Cs 137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.09E-07	1.09E-06
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.25E+04)	(4.02E+04)

Table 4.5-14— Historical Gaseous Release Data for JAF Stack (2001-2006) [Ci/yr (Bq/yr)](Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)

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Nuclide	2001	2002	2003	2004	2005	2006
Ce 144	0.00E+00	3.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(1.40E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)
Ba 140	0.00E+00	0.00E+00	0.00E+00	5.80E-05	1.76E-04	2.12E-04
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.14E+06)	(6.51E+06)	(7.85E+06)
As 76	0.00E+00	1.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	(0.00E+00)	(6.03E+04)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)

Table 4.5-15—Historical Gaseous Release Data for JAF Vent (2001-2006) [Ci/yr (Bq/yr)] (Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)

(Page 1 of 2)

Nuclide	2001	2002	2003	2004	2005	2006
H 3	2.42E+01	2.07E+01	1.41E+01	1.42E+01	1.45E+01	1.41E+01
	(8.96E+11)	(7.65E+11)	(5.22E+11)	(5.24E+11)	(5.37E+11)	(5.20E+11)
Cr 51	0.00E+00	2.61E-05	0.00E+00	1.63E-05	0.00E+00	0.00E+00
	(0.00E+00)	(9.66E+05)	(0.00E+00)	(6.03E+05)	(0.00E+00)	(0.00E+00)
Mn 54	2.41E-06	4.11E-05	4.66E-05	9.54E-05	1.28E-06	6.23E-06
	(8.92E+04)	(1.52E+06)	(1.72E+06)	(3.53E+06)	(4.74E+04)	(2.31E+05)
Co 57	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-06	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(4.00E+04)	(0.00E+00)
Co 58	0.00E+00	3.90E-06	1.48E-05	3.37E-05	0.00E+00	0.00E+00
	(0.00E+00)	(1.44E+05)	(5.47E+05)	(1.25E+06)	(0.00E+00)	(0.00E+00)
Co 60	1.01E-06	1.66E-05	2.10E-05	2.92E-05	0.00E+00	3.41E-06
	(3.74E+04)	(6.14E+05)	(7.78E+05)	(1.08E+06)	(0.00E+00)	(1.26E+05)
Fe 59	0.00E+00	1.70E-05	5.63E-06	7.75E-06	0.00E+00	0.00E+00
	(0.00E+00)	(6.29E+05)	(2.08E+05)	(2.87E+05)	(0.00E+00)	(0.00E+00)
Zn 65	2.13E-06	5.76E-06	2.05E-05	1.47E-04	0.00E+00	7.66E-06
	(7.88E+04)	(2.13E+05)	(7.60E+05)	(5.44E+06)	(0.00E+00)	(2.83E+05)
Kr 87	0.00E+00	0.00E+00	0.00E+00	2.56E+00	7.26E+00	6.76E-02
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(9.47E+10)	(2.69E+11)	(2.50E+09)
Kr 88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.89E-01	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(3.29E+10)	(0.00E+00)
Sr 89	5.09E-05	3.33E-05	1.63E-05	5.84E-04	2.05E-03	7.10E-04
	(1.88E+06)	(1.23E+06)	(6.01E+05)	(2.16E+07)	(7.60E+07)	(2.63E+07)
Sr 90	7.39E-06	1.41E-05	6.67E-07	4.97E-06	2.07E-06	4.75E-06
	(2.73E+05)	(5.23E+05)	(2.47E+04)	(1.84E+05)	(7.66E+04)	(1.76E+05)
Sb 124	0.00E+00	1.27E-06	0.00E+00	4.68E-07	0.00E+00	0.00E+00
	(0.00E+00)	(4.70E+04)	(0.00E+00)	(1.73E+04)	(0.00E+00)	(0.00E+00)
I 131	6.00E-05	1.58E-04	1.38E-05	4.53E-03	2.35E-03	2.54E-03
	(2.22E+06)	(5.86E+06)	(5.10E+05)	(1.68E+08)	(8.68E+07)	(9.39E+07)
I 133	9.47E-05	3.79E-04	4.87E-06	6.33E-03	7.90E-03	2.35E-03
	(3.50E+06)	(1.40E+07)	(1.80E+05)	(2.34E+08)	(2.92E+08)	(8.70E+07)
I 135	0.00E+00	0.00E+00	0.00E+00	8.16E-04	4.49E-04	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(3.02E+07)	(1.66E+07)	(0.00E+00)
Xe 133	0.00E+00	0.00E+00	0.00E+00	2.44E+00	1.38E+01	1.10E+01
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(9.04E+10)	(5.12E+11)	(4.06E+11)
Xe 135	2.60E-01	0.00E+00	0.00E+00	6.82E+00	2.60E+01	1.25E+01
	(9.62E+09)	(0.00E+00)	(0.00E+00)	(2.52E+11)	(9.61E+11)	(4.63E+11)
Xe 135m	0.00E+00	0.00E+00	0.00E+00	1.52E+01	6.17E+01	4.96E+01
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(5.63E+11)	(2.28E+12)	(1.84E+12)
Xe 137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	2.16E+02
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.43E+12)	(8.01E+12)
Xe 138	0.00E+00	0.00E+00	0.00E+00	6.52E+01	1.77E+02	1.86E+02
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(2.41E+12)	(6.56E+12)	(6.87E+12)
Cs 134	0.00E+00	0.00E+00	0.00E+00	3.50E-05	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(1.30E+06)	(0.00E+00)	(0.00E+00)
Cs 136	0.00E+00	0.00E+00	0.00E+00	2.94E-06	0.00E+00	0.00E+00
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(1.09E+05)	(0.00E+00)	(0.00E+00)

Table 4.5-15—Historical Gaseous Release Data for JAF Vent (2001-2006) [Ci/yr (Bq/yr)] (Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)

(Page 2 of 2)

Nuclide	2001	2002	2003	2004	2005	2006
Cs 137	2.35E-06	0.00E+00	0.00E+00	1.89E-05	0.00E+00	0.00E+00
	(8.70E+04)	(0.00E+00)	(0.00E+00)	(6.99E+05)	(0.00E+00)	(0.00E+00)
Ba 140	0.00E+00	0.00E+00	0.00E+00	2.34E-04	1.04E-03	6.34E-04
	(0.00E+00)	(0.00E+00)	(0.00E+00)	(8.65E+06)	(3.86E+07)	(2.35E+07)

Table 4.5-16—(Total Effective Dose Equivalent (TEDE) from All Gaseous Effluent Releases (mrem/yr)

Facility	Year	TEDE		
		Stack	Vent	Total
JAFNPP	2001	2.45E-03	3.95E-03	6.40E-03
	2002	6.57E-03	6.15E-03	1.27E-02
	2003	1.66E-03	5.95E-03	7.61E-03
	2004	3.75E-02	1.51E-01	1.89E-01
	2005	1.63E-01	4.25E-01	5.89E-01
	2006	3.45E-02	4.75E-01	5.10E-01
NMP Unit 1	2001	9.26E-02	2.56E-02	1.18E-01
	2002	1.50E-02	4.68E-03	1.97E-02
	2003	4.25E-02	9.79E-02	1.40E-01
	2004	5.81E-02	7.70E-03	6.58E-02
	2005	4.04E-02	5.40E-03	4.58E-02
	2006	2.82E-02	3.07E-03	3.13E-02
NMP Unit 2	2001	3.15E-03	4.60E-01	4.63E-01
	2002	2.46E-03	5.56E-01	5.58E-01
	2003	1.38E-02	2.43E-01	2.57E-01
	2004	3.98E-03	3.89E-01	3.93E-01
	2005	1.47E-02	1.69E-01	1.84E-01
	2006	5.78E-03	1.17E-01	1.23E-01

Table 4.5-17—Total of Maximum Shoreline Doses

Plant	LADTAPII mrem/yr (mSv/yr) (12 hr/yr occupancy)	Worker mrem/yr (mSv/yr) (2200 hr/yr occupancy)	Full mrem/yr (Sv/yr) (8760 hr/yr occupancy)
NMP Unit 1	2.28E-03 (2.28E-05)	4.18E-01 (4.18E-03)	1.66E+00 (1.66E-02)
NMP Unit 2	9.53E-03 (9.53E-05)	1.75E+00 (1.75E-02)	6.96E+00 (6.96E-02)
JAFNPP	1.43E-04 (1.43E-06)	2.62E-02 (2.62E-04)	1.04E-01 (1.04E-03)
Total	1.20E-02 (1.20E-04)	2.19E+00 (2.19E-02)	8.73E+00 (8.73E-02)

Table 4.5-18—Historical NMP Unit 1 Liquid Releases (Constellation, 2001a, 2001b, 2002a, 2003b, 2004a, 2005a, 2006c)

Isotope	2001 Ci (Bq)	2002 Ci (Bq)	2003 Ci (Bq)	2004 Ci (Bq)
Co-58			1.11E-07 (4.11E+03)	5.36-E08 (1.98E+03)
Co-60			1.67E-06 (6.18E+04)	1.27-E06 (4.70E+04)
Cs-137			5.79E-08 (2.14E+03)	
Fe-55	4.74E+00 (1.75E+11)	6.21E-01 (2.30E+10)		
H-3	1.52E+01 (5.62E+11)	2.72E+01 (1.00E+12)	6.03E-02 (2.23E+09)	4.86E-02 (1.80E+09)
Mn-54			8.11E-07 (3.00E+04)	5.15E-07 (1.91E+04)

Table 4.5-19—Historical NMP Unit 2 Liquid Releases (Constellation, 2001c, 2002b, 2003a, 2004b, 2005b, 2006c)

Isotope	2001 Ci (Bq)	2002 Ci (Bq)	2003 Ci (Bq)	2004 Ci (Bq)	2006 Ci (Bq)
Ag-110m	2.41E-03 (8.90E+07)	1.32E-03 (4.87E+07)		3.75E-04 (1.39E+07)	
Au-199	1.08E-03 (3.99E+07)				
Ba-140			1.61E-04 (5.96E+06)		
Co-58	1.84E-03 (6.82E+07)	2.39E-03 (8.84E+07)	2.57E-03 (9.51E+07)		
Co-60	2.51E-02 (9.28E+08)	4.36E-02 (1.61E+09)	4.56E-02 (1.69E+09)	1.19E-02 (4.39E+08)	4.32E-04 (1.50E+07)
Cr-51	6.88E-03 (2.55E+08)	4.39E-03 (1.62E+08)	6.15E-03 (2.28E+08)		
Cs-136	2.72E-05 (1.01E+06)				
Cu-64	2.86E-03 (1.06E+08)	1.46E-03 (5.39E+07)	6.02E-04 (2.23E+07)		1.94E-05 (7.19E+05)
Fe-55	8.01E-03 (2.96E+08)	1.70E-02 (6.31E+08)		3.91E-03 (1.45E+08)	1.17E-04 (4.34E+06)
Fe-59	8.99E-03 (3.33E+08)	6.83E-03 (2.53E+08)	5.00E-03 (1.85E+08)	5.81E-05 (2.15E+06)	
H-3	3.11E+01 (1.15E+12)	1.88E+01 (6.97E+11)	9.30E+00 (3.44E+11)	5.80E+00 (2.15E+11)	6.89E+00 (2.55E+11)
Mn-54	6.83E-02 (2.53E+09)	5.58E-02 (2.06E+09)	2.81E-02 (1.04E+09)	4.83E-03 (1.79E+08)	6.30E-06 (2.33E+05)
Mo-99	1.12E-05 (4.14E+05)				
Nb-95	1.43E-05 (5.29E+05)	3.61E-05 (1.34E+06)			
Sb-124	5.05E-04 (1.87E+07)	3.51E-04 (1.30E+07)	1.81E-04 (6.70E+06)		
Sr-89	5.08E-05 (1.88E+06)				
Sr-90	3.50E-05 (1.30E+06)	2.96E-06 (1.10E+05)			
Zn-65	4.60E-03 (1.70E+08)	5.21E-03 (1.93E+08)	4.27E-03 (1.58E+08)	3.97E-04 (1.47E+07)	
Zn-69m	3.79E-05 (1.40E+06)		4.02E-05 (1.49E+06)		
Zr-95		4.02E-05 (1.49E+06)			
Tc-99m	1.18E-05 (4.36E+05)				

Table 4.5-20—Historical JAF Liquid Releases (Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)

Isotope	2002 Ci (Bq)	2003 Ci (Bq)	2004 Ci (Bq)	2005 Ci (Bq)	2006 Ci (Bq)
Co-60	8.44E-04 (3.12E+07)				1.59E-05 (5.88E+05)
Cs-137	3.14E-05 (1.16E+06)				
Fe-55	6.32E-04 (2.34E+07)				2.02E-04 (7.47E+06)
Fe-59	1.88E-04 (6.96E+06)				
H-3	6.25E-01 (2.31E+10)	2.772E-03 (1.02E+08)	5.06E-03 (1.87E+08)	1.01E-02 (3.72E+08)	3.81E+00 (1.41E+11)
Mn-54	9.76E-04 (3.61E+07)				1.04E-04 (3.85E+06)
Sr-89	2.74E-07 (1.01E+04)				
Sr-90	5.47E-07 (2.02E+04)				7.06E-06 (2.61E+05)
Zn-65	7.88E-05 (2.92E+06)				3.83E-05 (1.42E+06)

Table 4.5-21—Historical NMP Unit 1 Dilutions

Year	1st Quarter L (ft^3)	2nd Quarter L (ft^3)	3rd Quarter L (ft^3)	4th Quarter L (ft^3)	Total L (ft^3)	Release Duration hr	Flow Rate L/hr (ft^3/sec)
2001	No Releases	No Releases	8.32E+10 (2.94E+09)	No Releases	8.32E+10 (2.94E+09)	2190	3.80E+07 (3.73E+02)
2002	4.49E+10 (1.59E+09)	9.45E+10 (3.34E+09)	9.02E+10 (3.19E+09)	No Releases	2.30E+11 (8.12E+09)	6570	3.49E+07 (3.43E+02)
2003	No Releases	2.04E+05 (7.20E+03)	5.11E+05 (1.80E+04)	No Releases	7.15E+05 (2.52E+04)	32.1	2.23E+04 (2.19E-01)
2004	7.33E+02 (2.59E+01)	No Releases	No Releases	No Releases	7.33E+02 (2.59E+01)	1.03	7.12E+02 (6.98E-03)
2005	No Releases				No Releases	No Releases	No Releases
2006	No Releases				No Releases	No Releases	No Releases

Table 4.5-22—Historical NMP Unit 2 Dilutions

Year	1st Quarter L (ft^3)	2nd Quarter L (ft^3)	3rd Quarter L (ft^3)	4th Quarter L (ft^3)	Total L (ft^3)	Release Duration hr	Flow Rate L/hr (ft^3/sec)
2001	1.66E+08 (5.86E+06)	3.85E+08 (1.36E+07)	7.79E+08 (2.75E+07)	6.58E+08 (2.32E+07)	1.99E+09 (7.02E+07)	285	6.98E+06 (6.85E+01)
2002	2.42E+08 (8.55E+06)	4.30E+08 (1.52E+07)	1.56E+08 (5.51E+06)	3.17E+08 (1.12E+07)	1.15E+09 (4.04E+07)	185	6.19E+06 (6.07E+01)
2003	No Releases	No Releases	4.12E+08 (1.45E+07)	No Releases	4.12E+08 (1.45E+07)	51.1	8.06E+06 (7.91E+01)
2004	No Releases	1.54E+08 (5.44E+06)	1.89E+07 (6.67E+05)	3.34E+07 (1.18E+06)	2.06E+08 (7.29E+06)	35.0	5.89E+06 (5.78E+01)
2005	No Releases				No Releases	No Releases	No Releases
2006	No Releases	1.10E+08 (3.88E+06)	2.39E+08 (8.44E+06)	No Releases	3.49E+08 (1.23E+07)	53.1	6.57E+06 (6.45E+01)

Table 4.5-23—Historical JAF Dilutions (Entergy, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007)

Year	1st Quarter L (ft^3)	2nd Quarter L (ft^3)	3rd Quarter L (ft^3)	4th Quarter L (ft^3)	Total L (ft^3)	Release Duration hr	Flow Rate L/hr (ft^3/sec)
2001	No Releases				No Releases	No Releases	No Releases
2002	No Releases	No Releases	No Releases	2.17E+08 (7.66E+06)	2.17E+08 (7.66E+06)	27	8.04E+06 (7.88E+01)
2003	5.72E+07 (2.02E+06)	3.73E+08 (1.32E+07)	7.64E+07 (2.70E+06)	2.62E+08 (9.25E+06)	7.69E+08 (2.72E+07)	73	1.05E+07 (1.03E+02)
2004	1.04E+08 (3.67E+06)	4.74E+08 (1.67E+07)	3.46E+08 (1.22E+07)	1.68E+08 (5.93E+06)	1.09E+09 (3.86E+07)	779	1.40E+06 (1.37E+01)
2005	2.77E+08 (9.78E+06)	1.34E+08 (4.73E+06)	3.47E+08 (1.23E+07)	1.63E+08 (5.76E+06)	9.21E+08 (3.25E+07)	1560	5.90E+05 (5.79E+00)
2006	1.51E+08 (5.33E+06)	2.47E+08 (8.72E+06)	2.32E+08 (8.19E+06)	2.57E+09 (9.08E+07)	3.20E+09 (1.13E+08)	46	6.95E+07 (6.82E+02)

Table 4.5-24—Historical NMP Unit 1 Shoreline Dose

Year	LADTAPII mrem/yr (mSv/yr) (12 hr/yr occupancy)	Worker mrem/yr (mSv/yr) (2200 hr/yr occupancy)	Full mrem/yr (Sv/yr) (8760 hr/yr occupancy)
2001	0 (0)	0 (0)	0 (0)
2002	0 (0)	0 (0)	0 (0)
2003	9.76E-05 (9.76E-07)	1.79E-02 (1.79E-04)	7.12E-02 (7.12E-04)
2004	2.28E-03 (2.28E-05)	4.18E-01 (4.18E-03)	1.66E+00 (1.66E-02)
2005	0 (0)	0 (0)	0 (0)
2006	0 (0)	0 (0)	0 (0)

Table 4.5-25—Historical NMP Unit 2 Shoreline Dose

Year	LADTAPII mrem/yr (mSv/yr) (12 hr/yr occupancy)	Worker mrem/yr (mSv/yr) (2200 hr/yr occupancy)	Full mrem/yr (Sv/yr) (8760 hr/yr occupancy)
2001	5.31E-03 (5.31E-05)	9.74E-01 (9.74E-03)	3.88E+00 (3.88E-02)
2002	9.53E-03 (9.53E-05)	1.75E+00 (1.75E-02)	6.96E+00 (6.96E-02)
2003	7.33E-03 (7.33E-05)	1.34E+00 (1.34E-02)	5.35E+00 (5.35E-02)
2004	2.59E-03 (2.59E-05)	4.75E-01 (4.75E-03)	1.89E+00 (1.89E-02)
2005	0 (0)	0 (0)	0 (0)
2006	8.18E-05 (8.18E-05)	1.50E-02 (1.50E-04)	5.97E-02 (5.97E-04)

Table 4.5-26—Historical JAF 1 Shoreline Dose

Year	LADTAPII mrem/yr (mSv/yr) (12 hr/yr occupancy)	Worker mrem/yr (mSv/yr) (2200 hr/yr occupancy)	Full mrem/yr (Sv/yr) (8760 hr/yr occupancy)
2001	0 (0)	0 (0)	0 (0)
2002	1.43E-04 (1.43E-06)	2.62E-02 (2.62E-04)	1.04E-01 (1.04E-03)
2003	0 (0)	0 (0)	0 (0)
2004	0 (0)	0 (0)	0 (0)
2005	0 (0)	0 (0)	0 (0)
2006	4.18E-07 (4.18E-09)	7.66E-05 (7.66E-07)	3.05E-04 (3.05E-06)

Table 4.5-27—Historical Total (summed for all 3 plants) Shoreline Dose

Year	LADTAPII mrem/yr (mSv/yr) (12 hr/yr occupancy)	Worker mrem/yr (mSv/yr) (2200 hr/yr occupancy)	Full mrem/yr (Sv/yr) (8760 hr/yr occupancy)
2001	5.31E-03 (5.31E-05)	9.74E-01 (9.74E-03)	3.88E+00 (3.88E-02)
2002	9.67E-03 (9.67E-05)	1.77E+00 (1.77E-02)	7.04E+00 (7.04E-02)
2003	7.43E-03 (7.43E-05)	1.36E+00 (1.36E-02)	5.42E+00 (5.42E-02)
2004	4.87E-03 (4.87E-05)	8.93E-01 (8.93E-03)	3.55E+00 (3.55E-02)
2005	0 (0)	0 (0)	0 (0)
2006	8.22E-05 (8.22E-07)	1.51E-02 (1.51E-04)	6.00E-02 (6.00E-04)

Table 4.5-28—Coefficients for Equation 4.5.7-1

Coefficient	9 cask JAFNPP ISFSI	N-16			Background
		JAFNPP	NMP Unit 2	NMP Unit 1	
c (mrem/yr)	203.72	1005.1	184.51	217.23	56.67
μ (1/ft)	0.002056	0.0008825	0.0008825	0.0008825	n.a.
R (ft)	116.52	260.82	260.82	260.82	n.a.

Table 4.5-29—TLD Measurements for NMPNS/JAF 2007

TLD #	Q1/month	Q2/month	Q3/month	Q4/month	mR/yr
3	13.39	14.78	12.73	12.55	160.35
4	4.11	5.25	4.65	4.86	56.61
5	4.04	5.34	4.89	4.93	57.6
6	3.32	4.7	4.42	4.59	51.09
7	3.17	4.39	3.95	4.18	47.07
24	3.98	5.36	4.99	4.85	57.54
27	20.54	21.83	20.24	19.8	247.23
29	26.47	24.81	24.59	21.49	292.08
39	8.62	9.14	10.15	9.58	112.47
75	7.83	8.81	8.47	8.8	101.73
76	5.16	6.28	5.89	6.18	70.53
77	6.15	7.18	6.65	7.09	81.21
79	3.35	4.56	4.4	4.62	50.79
80	3.43	4.76	4.46	4.67	51.96
81	3.53	4.63	4.56	4.56	51.84
82	3.46	4.36	4.26	4.58	49.98
83	3.39	4.1	4.04	4.33	47.58
84	3.56	4.78	4.46	4.75	52.65
87	7.51	9.02	7.8	8.32	97.95
101	3.32	4.27	4.2	4.45	48.72
103	4.05	4.86	4.72	4.84	55.41
106	4.51	5.74	5.78	5.54	64.71
107	4.22	5.41	5.54	5.83	63
109	4.21	4.66	4.57	4.76	54.6
I1	21.4	21.13	21.62	19.99	252.42
I2	22.76	22.06	21.69	20.93	262.32
I3	22.99	21.62	22.42	20.69	263.16
I4	31.46	28.61	30.21	27.85	354.39
I5	29.79	29.02	29.57	27.42	347.4
I6	24.29	23.64	24.47	23.38	287.34
I7	18.91	18.56	18.65	17.55	221.01
I8	19.32	18.36	18.51	18.48	224.01
I9	14.52	14.33	14.14	14.28	171.81
I10	14.75	14.29	14.37	13.68	171.27
I11	12.26	11.82	11.64	11.42	141.42
I12	18.53	18.52	17.95	17.61	217.83

Table 4.5-30—Locations of TLDs

TLD #	East (ft)	North (ft)
3	548030.6	1283636
4	547846.9	1281586
5	546714.3	1281368
6	545285.7	1281076
7	543642.9	1281846
24	550949	1282772
27	548520.4	1284291
29	548795.9	1284229
30	548449	1284271
39	545928.6	1283625
75	546653.1	1283729
76	546969.4	1283782
77	547193.9	1283865
79	551898	1280025
80	552020.4	1277372
81	549581.6	1275114
82	546673.5	1275010
83	544214.3	1277175
84	542755.1	1279276
87	546459.2	1283677
100	552020.4	1281669
101	551959.2	1278028
103	544673.5	1283095
106	545112.2	1283313
107	545071.4	1283261
109	552091.8	1281857
I1	548471.5	1282887
I2	548471.5	1282978
I3	548471.5	1283047
I4	548551.4	1283071
I5	548589.5	1283071
I6	548614.3	1283071
I7	548719.9	1283047
I8	548719.9	1282978
I9	548719.9	1282887
I10	548621.9	1282866
I11	548589.5	1282866
I12	548541.9	1282866

Table 4.5-31—Ratio of Calculated to Measured values for TLDs

TLD	C/M
3	0.612357
4	1.055028
5	1.037492
6	1.136643
7	1.214858
24	1.041949
27	0.682619
29	1.149521
30	1.049439
39	0.89817
75	0.954799
76	1.161867
77	0.916045
79	1.117241
80	1.090749
81	1.093206
82	1.13389
83	1.191186
84	1.076759
87	1.088409
100	1.059946
101	1.163381
103	1.13272
106	1.135842
107	1.149522
109	1.044032
I1	0.745061
I2	0.915188
I3	0.825769
I4	0.819163
I5	0.896842
I6	1.063221
I7	1.002247
I8	1.041555
I9	1.087114
I10	1.396526
I11	1.744081
I12	1.043879

Table 4.5-32—Past and Future Cask Loading of the JAF ISFSI

3 Casks	Spring 2002
6 Casks	Summer/Fall 2005
6 Casks	Summer 2009
6 Casks	Summer every four years thereafter (indefinitely)

Table 4.5-33—Average Annual JAF ISFSI TLD Exposures (mR/yr)

TLD ID	2001	2002	2003	2004	2005	2006	2007
I 1	129	113	153	150	200	275	252
I 2	134	126	171	172	224	268	262
I 3	147	128	186	181	231	275	263
I 4	167	204	279	274	334	365	354
I 5	185	251	338	323	374	358	347
I 6	92	195	278	269	291	294	287
I 7	122	111	157	150	193	231	221
I 8	104	98	142	134	176	230	224
I 9	95	88	116	113	139	180	172
I 10	110	102	137	142	163	176	171
I 11	94	84	107	114	132	146	141
I 12	112	85	115	116	151	232	218
Average	**124.3**	**132.1**	**181.6**	**178.2**	**217.3**	**252.5**	**242.7**

Table 4.5-34—Calculation of JAF ISFSI Cask Loading

Year	Cask Loading (Cask-Years)
2001	0
2002	2
2003	3
2004	3
2005	5
2006	9
2007	9
2008	9
2009	12
2010	15
2011	15
2012	15
2013	18
2014	21
2015	21

Table 4.5-35—Ratio of Annual Exposure to 2007 Exposure from JAF ISFSI

Year	Calculated ISFSI Exposure (mR/hr)	JAF ISFSI Exposure Ratio to 2007 Exposure
2001	0.0	0.00
2002	28.0	0.22
2003	42.0	0.33
2004	42.0	0.33
2005	69.9	0.56
2006	125.9	1.00
2007	125.9	1.00
2008	125.9	1.00
2009	167.8	1.33
2010	209.8	1.67
2011	209.8	1.67
2012	209.8	1.67
2013	251.7	2.00
2014	293.7	2.33
2015	293.7	2.33

Table 4.5-36—Estimate Exposure from NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation

Year	Cask Loading (cask-years)	Estimated Annual Exposure (mR/yr)	Ratio of Exposure compared to 2011 Exposure	Value of "c"
2011	40	559.4	1.00	905.42
2012	40	559.4	1.00	905.42
2013	46	643.3	1.15	1041.23
2014	46	643.3	1.15	1041.23
2015	52	727.2	1.30	1177.05

Table 4.5-37—Coefficients for Proposed NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation (Year 2011)

Coefficient	NMP Unit 1 and Unit 2 Independent Spent Fuel Storage Installation (40 Casks)
C (mrem/yr)	905.42
μ (1/ft)	0.002056
R (ft)	116.52

Table 4.5-38—Worker Occupancy at Specific Construction Zones

Zone Description	Zone Code	Conservative Occupancy Fractions Used in Calculation
Batch Plant	B	0.001
Construction on main structures	C	0.665
Laydown	L	0.020
Office/Trailer	O	0.160
Parking	P	0.020
Roads	R	0.020
Shoreline	S	0.066
Tower/Basin	T	0.066
Warehouse	W	0.003
	TOTAL	**1.021**

Table 4.5-39—Projected Construction Worker Census 2010 to 2015

Year	On Site Workers
2010	1700
2011	2900
2012	3550
2013	3950
2014	3950
2015	3200

Table 4.5-40—Collective Whole Body Doses (person-rem/yr) to NMP3NPP Construction Workers (person-mSv/yr)

Zone	Description	2010	2011	2012	2013	2014	2015	Total (ZONE)
B	Batch Plant	1.43E-03 (1.43E-02)	3.54E-03 (3.54E-02)	4.33E-03 (4.33E-02)	5.04E-03 (5.04E-02)	5.04E-03 (5.04E-02)	4.27E-03 (4.27E-02)	2.36E-02 (2.36E-01)
C	Construction on Main Structures	4.69E-01 (4.69E+00)	8.74E-01 (8.74E+00)	1.07E+00 (1.07E+01)	1.21E+00 (1.21E+01)	1.21E+00 (1.21E+01)	9.89E-01 (9.89E+00)	5.81E+00 (5.81E+01)
L	Laydown	2.60E-02 (2.60E-01)	4.81E-02 (4.81E-01)	5.89E-02 (5.89E-01)	6.82E-02 (6.82E-01)	6.73E-02 (6.73E-01)	5.59E-02 (5.59E-01)	3.24E-01 (3.24E+00)
O	Office/Trailer	8.92E-02 (8.92E-01)	1.58E-01 (1.58E+00)	1.94E-01 (1.94E+00)	2.17E-01 (2.17E+00)	2.17E-01 (2.17E+00)	1.77E-01 (1.77E+00)	1.05E+00 (1.05E+01)
P	Parking	9.21E-03 (9.21E-02)	1.60E-02 (1.60E-01)	1.95E-02 (1.95E-01)	2.18E-02 (2.18E-01)	2.18E-02 (2.18E-01)	1.77E-02 (1.77E-01)	1.06E-01 (1.06E+00)
R	Roads	1.65E-02 (1.65E-01)	4.58E-02 (4.58E-01)	5.61E-02 (5.61E-01)	6.60E-02 (6.60E-01)	6.60E-02 (6.60E-01)	5.64E-02 (5.64E-01)	3.07E-01 (3.07E+00)
S	Shoreline	2.90E-01 (2.90E+00)	5.01E-01 (5.01E+00)	6.14E-01 (6.14E+00)	6.84E-01 (6.84E+00)	6.84E-01 (6.84E+00)	5.55E-01 (5.55E+00)	3.33E+00 (3.33E+01)
T	Tower/Basin	7.17E-02 (7.17E-01)	2.21E-01 (2.21E+00)	2.70E-01 (2.70E+00)	3.21E-01 (3.21E+00)	3.21E-01 (3.21E+00)	2.76E-01 (2.76E+00)	1.48E+00 (1.48E+01)
W	Warehouse	1.61E-03 (1.61E-02)	2.84E-03 (2.84E-02)	3.47E-03 (3.47E-02)	3.88E-03 (3.88E-02)	3.88E-03 (3.88E-02)	3.16E-03 (3.16E-02)	1.88E-02 (1.88E-01)
Total (Year)		1.0 (10)	1.9 (19)	2.3 (23)	2.6 (26)	2.6 (26)	2.1 (21)	12.5 (125)

Figure 4.5-1—Nine Mile Point Nuclear Station Site Layout

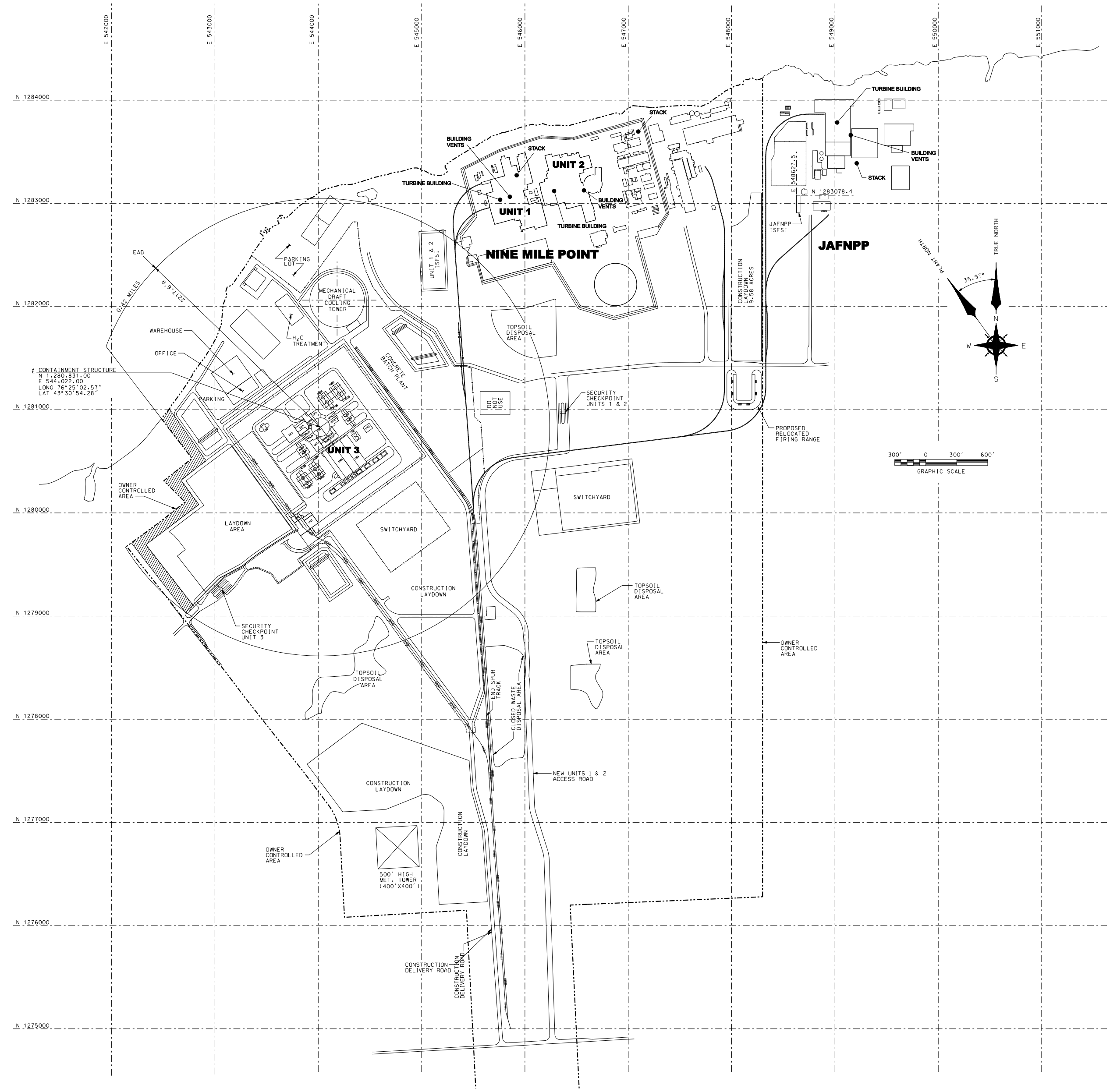


Figure 4.5-2—NP3NPP Site Utilization Plan

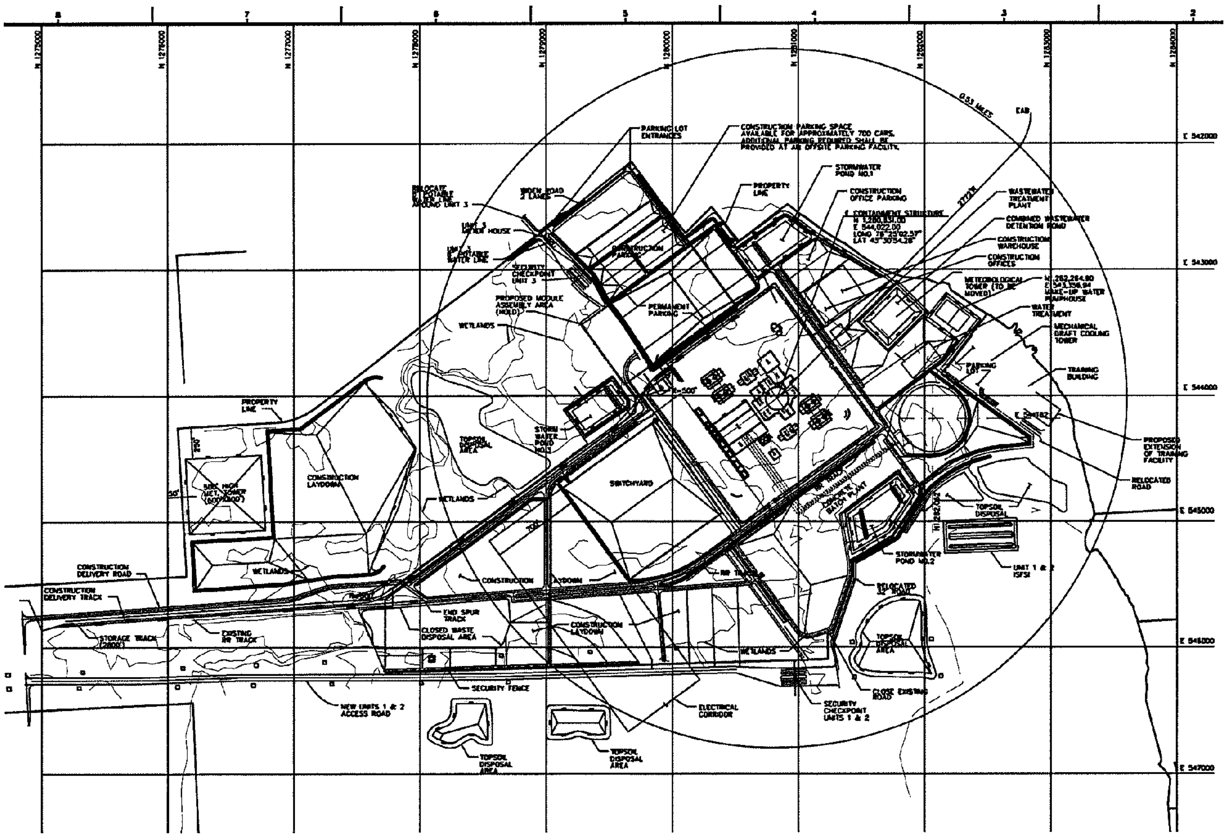


Figure 4.5-3—Site Worker Occupancies and Usage

Figure 4.5-4—Site Plan with Whole Body Dose Contours - Full Time Occupancy, mrem/yr (mSv/yr)

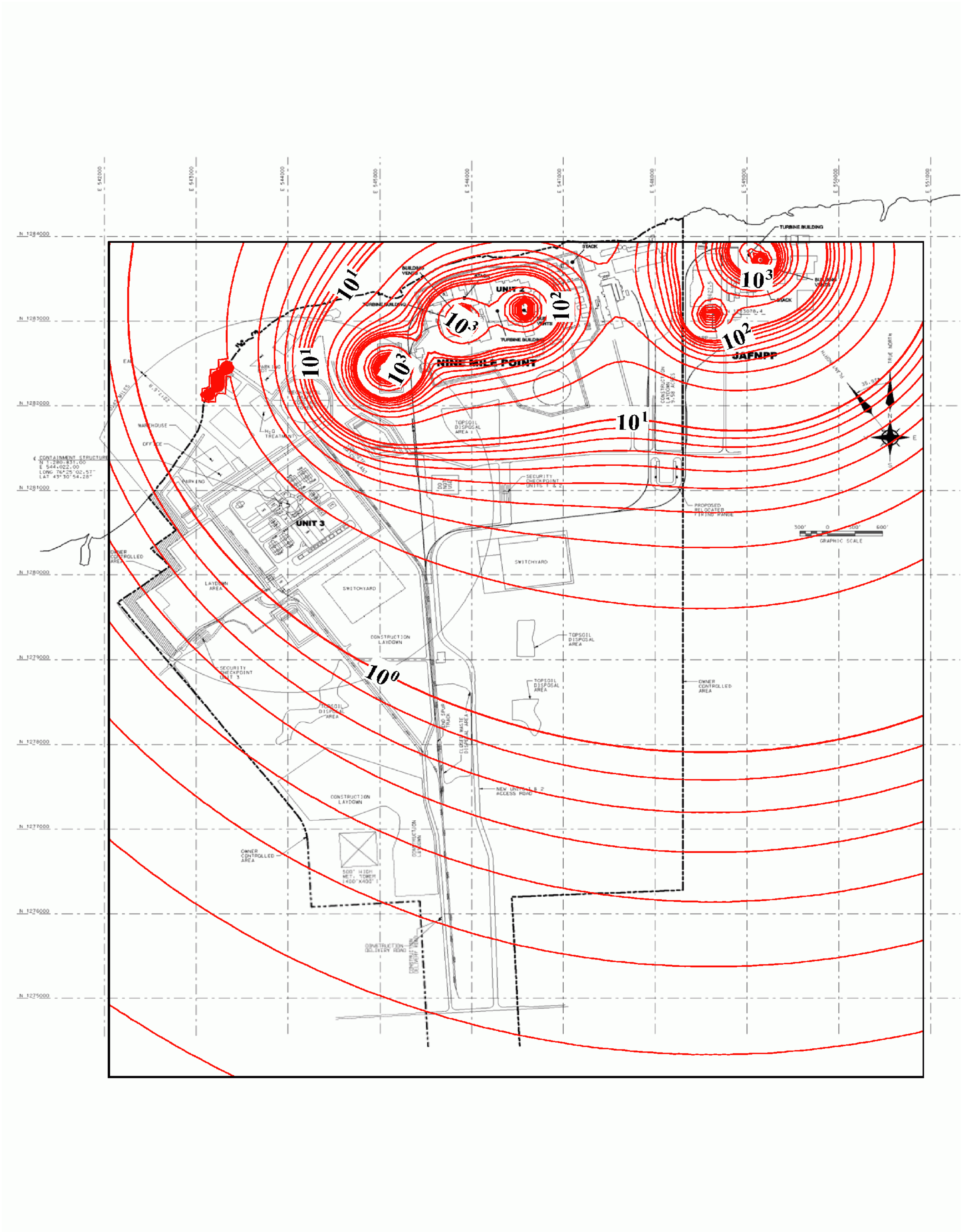


Figure 4.5-5—Ground Release Dispersion Factors with Bounding Mode

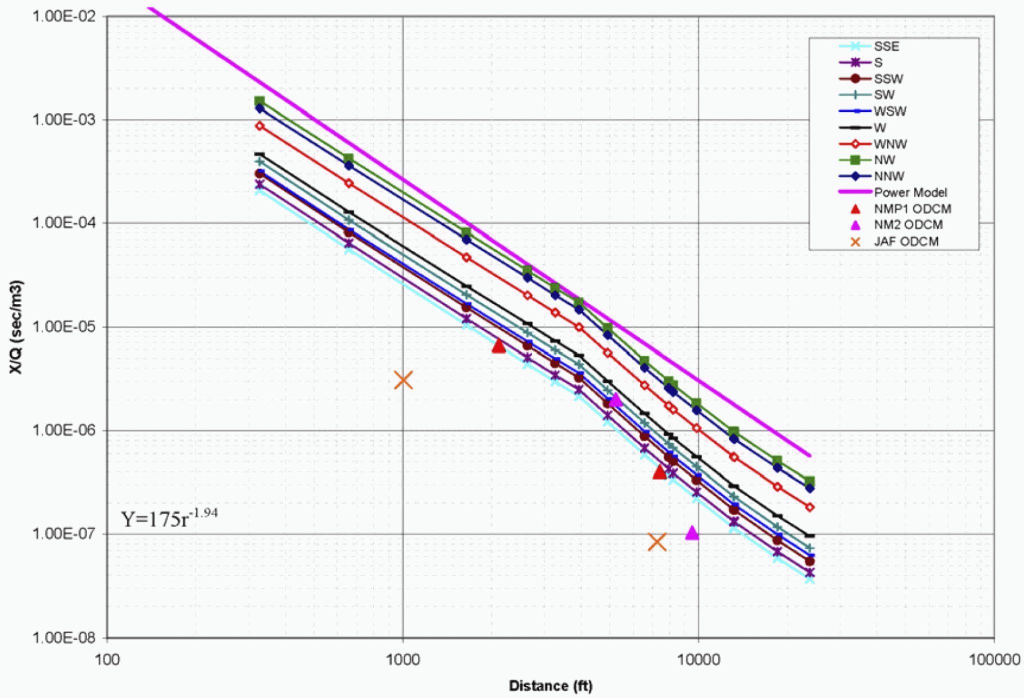
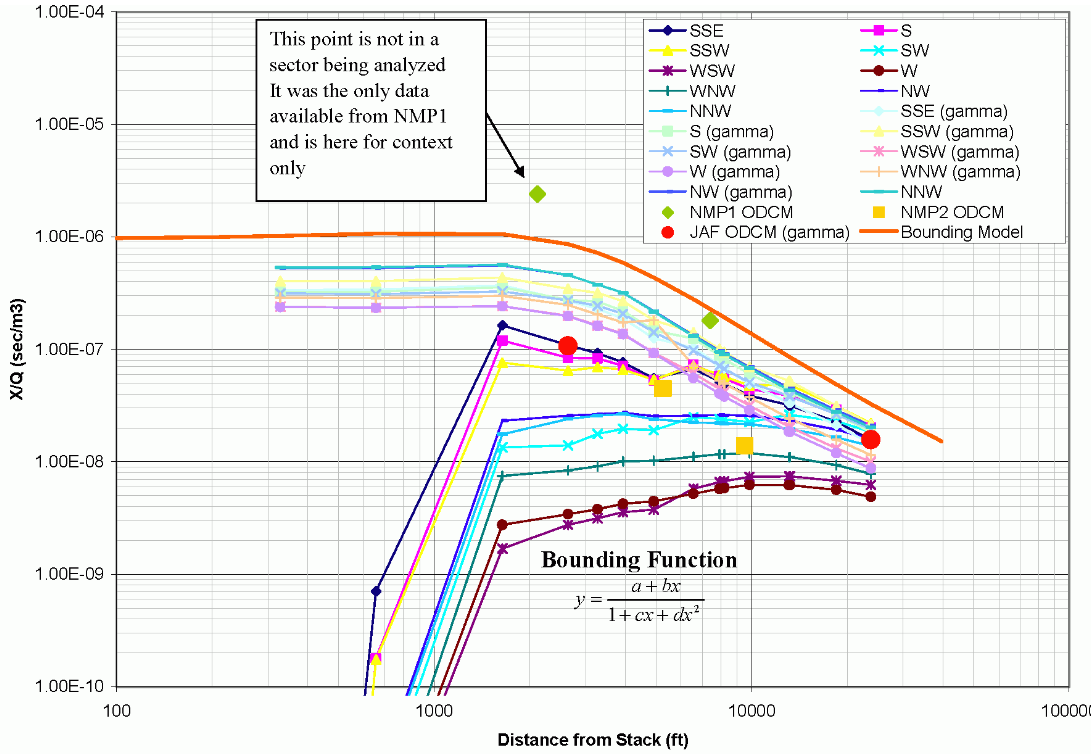


Figure 4.5-6—Elevated Dispersion Parameters and Bounding Model



a	b	c	d
9.53E-07	3.79E-11	-2.00E-04	1.07E-07

Figure 4.5-7—TLD Locations (Constellation, 2006a)

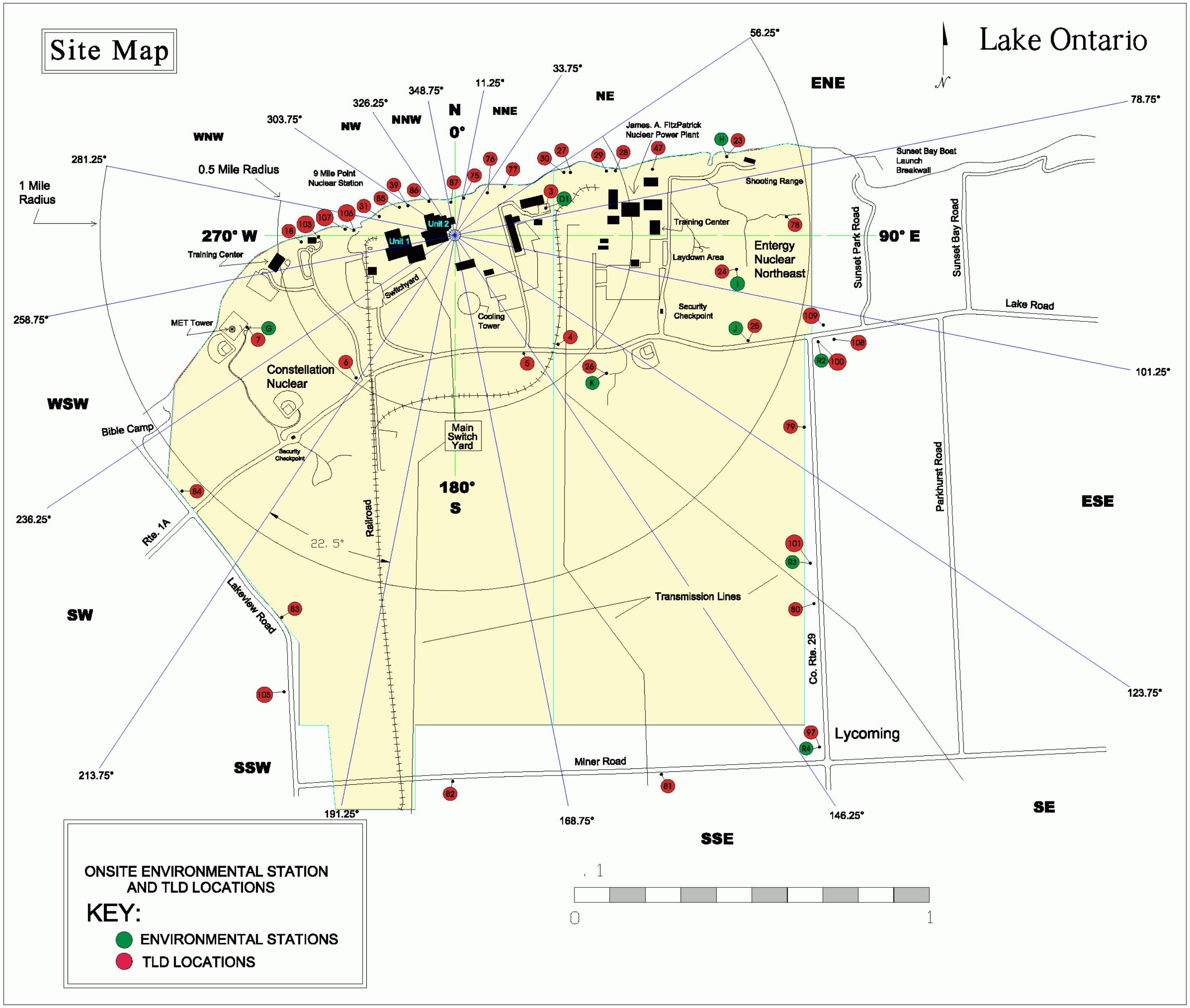


Figure 4.5-8—On-Site Environmental ISFSI TLD Locations

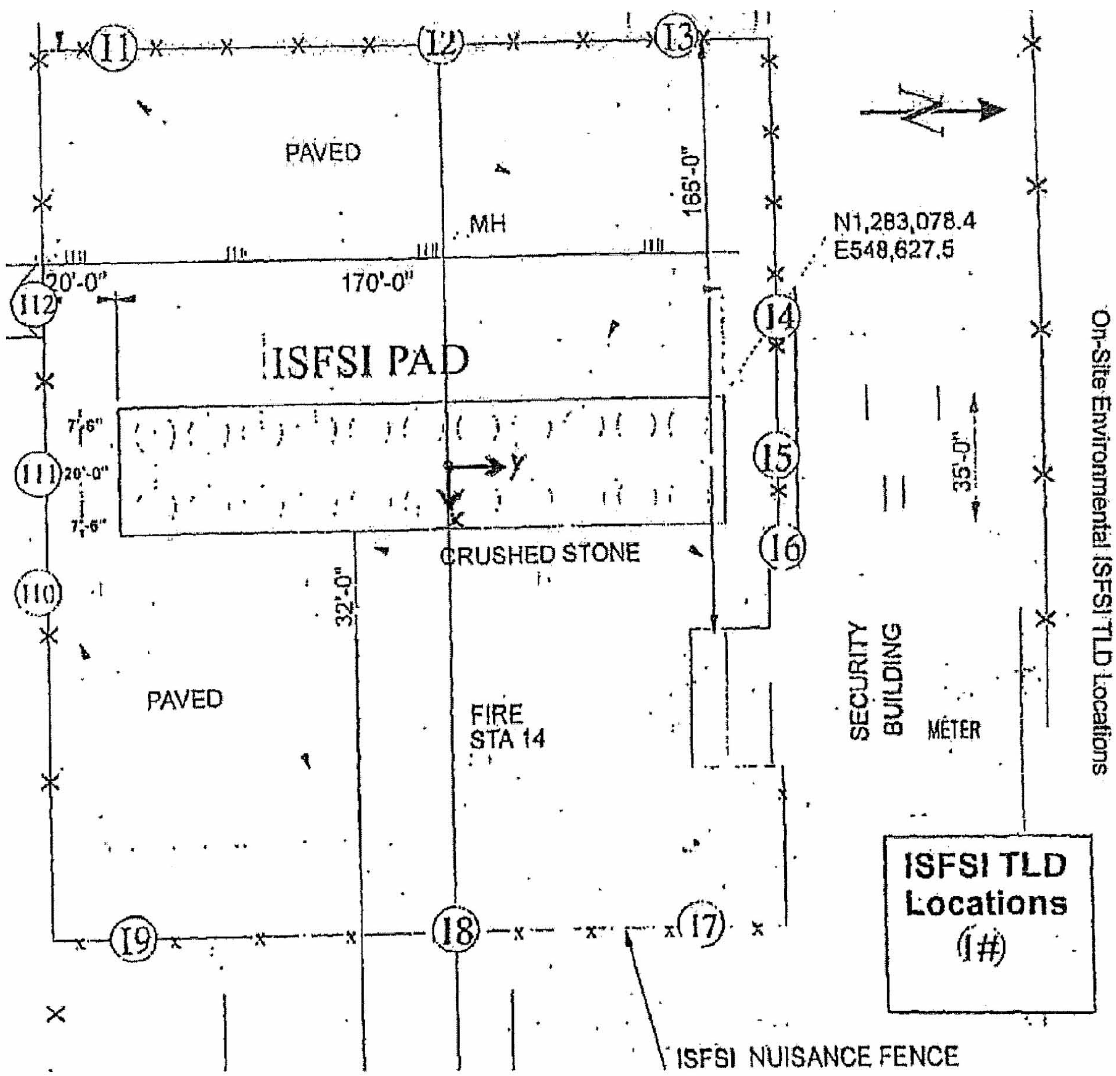


Figure 4.5-9—Annual Historical JAF ISFSI TLD Exposure

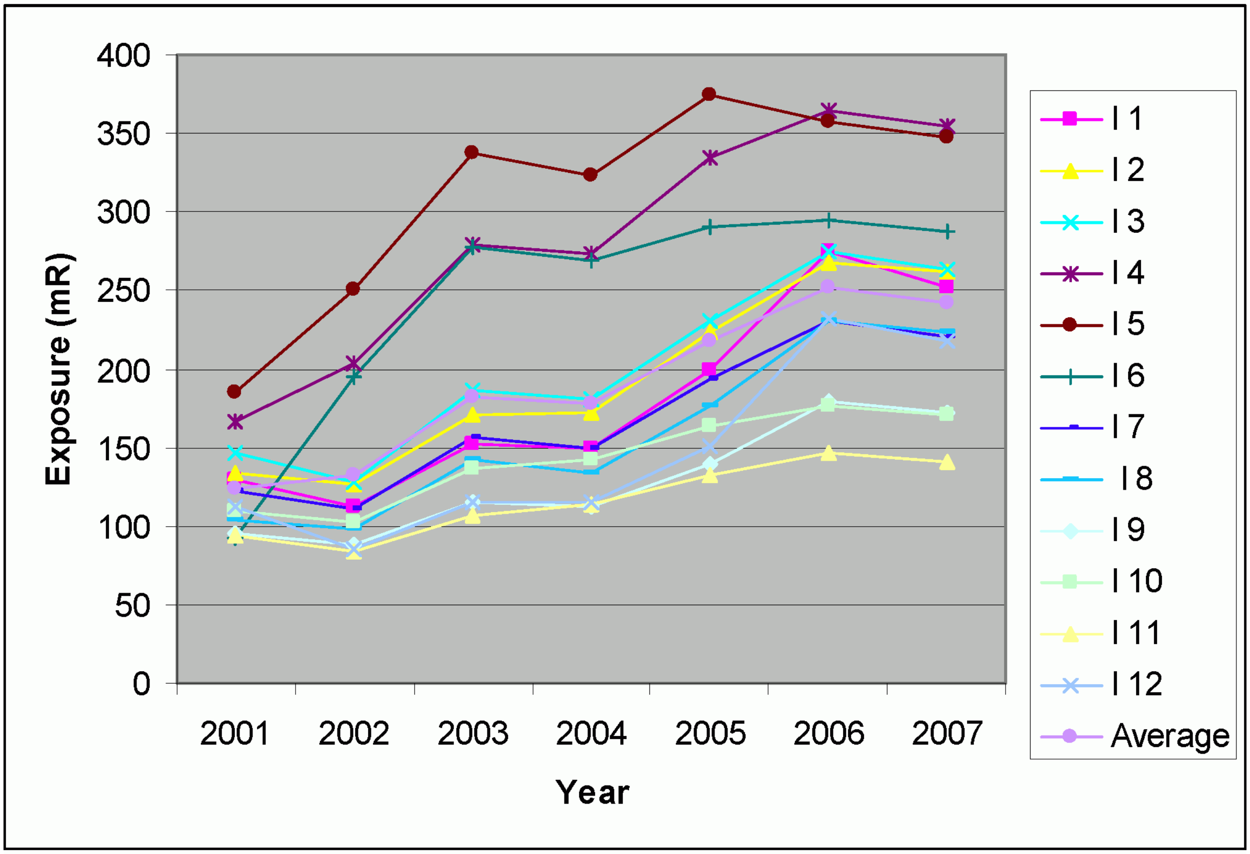
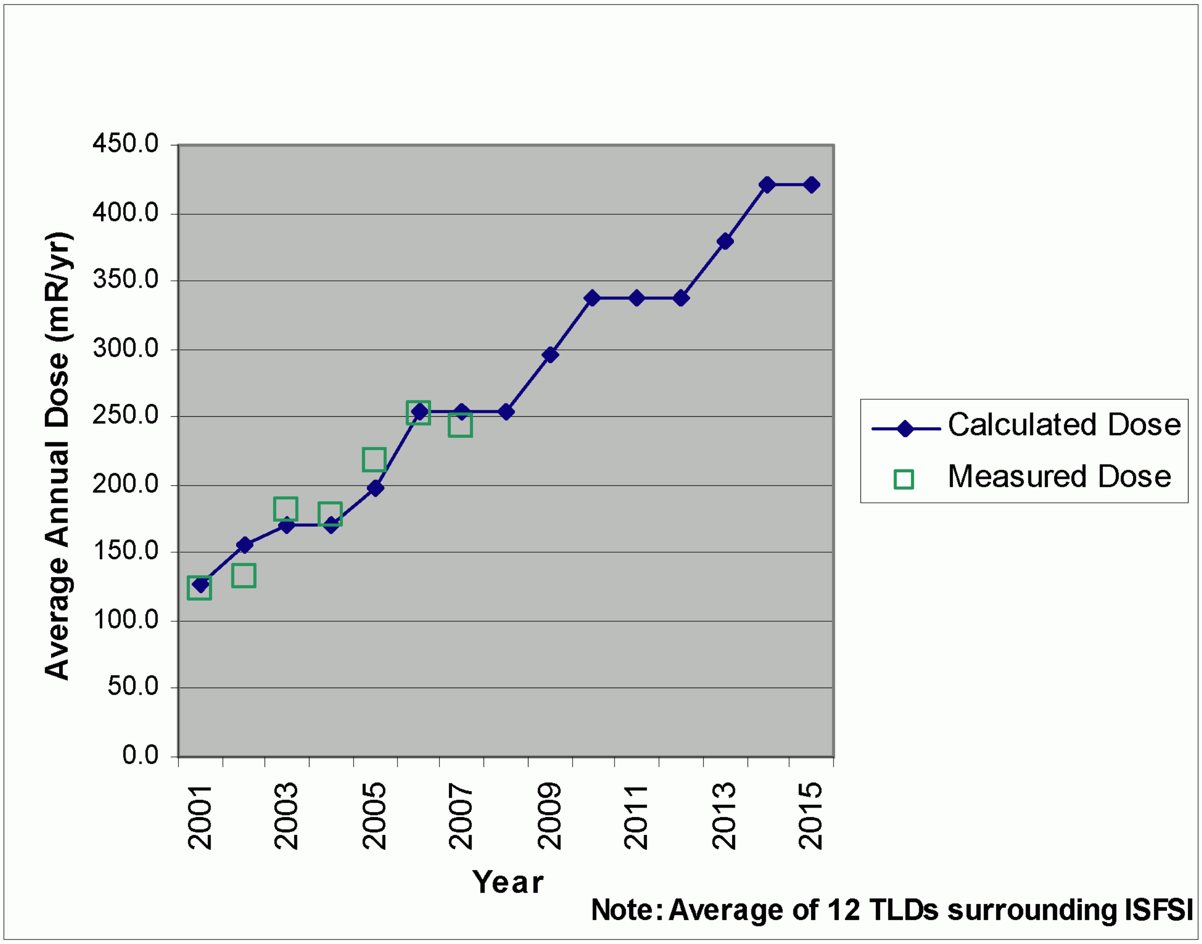


Figure 4.5-10—Calculated vs. Measured TLD Exposure at the JAF ISFSI by Year



4.6 MEASURES AND CONTROLS TO LIMIT ADVERSE IMPACTS DURING CONSTRUCTION

In general, potential impacts will be minimized through compliance with applicable federal, New York, and local laws and regulations enacted to prevent or minimize adverse environmental impacts that may be encountered such as air emissions, noise, storm water pollutants, and spills. Principal among these will be the State Pollutant Discharge Elimination System (SPDES) Construction General Permit and the Corps of Engineers Permit to minimize sediment erosion and protect water quality. The Site Resource Management Plan will address affected site lands and waters. Also included will be required plans such as a Storm Water Pollution Prevention Plan (SWPPP) and associated Best Management Practices (BMPs) as well as administrative actions such as a Traffic Management Plan.

Table 4.6-1 lists the potential impacts associated with the construction activities described in Sections 4.1 through 4.5 and 4.7. The table identifies, from the categories listed below, which adverse impact may occur as a result of construction activities and its relative significance rating (i.e., [S]mall, [M]oderate, or [L]arge) following implementation of associated measures and controls. Table 4.6-1 also includes a brief description, by Section, of each potential impact and the measures and controls to minimize the impact, if needed.

- Erosion and Sedimentation
- Air Quality (dust, air pollutants)
- Wastes (effluents, spills, material handling)
- Surface Water
- Groundwater
- Land Use
- Water Use and Quality
- Terrestrial Ecosystems
- Aquatic Ecosystems
- Socioeconomic
- Aesthetics
- Noise
- Traffic
- Radiation Exposure
- Other (site specific (i.e., non-radiological health impacts)

Based on existing site conditions, in-place programs and procedures at NMP Unit 1 and Unit 2, as well as the measures and controls proposed, the potential adverse impacts identified from the construction of NMP3NPP are anticipated to be SMALL, if any, for all categories evaluated except: except traffic, which is expected to be MODERATE, but manageable with mitigation (Table 4.6-2) and wetlands and surface water, which are expected to be LARGE, but manageable with mitigation.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction

(Page 1 of 7)

ER Reference Section	Erosion/Sediment	Air Quality	Wastes	Surface Water	Groundwater	Land Use	Water Use & Quality	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Aesthetics	Noise	Traffic	Radiation Exposure	Other (site specific)
4.1 Land Use Impacts	S	S				S		S	S		S		S		

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.1.1 The Site and Vicinity	Clearing, grading, excavation, and re-contouring.	Comply with New York SPDES Construction General Permit, including US Environmental Protection Agency (USEPA) effluent limitations.
		Obtain and comply with required agency programs listed in Table 1.3-1.
	Disturbance (temporary and permanent) of wetlands and surface water systems in vicinity.	Use site Resource Management Plan and Best Management Practices (BMPs) to protect and mitigate resources such as wetlands and surface water systems in vicinity.
		Obtain Article 15 and 24 of New York State Freshwater Wetland Act Permit; comply with BMP requirements.
		Obtain individual Corps of Engineers Permit.
	Soil stockpiling and disturbance to natural drainage channels.	Implement Storm Water Pollution Prevention Plan (SWPPP), including erosion and sediment plan, as part of the New York SPDES Construction General Permit requirements.
	Removal of existing trees and vegetation.	Use site Resource Management Plan and comply with BMP requirements.
		Chip unmerchantable trees and spread as wood chips, and/or disposed of at an off-site landfill.
		Restore acreage following construction to the maximum extent possible.
	Construction of temporary and permanent structures.	Place construction footprint wholly within a dedicated nuclear power plant site.
	Release of fuel, oils, or other chemicals.	Implement Spill Prevention, Control, and Countermeasures (SPCC) Plan.
	Heavy equipment transported to the site.	Construct new site access, perimeter roads, and a rail spur will be constructed.
4.1.2 Transmission Corridors and Off-site Areas	The existing transmission lines have sufficient capacity to carry the total output of the existing Units 1 and 2, as well as new Unit 3; as a result, there will be no new off-site transmission lines or rights-of-way disturbance.	Use existing transmission corridor maintenance policies and practices to protect terrestrial and aquatic ecosystems.
4.1.3 Historic Properties (and Cultural Resources)	Disturbance of potentially eligible archaeological resources.	Perform Phase 1b Cultural Resource Survey.
		Consult with the State Historic Preservation Office (SHPO); develop plan and procedures to manage identified/unidentified historic/cultural resources.
		Implement procedures and take appropriate actions (e.g., stop work) following discovery of potential historic/cultural resource.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction
(Page 2 of 7)

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.2.1 Hydrologic Alterations	Erosion, sediment, and storm water runoff (from on-site building, utilities, and road construction activities).	Implement SWPPP, including erosion and sediment plan, as part of the New York SPDES Construction General Permit requirements.
	Lake Ontario turbidity/sediment effects (from refurbishment of the existing railroad tracks and installation of the Intake and Discharge Structures).	Comply with Corps of Engineers Permit requirements.
	Temporary use of groundwater.	Use off-site water supply, as needed.
	Temporary dewatering activities.	Comply with New York SPDES General Permit requirements for dewatering and other construction effluents.
		Obtain individual Corps of Engineers Permit; comply with BMP requirements.
		Monitor perched water and groundwater levels.
	Disturbance (temporary and permanent) of wetlands and surface water systems in vicinity.	Use site Resource Management Plan and BMPs to protect resources such as wetlands and surface water systems in vicinity.
		Obtain Article 15 and 24 of New York State Freshwater Wetland Act Permit; comply with BMP requirements.
		Obtain individual Corps of Engineers Permit; comply with BMP requirements.
	Release of fuel, oils, or other chemicals.	Implement SPCC Plan.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction

(Page 3 of 7)

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.2.2 Water Use Impacts	Erosion, sediment, and storm water runoff (from on-site building, utilities, and road construction activities).	Implement SWPPP, including erosion and sediment plan (dikes, earthen berms, seeded ditches, and impoundment), as part of the New York SPDES Construction General Permit requirements; monitor impoundments; and implement BMPs.
	Temporary use of groundwater.	Install or establish coffer dams, stormwater management systems, spill containment controls, silt screens, settling basins, and dust suppression systems. Use off-site water supply, as needed.
	Reduction and/or increase in available pervious (infiltration) areas.	Use site Resource Management Plan and BMPs to protect resources such as wetlands and surface water systems in vicinity.
		Use off-site water supply, as needed.
	Temporary dewatering activities.	Comply with New York SPDES General Permit requirements for dewatering and other construction effluents.
		Obtain individual Corps of Engineers Permit; comply with BMP requirements.
		Monitor perched water and groundwater levels.
	Disturbance (temporary and permanent) of wetlands and surface water systems in vicinity.	Use site Resource Management Plan and BMPs to protect resources such as wetlands and surface water systems in vicinity.
		Obtain Article 15 and 24 of New York State Freshwater Wetland Act Permit; comply with BMP requirements.
		Obtain individual Corps of Engineers Permit; comply with BMP requirements.
	Increasing sediment loads into unnamed on-site streams and Lake Ontario.	Implement SWPPP, including erosion and sediment plan, as part of the New York SPDES Construction General Permit requirements.
	Shift of the unconfined aquifer recharge area(s).	Monitor construction effluents and storm water runoff.
	Release of fuel, oils, or other chemicals.	Implement SPCC Plan.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction
(Page 4 of 7)

ER Reference Section	Potential Impact Category and Description															Proposed Measures and Controls or Mitigating Circumstances
4.3 Ecological Impacts	Erosion/Sediment	Air Quality	Wastes	Surface Water	Groundwater	Land Use	Water Use & Quality	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Aesthetics	Noise	Traffic	Radiation Exposure	Other (site specific)	
	S					S	S	S	S		S					
4.3.1 Terrestrial Ecosystems	Loss of vegetation (i.e., green ash, sugar maple, American beech, silky dogwood, poison ivy, etc) and existing habitat for important fauna (i.e., white-tail deer, northern leopard, pickerel frogs, pied-billed grebe, osprey, golden-winged warbler, grasshopper sparrow, etc.), as well as forest cover.															Implement SWPPP, including erosion and sediment plan (silt fences, vegetative stabilization, bio-retention ditches and other controls) as part of the SPDES Construction General Permit requirements.
																Review NMP3NPP historic survey database to identify important terrestrial species; conduct new surveys, as needed.
																Use site Resource Management Plan and BMPs (may include restoration), to protect resources.
																Design construction footprint to account for important habitat.
																Minimize lighting, as practicable and allowed by regulation.
																Limit tree cutting activities, if needed, to times and sizes that will not affect fauna habitat.
																Restore acreage or mitigate, if needed, following construction to the maximum extent possible.
	Disturbance (temporary and permanent) of trees.															May preserve aesthetically outstanding tree clusters, as practical; harvest merchantable timber; use or recycle other woody material, as appropriate; and develop reforestation plan.
	Disturbance (temporary and permanent) of wetlands and surface water systems in vicinity.															Use site Resource Management Plan and BMPs (silt fences, bio-retention ditches, and vegetative stabilization) to protect resources such as wetlands and surface water systems in vicinity.
																Conduct wetland mitigation, if needed, on-site restoration, and/or wetland enhancement at another site.
																Obtain Article 15 and 24 of New York State Freshwater Wetland Act Permit; comply with BMP requirements.
																Obtain individual Corps of Engineers Permit; comply with BMP requirements.
	Limited mortality of wildlife (e.g., bird collisions with man-made structures).															Use site Resource Management Plan and BMPs to protect resources.
																Reduce cooling tower lighting, as practicable, and use flashing lights instead of flood lights.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction
(Page 5 of 7)

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.3.2 Aquatic Ecosystems	Disturbance (temporary and permanent) of wetlands and surface water systems (Pond infilling, elimination and/ or creation of ponds or streams, etc) in vicinity; however, streams within the construction zone contain no rare or unique aquatic species.	Review NMP3NPP historic survey database to identify important aquatic species; conduct new surveys, as needed.
		Implement SPCC Plan.
		Use site Resource Management Plan and BMPs to protect resources.
		Obtain Article 15 and 24 of New York State Freshwater Wetland Act Permit; comply with BMP requirements.
		Obtain individual Corps of Engineers Permit; comply with BMP requirements.
	Temporary sediment and silt increases in surface water systems.	Implement SWPPP, including erosion and sediment plan (silt fences, vegetative stabilization, bio-retention ditches, dust suppression, the construction of new impoundments, and other controls), as part of the New York SPDES Construction General Permit requirements.
	Temporary turbidity increase.	Comply with Corps of Engineers Permit requirements.
	Release of fuel, oils, or other chemicals.	Implement SPCC Plan.
	Limited mortality of fish and insects (i.e., resulting from sedimentation and surface water modifications).	Implement SWPPP, including erosion and sediment plan (silt fences, vegetative stabilization, bio-retention ditches, dust suppression, the construction of new impoundments, and other controls), as part of the New York SPDES Construction General Permit requirements; comply with BMP requirements.
4.4.1 Physical Impacts	Equipment and non-routine noise.	Comply with applicable New York State Department of Environmental Conservation (NYSDEC) noise limits.
		Comply with applicable Occupational Safety and Health Administration (OSHA) noise-exposure limits.
		Implement appropriate training, personal protective equipment, health and safety monitoring and other good industry noise control practices.
	Air emissions (dust and volatiles) increase.	Comply with applicable USEPA and NYSDEC air quality regulations.
		Implement routine vehicle/equipment inspection and maintenance program.
		Implement measures to comply with National Ambient Air Quality Standards (NAAQS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulatory limits.
		Obtain required permits and/or operating certificates.
	Local and regional temporary traffic increase.	Heavy plant equipment will be brought to the site on barges when possible.
		Install new site perimeter and access road.
	Site aesthetically altered due to plant construction; construction activities visible, but temporary.	Use low points in topography to create lowest visual profile practicable.
		Minimize tree and vegetation removal and post-construction restoration.
		Minimize new road construction.
		Paint exteriors of structures, where practicable, with a compatible color of the surrounding area.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction

(Page 6 of 7)

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.4.2 Social and Economic Impacts	Influx of large construction work force.	Small aggregate socioeconomic impacts anticipated; mitigation not required.
	Public services need (employment, housing, emergency services, schools, land use) increase.	Small aggregate socioeconomic impacts anticipated; mitigation not required.
	Traffic volume increase.	Temporary signalization of the 4 present stop-controlled intersections during construction peak periods. Lane designation of 2 of the 4 present stop-controlled intersections during construction peak periods. Restripe lanes and restrict parking during construction peak periods near one existing signalized intersection (NY104 and NY48).
	Spending and tax revenue increase.	Large beneficial impact to property tax revenues; small beneficial impact for other types of tax revenues. No mitigating measures or controls required.
4.4.3 Environmental Justice Impacts	No disproportionate adverse impacts to minority or low-income populations.	None necessary.

Table 4.6-1—Summary of Measures and Controls to Limit Adverse Impacts During Construction
(Page 7 of 7)

ER Reference Section	Potential Impact Category and Description														Proposed Measures and Controls or Mitigating Circumstances
4.5 Radiation Exposure to Construction Workers	Erosion/Sediment	Air Quality	Wastes	Surface Water	Groundwater	Land Use	Water Use & Quality	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Aesthetics	Noise	Traffic	Radiation Exposure	Other (site specific)	
														S		
	NMP Unit 1 and Unit 2 and JAFNPP gaseous effluents exposure.															Implement a radiation protection and/or monitoring program and/or as low as is reasonably achievable (ALARA) practices at construction site.
																Prohibit consumption of on-site agricultural products.
	NMP Units 1 and 2 and JAFNPP liquid effluents exposure.															Implement a radiation protection and/or monitoring program and/or as low as is reasonably achievable (ALARA) practices at construction site.
																Prohibit consumption of on-site agricultural products.
	JAF Unit 1 Independent Spent Fuel Storage Installation (ISFSI) direct radiation exposure.															Implement a radiation protection and/or monitoring program and/or as low as is reasonably achievable (ALARA) practices at construction site.
																Prohibit consumption of on-site agricultural products.
	NMP Unit 2 outage equipment storage (Cold/ Condensate Storage)															Implement a radiation protection and/or monitoring program and/or as low as is reasonably achievable (ALARA) practices at construction site.
																Prohibit consumption of on-site agricultural products.
	NMP Units 1 and Unit2 and JAFNPP Turbine building (N-16) direct radiation exposure.															Implement a radiation protection and/or monitoring program and/or as low as is reasonably achievable (ALARA) practices at construction site.
																Prohibit consumption of on-site agricultural products.
4.7 Non-Radiological Health Impacts	Erosion/Sediment	Air Quality	Wastes	Surface Water	Groundwater	Land Use	Water Use & Quality	Terrestrial Ecosystems	Aquatic Ecosystems	Socioeconomic	Aesthetics	Noise	Traffic	Radiation Exposure	Other (site specific)	
															S	
	Risk to workers from accidents and occupational illnesses.															Implement site-wide Safety and Medical Program, including safety policies, safe work practices, as well as general and topic-specific training.

Table 4.6-2—Summary of Measures and Controls to Limit Adverse Impacts During Construction

ER Reference Section	Potential Impact Category and Description	Proposed Measures and Controls or Mitigating Circumstances
4.4.2 Social and Economic Impacts	- Traffic volume increase	- Temporary signalization of the 4 present stop-controlled intersections during construction peak periods. - Lane designation of 2 of the 4 present stop-controlled intersections during construction peak periods. - Restripe lanes and restrict parking during construction peak periods near one existing signalized intersection (NY104 and NY48).

4.7 NONRADIOLOGICAL HEALTH IMPACTS

4.7.1 PUBLIC HEALTH

Members of the public can potentially be put at risk by construction of a new power generation unit and associated new transmission lines. Nonradiological air emissions and dust can migrate off-site through the atmosphere to nearby residences or businesses. Noise can also propagate off site. The increase in traffic from commuting construction workers and deliveries can result in additional air emissions and traffic accidents. Section 4.4.1, "Physical Impacts, addresses these potential impacts to the public from construction activities.

4.7.2 OCCUPATIONAL HEALTH

Construction of a new power generation unit and associated transmission lines would involve risk to workers from accidents or occupational illnesses. These risks could result from construction accidents (e.g., falls and burns), exposure to toxic or oxygen-replacing gases, and other causes.

During construction of NMP3NPP, UniStar Nuclear Operating Services will provide a safety and medical program with associated personnel to promote safe work practices and respond to occupational injuries and illnesses. The safety and medical program will utilize an industrial safety manual providing a set of work practices with the objective of preventing accidents due to unsafe conditions and unsafe acts. These safe work practices address hearing protection, confined space entry, personal protective equipment, respiratory protection, heat stress, electrical safety, excavation and trenching, scaffolds and ladders, fall protection, chemical handling, storage, and use, and other industrial hazards. The safety and medical program provides for employee training on safety procedures. Site safety and medical personnel are provided to handle construction accidents and occupational illnesses.

Contractors, including construction contractors, will be required to review all safety policies/safe work practices applicable to their work with site personnel. The contractors will be required to comply with site safety, fire, radiation, security polices, procedures, safe work practices, and federal and state regulations.

The Bureau of Labor Statistics (BLS) maintains records of occupational injuries and illnesses by industry and in many cases, for individual states. They calculate a statistic known as the incidence rate or total recordable cases (TRC). The TRC is the number of injuries and illnesses per 100 full-time workers. It is calculated as the number of injuries and/or illnesses divided by the total hours worked by all employees during the calendar year multiplied by 200,000 which is the equivalent of 100 full time workers working 40 hours per week, 50 weeks per year. The BLS has a nationwide TRC for Utility system construction which falls under North American Industrial Classification System (NAICS) code 2371. The nationwide TRC for utility system construction for 2006 was 5.4 per 100 workers (BLS 2008a). The annual average employment in this industry, nation wide, was 417,200 workers (BLS 2008a).

The BLS maintains occupational injury and illness statistics for the State of New York but not for the NAICS Code 2371. The BLS lists a TRC for Heavy and civil engineering construction, NAICS 237, of 5.8 per 100 workers (BLS 2008b). Utility system construction falls within this three digit code.

The number of injuries or illnesses that might occur during construction of NMP3NPP can be calculated as the product of the incidence rate and the number of full time workers divided by 100. The number of workers by year is shown in Table 4.7-1. The calculated annual average numbers of injuries and illnesses that could be expected each year of construction are shown below, using both the nationwide and New York state TRC values.

	TRC Incidence Based on US Rate	TRC Incidence Based on NY Rate
Average Annual	162	174

The BLS published statistics for fatal occupational injuries (BLS 2008c) and average employment by industry (BLS 2008a). There were 104 fatalities among 417,200 full time utility system construction workers in 2006. The national annual occupational fatality rate for utility system construction for 2006 was calculated as the number of fatalities times 100,000 divided by the number of workers. The fatality rate is 25 per 100,000 or 0.025%. Using this value and the number of workers, it is estimated that 5 construction deaths could occur over the pre-construction and construction period of 68 months for NMP3NPP.

Nine Mile Point 3 Nuclear Project, LLC and UniStar Nuclear Operating Services will require all construction contractors and subcontractors working at the construction site to comply with all safety procedures in order to prevent and/or minimize the number of deaths, injuries, and illness during the construction of NMP3NPP. Even with effective safety procedures, construction work carries the risk or injury, illness, and death. However, it is not expected that the construction of a new nuclear power generation facility will result in more construction deaths than other similarly sized non-nuclear heavy construction projects.

4.7.3 REFERENCES

BLS, 2008a. Table 1, Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2006, Bureau of Labor Statistics, Website: http://www.bls.gov/iif/oshwc/osh/os/ostb1765.pdf, Date accessed: March 25, 2008.

BLS, 2008b. Table 6, Incidence rates of nonfatal occupational injuries and illnesses by industry and case types, 2006, New York, Bureau of Labor Statistics, Website: http://www.bls.gov/iif/oshwc/osh/os/pr066ny.pdf, Date accessed: March 25, 2008.

BLS, 2008c. Table A-1, Fatal occupational injuries and even or exposure, All United States, 2006, Bureau of Labor Statistics, Website: http://www.bls.gov/iif/oshwc/cfoi/cftb0216.pdf, Date accessed: March 25, 2008.

Table 4.7-1—Projected Construction Worker Census

Construction Year	Number of Workers
1	531
2	2281
3	4000
4	4000
5	4000
6	3215
Total	**18027**
Average	**3005**