Applicant's Environmental Report - Operating License Renewal Stage

Nine Mile Point Nuclear Station
Docket Nos. 50-220 and 50-410
License Nos. DPR-63 and NPF-69

May 2004

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
°C	degrees Celsius
°F	degrees Fahrenheit
AC	alternating current
ADS	automatic depressurization system
ADTC	average daily traffic count
AEC	U.S. Atomic Energy Commission
AOV	air-operated valve
ARP	alarm response procedure
ATWS	anticipated transient without scram
BACT	best available control technology
bqs	becquerel
Btu/hr	British thermal unit per hour
BWR	boiling water reactor
BWROG	Boiling Water Reactors Owners' Group
CDF	core damage frequency
CEG	Constellation Energy Group
CET	containment event tree
CFR	*Code of Federal Regulations*
CNS	Constellation Nuclear Services, Inc.
CO	carbon monoxide
CO_2	carbon dioxide
CRD	control rod drive
CST	condensate storage tank
CT	combustion turbine
CWA	Clean Water Act
CWS	circulating water system
DC	direct current
DOE	U.S. Department of Energy
DSM	demand-side management
EC	emergency condenser
ECCS	emergency core cooling system
EDG	emergency diesel generator
EOP	emergency operating procedure
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESCOs	energy service companies
FBC	fluidized-bed combustion
FES	Final Environmental Statement
FES-CP	Final Environmental Statement - Construction Phase
fps	feet per second
FWS	U.S. Fish and Wildlife Service

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym	Definition
GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants*
GLWQA	Great Lakes Water Quality Agreement
gpm	gallons per minute
HCLPF	high confidence low probability failure
HPCI	high-pressure coolant injection
HPCS	high-pressure core spray
HRSG	heat recovery steam generator
HVAC	heating, ventilation, and air conditioning
IGCC	integrated gasification combined-cycle
IGLD	International Great Lakes Datum
IJC	International Joint Commission
IPE	independent plant examination
IPEEE	IPE for external events
ISLOCA	interfacing system loss of coolant accident
ISLRBC	International St. Lawrence River Board of Control
ISO-NE	Independent System Operator-New England
JAF	J.A. Fitzpatrick Power Plant
JTU	Jackson Turbidity Unit(s)
kV	kilovolt(s)
kWh	kilowatt-hour(s)
lb	pound(s)
lb/MMBtu	pounds per million British thermal units
LAER	lowest achievable emission rate
LERF	large early release frequency
LIPA	Long Island Lighting Power Authority
LMS	Lawler, Matusky & Skelly Engineers
LOCA	loss of coolant accident
LOS	level of service
LOOP	loss of offsite power
LRA	license renewal application
LSE	load-serving entity
m^2	square meter(s)
MACCS	Melcor Accident Consequences Code System
MFF	master frequency file
MSA	Metropolitan Statistical Area
MSIV	main steam isolation valve
msl	mean sea level
MW	megawatt(s)
MWB	Metropolitan Water Board
MWD/MTU	megawatt-days per metric ton uranium
MWe	megawatt electric

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym	Definition
MWt	megawatt thermal
NA	not applicable; not available
NAAQS	national ambient air quality standards
ND	no data available
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NMP	Nine Mile Point Units 1 & 2
NMPC	Niagara Mohawk Power Corporation
NMPNS	Nine Mile Point Nuclear Station, LLC
No.	issue number
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSPS	new source performance standards
NTU	Nephlometric Turbidity Unit(s)
NYCA	New York Control Area
NYISO	New York Independent System Operator
NYSDEC	New York State Department of Environmental Conservation
NYSEG	New York State Electric and Gas
NYSEPB	New York State Energy Planning Board
NYSERDA	New York State Energy Research and Development Authority
NYSPSC	New York State Public Service Commission
NYSRC	New York State Reliability Council
OCWA	Onondaga County Water Authority
OMNR	Ontario Ministry of Natural Resources
Ontario IMO	Ontario Independent Electricity Market Operator
PBT	persistent, bioaccumulative, toxic (chemicals)
PCB	polychlorinated biphenyl
PJM	PJM Interconnection
PM	particulate matter
PM_{10}	filterable particulates with diameter less than 10 microns
ppm	parts per million
PRA	probabilistic risk assessment
PSD	Prevention of Significant Deterioration (rules)
psig	pounds per square inch gage
RBCLC	reactor building closed loop cooling
RCIC	reactor core isolation cooling
Ref.	Reference
RHR	residual heat removal

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Acronym	Definition
RIS	Representative Important Species
ROW	right(s)-of-way
RPV	reactor pressure vessel
RRW	risk reduction worth
RWCU	reactor water cleanup
SAMA	severe accident mitigation alternative
SBC	systems benefit charge
SDC	shutdown cooling
SDPRA	shutdown PRA
SFP	spent fuel pool
SGTS	standby gas treatment system
SHPO	State Historic Preservation Officer
SIP	state implementation plan
SMITTR	surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping
SO_2	sulfur dioxide
SO_x	sulfur oxide
SOV	solenoid operated valves
SPDES	State Pollutant Discharge Elimination System
SRV	safety relief valve
SWMA	State Wildlife Management Area
TBCLC	Turbine Building Closed Loop Cooling
UFSAR	Updated Final Safety Analysis Report
UPS	uninterruptible power supply
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
V	volt
VOC	volatile organic compound

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION AND BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act and NRC implementing regulations. Nine Mile Point Nuclear Station, LLC (NMPNS) operates Nine Mile Point Units 1 & 2 (NMP) pursuant to NRC Operating Licenses DPR-63 and NPF-69, respectively. The Unit 1 license will expire August 22, 2009, and the Unit 2 license will expire October 31, 2026. NMPNS has prepared this environmental report (ER) in connection with its application to the NRC to renew the NMP operating licenses, as provided for by the following NRC regulations:

- Title 10, Energy, *Code of Federal Regulations* (CFR), Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants,” Section 54.23, “Contents of Application-Environmental Information” (10 CFR 54.23)

- Title 10, Energy, CFR, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions,” Section 51.53, “Post-Construction Environmental Reports,” Subsection 51.53(c), “Operating License Renewal Stage” [10 CFR 51.53(c)]

The NRC’s regulations at 10 CFR 54.17(c) state that an application for a renewed license may not be submitted earlier than 20 years before the current operating license for a unit expires. However, NMPNS has obtained an exemption from the requirement for NMP Unit 2 license renewal (Ref. 1.1-1), in accordance with provisions at 10 CFR 54.15. Therefore, as with other portions of this application, this environmental report addresses both of the NMP Units.

1.2 STATEMENT OF PURPOSE AND NEED

NMPNS adopts for this ER the following NRC general definition of purpose and need for the proposed action, as stated in the NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437 (Ref. 1.2-1, Section 1.3; Ref. 1.2-2, page 28472):

> The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers.

The proposed action would provide NMPNS the option to operate this important source of electric power for up to an additional 20 years beyond the current 40-year operating license terms.

1.3 ENVIRONMENTAL SCOPE AND METHODOLOGY

The NRC regulations for domestic licensing of nuclear power plants require environmental review of applications to renew operating licenses. NRC regulation 10 CFR 51.53(c) requires that an applicant for license renewal submit with its application a separate document entitled, *Applicant's Environmental Report - Operating License Renewal Stage*. In determining what information to include in the NMP environmental report, NMPNS relied on NRC regulations and the following supporting documents, which provide additional insight into the regulatory requirements:

- NRC supplemental information in the *Federal Register* (Ref. 1.2-2; Ref. 1.3-1; Ref. 1.3-2; Ref. 1.3-3)
- The GEIS (Ref. 1.2-1; Ref. 1.3-4)
- *Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses* (Ref. 1.3-5)
- *Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response* (Ref. 1.3-6)

NMPNS also obtained general guidance regarding format and content of the ER from the following NRC documents:

- *Supplement 1 to NRC Regulatory Guide 4.2, Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses* (Ref. 1.3-7)
- *Supplement 1 to NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants (Operating License Renewal)* (Ref. 1.3-8)

Table 1.3-1, developed to verify conformance with regulatory requirements, indicates where this ER addresses each requirement of 10 CFR 51.53(c). For convenience, key excerpts from applicable regulations and supporting documents preface each responsive section of the ER.

TABLE 1.3-1

ENVIRONMENTAL REPORT RESPONSES TO LICENSE RENEWAL ENVIRONMENTAL REGULATORY REQUIREMENTS

Regulatory Requirement	Responsive Environmental Report Section(s)	
10 CFR 51.53(c)(1)		Entire Document
10 CFR 51.53(c)(2), Sentences 1 and 2	3.0	The Proposed Action
10 CFR 51.53(c)(2), Sentence 3	7.2.3	Environmental Impacts of Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(1)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(2)	6.3	Unavoidable Adverse Impacts
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(3)	7.0 8.0	Alternatives to the Proposed Action Comparison of Environmental Impact of License Renewal with the Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(4)	6.5	Short-Term Use Versus Long-Term Productivity of the Environment
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(5)	6.4	Irreversible or Irretrievable Resource Commitments
10 CFR 51.53(c)(2) and 10 CFR 51.45(c)	4.0 6.2 7.2.3 8.0	Environmental Consequences of the Proposed Action and Mitigating Actions Mitigation Environmental Impacts of Alternatives Comparison of Environmental Impact of License Renewal with the Alternatives
10 CFR 51.53(c)(2) and 10 CFR 51.45(d)	9.0	Status of Compliance
10 CFR 51.53(c)(2) and 10 CFR 51.45(e)	4.0 6.3	Environmental Consequences of the Proposed Action and Mitigating Actions Unavoidable Adverse Impacts
10 CFR 51.53(c)(3)(ii)(A)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(B)	4.2 4.3 4.4	Entrainment of Fish and Shellfish in Early Life Stages Impingement of Fish and Shellfish Heat Shock

TABLE 1.3-1 (CONTINUED)

ENVIRONMENTAL REPORT RESPONSES TO LICENSE RENEWAL ENVIRONMENTAL REGULATORY REQUIREMENTS

Regulatory Requirement	Responsive Environmental Report Section(s)	
10 CFR 51.53(c)(3)(ii)(C)	4.1 4.5	Introduction Groundwater Use Conflicts – Impacts from Direct Use of Groundwater
10 CFR 51.53(c)(3)(ii)(D)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(E)	4.6 4.7	Impacts of Refurbishment on Terrestrial Resources Threatened or Endangered Species
10 CFR 51.53(c)(3)(ii)(F)	4.8	Air Quality During Refurbishment (Nonattainment Areas)
10 CFR 51.53(c)(3)(ii)(G)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(H)	4.9	Electromagnetic Field – Acute Effects
10 CFR 51.53(c)(3)(ii)(I)	4.10 4.11 4.12 4.13	Housing Impacts Public Utilities: Public Water Supply Availability Education Impacts from Refurbishment Offsite Land Use
10 CFR 51.53(c)(3)(ii)(J)	4.14	Transportation
10 CFR 51.53(c)(3)(ii)(K)	4.15	Historic and Archaeological Resources
10 CFR 51.53(c)(3)(ii)(L)	4.16	Severe Accident Mitigation Alternatives
10 CFR 51.53(c)(3)(iii)	4.1 6.2	Environmental Consequences of the Proposed Action and Mitigating Actions Mitigation
10 CFR 51.53(c)(3)(iv)	5.0	Assessment of New and Significant Information
10 CFR 51, Appendix B to Subpart A, Table B-1, Footnote 6	4.17	Environmental Justice

CFR = *Code of Federal Regulations*

1.4 NINE MILE POINT UNITS 1 & 2 LICENSEE AND OWNERSHIP

Nine Mile Point Units 1 & 2 are operated by NMPNS, LLC, an indirect subsidiary of Constellation Generation Group, LLC (CGG), which is a member of the Constellation Energy Group (CEG). NMPNS is a limited liability corporation. NMPNS and CGG own 100 percent of Nine Mile Point (NMP) Unit 1 and 82 percent of Unit 2. The Long Island Power Authority owns the remaining 18 percent of Unit 2. NMPNS is the exclusive operator and the holder of record for the operating licenses for both Units.

On November 7, 2001, CEG completed its purchase of the NMPNS, thereby acquiring 1,553 megawatts of Nine Mile Point's 1,759 megawatts of total generating capacity. Prior to that time, Niagara Mohawk Power Corporation (NMPC) owned Unit 1. The 82 percent of Unit 2 purchased by CEG was jointly owned by NMPC, New York State Electric & Gas Corporation, Central Hudson Gas & Electric Corporation, and Rochester Gas and Electric Corporation. NMPC was the exclusive operator prior to November 7, 2001.

1.5 REFERENCES

1.1-1 Letter from the NRC to NMPNS, P.S. Tam to J.T. Conway, dated October 8, 2002, "Nine Mile Point Nuclear Station, Unit No. 2 – Schedular Exemption from the Requirements of 10 CFR Part 54, Section 54.17(c) (TAC No. MB3532)."

1.2-1 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

1.2-2 U.S. Nuclear Regulatory Commission. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register*. Vol. 61, No. 109. (June 5, 1996): 28467-97.

1.3-1 U.S. Nuclear Regulatory Commission. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Correction." *Federal Register*. Vol. 61, No. 147. (July 30, 1996): 39555-6.

1.3-2 U.S. Nuclear Regulatory Commission. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register*. Vol. 61, No. 244. (December 18, 1996): 66537-54.

1.3-3 U.S. Nuclear Regulatory Commission. "Changes to Requirements for Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rules." *Federal Register*. Vol. 64, No. 171. (September 3, 1999): 48495-507.

1.3-4 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* Section 6.3, "Transportation," and Table 9-1, "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants." NUREG-1437, Vol. 1, Addendum 1. Office of Nuclear Reactor Regulation. Washington, D.C. August 1999.

1.3-5 U.S. Nuclear Regulatory Commission. *Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses*. NUREG-1440. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

1.3-6 U.S. Nuclear Regulatory Commission. *Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response*. NUREG-1529. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

1.3-7 U.S. Nuclear Regulatory Commission. *Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses*. Supplement 1 to Regulatory Guide 4.2. Office of Nuclear Regulatory Research. Washington, D.C. September 2000.

1.3-8 U.S. Nuclear Regulatory Commission. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants (Operating License Renewal)*. NUREG-1555, Supplement 1. Office of Nuclear Reactor Regulation. Washington, D.C. October 1999.

2.0 SITE AND ENVIRONMENTAL INTERFACES

2.1 LOCATION AND FEATURES

The Nine Mile Point Units 1 & 2 (NMP) nuclear generating station is located on the southeastern shore of Lake Ontario in the Town of Scriba, Oswego County, New York. The site is in a rural area approximately five miles northeast of Oswego, 36 miles north-northwest of Syracuse, and 65 miles east of Rochester, New York. Syracuse is the largest city within 50 miles of NMP. Lake Road (County Road 1A) provides road access to the site and transverses NMP property in an east-west direction just south of the main operational facilities. Figures 2.1-1 and 2.1-2 show the site location and features within 50 and 6 miles, respectively. Figure 2.1-3 shows the site boundary in relation to the power block and adjacent features. The exclusion area for the plant, as defined at 10 CFR 100.3, is centered at NMP and extends 1 mile to the east, 0.87 mile to the southwest, and 1.3 miles to the southern site boundary (Ref. 2.1-1, Section 2.1.2.1; see Figure 2.1-3).

The site consists of approximately 900 acres, with over a mile of shoreline on Lake Ontario. Approximately 188 acres are used for power generation and support facilities, including the Hazardous Waste Facility, a 90-day accumulation unit for the temporary storage of hazardous wastes, non-hazardous industrial wastes, and universal wastes, prior to offsite shipping for recycling or disposal. The remaining acres are generally undeveloped with the exception of the Energy Information Center (a nuclear information facility that was open to the public prior to September 11, 2001) and adjacent picnic area, the Nine Mile Point Nuclear Learning Center (training facility), a former construction and demolition landfill, and a firing range for security personnel training (Ref. 2.1-2, Table 4.1).

The site is located near the Erie-Ontario Lowlands subdivision of the Central Lowlands Physiographic Province. The local terrain consists of undulating hills reflecting a bedrock surface modified by repeated glaciations that eroded weathered rock and deposited glacially derived sediments. The site, however, does not have any of the prominent drumlins that are characteristic of the Erie-Ontario Lowlands (Ref. 2.1-1, Section 2.5.1.2.1). On site, the ground surface is generally flat and slopes gently to the north toward Lake Ontario with elevations ranging from 246 feet mean sea level (msl) at the shoreline to approximately 276 msl near the southern end of the developed portion of the site (Ref. 2.1-3, Section 2.2). The predominant land cover is woodlands, consisting of forest and brushlands. Federal and State designated wetlands consisting of shrub wetlands, bogs, marshes, and wooded wetlands, along with inactive agricultural land, occur on site (Ref. 2.1-4, Section 2.2.1, Table 2.2-1; Ref. 2.1-5, see Figure 2.1-3).

Transmission lines are prominent features on and near the NMP site. Transmission lines from the Unit 1 and Unit 2 Switchyards are routed southward and either connect through or narrowly bypass the Scriba Substation, located approximately 2,000 feet south of these Switchyards (see Figure 2.1-3). Most of the transmission lines from the

Scriba Substation are routed southward, initially on a common 500-foot right-of-way (ROW). The Scriba Substation is jointly owned by Niagara Mohawk, a National Grid Company (formerly known as Niagara Mohawk Power Corporation) and the New York State Electric and Gas Corporation (NYSEG). The transmission corridor is wholly owned by Niagara Mohawk. Section 3.1 of this environmental report describes the major features of NMP, including reactor and containment system, fuel configuration and refueling activities, water systems, and power transmission systems.

The 700-acre James A. Fitzpatrick Nuclear Power Plant site adjoins the NMP site to the east, and the Ontario Bible Conference operates a summer camp 4,500 feet southwest of the site (see Figure 2.1-2). Seventeen state parks and one national wildlife refuge are located within a 50-mile radius of NMP (Ref. 2.1-4, Section 2.2.3.2). The Montezuma National Wildlife Refuge is located north of Cayuga Lake in Seneca County, approximately 44 miles southwest of the site (Ref. 2.1-6, Section II.B.2.3). Approximately twenty State Wildlife Management Areas (SWMAs) are also located within a 50-mile radius of NMP (Ref. 2.1-7). The closest SWMA is Deer Creek Marsh, 1,195 acres located approximately 19 miles east-southeast of the site, offering boat access, hunting, fishing, trapping, bird watching, cross-country skiing, and snowshoeing (see Figure 2.1-1). The closest public parks are Scriba Town Park, Sunset Park, and Independence Park. Scriba Town Park is located five miles south-southwest of the site, occupies 74 acres, and offers a picnic area, playground, and swimming facilities (Ref. 2.1-4, Section 2.2.1). Sunset Bay Park, located approximately one mile east of NMP on the shore of Lake Ontario, is owned by the Town of Scriba and offers a boat launch, nature trail, picnic shelter, and restrooms. The park encompasses 48 acres of mostly woods and brushland, and includes a small apple orchard (Ref. 2.1-8, page 17). Independence Park is located approximately two miles to the southwest of NMP on Lake Ontario. It is a 50-acre wooded tract with a walking trail system and observation platform (Ref. 2.1-9, Section 10.2.1.4).

SECTION 2.1 FIGURES

FIGURE 2.1-1

50-MILE VICINITY

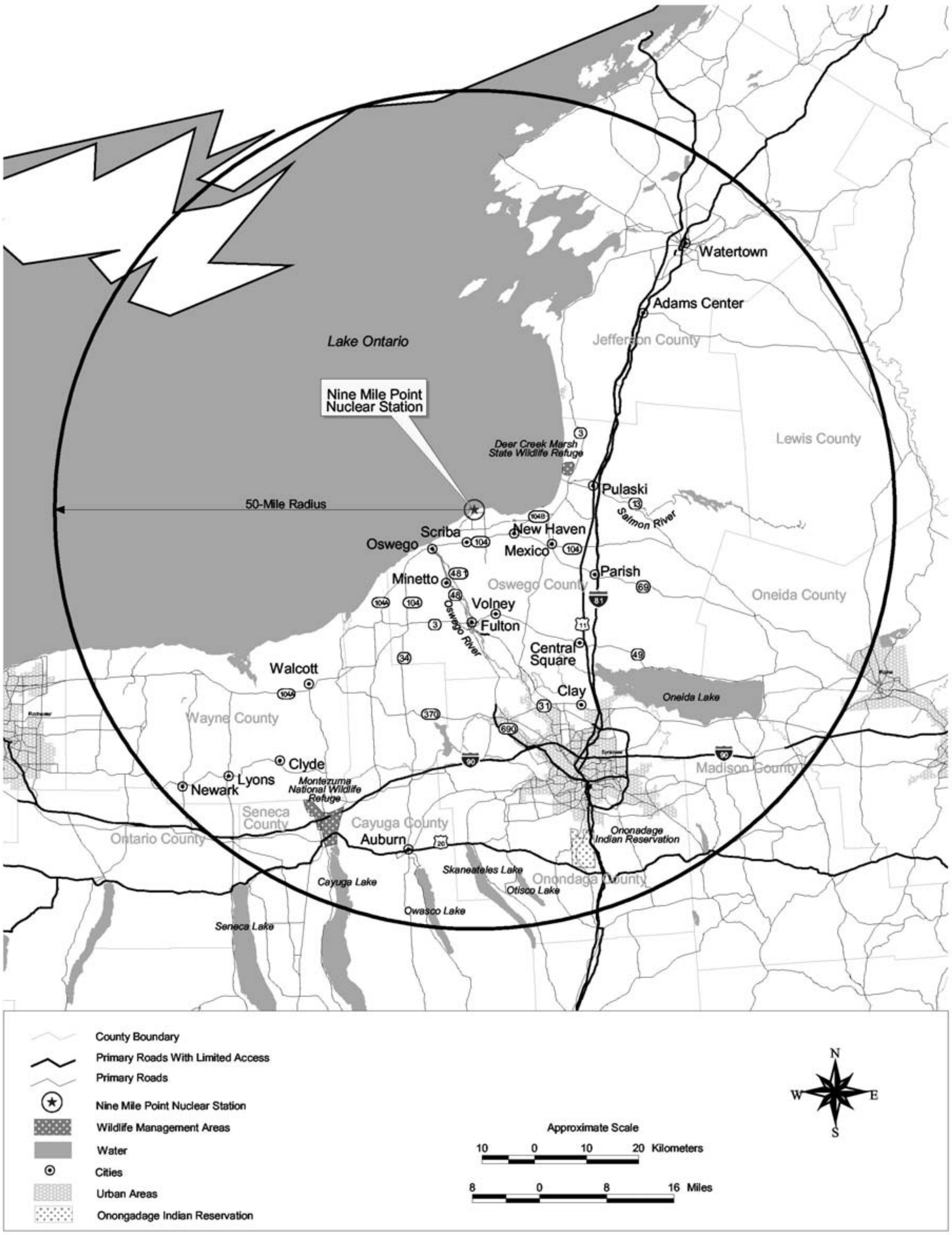


FIGURE 2.1-2

6-MILE VICINITY

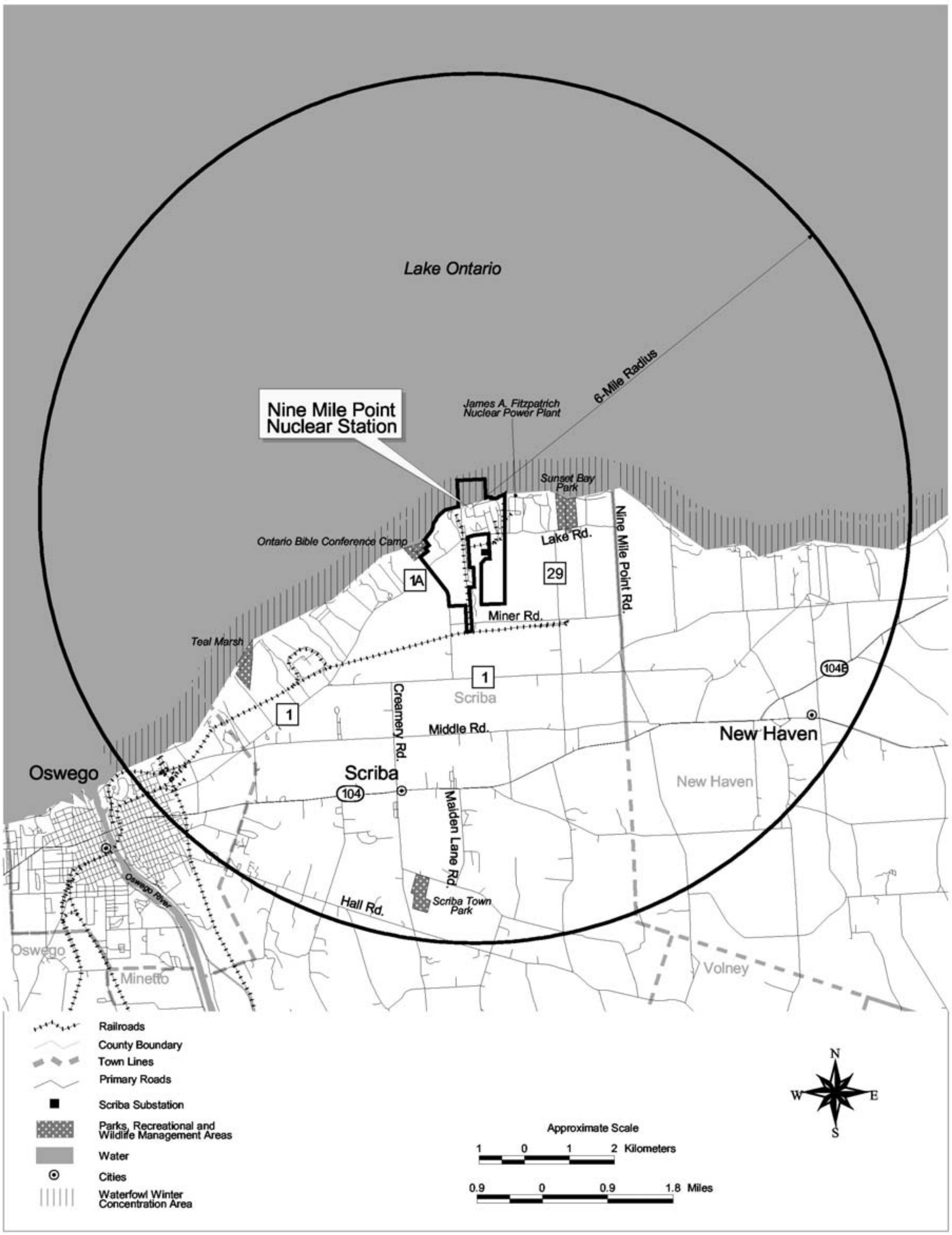
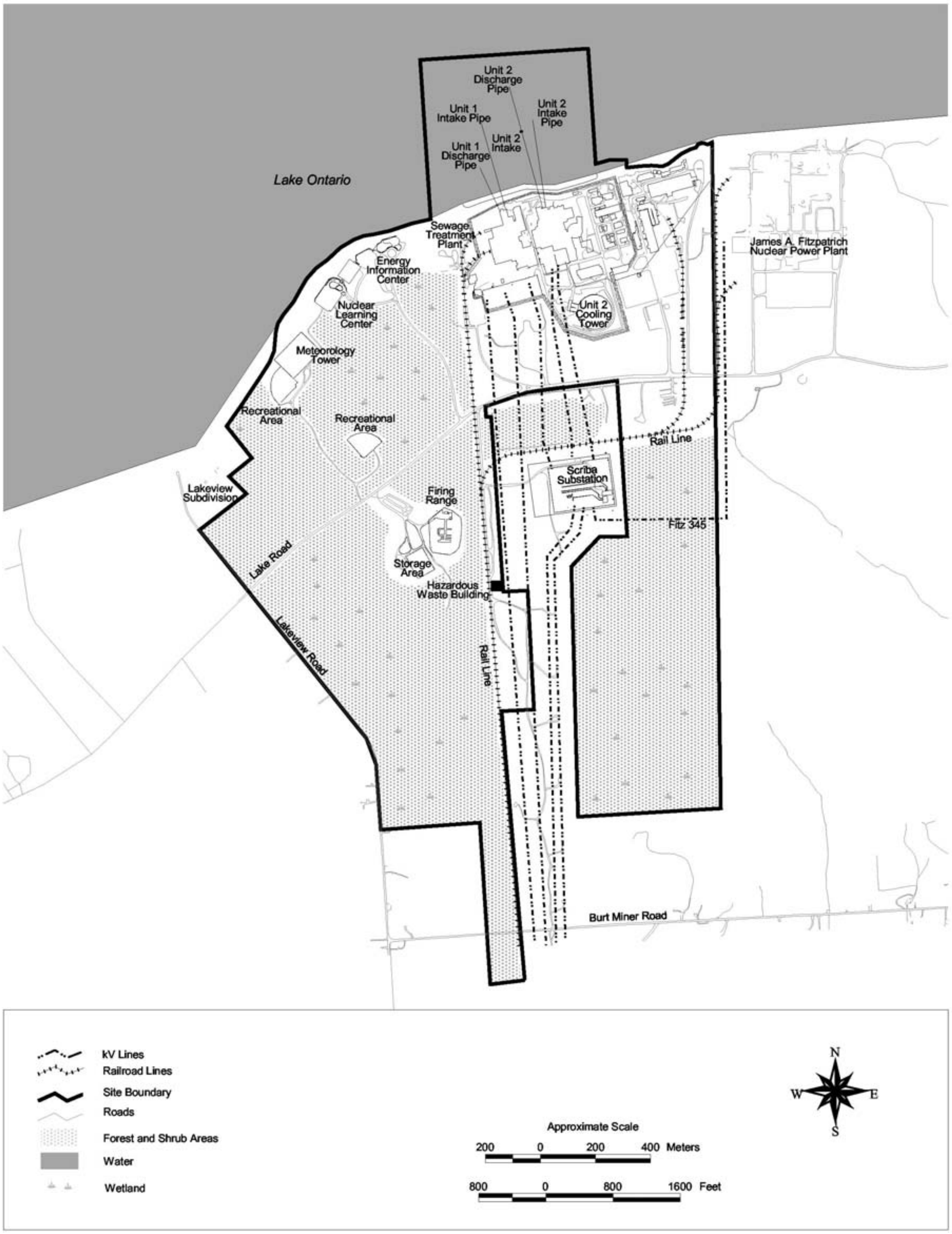


FIGURE 2.1-3

SITE BOUNDARY



2.2 HYDROLOGY

In this section, NMPNS describes the hydrologic characteristics of Lake Ontario and groundwater in the vicinity of the NMP site. Section 2.2.1 addresses Lake Ontario hydrology. Groundwater aquifer characteristics and use are described in Section 2.2.2. These characteristics are more fully described by the U.S. Nuclear Regulatory Commission (NRC) in the Final Environmental Statement (FES) for Unit 2 (Ref. 2.1-2, Section 4.3.1).

2.2.1 LAKE ONTARIO HYDROLOGY

As indicated in Section 2.1, NMP is located on the southeastern shore of Lake Ontario in Oswego County, New York. Lake Ontario, an international body of water forming part of the border between the U.S. and Canada, is the smallest and easternmost of the Great Lakes, with a surface area of approximately 7,340 square miles and a total volume of 393 cubic miles. The Lake is 193 miles long and 53 miles wide in its largest dimensions, and has an average and maximum depth of 283 feet and 802 feet, respectively (Ref. 2.1-2, Section 4.3.1).

Nine Mile Point, on which the NMP site is located, is a slight promontory on the southeastern shore of the Lake. The offshore slope at the plant site is steep (5 percent to 10 percent grade) at the beach, flattening to a 2 percent to 3 percent grade at the 15-foot depth contour, then increasing to a 4 percent slope lakeward. In general, bottom sediments in nearshore areas are characterized by a greater predominance of coarser sands, pebbles, cobbles, and boulders, while finer sediments occur further offshore (Ref. 2.1-2, Section 4.3.1).

Approximately 80 percent of the water flowing into Lake Ontario comes from Lake Erie through the Niagara River. The remaining water flow comes from Lake Ontario basin tributaries and precipitation. Approximately 93 percent of the water in Lake Ontario flows out to the St. Lawrence River and the remaining 7 percent disperses through evaporation. Water retention time is estimated to be approximately eight years. Since Lake Ontario is the most downstream of the Great Lakes, it is impacted by human activities occurring throughout the Lake Superior, Michigan, Huron, and Erie basins. (Ref. 2.2-1, Section 1.2).

Lake circulation is influenced by the prevailing west-northwest winds and the eastward flow of water from the Niagara River, resulting in a counter-clockwise flow. Circulation of water generally occurs along the eastern nearshore areas and within sub-basins of the main lake (Ref. 2.2-1, Section 1.2). Water currents typically move in an eastward direction along the south shore of Lake Ontario in a relatively narrow band. However, circulation patterns at a specific time can be affected by winds. Major shifts in wind distribution can alter currents in a matter of hours. Wind speed - frequency data collected during current measurement studies at Nine Mile Point and reported by the NRC in the Unit 2 FES indicate that, over the year, winds in excess of 20 miles per hour occur over 21 percent of the time based on readings averaged over a six-hour period.

From June – September winds in excess of 20 miles per hour occur 13 percent of the time. At the 19-foot depth contour, the measured current speed of six-hour duration exceeded with comparable frequency is about 0.2 feet per second (Ref. 2.1-2, Section 4.3.1.2.1).

Two other important examples of wind-induced effects on the general circulation pattern of Lake Ontario are upwelling and internal oscillation of thermocline depth. Upwelling is characterized by the rising of colder, heavier, bottom water toward the surface. As noted by the NRC in the Unit 2 FES, a variety of theories have been proposed to account for the oscillations, which are a common feature of Lake Ontario temperature records. The most direct explanation is that an upwelling displaces the thermocline from equilibrium by converting the kinetic energy from wind gusts into potential energy that alters the thermocline position. When the wind stress is removed, internal waves are set in motion and contribute to the dissipation of this energy. Internal waves increase in amplitude after storms. In Lake Ontario, approximately three complete oscillations occur every 2 days (Ref. 2.1-2, Section 4.3.1).

Lake Ontario is a large, temperate lake that exhibits a seasonally dependent pattern of thermal stratification, which alters circulation patterns. Changes in stratification result from atmospheric heat exchange and wind-induced mixing. In spring months, the shallow nearshore waters warm more quickly than the deep offshore waters, setting up isotherms roughly parallel to shore. As the lake temperature continues to warm, vertical stratification develops as a result of the combined effects of the lake warming and advection of the warmer, near shore waters. Most of the Lake is vertically stratified during the summer with the warm surface waters (epilimnion) averaging nearly 70°F and cool deeper waters (hypolimnion) ranging between 38.8°F and 39.2°F. Mixing of these strata begins as the thermocline breaks down during September as a result of surface water cooling, and continues until water temperatures are the same throughout the water column (Ref. 2.1-2, Section 4.3.1; Ref. 2.2-1, Section 1.2).

The lake water temperatures begin to warm in mid-March and by late-June the offshore ambient temperature stays above 39°F. Generally, vertical stratification is established over the entire basin by this time (Ref. 2.1-2, Section 4.3.1). During the warmest water temperature period (June – September) at Nine Mile Point, the ambient temperature of Lake Ontario exceeds 71°F approximately 10 percent of the time in the waters surrounding NMP. The mean summer ambient temperature of Lake Ontario at Nine Mile Point is reportedly 67°F, with a maximum surface temperature rise above ambient of approximately 12.4°F at capacity operation (Ref. 2.2-2). In late September, the warming process ends, the mean surface temperature drops rapidly below 63°F, and the thermocline breaks down, marking the beginning of the winter season. The date of overturn varies each year due to storms. After overturn and when the lake surface cools to below 39°F, isotherms tend to be parallel to shore. During the winter months, nearshore areas of the Lake freeze while the deep offshore waters remain open (Ref. 2.1-2, Section 4.3.1.2.1).

Since 1960, Lake Ontario outflows have been regulated to control lake water levels, under the supervisory authority of the International St. Lawrence River Board of Control (ISLRBC), by a series of dams on the St. Lawrence River. The ISLRBC was created in 1952 under the Boundary Waters Treaty of 1909 to help prevent and resolve disputes over the use of water along the Canadian and United States boundary. The current plan regulating Lake Ontario outflows is Plan 1958-D, which specifies weekly outflows based on the water level of the Lake and water supplies to the Lake (Ref. 2.2-3). The primary water regulation facility is the Moses-Saunders Power Dam near Cornwall, Canada, and Massena, New York, approximately 100 miles downstream from the beginning of the St. Lawrence River. A second dam, located near Long Sault, Ontario, Canada, acts as a spillway when outflows are larger than the capacity of the Moses-Saunders Dam. A third structure, at Iroquois, Ontario, Canada, is principally used to help to form a stable ice cover and regulate water levels at the power dam. One requirement in the ISLRBC's order was to regulate Lake Ontario water levels within a target range from 243.3 to 247.3 feet International Great Lakes Datum (IGLD[a]) (Ref. 2.2-3). The ISLRBC aims to maintain levels above 243.3 feet IGLD from April 1 through November 30 annually. Under the most extreme dry conditions, all possible relief is provided to navigation and power production facilities (Ref. 2.2-5). Data compiled by the U.S. Army Corps of Engineers for the period of record 1918 – 2001 indicate that average lake water levels range from approximately 244.5 feet to 246.2 feet IGLD; minimum and maximum lake water levels during that period were approximately 241.9 feet and 248.6 feet IGLD, respectively (Ref. 2.2-6).

2.2.2 GROUNDWATER AQUIFERS AND USE

Four hydrologic units exist below the NMP site, Unlithified Sediments, Oswego Sandstone, Pulaski Formation, and Whetstone Gulf Formation, in descending order. Groundwater is available from an unconfined aquifer and deeper confined aquifers. The unconfined aquifer is composed of glacial till and fill material (Unlithified Sediments) and the upper portion of the Oswego Sandstone beneath the soil. The unconsolidated deposits rest on a permeable fractured zone at the top of the Oswego Sandstone. The Oswego Sandstone formation becomes relatively impermeable within approximately 20 feet (Ref. 2.1-2, Section 4.3.1.2.2).

Within a two-mile radius of NMP, the local water table ranges in elevation from 300 feet National Geodetic Vertical Datum (NGVD) in the southeast to the lake water level, approximately 246 feet NGVD, with annual variations of approximately two feet (Ref. 2.1-1, Section 2.4.13). The normal groundwater table in the plant complex area is approximately 255 feet NGVD. The average gradient is approximately 0.7 percent to the north-northwest (Ref. 2.1-1, Section 2.4.13; Ref. 2.1-2, Section 4.3.1).

[a] Lake elevations cited refer to the 1995 International Great Lakes Datum (IGLD), which has been integrated with the National Geodetic Vertical Datum (NGVD). The International Great Lakes Datum is used to represent water levels in the Great Lakes region, which change due to the effect of vertical crustal movement following the last Ice Age. The rate of crustal rebound varies across the region, so the shift in benchmarks is not uniform. As a result, elevations in this area have to be re-measured every 25 to 35 years (Ref. 2.2-4).

The transition zone between the Oswego Sandstone and the youngest division of the Pulaski Formation (Pulaski Unit A) is more permeable than the overlying and underlying strata, and constitutes the uppermost confined aquifer at the NMP site. Below this zone, another confined zone of relatively high permeability exists in the Pulaski Unit B strata. The Pulaski Unit C zone has a very low permeability and separates the confined Unit B zone of the Pulaski Formation from the underlying Whetstone Gulf Formation. All of these deep aquifers are confined as characterized by artesian pressure (Ref. 2.1-1, Section 2.4.13; Ref. 2.1-2, Section 4.3.1.2.2).

Groundwater recharge in the NMP site vicinity most likely occurs as a result of infiltration of precipitation and local seepage from ponds and swamps through the unconsolidated deposits and bedrock outcrops. Due to the low permeability of the surficial soils in the vicinity of the site, most of the precipitation runs off toward the Lake, leaving approximately two inches available for recharge annually. The Oswego Sandstone is recharged by seepage from the unconsolidated deposits and local outcrops located to the south and southeast of the NMP site. Recharge of the lower zones of rock beneath the surface occurs through outcrops upgradient to the NMP site, or possibly through fractures. Groundwater flow velocities in the NMP site vicinity are slow due to low hydraulic conductivities. The maximum estimated regional velocity of groundwater in the unconfined aquifer is no more than a few yards annually, based on a gradient of 0.7 percent and an assumed average permeability of 4×10^{-6} inches per second (Ref. 2.1-1, Section 2.4.13).

The unconfined water table aquifer is generally of sufficient yield capacity for domestic use only. Within two miles of NMP, groundwater wells yield an estimated five to eight gallons per minute from the unconsolidated deposits, and up to 10 gallons per minute from the lower strata (Ref. 2.1-1, Section 2.4.13).

Potable water in the area is supplied to residents either through the Scriba Water District, which receives its water from the City of Oswego, or from private wells (Ref. 2.1-9). Currently, operation of private groundwater wells in Oswego County is not regulated, nor does any agency keep a listing of all groundwater wells in the area (Ref. 2.2-7). A groundwater well census conducted in 1972 revealed the existence of approximately 102 domestic wells within two miles of NMP, but only 70 were in use. The average pumping rate of the active wells in use was 650 gallons per day. The nearest domestic well was approximately one mile from the Unit 2 Reactor Building (Ref. 2.1-1, Section 2.4.13). A review by NMPNS of aerial photographs taken in March 1995 did not reveal any residential or industrial development within one mile of NMP. Currently, the nearest residence is approximately one mile from the site (Ref. 2.1-1, Section 2.2.3.1.4). The Town of Scriba has designated the majority of the land within the one-mile radius of NMP as either Industrial (including the NMP and J.A. Fitzpatrick plants) or as a Valued Natural Resource, limiting the potential for future residential growth in the area (Ref. 2.1-8). Therefore, it is unlikely that any private groundwater supply wells have been installed significantly nearer than one mile from the NMP Reactor Buildings.

NMP is not a direct user of groundwater, and has no plans for direct groundwater use in the future. However, Unit 2 does have a permanent dewatering system, which consists of perimeter drains and two sumps located below the Reactor Building. The Unit 2 dewatering system is designed to maintain the water table below the reactor mat elevation of approximately 163.8 feet NGVD. Submersible pumps are located in each of the sumps, which together discharge groundwater at an estimated average of 200 gallons per minute to maintain the cone of depression. The water is then discharged to Lake Ontario through a storm drain system. The cone of depression surrounding the Unit 2 Reactor Building estimated to result from this dewatering is steep; the groundwater table is estimated to reach 215 feet NGVD within a radius of 200 to 225 feet of the Reactor Building (Ref. 2.1-1, Figure 2.4-14). Results of groundwater monitoring at NMP, performed in 2002 to evaluate petroleum-impacted groundwater at the former vehicle maintenance area, indicate that the groundwater table reaches approximately 254 feet NGVD within 600 feet northeast of the Reactor Building, illustrating the limited radius of influence of the dewatering operation (Ref. 2.2-8). The NRC concluded in the Unit 2 FES that the cone of depression created by the dewatering system was small and would have no effect on offsite groundwater use (Ref. 2.1-2, Section 5.3.4).

Due to the geologic conditions surrounding the Unit 1 Reactor Building, an active dewatering system was deemed unnecessary for that Unit. According to the Unit 1 Updated Final Safety Analysis Report (UFSAR) (Ref. 2.1-6, Section XVII.C.4.2), very little groundwater seeps into the Reactor Building due to the lack of open joints in the surrounding strata at depths more than 20 feet below the rock surface. Therefore, there is no need to maintain the groundwater table below normal levels around the Unit 1 reactor. The exterior of the Reactor Building below grade is provided with a peripheral drain for collecting any groundwater seepage. The drain discharges into a sump pit with two 150-gpm submersible pumps (Ref. 2.1-6, Section VI.C.2.1)

2.3 BIOLOGICAL RESOURCES

2.3.1 AQUATIC COMMUNITIES

2.3.1.1 Site Description

The NMP Site comprises approximately 900 acres and is situated approximately five miles northeast of the city of Oswego on the southeastern shore of Lake Ontario (see Section 2.1). The area is considered part of the Erie-Ontario Lowlands physiographic region and the Eastern Ontario Plain/Lake Ontario Coastal ecological zones. The topography is relatively level with rolling plains and only minor relief (Ref. 2.3-1, Section II.A.2.e; Ref. 2.3-2, Section 2.4).

Lake Ontario ranks as the twelfth largest lake in the world (based on volume) with a surface area of 7,340 square miles, of which 48 percent is within the State of New York and the remainder is within the Province of Ontario, Canada. Lake Ontario is the smallest and easternmost of the Great Lakes and receives the majority of its water from Lake Erie by way of the Niagara River. Lake Ontario drains into the St. Lawrence Seaway, located northeast of the NMP site, where the water levels in the Lake are regulated by a series of dams (Ref. 2.2-1; Ref. 2.2-3; Ref. 2.3-3).

The lake depth in the vicinity of the NMP site ranges from 0 to approximately 100 feet. The lake bottom is characterized by a series of distinct ridges, running northeast to southwest, that are part of the Rochester Basin. There is a strong resemblance between the shape of the ridges and the topography of onshore drumlin fields to the north of the Lake. In the shallow inshore areas, the combination of wind and wave energies prevents the deposition of silt and mud except in sheltered areas (Ref. 2.3-4). The shoreline of Lake Ontario in the vicinity of NMP is composed of low bluffs with slip faces of sand or cobbles, with larger stones deposited at the bottom of the slope (Ref. 2.3-1, Section II.A.3.e). The shoreline within the NMP protected area has been shielded from storm surge wave action by a dike between Unit 1 and the Lake and a revetment-ditch system which extends in front of both Units 1 and 2. The front slope of the revetment-ditch system is reinforced with dolos, concrete armor units, in front of Unit 2 and with rock armor in front of Unit 1. The backslope is constructed of rockfill, a layer of rock armor units, and granular filters. The top of the revetment has an elevation of 263 feet. A ditch located immediately south of the revetment collects rainfall runoff flowing north, and conveys it to both ends of the revetment, where it discharges to the Lake (Ref. 2.1-1, Section 2.5.5.4.2; Ref. 2.1-2, Section 4.3.1; Ref. 2.1-6, Section II.A.2.0).

2.3.1.2 Water Quality

The water quality of Lake Ontario has changed dramatically since the mid-1960s, when work began at the NMP site. Historic changes in land uses and uncontrolled pollutant discharges into all the Great Lakes had contributed to a general eutrophication of the entire lake system (Ref. 2.3-3, page 17). These nutrient-rich waters were characterized by high phosphorus concentrations and high turbidity up to the late-1970s (see 1972 data in Table 2.3-1).

Changes in selected basic water quality parameters over the past thirty years are shown in Table 2.3-1. These data were collected at the Nine Mile Point area in 1972 and 1978, the City of Oswego water intake located about eight miles southwest of the project site in 1998 and 1999, and at the Monroe County water intake in 2000, approximately 50 miles west of NMP. General reductions in pollutants such as phosphorus and dissolved solids, and in turbidity levels have been observed over the past thirty years. However, while some nutrients have decreased, nitrogen input has increased (Ref. 2.3-6).

The gradual changes in Lake Ontario's water quality have also contributed to successive changes in the biological communities of the Lake. Nutrient supplies and other environmental pressures (e.g., toxic pollutants) have also caused direct effects upon all trophic levels within the lake ecosystem (Ref. 2.3-3, page 17).

TABLE 2.3-1

SELECTED WATER QUALITY PARAMETERS OF LAKE ONTARIO, 1972-2000

	Year			
Parameter	**1972**[a]	**1978**[b]	**1998-99**[c]	**2000**[d]
pH	8.0	8.4	7.96	7.6
Total Alkalinity (mg/L)	72 – 90	94.2	92	83
Total Phosphorus (mg/L)	0.01 – 0.28	0.027	ND	ND
Total Dissolved Solids (mg/L)	107 – 186	202	ND	160
Total Nitrates (mg/L)	0.04 – 0.40	<0.18	ND	0.34
Turbidity	2 - 6 (JTU)	3.0 (NTU)	0.5 (NTU)	0.09 (NTU)

a. Source: Ref. 2.3-2.
b. Source: Ref. 2.1-4, Table 2.3-13.
c. Source: Ref. 2.1-9, Table 17-12.
d. Source: Ref. 2.3-5, pH and alkalinity data are from water distribution system and not from ambient lake water.

JTU = Jackson Turbidity Unit(s)
mg/L = milligram(s) per liter
ND = no data available
NTU = Nephelometric Turbidity Unit(s)

The largest source of pollutants, including phosphorus, into Lake Ontario is Lake Erie, via the Niagara River (Ref. 2.3-3, page 17). Additional phosphorus and nitrogen enter Lake Ontario directly through runoff from agricultural lands, urban areas, and sewage outflows. The eutrophication of Lake Ontario was recognized by Canada and the U.S. in the 1960s, and led to the bi-national Great Lakes Water Quality Agreement (GLWQA) in 1972. Since the implementation of the U.S. Clean Water Act (CWA) and the GLWQA, phosphorus levels have been significantly reduced (Ref. 2.3-6, page A-18).

Nitrogen concentrations in Lake Ontario were not considered a major cause of eutrophication in the 1960s and 1970s. However, since the 1970s, nitrogen has been increasing in Lake Ontario, as well as in all of the other Great Lakes. The causal factors are not well understood, but agricultural runoff and atmospheric deposition are considered the most likely sources (Ref. 2.3-6, pages A-18 and A-19).

Persistent, bioaccumulative, toxic chemicals (PBTs), which include mirex, polychlorinated biphenyls or PCBs, dioxins, etc., entered Lake Ontario via tributaries and historically were accumulated in the sediments. Concentrations of toxic chemicals in Lake Ontario led the International Joint Commission (IJC) to name Lake Ontario the most contaminated of the Great Lakes. Canada and the U.S. developed and implemented the “Lake Ontario Toxics Management Plan,” in 1989, to address the PBTs through regulation of the toxic chemicals’ manufacture and use (Ref. 2.3-6, page A-19). Reductions in toxic chemical concentrations in some Lake Ontario biota have been reported by the New York State Department of Environmental Conservation (NYSDEC) from the 1960s to the 1980s. The reductions have been generally attributed to restrictions placed on the manufacture and use of those chemicals. The downward trend of toxic chemical concentrations has leveled off since the 1980s and may be due, in part, to a sequestering of the toxics within the Lake’s benthic sediments. Consumption advisories for numerous fish species continue to be issued by the NYSDEC, based on concentrations of PBTs found in fish samples (Ref. 2.3-6, page A-19).

2.3.1.3 Planktonic Community

The phytoplankton communities have historically been diverse, while actual abundance of phytoplankton species has varied seasonally (Ref. 2.3-7, page 2.0-3). Historical phosphorus loadings from wastewater (sewage) treatment discharges and urban and agricultural runoff contributed to significant eutrophication of the Lake, and accompanying algal community growth, during the 1960s –1970s. The increased phyto/zooplanktonic productivity contributed to increased turbidity within the Lake during that period. Nutrient loading reductions that were a result of (U.S.) federal legislation (i.e., CWA) and the GLWQA have allowed Lake Ontario’s plankton to evolve back into a more balanced, oligotrophic community (Ref. 2.3-3, page 17; Ref. 2.3-6, page A-18).

Net productivity (photosynthesis) has declined by 18 percent and late-summer zooplankton production has been reduced by 50 percent, indicating a return to more oligotrophic conditions since the 1970s (Ref. 2.3-6, page A-18). Shifts in the phytoplankton community structure also indicate improvement in the Lake's trophic status and have closely resembled the changes in the available nutrients. However, recently invading *Dreissena* spp. mussels have caused a redistribution of a large portion of Lake Ontario's available planktonic nutrients from the water column to the benthic environment, and contributed to the measurable decrease in turbidity throughout the Lake (Ref. 2.3-8, page 11).

In summary, a number of factors—including anthropogenic impacts, invasions by non-native fish and mussel species (see Section 2.3.1.4), and the salmonid stocking programs (see Section 2.3.1.5)—have contributed to the changes in the overall water quality of Lake Ontario.

2.3.1.4 Benthic Community

The introduced zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena bugensis*) have amplified the effects of the reduced nutrient levels by filtering and clarifying the water column throughout Lake Ontario. Quagga mussels are capable of colonizing deep waters (beyond 10- to 15-foot depths) and are the dominant mussel in some areas of the Lake (Ref. 2.3-9, page 4; Ref. 2.3-10). Zebra mussels widely colonize shallower waters. The collective ability of these two invasive species to filter large quantities of water, sometimes exceeding two liters per day per individual mussel with as many as 400,000 mussels per square meter (Ref. 2.3-11, pages 416 and 442), will continue to adversely impact the availability of nutrients to pelagic organisms. While *Dreissena* spp. populations have caused a relocation of nutrients to the benthic zone of the Lake, depriving planktonic populations from these nutrients, the non-bivalve benthic invertebrate populations have benefited (Ref. 2.3-8). This sequestering of available nutrients from the water column and from the lower food chain organisms has lead to expected population shifts among the various biota levels.

The reduction in available nutrients over the past two decades, combined with the increased penetration of light and extended seasonal warm water periods, has resulted in the return and increased growth of submerged aquatic vegetation, primarily filamentous *Cladophora spp.*, in the nearshore areas. The plant provides protection and nursery areas for a number of invertebrate and fish species. However, it is also capable of becoming a nuisance by forming large floating mats when it is separated from the benthic substrate by turbulent currents and wave action. The mats occasionally wash ashore and decay, causing odor and aesthetic problems (Ref. 2.3-6; Ref. 2.3-10). Additionally, the increasing clarity of Lake Ontario water may cause a shift of some light-sensitive fish species, such as walleye, to relocate into deeper waters (Ref. 2.3-3, page 19).

2.3.1.5 Fish Community

Historically, the Lake Ontario fish community had abundant top predators offshore, such as Atlantic salmon (*Salmo salar*), lake trout (*Salvelinus namaycush*), and burbot (*Lota lota*). In the warmer nearshore waters, predator species such as yellow perch (*Perca* *flavescens*), walleye (*Stizostedion vitreum*), northern pike (*Esox lucius*), and lake sturgeon (*Acipenser fulvescens*) were in abundance. Prey species included deepwater ciscoes (*Coregonus spp.*) and deepwater and slimy sculpins (*Myoxocephalus thompsoni* and *Cottus cognatus*, respectively) in the deeper offshore areas; emerald shiner (*Notropis atherinoides*) and spottail shiner (*Notropis hudsonius*) were abundant as nearshore prey species (Ref. 2.3-3, page 11).

Notable changes to the fish community of Lake Ontario began over 100 years ago with the arrival of several invasive fish species as summarized by the Great Lakes Fishery Commission (Ref. 2.3-3; Ref. 2.3-12). Alewife (*Alosa pseudoharengus*), sea lamprey (*Petromyzon marinus*), and rainbow smelt (*Osmerus mordax*) colonized Lake Ontario probably as a result of migration through the New York State Canal System into the Lake. Sea lampreys established a reproducing population, and their parasitic feeding behavior decimated native lake trout fish stocks until the 1970s, when control measures (physical and chemical) were implemented. Alewife and rainbow smelt became overabundant by the 1960s but served as important forage species in Lake Ontario, particularly for the stocked salmon and trout, during the 1970s. The eutrophic conditions of the Lake and the abundant phytoplankton perpetuated the population growth of both the planktivorous alewife and smelt. Alewife populations decreased during the late 1990s, as the Lake's water quality conditions changed to a more oligotrophic state, causing changes in the algal community. The stocked salmonids also pressured the alewife stocks (Ref. 2.3-12).

More recent invasions of exotic fish species include the European river ruffe (*Gymnocephalus cernuus*), blueback herring (*Alosa aestivalis*), and the round goby (*Neogobius melanostomus*). Blueback herring have not become as abundant as had been expected after their entry through the New York State Canal System, although they have been found in the Oswego area. Round goby, a natural predator of *Dreissena*, has recently become established in all of the Great Lakes including Lake Ontario. They are established in Rochester, New York, approximately 50 miles to the west and have spread eastward to the Sodus, New York area, approximately 30 miles west of the Nine Mile Point site. Round Goby has been collected from northeastern Lake Ontario in the Bay of Quinte, and there was an unconfirmed report of a round goby in eastern Lake Ontario. There are no reported occurrences near NMP (Ref. 2.3-9; Ref. 2.3-13; Ref. 2.3-14; Ref. 2.3-15).

Once the sea lamprey populations were under control, Canada and the NYSDEC began lake trout restoration programs, in the mid-1970s, that were designed to reduce the alewife population. Atlantic salmon stocking was started in 1989 in another attempt to re-establish an absent predator species back into Lake Ontario. A variety of other salmonids continue to be stocked and managed through efforts of the NYSDEC and the Ontario Ministry of Natural Resources (OMNR), including rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncoryhnchus kisutch*). The salmon and trout stocking programs have supported a popular recreational fishery that has had a significant impact on the local economy, particularly in the eastern basin of Lake Ontario. Annual expenditures by anglers utilizing Lake Ontario's recreational fishery were estimated at $71 million for New York waters in 1996 (Ref. 2.3-16, page 9). Recreational fishing yield has declined in recent years, as the stocking programs appear to have balanced the predator species stocks (salmon and trout) with the less-abundant prey species (alewife and rainbow smelt). Currently the Lake Ontario Committee believes that trout and salmon abundance should be maintained to provide good quality fishing opportunities for recreational fishing without facilitating excessive predation on the alewife population (Ref. 2.3-17).

The combination of predation pressure from stocked salmon and the change in the trophic structure of the Lake resulted in marked declines of alewife and rainbow smelt by the early 1990s. The results of midwater trawls combined with acoustical transects conducted by NYDEC and Ontario Ministry of Natural Resources in Lake Ontario revealed an 80 percent reduction in the alewife population between October 1991-1994 (Ref. 2.3-18). The change in the trophic structure of the Lake toward a more benthic-oriented food web, i.e., *Dreissena* spp. colonization, and resultant decreases in open-water plankton upon which alewife feed also affect the alewife population. The population of alewife does fluctuate and has increased in some years; however, it remains lower in 2002 than in the 1980s (Ref. 2.3-13).

A decline in the rainbow smelt population has also been documented, along with a more recent shift in size distribution (Ref. 2.3-13; Ref. 2.3-18). The combination of mid-water trawls and acoustic transects resulted in lower biomass estimates for rainbow smelt than for alewife through 1995, though a slight increase in the smelt population was noted in 1996-1997. There was no indication of older smelt; the population appeared to have only one spawning age-class. The year classes now present in Lake Ontario also have much smaller age-length frequencies than in the past (Ref. 2.3-13; Ref. 2.3-18).

Currently, the Lake Ontario fish community is in a dynamic state, affected by trophic changes triggered by invasive species as well as through manipulation by agency stocking programs. An imbalance of predators and prey has resulted, with the important forage species alewife and rainbow smelt at low population levels. These lakewide fluctuations in fish populations are reflected in the entrainment and impingement monitoring results for Unit 1, described in Sections 4.2 and 4.3 of this environmental report.

2.3.2 CRITICAL AND IMPORTANT TERRESTRIAL HABITATS

As described in Section 2.1, the NMP site is located on the southeastern shore of Lake Ontario. Flora and fauna of the site are typical of the upland and wetland communities that comprise the coastal zone of Oswego County. The topography of the site is generally flat and slopes gently toward the Lake. Much of the developed portion of the site was reworked and covered with fill during the early 1940s for the Camp Oswego U.S. Military Reservation (Ref 2.1-1, Section 2.5.1.2.1). Site-specific characterizing information in this section and Section 2.3.3 was derived from studies done in the 1980s and earlier. NMPNS believes the data are representative of current conditions because no additional development has occurred on the site and land use in the site vicinity has changed little (see Section 2.6).

Wetlands occupy approximately seven percent of onsite acreage (Ref. 2.1-4, Table 2.2-1). The U.S. Fish and Wildlife Service (FWS) has mapped and typed wetlands as part of the National Wetland Inventory (NWI); state-regulated wetlands on the site have also been mapped (Ref. 2.3-19; Ref. 2.3-20). This mapped information indicates that these wetlands exist as numerous small tracts, some isolated and some associated with intermittent drainage courses, throughout much of the undeveloped portions of the site. Most wetlands areas lie in the northern and western portion of the forested tract north of Lake Road and in forested areas south of Lake Road except in the vicinity of the Firing Range (Figure 2.1-3).

These onsite wetlands consist predominantly of seasonally saturated deciduous forest interspersed with some small tracts of seasonally saturated shrub-scrub and emergent vegetation (Ref. 2.3-20). State-designated wetlands lie entirely south of Lake Road and are all designated Class II wetlands in accordance with criteria set forth in 6 NYCRR Part 664.5. Wetland communities on and in the general vicinity of the NMP site are attributable to the presence of relatively impermeable glacial till soils where perched groundwater lies at or near ground surface at least seasonally or during particularly wet years (see Section 2.2.2) (Ref. 2.3-21, Section 17.3). No formal delineation or detailed characterization of these wetlands has been conducted. NMPNS expects that the species composition of wetland communities on the NMP site is similar to that observed at the Heritage Station site located on Lake Ontario approximately two miles southwest of NMP, which exhibits comparable wetland types and edaphic conditions (see Section 2.2.2) (Ref. 2.3-20; Ref. 2.3-21, Sections 14.2.2.2 and 17.3.2.1). A detailed listing of species by community is available in the Article X Application prepared for the Heritage Station project (Ref. 2.3-21, Section 14.2).

Upland community types on the NMP site consist predominantly of forest (Figure 2.1-3), with some small oldfield and shrubland areas. Dominant plant species in these communities and wildlife species found or likely to occur onsite or in the near vicinity are detailed in the Operating License Stage Environmental Report for Unit 1 (1972) and Unit 2 (1985) (Ref. 2.3-22, Section 2.7.1; Ref. 2.1-4, Section 2.4). These terrestrial communities have been impacted in the past by land clearing activities associated with agricultural use such as cropland, pasture, and orchards; therefore, much of the area is in varying stages of succession, reverting from the previous agricultural uses to old field communities and second-growth hardwood forest (Ref. 2.1-2, Section 4.3.4.1).

Plant communities on the site were characterized through aerial photography interpretation and field studies conducted in 1979 and reported in the NMP Unit 2 Operating License Stage ER (Ref. 2.1-4, Sections 2.4.1 and 6.5). In addition to the area within the current site boundaries, these studies addressed areas associated with the neighboring James A. Fitzpatrick plant and adjacent transmission corridor, which are no longer part of the NMP site (see Figure 2.1-3).

Advanced old field and shrubland habitats remaining on undeveloped portions of the site characterized in the 1979 field studies occur primarily near Lake Road south and east of the recreational area and north of the Firing Range. Nearly all of the remaining natural plant communities on the site are forested. On the basis of the 1979 studies, woodlands west of the power block and north of Lake Road are characterized as early second-growth forest with evidence of former agricultural use (e.g., orchard). Dominant canopy species recorded in this area include white ash (*Fraxinus americana*), apple (*Malus* sp.), quaking aspen (*Populus tremuloides*), and hawthorn (*Crataegus* sp.); silky dogwood (*Cornus amomum*), arrowwood (*Viburnum dentatum*), hawthorn, juneberry (*Amelanchier* sp.) and grape (*Vitus* sp.) were noted as shrub-stratum dominants. The portion of this forested tract, west of the Recreational Area and Meteorological Tower and north of Lake Road, is apparently younger, as evidenced by a very dense shrub stratum and presence of large apple trees and a scattering of maple (*Acer.* sp) and oak (*Quercus* sp.).

Forested areas on the site south of Lake Road were characterized in the 1979 studies from sampling in the portion east of the transmission line (Ref. 2.1-4, Sections 2.4.1 and 6.5.1). The canopy in this area, characterized as mixed hardwood forest, was found to be dominated by sugar maple (*Acer saccharum*). Other components of the overstory include quaking aspen, white ash, yellow birch (*Betula alleghaniensis*), beech (*Fagus grandifolia*), and gray birch (*Betula populifolia*). Mature black cherry (Prunus serotina) and hemlock (*Tsuga canadensis*) are also present. The understory was found to be dominated by saplings of the overstory species. (Ref. 2.1-4, Section 2.4.1).

Wildlife species found on or near the site are typical of disturbed areas in the northeastern United States (Ref. 2.1-2, Section 4.3.4.1; Ref. 2.1-4, Section 2.4.1). The most common small mammals trapped in the 1979 survey of the site were the white-footed mouse (*Peromyscus leucopus*) and the deer mouse (*P. maniculatus*). Other mammals confirmed to be present as a result of these field studies included woodchuck (*Marmota monax*), meadow jumping mouse (*Zapus hudsonius*), meadow vole (*Microtus pennsylvanicus*), red squirrel (*Tamiasciurus hudsonicus*), and white-tailed deer (*Odocoileus virginianus*). Of the 40 species of reptiles and amphibians believed to inhabit Oswego County, only 21 have been observed in the coastal zone. During the 1979 survey, wood frogs (*Rana sylvatica*) were observed in the mixed hardwood forest community and leopard frogs (*Rana pipiens*) were observed in disturbed areas. The coastal zone of Oswego County supports a large number of avian species. The area is part of the Atlantic Flyway, so bird numbers and species increase with the influx of spring and fall migrants. During the winter, large numbers of waterfowl congregate along the Lake Ontario shoreline. Sixty-nine bird species were observed on and near the site during a roadside count and breeding bird census conducted in 1976 (Ref. 2.1-4, Section 2.4.1).

The transmission corridor from the Scriba to Clay substations is primarily in Oswego County with a small portion extending into Onondaga County. Forest and brushland are the major vegetation cover types that occur along the Scriba to Volney portion of the corridor. Agriculture occupies a small percentage of the land along the corridor. This contrasts with the Volney to Clay portion of the corridor where large areas of active and abandoned agricultural land, forest, and wetlands occur. Plant communities within the corridor itself, outside of developed or agricultural areas, are maintained as low-growing plant communities by Niagara Mohawk in accordance with a long-range vegetation management plan approved by the New York State Public Service Commission (see Section 3.1.4). A detailed description of the plant communities found along the Scriba to Clay corridor can be found in the Article VII Application report prepared for the Independence Station-Clay 345 kV Transmission Line Project. The Article VII Application report also includes an assessment of the wildlife species found or that could be expected to occur in the habitats along the corridor (Ref. 2.3-23, Sections 4.3 and 4.8).

There are no designated critical terrestrial habitats for endangered species in the vicinity of NMP or along the transmission corridor. However, NMPNS is aware of three areas in the vicinity of NMP or the transmission line corridor considered by NYSDEC as significant habitats. The first of these is Teal Marsh, located approximately 3.5 miles west of NMP on Lake Ontario (see Figure 2.1-2). A 250-acre scrub-shrub and forested wetland separated from Lake Ontario by a narrow barrier beach, Teal Marsh is the largest area of predominately scrub-shrub wetland in the Oswego County coastal area. The number and diversity of wildlife species utilizing the area with its interspersion of marsh and wooded uplands is unusual for Oswego County. (Ref. 2.3-21, Section 17.5.2.6). NYSDEC also considers the nearshore area of Lake Ontario between the Salmon River and the City of Oswego to be significant habitat. This area is an important non-breeding waterfowl winter concentration area used primarily by diving ducks. Species observed include Greater Scaup (*Aythya marila*), Golden Eye (*Bucephala clangula*), Merganser (*Mergus merganser*), and in lesser numbers Canvasback (*Aythya valisineria*) and Oldsquaw (*Clangula hyemalis*) (Ref. 2.1-4, Section 2.4.1.1.3.2; Ref. 2.3-23, Section 4.8.2.1 and Figure 4.7). Finally, a rich shrub fen, identified as a Rare Natural Community, is located approximately four miles south of the NMP site and approximately 0.5 miles west of the transmission corridor (Ref. 2.3-23, Section 4.8.2.1 and Figure 4-7).

2.3.3 THREATENED AND ENDANGERED SPECIES

2.3.3.1 Flora

Six plant species listed by the U.S. Fish and Wildlife Service (FWS) as threatened or endangered are indicated by FWS as potentially occurring in New York (Ref. 2.3-24); however, none of these species are likely to exist on the NMP site or along the NMP to Clay transmission corridor. None of these plant species are noted by the New York Natural Heritage Program (Ref. 2.3-25) or the FWS (see Appendix C) as having a record of occurrence in Oswego County (Ref. 2.3-25), nor were they reported from field studies on and near the NMP site in 1979 (Ref. 2.1-2, Section 4.3.5.1). One of these species, Hart's-tongue fern (*Asplenium scolopendrium var. americanum*), is noted by the New York Natural Heritage Program (Ref. 2.3-25) and the FWS (see Appendix C) as having documented occurrence in Onondaga County, into which the southern portion of the Scriba to Clay transmission corridor extends. However, no federally listed plant species were noted as occurring along the Scriba to Clay transmission corridor in the Article VII application for the Independence Station – Clay line, which utilizes this corridor (Ref 2.3-23, Section 4.8.2). In addition, recent correspondence with the FWS indicates that none of these plant species would be expected to occur on the NMP site or along the transmission corridor (see Appendix C).

There is conflicting information concerning one plant species listed as endangered by the State of New York, northern running-pine (*Lycopodium complanatum*) (Ref. 2.3-26). It was recorded as occurring on the Unit 2 site or environs during the 1979 field study (Ref. 2.1-4, Table 2.4-1). However, the New York Natural Heritage Program's Rare Plant Status List includes no historical record of occurrence in Oswego County for this species and Oneida is the closest county with confirmed occurrence (Ref. 2.3-25). At the time of the 1979 survey, three other plants found on or near the site were listed as protected: Christmas fern (*Polystichum archostichoides*), New York fern (*Thelypteris noveboracensis*), and trillum (*Trillium* sp.). These plants were listed because they were attractive, but they were not considered endangered or threatened in New York State at the time (Ref 2.1-2, Section 4.3.5.1). Christmas fern, New York fern, and several species of trillium remain protected as vulnerable to exploitation under the state Environmental Conservation Law (Section 9-1503). However, only two trillium species, nodding trillium (*T. flexipes*) and toad-shade (*T. sessile*) are state-listed under this statute as either threatened or endangered. Both of these species are listed as endangered; however, neither is known to occur in Oswego County. (Ref. 2.3-25; Ref. 2.3-26).

An additional indication of federal or state-listed threatened or endangered plant species that have some potential for occurrence on the NMP site is provided by the assessment done in 1991 and 1999 for the Heritage Project site, approximately two miles to the southwest on Lake Ontario. That assessment included a screening of all protected plant species reported from Oswego County, and determined that habitats suitable for these species could be grouped in four categories: sandy shores and dunes, dry sandy woods, limestone and calcareous cliffs; bogs; and quiet water or muds of swamps and stream banks. Only the latter habitat, represented by swamps and wet woods, are present on the Heritage site. NMPNS considers the results of the Heritage site surveys to be indicative of occurrence potential for threatened and endangered plant species on the NMP site because the potentially compatible habitat types present are essentially the same at both sites (i.e., swamps and wet woods). On that basis, three plant species currently designated as threatened or endangered were specifically indicated as having the most potential to occur: angled spikerush (*Eleocharis quadrangulata*), blunt spikerush (*Eleocharis obtusa var. ovata*), and slender bulrush (*Scirpus heterochaetus*), all of which are currently state-listed as endangered. However, none of these species were found during field surveys of the Heritage Project site (Ref. 2.3-21, Section 14.4), nor were they reported from the 1979 survey of the NMP Unit 2 site (Ref. 2.1-4, Table 2.4-1).

In recent correspondence, two species of concern were identified by the New York Natural Heritage Program as historically present in the region (Brewerton, New York), hoary puccoon (*Lithosperimum canescens*) and swamp smartweed (*Polygonum setaceum var interjectum*) (Appendix C).

The hoary puccoon is listed by the New York Natural Heritage Program as unprotected and the swamp smartweed is listed as endangered. Neither species was found during the field surveys of the Heritage Project site (Ref. 2.3-21, Section 14.4) or the 1979 survey of the NMP Unit 2 site (Ref. 2.1-4, Table 2.4-1).

2.3.3.2 Fauna

Twenty animal species listed as federally threatened or endangered are indicated by the U.S. Fish and Wildlife Service (FWS) as potentially occurring in New York State (Ref. 2.3-24). One additional animal species, the eastern massasauga rattlesnake (*Sistrurus catenatus*) is designated by the FWS as a candidate for federal listing with potential for occurrence in the state (Ref. 2.3-27). However, based on NYSDEC range and habitat information (Ref. 2.3-28), only the following species have any reasonable potential to occur in Oswego or Onondaga Counties: Indiana bat (*Myotis sodalis*) and Piping Plover (*Charadrius melodus*), both federally listed as endangered; bog turtle (*Clemmys muhlenbergii*) and Bald Eagle (*Haliaeetus leucocephalus*), both federally listed as threatened; and possibly the massasauga rattlesnake. However, recent correspondence from the FWS indicates that none of these species, with the exception of occasional transient individuals, are likely to occur on the NMP site or along the NMP – Clay transmission corridor (see Appendix C). This determination confirms previous findings for the NMP site (Ref. 2.1-2, Section 4.3.5.1) and the Scriba-to-Clay transmission corridor (Ref. 2.3-23, Section 4.8.2). Potential transient species protected at the federal level that have potential to occur in the vicinity of the site or transmission line corridor based on range information provided by the FWS (Appendix C) and NYSDEC (Appendix C) are the Indiana bat, Bald Eagle, and Piping Plover. However, no federal endangered, threatened, or candidate species have been reported to have been observed or collected in assessments or field studies of the NMP site, associated transmission corridor, or nearby Heritage power plant site, located approximately two miles west of NMP (Ref. 2.1-2; Ref. 2.3-21; Ref. 2.3-23).

Potential for occurrence in the general vicinity of the NMP site and associated transmission line corridor to the Clay Substation of additional protected animal species that are listed as endangered, threatened, or of special concern on the state level is provided by recent information from the New York Natural Heritage Program (Appendix C), range and habitat information accessible from NYSDEC (Ref. 2.3-28), previous assessments conducted for NMP (Ref. 2.1-2; Ref. 2.1-4) and the transmission corridor (Ref. 2.3-23), and a recent assessment conducted for the proposed Heritage Station site, which features similar habitats to those found on the NMP site, as discussed in Section 2.3.3.1 (Ref. 2.3-21).

Current state-listed endangered species recognized in previous studies at NMP, the associated transmission corridor, and the Heritage Plant site as having potential for occurrence in the general vicinity, exclusive of species now thought to be locally extirpated, include the Golden Eagle (*Aquila chrysaetos*) and Peregrine Falcon (*Falco peregrinus*), Loggerhead Shrike (*Lanius ludovicianus*), Black Tern (*Chlidonias niger*), and Short-eared Owl (*Asio flammeus*). The Golden Eagle, Peregrine Falcon, and Short-eared Owl would be expected to occur only as transient species in the area (Ref. 2.1-4, Table 2.4-8; Ref. 2.3-28). This is likely to be the case also for the Black Tern, considering the paucity of breeding habitat at the NMP site (Ref. 2.3-29) and for the Loggerhead Shrike, which has not been observed to nest in the state since the 1980s (Ref. 2.3-28). None of these species were noted as having been observed in the area by the New York Natural Heritage Program or in assessment reports for NMP, the associated transmission line corridor, or the Heritage Site (Ref. 2.1-4; Ref. 2.3-21; Ref. 2.3-23; Appendix C).

Some potential reportedly exists for occurrence of the state-endangered deepwater sculpin (*Myoxocephalus thompsoni*) in Lake Ontario in the site vicinity; however, it is a deepwater species (Ref. 2.3-28). Neither this species or any other state-listed endangered aquatic species has been collected in the extensive lake sampling and impingement monitoring efforts at NMP or the nearby J.A. Fitzpatrick Plant and Oswego Steam Station through 1981 (Ref. 2.1-4, Section 2.4.2.1.6; Ref. 2.3-7, Table 2.1.6-1) or subsequent impingement and entrainment monitoring at NMP Unit 1, which was conducted through 1997 (Ref. 2.3-30; Ref. 2.3-31).

Current state-listed threatened species recognized in previous studies at NMP, the associated transmission corridor, and the Heritage Plant site as having potential for occurrence in the general area, exclusive of species now thought to be locally extirpated, include six bird species, all of which reportedly breed in the Oswego County coastal zone: Pied-billed Grebe (*Podilymbus podiceps*), Least Bittern (*Ixobrychus exilis*), Northern Harrier (*Circus cyaneus*), Upland Sandpiper (*Bartramia longicauda*), Common Tern (*Sterna hirundo*), Sedge Wren (*Cistothorus platensis*), and Henslow's Sparrow (*Ammodramus henslowii*) (Ref. 2.1-4, Table 2.4-8; Ref. 2.3-21, Section 14.5.2). It is unlikely that any of these species nest on the NMP site, based on available habitat (see Section 2.3.3.1). The New York Natural Heritage Program identified Least Bittern and Pied-billed Grebe as occurring at Teal Marsh 3.5 miles west of NMP (Appendix C). Neither species was documented as occurring during the field surveys of the Heritage Project site (Ref. 2.3-21, Table 14.4) or the 1979 survey of the NMP Unit 2 site (Ref. 2.1-4, Table 2.4-1). Both species utilize marsh habitat (Ref. 2.3-29), little of which is present on the NMP site. The Common Tern is a colonial breeder known to utilize a variety of open shoreline habitats (Ref. 2.3-28) but has not been observed to breed at the site. The Upland Sandpiper prefers upland fields, the Henslow's Sparrow is found in wet, shrubby fields and weedy meadows, and the Sedge Wren is found in wet, grassy meadows or shallow sedge marshes (Ref. 2.3-29); the Northern Harrier breeds in marshes, grasslands, meadows, and cultivated fields (Ref. 2.3-28). These open habitats are sparse or absent on the NMP site (see Section 2.3.3.1). Open habitat potentially suitable for these latter four species is more likely to occur along the transmission line corridor. However, none of these bird species were reported from field surveys of the NMP site or the nearby Heritage site (Ref. 2.1-4, Table 2.4-11; Ref. 2.3-21, Table 14-4). A specific assessment conducted in connection with the Article VII application for the Independence-Clay transmission line concluded that the Northern Harrier is the only state-listed threatened or endangered bird species considered to have reasonable potential for occurrence along the transmission corridor (Ref. 2.3-23, Section 4.8.2.2).

The timber rattlesnake (*Crotalus horridus*), a state-listed threatened species that was identified in the NMP Unit 2 ER (Ref. 2.1-4) as likely to occur on the NMP site or environs, has been found more recently not to have reasonable occurrence potential (Ref. 2.1-2, Section 4.3.5.1). Two state-listed threatened fish species, the lake sturgeon (*Acipenser fulvescens*) and lake chubsucker (*Erimyzon sucetta*), have some potential to occur in Lake Ontario in the NMP site vicinity, based on range information from NYSDEC (Ref. 2.3-28) and previous NMP environmental assessment (Ref. 2.1-4, Section 2.4.2.1.6 and Table 2.4-16). A single lake chubsucker was taken in a 1975 sample obtained during the summer at the mouth of the Salmon River, some eight miles east-northeast from the NMP site. It was the only state-listed threatened or endangered aquatic species that was collected either in lake sampling or in impingement sampling at the NMP Unit 1, Fitzpatrick, or Oswego power plants through 1981 (Ref. 2.1-2, Section 4.3.5.2; Ref. 2.3-7, Table 2.1.6-1). No state-listed threatened aquatic species have been collected in subsequent monitoring at NMP (Ref. 2.3-30; Ref. 2.3-31).

Several species designated as Species of Special Concern by New York State (Ref. 2.3-28) have some potential to occur in the general vicinity of the NMP site or associated transmission corridor based on range information from previous assessments of the NMP site (Ref. 2.1-4) and Heritage site (Ref. 2.3-21), and from other sources (e.g., Refs. 2.3-28 and 2.3-29). These include three species likely to occur as transients: Common Loon (*Gavia immer*), Osprey (*Pandion haliaetus*), and small-footed bat (*Myotis leibii*) (Ref. 2.1-4, Table 2.4-8; Ref. 2.3-21, Section 14.5.2; Ref. 2.3-28).

Amphibians and reptiles currently listed by New York state as species of Special Concern that were noted as likely to occur in the vicinity of the NMP Unit 2 site or the Heritage site include Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*A. laterale*), spotted turtle (*Clemmys guttata*), and wood turtle (*C. insculpta*) (Ref. 2.1-4, Table 2.4-13; Ref. 2.3-21, Section 14.5.2). Avian species of Special Concern that may breed in the general vicinity of the site or transmission line corridor and noted in previous assessments of the NMP site or Heritage site include Red-shouldered Hawk (*Buteo lineatus*), Sharp-shinned Hawk (*Accipiter striatus*), Cooper’s Hawk (*A. cooperii*), Common Nighthawk (*Chordeiles minor*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Horned lark (*Eremophila alpestris*), Golden-winged Warbler (*Vermivora chrysoptera*), Cerulean Warbler (*Dendroica cerulea*), Vesper Sparrow (*Pooecetes gramineus*), and Grasshopper Sparrow (*Ammodramus savannarum*) (Ref. 2.1-4, Table 2.4-8; Ref. 2.3-28).

Species of Special Concern that are most likely to occur on the NMP site and the transmission line corridor are indicated by results of previous field surveys reported for NMP and the nearby Heritage Site, which exhibits similar habitat to that present on the NMP site (Ref. 2.1-4; Ref. 2.3-21, Section 14.5.2). Using the latter study as an indicator, those most likely to occur on the NMP site include the Red-shouldered Hawk, Jefferson salamander, and blue-spotted salamander, all of which are associated with wet woodlands; and the Grasshopper Sparrow and Vesper Sparrow, which inhabit open fields and thus more likely to be found along the transmission corridor. The only Special Concern species reported from the Heritage site was the Osprey, which was observed in 1991 as a spring migrant (Ref. 2.3-21, Table 14-4). The only Special Concern terrestrial species observed during NMP monitoring were the Cerulean Warbler and Golden-winged Warbler, both observed in the general site area during 1976 field surveys (Ref. 2.1-4, Table 2.4-11). The Cerulean Warbler inhabits wet woodlands (Ref. 2.3-29), which occur on the NMP site. The Golden-winged Warbler is a ground nester found in overgrown pastures and briery woodland borders (Ref. 2.3-29), and would likely be expected to occur on or near the transmission corridor. NMPNS is aware of only one Special Concern aquatic species collected in aquatic monitoring studies associated with NMP, the redfin shiner (*Lythrurus umbratilis*; formerly *Notropis umbratilis*), which was reported only in 1975 (Ref. 2.3-7, Table 2.1.6-1).

2.4 METEOROLOGY AND AIR QUALITY

The NMP site is located in north-central New York State on the southeastern shoreline of Lake Ontario. The prevailing climate is characterized as humid continental and the Lake has a pronounced effect on the region. Cold, dry air masses moving south from the continental interior dominate in the winter months, and warm, moist air masses from the south and southwest prevail from late-spring through early-fall. The region is subject to frequent frontal passages and changes in weather, especially during the winter. These storm tracks, combined with the effect of the Great Lakes, result in the cloudy climate characteristic of the region from late-fall through spring. The influence of Lake Ontario is most apparent during the spring through late-summer, when lake breezes occur in the immediate vicinity of the lakeshore, and in late-fall and winter when heavier snowfall occurs in the region along the southern shore. Throughout the year, the presence of the Lake affects both temperatures and precipitation in the region. Temperature extremes are suppressed in that fall and winter months have warmer minimum daily temperatures, and spring and summer months have cooler maximum daily temperatures. Precipitation tends to be somewhat lower adjacent to the Lake as compared to inland areas in the summer months and greater in the winter months. Wind speeds also tend to be higher in shoreline areas as compared to inland areas as a result of the long fetch over the Lake and the reduced surface roughness of the Lake compared to the surrounding land surface (Ref. 2.1-1, Section 2.3.1).

The National Weather Service station at Hancock International Airport, north of Syracuse, is the closest and most representative Weather Service Station to the NMP site (Ref. 2.1-1, Section 2.3.1). According to the Northeast Regional Climate Center, the normal minimum and maximum daily temperatures in January are 14°F and 31°F, respectively. The normal minimum and maximum daily temperatures in July are 59°F and 82°F, respectively. Normal precipitation averages 39 inches annually, with the greatest average amount falling in July (3.81 inches). Snowfall averages 115 inches annually, with the greatest average amount falling in January (30 inches) (Ref. 2.4-1).

NMP is not located in an area designated by the U.S. Environmental Protection Agency as a maintenance area or an area of nonattainment. The nearest area of nonattainment is Jefferson County, which is classified as marginal for ozone. Onondaga County, where Syracuse is located, is a maintenance area for carbon monoxide and classified as moderate, i.e., less than or equal to 12.7 parts per million (Ref. 2.4-2).

2.5 DEMOGRAPHY

In this section, NMPNS describes demographic characteristics of the area within 50 miles of NMP. NMPNS uses 2000 U.S. census data and 1996 Canadian census data for the population classification determination presented in Section 2.5.1 and the determination of minority populations in Section 2.5.2.

2.5.1 GENERAL DEMOGRAPHY

The NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) presents a population classification method using degrees of "sparseness" and "proximity" to characterize the remoteness of the area surrounding a site. Sparseness measures population density and city size within 20 miles of a site; proximity measures population density and city size within 50 miles (Ref. 2.5-1, Section C.1.4). The NRC's model for categorizing population by sparseness and proximity measures, as presented in the GEIS, is shown below:

	Category	
Sparseness		
Most sparse	1.	Fewer than 40 persons per square mile and no community with 25,000 or more persons within 20 miles
	2.	40 to 60 persons per square mile and no community with 25,000 or more persons within 20 miles
	3.	60 to 120 persons per square mile or fewer than 60 persons per square mile with at least one community with 25,000 or more persons within 20 miles
Least sparse	4.	Greater than or equal to 120 persons per square mile within 20 miles
Proximity		
Not in close proximity	1.	No city with 100,000 or more persons and fewer than 50 persons per square mile within 50 miles
	2.	No city with 100,000 or more persons and between 50 and 190 persons per square mile within 50 miles
	3.	One or more cities with 100,000 or more persons and fewer than 190 persons per square mile within 50 miles
In close proximity	4.	Greater than 190 persons per square mile within 50 miles

Source: Ref. 2.5-1.

The NRC uses the following matrix to rank the population category as low, medium, or high:

		Proximity			
		1	2	3	4
Sparseness	1	1.1	1.2	1.3	1.4
	2	2.1	2.2	2.3	2.4
	3	3.1	3.2	3.3	3.4
	4	4.1	4.2	4.3	4.4

Low Medium High

Source: Ref. 2.5-1, page C-6.

NMPNS used U.S. Census Bureau Year 2000 data (Ref. 2.5-2) and geographic information system software (ArcView®) to determine demographic characteristics in the NMP vicinity at the block group level. NMPNS estimated 109,440 persons live within 20 miles of NMP, which equals a population density of 87 persons per square mile within 20 miles. NMP falls into Category 3 of the NRC's GEIS sparseness classification. There are an estimated 914,668 persons living within 50 miles of NMP. This equates to a population density of 117 persons per square mile within 50 miles. Since Syracuse is the largest city within 50 miles of the site and has a total population well over 100,000 persons, NMP falls into Category 3 (one or more cities with 100,000 or more persons and fewer than 190 persons per square mile within 50 miles) of the GEIS proximity classification. According to the NRC's GEIS sparseness and proximity matrix, NMP's sparseness Category 3 and proximity Category 3 indicate that NMP is in a medium population area.

All or parts of 10 counties in New York (Cayuga, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, Ontario, Seneca, and Wayne) and portions of three Canadian Census divisions located in the Province of Ontario (Prince Edward, Frontenac, and Addington and Lennox) lie within the 50-mile radius of NMP. There are three Metropolitan Statistical Areas (MSAs) located at least partially within a 50-mile radius of NMP. The Syracuse MSA, which includes the Counties of Onondaga, Oswego, and Madison, is the 60th most populated MSA with an estimated Year 2000 Census population of 732,117 persons. Both the Utica-Rome MSA and the Rochester MSA lie partially within NMP's 50-mile radius. The Utica-Rome MSA comprises Oneida and Herkimer Counties and is the 132nd most populated MSA, with an estimated Year 2000 Census population of 299,896 persons (Note: Herkimer County falls outside the 50-mile radius of the NMP site). The Rochester MSA comprises five New York counties, but only Wayne County is within 50 miles of the NMP site. With an estimated Year 2000 Census population of 1,098,201 persons, the Rochester MSA is the 47th most populous (Ref. 2.1-1, Section 2.1.3.2; Ref. 2.5-3).

In New York State, counties are subdivided into towns, which have jurisdiction over all unincorporated lands within the county. The NMP site is located on the southeastern shore of Lake Ontario in Oswego County, a diverse area composed of small suburban and rural communities. Much of the population lives in unincorporated, rural portions of the county (Ref. 2.3-1). The largest city in Oswego County is the City of Oswego, located approximately five miles southwest of NMP. The City of Oswego has an estimated Year 2000 Census population of 17,954 persons. The City of Fulton, located approximately 12 miles south of the NMP site, is the second largest municipality in Oswego County with an estimated Year 2000 Census population of 11,855 persons. The NMP site is located within the Town of Scriba, which has an estimated Year 2000 Census population of 7,331 persons. The U.S. Census Bureau lists 22 other towns in Oswego County, all of which have populations between 500 and 9,000 persons. The population in Oswego County is relatively young. The median age in the county is 35.0 years, compared to a median age of 36.3 years for Onondaga County and 35.9 years for the State of New York (Ref. 2.5-4).

Syracuse is the largest city within the 50-mile radius of the NMP site. Located in Onondaga County, Syracuse is approximately 33 miles south-southeast from the NMP site. Populations have declined in Syracuse in recent years, and in Onondaga County as a whole (see Table 2.5-1). Syracuse had an estimated Year 2000 Census population of 147,306 persons, down from the 1990 population of 163,860 persons. Some towns and municipalities surrounding Syracuse have had modest growth. Since 1980, a majority of the growth has occurred in the northern towns of Clay (Year 2000 Census population 58,805 persons), Cicero (Year 2000 Census population 27,982 persons), and Lysander (Year 2000 Census population 19,285 persons), as well as the eastern town of Manluis (Year 2000 Census population 31,872 persons). In southern Onondaga County, the Onondaga Reservation had an estimated Year 2000 Census population of 1,473 persons. Local planning officials estimate that the northern towns of Clay, Cicero, and Lysander will continue to grow in the near future (Ref 2.5-4; Ref. 2.5-5).

Area colleges and universities attract thousands of students to the region. Approximately 10,700 under-graduate and 4,800 graduate students from across the U.S. and over 100 foreign countries attend the Syracuse University. The State University of New York has campuses in both Syracuse and Oswego with enrollments of 954 and 7,000 full-time students, respectively (Ref. 2.3-1; Ref. 2.5-6; Ref. 2.5-7, Table 3).

TABLE 2.5-1

ESTIMATED POPULATIONS AND ANNUAL GROWTH RATES IN ONONDAGA AND OSWEGO COUNTIES FROM 1980 TO 2030

	Onondaga		Oswego	
Year	Population[a]	Percent[b]	Population[a]	Percent[b]
1970	472,835	--	100,897	--
1980	463,920	-0.2	113,901	1.2
1990	468,973	0.1	121,771	0.7
2000	458,336	-0.2	122,377	0.05
2010	442,531	-0.4	123,400	0.08
2020	423,235	-0.4	123,591	0.02
2030	398,596	-0.6	121,834	-0.1
2040	375,316	-0.6	120,621	-0.1

a. Source: Years 1970 through 1990, Ref. 2.5-9; Year 2000, Ref. 2.5-4; Years 2010 through 2030, Ref. 2.5-10; Year 2040 is a projection using previous decade's rate of growth.

b. Annual percent growth rate calculated using the equation $N_{[t]} = N_{[o]} (1+r)^t$ where N is population, t is time in years, and r is the annual growth rate expressed as a decimal.

Approximately 96 percent of NMP employees live in Oswego and Onondaga Counties (see Section 3.4.1 for workforce description). Table 2.5-1 presents decennial population estimates and annual growth rates for Oswego and Onondaga Counties.

Small daily and seasonal fluctuations in regional population occur due to the number of colleges and recreational facilities that attract visitors (see Section 2.1). Temporary housing for seasonal, recreational, or occasional use is relatively strong in Oswego County, accounting for 6.6 percent of all housing units. By comparison, temporary housing accounts for only 1.0 percent and 3.1 percent of total housing units in Onondaga County and the State of New York, respectively (Ref. 2.5-4). Onondaga and Oswego Counties host relatively small numbers of migrant workers. According to 1997 Census of Agriculture estimates, 749 and 565 temporary farm laborers (less than 150 days of employment) were employed in Onondaga and Oswego Counties, respectively (Ref. 2.5-8).

2.5.2 MINORITY AND LOW-INCOME POPULATIONS

2.5.2.1 Minority Populations

Demographic data were compiled in Census 2000 to the block group level for the following minority categories: Black or African American, American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Other Single Race, Two or More Races, and Hispanic or Latino origin (Ref. 2.5-2). In addition to these groups, NRC guidance also states that the minority population as a whole (aggregate minority category) should be included in the license renewal environmental impacts analysis. The minority percentage is calculated by aggregating all minority individuals in the block group (Ref. 2.5-11).

The minority population determination for the NMP license renewal environmental review includes an evaluation of the six racial minority categories used in the Year 2000 Census, along with the Hispanic or Latino ethnicity and the aggregate minority categories, as instructed by the NRC.

The NRC guidance (Ref. 2.5-11) specifies that a minority population exists in either of the following cases:

Exceeds 50 Percent – the minority population of the census block group or environmental impact site exceeds 50 percent or

More than 20 Percentage Points Greater – the minority population percentage of the census block group or the environmental impact site is significantly greater (typically at least 20 percentage points) than the minority population percentage in the geographic area chosen for comparative analysis.

An NMP 50-mile radius, drawn from the centerpoint midway between Unit 1 and Unit 2, was used in this analysis to define the environmental impact site. Census block groups with greater than 50 percent of their area located outside the 50-mile radius, as defined above, were not included in the analysis. The 50-mile radius from NMP encompasses all or part of 10 counties (see Figure 2.1-1). The geographic area for comparative analysis consists of each county with at least one census block group located within the 50-mile radius. The population demographic data from these counties were added together to derive average regional numbers for both the aggregate minority population and each minority category for comparison (see Table 2.5-2).

The percentage of each minority group in an individual census block group was calculated using the following:

[minority group population/ total population] * 100

To calculate the aggregate minority population in an individual census block group, the populations of each of the six minority groups (Black or African American, American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Other Single Race, and Two or More Races), and the Hispanic or Latino ethnicity designation were

TABLE 2.5-2

NUMBER OF CENSUS BLOCK GROUPS WITH MINORITY AND LOW-INCOME POPULATIONS WITHIN THE 50-MILE RADIUS OF NMP

									Low-Income	
	Black or African American	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian and Other Pacific Islander**	**Other Single Race**	**Two or More Races**	**Hispanic and Latino**	**Aggregate Minority**	**NRC Criteria**	**NYSDEC Criteria**
Regional Percent[a]	**5.5**	**0.51**	**1.20**	**0.03**	**0.92**	**1.50**	**2.40**	**10.8**	**11.70**	**11.70**
Threshold for Minority Population[b]	**25.5**	**20.5**	**21.2**	**20.0**	**20.9**	**21.5**	**22.4**	**30.8**	**31.7**	**23.59[c]**
County										
Cayuga	1	0	0	0	0	0	1	1	4	8
Jefferson	1	0	0	0	0	0	0	8	2	6
Lewis	0	0	0	0	0	0	0	0	0	0
Oswego	0	0	0	0	0	0	0	0	3	10
Oneida	1	0	0	0	0	0	0	1	0	0
Madison	0	0	0	0	0	0	0	0	0	3
Onondaga	58	1	2	0	0	0	6	72	46	72
Seneca	0	0	0	0	0	0	0	0	0	1
Ontario	0	0	0	0	0	0	0	0	0	0
Wayne	0	0	0	0	0	0	0	0	0	0
Total	**61**	**1**	**2**	**0**	**0**	**0**	**7**	**82**	**55**	**100**

Source: Census 2000 Summary Files 1(SF1) and 3(SF3) for New York (Ref. 2.5-2; Ref. 2.5-13).

a. Regional percent calculated using the summary data from each county with at least one block group located within the 50-mile radius.

b. At least 20 percentage points greater than the regional percent.

c. Low-income community threshold established by the NYSDEC (Ref. 2.5-12).

added together and used in the above equation. Since Hispanics and Latinos may be of any race, and therefore are included within the other racial categories, only the number of persons identified as white Hispanic or Latino was used in the calculation of the aggregate minority population.

The New York State Department of Environmental Conservation (NYSDEC) issued a policy, CP-29 Environmental Justice and Permitting, in March 2003 (Ref. 2.5-12). The policy provides criteria for identifying minority and low-income communities. The policy defined a minority community as a census block group or contiguous area with multiple census block groups, having a minority population equal to or greater than 51.1 percent in an urban area and 33.8 percent in a rural area of the total population. Minority populations identified in the policy include Hispanic, African-American or Black, Asian, and Pacific Islander, and American Indian. All of the threshold numbers established on the basis of the NRC criteria described above, for each minority group covered by the NYSDEC policy, were 25.5 percent or lower (see Table 2.5-2). Also, the NRC identifies more racial categories by including other single race, two or more races, and aggregate minority. Therefore, census block groups identified using the NRC criteria would also include those meeting the standards included in the NYSDEC policy.

Census 2000 data to the block group level from New York were analyzed to determine which block groups meet either or both of the NRC's criteria (exceed 50 percent or more than 20 percentage points greater). The NMP 50-mile radius includes 729 census block groups. Table 2.5-2 shows the number of census block groups with a minority population in each county, and the threshold values for determining if a minority population exists. The threshold values were calculated using the "greater then 20 percentage points" criterion and the results of the regional area comparison.

There were no census block groups with a minority population of Native Hawaiian or other Pacific Islander, Other Single Race, or Two or More Races within the 50-mile radius of NMP. There were a total of 82 census block groups with an aggregate minority population (see Figure 2.5-1).

For the individual minority categories,

- 61 census block groups had a minority population of Black or African Americans (see Figure 2.5-2 and Table 2.5-2),
- 2 census block groups had a minority population of Asians (see Figure 2.5-3 and Table 2.5-2),
- 1 census block group had a minority population of American Indians and Alaska Natives (see Figure 2.5-4 and Table 2.5-2), and
- 7 census block groups had a minority population of Hispanic or Latino ethnicity (see Figure 2.5-5 and Table 2.5-2).

Onondaga County has 58 block groups with a Black or African American minority population, and Cayuga, Jefferson, and Oneida Counties each have one block group with a Black or African American minority population (see Table 2.5-2).

Onondaga County is the only county within the 50-mile radius of NMP to have block groups with an Asian minority population (2 block groups) and the only county to have a block group with a Native American and Alaska Native minority population (one block group).

Onondaga County has six block groups with a Hispanic or Latino ethnicity, and Cayuga County has one block group with a Hispanic or Latino ethnicity.

Seventy-two of the 82 census blocks groups with an aggregate minority population were located in Onondaga County. Jefferson County had eight block groups with an aggregate minority population, and Cayuga and Oneida Counties each had one census block group with an aggregate minority population.

Onondaga County is home to both the Onondaga Indian Reservation and the City of Syracuse. The only block group within the NMP 50-mile radius with a Native American and Alaska Native minority population is located on the Onondaga Indian Reservation. Many of the other block groups with minority populations within the 50-mile radius of NMP are located within Syracuse, typical for an urban center with a high population density.

2.5.2.2 Low-Income Populations

Information about the percentage of low-income households within the 50-mile radius of NMP was compiled in Census 2000 to the block group level (Ref. 2.5-13). The NRC guidance (Ref. 2.5-11) specifies that a low-income population exists in either of the following cases:

> Exceeds 50 Percent – the percentage of households below the poverty level in the census block group or environmental impact site exceeds 50 percent or
>
> More than 20 Percentage Points Greater – the percentage of households below the poverty level in the census block group or environmental impact site is significantly greater (typically at least 20 percentage points) than the percentage of households below the poverty level in the geographic area chosen for comparative analysis.

An NMP 50-mile radius, drawn from the centerpoint midway between Unit 1 and Unit 2, was used in this analysis to define the environmental impact site. Census block groups with greater than 50 percent of their area located outside the 50-mile radius, as defined above, were not included in the analysis. The 50-mile radius from NMP encompasses all or part of 10 counties (see Figure 2.1-1). The geographic area for comparative analysis consists of each county with at least one census block group located within the NMP 50-mile radius. The percentages of households below the poverty level from these counties were added together to derive average regional numbers for comparison (see Table 2.5-2).

Data for both the total number of households and the number of households with an income below the poverty level were obtained for each census block group within the 50-mile radius of NMP. The number of households below the poverty level in each census block group was then calculated as a percentage using the following:

[households below poverty/ total households] * 100

Any census block group with a percentage of households below the poverty level greater than 31.7 percent (see Table 2.5-2) was considered a low-income population in this assessment.

A total of 55 census block groups within the 50-mile radius of NMP meet the criteria for low-income populations (see Table 2.5-2). The majority of the census block groups with a low-income population were located in Onondaga County (46 block groups with a low income population) in the City of Syracuse. Three other counties—Cayuga, Jefferson, and Oswego—each had less than five census blocks with a low-income population (see Table 2.5-2 and Figure 2.5-6).

NYSDEC's policy, CP-29, defines low-income communities as a block group or contiguous area with multiple census block groups having a low-income population equal to or greater than 23.59 percent of the total population (Ref. 2.5-12). This criteria is less stringent than the NRC criteria.

A total of 100 census block groups within the 50-mile radius of NMP meet the NYSDEC criteria for low-income populations (Table 2.5-2). The majority of the census block groups with a low-income population were located in Onondaga County (72 block groups with a low-income population) in the city of Syracuse. Five other counties – Cayuga, Jefferson, Oswego, Madison, and Seneca – each had ten or fewer census blocks with a low-income population (Table 2.5-2; Figure 2.5-7).

SECTION 2.5 FIGURES

FIGURE 2.5-1

AGGREGATE MINORITY POPULATION

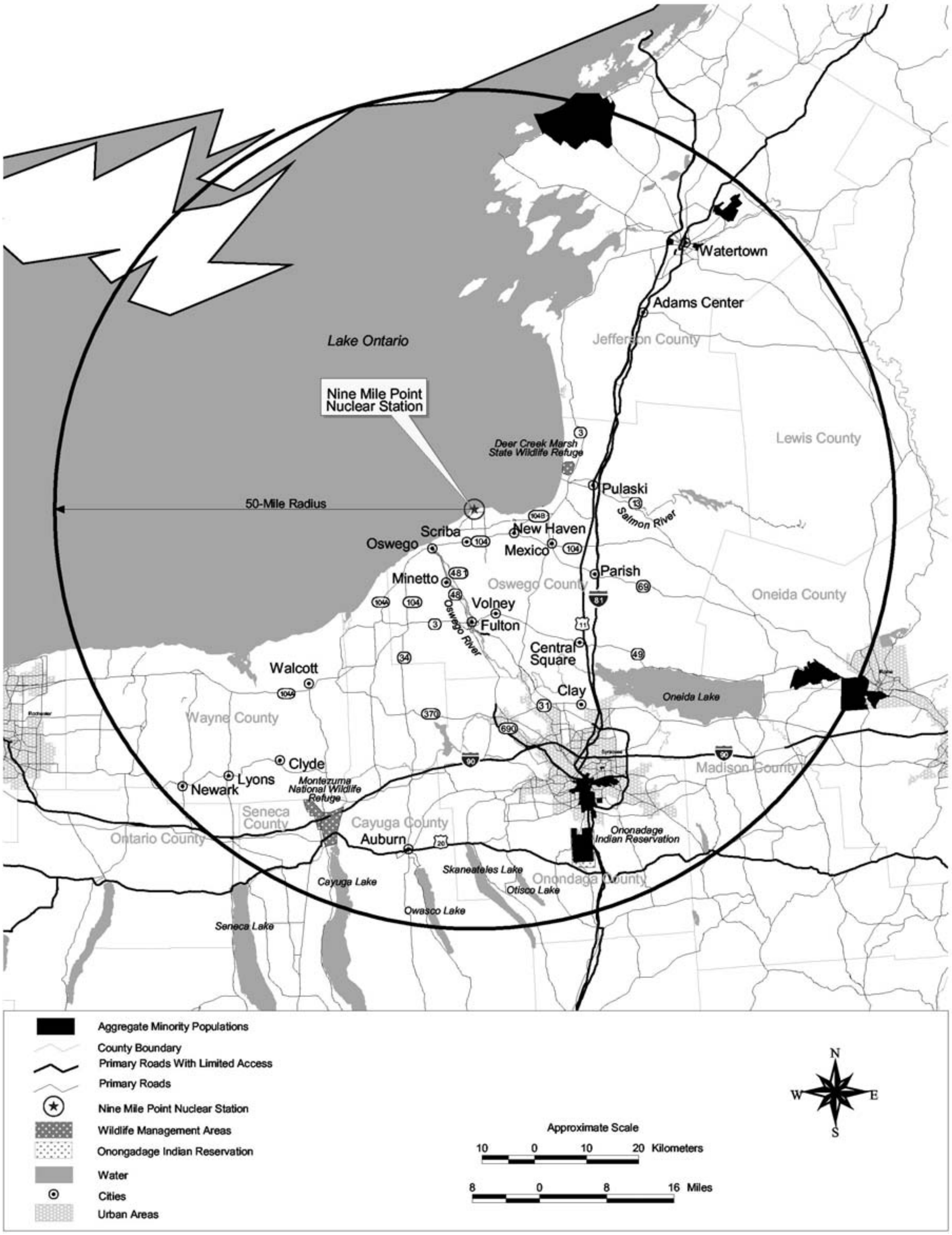


FIGURE 2.5-2

BLACK OR AFRICAN AMERICAN MINORITY POPULATION

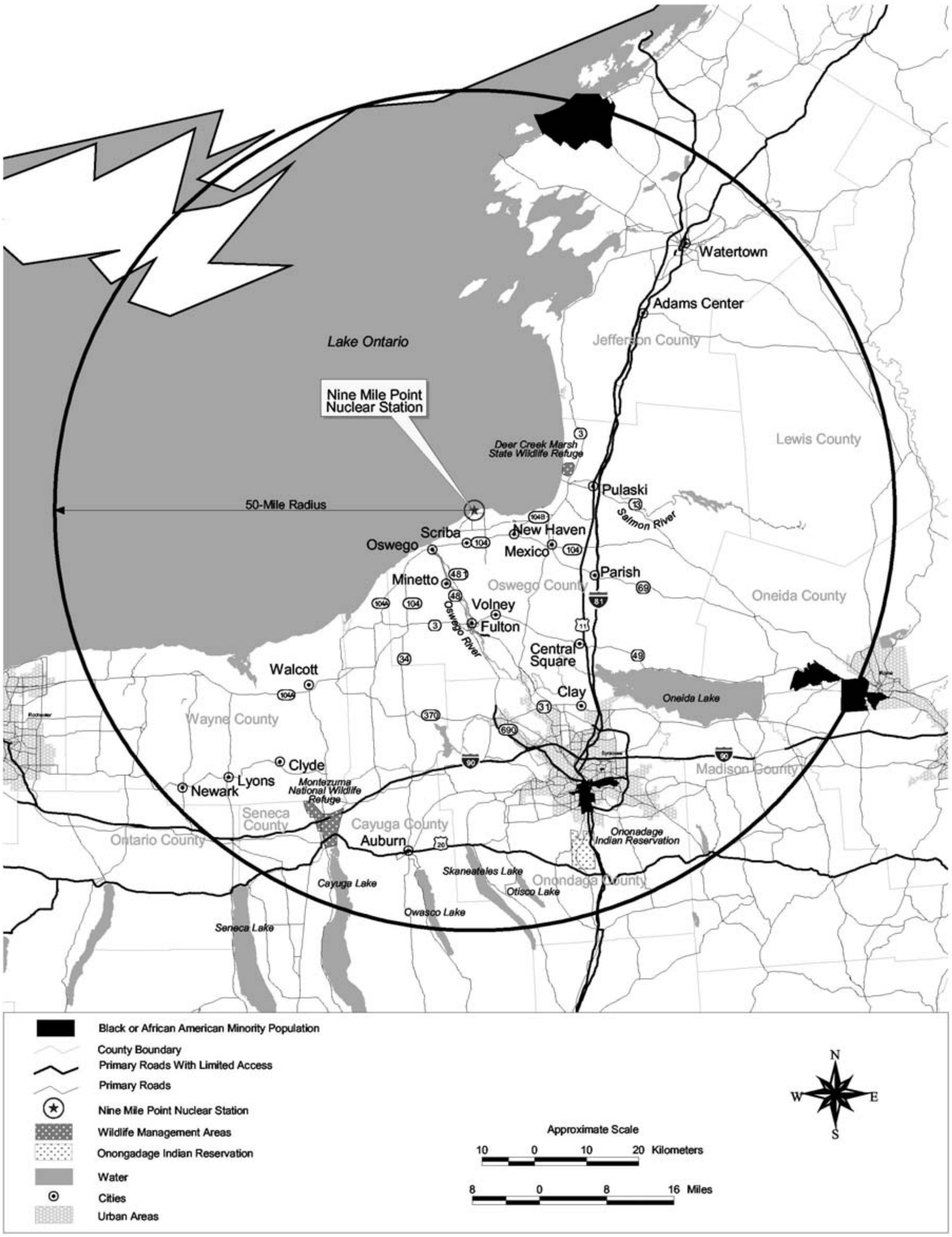


FIGURE 2.5-3

ASIAN MINORITY POPULATION

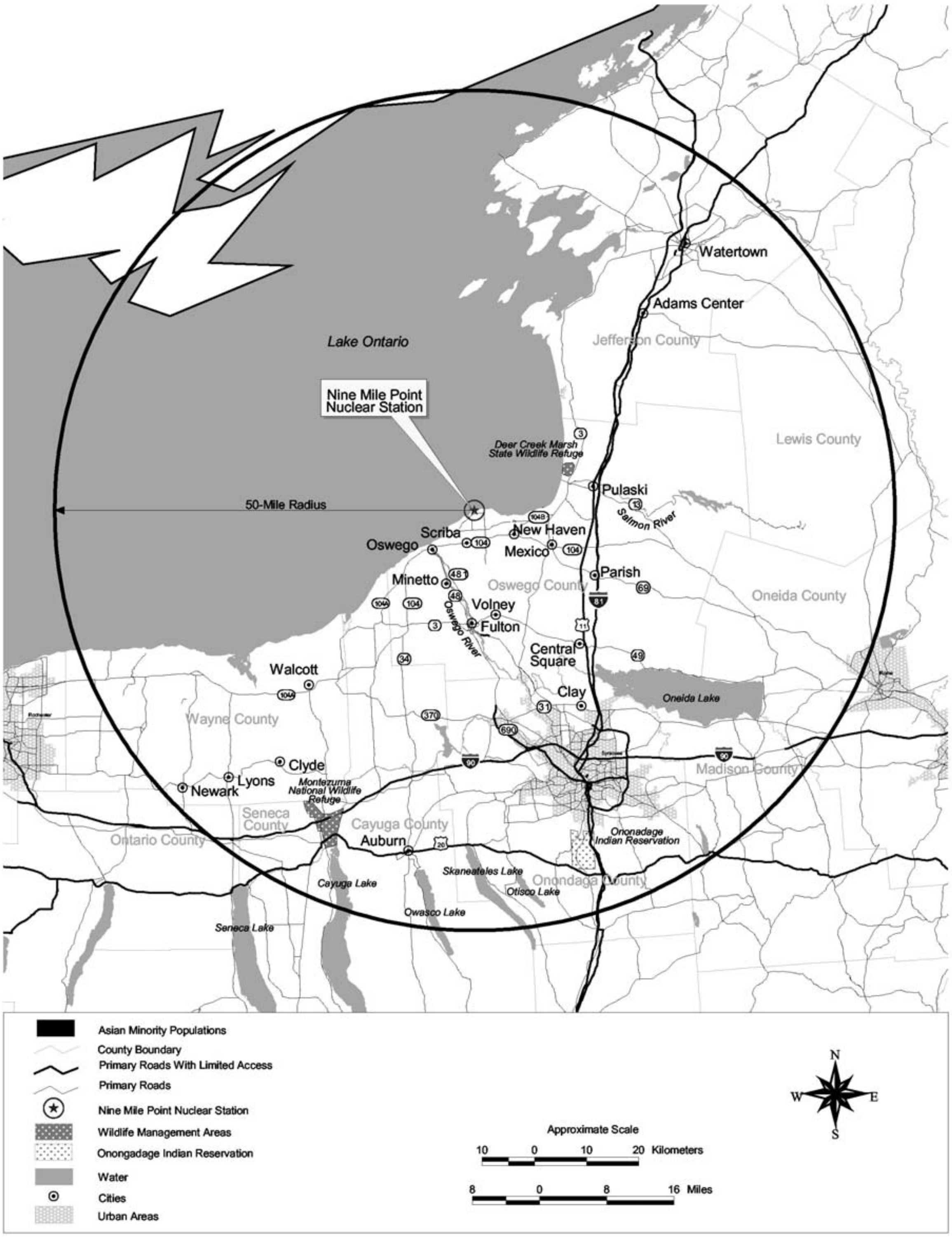


FIGURE 2.5-4

AMERICAN INDIAN AND ALASKA NATIVE MINORITY POPULATION

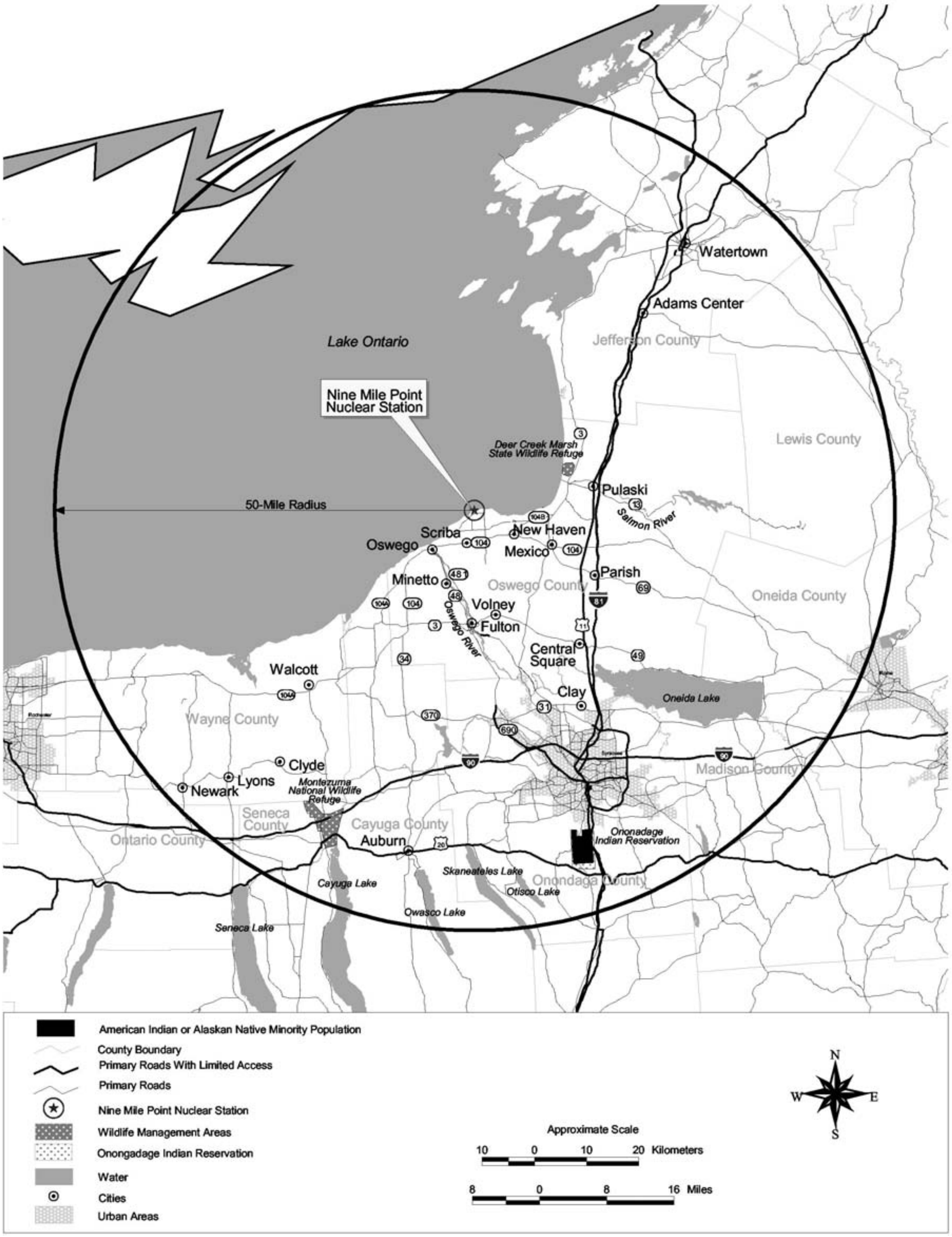


FIGURE 2.5-5

HISPANIC OR LATINO ETHNICITY MINORITY POPULATION

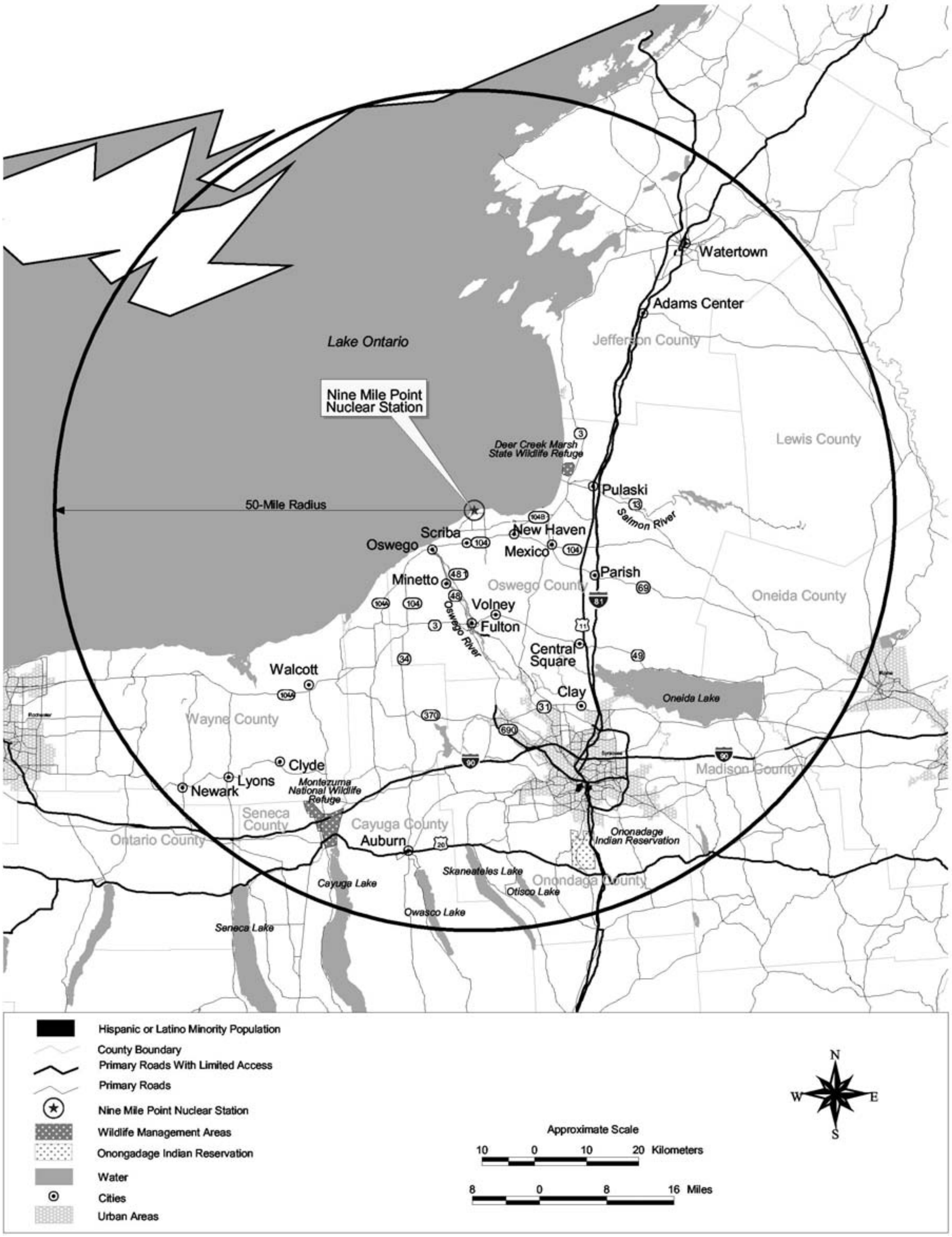


FIGURE 2.5-6

LOW-INCOME POPULATION

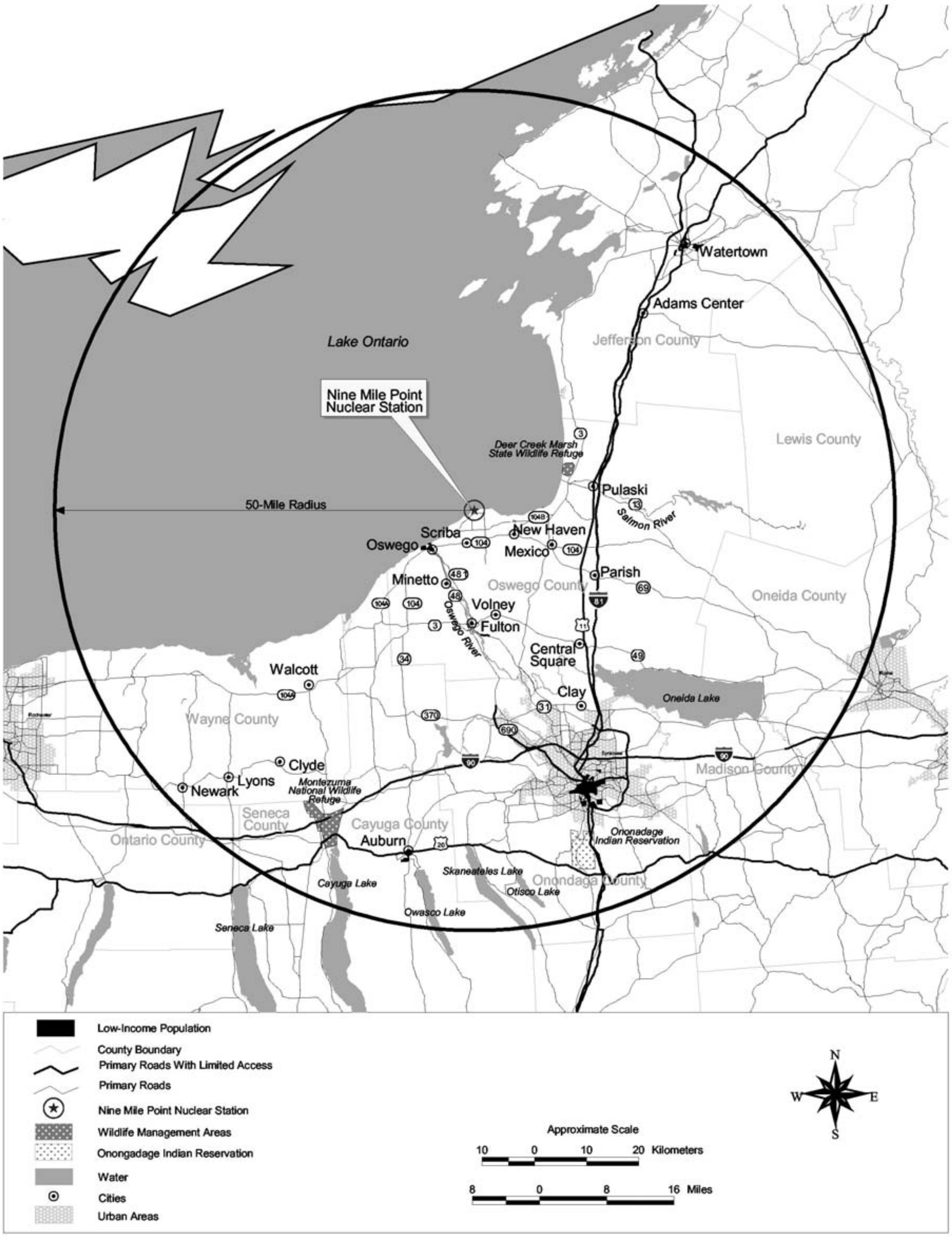
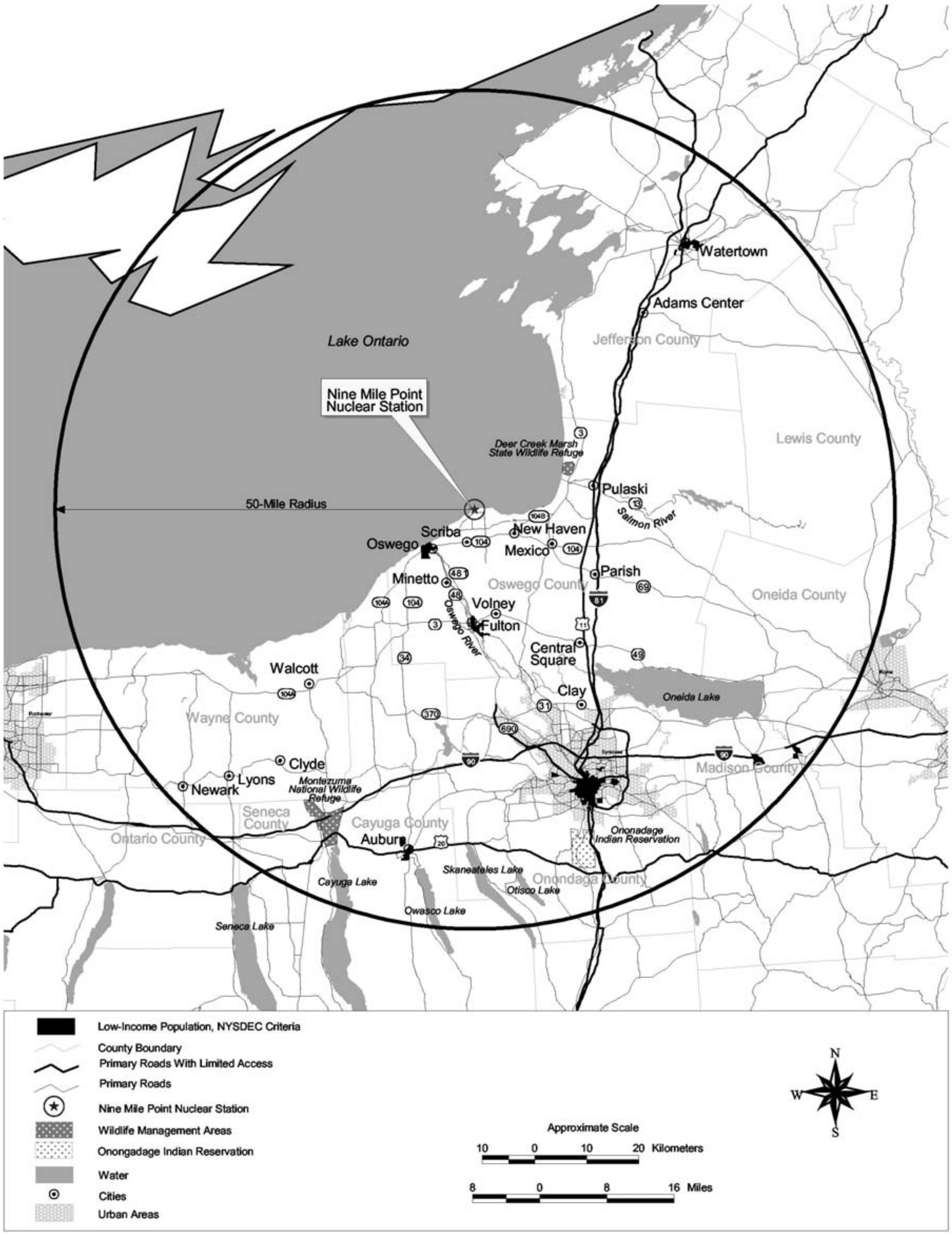


FIGURE 2.5-7

LOW-INCOME POPULATION NYSDEC CRITERIA



2.6 AREA ECONOMIC BASE

This section focuses on Oswego and Onondaga Counties because 96 percent of the NMP workforce resides in those counties (see Section 3.4). Both counties lie within the Syracuse MSA.

In 2001, Onondaga County had an estimated workforce of 227,600 persons, while Oswego County had an estimated workforce of 55,500 persons in the same year. Workforces have decreased by 7 and 3.6 percent in both counties over the past decade, as Onondaga and Oswego Counties had 1990 estimated workforces of 244,900 and 57,600 persons, respectively (Ref. 2.6-1). While the total workforce has decreased over the past decade, unemployment rates have also steadily decreased. Onondaga County had a 2001 unemployment rate of 4.2 percent and Oswego County had a 2001 unemployment rate of 6.5 percent. Oswego County has historically had higher unemployment rates than Onondaga County or New York State (Ref. 2.6-1).

Over the past decade, the services sector has increased in both counties, while the total number of manufacturing positions has decreased in recent years (see Table 2.6-1). In 2000, services accounted for 29.1 percent of total employment in Onondaga County, while wholesale and retail trade accounted for 23.8 percent, government accounted for 15.4 percent, and manufacturing accounted for 14.5 percent. Services was the largest payroll producing sector, accounting for 25.6 percent of the total annual wages, followed by manufacturing, accounting for 20.9 percent. Wholesale and retail trade accounted for 17.2 percent of total annual wages, while government accounted for 15 percent (Ref. 2.6-2).

In 2000, government was the largest employment sector in Oswego County, accounting for 27.2 percent of the total employment and 31.8 percent of the total annual wages. Despite losing nearly 2,000 jobs over the past decade, manufacturing remained the largest private payroll producing sector in Oswego County, accounting for approximately 22.8 percent of the total annual wages and approximately 15.7 percent of the County employment. Wholesale and retail trade accounted for 22.8 percent of the County employment and 10.9 percent of the total annual wages. Services accounted for over 19.6 percent of County employment and 13.9 percent of the County’s total annual wages (Ref. 2.6-2).

The Cities of Oswego and Fulton serve as the largest employment centers in Oswego County. The Villages of Phoenix, Pulaski, and Central Square are growing commercial centers. Industrial parks are located in the Towns of Schroeppel and Volney and the City of Oswego. Power production is a major component of the regional economy. In addition to NMP, the James A. Fitzpatrick Nuclear Power Plant, the fossil fuel powered Oswego Steam Station, the 980-megawatt gas-powered Sithe Energies Independence Station, two small cogeneration plants, the Oswego County Department of Public Works 1.8-megawatt waste to energy facility, and nine hydroelectric plants are located in Oswego County (Ref. 2.3-1).

TABLE 2.6-1

TOTAL EMPLOYMENT BY SECTOR OF ONONDAGA AND OSWEGO COUNTIES[a]

Industry	Onondaga County 1990	Onondaga County 2000	Oswego County 1990	Oswego County 2000
Manufacturing	41,497	36,644	7,469	5,401
Services	64,121	73,571	5,305	6,732
Wholesale and Retail Trade	62,745	60,025	7,027	7,842
Government	37,420	38,818	8,942	9,363
Construction	12,804	10,476	1,623	1,269
Transportation and Public Utilities	15,823	15,881	2,737	2,545
Finance, Insurance, and Real Estate	19,013	15,137	743	766
Other	1,499	1,922	490	479
Total Employment	254,927	252,477	34,338	34,400

a. Source: Ref. 2.6-2.

The Cities of Oswego and Fulton serve as the largest employment centers in Oswego County. The Villages of Phoenix, Pulaski, and Central Square are growing commercial centers. Industrial parks are located in the Towns of Schroeppel and Volney and the City of Oswego. Power production is a major component of the regional economy. In addition to NMP, the James A. Fitzpatrick Nuclear Power Plant, the fossil fuel powered Oswego Steam Station, the 980-megawatt gas-powered Sithe Energies Independence Station, two small cogeneration plants, the Oswego County Department of Public Works 1.8-megawatt waste to energy facility, and nine hydroelectric plants are located in Oswego County (Ref. 2.3-1).

Per capita personal income has historically been significantly lower in Oswego County than in Onondaga County or New York State. In 1999, Oswego County had a per capita personal income of $20,993, compared to $27,097 for Onondaga County and $33,901 for New York State (Ref. 2.6-3).

The region's economy is bolstered in part by its location. Approximately one half of the combined population of the United States and Canada is located within 750 miles of Syracuse. The Syracuse-Hancock International Airport is serviced by six major airlines, three commuter airlines, and six major air cargo companies. It hosts approximately 200 arriving and departing passenger flights daily. Two interstate highways intersect in Syracuse; Interstate 81 creates a north-south corridor and Interstate 90 creates an east-west corridor. The Port of Oswego offers shipping access to the Great Lakes and the Atlantic Ocean, and the Onondaga Lake Barge Canal offers access to the 524-mile New

York State Canal System, which connects the Niagara River with the Hudson River. The region’s transportation network also includes rail and trucking terminals (Ref. 2.6-4).

2.7 TAXES

NMPNS is assessed annual property taxes for NMP by Oswego County, the Town of Scriba, and the City of Oswego School District. Property taxes paid to Oswego County and the Town of Scriba fund such services as transportation, education, public health, and public safety.

From 1995 to 2001, NMPNS property tax contributions for NMP to Oswego County have decreased by over 50 percent, and the percentage of these contributions compared to the total revenues has decreased from 21 percent to 9.5 percent. By comparison, NMP property tax payments to the City of Oswego School District have remained relatively consistent, averaging over 26 million dollars annually and constituting approximately 49 percent of total expenditures during the same time period (see Table 2.7-1).

From 1995 to 2001, the Town of Scriba has produced an average annual operating budget of approximately 3.8 million dollars, with budgets topping 4.2 million dollars in years 2000 and 2001. Property tax payments for NMP have historically constituted a significant portion of Town of Scriba revenues, although the percentage of the contributions compared to total revenues has decreased from 74.1 percent to 38.8 percent (see Table 2.7-1).

NMPNS has entered into an agreement with Oswego County, the Town of Scriba, and the City of Oswego regarding property taxes paid to those entities for NMP. Instead of calculating property taxes for NMP from the assessed value of the plant, NMPNS will make standardized in lieu payments annually to the taxing entities. Beginning in 2002, the agreement sets a base level of payments to the taxing entities for each year until 2010 for Unit 1 and until 2011 for Unit 2. The City of Oswego School District, Oswego County, and the Town of Scriba receive 57.80296 percent, 37.23941 percent, and 4.95762 percent of the base payments, respectively. These were derived from the historical property tax payments made to the taxing entities. The agreement also sets “incentive payments” to be paid to each entity should megawatt production for either Unit 1 or Unit 2 exceed certain annual benchmarks. Incentive payments will be applicable to Unit 1 from 2005 through 2009, and to Unit 2 from 2006 through 2011 (Ref. 2.7-6; Ref. 2.7-7).

For purposes of conservative analysis, NMPNS assumes the maximum level of incentive payments will be achieved. From 2002 through 2011, the City of Oswego School District, Oswego County, and the Town of Scriba will receive an average annual base payment of approximately 13.3 million dollars, 8.6 million dollars, and 1.1 million dollars, respectively. Base payments with the maximum level of incentives are also presented in Table 2.7-2 and average 15.0 million dollars, 9.7 million dollars, and 1.3 million dollars for the City of Oswego School District, Oswego County, and the Town of Scriba respectively (see Table 2.7-2). These payments are significantly smaller than historic property tax payments.

TABLE 2.7-1

PROPERTY TAX PAID FOR NINE MILE POINT; TAX REVENUES AND TOTAL BUDGETS OF OSWEGO COUNTY, TOWN OF SCRIBA, AND THE CITY OF OSWEGO SCHOOL DISTRICT; 1994-2001

Year	Total Revenues ($)	Property Tax Paid for NMP Station ($)	Property Tax as Percent of Total Revenues (%)	Total Budget ($)	Percent of Total Budget (%)
			Oswego County[a]		
1995	$131,367,137	$27,629,514	21.0%	$143,052,155	19.3%
1996	$129,747,249	$25,442,508	19.6%	$138,534,865	18.4%
1997	$129,733,928	$19,117,299	14.7%	$131,442,264	14.5%
1998	$133,179,407	$18,661,593	14.0%	$133,598,143	14.0%
1999	$139,648,005	$17,138,590	12.3%	$138,624,495	12.4%
2000	$146,444,886	$14,166,077	9.7%	$140,812,265	10.1%
2001	$144,810,855	$13,706,832	9.5%	$151,410,907	9.1%
			Town of Scriba		
1995	$3,139,271[b]	$2,327,402	74.1%	$3,368,368[c]	69.1%
1996	$3,423,085[b]	$2,173,171	63.5%	$3,454,923[c]	62.9%
1997	$3,275,207[b]	$2,182,803	66.6%	$3,680,248[c]	59.3%
1998	$3,224,793[b]	$2,201,743	68.3%	$3,743,085[c]	58.8%
1999	$3,119,808[b]	$1,980,982	63.5%	$3,867,633[c]	51.2%
2000	$3,692,177[b]	$2,410,731	65.3%	$4,235,846[c]	56.9%
2001	$5,480,372[b]	$2,124,232	38.8%	$4,224,463[c]	50.3%
			City of Oswego School District		
1995	$52,068,435[d]	$29,106,226	55.9%	$50,902,596[e]	57.2%
1996	$52,831,055[d]	$28,005,293	53.0%	$51,206,190[e]	54.7%
1997	$52,249,574[d]	$27,120,597	51.9%	$51,806,088[e]	52.4%
1998	$53,048,753[d]	$26,010,187	49.0%	$52,313,392[e]	49.7%
1999	$54,854,602[d]	$24,153,240	44.0%	$52,307,262[e]	46.2%
2000	$56,771,253[d]	$24,267,856	42.7%	$52,867,002[e]	45.9%
2001	NA	$26,413,199	NA	$54,021,382[e]	48.9%

a. Source: Ref. 2.7-1.
b. Source: Ref. 2.7-2.
c. Source: Ref. 2.7-3.
d. Source: Ref. 2.7-4.
e. Source: Ref. 2.7-5.
NA = Not Available

TABLE 2.7-2

NINE MILE POINT UNITS 1 & 2 FUTURE IN LIEU CONTRIBUTIONS TO CITY OF OSWEGO SCHOOL DISTRICT, OSWEGO COUNTY, AND THE TOWN OF SCRIBA[a,b]

Year	Base Payment to City of Oswego School District	Total Base and Maximum Incentive Taxes for the City of Oswego School District	Base Payment to Oswego County	Total Base and Maximum Incentive Taxes for Oswego County	Base Payment to the Town of Scriba	Total Base and Maximum Incentive Taxes for the Town of Scriba
2002	21,100,000	$21,100,000	13,590,000	$13,590,000	1,810,000	$1,810,000
2003	18,500,000	$18,500,000	11,920,000	$11,920,000	1,580,000	$1,580,000
2004	14,170,000	$14,170,000	9,120,000	$9,120,000	1,210,000	$1,210,000
2005	12,140,000	$12,718,030	7,820,000	$8,192,394	1,040,000	$1,089,576
2006	11,560,000	$14,247,838	7,450,000	$9,181,633	990,000	$1,220,529
2007	11,560,000	$14,652,458	7,450,000	$9,442,308	990,000	$1,255,232
2008	11,560,000	$14,652,458	7,450,000	$9,442,308	990,000	$1,255,232
2009	11,560,000	$14,652,458	7,450,000	$9,442,308	990,000	$1,255,232
2010	11,560,000	$13,872,118	7,450,000	$8,939,576	990,000	$1,188,305
2011*	9,250,000	$11,562,118	5,960,000	$7,449,576	790,000	$988,305

*Does not include payments for Nine Mile Point Unit 1

a. Source: Ref. 2.7-6.
b. Source: Ref. 2.7-7.

The agreement ends in 2010 for Unit 1 and in 2011 for Unit 2. The taxing entities may elect to institute a new agreement with NMPNS at that time, or they will return to the previous system of calculating NMP property taxes by assessing its worth. The energy market in the State of New York has been deregulated to encourage the development of competition in the production and sale of electricity. A study performed by the New York State Board of Real Property Services concluded that the value of many power generating plants is likely to decline in a deregulated market (Ref. 2.7-8). Therefore, NMPNS expects that any future property taxes assessed through the license renewal term should be similar to or may be less than the in lieu payments represented in Table 2.7-2.

2.8 SOCIAL SERVICES AND PUBLIC FACILITIES

2.8.1 PUBLIC WATER SUPPLY

The discussion of public water systems focuses on Oswego and Onondaga Counties because approximately 96 percent of the NMP workforce resides in the two counties (see Section 3.4) for workforce description). Local municipalities and private water companies provide public potable water service to residents who do not have individual onsite wells. These providers are subject to regulation under the Federal Safe Drinking Water Act, as implemented by the New York State Department of Health.

Approximately 49 percent of Oswego County's population obtains potable water from private groundwater wells (Ref. 2.8-1). The vast majority of the remaining population obtains potable water from one of Oswego County's 29 public water districts. The main water sources for the public water districts are Lake Ontario and a variety of groundwater aquifers and associated springs. Twelve districts obtain water directly from Lake Ontario, nine use groundwater wells and local springs, six use both local wells and water purchased from the Onondaga County Water Authority (OCWA), and seven rely on water purchased from the OCWA alone (Ref. 2.3-1, Section V.A.1).

Groundwater is a significant resource in Oswego County. There are three principal groundwater aquifers currently used as a consumptive resource by public water facilities in Oswego County: the Sand Ridge Aquifer; the Fulton Aquifer; and the Tug Hill Aquifer. In the Oswego lowlands in northern Oswego County, the Sand Ridge Aquifer extends for 13 miles and is contained almost entirely in the Towns of Palermo and Schroeppel. The Redfield Aquifer is also located in this region, and though it is largely untapped, planning officials believe wells from this aquifer could potentially yield 8 to 14 million gallons of water per day. Substantial groundwater resources could also be available from other area groundwater aquifers that have been as-yet largely unused. The Fulton Aquifer is the most often used groundwater resource, as it encompasses five municipalities in central and western Oswego County. The Tug Hill Aquifer is a 47-mile long, crescent shaped aquifer located in eastern Oswego County, and extends into both Jefferson and Oneida Counties (Ref. 2.3-1, Section II.A.2).

NMP acquires potable water through the Oswego Water System, the largest public water supply provider in Oswego County. Current plant usage averages 172,000 gallons per day with no restrictions on supply (see Section 3.1.3.3). The Oswego Water System serves approximately 23,950 customers in the City of Oswego and in portions of the Towns of Oswego, Minetto, Scriba, and Volney. The water plant obtains its water from Lake Ontario, and its allowable withdrawal allocation is approximately 62.5 million gallons per day, well in excess of its needs. The full design capacity of the water plant is 20.1 million gallons per day, though 8 million is reserved for Sithe Energies, Inc., with the remaining 12 million available for other industrial, residential, and commercial customers (Ref. 2.3-1). In 2001, consumptive daily demand averaged 8 million gallons per day and peak demand was approximately 10 million gallons per day (Ref. 2.8-2). The water lines for the Water System in the Town of

Scriba run along Middle Road to Creamery Road, State Route 104 to Maiden Lane Road, Hall Road to County Route 53, and along County Routes 1 and 1A. These water lines serve approximately 40 percent of the population of Scriba (Ref. 2.1-8). County planning officials estimate that the capacity of the Oswego Water System is adequate to meet the demands of an additional 4,000 to 8,000 residential customers (Ref. 2.3-1).

The City of Fulton is the second largest water service provider in Oswego County, with a total of 12,900 customers. Source water for Fulton's water plant is obtained from 10 groundwater wells that have a production capacity of 2.4 million gallons per day from the Fulton Aquifer. In 2002, peak demand was approximately 4 million gallons per day (Ref. 2.8-3). Because consumptive daily demand averages 2.7 million gallons per day, the City of Fulton has an agreement with the OCWA to supplement the City's water supply with as much as 3 million gallons per day (Ref. 2.3-1).

The Metropolitan Water Board (MWB) functions as a potable water wholesaler to public water districts and water authorities in both Oswego and Onondaga Counties. The MWB sells most of its water to the OCWA, which in turn supplies water to parts of Onondaga County and six water districts in Oswego County. Under New York State Law, the MWB must provide 25 percent of its pipeline capacity to Oswego County. This equals approximately 10 million gallons per day. Currently, the MWB supplies an average of approximately 200,000 gallons per day to communities in Oswego County. The MWB may draw as much as 62.5 million gallons per day from Lake Ontario through an intake owned by the City of Oswego. Therefore, the MWB has large excess capacity to support future growth in Oswego County (Ref. 2.3-1). The City of Syracuse also has an agreement to buy water from the MWB to supplement Syracuse's supply as needed. In 1998, the MWB withdrew an average of over 25 million gallons of water per day from Lake Ontario (Ref. 2.5-5, page 73). The MWB's water plant has a total capacity of 60 million gallons per day, and up to 50 million gallons can be delivered to Onondaga County (Ref. 2.8-4).

In contrast to Oswego County, the majority of the residents of Onondaga County obtain potable water from municipal supplies. Census data indicate that approximately 92 percent of Onondaga County's population obtains potable water from a public water system (Ref. 2.8-1). Public water service is not available in unincorporated areas of southern and western Onondaga County (Ref. 2.5-5).

The OCWA retails its water to districts in central and northern Onondaga County, central Oswego County, Eastern Oneida County, western Madison County, and portions of eastern Cayuga County. Consumptive daily demand averages nearly 44 million gallons per day, and peak demand reaches nearly 54 million gallons per day. In 2001, the OCWA served an estimated 339,540 customers (Ref. 2.8-5). In addition to the water from Lake Ontario that the OCWA buys from the MWB, approximately 40 percent of OCWA's source water is obtained from its own water plant, which withdraws from Otisco Lake and has a design capacity of approximately 20 million gallons per day. In addition, the OCWA also buys approximately one percent of its water from the City of Syracuse (Ref. 2.8-4).

The City of Syracuse Water Department provides potable water services to residents of Syracuse and to portions of the Towns of DeWitt, Onondaga, Geddes, Camillus, Skaneateles, and Salina, and the Villages of Jordan and Elbridge. Source water is primarily obtained from Skaneateles Lake. The City of Syracuse Water Department withdraws an average of 42.6 million gallons per day from Skaneateles Lake. During drought conditions, emergencies, or periods of high consumption, up to 10 million gallons per day can be delivered as needed from Lake Ontario as a supplemental source. In 2000, consumptive daily demand averaged 43.5 million gallons per day, and peak demand was 49.2 million gallons (Ref. 2.8-6). The water system has a total capacity of approximately 58 million gallons per day (Ref. 2.8-7).

2.8.2 TRANSPORTATION

Road access to NMP is eastward via Lake Road (County Route 1A), a two-lane paved roadway that is formed east of the intersection of County Route 1A and Lakeview Road, approximately one mile from the site. Although Lake Road connects with County Route 29 west of the site, through traffic is not currently allowed. County Road 1 is another major throughway that intersects with both County Route 1A and Lakeview Road in the site vicinity (see Figure 2.1-3). Oswego County Public Works staff consider each of these roads to be in good condition (Ref. 2.8-8). According to the Oswego County Planning and Community Development Department, the average daily traffic count (ADTC) for County Route 1A from County Route 1 to Lakeview Road was 4,900 vehicles in 1995 (Ref. 2.3-21, Table 15-2).

The U.S. Transportation Research Board has developed a commonly used indicator, called “level of service” (LOS), to measure roadway traffic volume. LOS is a qualitative assessment of traffic flow and how much delay the average vehicle might encounter during peak hours. Table 2.8-1 presents the LOS definitions used by local and state agencies, as well as by the NRC in the GEIS (Ref. 2.5-1, Section 3.7.4.2).

Although neither state nor local governments have LOS information for county roads in the State of New York, a capacity analysis of area intersections was performed as part of the application for Certification of a Major Generating Facility Under Article X of the New York State Public Service Law for the proposed Heritage Station. The plant was to have been located on Lake Ontario, approximately two miles west of NMP. Table 2.8-2 presents 1999 LOS data from this analysis for peak morning (6:00-7:00 a.m.) and afternoon (3:15-4:15 p.m.) periods for intersections of interest in the vicinity of NMP. In the study, area intersections were found to exhibit acceptable operating conditions with the exception of the Route 1 eastbound approach at Route1/Route 1A during the morning peak conditions. The access road for the Alcan Rolled Products Company is also located at this intersection, to the left of the eastbound approach. This intersection is a four-way intersection with stop-sign control on all four approaches. Though placing a two-way stop sign at this intersection would improve traffic conditions for the eastbound approach, the four-way stop-sign control was noted as the preferred option due to safety concerns (Ref. 2.3-21, page 15-26).

TABLE 2.8-1

LEVEL OF SERVICE DEFINITIONS

Level of Service	Conditions
A	Free flow of the traffic stream; users are unaffected by the presence of others.
B	Stable flow in which the freedom to select speed is unaffected, but the freedom to maneuver is slightly diminished.
C	Stable flow that marks the beginning of the range of flow in which the operation of individual users is significantly affected by interactions with the traffic stream.
D	High-density, stable flow in which speed and freedom to maneuver are severely restricted; small increases in traffic will generally cause operational problems.
E	Operating conditions at or near capacity level causing low, but uniform, speeds and extremely difficult maneuvering that is accomplished by forcing another vehicle to give way; small increases in flow or minor perturbations will cause breakdowns.
F	Defines forced or breakdown flow that occurs wherever the amount of traffic approaching a point exceeds the amount that can traverse the point. This situation causes the formation of queues characterized by stop-and-go waves and extreme instability.

Source: Ref. 2.5-1, Section 3.7.4.2.

TABLE 2.8-2

LEVEL OF SERVICE CAPACITY ANALYSIS FOR COMMUTING ROUTES TO NMP

Study Area Intersection	Level of Service (1999 data)	
	a.m.	**p.m.**
Route 1A/Lakeview Road		
– Left from Route 1A eastbound	A	A
– Left from Route 1A westbound	A	A
– All moves from Lakeview Road northbound	C	C
– All moves from Lakeview Road southbound	C	C
Routes 1/1A		
– All moves from Route 1 northbound	B	B
– All moves from Route 1 eastbound	F	A
– All moves from Route 1A westbound	A	C

Source: Ref. 2.3-21, Table 15-7

2.9 LAND USE PLANNING

This section focuses on Oswego and Onondaga Counties because 96 percent of the NMP workforce resides in those counties (see Section 3.4 for workforce description).

In order to accommodate and regulate growth and development, Onondaga and Oswego Counties have developed county-specific comprehensive growth management plans characterizing current conditions and setting standards, regulations, and goals for land use and development. Oswego County's plan was adopted in March 1997 and updated in 2000. Onondaga County's plan was adopted in June 1998.

Land use planning and zoning regulations are primarily developed by the towns, villages, and municipalities located within Oswego and Onondaga Counties. Therefore, land use standards may vary greatly in different regions within the counties. Neither county implements growth control measures that limit residential housing development. Land is available for new housing developments in both Oswego and Onondaga Counties (Ref. 2.3-1; Ref. 2.5-5).

In Onondaga County, the City of Syracuse and all towns and villages, except the Town of Otisco, use zoning to manage growth (Ref. 2.5-5). Most towns in Oswego County have developed some type of land use regulation, either zoning or subdivision regulations, while a few towns in the less developed northeastern Oswego County have not. The Town of Scriba, where NMP is located, as well as the Towns of New Haven, Palermo, and Constantia do not use zoning to regulate growth. Instead, these towns implement site plan reviews to evaluate the layout and design of a new development when it occurs on a single parcel of land. The site plan review ensures new developments will not endanger important natural resources and will fit in with the overall character of the local community. In eastern Oswego County, the Towns of Redfield, Sandy Creek, Orwell, Williamstown, Albion, Aboy, and West Monroe currently have not developed any land use regulations. All other towns in Oswego County currently implement zoning to regulate growth (Ref. 2.9-1).

Based on real property tax records for 1995, residential land was the predominant land use in Oswego County, accounting for 36.3 percent of the total county acreage. Approximately 20.6 percent was classified as vacant, 19.3 percent was classified as wild forest, 15.4 percent was classified as agriculture, and only 4.0 percent was classified as industrial, commercial, and community service. Commercial and industrial land uses have centered on the Cities of Oswego and Fulton and their surrounding areas in adjoining towns. Residential growth has been strongest in towns in southern Oswego County, and the Town of Scriba in northern Oswego County. Wetlands are an important natural resource in Oswego County, and development is restricted in these areas. State-regulated wetlands account for 13.0 percent of the total land area in Oswego County (Ref. 2.3-1).

In the Town of Scriba, approximately 41 percent of all land is classified as residential. Residential development has typically occurred along existing roadways. The subdivision of property has increased along County Route 4. In 1998, the Town of Scriba adopted a subdivision law requiring that each lot be at least 60,000 square feet. However, the Town of Scriba Comprehensive Plan notes that the subdivision of property for single-family residential development is a trend that will likely continue, and Scriba may begin to transition from a community with rural characteristics to a more suburbanized community (Ref. 2.1-8).

Vacant land composes 22 percent of the Town of Scriba, while agriculture accounts for 15 percent, and commercial and industrial uses account for 4 percent and 3 percent, respectively. Strip development has increased on New York State Route 104. The Town of Scriba is one of the industrial centers of Oswego County, particularly for energy production (Ref. 2.1-8). In addition to NMP and the adjacent J.A. Fitzpatrick Plant, Sithe Industries operates Independence Station, a 1,042-megawatt natural gas fueled power plant. The 190-acre site is located approximately two miles from NMP (Ref. 2.1-9).

Onondaga County is more developed, as both residential and commercial land uses increase in towns and villages surrounding Syracuse. Between 1990 and 1996, over 8,241 building permits were issued in Onondaga County. The northern towns accounted for approximately 58 percent of all new building permits in Onondaga County from 1990 until 1996. Growth has been steady throughout Onondaga County, except in the County's southern towns, where the lack of infrastructure and public water availability have limited growth. Agriculture remains a significant land use in southern Onondaga County. County planning officials expect residential growth to continue in northern and central Onondaga County, as 17,000 parcels of vacant residential land are available for residential purposes (Ref. 2.5-5).

In 1998, the Syracuse-Onondaga County Planning Agency estimated that 6,892 acres (56.9 percent) of land in the City of Syracuse were classified as residential or vacant residential. In addition, commercial land uses (both vacant and used) accounted for 2,893 acres (23.9 percent), industrial accounted for 504 acres (4.2 percent), public service accounted for 1,255 acres (10.4 percent), and parks accounted for 571 acres (4.7 percent). No acreage in the City of Syracuse was classified as agricultural. In the year 2000, the Syracuse-Onondaga County Planning Agency estimated that 170,301 acres in Onondaga County (35.8 percent), excluding the City of Syracuse, were classified as residential or vacant residential. In addition, agricultural land uses accounted for 143,926 acres (30.3 percent), commercial (both vacant and used) accounted for 32,792 acres (6.9 percent), industrial accounted for 26,196 acres (5.5 percent), public service accounted for 10,677 acres (2.2 percent), vacant rural accounted for 56,653 acres (11.9 percent), mining accounted for 2,814 acres (0.6 percent), and parks accounted for 27,527 acres (5.8 percent) (Ref. 2.9-2).

2.10 CULTURAL RESOURCES

The construction of NMP and the associated transmission line corridors did not impact any known historic or archaeological resources. No significant resources were found on site or on transmission line corridors during historic and archaeological surveys performed in the 1970s, 1980s, and early 1990s (Ref. 2.1-2, Section 5.7; Ref. 2.10-1, Section 2.3; Ref. 2.10-2).

The National Register of Historic Places (NRHP) lists 43 historic sites within approximately ten miles of NMP (see Table 2.10-1). Sixteen sites are located in the Town of Mexico, approximately 10 miles east of NMP. The remaining 27 listed sites are located within the City of Oswego, approximately six to eight miles southwest of NMP. Notable among these sites is Fort Ontario, located in the City of Oswego along the shoreline of Lake Ontario. Fort Ontario has also been designated as a State Historical Site by the New York State Department of Parks, Recreation, and Historic Preservation (Ref. 2.10-3).

Archeological resources in Oswego County are concentrated along with Oswego River, Oneida Lake, the Salmon River, and Lake Ontario at the mouth of the Salmon River. Additionally, archeologically sensitive areas have been found in the Town of New Haven, Villages of Parish, Central Square, and Pulaski, and in the Cities of Oswego and Fulton (Ref. 2.3-1).

TABLE 2.10-1

HISTORICAL SITES WITHIN 10 MILES OF NINE MILE POINT[a]

Site	Address	City	Listed
Buckhout--Jones Building	5-13 W. Bridge St.	Oswego	12/4/01
Clarke, Edwin W. and Charlotte, House	80 E. Mohawk St.	Oswego	2/26/02
Edwards, John B. and Lydia, House	144 E. Third St.	Oswego	12/4/01
Fort Ontario	E. 7th St. and Lake Ontario	Oswego	12/18/70
Franklin Square Historic District	Roughly bounded by 3rd, 6th, Van Buren, and Bridge Sts.	Oswego	8/4/82
Green, Nathan and Clarissa, House	98 West Eight St.	Oswego	2/26/02
Hunter--Oliphant Block	215--219 W. First St.	Oswego	7/21/95
Kingsford House	150 W. Third St.	Oswego	8/21/97
Littlefield, Hamilton and Rhoda, House	44 E. Oneida St.	Oswego	2/26/02
Market House	Water St.	Oswego	6/20/74
McKenzie, John and Harriet, House	96 W. Eighth St.	Oswego	12/4/01
Montcalm Park Historic District	Roughly bounded by Montcalm St., W 6th St., W. Schuyler St., and Bronson St.	Oswego	5/25/01
Oswego Armory	265 W. First St.	Oswego	5/19/88
Oswego City Hall	W. Oneida St.	Oswego	2/20/73
Oswego City Library	120 E. 2nd St.	Oswego	9/22/71
Oswego County Courthouse	East Bridge St.	Oswego	12/7/00
Oswego Theater	138 W. Second St.	Oswego	9/19/88
Oswego West Pierhead Lighthouse	Lake Ontario, 0.5 mi. N of Oswego R.	Oswego	12/1/00
Pease, Daniel and Miriam, House	361 Cemetery Rd.	Oswego	2/26/02
Pontiac Hotel	W. 1st St.	Oswego	7/21/83
Richardson-Bates House	135 E. 3rd St.	Oswego	9/5/75
Riverside Cemetery	E. River Rd. S of jct. with NY 57	Oswego	8/19/93
Sheldon Hall	Washington Blvd.	Oswego	5/13/80
Sloan, George B., Estate	107 W. Van Buren St.	Oswego	8/11/88
U.S. Customhouse	W. Oneida St. between 1st and 2nd Sts.	Oswego	11/21/76
Walton and Willett Stone Store	1 Seneca St.	Oswego	5/24/76
Woodruff Block	17 W. Cayuga St.	Oswego	4/20/95
Ames, Leonard, Farmhouse	5707 Main St.	Mexico	11/14/91
Ames, Orson, House	3339 Main St.	Mexico	12/4/01
Chandler, Peter, House	5897 Main St.	Mexico	11/14/91
Clark, Starr, Tin Shop	3250 Main St.	Mexico	12/4/01
Davis, Phineas, Farmstead	5422 North Rd.	Mexico	6/20/91
Fowler--Loomis House	6022 Main St.	Mexico	11/14/91
Hamilton Farmstead	5644 Hamilton St.	Mexico	11/18/91
Mexico Academy and Central School	5805 Main St.	Mexico	11/14/91
Mexico Octagon Barn	5276 Ames St.	Mexico	6/20/91
Mexico Railroad Depot	5530 Scenic Ave.	Mexico	6/20/91
Mexico Village Historic District	Main, Jefferson, Church and Spring Sts.	Mexico	6/20/91
Skinner, Timothy, House	5355 Scenic Ave.	Mexico	6/20/91
Slack Farmstead	5174 Row Rd.	Mexico	11/14/91
Stillman Farmstead	NY 104 between Co. Rt. 58 and US 11	Mexico	6/20/91
Thayer Farmstead	5933 Church St.	Mexico	11/14/91
Wing, Asa and Caroline, House	3392 NY 69	Mexico	12/4/01

a. Source: Ref. 2.10-4.

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3.0 THE PROPOSED ACTION

> **NRC**
>
> **"The report must contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures… .This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment…." 10 CFR 51.53(c)(2)**

Nine Mile Point Nuclear Station, LLC (NMPNS), proposes that the U.S. Nuclear Regulatory Commission (NRC) renew the operating licenses for Nine Mile Point Units 1 & 2 (NMP) for up to an additional 20 years beyond the expiration dates of the current licenses in accordance with provisions of 10 CFR 54.31. The current operating licenses expire on August 22, 2009, for Unit 1, and on October 31, 2026, for Unit 2. Renewal would give Constellation Energy Group (CEG) and the State of New York the option of relying on NMP to meet New York's future electric generation needs. Section 3.1 provides a general description of selected plant design and operating features pertinent to the environmental assessments presented in Chapter 4.0 of this environmental report. Sections 3.2 through 3.4 address potential site-related changes that could be required to support operations under the renewed NMP operating licenses.

3.1 GENERAL PLANT INFORMATION

General information about NMP designs and operational features of interest from an environmental impact standpoint is available in several documents. Among the most comprehensive sources are the Final Environmental Statements (FESs) prepared by the NRC or its predecessor agency, the U.S. Atomic Energy Commission (AEC), and the Safety Analysis Reports (SARs), prepared and maintained by the licensee. The AEC issued an FES in January 1974 that addressed the operation of Unit 1 during the initial operating license term (Ref. 3.1-1). The NRC issued the FES for Unit 2 operation in May 1985 (Ref. 3.1-2). NMPNS maintains separate Unit 1 and Unit 2 SARs, which provide current design information (Ref. 3.1-3; Ref. 3.1-4). NMPNS used these documents and other sources as a basis for the plant descriptive information presented in the remainder of Section 3.1.

The arrangement of NMP major structures and equipment in the power block and nearby areas is shown in Figure 3.1-1.

The prominent interconnected structures and housed facilities and equipment associated with Unit 1 include: the Reactor Building, which encloses the reactor vessel and associated primary containment structure and pressure suppression system, and houses the refueling and reactor servicing equipment, fresh and spent fuel storage facilities, and other reactor auxiliary or service equipment, including the emergency core cooling system; the Turbine Building, where the turbine generator, feedwater heaters, and associated main condensers are located; the Radwaste Solidification Storage Building, which also contains the material handling crane; the Waste Storage Building;

the Screen House and Pumphouse; the Off Gas Building; and the Administration Building.

The prominent interconnected structures and housed facilities and equipment associated with Unit 2 include: the Reactor Building, which encloses the reactor vessel and associated primary containment structure and houses the refueling and reactor servicing equipment, new and spent fuel storage facilities, and other reactor auxiliary or service equipment; the Turbine Building, where the turbine generator, condensers and moisture separator reheaters, condensate demineralizer system, feedwater heaters, and other systems are located; the Radwaste Building, which primarily houses the tanks and equipment associated with the liquid and solid radwaste system; the Heater Bays and the Screenwell Building; the Condensate Storage Tank Building; the Control Building; and the Normal Switchgear Building.

Prominent features beyond the power block area include the Cooling Tower for Unit 2, and the switchyards and exhaust stacks for Units 1 and 2. Additional support facilities for NMP include the Nuclear Learning Center, the Energy Information Center (a nuclear information facility open to the public prior to September 11, 2001), the Site Services and Engineering Services Building, and the Warehouse. The taller structures on the site and their corresponding heights include the Unit 1 and Unit 2 Reactor Buildings (137.5 feet high and approximately 170 feet high, respectively), the Unit 2 Cooling Tower (541 feet high), the exhaust stack from the Unit 1 Radwaste Solidification Storage Building (350 feet high), and the Unit 2 main exhaust stack (429 feet high).

3.1.1 REACTOR AND CONTAINMENT SYSTEMS

The nuclear power units are both General Electric boiling water reactors (BWRs). Unit 1 is a BWR/2 design with a power rating of 1,850 megawatts thermal (MWt), corresponding to a net output of 615 megawatts electric (MWe) (Ref. 3.1-3, Section I.B). Unit 2 is a BWR/5 design with an initial power rating of 3,323 MWt, corresponding to a net output of 1,100 MWe. In 1995, Unit 2 underwent a power uprate authorized by Amendment No. 66 to Operating License No. NPF-69. Currently, Unit 2's rated power level is 3,467 MWt, corresponding to a net output of 1,144 MWe (Ref. 3.1-4, Chapter 1.1). Unit 1 was designed by Niagara Mohawk Power Corporation (NMPC) and constructed by Stone and Webster Engineering Corporation (Ref. 3.1-1, Section 1.0). Stone and Webster was the architect-engineer responsible for the design and construction management of Unit 2 (Ref. 3.1-2, Section 1.0).

The primary containment structure for Unit 1 is located inside the Reactor Building and consists of the primary containment and internal structural steel. The primary containment is a BWR Mark I design consisting of a drywell, a torus-shaped pressure suppression chamber, and a vent system that connects the drywell and the pressure suppression chamber. The structure houses the reactor vessel and the reactor coolant recirculation loops and their branch connections.

When the reactor is hot (>215°F) and pressurized, the primary containment structure and pressure suppression system function to provide the primary containment barrier portion of Unit 1's multi-barrier system. A secondary containment barrier is provided by the Reactor Building. The major safety function of the Reactor Building as a secondary containment barrier is to minimize ground-level release of airborne radioactive materials by providing controlled, elevated release of the building atmosphere through a filter system under accident conditions. When the reactor is shut down for refueling, maintenance, or testing, and the drywell head is removed or pressure suppression system integrity is not required, the Reactor Building provides the primary containment barrier.

The Reactor Building houses the refueling and reactor servicing equipment; fresh and spent fuel storage facilities; and other reactor auxiliary or service equipment, including the emergency core cooling system, reactor cleanup system, liquid poison system, control rod drive hydraulic system equipment, core and containment spray systems, and components of electrical equipment (Ref. 3.1-3, Section VI).

The containment design for Unit 2 employs the BWR Mark II concept of over-under pressure suppression with multiple downcomers connecting the reactor drywell to the water-filled pressure suppression chamber. The primary containment is a steel lined, reinforced concrete enclosure housing the reactor and pressure suppression pool.

The Reactor Building encloses the primary containment. This structure provides a secondary containment barrier when the primary containment is closed and in service, and provides a primary containment barrier when the primary containment is open, as during refueling. The primary containment barrier safety function of the Reactor Building is to minimize ground-level release of airborne radioactive material.

The Reactor Building houses the refueling and reactor servicing equipment, new and spent fuel storage facilities, and other reactor auxiliary and service equipment. The outer wall of the Reactor Building is reinforced concrete up to the crane rail level above the refueling floor. Above the crane rail level, the superstructure is a steel frame using metal wall panels with sealed joints. Access to the building is through airlocks (Ref. 3.1-4, Chapter 1.1).

The stone dike and revetment ditch system along the shoreline of Lake Ontario provides NMP Units 1 and 2, respectively, with protection from flooding or wave action (Ref. 3.1-3, Section III.A.3.0; Ref. 3.1-2, Section 5.3.3.1).

3.1.2 NUCLEAR FUEL

The NMP reactors are licensed for uranium-dioxide fuel that is slightly enriched up to 4.95 percent by weight uranium-235. The uranium-dioxide fuel is in the form of pellets contained in Zircaloy tubes with welded end plugs to confine radionuclides. The tubes are fabricated into assemblies designed for loading into the reactor cores. The Unit 1 reactor core accommodates 532 fuel assemblies; the Unit 2 reactor core holds 764 fuel assemblies (Ref. 3.1-5, Section 5.2; Ref. 3.1-6, Section 4.2.1).

NMPNS currently replaces approximately one-third of the fuel assemblies in each reactor at an average interval of 24 months. Scheduled refueling outages are staggered so that both units are not offline at the same time. In the event of a maintenance outage, the 24-month cycle could be shortened. NMPNS operates the reactors such that the average burnup for fuel discharged from the reactors is approximately 40,000 megawatt-days per metric ton uranium (MWD/MTU) for Unit 1, and 47,500 MWD/MTU for Unit 2.

3.1.3 COOLING AND AUXILIARY WATER SYSTEMS

3.1.3.1 Water Use Overview

Water use associated with the operation of NMP consists of freshwater withdrawn from Lake Ontario, which is used primarily for cooling, and for the main condensers, auxiliary systems, and reactor shutdown heat removal, and municipal water from the Port of Oswego Authority, which is used for drinking water, makeup for demineralized water, and other miscellaneous purposes. NMPNS holds a Great Lakes Water Withdrawal Registration, issued by the New York State Department of Environmental Conservation (NYSDEC), that allows withdrawal of water from Lake Ontario (Ref. 3.1-7). Most of the water used for plant operations is returned to Lake Ontario. Net water consumption from the site includes evaporation losses (e.g., from the Cooling Tower), water in disposed solids or radwaste solutions, and other minor losses.

Cooling and service water systems are treated with sodium hypochlorite and other oxidants to control biofouling. Unit 1's system was installed in the 1990s (Ref. 3.1-8). The Unit 2 system was part of the Unit's original design, but due to corrosion problems, did not become operational until the mid-1990s (Ref. 3.1-9). Until zebra mussels (*Dreissena polymorpha*) were discovered in the NMP water intakes in 1989 (Ref. 3.1-10), fouling was likely to be caused by microscopic organisms and slimes, filamentous *Cladophora* algae, or the Asiatic clam (*Corbicula* sp). With the introduction of zebra mussels, additional measures have been taken to control colonization in the facility's water systems.

NMPNS's State Pollutant Discharge Elimination System (SPDES) permit (Ref. 3.1-11) specifies the molluscicides that may be used at NMP to control zebra mussels. An example is EVAC®, which has been used in recent years. A maximum limit of two treatments per year for each Unit is imposed and the applications are made in the warmer summer months when the organisms are certain to filter water and be exposed to the chemical. Units 1 and 2 each receive up to two 48-hour treatments. Unit 2 has one delivered at the submerged, offshore Intake Structure and the other is delivered at the onshore traveling screen inlets to the water systems. Unit 1 treatments are delivered onshore. The SPDES permit Special Conditions (Ref. 3.1-11) require 48-hour notification to the NYSDEC before EVAC® is applied, monitoring to ensure the effluent limits are met, and submission of an annual report by March 1 to the NYSDEC describing the effectiveness of the program and effluent analyses.

3.1.3.2 Cooling Water Systems

Cooling water systems for each Unit include a circulating water system (CWS) and a service water system. The CWS circulates cool water through the main condensers to condense steam after it passes through the turbine. The service water system circulates cooling water through heat exchangers that serve various plant components. Both the CWS and the service water system for Unit 1 are once-through systems. The service water system for Unit 2 is also a once-through system. However, the Unit 2 CWS is a closed-cycle system that uses a Cooling Tower, and some of the discharge from the service water system is added to the CWS to make up for losses due to evaporation and drift from the Cooling Tower.

Unit 1 and Unit 2 each have separate Intake and Discharge Structures located offshore in Lake Ontario, and each has a separate screenwell and pumphouse structure located onshore. The design and operating characteristics of these systems are generally described in the respective FES and SAR for each Unit (Ref. 3.1-1, Section 3.4; Ref. 3.1-2, Section 4.2.4 and Appendix G; Ref. 3.1-3; Ref. 3.1-4). Details of these systems and structures are described in the following paragraphs.

Unit 1

The Intake Structure is located approximately 850 feet from the existing shoreline in 18 feet of water. Water enters the intake tunnel through a bellmouth-shaped inlet. The inlet is surrounded by hexagonally shaped concrete guard structure, the top of which is about six feet above the lake bottom and 14 feet below the lowest anticipated lake water level. The structure is covered with a cap consisting of sheet piling supported on steel beams. Each of the six sides has a water inlet about five feet high by ten feet wide. Galvanized steel racks guard each of the six inlets. (Ref. 3.1-3, Section III.F.2.2) The design provides for water to be drawn equally from all horizontal directions with a minimum of disturbance and no vortex at the surface. When Unit 1 is at maximum output, the water velocity at the intake is approximately two feet per second (fps). From the Intake Structure, the water flows at a maximum velocity of eight fps through a concrete-lined tunnel approximately 78 square feet in cross section (10 foot diameter) to the Screen House and Pumphouse adjacent to the Turbine Building. From three separate, interconnected bays in the Screen House, two circulating pumps (total capacity 250,000 gallons per minute, or gpm) pump the water through the trash racks and traveling screens to the condensers at a maximum velocity of 0.85 fps (Ref. 3.1-1, Section 3.4.1; Ref. 3.1-3, Section XI.B.4).

The trash racks remove large items, such as logs and other debris. A total of three traveling screens, constructed of nine-millimeter mesh, collect smaller materials. Periodically, the traveling screens are rotated and washed to remove any accumulation of impinged organisms or other material into a sluiceway, which empties into an impingement collection basket during impingement monitoring. Otherwise, washwater and debris are discharged to the Lake. The aquatic organisms impinged at Unit 1 have been monitored from 1972 through 1997 in order to estimate species abundance and composition (Ref. 3.1-12, page 1-1).

The service water system is intended to provide strained lake water to various critical systems and be available to supply the Reactor Building cooling water system under all conditions of operation. Lake water from the intake tunnel passes through the trash racks and traveling screens in the Screen House and Pumphouse and floods the service water pump well. Two full-capacity 20,000 gpm pumps take suction from the well. Each pump is provided with a 0.03-inch mesh automatic self-cleaning strainer. Two emergency 3,600 gpm service water pumps provide back-up if the primary pumps fail (Ref. 3.1-3, Section X.F.2).

The discharge tunnel is 10 feet in diameter and approximately 78 square feet in cross section, and is designed for a flow velocity of approximately eight fps. The tunnel directs the heated water from the Screen House to a hexagonally shaped Discharge Structure located approximately 335 feet off shore. The Discharge Structure has six ports, each 3 feet high by 7.3 feet wide, located on the sides. The top of the Structure is approximately four feet above the lake bottom and approximately 8.5 feet below the lowest expected lake level. The transit time of water through the cooling water system is approximately six minutes, including 14 seconds for passage through the condensers. From the condensers to the exit at the Discharge Structure, travel time is approximately two minutes. As it exits the Discharge Structure, the effluent has an initial velocity of approximately four fps (Ref. 3.1-1, Section 3.4.2).

The configuration of the thermal plume from Unit 1 has been found to vary with wind-induced currents, wave action, and upwelling (Ref. 3.1-13, Section III). However, no relationship between the size and the extent of the plume and either wind speed or station heat load has been demonstrated, reflecting the stochastic nature of the plume as influenced by lake hydrodynamics. In 25 surveys, the size of the plume, defined as the area or volume within the 2°C (35.6°F) above ambient isotherm, has varied between 34 and 370 surface acres and 54 and 1,229 acre-feet. A frequency analysis determined that the median plume size (50^{th} percentile) is approximately 120 surface acres; the plume exceeded 160 surface acres 30 percent or more of the time. The 160 surface-acre plume was estimated to extend approximately 1,875 feet on each side of the discharge point along the shore, and a maximum distance of nearly 2,400 feet offshore. As is typical of heated discharges, the warmer water in the plume is buoyant and thus largely a surface phenomenon. The 160 surface-acre plume had a volume of 350 acre-feet, and a calculated depth from the surface of 2.19 feet.

The current SPDES permit allows a maximum daily discharge temperature of 115°F from Unit 1. The maximum allowable intake-discharge temperature difference is 35°F (Ref. 3.1-11, Part 1, page 2 of 18).

Unit 2

The closed-loop CWS for Unit 2 employs a single-cell, wet-evaporative, 541 foot-high natural draft cooling tower with a counter-flow design. The CWS uses the service water system as a makeup source (Ref. 3.1-4, Chapter 1.2.8.7). The lake intake system conveys required cooling water from Lake Ontario through two identical submerged Intake Structures located approximately 950 feet and 1,050 feet from the existing shoreline. Each Intake Structure is hexagonal, with a 7.5-foot wide by 3 foot high intake opening on each side, and a 1.6 foot-thick roof or velocity cap. The total area of the 12 openings is designed to provide a maximum approach velocity of 0.5 fps while drawing water through both structures. The 12 openings are equipped with vertical bar racks that have 10 inches of clear spacing between the bars to prevent large debris from entering the intake system. Each bar rack consists of nine vertical bars for each opening, of which seven are electronically heated to eliminate the potential for frazil ice adhesion. Each Intake Structure is independently connected to the onshore screenwell by a 4.5-foot diameter concrete intake tunnel. At the onshore screenwell, each intake tunnel connects to a separate vertical shaft. Intake water travels at a velocity of approximately three fps in the intake tunnel and approximately one fps in the vertical shafts. After passing through the two vertical shafts, the water enters the onshore Screenwell Building, which has a floor elevation of 224 feet. Water from both vertical shafts merges into a common Intake Forebay, which is divided at its downstream end into two four-foot-wide screenbays. An angled, flush-mounted traveling screen and two trash racks, one upstream and one downstream from the traveling screen, are located in each screenbay. Unit 2 is equipped with a fish diversion system. Fish entering the screenbays pass through the trash racks and are guided by the angled, flush-mounted traveling screens into a six-inch-wide bypass slot at the downstream end of the screen. The two slots converge and, at their junction, the fish are transported through a funnel-shaped transition to two pipes that merge into a single pipe leading to a jet pump. The bypass flow and fish are then transported by the jet pump through this pipe to a vertical riser that discharges into the Lake in an easterly direction, parallel to the lake bottom (Ref. 3.1-4, Chapter 9.2.5.2.1). This fish diversion system reduces the number of fish impinged upon the traveling screens (Ref. 3.1-2, Section 4.2.4.1).

The trash racks upstream of the traveling screens are cleaned by a motorized rake. The traveling screens are cleaned by a water spray wash system that is actuated either by a timer or a high differential pressure across the screens. The debris washed from the screens is directed into a trash trough that empties into a perforated trash basket. Water passes through the two screenbays, which merge into a common bay (Ref. 3.1-4, Chapter 9.2.5.2.1).

The Unit 2 service water system is a once-through system and provides cooling water to various essential and nonessential components throughout the plant. Essential components are serviced by two 100 percent redundant subsystems. The nonessential components are automatically isolated in the event of a Loss of Coolant Accident (LOCA). After passing through the system, the discharge is returned to Lake Ontario and/or to the CWS as makeup (Ref. 3.1-4, Chapter 1.2.10.3).

The Unit 2 discharge system consists of an onshore discharge bay, a discharge tunnel, and a two-port diffuser. The cooling water discharge consists of that portion of service water not used for makeup to the CWS, plus a portion of the circulating water flow that is discharged to maintain dissolved solids at an appropriate equilibrium in the system (i.e., cooling water blowdown). This discharge is conveyed to the discharge bay, which is located on the west side of the two intake shafts and is separated from them by a wall that acts as a weir. The discharge tunnel terminates at a point approximately 1,500 feet from the existing shoreline, where the discharge enters a 4.5 foot diameter steel riser leading to a two-port diffuser located approximately three feet above the lake bottom. Water exits the diffuser nozzles at an approximate velocity of 18 fps (Ref. 3.1-4, Chapter 9.2.5.2.2).

During normal operation, an average total flow of 53,600 gallons per minute is withdrawn from the lake: 38,675 gallons per minute for the service water system and 14,925 gallons per minute for the fish diversion system. The closed-loop CWS uses discharge from the service water system for its makeup requirements. The CWS is designed to convey 580,000 gallons per minute of cooling water between the main condenser and the Cooling Tower. As discussed previously, makeup water for the closed-loop CWS is obtained from the service water system; therefore, the only cooling water withdrawn from Lake Ontario is for the service water requirements and fish diversion system. Makeup flow to the CWS fluctuates due to meteorological conditions and CWS blowdown rates. The Cooling Tower blowdown flow design rate ranges from 8,445 to 20,440 gallons per minute. During icing conditions, the tempering rate is approximately 3,000 gallons per minute. The rates are based on copper concentrations present in the cooling water systems and are a function of Unit 2's SPDES permit limitations (Ref. 3.1-11). Both the Cooling Tower evaporation rate and the total plant discharge rate depend on meteorological conditions. The estimated cooling tower evaporation rate ranges from 4,560 to 13,800 gallons per minute. The combined plant discharge flow ranges from a minimum of 23,055 gallons per minute to a maximum of 35,040 gallons per minute during normal operation. During normal shutdown, the maximum plant discharge is approximately 48,800 gallons per minute (Ref. 3.1-14, pages 3.4-1, 3.4-2, and 3.4-4).

The current SPDES permit allows a maximum daily discharge temperature of 110°F from Unit 2 and a maximum allowable intake-discharge temperature difference of 30°F (Ref. 3.1-11, Part 1, page 3 of 18). The initial discharge temperature rise is diluted in excess of 10:1 for all discharge conditions, and because the dilution is achieved in the near-field, it does not vary with meteorological conditions. The maximum surface temperature rise meets the New York State surface temperature criteria for Lake Ontario, as described in 6 New York Code of Rules and Regulations Sections 704.2 and 704.3 of 3°F; therefore, no surface mixing zone is required (Ref. 3.1-14, page 5.3-25).

3.1.3.3 Municipal Water Supply

Domestic water for drinking and to satisfy the flow and pressure requirements of all installed plumbing fixtures is supplied by the Port of Oswego Authority via a water main that is owned and operated by NMPNS. In addition to domestic water needs, this water supply is the raw water source for the NMP water treatment facility, which provides demineralized water to various plant systems. In addition to NMP, the water main serves the municipal water needs of a number of private residences, at least one commercial business, and the adjacent James A. Fitzpatrick Plant. Water quality is in accordance with applicable standards promulgated by the State of New York. Based on recent quarterly billings from the Port of Oswego Authority and internal information, NMPNS estimates water use from this system to be approximately 172,000 gallons per day for NMP.

3.1.3.4 Sanitary Drains and Disposal System

Wastewater flows by gravity, and where needed, is pumped via lift stations from the NMP Units 1 and 2 facilities, the Energy Information Center and the Nuclear Learning Center to the Unit 1 Sewage Treatment Plant, located east of the Energy Information Center. After preliminary treatment to shred large solids, the flow is pumped via dual force main consisting of a four inch and a six inch pipe to the adjacent treatment units by two pumps, with a third acting as installed standby. Wastewater enters a flow distribution structure and is split evenly by weirs to two extended aeration (activated sludge) units each 2,800 cu. feet in volume. Only one of the aeration units is required to handle current wastewater volumes. From there, the mix liquor is sent to a settling tank/clarifier, one for each aeration unit. The clarifiers are center feed with radial outward flow to facilitate separation of the sludge. Scum is removed from the final settling tanks by a rotary wiper arm and then drawn over a short inclined beach and discharged to a scum trough. The scum is flushed to a scum well and air lifted to the aerated sludge holding tanks. Some of the sludge is recycled back to the head of the aeration tanks to maintain constant mixed liquor, suspended solids, and solids retention time in the aeration tanks. Excess sludge is concentrated in the aerated sludge holding tanks, then dewatered by means of evaporation and drainage via an underground drainage system. Water from the drainage system is periodically pumped to the influent of the treatment plant. Treated effluent undergoes chlorination and subsequent dechlorination before being discharged via a 12-inch pipe to a drainage ditch eventually flowing to Lake Ontario (Ref. 3.1-3, Section III.E.2.2.1; Ref. 3.1-4, Chapter 1.2.10.10). The discharge is permitted as Outfall 030. The effluent is monitored for flow, biochemical oxygen demand, suspended solids, settable solids, pH, and total residual chlorine. Maximum permitted flow is 120,000 gallons per day as 30-day average (Ref. 3.1-11, page 9). Daily flow ranges from 35,000 to 240,000 gallons per day (Ref. 3.1-3, Section III.E.2.2.1). NMPNS operates the plant in accordance with applicable local, state, and federal discharge limitations (Ref. 3.1-4, Chapter 9.2.4).

3.1.3.5 Groundwater Use

NMPNS does not use groundwater in any of the NMP water systems and there are no production wells on the site. The Unit 1 Reactor Building has a peripheral drain for collecting any groundwater seepage which is then pumped to the Lake (see Section 2.2). The Unit 2 Reactor Building area is actively dewatered (see Section 2.2).

3.1.4 POWER TRANSMISSION SYSTEMS

Overview

Power output from NMP is connected to the grid by three single-circuit 345-kilovolt (kV) lines (see Figure 3.1-2). Two of these lines connect to the Unit 1 345kV Switchyard (Nine Mile 1 – Clay Line 8 and Nine Mile 1 – Scriba Line 9), and the remaining line connects to the Unit 2 345kV Switchyard (Nine Mile – Scriba Line 23). Two of these lines (Line 9 and Line 23) connect to the grid at the Scriba Substation, located approximately 2,000 feet southeast of the NMP Switchyards. Line 8 extends approximately 26 miles southeast on a 500-foot-wide corridor owned by Niagara Mohawk, a National Grid Company (Niagara Mohawk) and connects to the grid at the Clay Substation. These three 345kV lines were addressed in the FESs for Unit 1 and Unit 2 and are further addressed in Chapter 4.0 of this environmental report.

Unit 1 and Unit 2 each have a 115kV Switchyard that brings in offsite power. Unit 1 has two single-circuit 115kV lines: South Oswego – Nine Mile Line 1 and Nine Mile 1 – Fitzpatrick Line 4. Unit 2 also has two single-circuit 115kV lines: Nine Mile 2 – Scriba Line 5 and Nine Mile 2 – Scriba Line 6.

Four additional 345kV lines (Scriba – Volney Lines 20 and 21, Independence – Scriba Line 25, and Independence – Clay Line 26) lines and two 115kV lines (NMP – Lighthouse Hill Line 4 and Oswego – NMP Line 1) share the 500-foot corridor with Line 8 for all or part of the approximate 8.5 mile distance between the Scriba and Volney Substations. However, at no point are there more than four 345kV lines within the 500-foot corridor, because Lines 25 and 26 enter the corridor at the same location and Line 25 travels north to Scriba, while Line 26 goes south around Volney to Clay. Two 345kV lines (Volney – Clay Line 6 and Independence – Clay Line 26) share the corridor with Line 8 for the 17.5-mile distance between Volney and Clay Substations (see Figure 3.1-2).

The following subsections provide a more detailed description of transmission lines from the Unit 1 and Unit 2 Switchyards.

Unit 1

Unit 1 has a 345kV Switchyard and a 115kV Switchyard. The Switchyards are side by side. At the time of Unit 1's construction, the output of the main generator was connected via two single-circuit 345kV lines (Line 8 and Line 9) to the grid at NMPC's Clay Substation, which is located approximately 26 miles southeast of the NMP site. In anticipation of additional lines, a 500-foot corridor was purchased by NMPC and Line 8 and Line 9 were constructed in the middle of the corridor. In addition to the two 345kV lines, the corridor also accommodated two 115kV lines (South Oswego – Nine Mile Line 1 and Indeck – Lighthouse Line 2) on its western edge for about four miles, where they join NMPC's Lighthouse Hill-Oswego 115kV grid (Ref. 3.1-1, Section 3.8).

With the construction of Unit 2, Line 9 was rerouted so that it left the Unit 1 Switchyard and connected to the grid at NMPC's then-new Scriba Substation. Line 8 continued to connect to the grid at the Clay Substation, although construction of the Volney Substation approximately 8.5 miles southeast of Unit 1 resulted in a realignment of Line 8 in the immediate area of that facility. When Line 8 was constructed, it was supported on wooden H-frame poles for 25 miles. Lattice steel towers were used for the initial 1.7 miles out of the Unit 1 Switchyard and the final 0.3-mile into Clay Substation (Ref. 3.1-1 Section 3.8). These structures continue to be used. Wooden pole structures were used when the line was realigned at Volney Substation. The two 115kV lines (South Oswego – Nine Mile 1 Line 1 and Indeck – Lighthouse Hill Line 2) still occupy the western edge of the right-of-way (ROW). However, the Indeck-Lighthouse Hill Line 2 is no longer connected to the NMP Unit 1 Switchyard; rather, it connects to Scriba Substation. With construction of the neighboring James A. Fitzpatrick Plant, a new 115kV line (Nine Mile 1-Fitzpatrick Line 4) was built. This line runs in an east-west direction between the Unit 1 115kV Switchyard and the Fitzpatrick 115kV Switchyard (see Figure 3.1-2; Ref. 3.1-3, Section IX.B.1.0).

Unit 2

Line 23, a single-circuit 345kV line, connects the output of Unit 2 to the grid at Scriba Substation, which was constructed at the time Unit 2 was built. The line originates in the Unit 2 345kV Switchyard and is routed south approximately 2,000 feet to the Scriba Substation on tubular steel poles. In addition to Line 23, two single-circuit 115kV lines were also constructed (Nine Mile 2 - Scriba Line 5 and Nine Mile 2 - Scriba Line 6) to provide offsite power. Line 5 exits the north side of Scriba Substation parallel to Line 23 and enters the Unit 2 115kV Switchyard. The distance between the two lines varies up to a maximum of 200 feet. Line 6 exits the Scriba Substation from the south, and is routed eastward approximately 1,200 feet then redirected to the north approximately 4,500 feet towards the Unit 2 115kV Switchyard (Ref. 3.1-4, Chapter 8).

Transmission Facilities Ownership, Inspection, and Maintenance

In November 2001, a number of ownership changes occurred at NMPNS that impacted much of the NMP site, including the power transmission system. Scriba Substation is now owned by Niagara Mohawk and New York State Electric and Gas (NYSEG). The transmission corridor south of Lake Road is solely owned by Niagara Mohawk. The area between the Unit 1 Switchyards and the Unit 2 Switchyards up to the northern boundary of Lake Road is owned by NMPNS. All transmission lines are owned by Niagara Mohawk with the exception of Line 5, Line 6, and Line 23, which are owned by NMPNS. NMPNS owns 100 percent of the Unit 1 345kV and 115kV Switchyards and 82 percent of the Unit 2 345kV and 115kV Switchyards [the remaining 18 percent is owned by the Long Island Lighting Power Authority (LIPA)]. NMPNS has easements for access, construction, operation, maintenance, repair, alteration, and renovation for the three lines it owns that are located on the transmission corridor owned by Niagara Mohawk. Niagara Mohawk has easements with NMPNS for the lines owned by Niagara Mohawk that are located on property owned by NMPNS.

The 500-foot-wide transmission corridor between NMPNS and Clay Substation ranges from an elevation of 250 feet National Geodetic Vertical Datum (NGVD) at NMPNS to 400 feet NGVD at the substation. Land use and vegetation cover along the route remain generally as described when it was established, consisting predominantly of open farmland, wetlands, wooded areas, and pastureland (Ref. 3.1-1, Section 3.8).

Niagara Mohawk has a New York State Public Service Commission approved long-range vegetation management plan for the ROW (Ref. 3.1-15). This plan embodies the use of selected management techniques to foster the goal of maintaining a low-growing vegetative community and to keep the transmission facility free of interruptions from trees and tall-growing shrub species. Ongoing transmission corridor surveillance and maintenance of the facilities ensure continued conformance to design standards. Niagara Mohawk performs routine and emergency helicopter and foot patrols to inspect the transmission corridor and facilities. In addition to these routine patrols, Niagara Mohawk performs an annual assessment of each ROW in the spring and mid-summer to ensure the continued safe and reliable operation of the transmission system.

SECTION 3.1 FIGURES

FIGURE 3.1-1

POWER BLOCK

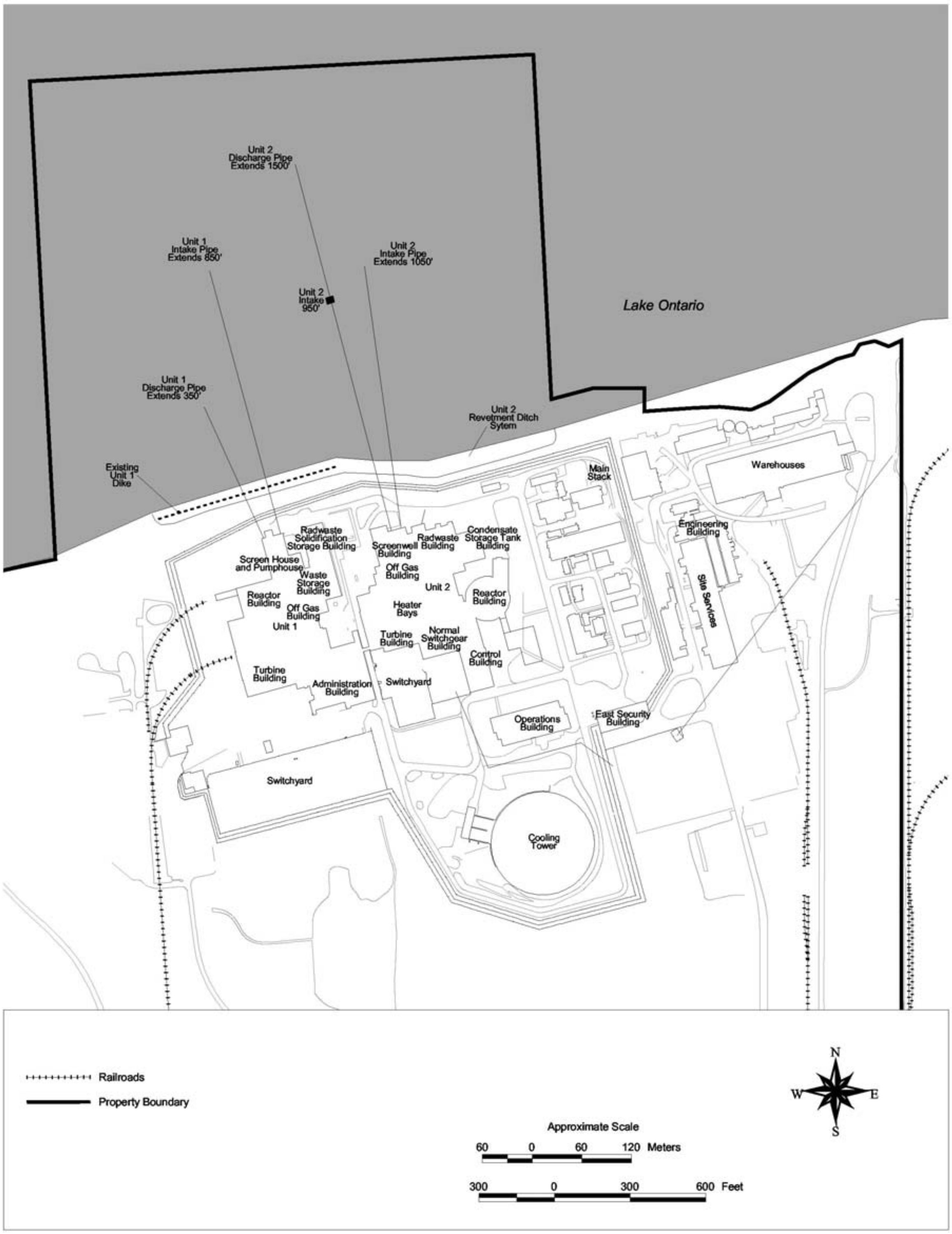
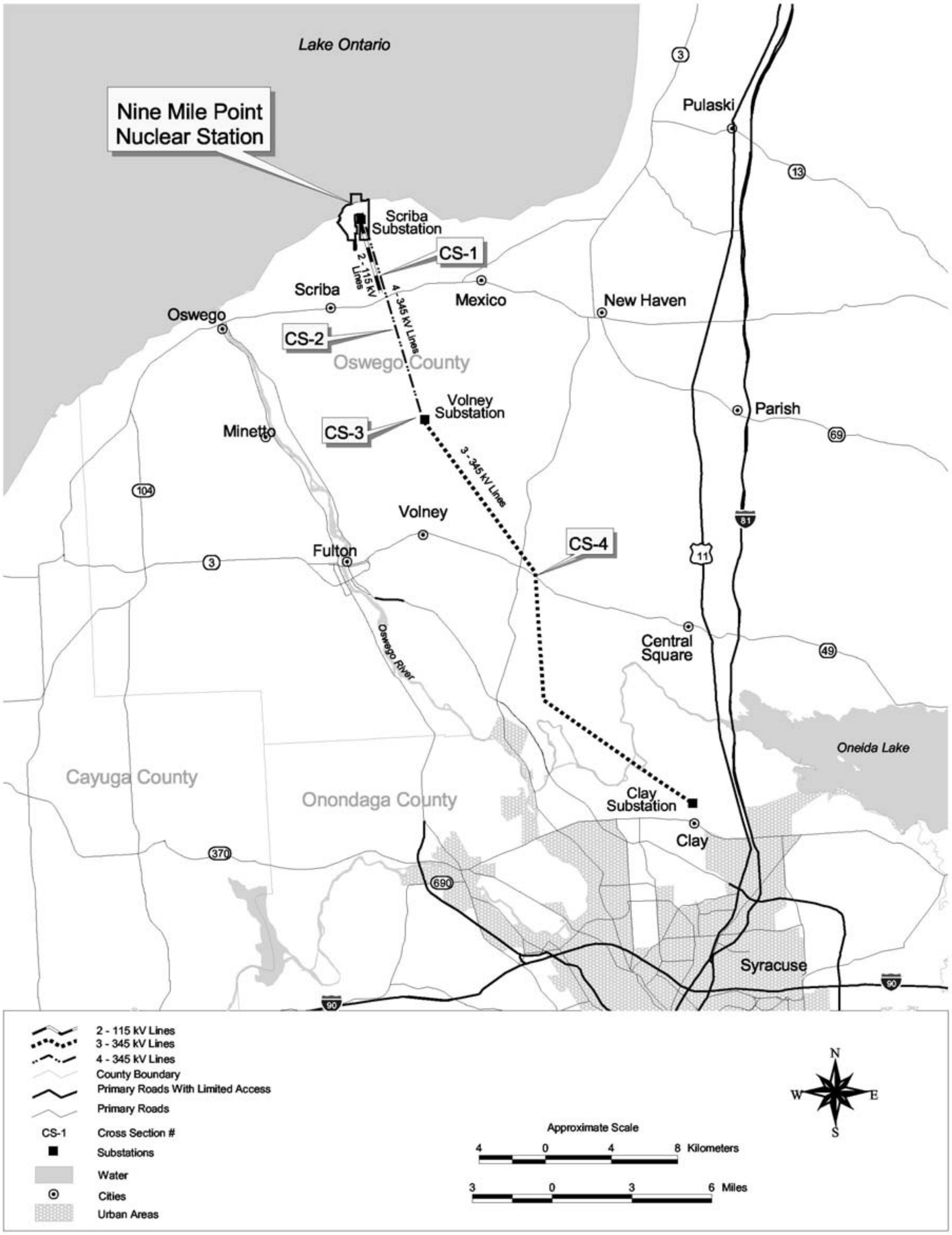


FIGURE 3.1-2

TRANSMISSION



3.2 REFURBISHMENT ACTIVITIES

NRC

"...The report must contain a description of...the applicant's plans to modify the facility or its administrative control procedures.... This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment…." 10 CFR 51.53(c)(2)

"...The incremental aging management activities carried out to allow operation of a nuclear power plant beyond the original 40-year license term will be from one of two broad categories: (1) SMITTR actions, most of which are repeated at regular intervals, and (2) major refurbishment or replacement actions, which usually occur fairly infrequently and possibly only once in the life of the plant for any given item…." (Ref. 3.1-16, Section 2.6.3.1, page 2-41.) ["SMITTR" is defined at GEIS Section 2.4, page 2-30 as surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping.]

In the GEIS (Ref. 3.1-16, Section 2.6 and Appendix B, Table B.2), the NRC identifies plant refurbishment activities that licensees might perform for license renewal. Performing such major refurbishment activities would necessitate changing administrative control procedures and modifying the facility. The NRC's GEIS analysis assumed that an applicant would begin any major refurbishment work shortly after the NRC granted a renewed license and would complete the activities during five outages, including one major outage at the end of the 40th year of operation. The GEIS refers to this as the refurbishment period.

GEIS Table B.2 lists major license renewal refurbishment activities that the NRC anticipated licensees might undertake. In identifying these activities, the NRC intended to encompass actions that typically take place only once in the life of a nuclear power plant, if at all. The GEIS analysis assumed that a licensee would undertake these activities solely for the purpose of extending plant operations beyond 40 years and would undertake them during the refurbishment period. The NRC indicates in the GEIS that many licensees will have undertaken various major plant refurbishment activities to support the current license period but that some might undertake such tasks only to support extended plant operations.

NMPNS has performed some major construction activities at NMP (e.g., replacement and resleeving of Unit 1 feedwater heaters, installation of emergency core cooling system pump strainers for both units, complete retubing of the Unit 1 condenser in the 1980's, and replacement of the Unit 2 LP rotors in the 1990's).

However, the integrated plant assessment that NMPNS has conducted under 10 CFR 54 and submits as part of this application has not identified the need to undertake any major refurbishment or replacement actions to maintain the functionality of important systems, structures, or components during the NMP license renewal period, or any modifications related to license renewal. Therefore, no major refurbishments or modifications have been identified that would directly affect the environment or plant effluents that affect the environment.

3.3 PROGRAMS AND ACTIVITIES FOR MANAGING THE EFFECTS OF AGING

NRC

"...The report must contain a description of...the applicant's plans to modify the facility or its administrative control procedures....This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment…." 10 CFR 51.53(c)(2)

"...The incremental aging management activities carried out to allow operation of a nuclear power plant beyond the original 40-year license term will be from one of two broad categories: (1) SMITTR actions, most of which are repeated at regular intervals, and (2) major refurbishment or replacement actions, which usually occur fairly infrequently and possibly only once in the life of the plant for any given item…." (Ref. 3.1-16, Section 2.6.3.1, page 2-41.) ["SMITTR" is defined at GEIS Section 2.4, page 2-30 as surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping]

In accordance with NRC regulation 10 CFR 54, NMPNS has performed an aging management review of Units 1 and 2 and has included in the license renewal application an integrated plant assessment that identifies how NMPNS would manage the effects of aging on systems, structures, and components. In some cases, existing NMP programs adequately address aging effects with no license renewal modification. In other cases, NMPNS has identified necessary modifications to existing programs, or development and implementation of new programs.

Appendix A of the NMP License Renewal Application contains a separate supplement for each Unit's Final Safety Analysis Report. In accordance with NRC requirements [10 CFR 54.21 (d)], the supplements contain descriptions of the programs and activities for managing the effects of aging at the NMP power station and the evaluation of time-limited aging analyses for the period of extended operation.

3.4 EMPLOYMENT

3.4.1 CURRENT WORKFORCE

NMPNS employs a permanent workforce of approximately 1,281 employees, a number that is within the range of 600 to 800 personnel per reactor unit that the NRC estimates in the GEIS (Ref. 3.1-16, Section 2.3.8.1). Approximately 72.7 percent of the workforce lives in Oswego County and 23.3 percent lives in Onondaga County. Both Counties are located within the Syracuse Metropolitan Statistical Area (MSA), which also includes Cayuga and Madison Counties. The remaining employees live in various other locations.

NMPNS refuels each NMP unit at 24-month intervals staggered so that one outage is scheduled every 12 months. During refueling outages, site employment increases by as many as 1,000 to 1,250 workers for temporary (30 to 40 days) duty.

3.4.2 LICENSE RENEWAL INCREMENT

Performing the license renewal surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping (SMITTR) activities discussed in Section 3.3 would necessitate increasing NMP staff workload by some increment, the size of which would be a function of the schedule within which NMPNS must accomplish the work and the amount of work involved.

In the GEIS (Ref. 3.1-16, Section 2.6.2.7), NRC assumes that it would issue a renewed license to a nuclear power plant for a maximum of 20 years plus the remaining duration of the current license and that the renewal would be issued approximately 10 years prior to the current license expiration. Using the NRC's assumption, the renewed license would be effective for 30 years. The NRC determined that the utility would initiate SMITTR activities when the renewed license is issued and would conduct license renewal SMITTR activities throughout the remaining life of the plant, sometimes during full power operation (Ref. 3.1-16, Section B.3.1.3), but mostly during normal refueling, and during 5-year and 10-year in-service inspections during refueling outages (Ref. 3.1-16, Table B.4).

NMPNS has determined that the NRC's scheduling assumptions in the GEIS are reasonably representative of NMP incremental license renewal workload scheduling. Many SMITTR activities that Section 3.3 refers to would have to be performed during outages. Although some license renewal SMITTR activities would be one-time efforts, others would be recurring, periodic activities that would continue for the lives of the Units.

The NRC estimates in the GEIS that no more than 60 additional personnel per reactor would be needed to perform license renewal SMITTR activities during the three-month duration of a 10-year in-service inspection and refueling outage. Having established this upper value for what would be a single event in the license renewal period, the NRC uses this number in the GEIS as the expected number of additional permanent workers needed per unit attributable to license renewal. In GEIS Section C.3.1.2, the NRC uses this approach in order to “...provide a realistic upper bound to potential population-driven impacts….”

NMPNS expects that existing “surge” capabilities for routine activities such as outages will enable its employees to perform the increased SMITTR workload without additional permanent staff. Nevertheless, for the purpose of performing its own analyses in this environmental report, NMPNS is adopting the NRC’s GEIS approach with one alteration. NMPNS license renewal plant modifications would be SMITTR activities that would be performed mostly during outages, and NMPNS would stagger outage schedules so that both units would not be down at the same time. Therefore, NMPNS believes it is unreasonable to assume that each unit would need an additional 60 workers. Instead, as a reasonably conservative high estimate, NMPNS is assuming that no more than 60 additional permanent workers would be required to perform license renewal SMITTR activities at NMP.

Adding full-time employees to the plant workforce for operating during the license renewal period would have the indirect effect of creating additional jobs and related population growth in the community. Using RIMS II (Regional Input-Output Modeling System), the U.S. Bureau of Economic Analysis calculated a regional employment multiplier appropriate for the electric services (utilities) sector for the Oswego and Onondaga combined-county area. NMPNS used this value (3.3808) to estimate the number of direct and indirect jobs supported by the 60 additional NMPNS employees that might be needed during the NMP license renewal period (Ref. 3.4-1). Applying the multiplier, a total of 203 (60 × 3.3808) new jobs would be created in an area with a 2001 labor force of 283,100 workers. These 203 new direct and indirect jobs represent less than 1 percent of the current total employment in the Onondaga and Oswego combined-county area (see Section 2.6 of this environmental report). In summary, NMPNS is assuming that 60 additional permanent direct workers during the NMP license renewal period would create an additional 143 indirect jobs in the community.

These 203 new jobs (60 direct and 143 indirect) could result in a population increase of 530 in the area [203 jobs multiplied by 2.61 average number of persons per household in the State of New York (Ref. 3.4-2)]. This increase represents approximately 0.1 percent of the Census Bureau’s estimated population in year 2000 (580,713 persons) for the combined area of Oswego and Onondaga counties.

3.5 REFERENCES

3.1-1 U.S. Atomic Energy Commission. *Final Environmental Statement Related to the Operation of Nine Mile Nuclear Station Unit 1*; Niagara Mohawk Power Corporation. Docket No. 50-220. Directorate of Licensing. Washington, D.C. January 1974.

3.1-2 U.S. Nuclear Regulatory Commission. *Final Environmental Statement Related to the Operation of Nine Mile Nuclear Station Unit 2;* Niagara Mohawk Power Corporation, Rochester Gas and Electric Corporation, Central Hudson Gas and Electric Corporation, New York State Electric and Gas Corporation, Long Island Lighting Company. Docket No. 50-410. Office of Nuclear Reactor Regulation. Washington, D.C. May 1985.

3.1-3 Niagara Mohawk Power Corporation. *Nine Mile Point Nuclear Station Unit 1 Final Safety Analysis Report (Updated).* Revision 17. October 2001.

3.1-4 Nine Mile Point Nuclear Station, LLC. *Nine Mile Point Nuclear Station Unit 2 Updated Safety Analysis Report.* Revision 15. October 2002.

3.1-5 Nine Mile Point Nuclear Station, LLC. “Radiological Technical Specifications.” Amendment 180. Appendix A to *Nine Mile Point Unit 1 Facility Operating License No. DPR*-63. Docket No. 50-220. March 27, 2003.

3.1-6 Nine Mile Point Nuclear Station, LLC. Long Island Lighting Corporation. “Appendix A, Improved Technical Specifications.” *Amendment 108 to Nine Mile Point Unit 2 Facility Operating License*. Docket 50-410. February 21, 2003.

3.1-7 New York State Department of Environmental Conservation. *Great Lakes Water Withdrawal Registration Certificate 3811*. Division of Water. November 20, 2001.

3.1-8 Niagara Mohawk Power Corporation. “Quality Assurance Audit Reports on Nine Mile Point Units 1 and 2 Service Water Systems.” July 1, 1993.

3.1-9 Niagara Mohawk Power Corporation. “1996 Annual Environmental Operating Report.” April 30, 1997.

3.1-10 McMahan, R.F. “Review of the Zebra Mussel Fouling Mitigation and Control Program at Niagara Mohawk Power Corporation Nine Mile Point Units I and II Nuclear Power Stations.” March 25, 1991.

3.1-11 New York State Department of Environmental Conservation. *State Pollutant Discharge Elimination System (SPDES) Permit No. NY-000 1015*. Division of Environmental Permits, Region 7. July 21, 2003.

3.1-12 *Final SPDES Annual Biological Monitoring Report Nine Mile Point Nuclear Station, 1997*. EA Engineering, Science, and Technology. Newburgh, New York. April 1998.

3.1-13 Niagara Mohawk Power Corporation. "Nine Mile Point Unit 1 316(a) Demonstration Submission, NPDES Permit NY 0001015." West Syracuse, NY. 1975.

3.1-14 Niagara Mohawk Power Corporation. *Environmental Report Operating License Stage Nine Mile Point Nuclear Station Unit 2*. Volume 1. February 8, 1985.

3.1-15 *Transmission Right-of-Way Management Program*. Environmental Affairs and System Forestry Departments. Niagara Mohawk Power Corporation. Syracuse, New York. Revised October 1989.

3.1-16 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

3.4-1 U.S. Department of Commerce Bureau of Economic Analysis. *RIMS II Multipliers for Onondaga and Oswego County, New York*. Washington, D.C. May 2, 2002.

3.4-2 U.S. Census Bureau. *Profile of General Demographic Characteristics. 2000 Census of Population and Housing. New York.* Washington D.C. May 2001. http://www.census.gov/census2000/states/ny.html. Accessed March 6, 2002.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND MITIGATING ACTIONS

NRC

The environmental report shall discuss the "…impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance[.]" 10 CFR 51.45(b)(1) as adopted by 51.53(c)(2)

The report "...should not be confined to information supporting the proposed action but should also include adverse information." 10 CFR 51.45(e)

4.1 INTRODUCTION

Chapter 4 presents an assessment of the environmental consequences and potential mitigating actions associated with the renewal of the Nine Mile Point Units 1 & 2 (NMP) operating licenses. The U.S. Nuclear Regulatory Commission (NRC) has identified and analyzed 92 environmental issues that it considers associated with nuclear power plant license renewal and has designated the issues as Category 1, Category 2, or Not Applicable (NA). The NRC has designated the issues as "Category 1" if, after analysis, the following criteria were met:

- The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic; and
- A single significance level (i.e., small, moderate, or large) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level-radioactive waste and spent-fuel disposal); and
- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

If the NRC analysis concluded that one or more of the Category 1 criteria could not be met, the NRC designated the issue as Category 2. The NRC requires plant-specific analyses for Category 2 issues. The NRC designated two issues as "NA," signifying that the categorization and impact definitions do not apply to these issues. NRC rules do not require analyses of Category 1 issues that the NRC has resolved using generic findings [10 CFR 51.53(c)(3)(i)] based on its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (Ref. 4.1-1). An applicant may reference the generic findings or GEIS analyses for Category 1 issues.

Appendix A of this Nine Mile Point Nuclear Station, LLC (NMPNS) environmental report lists the 92 issues with their NRC-assigned categorizations, identifies the environmental report and GEIS sections that address each issue, and notes each issue's applicability to either Unit 1 or Unit 2, or both. For those issues not applicable, a notation gives the basis for that designation. The issues are numbered in the same order in which they are listed in Table B-1 of Appendix B to Subpart A of 10 CFR 51, for ease of reference.

4.1.1 CATEGORY 1 LICENSE RENEWAL ISSUES

NRC

"The environmental report for the operating license renewal stage is not required to contain analyses of the environmental impacts of the license renewal issues identified as Category 1 issues in Appendix B to subpart A of this part." 10 CFR 51.53(c)(3)(i)

"…[A]bsent new and significant information, the analysis for certain impacts codified by this rulemaking need only be incorporated by reference in an applicant's environmental report for license renewal…." (61 *Federal Register*, page 28483).

NMPNS has determined that of the 69 Category 1 issues, six do not apply to either Unit 1 or Unit 2 because they apply to design, operational, or location features that do not exist at the NMP facility. These features are intake and discharge from an ocean, an estuary, or a small river; Ranney wells; use of groundwater for service and potable water; and cooling ponds (Appendix A, Table A-1). In addition, because NMPNS does not plan to conduct any major refurbishment activities, the NRC findings for the seven Category 1 issues that apply only to refurbishment clearly overestimate NMP refurbishment impacts and do not apply (Section 3.3; Appendix A, Table A-1). NMPNS has reviewed the NRC findings and has identified no new and significant information, or become aware of any such information that would make the NRC findings inapplicable to NMP. Therefore, NMPNS adopts by reference the NRC findings for the 56 Category 1 issues that NMPNS determined to be applicable to either Unit 1 or Unit 2, or both. Of the applicable Category 1 issues, Issue 12, Water Use Conflicts (plants with once-through cooling systems), applies only to Unit 1. Six Category 1 issues apply only to Unit 2 because its design includes a heat dissipation system cooling tower.

4.1.2 CATEGORY 2 LICENSE RENEWAL ISSUES

NRC

"The environmental report must contain analyses of the environmental impacts of the proposed action, including the impacts of refurbishment activities, if any, associated with license renewal and the impacts of operation during the renewal term, for those issues identified as Category 2 issues in Appendix B to subpart A of this part…." 10 CFR 51.53(c)(3)(ii)

"The report must contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues…." 10 CFR 51.53(c)(3)(iii)

The NRC designated 21 issues as Category 2. As in the case of Category 1 issues, some Category 2 issues (five) do not apply to design, operational, or location features that exist at NMP (Appendix A, Table A-1). These issues and their bases for exclusion are listed below:

Issue	Basis for Exclusion
13. Water use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	Not applicable because NMP is not located on a small river.
34. Groundwater use conflicts (plants using cooling towers withdrawing makeup water from a small river)	Not applicable because NMP is not located on a small river.
35. Groundwater use conflicts (Ranney wells)	Not applicable because NMP does not use Ranney wells.
39. Groundwater quality degradation (cooling ponds at inland sites)	Not applicable because NMP is not equipped with cooling ponds.
57. Microbiological organisms (public health)(plants using cooling ponds, lakes, or canals that discharge to a small river)	Not applicable because NMP is not located on a small river or small lake, and is not equipped with cooling ponds.

Sections 4.2 through 4.17 of this environmental report address the Category 2 issues applicable to either Unit 1 or Unit 2, or both, and the four issues that apply to refurbishment activities. Each section begins with a statement of the issue, and explains why the NRC was not able to generically resolve the issue. If the issue does not warrant detailed analysis, NMPNS explains the basis for inapplicability.

If the subject Category 2 issue has been determined by NMPNS to be applicable to either NMP or specifically to Unit 1 or Unit 2, the section provides both details on the issue and the required detailed analysis. These analyses include conclusions regarding the significance of the impacts relative to renewal of the operating licenses for Unit 1 and Unit 2 and discuss potential mitigative alternatives, when applicable and to the extent required. NMPNS has determined that 12 Category 2 issues and the four Category 2 issues related to refurbishment warrant this detailed discussion. For each, NMPNS has identified the significance of the impacts associated with the issue as either small, moderate, or large, consistent with the criteria that the NRC established at 10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 3, as follows:

> Small – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the NRC has concluded that those impacts that do not exceed permissible levels in the NRC's regulations are considered small.
>
> Moderate – Environmental effects are sufficient to alter noticeably but not to destabilize any important attribute of the resource.
>
> Large – Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

In accordance with National Environmental Policy Act (NEPA) practice, NMPNS considered ongoing and potential additional mitigation in proportion to the significance of the impact to be addressed (i.e., impacts that are small receive less mitigative consideration than do impacts that are large).

4.1.3 "NA" LICENSE RENEWAL ISSUES

The NRC determined that its categorization and definitions of impact did not apply to two issues. Regarding chronic effects from electromagnetic fields (10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 5), the NRC noted that applicants currently do not need to submit analysis for this issue because no consensus has been reached by appropriate Federal health agencies that there are adverse health effects from electromagnetic fields. Likewise, applicants are not required to submit information regarding environmental justice, as the NRC will address the issue in a site-specific review (10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 6). However, the NRC has indicated that applicants include in the environmental report pertinent information to support an environmental justice review by the NRC (Ref. 4.1-2, Section 4.22). Therefore, NMPNS has included an environmental justice analysis in Section 4.17, along with supporting demographic information in Section 2.5.2.

4.2 ENTRAINMENT OF FISH AND SHELLFISH IN EARLY LIFE STAGES

NRC

"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act 316(b) determinations…or equivalent State permits and supporting documentation. If the applicant can not provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from…entrainment." 10 CFR 51.53(c)(3)(ii)(B)

"...The impacts of entrainment are small in early life stages at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems. Further, ongoing efforts in the vicinity of these plants to restore fish populations may increase the numbers of fish susceptible to intake effects during the license renewal period, such that entrainment studies conducted in support of the original license may no longer be valid...." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 25

The NRC made impacts on fish and shellfish resources resulting from entrainment a Category 2 issue because it could not assign a single significance level (small, moderate, or large) to the issue; the impacts of entrainment are small at many plants, but they may be moderate or large impacts at some plants. Also, ongoing restoration efforts may increase the number of fish susceptible to intake effects during the license renewal period (Ref. 4.1-1, Section 4.2.2.1). Information to be ascertained includes: (1) type of cooling system (whether once-through or cooling pond); and (2) current Clean Water Act Section 316(b) determination or equivalent state documentation.

This section addresses entrainment at Unit 1, which uses a once-through cooling water system. Unit 2 uses a closed-cycle cooling system that includes a cooling tower. The NRC has determined that entrainment impacts are small for all plants using closed-cycle cooling systems (10 CFR 51, Subpart A, Appendix B, Table B-1) and do not require site-specific analysis for purposes of license renewal.

Initial studies of entrainment at Unit 1 were conducted in the mid-1970s and summarized in 1983 (Ref. 4.2-1, Section 2.2.4). The purpose of that summary was to use data from Unit 1 and the nearby J.A. Fitzpatrick Power Plant (JAF) to project potential impacts for Unit 2, then not yet operational. For entrainment, the summary focused on the 1976 data, the first year that Nine Mile Point Unit 1 and JAF were both operational. The 1976 entrainment sampling program at Unit 1 yielded a number of eggs and larvae of fish species, typified by burbot (*Lota lota*) and *Coregonus* [cisco and/or lake herring] spp. in early spring, rainbow smelt (*Osmerus mordax*) in midspring, and alewife (*Alosa pseudoharengus*) in late spring/summer. Abundance was highest during summer, attributable to a large alewife population. Rainbow smelt was the second most abundant fish species entrained (Ref. 4.2-1, Section 2.2.4.1). Weekly average densities ranged from 0 to 34.4 eggs per cubic meter and 0 to 0.5 larvae per cubic meter for alewife. Corresponding densities for rainbow smelt were 0 to 0.15 eggs per cubic meter and 0 to 0.02 larvae per cubic meter (Ref. 4.2-1, Tables 2.2.4-2 and 2.2.4-3). Assuming full load and a maximum cooling-water flow rate at Unit 1 during the

1976 entrainment sampling program [i.e., 268,000 gallons per minute (gpm) or 1,014.5 cubic meters per minute] (Ref. 4.2-2, Section II-B), up to 350 million alewife eggs and 4.9 million larvae would have been entrained during the respective periods of maximum weekly density. Maximum weekly numbers of entrained rainbow smelt would have been 1.5 million eggs and 205,000 larvae.

Lawler, Matusky & Skelly Engineers (LMS) (Ref. 4.2-1, Section 2.2.4.2) placed their predicted entrainment losses at the future Unit 2 plant in perspective by comparing them to populations in Lake Ontario. Their estimates of lake populations may be used here to characterize the entrainment numbers at Unit 1. LMS estimated the standing stock of alewife in the U.S. waters of Lake Ontario in 1976 at 12.56 billion (Ref. 4.2-1, Table 2.2.6-3). Assuming a 1:1 sex ratio, this equates to 6.28 billion females. When the maximum weekly entrainment total of alewife eggs of 350 million is divided by the fecundity (number of eggs per female) of alewife of 26,272, the result is 13,322 females, which represents lost spawning capacity. When this number is divided by the lake population of 6.28 billion alewife females, the estimated loss of the lake population of females equates to 0.0002 percent. For alewife larvae, the peak weekly estimated number entrained of 4.9 million was compared to the estimated peak standing stock in the lake of 35 billion larvae. The entrainment loss represented 0.014 percent. Similar calculations for the rainbow smelt yielded a loss of female standing stock due to egg entrainment of 0.00001 percent and a loss of larval standing stock of 0.025 percent. These calculations were based on the peak weekly entrainment during 1976, but even if all weeks were included, the proportional losses to standing stocks in the Lake would be extremely small.

The studies of the 1970s also included evaluation of entrainment of lower trophic level organisms including phytoplankton, microzooplankton, and macrozooplankton (Ref. 4.2-1, Sections 2.2.1, 2.2.2, and 2.2.3). Species composition and abundance of phytoplankton and microzooplankton were found not to have changed substantively during the early years of operation of Unit 1, suggesting small, if any, impacts from Unit 1 operation. The macrozooplankton *Gammarus fasciatus* was examined in some depth with regard to future Unit 2 operation. Using the maximum cooling-water flow for Unit 1, and entrainment densities of *G. fasciatus* at the nearby JAF station in 1976, seasonal entrainment cropping at Unit 1 was found to be less than 1.0 percent of the standing stock in a nearfield area of 1,680 acres in all periods except January-February. Higher entrainment densities in January-February were considered anomalous by LMS (Ref. 4.2-1, Section 2.2.3). LMS referenced plankton entrainment studies from 1973 to 1976 and indicated that, “no substantial impacts from the operation of either Unit 1 or JAF have been noted.”

Based on the studies and impact evaluations through 1983, the New York State Department of Environmental Conservation (NYSDEC) stated in Additional Requirement II.4 of the State Pollutant Discharge Elimination System (SPDES) Permit (Ref. 4.2-3) that it “has contingently approved the applicant’s consideration of intake impacts submitted pursuant to Section 316(b) of the CWA,” subject to completion of a biological monitoring program and demonstration of impacts similar to previous studies.

The additional monitoring program required at that time did not include additional entrainment studies.

Entrainment sampling was again conducted in 1997, pursuant to Additional Requirement III.2 of the State Pollutant Discharge Elimination System (SPDES) Permit No. NY-000 1015 (Ref. 4.2-4, Section Additional Requirements III.2). Weekly day and night samples were collected from April through August (Ref. 4.2-5, Section 2.1). Although seven species and two additional family groups were represented in the collection of eggs and larvae as shown in Table 4.2-1 (Ref. 4.2-5, Table 3), abundance was overwhelmingly dominated by alewife, at greater than 95 percent of both egg and larval stages collected. Most alewife eggs and larvae were collected in July, but larvae were more abundant than eggs in August (Ref. 4.2-5, Table 4).

The total numbers of ichthyoplankton entrained at Unit 1 in 1997 were related to cooling-water flow. It was estimated that 86.8 million ichthyoplankton were entrained during the April-August period, of which 77.9 million (90.7 percent) were alewife eggs and larvae, and a relatively few juveniles (Ref. 4.2-5, Section 3.3). Tessellated darter was second-most abundant, with 3.6 million estimated entrained (4.2 percent), followed by threespine stickleback (2.4 million, 2.8 percent). The rainbow smelt, the second-most abundant fish entrained in the 1970s, was rare in the 1997 collection, representing only 0.1 percent of the total. These were almost entirely juveniles. Only one smelt egg and no larvae were collected. The low numbers of rainbow smelt may reflect reduced lake populations, as well as reduced cooling-water flow in April and May when smelt are most abundant in the area.

TABLE 4.2-1

LIST OF COMMON AND SCIENTIFIC NAMES OF ICHTHYOPLANKTON TAXA ENTRAINED AT NINE MILE POINT NUCLEAR STATION UNIT 1 DURING 1997 MONITORING PROGRAM

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Carp	*Cyprinus carpio*
Minnow family	*Cyprinidae*
Rainbow smelt	*Osmerus mordax*
Threespine stickleback	*Gasterosteus aculeatus*
Sunfish family	*Centrarchidae*
Tesselated darter	*Etheostoma olmstedi*
Yellow perch	*Perca flavescens*
Mottled sculpin	*Cottus bairdi*

Source: Ref. 4.2-5, Table 3.

Entrainment of ichthyoplankton in 1997 was much reduced relative to the 1970s. As noted above, an estimated 350 million alewife eggs and 4.9 million larvae were entrained during their respective peak weeks in 1976. In contrast, 77.9 million alewife eggs and larvae were entrained during the entire season in 1997. Millions of smelt eggs and larvae were entrained in 1976, but they were rare in 1997. The principal reason for the difference in entrainment between 1976 and 1997 was the difference in lakewide abundance of alewife and rainbow smelt. Stewart, et al. of the Great Lakes Fishery Commission (Ref. 4.2-6, page 6) reported in 1999 that the biomass of alewife and rainbow smelt in Lake Ontario had been reduced to one-half that recorded in the early 1980s. Alewife biomass reached a 20-year low in 1997, and further reductions were anticipated (Ref. 4.2-6, page 2). The reductions in forage fish populations were attributed to predation pressure from stocked salmon as well as changes in nutrient cycling brought about by the invasive zebra and quagga mussels (Ref. 4.2-6, page 2).

It is clear that entrainment of early life stages of fish at Unit 1 is a function of the species' abundance in the Lake. Given similar operation of Unit 1 between the 1970s and 1997, the proportion of available eggs and larvae entrained would be similar, that is, a negligible proportion of the lakewide populations. The fact that lakewide population abundance controls the level of entrainment abundance at Unit 1—and not the converse—supports a conclusion of minimal impact on populations from entrainment at Unit 1.

NMPNS concludes that impacts to lakewide fish populations as a result of entrainment of early life stages at Unit 1 would be SMALL during the license renewal period and mitigation would be unwarranted.

4.3 IMPINGEMENT OF FISH AND SHELLFISH

NRC

"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act 316(b) determinations…or equivalent State permits and supporting documentation. If the applicant can not provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from…impingement…."10 CFR 51.53(c)(3)(ii)(B)

"...The impacts of impingement are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems...." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 26

The NRC made impacts on fish and shellfish resources resulting from impingement a Category 2 issue because it could not assign a single significance level (small, moderate, or large) to the issue; the impacts of impingement are small at many plants, but they may be moderate or large impacts at some plants. Also, ongoing restoration efforts may increase the number of fish susceptible to intake effects during the license renewal period (Ref. 4.1-1, Section 4.2.2.1.3). Information to be ascertained includes: (1) type of cooling system (whether once-through or cooling pond); and (2) current Clean Water Act Section 316(b) determination or equivalent state documentation.

This section addresses impingement of fish at Unit 1, which uses a once-through cooling system. As stated in Section 4.2, Unit 2 uses a cooling tower, which NRC has determined produces small impacts as a result of impingement (10 CFR 51, Subpart A, Appendix B, Table B-1). Impingement occurs when fish are drawn into the submerged offshore intake at Unit 1 (described in Section 3.1.3) and transported to the onshore screenwell and pumphouse where they are trapped on the intake screens. Monitoring of impingement was conducted annually to determine potential impacts. From 1972 to 1983, monitoring was conducted as required by the NRC Environmental Technical Specifications for Nine Mile Point Unit 1. Subsequent annual monitoring programs at Unit 1 were a requirement of the station's New York State Pollutant Discharge Elimination System (SPDES) Permit (Ref. 4.3-1, Summary). Except for 1996, impingement monitoring was conducted every year from 1972 through 1997, providing a virtually continuous 25-year data set. Information on impingement provided herein was obtained from 25 annual monitoring reports (Refs. 4.3-1 through 4.3-25) and other sources cited herein as applicable.

Historically, impingement catches at Unit 1 were dominated by one or more of three species: alewife (*Alosa pseudoharengus*), rainbow smelt (*Osmerus mordax*), and threespine stickleback (*Gasterosteus aculeatus*). Each is an abundant forage species in Lake Ontario. During the 1972 to 1997 period, alewife dominated the impingement catch in most years. Rainbow smelt were most abundant in three years (1979, 1982, 1989). In 1978 and 1997, the threespine stickleback dominated the impingement catch. Highest impingement rates were usually evident during spring when alewife and rainbow smelt move inshore to spawn (Ref. 4.3-25, Section 3.1). Although the threespine stickleback is also an inshore spawner (Ref. 4.3-26, p. 667), their infrequent dominance of impingement catches is also likely influenced by weather events. For example, one third of the estimated annual impingement catch of threespine sticklebacks in 1997 occurred on one day in February during a storm (Ref. 4.3-25, Section 3.1

The number of fish estimated impinged on an annual basis varied greatly due to a variety of factors, including local abundance, weather-related factors, and plant operation. The lowest estimated annual impingement catch (all species combined) was 3,679 fish in 1988 when Unit 1 was offline all year with infrequent operation of circulating water pumps (Ref. 4.3-17, Table 3-4) and the highest estimated annual total impinged was over five million (Ref. 4.3-3, page 287) in 1973 due to high impingement rates of alewife. Figures 4.3-1 through 4.3-3 show total annual impingement for all species, alewife, and rainbow smelt, respectively, for the period from 1973 - 1997. Data for 1972 were not included because the low sampling frequency precluded calculation of reasonable estimates of annual impingement.

Although less abundant, a variety of other species have been reported impinged at Unit 1 over the years. For the period 1972-1997, the number of species impinged annually ranged from 16 in 1988 (when Unit 1 was offline) to 48 species in 1974 (Refs. 4.3-1 through 4.3-25). In addition to alewife and rainbow smelt, a variety of other forage fishes have been reported impinged including species of minnows (Cyprinidae), sculpins (*Cottus* sp.), catfish (Ictaluridae sp.), trout-perch (*Percopsis omiscomaycus*) and gizzard shad (*Dorosoma cepedianum*). Game fish such as smallmouth bass (*Micropterus dolomieui*), white bass (*Morone chrysops*), yellow perch (*Perca flavescens*), white perch (*Morone americana)*, lake trout (*Salveninus namaycush*), and walleye (*Stizostedion vitreum*) were also impinged, but in relatively low numbers compared to alewife and rainbow smelt. For example, the number of smallmouth bass and salmonids impinged per year (1977-1997) averaged 226 and 68, respectively.

Except for walleye, these game fishes were among the “species of concern” designated for detailed evaluation during 1997 at Unit 1 in the SPDES permit (Ref. 4.3-28, Additional Requirements III.3.b). Using data from 1973 to 1981, LMS (Ref. 4.3-27, Section 2.2.6) concluded that impingement of game species at Unit 1 represented a negligible impact based on zero to very low tag returns and comparisons to commercial catches, where available. Tagging studies were conducted from 1972 through 1976; the low tag returns indicate the number impinged is a small proportion of the population.

Although a variety of factors can affect impingement rates, the overriding factor is the abundance of a species in the water body near an intake. Lake-wide fluctuations in abundance of alewife may be the primary influence on impingement of alewife at Unit 1. Following the peak impingement abundance of alewife at Unit 1 in 1974 (Ref. 4.3-27, Section 2.1.6), there were massive dieoffs in the winters of 1974-1975 and 1976-1977. Recovery of the lake population was evident by the early 1980s, and this may be reflected in the peak in alewife impingement at Unit 1 in 1985. There has also been concern that the burgeoning predator populations, particularly salmon and trout species from stocking programs, have reduced prey abundance in Lake Ontario, particularly rainbow smelt and alewife (Ref. 4.3-29, p. 2 and 6). Stewart et al. of the Great Lakes Fishery Commission (Ref. 4.2-6) outlined the decline of the forage fish stocks in Lake Ontario, primarily alewife and rainbow smelt. They reported that the biomass of alewife and rainbow smelt had been reduced to one-half that recorded in the early 1980's. The Commission attributed these declines to increased abundance of predators such as chinook salmon, as well as reductions in zooplankton (food of alewife and smelt) due to the effect of filtering by the invasive zebra (*Dreissena polymorpha*) and quagga (*Dreissena bugensis*) mussels. The year 1997 was a 20-year low in biomass of alewife (see Section 2.3.1.4 and 2.3.1.5).

The Environmental Report for the R.E. Ginna Nuclear Power Plant (Ref. 4.3-30, Section 4.2.2) also reported reduced impingement catches of alewife and smelt in recent years, concurrent with reduced numbers in the Eastern Basin of Lake Ontario. Impingement rates at NMP Unit 1 appear to have been similarly influenced, as reflected in Figures 4.3-2 to 4.3-3. The reduction of alewife numbers in impingement collections after 1985 appears to reflect reduced lake abundance. The plot of rainbow smelt impingement also shows a clearly decreasing trend over time.

Based on the average annual estimated impingement catch for the period 1973-1981, LMS assessed the impact of impingement at NMP Unit 1 by comparison to the standing stocks of alewife and rainbow smelt in Lake Ontario. The impingement cropping for that time period was found to represent 0.01 percent of the standing stocks of both species in the U.S. waters of Lake Ontario (Ref. 4.3-27, Table 2.2.6-3). A similar assessment was performed by NMPNS for the subsequent period 1982-1997 using lakewide population estimates (U.S. waters) provided by Rochester Gas & Electric (Ref. 4.3-31). The proportions of lakewide populations of alewife and rainbow smelt impinged were quite low in all years (see Table 4.3-1) and similar to the results for 1973 -1981. The greatest proportional impingement in any year was just under 0.05 percent in 1985 for the alewife, and just under 0.02 percent in 1984 for the rainbow smelt. These percentages represent very low impingement cropping rates at Unit 1 relative to lakewide populations, and are clearly indicative of a lack of population impacts for these species.

Based on the studies and impact evaluations through 1983, the New York State Department of Environmental Conservation (NYSDEC) stated in the 1983 SPDES permit (Ref. 4.2-3, Additional Requirements II.4) that it "has contingently approved the applicant's consideration of intake impacts submitted pursuant to Section 316(b) of the CWA," subject to further impingement (and entrainment) monitoring. These additional studies were carried out between 1984 and 1997, as discussed above, and clearly support a conclusion that impingement impacts from NMP Unit 1 are SMALL.

In the period since the mid-1970's, when the Federal Water Pollution Control Act Amendments first required 316(b) determinations to assess the impact of power plant cooling water intake structures, scores of studies were conducted across the nation.

TABLE 4.3-1

ANNUAL PERCENTAGES OF LAKE ONTARIO ALEWIFE AND RAINBOW SMELT

	Percent Impinged		No. Impinged at NMP		Lakewide Population	
Year	Alewife (%)	Rainbow Smelt (%)	Alewife	Rainbow Smelt	Alewife	Smelt
1982	0.00030	0.00532	11,271	59,921	3,737,000,000	1,126,000,000
1983	0.00253	0.00138	113,526	16,352	4,484,000,000	1,188,000,000
1984	0.00402	0.01621	60,514	53,501	1,505,000,000	330,000,000
1985	0.04578	0.00352	1,441,953	73,272	3,150,000,000	2,080,000,000
1986	0.00295	0.00498	110,152	39,831	3,740,000,000	800,000,000
1987	0.00483	0.00201	89,785	87,916	1,860,000,000	4,370,000,000
1988	0.00004	0.00010	1,105	994	2,560,000,000	1,000,000,000
1989	0.00018	0.00055	6,284	11,443	3,514,000,000	2,095,000,000
1990	0.01167	0.00673	162,933	41,705	1,396,300,000	620,000,000
1991	0.00789	0.00242	214,941	25,809	2,723,000,000	1,066,000,000
1992	0.00155	0.00199	29,757	9,091	1,926,000,000	456,000,000
1993	0.00343	0.00033	99,082	4,570	2,888,800,000	1,383,000,000
1994	0.00273	0.00159	60,894	5,752	2,230,000,000	361,600,000
1995	0.00274	0.00029	62,899	7,667	2,293,000,000	2,650,000,000
1997	0.00290	0.00030	27,311	7,006	941,300,000	2,330,000,000
MIN	0.00004	0.00010	1,105	994	941,300,000	330,000,000
AVG	0.00640	0.00204	166,160	29,655	2,596,524,913	1,457,058,188
MAX	0.04578	0.01621	1,441,953	87,916	4,484,000,000	4,370,000,000

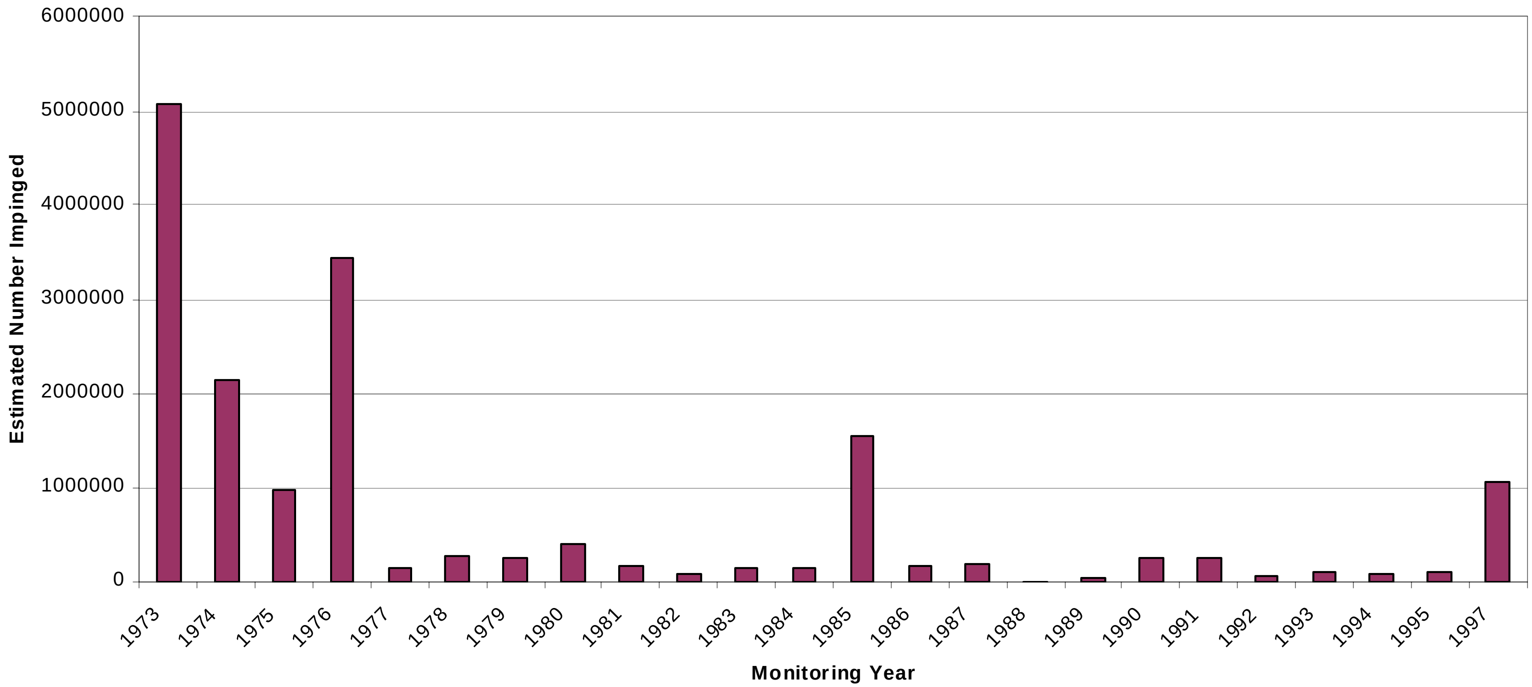
Note: Lakewide population estimates for U.S. Waters (Ref. 4.3-31).

Many of the investigations, including the work at NMP Unit 1 and other nuclear facilities, continued to survey impingement for many years beyond what was necessary to obtain regulatory acceptance of the intake's impact. The years of impingement studies at many cooling-water intake structures have been synthesized in several recent publications. For example, power plant cooling water intake system impacts have been described as akin to a non-consumptive cropping of the resource (Ref. 4.3-32). In a summary of a nuclear plant's impact on the Chesapeake Bay (Ref. 4.3-33), the author reported regulatory acceptance that impingement is a non-selective cropping mechanism, i.e., species are impinged at a rate proportional to their abundance in the vicinity of the plant. The years of studies at NMP-1 clearly identified impingement as a non-consumptive cropping mechanism and quantitative estimates of the percentage cropping are very low. Consequently, there is no evidence to support a contention that the NMP Unit 1 cooling water intake system has caused any lake-wide or population level impacts on resident aquatic species, and a conclusion that impacts due to impingement of fish and shellfish are SMALL is supported. As a result, no mitigation is warranted.

SECTION 4.3 FIGURES

FIGURE 4.3-1

ANNUAL ESTIMATED IMPINGEMENT OF ALL FISH SPECIES AT NMP UNIT 1

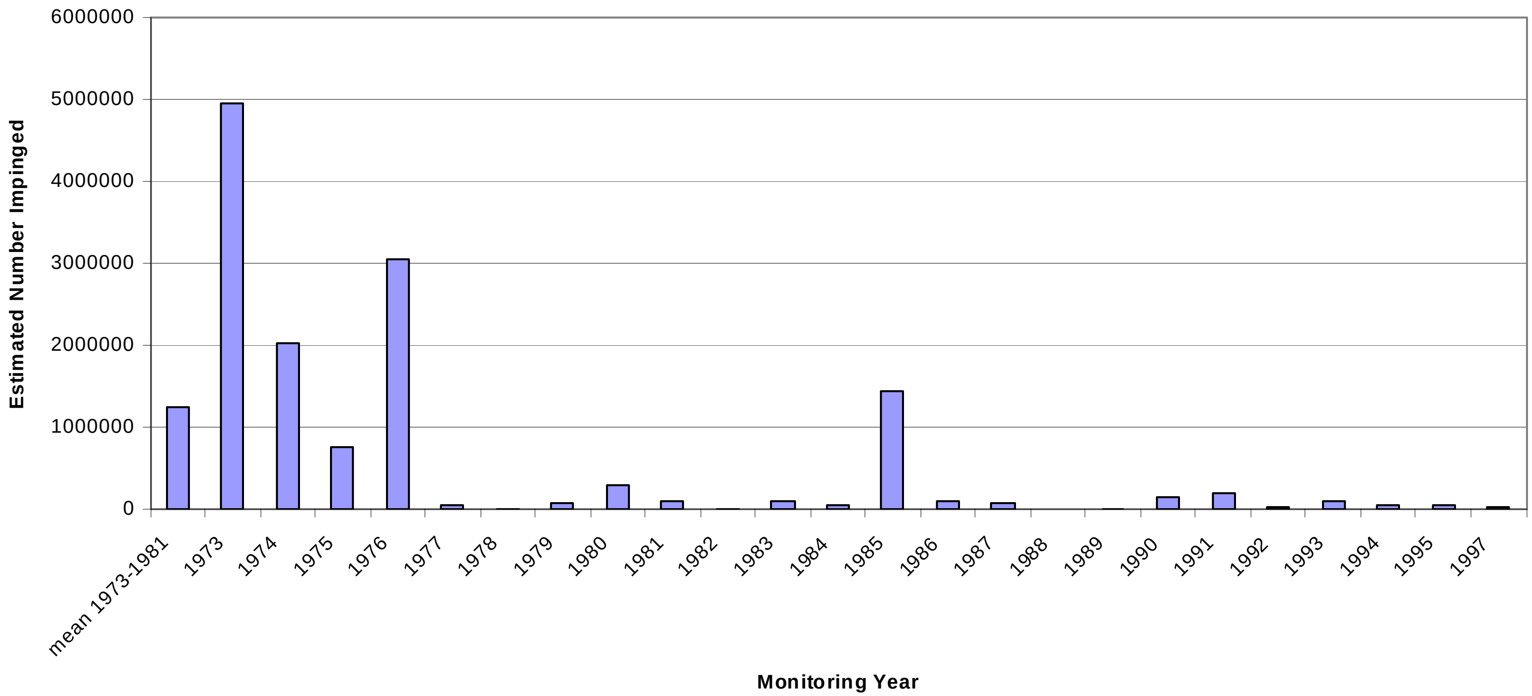


Source: Ref. 4.3-1 and Ref. 4.3-3 thru Ref. 4.3-25.

Note: No data collected during 1996.

FIGURE 4.3-2

ANNUAL ESTIMATED IMPINGEMENT OF ALEWIFE AT NMP UNIT 1

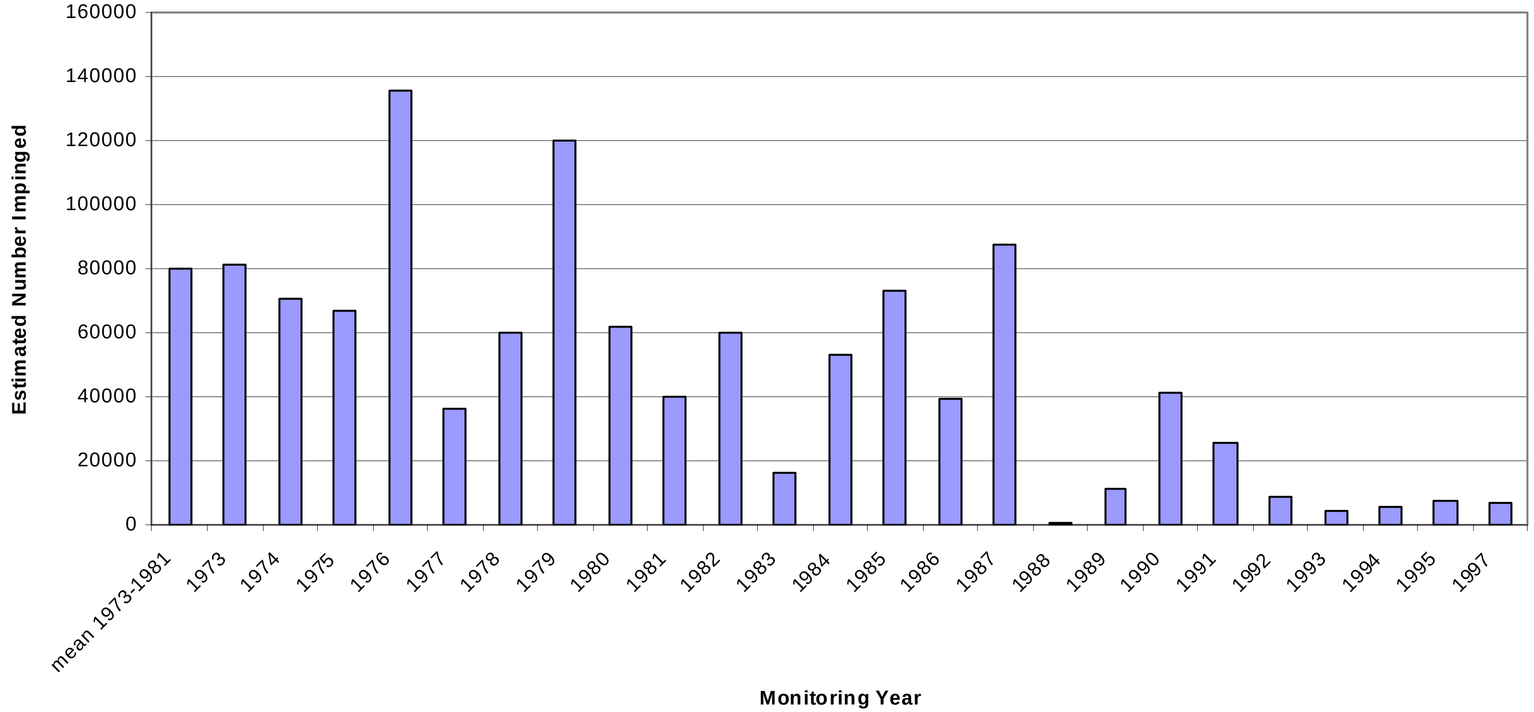


Source: Ref. 4.3-1 and Ref. 4.3-3 thru Ref. 4.3-25.

Note: No data collected during 1996.

FIGURE 4.3-3

ANNUAL ESTIMATED IMPINGEMENT OF RAINBOW SMELT AT NMP UNIT 1



Source: Ref. 4.3-1 and Ref. 4.3-3 thru Ref. 4.3-25.

Note: No data collected during 1996.

4.4 HEAT SHOCK

NRC

"If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act… 316(a) variance in accordance with 40 CFR 125, or equivalent State permits and supporting documentation. If the applicant can not provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from heat shock …." 10 CFR 51.53(c)(3)(ii)(B)

"...Because of continuing concerns about heat shock and the possible need to modify thermal discharges in response to changing environmental conditions, the impacts may be of moderate or large significance at some plants...."10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 27

The NRC made impacts on fish and shellfish resources resulting from heat shock a Category 2 issue because of continuing concerns about thermal discharge effects and the possible need to modify thermal discharges in the future in response to changing environmental conditions. Information to be ascertained includes: (1) type of cooling system (whether once-through or cooling pond); and (2) evidence of a Clean Water Act Section 316(a) variance or equivalent state documentation.

The use of a once-through cooling system at Unit 1, described in Section 3.1.3 of this NMPNS environmental report, requires evaluation of the effects of the heated discharge on the biological resources of Lake Ontario. The nature of the discharge plume and its potential impact on the aquatic community were extensively studied during the first five full operational years of Unit 1 (1970-1975), and included 25 plume measurement surveys. The results of these studies were summarized in a Section 316(a) Demonstration (Ref. 4.4-1) submitted in 1975 to the U.S. Environmental Protection Agency (EPA) Region II in support of alternate thermal discharge limitations. Supplemental information was submitted in 1976 in response to the EPA's request for additional information (Ref. 4.4-2).

The configuration of the thermal plume from Unit 1 was found to vary with wind-induced currents, wave action, and upwelling (Ref. 4.4-1, Section III). However, no relationship between plume size and extent could be determined from wind speed or station heat load, reflecting the stochastic nature of the plume as influenced by lake hydrodynamics. In 25 surveys, the size of the plume, defined as the area or volume within the 2°C (35.6°F) above ambient isotherm, varied between 34 and 370 surface acres, and 54 and 1,229 acre-feet. A frequency analysis identified the median plume size (50^{th} percentile) as approximately 120 surface acres. The plume exceeded 160 acres 30 percent or more of the time. The 160 surface-acre plume was estimated to extend approximately 1,875 feet on each side of the discharge point along the shore, and a maximum distance of nearly 2,400 feet offshore. As is typical of heated discharges, the warmer water in the plume is buoyant and thus largely a surface phenomenon. For the 70^{th} percentile plume (160 surface acres, 350 acre-feet), calculated depth of the plume from the surface was 2.19 feet.

In parallel with the physical plume studies, extensive biological studies were carried out in the vicinity of Unit 1. The resulting data were summarized and critically evaluated in the 316(a) Demonstration (Ref. 4.4-1, Sections IV-VI). Surveys included phytoplankton, zooplankton, ichthyoplankton, benthos, and fish. They were conducted during early-spring through December and sampled various depths and locations near Unit 1 during 1969-1974. Emphasis was placed on several Representative Important Species (RIS), with approval of the EPA Region II. These were:

Macroalgae
Cladophora - habitat former
Macroinvertebrate
Gammarus sp. - lower trophic level food source
Fish
Alewife (Clupeidae) – forage species, community dominant
Coho salmon (Salmonidae) - major predator, thermally sensitive
Brown trout (Salmonidae) - major predator, thermally sensitive
Rainbow smelt (Osmeridae) - forage species
Threespine stickleback (Gasterosteidae) - forage species
Smallmouth bass (Centrarchidae) – sport species
Yellow perch (Percidae) - sport species, thermally sensitive

The evaluation of thermal effects in the 316(a) Demonstration followed then-existing EPA guidance and included direct and indirect temperature effects, aesthetics, changes in community structure, RIS life cycle activity, and effects on economic/recreational activities (Ref. 4.4-1). The results demonstrated that no aspect of the biotic community was influenced or impacted by the heated discharge from Unit 1. Although nuisance species and aesthetic impacts can be attributed to effects of thermal discharges, the primary issues in Lake Ontario—seasonal dieoffs of alewife and the macroalga, *Cladophora*—were found to be natural phenomena throughout the Lake and unrelated to Unit 1. Detailed assessment of life history—reproduction, growth, feeding—as well as abundance and distribution of RIS revealed similar patterns to other areas of the Lake outside the influence of Unit 1. Yellow perch was found to have decreased in abundance between 1969 and 1974, but this was attributed to competition with the rapidly increasing alewife population at that time. Statistical comparisons of transects within and outside of the Unit 1 discharge plume revealed no significant differences in abundance.

Based on these evaluations and documentation of intact biotic communities, the 316(a) Demonstration (Ref. 4.4-1, pages S-2 – S-3) concluded that “no appreciable harm” had resulted from the Unit 1 discharge, and that, “continued operation of this discharge will assure the protection and propagation of the community at Nine Mile Point." The following paragraph summarizes the chronology of events leading to EPA and New York State Department of Environmental Conservation (NYSDEC) approval of the alternative thermal limits for Unit 1. Except where noted, the information is summarized from Reference 4.4-1.

In response to the Notice of Application for National Pollutant Discharge Elimination System (NPDES) Permit for Nine Mile Point Unit 1 issued by the EPA Region II on May 31, 1974, Niagara Mohawk Power Corporation (NMPC) requested, on June 28, 1974, alternate thermal limitations subject to Section 316(a) of the Federal Water Pollution Control Act (Ref. 4.4-3). NMPC provided evidence in support of its request on August 2, 1974. On February 24, 1975, the EPA Region II issued the final permit for Unit 1, which did not contain the requested alternate thermal limitations. To further support their request for alternate thermal limitations, NMPC submitted its 316(a) Demonstration (summarized above) on December 8, 1975 (Ref. 4.4-4), and followed up with additional data and analyses in November 1976 (Ref. 4.4-2) as requested by the EPA Region II. Ultimately, an Advisory Determination (Ref. 4.4-5) was signed on January 29, 1982, by the Region II Regional Administrator, wherein it was recommended to the NYSDEC that NMPC's request for alternate thermal limitations for Unit 1 be granted. Upon renewal of the SPDES permit for Nine Mile Point on July 1, 1983, the NYSDEC accepted the Region II Regional Administrator's recommendation, and incorporated the requested alternate thermal limitations in the SPDES permit (Ref. 4.2-3). The alternate thermal limitations for Unit 1 continue to be a part of the SPDES permit and allow for a 425-acre mixing zone in Lake Ontario from the point of discharge. On the basis of these considerations, NMPNS concludes that heat shock impacts from continued operation of Unit 1 during the license renewal period would continue to be SMALL and, mitigation through the license renewal period would not be warranted.

4.5 GROUNDWATER USE CONFLICTS (PLANTS USING MORE THAN 100 GPM OF GROUNDWATER)

NRC

"If the applicant's plant…pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater use must be provided." 10 CFR 51.53(c)(3)(ii)(C)

"Plants that use more than 100 gpm may cause groundwater use conflicts with nearby groundwater users." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 33

The NRC made groundwater use conflicts a Category 2 issue because, at a withdrawal rate of more than 100 gpm, the magnitude of potential impacts the resulting cone of depression has on offsite wells could not be determined generically. Information to be ascertained includes (1) NMP groundwater withdrawal rate, (2) size of the cone of depression, (3) location of neighboring wells, and (4) description of wetlands in the vicinity that might be impacted by a lowered water table.

As noted in Section 2.2, the only ongoing or planned withdrawal of groundwater at NMP is the permanent dewatering system that NMPNS operates to maintain a cone of depression around the Unit 2 Reactor Building. Two submersible pumps draw groundwater at an estimated average combined rate of 200 gpm to maintain the cone of depression, making this issue applicable to NMP.

As discussed in Section 2.2, the Unit 2 dewatering system is designed to maintain the water table below the reactor basemat elevation of approximately 163.8 feet National Geodetic Vertical Datum (NGVD). The cone of depression created by dewatering activities is steep, as evidenced by studies showing that the water table reaches approximately 254 feet NGVD within 600 feet of the Unit 2 Reactor Building. The normal groundwater table in the NMP plant complex area is approximately 255 feet NGVD. Therefore, through the current operating period, dewatering activities at Unit 2 have resulted in a groundwater table drawdown of approximately one foot or less beyond 600 feet of the Reactor Building. This comparison indicates that dewatering results in little or no lowering of the groundwater table off site; NMPNS concludes that continued dewatering activities would not impact offsite wells, none of which are nearer than approximately one mile from the Unit 2 Reactor Building (see Section 2.2). All onsite wetlands are likely outside the zone of influence and are upgradient of dewatering operations. Considering the evidence presented herein, no noticeable groundwater use conflicts are posed by NMP groundwater withdrawals. NMPNS concludes that impacts to the aquifer in the area would be SMALL over the license renewal period, and mitigation would be unwarranted.

4.6 IMPACTS OF REFURBISHMENT ON TERRESTRIAL RESOURCES

NRC

The environmental report must contain an assessment of "…the impact of refurbishment and other license-renewal-related construction activities on important plant and animal habitats…." 10 CFR 51.53(c)(3)(ii)(E)

"…Refurbishment impacts are insignificant if no loss of important plant and animal habitat occurs. However, it cannot be known whether important plant and animal communities may be affected until the specific proposal is presented with the license renewal application…." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 40

"…If no important resources would be affected, the impacts would be considered minor and of small significance. If important resources could be affected by refurbishment activities, the impacts would be potentially significant…." (Ref. 4.1-1, Section 3.6, page 3-6)

The NRC made impacts of refurbishment on terrestrial resources a Category 2 issue because the significance of ecological impacts cannot be determined without considering site-specific and project-specific refurbishment details (Ref. 4.1-1, Section 3.6). Aspects of the site and the project to be ascertained are (1) the identification of important ecological resources, (2) the nature of refurbishment activities, and (3) the extent of impacts to plant and animal habitat.

Detailed analyses are not required for this issue because, as Section 3.2 discusses, NMPNS has no plans for major refurbishment or other license renewal-related construction activities at NMP.

4.7 THREATENED AND ENDANGERED SPECIES

NRC

"All license renewal applicants shall assess the impact of refurbishment and other license-renewal-related construction activities on important plant and animal habitats. Additionally, the applicant shall assess the impact of the proposed action on threatened and endangered species in accordance with the Endangered Species Act." 10 CFR 51.53(c)(3)(ii)(E)

"Generally, plant refurbishment and continued operation are not expected to adversely affect threatened or endangered species. However, consultation with appropriate agencies would be needed at the time of license renewal to determine whether threatened or endangered species are present and whether they would be adversely affected." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 49

The NRC made impacts to threatened and endangered species a Category 2 issue because the status of many species is being reviewed, and a site-specific assessment is required to determine whether any identified species could be affected by refurbishment activities or continued plant operations through the renewal period. In addition, compliance with the Endangered Species Act requires consultation with the appropriate Federal agency (Ref. 4.1-1, Sections 3.9 and 4.1).

Sections 2.3.1 and 2.3.2 describe aquatic and terrestrial habitats on and in the vicinity of the NMP site and along the transmission line corridor of concern. Section 2.3.3 provides a discussion of those species listed as threatened or endangered at the federal level or the state level (in New York) that have the greatest likelihood of occurrence in the general vicinity of NMP. This section presents an assessment of the environmental consequences to these species from future plant refurbishment activities and continued operation of the plant.

As discussed in Section 3.2, NMPNS has no plans to conduct major refurbishment or construction activities at NMP for continued operations during the license renewal period. Therefore, there would be no refurbishment-related or other license renewal construction-related impacts to protected species, and no further analysis of such impacts is required.

Section 2.3.3 presents information that indicates the potential for occurrence of any threatened or endangered aquatic species in the immediate vicinity of the site is very limited based on habitat and range considerations. No terrestrial endangered or threatened species are known to inhabit or frequent the site or the transmission corridor. Potential for impact from station operation on these species is reduced accordingly.

In addition to lack of suitable habitat in areas of concern, potential for adverse impact on federal or stated-listed threatened and endangered species from continued plant operation is highly unlikely on the basis of plant operational history. Specifically, there has been no perceptible impact on the population of any threatened or endangered species during the 30-year operation of NMP.

NMPNS has initiated contacts with FWS and NYSDEC regarding NMP Units 1 & 2 license renewal and potential impacts to threatened and endangered species. Appendix C to this environmental report includes copies of the contact letters and agency responses. Based on the considerations presented above and the results of correspondence with these agencies, NMPNS concludes that impact to threatened and endangered species from continued operation of NMP Unit 1 & 2 in the license renewal period (Issue 49) would be SMALL, and mitigation would be unwarranted.

4.8 AIR QUALITY DURING REFURBISHMENT (NONATTAINMENT AREAS)

NRC

"If the applicant's plant is located in or near a nonattainment or maintenance area, an assessment of vehicle exhaust emissions anticipated at the time of peak refurbishment workforce must be provided in accordance with the Clean Air Act as amended…." 10 CFR 51.53(c)(3)(ii)(F)

"Air quality impacts from plant refurbishment associated with license renewal are expected to be small. However, vehicle exhaust emissions could be cause for concern at locations in or near nonattainment or maintenance areas. The significance of the potential impact cannot be determined without considering the compliance status of each site and the numbers of workers expected to be employed during the outage." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 50

The NRC made impacts to air quality during refurbishment a Category 2 issue because vehicle exhaust emissions from refurbishment-related activities could be cause for some concern, and a general conclusion about the significance of the potential impact could not be drawn without considering the compliance status of each site and the size of the estimated peak refurbishment-related workforce (Ref. 4.1-1, Section 3.3). Information needed would include (1) the attainment status of the plant-site area and (2) number of vehicles added as a result of refurbishment activities.

As described in Section 2.4, NMP is not located in an area designated as a maintenance area or an area of nonattainment. Jefferson County, New York, is the nearest area of nonattainment, currently classified as marginal for ozone. Onondaga County, New York, has been designated as a maintenance area for carbon monoxide. No other maintenance or nonattainment areas are located within 50 miles of NMP. Detailed analysis is not required for this issue because, as Section 3.2 discusses, NMPNS has no plans for major refurbishment at NMP.

4.9 ELECTROMAGNETIC FIELD-ACUTE EFFECTS

NRC

"If the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electrical Safety Code for preventing electric shock from induced currents, an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines must be provided." 10 CFR 51.53 (c)(3)(ii)(H)

"Electrical shock resulting from direct access to energized conductors or from induced charges in metallic structures have not been found to be a problem at most operating plants and generally are not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential at the site." 10 CFR Part 51, Subpart A, Appendix B, and Table B-1, Issue 59

The NRC made the impact of electric shock from transmission lines a Category 2 issue because without a review of each plant's transmission line conformance with the National Electrical Safety Code® (NESC®) criteria, which specifies minimum vertical clearances to the ground for electric wires to limit electrostatic effects, the NRC could not determine the significance of the electrical shock potential. The regulation at 10 CFR 51.53(c)(3)(ii)(H) does not define the phrase "transmission line," but in the GEIS, the NRC indicates that transmission lines use voltages of about 115/138 kilovolts (kV) and higher, and that, in contrast, distribution lines use voltages below the 115/138 kV level (Ref. 4.1-1, Sections 2.2.7 and 4.5.1). The GEIS also specifies that the transmission lines of concern are located between the plant switchyard and the connection to the existing transmission system (or grid). Information to be ascertained includes: (1) change in line use and voltage since last analysis; (2) conformance with NESC® (1981) standards; and the potential change in land use along the transmission lines since the initial NEPA review.

As stated above, the NESC® specifies minimum vertical clearances to the ground for electric lines. For electric lines operating at voltages exceeding 98 kV alternating current (AC) to ground (Ref. 4.9-1), the clearance provided must limit the steady-state current[1] due to electrostatic effects to 5 milliamperes (mA) if the largest anticipated vehicle were short-circuited to ground. For this determination, the lines should be evaluated assuming final unloaded conductor sag at 120°F. The Electric Power Research Institute (EPRI) published a guide (Ref. 4.9-2) and has developed a computer program named ENVIRO (Ref. 4.9-3), which together are used to calculate the steady-state, short-circuit current that may exist beneath transmission lines. The calculation is a two-step process in which the analyst first calculates the electric field strength profile, as well as several other transmission line parameters, under the transmission line(s) at the location(s) of minimum wire clearance. The second step is to utilize the calculated electric field strength profile to determine the steady-state, short-circuit current value, based on the maximum allowable vehicle size in New York State. The largest vehicle

[1] The NESC® and the GEIS use the phrase "steady-state current," whereas 10 CFR 51.53(c)(3)(ii)(H) uses the phrase "induced current." The phrases have the same meaning here.

that is anticipated under the NMP lines is a 65-foot long tractor-trailer, with a height of 13.5 feet, parked along a roadway.

As described in Section 3.1.4, three single-circuit 345kV lines connect NMP Units 1 and 2 to the transmission grid. Two of these lines (NMP1 to Scriba Lines Line 9 and NMP to Scriba Line 23) connect Units 1 and 2, respectively, at the Scriba Substation located approximately 2,000 ft. southeast of the NMP switchyards. The third 345kV line (NMP1 to Clay Line 8) is located along a 500-foot right-of-way (ROW) owned by Niagara Mohawk and connects to the transmission grid at the Clay Substation, approximately 26 miles southeast of the site. These three lines were analyzed to determine adherence to the NESC® steady-state limit. As noted in Section 3.1.4, several other transmission lines co-exist on the 500-ft. ROW and were included in the analysis, where appropriate, to account for any synergistic and antagonistic effects.

Drawings of each transmission line obtained from Niagara Mohawk were analyzed to determine the minimum clearance for each set of lines in cross section along the transmission line corridor at the NESC®-specified temperature of 120°F. Where data were not available on the drawings, NMPNS made field measurements to determine line height and converted field data to 120°F. To be conservative, NMPNS determined the locations of minimum clearance along each line segment, regardless of whether or not a public road crossing existed. The analysis resulted in four separate cross sections to represent the various line configurations: one between the plant and Scriba Substation at Lake Road and three along the 500-ft. ROW between the site and Clay Substation. Locations of the four cross sections are shown on Figure 3.1-2. Minimum ground clearances at these four locations were 30, 32, 32, and 37 ft. respectively, and, except for the Lake Road cross section, were not at roadway crossings.

The wire clearances at these locations, together with line characteristics such as voltage, current, and conductor position, were entered into the EPRI ENVIRO computer program. The program results include the electric field strengths at 3.28-feet (1 meter) above ground and at 10-foot intervals beneath and perpendicular to the lines. The maximum calculated electric field strengths at the four locations of minimum clearance were 4.71, 3.98, 3.84, and 3.02 kV/m; average electric field strengths were 3.14, 2.89, 2.77, and 2.20 kV/m, (Table 5, Attachments 1, 2, and 3, respectively). Using the maximum electric field strength from above and the EPRI reference book methodology (Ref. 4.9-2, Section 8.8), calculations were made to determine the steady-state current for a tractor trailer 65 feet long, 8 feet wide, and 13.5 feet high (which is the largest regularly allowed vehicle on New York State roads) centered at the location of maximum electric field and perpendicular to the alignment of the transmission lines. The resultant values for cross sections 1 through 4 are 3.5 mA, 2.6 mA, 2.5 mA, and 2.0 mA, respectively, which are less than the 5-mA limit imposed by the NESC®.

In summary, the three NMP 345 kV lines that connect the two units to the existing transmission system adhere to the NESC®'s present steady-state current limit. Therefore, NMPNS concludes that the three transmission lines meet the NESC® recommendations for preventing electric shock from induced currents and further assessment of the impact of the proposed action on the potential shock hazard is not required. NMPNS adopts, by reference, the NRC's conclusion in the GEIS that the impact of electric shock (Issue 59) is of SMALL significance for such lines. Due to the small significance of the issue, mitigation measures, such as the installation of warning signs at roadway crossings or increasing wire clearances, are not warranted.

4.10 HOUSING IMPACTS

NRC

The environmental report must contain " …[a]n assessment of the impact of the proposed action on housing availability…" 10 CFR 51.53(c)(3)(ii)(I)

"…Housing impacts are expected to be of small significance at plants located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Moderate or large housing impacts of the workforce associated with refurbishment may be associated with plants located in sparsely populated areas or areas with growth control measures that limit housing development…." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 63

"…small impacts result when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and no housing construction or conversion occurs." (Ref. 4.1-1, Section 4.7.1.1)

The NRC made housing impacts a Category 2 issue because impact magnitude depends on local conditions the NRC could not predict for all plants at the time of the GEIS publication (Ref. 4.1-1, Section 3.7.2). Local conditions that need to be ascertained are (1) population categorization as small, medium, or high and (2) applicability of growth control measures.

Refurbishment activities and continued operations could impact housing due to increased staffing. As Section 3.2 describes, NMPNS does not plan to perform major refurbishment activities for NMP license renewal. NMPNS concludes that there would be no refurbishment-related impacts to area housing and, therefore, no analysis is required. As Section 3.4 describes, approximately 96 percent of the NMP workforce resides in the Onondaga and Oswego combined-county area. Accordingly, the following discussion focuses on impacts of continued operations on local housing availability in Onondaga and Oswego Counties.

As Section 2.5 describes, NMP is located in a medium population area. As noted in Section 2.9, neither Onondaga County nor Oswego County is subject to growth control measures that limit housing development. In 10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 63), the NRC concludes that impacts to housing are expected to be of small significance at plants in medium population areas where growth control measures are not in effect. Therefore, NMPNS expects housing impacts to be small.

A site-specific housing analysis supports this conclusion. The maximum impact to area housing is calculated using the following assumptions: (1) all direct and indirect jobs would be filled by immigrating residents; (2) the residential distribution of new residents would be similar to current worker distribution; and (3) each new job created (direct and indirect) represents one housing unit. As Section 3.4 describes, NMPNS's conservatively high estimate of 60 license renewal employees could generate 203 new jobs in the area (60 direct and 143 indirect). If it is assumed each of the 203 new workers would locate in the Onondaga and Oswego combined-county area, an additional 203 new housing units would be needed. This would not create a discernible change in housing availability, change rental rates and housing values, or spur housing construction or conversion in an area with a Year 2000 Census estimated population of 580,713 persons and housing vacancy rates in Onondaga and Oswego Counties of 7.9 percent and 13.8 percent, respectively (Ref. 4.10-1). Given the magnitude of the impact on housing from continued operation of NMP in the license renewal period, which is SMALL, mitigative measures would not be necessary.

4.11 PUBLIC UTILITIES: PUBLIC WATER SUPPLY AVAILABILITY

NRC

The environmental report must contain "…an assessment of the impact of population increases attributable to the proposed project on the public water supply." 10 CFR 51.53(c)(3)(ii)(I)

"An increased problem with water shortages at some sites may lead to impacts of moderate significance on public water supply availability." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 65

"Impacts on public utility services are considered small if little or no change occurs in the ability to respond to the level of demand and thus there is no need to add capital facilities. Impacts are considered moderate if overtaxing of facilities during peak demand periods occurs. Impacts are considered large if existing service levels (such as quality of water and sewage treatment) are substantially degraded and additional capacity is needed to meet ongoing demands for services." (Ref. 4.1-1, Section 3.7.4.5)

The NRC made public utility impacts a Category 2 issue because water shortages may occur in conjunction with plant demand and plant-related population growth (Ref. 4.1-1, Section 4.7.3.5). Local information needed would include a description of water shortages experienced in the area and an assessment of the public water supply system's available capacity.

The NRC's analysis of impacts to the public water supply system considered both plant demand and plant-related population growth demands on local water resources. As Section 3.2 discusses, NMPNS plans no major refurbishment on the public water supply; therefore, plant demand is not expected to increase.

The impact to the local water supply systems from plant-related population growth can be determined by calculating the amount of water that would be required by these individuals. As Section 3.4 describes, NMPNS's conservatively high estimate of 60 license renewal employees could generate a total of 203 new jobs. This could increase population in the area by 530 [203 jobs multiplied by 2.61, the average number of persons per household in the State of New York (Ref. 4.10-1)]. The average American uses between 50 and 80 gallons per day for personal use (Ref. 4.11-1, page 2). Assuming that this increase (26,500 to 42,400 gallons per day) is distributed across the Onondaga and Oswego combined-County area, consistent with current employee trends, the increase in water demand represents a small percentage of total daily demand and would not create shortages in capacity of the water supply systems in these communities since all have either excess capacity or additional supply available through agreements with other water suppliers (see Section 2.8). Therefore, NMPNS concludes that impacts resulting from plant-related population growth on the public water supply from continued operation of NMP in the license renewal period would be SMALL, requiring no increase in capacity or additional supplies, and would not warrant mitigation.

4.12 EDUCATION IMPACTS FROM REFURBISHMENT

NRC

The environmental report must contain "An assessment of the impact of the proposed action on… public schools (impacts from refurbishment activities only) within the vicinity of the plant…." 10 CFR 51.53(c)(3)(ii)(I)

"…Most sites would experience impacts of small significance but larger impacts are possible depending on site- and project-specific factors…." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 66

"…small impacts are associated with project-related enrollment increases of 3 percent or less. Impacts are considered small if there is no change in the school systems' abilities to provide educational services and if no additional teaching staff or classroom space is needed. Moderate impacts are associated with 4 to 8 percent increases in enrollment, and if a school system must increase its teaching staff or classroom space even slightly to preserve its pre-project level of service…. Large impacts are associated with enrollment increases greater than 8 percent…." (Ref. 4.1-1, Section 3.7.4.1)

The NRC made impacts to education from refurbishment a Category 2 issue because site-specific and project-specific factors determine the significance of impacts (Ref. 4.1-1, Section 3.7.4.1). Local factors to be ascertained include (1) project-related enrollment increases and (2) status of the student/teacher ratio.

As Section 3.2 describes, NMPNS does not plan to perform major refurbishment activities at NMP. NMPNS concludes there would be no refurbishment-related impacts to education; therefore, no analysis is required.

4.13 OFFSITE LAND USE

4.13.1 REFURBISHMENT

NRC

The environmental report must contain "…an assessment of the impact of the proposed action on… land-use… within the vicinity of the plant…." 10 CFR 51.53(c)(3)(ii)(I)

"…Impacts may be of moderate significance at plants in low population areas…." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 68

"…if plant-related population growth is less than 5 percent of the study area's total population, off-site land-use changes would be small, especially if the study area has established patterns of residential and commercial development, a population density of at least 60 persons per square mile, and at least one urban area with a population of 100,000 or more within 50 miles…." (Ref. 4.1-1, Section 3.7.5)

The NRC made impacts to offsite land use from refurbishment activities a Category 2 issue because land-use changes could be considered beneficial by some community members and adverse by others. Local conditions to be ascertained include (1) plant-related population growth, (2) patterns of residential and commercial development, and (3) proximity to an urban area of at least 100,000 residents.

As Section 3.2 describes, NMPNS does not plan to perform major refurbishment activities at NMP. NMPNS concludes there would be no refurbishment-related impacts to offsite land use; therefore, no analysis is required.

4.13.2 OFFSITE LAND USE: LICENSE RENEWAL TERM

NRC

The environmental report must contain "…[a]n assessment of the impact of the proposed action on …land-use…within the vicinity of the plant…" 10 CFR 51.53(c)(3)(ii)(I)

"Significant changes in land use may be associated with population and tax revenue changes resulting from license renewal." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 69

"…if plant-related population growth is less than five percent of the study area's total population, off-site land-use changes would be small…" (Ref. 4.1-1, Section 3.7.5)

"If the plant's tax payments are projected to be small relative to the community's total revenue, new tax-driven land-use changes during the plant's license renewal term would be small, especially where the community has pre-established patterns of development and has provided adequate public services to support and guide development." (Ref. 4.1-1, Section 4.7.4.1)

The NRC made impacts to offsite land use during the license renewal term a Category 2 issue because land-use changes may be perceived to be beneficial by some community members and adverse by others. Therefore, the NRC could not assess the potential significance of site-specific offsite land-use impacts (Ref. 4.1-1, Section 4.7.4.1). Site-specific factors to consider in an assessment of new tax-driven land-use impacts include (1) the size of plant-related population growth compared to the area’s total population, (2) the size of the plant’s tax payments relative to the community’s total revenue, (3) the nature of the community’s existing land-use pattern, and (4) the extent to which the community already has public services in place to support and guide development.

The GEIS presents an analysis of population-driven and tax-driven impacts on offsite land use for the renewal term (Ref. 4.1-1, Section 4.7.4.1). Based on the GEIS case study analysis, the NRC concludes that all new population-driven land-use changes during the license renewal term at all nuclear power plants would be small. The GEIS analysis concludes that population growth caused by license renewal would represent a much smaller percentage of the local area’s total population than the percentage represented by operations-related growth (Ref. 4.1-1, Section 4.7.4.2).

Section 4.7.4.1 of the GEIS (Ref. 4.1-1) states that the assessment of tax-driven land-use impacts during the license renewal term should consider (1) the size of the plant's payments relative to the community's total revenues, (2) the nature of the community's existing land-use pattern, and (3) the extent to which the community already has public services in place to support and guide development. If the plant's tax payments are projected to be small relative to the community's total revenue, new tax-driven land-use changes by the plant during the plant's license renewal term would be SMALL, especially where the community has pre-established patterns of development and has provided adequate public services to support and guide development. If the plant's tax payments are projected to be medium-to-large relative to the community's total revenue, new tax-driven land-use changes would be MODERATE. This is most likely to be true where the community has no pre-established patterns of development (i.e., land-use plans or controls) or has not provided adequate public services to support and guide development in the past, especially infrastructure that would allow industrial development. If the plant's tax payments are projected to be a dominant source of the community's total revenue, new tax-driven land-use changes would be LARGE. This would be especially true where the community has no pre-established pattern of development or has not provided adequate public services to support and guide development in the past.

Oswego County has not experienced any significant changes in land-use patterns due to the operation of NMP. Current land-use characteristics within Oswego County, as described in Section 2.9, are similar to those the described in the Unit 2 Operating License Stage Environmental Report (Ref. 4.13-1, Section 2.2). However, continuation of tax receipts from NMP keeps tax rates below what they otherwise would have to be to fund the local governments and also provide for a higher level of public infrastructure and services than otherwise would be possible. This enhances the county's attractiveness as a place to live and may tend to accelerate the conversion of open space to residential and commercial uses.

Because there are no major refurbishment activities and no new construction plans as a result of license renewal at NMP, no new sources of plant-related tax payments are expected that could significantly influence land use in Oswego County and the Town of Scriba. During the license renewal term, however, new land-use impacts could result from the use by local governments of the tax revenue paid by NMPNS for NMP. As described in Section 2.7, NMPNS has historically contributed a significant portion of total revenues in Oswego County, the City of Oswego School District, and the Town of Scriba, although these payments have steadily decreased since 1995. As detailed in Section 2.7, NMPNS has entered into agreements to make annual base payments with added incentive payments in lieu of property taxes for NMP to Oswego County, the City of Oswego School District, and the Town of Scriba, from 2002 through 2010 for both Units 1 and 2, and continuing until 2011 for Unit 2. Average base payments for the period with maximum incentives would constitute approximately 6.7 percent and 23.5 percent of the respective 2001 total revenues for Oswego County and the Town of Scriba, and 26.4 percent of the 2000 revenues for the City of Oswego School District. As noted in Section 2.7, NMPNS expects that any future property taxes assessed through the license renewal term should be similar or less than the in-lieu payments currently agreed to for the period 2002 through 2011. Using the NRC's criteria, NMPNS' payments to the county are of small significance and the payments to the town and school district are of large significance.

As described in Section 2.9, Oswego County, including the Town of Scriba, has an established pattern of development and guides growth with regulatory measures such as zoning and comprehensive planning. As noted in Section 2.5, population growth in Oswego County has been small during the period of NMP operation and is projected to decline during the period of license renewal. Continued operation of NMP over the license renewal term would continue to be an important source of tax revenue for the town and school district and to a lesser degree the county, helping to maintain current levels of development and public services. NMPNS' tax contributions during this period should not induce changes to local land-use and development patterns. NMPNS has no plans to conduct any refurbishment activities for NMP; therefore, no additional tax impact would result from an increase in the plant's assessed value due to refurbishment-related improvements. Therefore, there are no land-use changes expected during the license renewal period due to new tax-driven impacts, and NMPNS concludes that the land-use impact will be SMALL and mitigation is not warranted.

4.14 TRANSPORTATION

NRC

The environmental report must contain an assessment of "…the impact of the proposed project on local transportation during periods of license renewal refurbishment activities." 10 CFR 51.53(c)(3)(ii)(J)

"Transportation impacts are generally expected to be of small significance. However, the increase in traffic associated with the additional workers and local road and traffic control conditions may lead to impacts of moderate or large significance at some sites." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 70

Level of Service (LOS) "A and B are associated with small impacts because the operation of individual users is not substantially affected by the presence of other users." LOS A is characterized by "free flow at the traffic stream; users are unaffected by the presence of others." LOS B is characterized by "stable flow in which the freedom to maneuver is slightly diminished." (Ref. 4.1-1, Section 3.7.4.2)

The NRC made impacts to transportation a Category 2 issue because road conditions existing at the time of the project, which the NRC could not forecast for all plants (Ref. 4.1-1, Section 3.7.4.2), primarily determine impact significance. Local road conditions to be ascertained are (1) level of service (LOS) conditions and (2) incremental increase in traffic associated with refurbishment activities and license renewal staff.

As Section 3.2 describes, NMPNS does not plan to perform major refurbishment activities at NMP. NMPNS concludes there would be no refurbishment-related impacts to local transportation; therefore, no analysis is required.

As described in Section 3.4, approximately 1,281 workers are currently employed at NMP for normal plant operations. Approximately 96 percent of this workforce resides in Onondaga and Oswego Counties. During refueling outages, which occur at 24-month intervals at each unit and are staggered, site employment increases annually by as many as 500 to 1,000 workers for temporary (30 to 40 days) duty.

As described in Section 2.8.2, road access to NMP is via Lake Road (County Road 1A). This roadway, County Road 1, and Lakeview Road are considered to be in good condition by Oswego County Public Works. The average count for the segment of County Road 1A from County Road 1 to Lakeview Road was 4,900 in 1995. LOS ratings of the approaches for the two intersections closest to NMP along County Road 1A for peak use hours ranged from 'A' to 'C' with one approach having an 'F' rating; however the majority of approaches carried an 'A' or 'B' rating. NMPNS's conservative estimate of 60 additional employees associated with license renewal for NMP would represent a 4.7 percent increase in the current number of permanent employees and an even smaller percentage of employees present on site during a typical refueling outage. NMPNS has staggered starting times for workers at the NMP site, which minimizes the impact on local transportation conditions caused by plant workers entering and leaving the site.

Given these employment projections and the staggered shifts used at the NMP site, NMPNS concludes the impacts of NMP license renewals on traffic conditions would be SMALL and additional mitigative measures would be unwarranted.

4.15 HISTORIC AND ARCHAEOLOGICAL RESOURCES

NRC

The environmental report must contain an assessment of "…whether any historic or archaeological properties will be affected by the proposed project." 10 CFR 51.53(c)(3)(ii)(K)

"Generally, plant refurbishment and continued operation are expected to have no more than small adverse impacts on historic and archaeological resources. However, the National Historic Preservation Act requires the Federal agency to consult with the State Historic Preservation Officer to determine whether there are properties present that require protection." 10 CFR 51, Subpart A, Appendix B, Table B-1, Issue 71

"Sites are considered to have small impacts to historic and archaeological resources if (1) the State Historic Preservation Office (SHPO) identifies no significant resources on or near the site; or (2) the SHPO identifies (or has previously identified) significant historic resources but determines they would not be affected by plant refurbishment, transmission lines, and license-renewal-term operations and there are no complaints from the affected public about the altered historic character; and (3) if the conditions associated with moderate impacts do not occur." (Ref. 4.1-1, Section 3.7.7)

The NRC made impacts to historic and archaeological resources a Category 2 issue because determinations of impacts to historic and archaeological resources are site-specific in nature, and the National Historic Preservation Act mandates that determination of impacts must be made through consultation with the State Historic Preservation Officer (SHPO) (Ref. 4.1-1, Section 4.7.7.3).

As Section 3.2 describes, NMPNS does not plan to perform land-disturbing refurbishment activities at NMP. NMPNS concludes that there would be no refurbishment-related impacts to historic and archaeological resources; therefore, no analysis is required.

As described in Section 2.10, no known archaeological or historic sites have been identified on site grounds, therefore, no historical or archaeological resources were impacted by the construction of NMP. No known archaeological or historic sites have been identified along the transmission line rights-of-way. Therefore, continued use of transmission lines and rights-of-way are projected to cause no impact.

NMPNS has initiated discussions regarding NMP license renewals with the SHPO. Appendix D includes copies of the contact letter and the SHPO response. Based on the considerations above and response by the SHPO, NMPNS concludes that continued operation of NMP would have no adverse impacts to historic or archaeological resources; hence, there would be no impacts to mitigate. The impact on historic and archaeological resources from continued operation of NMP in the license renewal period is therefore SMALL and mitigative measures would be unwarranted.

4.16 SEVERE ACCIDENT MITIGATION ALTERNATIVES

NRC

The environmental report must contain a consideration of alternatives to mitigate severe accidents " . . . [i]f the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment . . . ." 10 CFR 51.53(c)(3)(ii)(L)

"The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives." 10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 76)

The term "accident" refers to any unintentional event (i.e., outside the normal or expected plant operational envelope) that results in the release or a potential for release of radioactive material to the environment. Generally, the NRC categorizes accidents as "design basis" or "severe." Design basis accidents are those for which the risk is great enough that an applicant is required to design and construct a plant to prevent unacceptable accident consequences. Severe accidents are those considered too unlikely to warrant design controls.

Historically, the NRC has not included in its environmental impact statements or environmental assessments any analysis of alternative ways to mitigate the environmental impacts of severe accidents. A 1989 court decision ruled that, in the absence of an NRC finding that severe accidents are remote and speculative, severe accident mitigation alternatives (SAMAs) should be considered in the NEPA analysis [Limerick Ecology Action v. NRC, 869 F.d 719 (3rd Cir. 1989)]. For most plants, including NMP, license renewal is the first licensing action that would necessitate consideration of SAMAs.

The NRC concluded in its generic license renewal rulemaking that the unmitigated environmental impacts from severe accidents met the Category 1 criteria, but the NRC made consideration of mitigation alternatives a Category 2 issue because ongoing regulatory programs related to mitigation [i.e., Individual Plant Examination (IPE) and Accident Management] have not been completed for all plants. Since these programs have identified plant programmatic and procedural improvements (and, in a few cases, minor modifications) as cost effective in reducing severe accident and risk consequences, the NRC thought it premature to draw a generic conclusion as to whether severe accident mitigation would be required for license renewal.

Site-specific information to be presented in the environmental report includes: (1) potential SAMAs; (2) benefits, costs, and net value of implementing potential SAMAs; and (3) sensitivity of the analysis to changes to key underlying assumptions. This section of the environmental report is a synopsis of key site-specific SAMA information. Additional details, as called out in the following sections, are provided in Appendix F.

4.16.1 METHODOLOGY OVERVIEW

Unit-specific SAMA analyses were performed for both of the Nine Mile Point Units. Having been built approximately 17 years apart, the designs for the two Units are completely different. Because of the major design differences (plant layout, electrical separation, and systems and structural design), the risk profiles are also very different for the two plants. Some additional key design differences are summarized below:

- Unit 1 has a Mark I containment design versus the Unit 2 Mark II containment design.

- The Unit 1 reactor contains five recirculation loops, is a non-jet pump plant, and has a power level much less than Unit 2. Unit 2 has two recirculation loops with jet pumps.

- The emergency core cooling system (ECCS) related systems are also very different. Unit 1 has emergency condensers, no steam-driven injection systems [e.g., reactor core isolation cooling (RCIC) and high-pressure coolant injection (HPCI)], a three-train shutdown cooling system independent from ECCS, and a four-train containment spray and removal system. Unit 2 has no emergency condenser, but does have a steam-driven RCIC, a Division III high-pressure core spray (HPCS) system, and a multifunctional residual heat removal system (e.g., low-pressure injection, decay heat removal, and containment spray).

- Unit 1 has dedicated raw water pumps for each emergency diesel generator, each train of containment heat removal, and an additional four service water pumps (two normal and two emergency) to support equipment cooling [Reactor Building Closed Loop Cooling (RBCLC) and Turbine Building Closed Loop Cooling (TBCLC)]. Unit 2 has a single service water system with six pumps (three pumps for each emergency division).

- With the exception of a firewater crosstie between Units, the two plants do not share key systems and equipment that are important to reactor safety.

The methodology for performing the SAMA analyses was, however, identical for each Unit and is summarized in the following paragraphs.

The methodology used to perform the NMP SAMA cost-benefit analyses was based primarily on the handbook used by the NRC to analyze the benefits and costs of its regulatory activities, NUREG/BR-0184 (Ref. 4.16-1), subject to NMP-specific considerations.

Environmental impact statements and environmental reports are prepared using a sliding scale in which impacts of greater concern and mitigative measures of greater potential value receive more detailed analysis than do impacts of less concern and mitigative measures of less potential value. Accordingly, NMPNS used less detailed feasibility investigation and cost estimation techniques for SAMAs having disproportionately high costs and low benefits, and more detailed techniques for the most viable candidates.

The following is a brief outline of the approach taken in the NMP SAMA analyses:

- Establish the Base Case – Use NUREG/BR-0184 and the current NMP probabilistic risk assessment (PRA) models at the time of evaluation to evaluate the following severe accident impacts:
  - Offsite exposure costs – Monetary value of consequences (dose) to offsite population:

    Use the NMP PRA models to determine the total Unit 1 and Unit 2 accident frequencies, which are a function of core damage and containment release frequencies. Use the Melcor Accident Consequences Code System (MACCS) to convert release input to public dose, and the methodology described in NUREG/BR-0184 to convert dose to present-worth dollars, based on a valuation of $2,000 per person-rem and a present-worth discount factor.
  - Offsite economic costs – Monetary value of damage to offsite property:

    Use the NMP unit-specific models to determine total Unit 1 and Unit 2 accident frequencies [core damage frequency (CDF) and containment release frequency]; use MACCS to convert release input to offsite property damage; and use the NRC's NUREG/BR-0184 methodology to convert offsite property damage estimate to present-worth dollars.
  - Onsite exposure costs – Monetary value of dose to workers:

    Use NUREG/BR-0184 best estimate occupational dose values for immediate and long-term dose, then apply the NUREG/BR-0184 methodology to convert dose to present-worth dollars based on the valuation of $2,000 per person-rem and the present-worth discount factor.
  - Onsite economic costs – Monetary value of damage to onsite property:

    Use NUREG/BR-0184 best estimate cleanup, decontamination, and replacement power costs; then apply the NUREG/BR-0184 methodology to convert onsite property damage estimate to present-worth dollars.
- SAMA Identification – Identify potential SAMAs from the following sources:

  NMP PRA results and staff insights regarding the significant contributors to risk and plant design; SAMA analyses submitted in support of license renewal activities for other nuclear power plants, particularly other boiling water reactors such as Hatch and Peach Bottom; and NRC and industry documentation discussing potential plant improvements.
- Disposition of SAMAs – Eliminate candidates based on cost-benefit analyses:
  - SAMA impacts – Calculate impacts (i.e., onsite/offsite dose and damages) by using the Unit-specific models to simulate revised plant risk following implementation of each individual SAMA.
  - SAMA benefits – Calculate benefits for each SAMA in terms of averted consequences. Averted consequences are the arithmetic differences between the calculated impacts for the base case and the revised impacts following implementation of each individual SAMA.

- Cost estimate – Estimate the cost of implementing each SAMA. The detail of the cost estimate must be commensurate with the benefit. If a benefit is low, it is not necessary to perform a detailed cost estimate to determine that the SAMA is not cost beneficial. Engineering judgment may be applied.

- Sensitivity Analysis – Determine the effect that changing the discount rate would have on the cost-benefit calculation.

- Conclusions – Identify SAMAs that are cost beneficial and provide implementation plans for those SAMAs, or bases for not implementing them.

The results of the SAMA analyses for NMP are presented in the following sections. These sections provide a detailed discussion of the process presented above.

4.16.2 ESTABLISHING THE BASE CASE

The purpose of establishing the base case for each Unit is to provide the unit baseline for determining the risk reductions (benefits) that would be attributable to the implementation of potential SAMAs. For each Unit, the primary source of data relating to the base case is the Unit-specific PRA model. Severe accident risk is calculated through use of the PRA models and the MACCS2 Level 3 model. The NMP PRA models describe the results of the first two levels of the NMP probabilistic risk assessment for the plant's two Units. These levels are defined as follows: Level 1 determines CDFs based on system analyses and human factors evaluations; Level 2 evaluates the impact of severe accident phenomena on radiological releases and quantifies the condition of the containment and the characteristics of the release of fission products to the environment. The NMP models use PRA techniques to:

- Develop an understanding of severe accident behavior;

- Understand the most likely severe accident consequences;

- Gain a quantitative understanding of the overall probabilities of core damage and fission product releases; and

- Evaluate hardware and procedure changes to assess the overall probabilities of core damage and fission product releases.

The Unit 1 and Unit 2 PRAs were initiated in response to Generic Letter 88-20, which resulted in IPE and IPE for external events (IPEEE) analyses (Refs. 4.16-2 through 4.16-5). The current model for each Unit (PRA01B) is a consolidated Level 2 model including both internal and external initiating events (consolidates IPE and IPEEE studies into a single, Unit-specific PRA model) for power operation. This means that severe accident sequences have been developed from internal and external initiated events, including internal and external floods, internal fires, and seismic events. Appendix F, Section F.1 provides additional information pertaining to the evolution of the Nine Mile Point Unit 1 and Unit 2 PRA models, the current risk profile for each Unit, and risk-important modifications.

Using the results of these analyses, the next step is to perform Level 3 PRA analyses, which calculate the hypothetical impacts of severe accidents on the surrounding environment and members of the public. The MACCS2 computer code is used for determining the offsite impacts for the Level 3 analyses, whereas the magnitude of the onsite impacts (in terms of cleanup and decontamination costs and occupational dose) are based on the methodology provided in NUREG/BR-0184.

The principal phenomena analyzed are: (1) atmospheric transport of radionuclides; (2) mitigating actions (i.e., evacuation, condemnation of contaminated crops and milk) based on dose projection; (3) dose accumulation by a number of pathways, including food and water ingestion; and (4) economic costs.

Input for the Level 3 analyses includes: (1) the reactor core radionuclide inventory; (2) NMP source terms (as applied to the Unit 1 and Unit 2 PRA models); (3) site meteorological data; (4) projected population distribution (within a 50-mile radius) for the year 2030, midpoint between expiration dates for the Units 1 and 2 renewed licenses; (5) emergency response evacuation modeling; and (6) economic data. Appendix F, Section F.2 describes the MACCS2 input data, assumptions, and results.

4.16.2.1 Offsite Exposure Costs

The Level 3 base case analyses show an annual offsite exposure risk of 22.5 person-rem for Unit 1 and 50.9 person-rem for Unit 2. These calculated values are converted to monetary equivalents (dollars) via application of the NRC's conversion factor of $2,000 per person-rem. This monetary equivalent is then discounted to present value using the standard NRC formula (Ref. 4.16-1):

$$W_{pha} = C \times Z_{pha}$$

where:

W_{pha} = monetary value of public health risk after discounting ($)
C = $[1 - \exp(-rt_f)]/r$,

where:

t_f = years remaining until end of facility life (20 years)
r = real discount rate (as fraction) (0.07)
Z_{pha} = monetary value of public health (accident) risk per year before discounting ($/year)

Using a 20-year period for remaining unit life and a seven percent discount rate results in a value of approximately 10.76 for C. Therefore, calculating the discounted monetary equivalent of public health risk involves multiplying the dose (person-rem per year) by $2,000 and by the value of C. The resulting monetary equivalent is $484,000 for Unit 1 and $1,100,000 for Unit 2.

4.16.2.2 Offsite Economic Costs

The Level 3 analyses show that the offsite property loss factor multiplied by accident frequency yields an annual offsite economic risk of $86,100 for Unit 1 and $125,000 for Unit 2. Calculated values for offsite economic costs caused by severe accidents are also discounted to present value. Discounting is performed in the same manner as for the Offsite Exposure Costs discussed above. The resulting monetary equivalent is $927,000 for Unit 1 and $1,350,000 for Unit 2.

4.16.2.3 Onsite Exposure Costs

Values for occupational exposure associated with severe accidents are not derived from the Unit 1 and Unit 2 PRA models, but are, instead, obtained from information published by the NRC. Occupational exposure consists of “immediate dose” and “long-term dose.” The best-estimate value provided by the NRC for immediate occupational dose is 3,300 person-rem, and long-term occupational dose is 20,000 person-rem (over a 10-year cleanup period). The following equations are applied to these values to calculate monetary equivalents.

Immediate Dose

For a currently operating facility, the NRC, in NUREG/BR-0184, recommends calculating the immediate dose present value with the following equation:

Equation (1):

$$W_{IO} = \left(F_S D_{IO_S} - F_A D_{IO_A}\right) R \frac{1 - e^{-rt_f}}{r} \tag{1}$$

where:

W_{IO}	=	monetary value of accident risk avoided due to immediate occupational dose, after discounting ($)
R	=	monetary equivalent of unit dose ($/person-rem)
F	=	accident frequency (events/year)
D_{IO}	=	immediate occupational dose (person-rem/event)
s	=	subscript denoting status quo (current conditions)
A	=	subscript denoting after implementation of proposed action
r	=	real discount rate
t_f	=	years remaining until end of facility life

The values used in the analysis are:

R	=	$2,000/person-rem
r	=	0.07
D_{IO}	=	3,300 person-rem/accident (best estimate)
t_f	=	20 years

Assuming F_A is zero for the base case, the monetary value of the immediate dose associated with NMP accident risks is:

$$W_{IO} = \left(F_S D_{IO_S}\right) R \frac{1 - e^{-rt_f}}{r}$$

$$= 3{,}300 * F * \$2{,}000 * \frac{1 - e^{-.07*20}}{.07}$$

The CDF for the Unit 1 base case is 2.7E-05 per year; therefore,

W_{IO} = $1,910

Long-term Dose

For a currently operating facility, the NRC, in NUREG/BR-0184, recommends calculating the long-term dose present value with the following equation:

Equation (2):

$$W_{LTO} = \left(F_S D_{LTO_S} - F_A D_{LTO_A}\right) R * \frac{1 - e^{-rt_f}}{r} * \frac{1 - e^{-rm}}{rm} \quad (2)$$

where:

W_{LTO}	=	monetary value of accident risk-avoided long-term doses, after discounting ($)
F	=	accident frequency (events/year)
s	=	subscript denoting status quo (current conditions)
A	=	subscript denoting after implementation of proposed action
t_f	=	years remaining until end of facility life
r	=	real discount rate
R	=	monetary equivalent of unit dose ($/person-rem)
D_{LTO}	=	long-term occupational dose (person-rem/event)
m	=	years over which long-term doses accrue

The values used in the analysis are:

R	=	$2,000/person-rem
r	=	0.07
D_{LTO}	=	20,000 person-rem/accident (best estimate)
m	=	“as long as 10 years”
t_f	=	20 years

Assuming F_A is zero for the base case, the monetary value of the long-term dose associated with the plant accident risk is:

$$W_{LTO} = \left(F_S D_{LTO_S}\right) R * \frac{1 - e^{-rt_f}}{r} * \frac{1 - e^{-rm}}{rm}$$

$$= \left(F_S \times 20{,}000\right) \$2{,}000 * \frac{1 - e^{-.07*20}}{.07} * \frac{1 - e^{-.07*10}}{.07*10}$$

The CDF (F_S) for the Unit 1 base case is 2.7E-05 per year; therefore,

W_{LTO} = $8,340

Total Occupational Exposures

Combining Equations (1) and (2) above and using the above numerical values, the long-term accident related onsite (occupational) bounding dose (W_O) for Unit 1 is equivalent to:

$W_O = W_{IO} + W_{LTO} = \$10,200$

The CDF for the Unit 2 base case is 6.2E-05 per year; therefore, applying the same methodology outlined above, the long-term accident related onsite (occupational) bounding dose for Unit 2 is approximately $23,500**.**

4.16.2.4 Onsite Economic Costs

Onsite economic costs are considered to include costs associated with cleanup/ decontamination, replacement power, and repair/refurbishment. Each of these factors is discussed in the following sections.

CLEANUP AND DECONTAMINATION

The total undiscounted cost estimate of cleanup and decontamination of a power facility subsequent to a severe accident is estimated by the NRC, in NUREG/BR-0184, at $1.5E+09. Assuming the $1.5E+09 estimate is spread evenly over a 10-year period for cleanup and applying a seven percent real discount rate, the cost translates into a net present value of $1.1E+09 for a single event. This quantity is derived from the following equation:

$$PV_{CD} = \left(\frac{C_{CD}}{m}\right)\left(\frac{1-e^{-rm}}{r}\right)$$

where:

PV_{CD} = present value of the cost of cleanup/decontamination ($)
C_{CD} = total cost of the cleanup/decontamination effort ($1.5E+09)
m = cleanup period (10 years)
r = real discount rate (7 percent)

Therefore:

$$PV_{CD} = \left(\frac{\$1.5E+09}{10}\right)\left(\frac{1-e^{-.07*10}}{.07}\right)$$

$$PV_{CD} = \$1.079E+09$$

This cost is integrated over the license renewal period as follows:

$$U_{CD} = PV_{CD} \frac{1 - e^{-rt_f}}{r}$$

where:

U_{CD} = net present value of cleanup/decontamination over the life of the plant ($)
t_f = years remaining until end of facility life

Based upon the values previously assumed:

$$U_{CD} = \$1.161E + 10$$

Replacement Power

Replacement power costs, U_{RP}, are an additional contributor to onsite costs. These are calculated in accordance with NUREG/BR-0184, Sections 5.7.6.4 and 5.6.7.2. Since replacement power will be needed for the time period following a severe accident and for the remainder of the expected generating plant life, long-term replacement power calculations have been used. Values used in the calculations are based on the 910 megawatts-electric (MWe) reference plant provided in NUREG/BR-0184.

$$PV_{RP} = \left(\frac{\$1.2E + 08}{r} \right) \left(1 - e^{-rt_f} \right)^2$$

where:

PV_{RP} = present value of the cost of replacement power for a single event ($)
t_f = years remaining until end of facility life
r = real discount rate

This equation was developed per NUREG/BR-0184 for discount rates between 5 percent and 10 percent only. It was developed using the constant $1.2E+08, which has no intrinsic meaning, but is a substitute for a string of non-constant replacement power costs that occur over the lifetime of a “generic” reactor after an event.

To account for the entire lifetime of the facility, U_{RP} was then calculated from PV_{RP}, as follows:

$$U_{RP} = \frac{PV_{RP}}{r} \left(1 - e^{-rt_f} \right)^2$$

where:

U_{RP} = present value of the cost of replacement power over the life of the facility ($)

Based upon values previously assumed:

U_{RP} = $7.89E+09

Applying the correction for the 615 MWe Unit 1 versus 910 MWe for the “generic” reactor, U_{RP} = \$5.33E+09. Applying a similar correction for the 1,144 MWe Unit 2, U_{RP} = \$9.92E+09.

Repair and Refurbishment

NMPNS has no plans for major repair/refurbishment following a severe accident; therefore, there is no contribution to averted onsite costs from this source.

Total Onsite Economic Cost

The total onsite economic cost is the sum of the cleanup/decontamination cost (U_{CD}) and the replacement power cost (U_{RP}) multiplied by the CDF. The Unit 1 CDF is 2.7E-05/year; therefore, the total onsite economic cost for Unit 1 is \$456,000. The Unit 2 CDF is 6.2E-05/year; therefore, the total onsite economic cost for Unit 2 is \$1,330,000.

4.16.2.5 Maximum Attainable Benefit

The present-dollar value equivalent for severe accidents for each Unit is the sum of the offsite exposure costs, offsite economic costs, onsite exposure costs, and onsite economic costs. Table 4.16-1 lists these values for each Unit-specific base case as calculated in the previous sections. As shown, the monetized value of severe accident risk is approximately \$1,880,000 for Unit 1 and \$3,790,000 for Unit 2.

The maximum theoretical benefit is based upon the elimination of all plant risk and equates to the base case severe accident risk described above. Therefore, the maximum attainable benefit is \$1,880,000 for Unit 1 and \$3,790,000 for Unit 2.

4.16.3 SAMA IDENTIFICATION

NMPNS identified candidate modifications by focusing on Unit-specific risk and design characteristics. NMPNS considered insights into possible Unit-specific improvements gained through the development and use of the Unit 1 and Unit 2 PRA models over the past decade. NMPNS focused on the dominant risk sequences identified by the models, as well as the results of other risk-importance studies to further focus the evaluation. Appendix F, Section F.1 provides details of the NMP risk profiles.

The SAMA list was developed following the steps summarized below:

- An initial list of candidate SAMAs was created from the Hatch and Peach Bottom license renewal applications (LRAs) (Ref. 4.16-6; Ref. 4.16-7). This list identified SAMAs 1 through 207.

- Two Unit-specific meetings were held at NMP to review the initial list. The personnel in attendance at each meeting were from NMP Operations, Design, and Risk Assessment. During these meetings, each of the 207 SAMAs was screened, using

TABLE 4.16-1

ESTIMATED PRESENT DOLLAR VALUE EQUIVALENT FOR SEVERE ACCIDENTS AT NMP

Parameter	Unit 1 Present Dollar Value	Unit 2 Present Dollar Value
Onsite Economic Costs	$456,000	$1,330,000
Offsite Economic Costs	$927,000	$1,350,000
Onsite Exposure Costs	$10,000	$24,000
Offsite Exposure Costs	$484,000	$1,100,000
Total	$1,880,000	$3,800,000

judgment from the team, and either eliminated based on cost and/or benefits, or the SAMA was retained for further analysis. Plant-specific SAMAs were added to the list based on plant risk profiles. SAMAs 208 through 223 were identified as a result of Unit-specific considerations. No SAMA was added or retained for further analysis if it was considered to be already implemented.

- Final development of the SAMA list included enhancement of the screening basis and documentation and specific definition of conceptual modifications.

As described above, the PRA risk profiles and results were reviewed to determine whether there were any potential cost-beneficial improvements. The following observations apply to both Units:

- Release reductions without a reduction in CDF – several generic SAMAs were developed to address improvements in containment performance. Generally, these are relatively expensive modifications and were screened out with the exception of SAMA 208. Also, the release contribution to the maximum attainable benefit is less than 50 percent of the total. No other Unit-specific weaknesses were identified relative to potential modifications to improve containment performance.

- Shutdown Risk – a shutdown PRA (SDPRA) has been developed recently for Unit 2, and one is under development for Unit 1. Application of the SDPRA during the last refueling outage indicates that CDF during shutdown is less than during power operation and no significant weaknesses were identified. Additionally, the source term is reduced during shutdown. As a result, no other plant-specific weaknesses were identified relative to potential modifications to improve risk during plant shutdown. However, SAMA 112 was retained to evaluate the level of benefit that could be achieved by improvement in decay heat removal.

- This review was supplemented by reviewing sequences considered to be important to CDF and large early release frequency (LERF) (>1% contribution). The dominant contributors to CDF and LERF (functional, initiating events, and risk reduction worth ranking of systems) were considered.

The screening of SAMAs based on cost was conducted using the maximum attainable benefit. A $2 million and $5 million maximum attainable benefit, for Unit 1 and Unit 2, respectively, were used to determine whether SAMAs would be considered for further evaluation. NMPNS considers the amount of conservatism built into the maximum attainable benefit values to be adequate to address uncertainty. For example, a 10 percent reduction in CDF applied to the worst release category only represents approximately a $400,000 benefit for Unit 1 and a $1,400,000 benefit for Unit 2. Therefore, using the maximum attainable benefit value allows for significant margin with no further consideration of uncertainty.

4.16.4 COST-BENEFIT ANALYSES

The cost-benefit analyses involved developing Unit-specific descriptions for each SAMA and performing cost-benefit analyses for the viable candidates. NMPNS developed general descriptions for how each potential SAMA would be implemented to provide a basis for bounding benefit and cost estimates. Each SAMA description provided the analysts with a description that could be compared with the current plant configuration and processes. Appendix F, Section F.3 provides a description for each candidate SAMA.

NMPNS then prepared site-specific cost estimates for implementing each candidate SAMA. Conservatively, the cost estimates included neither the cost of replacement power during extended outages required to implement the modifications, nor the contingency costs associated with unforeseen implementation obstacles. Estimates were presented in terms of dollar values at the time of implementation or estimation, and were not adjusted to present-day dollars.

Consistent with the methodology presented in Section 4.16.2, NMP calculated the maximum benefit for each potential SAMA. The methodology for determining if a SAMA is beneficial consists of determining whether the benefit provided by implementation of the SAMA exceeds the expected cost of implementation. The benefit is defined as the sum of the reductions in the dollar equivalents for each severe accident impact (offsite exposure costs, offsite economic costs, occupational exposure costs, and onsite economic costs) resulting from the implementation of a SAMA.

The result of implementation of each SAMA would result in a change to the severe accident risk (i.e., a change in frequency or consequence of severe accidents)[2]. The methodology for calculating the magnitude of these changes is straightforward. First, the NMP severe accident risk after implementation of each SAMA was calculated using

[2] Frequency x consequence = risk.

the same methodology as for the base case. A spreadsheet was then used to combine the results of the Level 2 models with the respective Level 3 models to calculate the post-SAMA Unit risks. The results of the benefit analyses for each of the SAMAs are presented in Section 4.16.5.

As described above for the base case, values for avoided public and occupational health risks (benefits) were converted to a monetary equivalent (dollars) via application of the NRC's conversion factor of $2,000 per person-rem (Ref. 4.16-1) and discounted to present value. Values for avoided offsite economic costs were also discounted to present value. The formula used for calculating net value for each SAMA is as follows:

Net value = ($APE + $AOC + $AOE + $AOSC) – COE

where:

$APE	=	monetized value of averted public exposure ($)
$AOC	=	monetized value of averted offsite costs ($)
$AOE	=	monetized value of averted occupational exposure ($)
$AOSC	=	monetized value of averted onsite costs ($)
COE	=	cost of enhancement ($)

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA, and the SAMA would not be considered cost-beneficial. The projected cost of each SAMA (the COE) was determined by NMPNS personnel knowledgeable in cost estimation processes. Screening level plant-specific cost estimates that address the major cost considerations for implementing each SAMA were prepared. Additional detail for the candidate SAMA cost estimates is provided in Appendix F, Section F.3.

4.16.5 RESULTS

As discussed in Section 4.16.1, the NMP SAMA evaluation was performed separately for each Unit. A total of 223 SAMAs were evaluated for each Unit. The first 207 SAMAs were obtained from the Peach Bottom LRA environmental report (ER) and encompassed the 115 SAMAs that were addressed in the Hatch LRA ER. At the time the analyses were performed, these were the only other boiling water reactors for which licensees had submitted LRAs. Sixteen site-specific SAMAs (items 208 through 223) were identified and evaluated for each Unit. The Unit-specific results of the evaluation are contained in Sections 4.16.5.1 and 4.16.5.2 for Unit 1 and Unit 2, respectively.

In the GEIS, the NRC concluded that the probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts of severe accidents are of small significance for all plants. Furthermore, NMPNS concurs with that conclusion and addressed site-specific measures to mitigate severe accidents in these analyses. NMPNS determined that the potentially cost-beneficial SAMAs identified do not relate to adequately managing the effects of aging and, therefore, would not be required to be implemented pursuant to 10 CFR 54.

However, NMPNS has historically identified and implemented various plant improvements to reduce the CDF of each Unit and the consequences of postulated accidents. Accordingly, NMPNS will continue to refine the evaluations and consider implementation of the potentially cost-beneficial modifications discussed in the following sections through the current plant change process as voluntary plant enhancements.

4.16.5.1 Unit 1

NMPNS used Version U1PRA01B of the Unit 1 PRA model (dated 2002) and developed a limited Level 3 model to conduct the SAMA analysis. Using these models, NMPNS analyzed 13 plant-specific alternatives for mitigating Unit 1 severe accident impacts. Table 4.16-2 presents the Unit 1 analysis results and includes: (1) the percentage of CDF reduction; (2) the estimated benefit; (3) the estimated cost of the enhancement; and (4) the net benefit for each of the candidate SAMAs evaluated. The Unit 1 cost-benefit evaluation indicates three candidate SAMAs are potentially cost beneficial for mitigating the consequences of a severe accident. These include:

- SAMA 209 – Improve Procedure SOP-14 and Provide Training
- SAMA 210 – Protect Critical Fire Targets
- SAMA 215 – Add a Portable Charger

In NUREG/BR-0184, the NRC recommends using a seven percent real (i.e., inflation-adjusted) discount rate for value-impact analyses and notes that a three percent discount rate should be used for sensitivity analyses to indicate the sensitivity of the results to the choice of discount rate. This reduced discount rate takes into account the additional uncertainties (i.e., interest rate fluctuations) in predicting costs for activities that would take place several years in the future. Using a three percent discount rate, the magnitude of the net benefit increase for each candidate SAMAs was calculated. As a result of this increase, one additional SAMA candidate, SAMA 212 – Capability to Manually Operate Containment Venting, was determined to be potentially cost beneficial for Unit 1.

NMPNS conducted the SAMA evaluation on each concept independently; not taking into account the potential relationships that may exist among SAMAs. These relationships are important to note, and must be weighed by NMPNS when considering implementation of any one SAMA. For Unit 1, implementing SAMA U1-215 would significantly reduce the benefit modeled for SAMA U1-209. Therefore, NMPNS will continue to refine the evaluation and pursue SAMA U1-215, since it is judged to provide a more reliable method of recovering instrumentation, as well as, supporting other functions (e.g., keeping emergency relief valve open, recovering alternating current supply).

TABLE 4.16-2

DISPOSITION OF NINE MILE POINT UNIT 1 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
4	Provide Training for Loss of RBCLC	<1%	$8,600	$30,000	Net benefit of ($21,400). [Using a 3 percent discount rate, the net benefit is ($18,000).]
21	Firewater Supply to SDC Heat Exchanger	2.3%	$41,400	$500,000	Net benefit of ($459,000). [Using a 3 percent discount rate, the net benefit is ($442,000).]
24	Improve Procedures for Loss of Control Room HVAC	0%	NA	NA	After further review of this modification, it was determined that no benefit could be gained; therefore, a detailed evaluation was not performed.
112	Modify RWCU for Decay Heat Removal	0%	NA	NA	After further review of this modification, it was determined that no benefit could be gained; therefore, a detailed evaluation was not performed.
113	Use of CRD for Alternate Boron Injection	<1%	$5,490	>$70,000	Net benefit of >($64,500). [Using a 3 percent discount rate, the net benefit is still negative at >($62,300).]
208	Improve Drywell Head Bolts	0%	$1,510	>$150,000	Net benefit of >($148,000). [Using a 3 percent discount rate, the net benefit is still negative at >($148,000).]
209	Improve SOP-14 and Provide Training	22%	$449,000	$30,000	Positive net benefit of $419,000.

TABLE 4.16-2 (CONTINUED)

DISPOSITION OF NINE MILE POINT UNIT 1 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
210	Protect Critical Fire Targets	23%	$459,000	$40,000	Positive net benefit of $419,000.
211	Reduce Offsite Dependency on DC11	<1%	$24,400	$50,000	Net benefit of ($25,600). [Using a 3 percent discount rate, the net benefit is still negative at ($16,000).]
212	Capability to Manually Operate Containment Venting	<1%	$37,500	>$40,000	Net benefit of >($2,500). [Using a 3 percent discount rate, the net benefit is still negative at >($12,400).]
215	Add a Portable Charger	22%	$449,000	$50,000	Positive net benefit of $399,000.
220	Installation of New Transformers to Improve AC Power Load Management	14%	$295,000	$600,000	Net benefit of ($305,000). [Using a 3 percent discount rate, the benefit changes to a net benefit of ($189,000).]
222	Improved Response to Loss of Instrument Air	4.2%	$87,500	$600,000	Net benefit of ($512,000). [Using a 3 percent discount rate, the benefit changes to a net benefit of ($478,000).]

Source: see Appendix F.
AC = alternating current
AOV = air-operated valve
CDF = core damage frequency
CRD = control rod drive system
HVAC = heating, ventilation, and air conditioning
RBCLC = reactor building closed loop cooling
RWCU = reactor water cleanup system
SDC = shutdown cooling
SOP = standard operating procedure
U1 = Nine Mile Point Unit 1

Adding a portable charger (SAMA 215) would also reduce the benefit of SAMAs 210 and 212; however, the magnitude of this reduction has not been quantified. Given the magnitude of the benefit associated with SAMA 210, NMPNS will pursue this modification and continue to evaluate the potential benefit associated with SAMA 212.

4.16.5.2 Unit 2

NMPNS used Version U2PRA01B of the Unit 2 PRA model (dated 2002) and also developed a limited Level 3 model to conduct the SAMA analysis. Using these models, NMPNS analyzed 20 plant-specific alternatives for mitigating Unit 2 severe accident impacts. Table 4.16-3 presents the Unit 2 analysis results. Similar to the Unit 1 disposition summary table, the Unit 2 table includes: (1) the percentage of CDF reduction; (2) the estimated benefit; (3) the estimated cost of the enhancement; and (4) the net benefit for each of the candidate SAMAs evaluated. The cost-benefit evaluation indicates 10 of the 20 candidate SAMAs are potentially cost beneficial for mitigating the consequences of a severe accident for Unit 2. These include:

- SAMA 23a – Provide Redundant Ventilation for Residual Heat Removal (RHR) Pump Rooms
- SAMA 23b – Provide Redundant Ventilation for HPCS Pump Room
- SAMA 23c – Provide Redundant Ventilation for RCIC Pump Room
- SAMA 213 – Enhance Loss of Service Water Procedure
- SAMA 214 – Enhance Station Blackout (SBO) procedures
- SAMA 215 – Use of a Portable Charger for the Batteries
- SAMA 216 – Hard Pipe Diesel Fire Pump to the Reactor Pressure Vessel (RPV)
- SAMA 221a – Reduce Unit Cooler Contribution to Emergency Diesel Generator (EDG) Unavailability – increase testing frequency
- SAMA 221b – Reduce Unit Cooler Contribution to EDG Unavailability – provide redundant means of cooling
- SAMA 222 – Improve Procedure for Loss of Instrument Air

Using the three percent discount rate versus the seven percent rate, the magnitude of the net benefit increases for each of the candidate SAMAs was calculated. As a result of this increase, one additional SAMA candidate, SAMA 223 – Improve Control Building Flooding Scenarios, was determined to be potentially cost beneficial for Unit 2.

TABLE 4.16-3

DISPOSITION OF NINE MILE POINT UNIT 2 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
21	Firewater Supply to RHR Heat Exchanger	0%	NA	NA	After further review of this modification, it was determined that no benefit could be achieved; therefore, a detailed evaluation was not performed.
23a	Provide Redundant Ventilation for RHR Pump Rooms	3.0%	$210,000	$30,000	Positive net benefit of $180,000.
23b	Provide Redundant Ventilation for HPCS Pump Room	4.0%	$264,000	$30,000	Positive net benefit of $234,000.
23c	Provide Redundant Ventilation for RCIC Pump Room	1.4%	$77,500	$30,000	Positive net benefit of $47,500.
24	Improve Procedures for Loss of Control Room HVAC	0%	NA	NA	After further review of this modification, it was determined that no benefit could be gained from a procedure change; therefore, a detailed evaluation was not performed.
56	Additional Diesel for Onsite Emergency AC Power	54%	$956,000	>$10,000,000	Net benefit of >($9,040,000). [Using a 3 percent discount rate, the net benefit is >($8,780,000).]
73	Firewater Back-up for EDG Cooling	2.5%	$135,000	$500,000	Net benefit of ($365,000). [Using a 3 percent discount rate, the net benefit is ($316,000).]

TABLE 4.16-3 (CONTINUED)

DISPOSITION OF NINE MILE POINT UNIT 2 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
112	Modify RWCU for Decay Heat Removal	0%	NA	NA	After further review of this modification, it was determined that no benefit could be achieved; therefore, a detailed evaluation was not performed.
113	Use CRD for Alternate Boron Injection	<1%	$46,800	>$150,000	Net benefit of ($103,000). [Using a 3 percent discount rate, the net benefit is ($86,100).]
208	Improve Drywell Head Bolts	0%	$30,700	>$150,000	Net benefit of ($119,000). [Using a 3 percent discount rate, the net benefit is ($107,000).]
213	Enhance Loss of Service Water Procedure	4.0%	$264,000	$30,000	Positive net benefit of $234,000.
214	Enhance SBO Procedures	NA	>$100,000	$30,000	Positive net benefit of >$70,000. Implementation of this modification was qualitatively assessed. The estimated benefit is based on engineering judgment from experience in dealing with the assessment of the workweek risk when taking an offsite power line out of service.

TABLE 4.16-3 (CONTINUED)

DISPOSITION OF NINE MILE POINT UNIT 2 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
215	Use of a Portable Charger	4.9%	$507,000	$50,000	Positive net benefit of $457,000. Implementation of U2-216 and/or -221 would reduce the modeled benefit.
216	Hard Pipe Diesel Fire Pump to the RPV	42%	$800,000	$200,000	Positive net benefit of $600,000. Implementation of U2-215 and/or -221 would reduce the modeled benefit.
218	Improve the HPCS Crosstie to Division I/II	41%	$706,000	NA	After further evaluation, NMPNS determined this concept was not feasible for implementation to achieve the modeled benefit. Implementation of SAMAs U2-215, -216, and -221 are judged to provide a more reliable and cost-effective alternative.
219	Improve Containment Venting	4%	$313,000	$700,000	Net benefit of ($387,000). [Using a 3 percent discount rate, the net benefit is ($272,000).]
221a	Reduce Unit Cooler Contribution to EDG Unavailability – increase testing frequency	14%	$342,000	$55,000	Positive net benefit of $287,000.
221b	Reduce Unit Cooler Contribution to EDG Unavailability – provide redundant means of cooling	31%	$872,000	$55,000	Positive net benefit of $817,000.

TABLE 4.16-3 (CONTINUED)

DISPOSITION OF NINE MILE POINT UNIT 2 SAMAs

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
222	Improve Procedures for Loss of Instrument Air	7.4%	$273,000	$30,000	Positive net benefit of $243,000.
223	Improve Control Building Flooding Scenarios	1.3%	$86,700	>$100,000	Net benefit of ($13,300). [Using a 3 percent discount rate, the net benefit is $18,300.]

Source: see Appendix F.
AC = alternating current
CDF = core damage frequency
CRD = control rod drive system
EDG = emergency diesel generator
HPCS = high-pressure core spray
HVAC = heating, ventilation, and air conditioning
RCIC = reactor core isolation cooling
RHR = residual heat removal
RPV = reactor pressure vessel
RWCU = reactor water cleanup system
SBO = station blackout
U2 = Nine Mile Point Unit 2

NMPNS conducted the SAMA evaluation on each concept independently; not taking into account the potential relationships that may exist among SAMAs. These relationships are important to note, and must be weighed by NMPNS when considering implementation of any one SAMA. For Unit 2, the modeled benefits achieved by the implementation of SAMAs U2-23a, -23b, -23c, and -213 should be considered as a combination since loss of service water (SAMA U2-213) is an important contributor and cause of room cooling failure (SAMA U2-23). Another relationship worthy of note includes SAMAs U2-215, -216, and -221. The benefits of these modifications on an individual basis are also influenced by implementation of either or both of the other two. These relationships have not been modeled at this point, but would be considered as NMPNS continues to refine the evaluations.

4.17 ENVIRONMENTAL JUSTICE

NRC

"The need for and the content of an analysis of environmental justice will be addressed in plant-specific reviews." 10 CFR 51, Appendix B to Subpart A, Table B-1, Footnote 6

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (Ref. 4.17-1), requires executive agencies to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects" from their programs, policies, and activities on minority and low-income populations. The Presidential Memorandum that accompanied Executive Order 12898 emphasized the importance of using existing laws, including NEPA, to identify and address environmental justice concerns, "including human health, economic, and social effects, of Federal actions" (Ref. 4.17-2).

Although the NRC is not subject to Executive Order 12898, it has voluntarily committed to conducting environmental justice reviews of actions under its jurisdiction and has issued procedural guidance (Ref. 4.17-3, Appendix D) to assist NRC staff in discharging their responsibilities under NEPA. Supplement 1 to Regulatory Guide 4.2, "Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses" (Ref. 4.1-2, pages 4.2-S-51 and 4.2-S-52) provides general guidance on the demographic information to be included in an applicant's environmental report to facilitate the NRC's conduct of the environmental justice review. Information provided in Section 2.5 of this environmental report is consistent in format and content with that specified by the guidance contained in these documents. Information NMPNS presents in Chapter 4.0 of this environmental report also constitutes relevant input to the NRC's environmental justice review, and indicates that the environmental impacts associated with all Category 1 and Category 2 issues applicable to NMPNS license renewal are expected to be of SMALL significance.

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4.16-4 NMP1 IPEEE (Generic Letter 88-20 submittal, models, and supporting analyses), June 1996.

4.16-5 NMP2 IPEEE (Generic Letter 88-20 submittal, models, and supporting analyses), June 1995.

4.16-6 Southern Nuclear Operating Company. *Applicant's Environmental Report – License Renewal Stage Edwin I. Hatch Nuclear Plant*. March 2, 2000.

4.16-7 Exelon Generating Company, LLC. *Applicant's Environmental Report – Operating License Renewal Stage Peach Bottom Atomic Power Station Units 2 and 3*. July 2, 2001.

4.17-1 "Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." *Federal Register*. Vol. 59, No. 32. (February 16, 1994.) http://www.access.gpo.gov/su_docs/aces/aaces002.html.

4.17-2 Clinton, W.J. (President of United States). Memorandum for the Heads of All Departments and Agencies. "Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." February 11, 1994.

4.17-3 U.S. Nuclear Regulatory Commission. "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues." NRR Office Instruction LIC-203. Office of Nuclear Reactor Regulation. Washington, D.C. June 21, 2001.

5.0 ASSESSMENT OF NEW AND SIGNIFICANT INFORMATION

> **NRC**
>
> **"The environmental report must contain any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware." 10 CFR 51.53(c)(3)(iv)**

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants and provides for license renewal, requiring an application that includes a supplement to the environmental report (ER) (10 CFR 54.23). NRC regulations at 10 CFR 51 prescribe the ER content and identify the specific analyses the applicant must perform. In an effort to perform the environmental review efficiently and effectively, the NRC has resolved most of the environmental issues generically, but requires an applicant's analysis of all the remaining applicable issues.

While NRC regulations do not require an applicant's ER to contain analyses of the impacts of those environmental issues that have been generically resolved [10 CFR 51.53(c)(3)(i)], the regulations do require that an applicant identify any new and significant information of which the applicant is aware [10 CFR 51.53(c)(3)(iv)]. The purpose of this requirement is to alert the NRC staff to such information so that the staff can determine whether to seek the NRC's approval to waive or suspend application of the Rule with respect to the affected generic analysis. The NRC has explicitly indicated, however, that an applicant is not required to perform a site-specific validation of its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) conclusions (Ref. 5.1-1, page C9-13, Concern Number NEP.015).

Nine Mile Point Nuclear Station, LLC (NMPNS) assumes new and significant information would be the following:

- Information that identifies a significant environmental issue the GEIS does not cover and is not codified in the regulation, or
- Information the GEIS analyses did not cover and that leads to an impact finding different from that codified in the regulation.

The NRC does not define the term "significant." For the purpose of its review, NMPNS used guidance available in Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1518). The National Environmental Policy Act (NEPA) authorizes the CEQ to establish implementing regulations for federal agency use. The NRC requires license renewal applicants to provide the NRC with input, in the form of an ER that the NRC will use to meet NEPA requirements as they apply to license renewal (10 CFR 51.10; 10 CFR 54.23). CEQ guidance provides that federal agencies should prepare environmental impact statements for actions that would significantly affect the environment (40 CFR 1502.3), to focus on significant environmental issues (40 CFR 1502.1), and to eliminate from detailed study issues that are not significant [40 CFR 1501.7(a)(3)]. The CEQ guidance includes a lengthy definition of "significantly," which requires consideration of the context of the action and the intensity or severity of the impact(s) (40 CFR 1508.27). NMPNS assumed that moderate or large impacts, as the NRC defines, would be "significant." Section 4.1.2 presents the NRC definitions of "moderate" and "large" impacts.

NMPNS prepared the *Nine Mile Point Units 1 & 2 Environmental Report – Operating License Renewal Stage* in accordance with the regulations at 10 CFR 51.53(c). The NRC regulation specifically states that applicants need not provide additional analysis for Category 1 issues [10 CFR51.53(c)(3)(i)]; however, the NRC regulation requires that each license renewal applicant submit in its ER "...any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware..." [10CFR51.53(c)(3)(iv)].

NMPNS conducted an assessment for new and significant information as part of its preparation of the ER for the license renewal of Nine Mile Point Units 1 & 2 (NMP). The process was directed by the License Renewal Project Environmental Review Lead and included the following actions:

(1) Assembly of an investigative team of individuals from NMPNS and corporate headquarters to support preparation of the ER. (These individuals are knowledgeable about plant systems, the site environment, and plant environmental issues.);

(2) Interviews with subject matter experts from NMPNS and corporate headquarters along with Niagara Mohawk employees formerly associated with NMP on information related to the conclusions in the GEIS as they relate to NMP;

(3) Review of NMPNS's environmental management system, permits, procedures, and practices to understand how the programs and activities manage potential impacts and/or provide mechanisms for staff to become aware of new and significant information;

(4) Review of documents related to environmental issues of NMP and associated environs; and

(5) Correspondence and discussions with state and federal regulatory agencies to determine if the agencies had concerns not addressed in the GEIS and/or concerns with issues relative to their expertise as addressed in the environmental report; and

(6) Maintaining interfaces with the nuclear power industry to ensure current knowledge of events at other plants with potential to affect environmental issues; and

(7) Review of other license renewal application submittals for pertinent issues; and

(8) Crediting the oversight provided by inspections of plant facilities by state and federal regulatory agencies.

As a result of this assessment, NMPNS is aware of no new and significant information regarding the environmental impacts of NMP license renewal and continued operation.

5.1 REFERENCES

5.1-1 U.S. Nuclear Regulatory Commission. *Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response*. NUREG-1529. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

6.0 SUMMARY OF LICENSE RENEWAL IMPACTS AND MITIGATING ACTIONS

6.1 LICENSE RENEWAL IMPACTS

Nine Mile Point Nuclear Station, LLC (NMPNS), has reviewed the environmental impacts associated with renewing the Nine Mile Point Units 1 & 2 (NMP) operating licenses and has concluded that all of the impacts would be small and would not require mitigation. This environmental report documents the basis for the conclusion. In Section 4.1, NMPNS incorporates by reference the U.S. Nuclear Regulatory Commission's (NRC's) findings for the 56 Category 1 issues that apply to NMP, all of which have impacts that are SMALL (see Appendix A). Chapter 4, Sections 4.2 through 4.17, present NMPNS's analysis of the 16 Category 2 issues that apply to the NMP site. Results of these analyses indicate that impacts would be SMALL for all applicable Category 2 issues. NMPNS studies indicate that no refurbishment would be required for Unit 1 and Unit 2 license renewals; therefore, no impacts would be associated with the three Category 2 refurbishment issues included in Sections 4.8, 4.12, and 4.13.1. The impacts that NMP would have on resources associated with Category 2 issues are summarized in Table 6.1-1.

TABLE 6.1-1

ENVIRONMENTAL IMPACTS RELATED TO LICENSE RENEWAL OF NMP[a]

No.	Issue	Environmental Impact
	Surface Water Quality, Hydrology, and Use (for all plants)	
13	Water-use conflicts (plants using cooling ponds or cooling towers using makeup water from a small river with low flow)	NONE. The issue is not applicable because NMP is located on Lake Ontario, not a small river.
	Aquatic Ecology (for plants with once-through and cooling pond heat dissipation systems)	
25	Entrainment of fish and shellfish in early life stages	SMALL. No significant impacts observed from current operations. Entrainment monitoring conducted from the 1972 to 1997 indicates that entrainment levels from Unit 1 operations constitute a negligible proportion of lakewide populations.
26	Impingement of fish and shellfish	SMALL. No significant impacts observed from current operations. Impingement monitoring conducted from the 1970s to 1997 indicates that impingement levels from Unit 1 operations constitute a negligible proportion of lakewide populations.
27	Heat shock	SMALL. Unit 1 has an approved CWA Section 316(a) variance that provides alternate thermal limits and allows for a 425-acre mixing zone in Lake Ontario from the point of discharge.
	Groundwater Use and Quality	
33	Groundwater use conflicts (potable and service water, and dewatering; plants that use more than 100 gpm)	SMALL. The cone of depression created by dewatering at Unit 2 does not extend off site.
34	Groundwater use conflicts (plants using cooling towers withdrawing makeup water from a small river)	NONE. The issue is not applicable because NMP is located on Lake Ontario, not a small river.
35	Groundwater use conflicts (Ranney wells)	NONE. The issue is not applicable because the NMP site does not use Ranney wells.
39	Groundwater quality degradation (cooling ponds at inland sites)	NONE. The issue is not applicable because the NMP site does not use cooling ponds.
	Terrestrial Resources	
40	Refurbishment impacts to terrestrial resources	NONE. NMPNS has no plans for major refurbishment at NMP related to license renewal.

TABLE 6.1-1 (CONTINUED)

ENVIRONMENTAL IMPACTS RELATED TO LICENSE RENEWAL OF NMP[a]

No.	Issue	Environmental Impact
		Threatened or Endangered Species
49	Threatened or endangered species	SMALL. Species of concern have a low potential for occurrence in habitats affected by the plant and transmission line operation and associated maintenance; protective operation and maintenance practices are employed; no impacts have been observed during operational monitoring.
		Air Quality
50	Air quality during refurbishment (nonattainment and maintenance areas)	NONE. NMP is not in a nonattainment or maintenance area nor does NMPNS have plans for major refurbishment at NMP related to license renewal.
		Human Health
57	Microbiological organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)	NONE. NMP is not located on a small river or a small lake, and is not equipped with cooling ponds.
59	Electromagnetic fields, acute effects (electric shock)	SMALL. All circuits meet National Electric Safety Code® requirements for limiting induced shock.
		Socioeconomics
63	Housing impacts	SMALL. NMPNS does not plan any refurbishment activities related to license renewal, so there would be no housing impacts due to refurbishment. A bounding analysis, which assumes 60 additional employees may be required during the license renewal term, indicates the need for an additional 203 housing units in an area with a population greater than 500,000 persons and demonstrates impacts would be small.
65	Public services: public utilities	SMALL. NMPNS does not plan any refurbishment activities related to license renewal, so there would be no impacts to public utilities due to refurbishment. A bounding analysis, which assumes 60 additional employees may be required during the license renewal term, indicates increased demand of approximately 42,400 gallons of water per day on water systems in the Onondaga and Oswego combined-County area. Given the available capacity of these systems, bounding analysis demonstrates impacts would be small.

TABLE 6.1-1 (CONTINUED)

ENVIRONMENTAL IMPACTS RELATED TO LICENSE RENEWAL OF NMP[a]

No.	Issue	Environmental Impact
	Socioeconomics (continued)	
66	Public services: education (refurbishment)	NONE. NMPNS has no plans for major refurbishment at NMP as part of license renewal.
68	Offsite land use (refurbishment)	NONE. NMPNS has no plans for major refurbishment at NMP as part of license renewal.
69	Offsite land use (license renewal term)	SMALL. Oswego County has not experienced any significant changes in land-use patterns from current operations. Given the established patterns of development and the growth management measures enacted in Oswego County and the Town of Scriba, license renewal tax-driven land-use changes are not likely to generate significant changes in the area's land-use patterns.
70	Public services: transportation	SMALL. The addition of up to 60 employees would be less than a typical refueling outage workforce (500-1,000). Access and commuting routes are adequate to handle outage traffic. Therefore, impacts on local transportation systems would be small
71	Historic and archaeological resources	SMALL. No impacts to historic or archaeological resources were identified.
76	Severe accidents	NMPNS identified 3 potentially cost-beneficial SAMAs for Unit 1 and 10 for Unit 2; none of which are related to adequately managing the effects of aging. However, NMPNS will continue to evaluate and pursue these modifications as voluntary plant enhancements through the current plant change process.

a. Exclusive of Issue 60, "Electromagnetic Field - Chronic Effects," which is categorized "NA" by the NRC and for which the applicant is not required to provide an analysis [10 CFR 51.53(c)(3); 10 CFR 51, Subpart A, Appendix B, Table B-1] and Issue 92, "Environmental Justice," which will be addressed by the NRC in plant-specific reviews [10 CFR 51, Subpart A, Appendix B, Table B-1].

CWA = Clean Water Act
gpm = gallons per minute
NMP = Nine Mile Point Units 1 & 2
NMPNS = Nine Mile Point Nuclear Station, LLC
No. = issue number

6.2 MITIGATION

> **NRC**
>
> **"The report must contain a consideration of alternatives for reducing adverse impacts...for all Category 2 license renewal issues..." 10 CFR 51.53(c)(3)(iii)**
>
> **"The environmental report shall include an analysis that considers and balances...alternatives available for reducing or avoiding adverse environmental effects...." 10 CFR 51.45(c) as incorporated by 10 CFR 51.53(c)(2)**

All impacts of license renewal at NMP are small and would not require additional mitigation. Mitigative measures were implemented during original construction to minimize potential operational impacts. The Unit 1 once-through cooling water system was constructed in a way that minimizes impacts to aquatic life. As described in Section 3.1, the Unit 1 Intake Structure is located approximately 850 feet from the existing shoreline in 18 feet of water. This design provides an improvement with respect to impacts to aquatic life over surface water intakes located at the shoreline, which were standard when Unit 1 was built. The Intake Structure is designed so water is drawn equally from all horizontal directions with a minimum of disturbance and no vortex at the surface. The heated effluent is discharged via a hexagonally shaped Discharge Structure located approximately 335 feet from shore. The design and offshore location of the Discharge Structure allow for rapid mixing and dispersal of the heated effluent with the receiving water. Unit 2 employs a closed-loop cooling water system using a natural draft Cooling Tower, equipped with a fish diversion system to reduce the number of fish impinged on the traveling screens and returns fish to Lake Ontario. The lake intake system conveys cooling water from Lake Ontario through two identical submerged Intake Structures, located approximately 950 feet and 1,050 feet, respectively, from the shoreline. Intake approach velocities are 2 feet per second (maximum plant output) and 0.5 feet per second for Unit 1 and Unit 2, respectively.

During the current license term, procedural controls have been put in place to significantly reduce the potential for waterfowl impingement at Unit 1. During reverse-flow conditions, plant operations staff have been directed to avoid returning the plant to normal operation during the most active feeding times of the ducks (Ref. 6.2-1). As an additional measure, the exterior of the Intake Structure is periodically cleaned to remove zebra mussels annually, removing a food source that had, in the past, attracted ducks.

All impacts of license renewal at NMP are either beneficial or small and, in either case, would not require additional mitigation. Ecological studies assessing impacts of plant operations on aquatic ecology in Lake Ontario, as summarized in Sections 4.2, 4.3, and 4.4, concluded that impacts from operations were small. Current operations include environmental monitoring activities that would continue during the license renewal term. These activities include the radiological environmental monitoring program and New York State Pollutant Discharge Elimination System (SPDES) discharge monitoring.

6.3 UNAVOIDABLE ADVERSE IMPACTS

NRC

The environmental report shall discuss "Any adverse environmental effects which cannot be avoided should the proposal be implemented…." 10 CFR 51.45(b)(2) as adopted by 51.53(c)(2)

The report "...should not be confined to information supporting the proposed action but should also include adverse information." 10 CFR 51.45(e)

NMPNS adopts by reference for this environmental report the NRC findings stated in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) for applicable Category 1 issues (see Appendix A), including discussions of any unavoidable adverse impacts. In Section 4.0, NMPNS examined the 21 Category 2 issues the NRC identified in the GEIS (13 of the 21 were applicable to NMP) and the environmental justice issue, and identified the following unavoidable adverse impacts of renewing the operating licenses for NMP:

- The once-through cooling water system employed at Unit 1 would cause some early life stages of fish, largely alewife, to be lost by entrainment during plant operation. Operational monitoring conducted at NMP estimates that entrainment of eggs and larvae at Unit 1 results in negligible losses to the population. Using 1976 data on standing stock in the U.S. waters of Lake Ontario, the loss of alewife eggs represented approximately 0.0002 percent of the total female alewife population, while alewife larvae losses were estimated to be approximately 0.014 percent (see Section 4.2).

- Some fish would be lost due to impingement on the intake screens at NMP. Impingement monitoring at NMP was conducted from the 1972 through 1997. The results showed that impinged fish consisted predominantly of alewife and smelt. Results of these studies indicated that the overall effects of impingement on Lake Ontario fish populations in the vicinity of NMP were minimal (see Section 4.3).

- NMPNS does not expect to add staff for the license renewal period. However, for purpose of analysis, NMPNS assumed that license renewal could necessitate adding as many as 60 staff. The assumed addition of 60 direct workers to Oswego and Onondaga Counties, where approximately 96 percent of the NMP workforce resides, could result in small impacts to housing availability, public water supplies, offsite land use, and transportation infrastructure (see Sections 4.10, 4.11, 4.13, and 4.14).

6.4 IRREVERSIBLE OR IRRETRIEVABLE RESOURCE COMMITMENTS

NRC

The environmental report shall discuss "Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented…." 10 CFR 51.45(b)(5) as adopted by 51.53(c)(2)

The continued operation of NMP for the license renewal term will result in irreversible and irretrievable resource commitments including:

- Nuclear fuel, which is utilized in the reactors and converted to radioactive waste,
- Land required to permanently store or dispose of this spent nuclear fuel and low-level radioactive wastes generated from plant operations,
- Elemental materials that will become radioactive, and
- Materials used for the normal industrial operations of the plant that cannot be recovered or recycled or that are consumed or reduced to unrecoverable forms.

6.5 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

NRC

The environmental report shall discuss "The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity…." 10 CFR 51.45(b)(4) as adopted by 51.53(c)(2)

The current balance between short-term use and long-term productivity of the environment at the NMP site has remained relatively constant since Unit 1 and Unit 2 began operating in 1969 and 1986, respectively. This balance is described in the Final Environmental Statement (FES) for Unit 1 (Ref. 6.5-1, Section 10.3) and the FES for the operation phase of Unit 2 (Ref. 6.5-2), which noted the conversion of approximately 188 acres of land to facilities for electrical power generation. Much of the land in the vicinity of NMP had once been farmed, although at the time of construction the site was covered with a secondary growth of trees and brush. The NRC noted that these lands were essentially irreversibly committed because the land is not likely to be returned to agricultural use at the end of the project (Ref. 6.5-2, Section 4.2.2.1 and Section 6.2).

NMPNS notes that the current balance is now well established and can be expected to remain essentially unchanged by renewal of the operating licenses and extended operation of the NMP site. Extended operation of Unit 1 and Unit 2 would postpone restoration of the site and its potential availability for uses other than electric power generation. It would also result in other short-term impacts on the environment, all of which have been determined to be small on the basis of the NRC's evaluation in the GEIS and NMPNS's evaluation in this environmental report.

6.6 REFERENCES

6.2-1 Niagara Mohawk Power Corporation. *Duck Impingement Report/Unit 1.* May 2000.

6.5-1 U.S. Atomic Energy Commission. *Final Environmental Statement Related to the Operation of Nine Mile Point Nuclear Station, Unit 1.* Docket No. 50-220. Directorate of Licensing. Washington, D.C. January 1974.

6.5-2 U.S. Nuclear Regulatory Commission. *Final Environmental Statement Related to the Operation of Nine Mile Point Nuclear Station, Unit No. 2*. Docket No. 50-410. Office of Nuclear Reactor Regulation. Washington, D.C. May 1985.

7.0 ALTERNATIVES TO THE PROPOSED ACTION

NRC

The environmental report shall discuss "Alternatives to the proposed action…." 10 CFR 51.45(b)(3), as adopted by reference at 10 CFR 51.53(c)(2).

"...The report is not required to include discussion of need for power or economic costs and benefits of ... alternatives to the proposed action except insofar as such costs and benefits are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation...." 10 CFR 51.53(c)(2).

"While many methods are available for generating electricity, and a huge number of combinations or mixes can be assimilated to meet a defined generating requirement, such expansive consideration would be too unwieldy to perform given the purposes of this analysis. Therefore, NRC has determined that a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable…." (Ref. 7.0-1, Section 8.1).

"…The consideration of alternative energy sources in individual license renewal reviews will consider those alternatives that are reasonable for the region, including power purchases from outside the applicant's service area.…" (Ref. 7.0-2, Section II.H, page 66541).

The National Environmental Policy Act (NEPA) requires the U.S. Nuclear Regulatory Commission (NRC) to consider the environmental impacts of the proposed action (i.e., license renewal) and alternatives to the proposed action when deciding whether to approve renewal of an applicant's operating license. In this chapter, Nine Mile Point Nuclear Station, LLC (NMPNS), identifies reasonable alternatives to renewal of the Nine Mile Point Units 1 & 2 (NMP) operating licenses and presents its evaluation of associated environmental impacts. This chapter also includes descriptions of alternatives NMPNS considered but determined to be unreasonable to consider in detail, and associated supporting rationale.

In Section 7.1, NMPNS addresses the "no-action" alternative in terms of the potential environmental impacts of not renewing the NMP operating licenses, independent of any actions taken to replace or compensate for the loss of generating capacity. In Section 7.2, NMPNS describes feasible alternative actions that could be taken, which NMPNS also considers to be elements of the no-action alternative, and presents other alternatives that NMPNS does not consider to be reasonable. Section 7.3 presents environmental impacts for the reasonable alternatives.

The environmental impact evaluations of alternatives presented in this chapter are not intended to be exhaustive. Rather, the level of detail and analysis rely on the NRC's decision-making standard for license renewal, as follows:

> "…the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable" [10 CFR 51.95(c)(4)].

Therefore, analyses were generally scoped to provide enough information to support NRC decision-making by demonstrating whether an alternative would have a smaller, comparable, or greater environmental impact than the proposed action. Additional detail or analysis was not considered useful or necessary if it would identify only additional adverse impacts of license renewal alternatives; i.e., information beyond that necessary for a decision based on the standard quoted above. This approach is consistent with the Council on Environmental Quality regulations, which provide that the consideration of alternatives (including the proposed action) be adequately addressed so reviewers may evaluate their comparative merits [40 CFR 1502.14(b)].

NMPNS characterizes environmental impacts in this chapter using the same definitions of “Small,” “Moderate,” and “Large” used in Chapter 4 of this environmental report (ER) and by the NRC in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (Ref. 7.0-1). In Chapter 8, NMPNS presents a summary comparison of environmental impacts of the proposed action and alternatives.

7.1 NO-ACTION ALTERNATIVE

NMPNS considers the no-action alternative addressed in this ER to be a scenario in which the NRC does not renew the current NMP operating licenses, NMPNS ceases operating Unit 1 and Unit 2 upon expiration of their respective licenses in 2009 and 2026 and decommissions the facilities, and NMPNS and/or others take appropriate actions to meet system-generating needs created by discontinued operation of the Units. NMPNS addresses the impacts of terminating operations and decommissioning in this section.

7.1.1 TERMINATING OPERATIONS AND DECOMMISSIONING

In the event the NRC does not renew the NMP operating licenses, NMPNS assumes for this ER that it would operate the Units until their current licenses expire, then terminate operations and initiate decommissioning activities in accordance with NRC requirements. For purposes of this discussion, terminating operations includes those actions directly associated with permanent cessation of operations, which may result in more or less immediate environmental impacts (e.g., socioeconomic impacts from reduction in employment and tax revenues). Decommissioning, defined by the NRC at 10 CFR 50.2, denotes the safe removal from service of a nuclear generating facility and the reduction of residual radioactivity to a level that permits release of the property for unrestricted or restricted use, and termination of the license. Additional activities, such as dismantlement of major plant structures (e.g., intake and discharge structures, cooling towers) for purposes other than reduction of residual activity, are closely associated with, but not necessarily wholly included in, the decommissioning process. The NRC provides more detailed descriptions of these activities in the GEIS (Ref. 7.0-1, Chapter 7 and Section 8.4) and its recently issued Supplement 1 to the *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NUREG-0586, Supplement 1) (Ref. 7.1-1, Sections 1.3 and 3.2).

The two decommissioning options typically selected for U.S. reactors are referred to as DECON and SAFSTOR (Ref. 7.1-1, Section 3.2). Under the DECON option, radioactively contaminated portions of the facility and site are decontaminated or removed promptly after cessation of operations to a level that permits termination of the license; these activities may require about nine years for large-light water reactors like NMP. The SAFSTOR option involves safe storage of the stabilized and defueled facility for a period of time followed by decontamination to levels that permit license termination. Regardless of the option chosen, decommissioning typically must be completed within 60 years after operations cease in accordance with NRC requirements at 10 CFR 50.82 (Ref. 7.1-1, Section 3.2; Ref. 7.0-1, Section 7.1).

NMPNS has not selected a decommissioning method for NMP. However, DECON is a likely option for both Units, and a reasonable potential exists that NMPNS would use SAFSTOR for Unit 1 until expiration of the Unit 2 operating license to take advantage of potential economies of scale for decontamination and related activities, and to minimize potential disruption of Unit 2 operations. Decommissioning methods for NMP would be described in post-shutdown decommissioning plans for the Units, which must be submitted within two years following cessation of operations. Related NRC requirements ensure that the decommissioning activities, when defined, would be subject to required environmental reviews in accordance with NEPA (10 CFR 50.82).

The NRC presents in the GEIS (Ref. 7.0-1, Chapter 7) a summary of generic environmental impacts of the decommissioning process and, in the interest of thoroughly examining potential consequences of the proposed action (license renewal), an evaluation of potential changes in impact that could result from deferring the decommissioning process for up to 20 years. The NRC bases that summary and evaluation on information from its *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (NUREG-0586), issued in 1988 (Ref. 7.1-2)), and related documents. Its discussion of boiling water reactor (BWR) decommissioning used the 1,155-megawatt (MW) Washington Public Power Supply System Nuclear Project 2 reactor (now Energy Northwest's Columbia Generating Station) as a basis. This "reference BWR" features the General Electric BWR/5 reactor, the same type and size as used in the larger of the two NMP reactors (Unit 2, 1,144 MW). Unit 1 is also a General Electric BWR (BWR/2). Therefore, NMPNS considers the reference reactor to be representative of the NMP units, and considers the decommissioning activities described in the GEIS to be reasonably representative of activities NMPNS would perform for decommissioning at NMP. The NRC concluded from its evaluation that decommissioning impacts would not be significantly greater as a result of the proposed action (Ref. 7.0-1, Section 7.3; 10 CFR 51, Subpart A, Appendix B, Table B-1). The NRC conclusions presented in 10 CFR 51, Subpart A, Appendix B, Table B-1 also indicate that the impacts of the decommissioning process itself, addressed here as part of the no-action alternative, would have small impacts with respect to radiation dose, waste management, air quality, water quality, and ecological resources. Considering the above and information presented in GEIS Chapter 7, NMPNS considers this generic evaluation and associated conclusions appropriate to NMP for purposes of this ER.

In Supplement 1 to NUREG-0586 (Ref. 7.1-1), prepared and issued subsequent to the GEIS, the NRC provides an update of its 1988 generic environmental impact evaluation of decommissioning nuclear power reactors and addresses the impacts of associated demolition activities. The generic evaluation draws from decommissioning experience gained since issuance of the 1988 document, including that from 19 commercial power reactor facilities in the decommissioning process. In addition, the NRC considers in the generic evaluation the attributes and characteristics of the remaining 104 operating plants in the U.S., including NMP, to ensure its appropriateness for future decommissioning of these plants (Ref. 7.1-1, page 3-1). In its evaluation, the NRC addressed a full range of environmental issues, categorized them as generic or site-specific, and assigned NRC's standard impact significance levels of small, moderate, and large (see Section 4.1.2) to the site-specific issues. Of the 23 environmental issues evaluated, the NRC concluded that the following issues were site-specific: impacts on land use from offsite land use activities; impacts on aquatic and terrestrial ecology and cultural and historic resources from activities beyond operational areas; impacts on threatened and endangered species; and environmental justice impacts. The NRC concluded that all of the remaining issues were generic with small impacts (Ref. 7.1-1, Table ES-1).

In consideration of the above and based on its review of the document, NMPNS considers the generic description of decommissioning and associated demolition activities, and the generic evaluation and associated conclusions presented in Supplement 1 to NUREG-0586 to be appropriate to NMP for purposes of this ER. Further, NMPNS has no reason to believe at this time that decommissioning activities would involve significant land use disturbance off site or significant activities beyond current operational areas. No resident federal- or state-listed threatened or endangered species are known to exist on the NMP site or transmission line corridor (see Section 2.3). On this basis, NMPNS assumes that environmental impacts from decommissioning and demolition activities at NMP would be of small significance for all issues evaluated, including environmental justice. Moreover, NMPNS found no information in the document that would be contrary to NRC's conclusion in Chapter 7 of the GEIS that there would be no significant difference between the no-action alternative and the proposed action with respect to environmental impacts of decommissioning.

The environmental impacts that relate directly to terminating plant operations were not addressed in the scope of decommissioning impacts evaluated in either Chapter 7 of the GEIS or Supplement 1 to NUREG-0586, as discussed above. However, the NRC did address such impacts in Section 8.4 of the GEIS and provided some relevant discussion in the latter document. Environmental issues addressed in the Section 8.4 of the GEIS include land use, air quality, water resources, ecology, radiological effects, waste management, and aesthetics. With the potential exception of socioeconomics and ecological resources, the NRC's generic evaluation of these issues indicates that environmental impacts would be small. Based on its review of the document and in light of information presented in this ER regarding existing environmental resources potentially affected (Chapter 2), NMP design and operating characteristics (Chapter 3), and impacts of current operation (Chapter 4), NMPNS considers NRC's generic evaluation in Section 8.4 of the GEIS to be appropriate with respect to NMP, with the following clarifications and additions:

- Considering the characteristics of current terrestrial and aquatic ecological resources that could be affected by plant shutdown, including the absence of any known resident threatened or endangered species in potentially affected areas (Section 2.3); associated impact initiators discussed in the Section 8.4 of the GEIS (e.g., cessation of thermal discharge, entrainment, and impingement); the small significance of current operational impacts on these resources (Chapter 4); and high likelihood that transmission lines from NMP addressed in this ER would continue to be used, NMPNS expects that termination of NMP operations would have little, if any, adverse effects on these resources. Therefore, NMPNS concludes that impact significance is small with respect to ecological resources.

- Considering that no significant historic or archeological resources are known to exist on the NMP site or transmission line corridor (Section 2.10), NMPNS concludes that potential adverse impact on such resources from NMP operations termination would be small.

- Under the assumptions of this assessment, termination of NMP operations would result in a decrease in tax revenues, employment, and expenditures for goods and services in the surrounding communities approximately 20 years sooner than if the licenses are renewed. Most of the tax revenue losses resulting from closure of NMP would occur in Oswego County. As noted in Section 4.13, NMPNS has entered into agreements with three taxing entities in Oswego County to make average annual payments in lieu of property taxes for NMP amounting to approximately 6.7 percent and 23.6 percent of the respective Year 2001 total revenues for Oswego County and the Town of Scriba, and 26.4 percent of the Year 2000 revenues for the City of Oswego School District. Assuming that these payments and proportional contributions to revenue persist through the terms of the current NMP operating licenses, loss of tax revenues attributable to terminating NMP operations could be destabilizing, and therefore constitute a large impact, to the Town of Scriba and the City of Oswego School District.

  Assuming the current geographic distribution of the NMP operational labor force is representative of conditions at the time NMP operations cease, NMPNS expects that the impacts of reduced employment would be most felt in Oswego and Onondaga Counties where 73 percent and 23 percent, respectively, of the current NMP workforce of approximately 1,280 persons resides (see Section 3.4). These impacts likely would be relatively greater in Oswego County which, in addition to being the source of more NMP workers, has a smaller workforce (approximately 55,500 workers compared to 227,600 workers for Onondaga County), and historically has had significantly lower per-capita personal income and a higher unemployment rate (6.5 percent versus 4.2 percent; see Section 2.6). However, NMPNS notes that terminating operations at Unit 1 and Unit 2 would be separated by 17 years and impacts would be partially moderated by a decommissioning workforce for several years after operation of each of the Units is terminated. Localized employment impacts could also be moderated somewhat by proximity to the Syracuse metropolitan area job market. In view of these considerations, NMPNS considers that these employment losses would be clearly noticeable but not destabilizing, a characteristic of moderate impact.

  These impacts of plant operations termination could be further moderated by future economic growth in Oswego and Onondaga Counties. However, population growth in the area is projected to be relatively stagnant (see Section 2.5), and the workforce in Oswego and Onondaga Counties has declined over the past decade (see Section 2.6). If these conditions persist, NMPNS expects that loss of tax receipts and payroll resulting from plant closure could result in moderate to large socioeconomic impacts, particularly with respect to Oswego County communities.

In summary, the environmental impacts associated with terminating operations and decommissioning provide little or no basis for discriminating between the proposed action and the no-action alternative, except for potential adverse socioeconomic impacts associated with terminating plant operations. The environmental impacts of replacement options considered in Section 7.3 provide substantial additional information useful for evaluating the relative environmental merits of the proposed action versus the no-action alternative.

7.1.2 REPLACEMENT CAPACITY

Unit 1 and Unit 2 have net generating capabilities of approximately 615 MW and 1,144 MW, respectively, for a total net generating capability of 1,759 MW (see Section 3.1.1). In 2001, the average capacity factors for these Units were 81 percent and 88 percent, respectively, and the combined total net generation of electricity for the Units was approximately 13.2 billion kilowatt-hours (Ref. 7.1-3). This power, enough to supply the electric power needs of approximately 2.2 million households based on average use statistics for New York State (Ref. 7.1-4), would be unavailable to the New York wholesale energy market in the event the NMP operating licenses are not renewed. NMPNS believes that any alternative would be unreasonable if it did not include actions to accommodate this loss of power.

7.2 ALTERNATIVES THAT MEET SYSTEM GENERATING NEEDS

In Section 7.2.1, NMPNS provides general background information regarding the regulatory status of the electric power industry in the State of New York, and information pertinent to development of new generating facilities in the State. Section 7.2.2 provides more specific information about alternatives NMPNS considers reasonable to replace the generating capability that would be lost in the event the NMP operating licenses are not renewed. These include power purchase (Section 7.2.2.1), new natural gas-fired generation (Section 7.2.2.2), and new coal-fired generation (Section 7.2.2.3). Section 7.2.3 describes other alternatives evaluated and NMPNS's rationale for not considering them to be reasonable options for replacing power produced by NMP.

7.2.1 GENERAL CONSIDERATIONS

7.2.1.1 Restructuring Initiatives

The electric power industry in New York has undergone substantial restructuring in recent years with the transition to functional wholesale and retail markets. Strategic direction and policy guidance for energy production and use in the State, including the restructuring initiative, is provided by the New York State Energy Planning Board (NYSEPB). NYSEPB planning results are set forth in the State Energy Plan, the most recent of which was issued in June 2002 (Ref. 7.2-1). Progress with respect to the plan and an assessment of the need to update the plan are provided in NYSEPB Annual Reports in intervening years between plan updates (e.g., Ref. 7.2-2). The staffs of the New York State Energy Research and Development Authority (NYSERDA) and other state agencies comprising the NYSEPB issued a memorandum documenting progress with respect to the current plan as of the end of 2003 (Ref. 7.2-3).

NYSEPB's 2002 State Energy Plan (Ref. 7.2-1, pages S-2, S-3) adopted the following public policy objectives:

- Supporting the continued safe, secure, and reliable operation of the State's energy and transportation systems infrastructures;
- Stimulating sustainable economic growth, technological innovation, and job growth in the State's energy and transportation sectors through competitive market development and government support;
- Increasing energy diversity in all sectors of the State's economy through greater use of energy efficiency technologies and alternative energy resources, including renewable-based energy;
- Promoting and achieving a cleaner and healthier environment; and,
- Ensuring fairness, equity, and consumer protections in an increasingly competitive market economy.

The NYSEPB's 2002 State Energy Plan documents progress in the restructuring initiative. It indicates that more than 80 percent of generating capacity formerly owned by utilities in the State has been sold to independent power producers who participate in the State's competitive wholesale electricity market, and all retail electricity customers in the State formerly served by regulated utilities now have a choice of supplier (Ref. 7.2-1, page 1-10).

The New York State Public Service Commission (NYSPSC) implements many provisions of the State Energy Plan. The Commission has played a central role in efforts to develop competitive wholesale and retail electricity markets, primarily through mandates for and approval of restructuring plans by the State's utilities during the late-1990s. The NYSPSC set the terms and conditions for introduction of retail competition (customer choice) and divestiture of generating plants in New York by regulated utilities. One of the results of these actions was the divestiture by the Niagara Mohawk Power Corporation (now Niagara Mohawk, a National Grid Company) and other regulated utilities of their ownership shares in NMP, which is now operated as an independent merchant generating plant. As such, NMPNS sells electricity generated from NMP to energy service companies (ESCos) for resale to retail customers or other wholesale entities, and does not own or operate the transmission system used to transport this power (see Section 3.1.4). Virtually all of the power from NMP is sold to Niagara Mohawk under existing power purchase agreements, though power from NMP may also be sold via the wholesale market.

Restructuring has resulted in additional responsibilities for the NYSERDA. NYSERDA sponsors energy research and development programs to promote safe and economical energy production and efficiency technologies, provides funding vehicles for energy-related projects, and analyzes the effect of New York's energy-related policies on energy consumers in the State (Ref. 7.2-4). NYSERDA implements the New York Energy $mart™ Program, which is designed to continue energy efficiency, research and development, and environmental protection programs during the State's transition to electric retail competition. The NYSPSC named NYSERDA administrator of this program to ensure the continued benefit of these services, which were traditionally offered by utilities prior to deregulation. The program is paid for by a system benefit charge on the electricity transmitted and distributed by the utilities in the State, and is being implemented in those utility territories (Ref. 7.2-5).

The New York State Reliability Council (NYSRC) promotes and preserves the reliability of electric service on the New York State Power System by developing, maintaining, and monitoring compliance with reliability rules that must be complied with by the New York Independent System Operator (NYISO) and all other entities engaged in electric transmission, ancillary services, and energy and power transactions on the New York State Power System (Ref. 7.2-6). The NYSRC sets the installed capacity requirements for the New York Control Area (NYCA) consistent with the Northeast Power Coordinating Council reliability criterion, which is revisited annually. For 2002, the NYSRC set this installed capacity requirement at 18 percent above the anticipated

NYCA year-2002 summer peak load, and the NYISO assumes for planning purposes that this margin will be retained through 2021 (Ref. 7.2-7, page 2).

The NYISO, which initiated operations December 1, 1999, upon establishment of New York's wholesale electric energy market, is responsible for the safe and reliable operation of New York State's bulk power system and for the operation of wholesale electric energy markets in the State. The NYISO has a central role in planning efforts needed to ensure continued adequacy of electric generation and transmission capabilities (Ref. 7.2-8). The NYISO assigns a proportion of the installed capacity requirement established by the NYSRC to each load-serving entity (LSE) located in the NYCA, including Niagara Mohawk. LSEs within the NYCA may meet their installed capacity requirements through procurement of capacity from appropriately qualified resources within the NYCA or neighboring control areas directly interconnected to the NYCA, including the PJM Interconnection (PJM), serving the mid-Atlantic region; Independent System Operator-New England (ISO-NE), serving New England; and Hydro Quebec and the Ontario Independent Electricity Market Operator (Ontario IMO), serving neighboring portions of Canada (Ref. 7.2-7, page 1).

Construction and operation of electric generating facilities with a capacity of 80 MW or more requires a Certificate of Environmental Compatibility and Public Need in accordance with Article X of the New York State Public Service Law (NY Consolidated Laws, Chapter 48, Article X). The New York State Board on Electric Generation Siting and the Environment, chaired by the Chairman of the NYSPSC and supported by the Department of Public Service, conducts the Article X reviews, which include an examination of alternatives to and detailed environmental impact analyses of each proposed facility (Ref. 7.2-9). A comparable process for electric and natural gas transmission facilities is conducted in accordance with Article VII of the New York State Public Service Laws (NY Consolidated Laws, Chapter 48, Article VII).

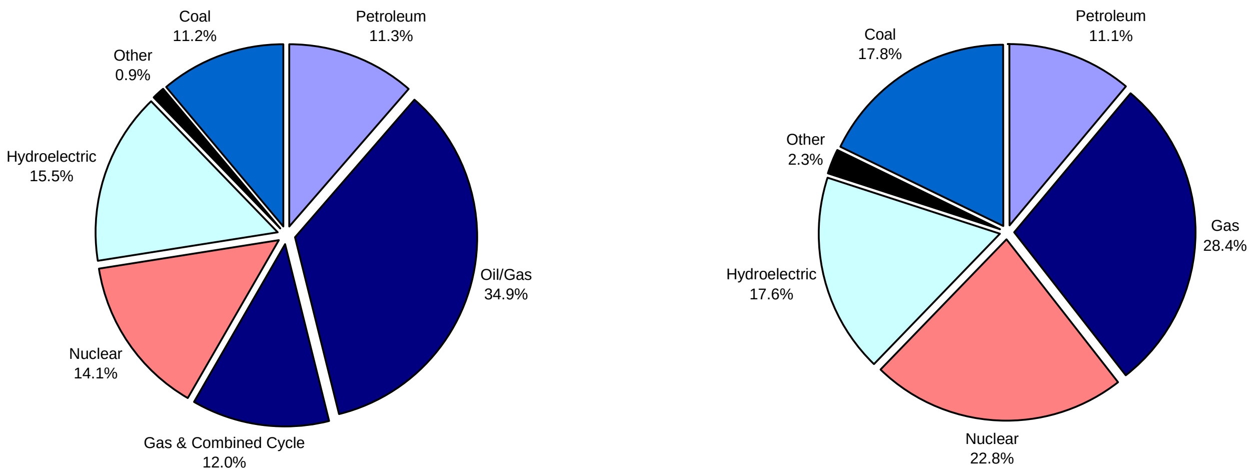
7.2.1.2 Generation and Utilization

Electric power generating capability and utilization in New York, projected energy needs, and current actions being taken to meet those needs reflect the influence of energy markets and technical and economic viability of technologies for generating electricity, and therefore, offer insight regarding potentially reasonable alternatives to replace power produced by NMP.

As Figure 7.2-1 shows, power plants that rely primarily on natural gas for fuel, including gas-fired, oil- or gas-fired, and combined-cycle facilities, represented approximately 47 percent of generating capability in New York at the end of the year 2001, followed by approximately 11 percent to 15 percent of generating capability each by hydroelectric, nuclear, petroleum-fired, and coal-fired facilities (Ref. 7.2-10, page 52). Comparison of installed capability vs. actual utilization during the year 2000 indicates that coal and nuclear are used to a substantially greater degree relative to available capability than either oil-fired or gas-fired generation (Ref. 7.2-11, Table 7). This condition reflects the

FIGURE 7.2-1

NEW YORK ELECTRIC CAPABILITY AND UTILIZATION



Capability as of January 1, 2001 **Utilization During 2000**

Source: Capability from Ref. 7.2-10, page 52; utilization from Ref. 7.2-11, Table 7.

relatively low fuel cost and baseload suitability for nuclear and coal-fired plants, and relatively higher use of gas- and oil-fired units to meet peak loads. Comparison of capability and utilization for petroleum and gas-fired facilities indicates a strong preference of gas over oil, indicative of higher cost and air emissions associated with oil. Energy production from hydroelectric sources is similarly preferred from a cost standpoint, but capacity is limited and utilization can vary substantially depending on water availability.

NYSERDA compiled annual New York electric generation data by fuel type for the period 1986 to 2000. The actual amount of New York electric power generated in 2000 compared to that in 1986 by source has increased substantially for natural gas (214 percent) and nuclear (43 percent), and decreased substantially for petroleum (52 percent). The amount of power from hydroelectric generation has decreased by 18 percent, while power from coal-fired plants generally exhibited a slight increase through this period. Electricity from biofuels increased markedly from zero during the period, though amounted to only 3.2 billion kilowatt-hours by 2000 (Ref. 7.2-12, Table 2-6).

NYISO projections through 2021, which account for demand-side management (DSM) load reductions, known purchases and sales with neighboring control areas, and

6220 MW of new capacity (consisting of planned generating facilities with accepted or approved Article X applications), and which assume shutdown of nuclear generating facilities when their current operating licenses expire, indicate that the NYCA will need additional capacity beyond 2011 to meet an 18 percent reserve margin (Ref. 7.2-7, page 2). However, NYISO anticipates that the additional resources necessary to meet the reserve margin would be procured through the installed capacity market, noting that facilities in the pre-application phase of the Article X process represented capacity in excess of that needed (Ref. 7.2-7, page 2).

A review of proposed new generation projects that have filed Article X applications or have filed pre-application reports or pre-scoping statements (Ref. 7.2-13) indicates that virtually all of these facilities utilize natural gas as exclusive or primary fuel, and those proposed for baseload service use combined-cycle technology. The NYSEPB (Ref. 7.2-1, pages 1-29, 3-106 through 3-108) points out that the State's dependence on natural gas for electric generation could increase from approximately 25 percent to almost 40 percent over the next 20 years. This trend can be traced to power plant emission standards, New York State environmental siting review requirements, the cost and availability of gas and gas-fired power plants, the development of high-efficiency combined-cycle technology, and the restructuring of the electric industry. Unfortunately, reduced fuel diversity due to this growing dependence on natural gas increases the State's exposure to fuel supply disruption and price swings, a concern expressed by the NYSEPB.

According to the NYSEPB (Ref. 7.2-1, pages 1-31, 3-172 through 3-177), future gas demand, supply, and price are especially difficult to project due to the dynamic changes taking place in the gas and electric industries and rapidly changing market conditions. However, adequate supplies are expected to be available nationally and real prices are projected to drop slightly on average, although they are expected to remain volatile. NYSEPB expects that demand for natural gas will expand significantly through 2001. Although additional pipeline capacity will be needed to meet this demand, NYSEPB notes that interest in expanding interstate delivery capacity continues to be strong (Ref. 7.2-1, page 3-181).

The 2002 New York State Energy Plan (Ref. 7.2-1, pages 1-30, 1-32, 3-141 through 3-145) assumes that the operating licenses for all nuclear power plants would be extended. A scenario was studied in which this did not occur. Wholesale prices by 2020 were found to rise roughly 10 percent above the base case scenario, and emissions were found to increase (subject to the limits of the statewide emission caps). Natural gas dependence approached 50 percent. The plan also concluded that advanced coal technologies offer a means to provide fuel diversity, lower wholesale prices, and reduced emissions in relation to conventional coal-fired generation technologies, although not in relation to gas-fired generation.

7.2.1.3 Regulatory Considerations for Air Quality

Use of either natural gas-fired combined-cycle or clean-coal technologies would be subject to air emission controls and limits established in accordance with applicable U.S. Environmental Protection Agency (EPA) regulations (40 CFR 50-99) and State regulations [e.g., New York State Department of Environmental Conservation (NYSDEC) regulations at 6 NYCRR Chapter III]. As a minimum standard, the facilities would be required to comply with New Source Performance Standards (NSPS) set forth by EPA at 40 CFR 60. For a large coal-fired power plant, NSPS standards specify minimum required reductions from standard uncontrolled levels and maximum emission limits as follows: particulates [99 percent reduction, not to exceed 0.03 pounds per million British thermal units (lb/MMBtu) heat input]; sulfur dioxide (SO_2) (90 percent reduction, not to exceed 1.20 lb/MMBtu); nitrogen oxide (NO_x) emissions expressed as nitrogen dioxide, NO_2, (65 percent reduction, not to exceed 0.50 lb/MMBtu or 0.60 lb/MMBtu, depending on fuel type). For large natural-gas turbines, the NSPS for NO_x emissions is a calculated value that depends on fuel-bound nitrogen and heat rate of the unit, generally amounting to approximately 75 parts per million (ppm); SO_2 emissions are limited to 0.015 percent by volume at 15 percent oxygen (dry basis); and fuel must contain sulfur less than 0.8 percent by weight. More stringent performance standards may be applied by states. For example, 6 NYCRR 227 specifies application of reasonably available control technology for NO_x of 0.42 lb/MMBtu for very large tangentially fired dry-bottom coal-fired boilers, and 42 ppm corrected to 15 percent oxygen for large natural gas-fired combined-cycle combustion turbines.

The NSPS are seldom limiting because emission limits for individual plants are established on the basis of air emission source designation, attainment status of potentially affected areas with respect to air quality standards, technology and fuel type, and related factors. A new plant located in an area that is in attainment or unclassified with respect to national ambient air quality standards (NAAQS; 40 CFR 50), such as is the case for most of upstate New York including Oswego County, would qualify as a major source subject to the new source review provisions of the Prevention of Significant Deterioration (PSD) rules (40 CFR 51.166). Under these provisions, emission limits are established on the basis of best available control technology (BACT) for regulated pollutants that exceed established PSD emission rates and a demonstration that ambient air quality standard compliance would not be jeopardized. If the facility is located in a nonattainment area with respect to one or more NAAQS pollutants, emission rates for the nonattainment contaminants would be established under nonattainment new source review provisions (e.g., as set forth for New York at 6 NYCRR 231). In this case, emission standards for the nonattainment contaminants are generally established on the basis of more stringent lowest achievable emission rates (LAERs). In addition, offsets of 1:1 or more could be required for nonattainment contaminant emissions.

Because NO_x is an ozone precursor, emissions of this pollutant are subject to the more stringent LAER controls for plants located in New York or elsewhere in EPA's designated Ozone Transport Region where changes in state implementation plans

(SIPs) were implemented in accordance with EPA's NO_x SIP Call (63 FR 57356, October 27, 1998). For example, even if located in an attainment area, NO_x emissions for a plant in New York are established on the basis of LAER, and offsets amounting to a ratio of at least 1.15:1 are required using emission reduction credits, per 6 NYCRR 231. In addition, large fossil fuel-fired electric generating units are subject to an industry cap on NO_x emissions through a market-based trading system under New York's NO_x Emissions Budget and Allowance Program (6 NYCRR 204). Under this program, each affected source must have allowances for each ton of NO_x actually emitted during the ozone season (May 1 through September 30). The allowances are allocated to new and existing sources based on an emission rate of 0.15 lb/MMBtu for the ozone season.

Clean Air Act acid rain provisions (Title IV) are a particular concern with respect to SO_2 emissions from a coal-fired power plant. These provisions capped aggregate SO_2 emissions from power plants and established a market-based trading system for SO_2 allowances. Development of a new coal-fired plant thus would require acquisition of allowances sufficient to cover SO_2 emissions from the plant. Additional acid rain program provisions are a consideration for new coal-fired plants built in New York. New York currently limits sulfur content of coal used as fuel in new stationary combustion installations with total heat input greater than 250 million British thermal units per hour (Btu/hr) to an annual average of 1.7 pounds of sulfur per million Btu of gross heat content (6 NYCRR 225-1.2). In addition, New York issued Acid Rain Reduction Initiative regulations (i.e., 6 NYCRR 237 and 238) in 2003. These regulations require electric generators in the State to reduce SO_2 emissions an additional 50 percent below levels currently allowed under the Clean Air Act Acid Rain Program requirements by 2008, corresponding to target levels for large coal-fired facilities of 0.6 lb/MMBtu, and extend the current 5-month NO_x emission target of 0.15 lb/MMBtu to the entire year.

7.2.2 FEASIBLE ALTERNATIVES

In view of the background information presented above, NMPNS considers that purchased power and new generating capacity represented by natural gas combined-cycle technology are reasonable alternatives for purposes of this ER to replace NMP generating capacity of 1,759 MW in the event the NMP operating licenses are not renewed.

The economic and regulatory viability of developing new coal-fired baseload capacity in New York is less clear considering air emission concerns and required control measures, as evidenced by the fact that all new baseload generation planned for the State consists of combined-cycle units using natural gas as primary fuel. However, as noted in Section 7.2.1.2, the NYSEPB acknowledges that clean-coal technologies can play a role in helping the State achieve its energy, economic, and environmental goals. By increasing the fuel diversity, use of coal would also contribute to overall supply reliability and price stability for electricity in the State. Therefore, NMPNS includes a modern coal-fired plant featuring clean-coal technology for air emission controls in its evaluations for purposes of this ER.

Specific clean-coal generating technologies that would represent viable alternatives in upstate New York are similarly uncertain. NMPNS notes that integrated gasification combined-cycle (IGCC) and fluidized-bed-combustion (FBC) technologies (atmospheric and pressurized) are at or near commercial viability and could prove to be appropriate replacements, at least for Unit 2. However, modern pulverized coal plants with advanced, clean-coal technology air emission controls represent currently proven technology, and are economically competitive and commercially available in large-capacity unit sizes that could effectively replace the NMP units. Therefore, NMPNS uses a representative plant of this type for purposes of impact evaluation, noting that air emissions impacts of IGCC and FBC options may be lower than modern pulverized coal, but would be higher than the gas-fired combined-cycle alternative (Ref. 7.2-14, page 7).

Descriptions of these alternatives are provided in Sections 7.2.2.1 through 7.2.2.3. Other alternatives evaluated by NMPNS and reasons for not considering them in detail are presented in Section 7.2.3.

7.2.2.1 Purchased Power

As noted in Section 7.2.1, electric industry restructuring initiatives in the State of New York are designed to promote competition in energy supply markets by facilitating participation by non-utility suppliers like NMPNS, a regulatory structure is in place to appropriately anticipate and meet electricity demands, and the NYISO anticipates that adequate supplies of electricity will be available to meet anticipated future demands through at least 2021. NMPNS concludes that purchased power would be a reasonable alternative to replace the NMP capacity in the event the operating licenses are not renewed.

The source of this purchased power is speculative, but may reasonably include new generating facilities developed elsewhere in the State, from neighboring U.S. power pool jurisdictions (e.g., PJM, ISO-NE), or from Canada. The technologies that would be used to generate this purchased power are similarly conjectural. However, considering the current and projected development of additional generating capabilities in New York noted above, natural gas combined-cycle units, such as those described in Section 7.2.2.2, would be a most likely candidate. NMPNS assumes one or more of the technologies the NRC evaluated in the GEIS would be used, and considers the GEIS descriptions of these technologies to be appropriately representative.

NMPNS does not anticipate that significant additional transmission infrastructure would be needed to facilitate transfer of this purchased power to replace NMP capacity. Upstate New York has sufficient capacity to meet local loads and Niagara Mohawk anticipates that the NMP-Clay transmission line and transmission lines from Scriba Substation would remain in service in the event the NMP plants cease operation; therefore, no local load pocket would be created requiring construction of new transmission lines. From a regional perspective, New York State’s interconnected transmission system is highly reliable, and the market-driven process for generation addition in the State is expected to have a positive impact on overall system reliability (Ref. 7.2-15, pages 1-5, 39-42, 58-59). The traditional strain on the New York transmission system is west-to-east as a result of relatively low-cost generation in upstate New York and higher demand in the east and downstate. As noted by a recent NYISO-sponsored study (Ref. 7.2-16, pages 4-5, 22-25), power imports from New England in the next few years are expected to relieve this strain in the near term, and the addition of new generation within the State is expected to reduce the frequency of encountering transmission constraints in the future.

7.2.2.2 Representative Natural Gas-Fired Generation

For purposes of this analysis, NMPNS assumes development of a modern natural gas-fired combined-cycle plant similar to others being planned or developed in New York with recently certified Article X applications, and which are based on commercially available designs that could be readily configured as a baseload facility to replace power currently generated by NMP. The Wawayanda Energy Center, a 540 MW plant near Middletown, New York, meets these general criteria. Therefore, NMPNS used characteristics of that plant as described in its Article X application (Ref. 7.2-17) as a primary basis for the representative plant description in this section and the associated environmental impact assessment in Section 7.3.2. NMPNS also drew upon other relevant sources of information, including supplements to the GEIS and the certified Article X application for the Heritage Station, an 800 MW plant proposed for development approximately 2 miles west of NMP but cancelled in 2002 for economic reasons (Ref. 7.2-18).

NMPNS assumes that the representative plant would be located at the NMP site, which offers potential advantages of existing infrastructure (e.g., cooling water system, transmission, roads, technical and administrative support facilities). However, the plant reasonably could be located elsewhere, and NMPNS analysis of the gas-fired alternative considers as a variation of this alternative the location of the plant at a greenfield site in upstate New York. Except for the choice of locating the plant at the NMP site, NMPNS assumes that the location and design of the facility and any associated new infrastructure would be subject to substantial environmental review and approvals under New York’s current Article X, Article VII, or comparable process.

The generating unit for the proposed Wawayanda Energy Center is a standard, state-of-the-art, commercially available design, consisting of two 180 MW General Electric 7FB combustion turbines (CTs) with associated heat recovery steam generators (HRSGs) that supply steam to a single 180 MW steam turbine generator (“two-on-one” configuration). This unit provides a nominal net output of approximately 540 MW (Ref. 7.2-17, Section 3.1). NMPNS assumes for this analysis that three of these standard units would be constructed, representing a total net capacity of approximately 1,620 MW. This standard configuration would result in somewhat less generating capacity than NMP’s capacity of 1,759 MW. However, power output to achieve parity with NMP could be readily achieved through the use of supplemental firing of the HRSGs (Ref. 7.2-17, Section 5.5.2). NMPNS has retained the base design configuration exemplified by the Wawayanda facility (i.e., 540 MW and closed-cycle cooling) for purposes of this analysis, which provides conservatism in the alternative analysis by reducing the potential for overstating impacts of the gas-fired option, but has assumed a relatively high but achievable capacity factor of 90 percent (see Ref. 7.2-17, Section 5.4) to ensure reasonable comparability with respect to electricity production.

Based on daily consumption estimates for Wawayanda (Ref. 7.2-17, Section 9.2.4), and assuming a capacity factor of 90 percent for the representative plant, annual natural gas consumption for the facility would be approximately 93 billion cubic feet. The facility would be designed to meet BACT or LAER standards, as applicable, for control of criteria air emissions. As a minimum, NMPNS assumes that the plant would feature dry, low-NO_x combustion turbines to minimize formation of NO_x, and selective catalytic reduction for post-combustion NO_x control. Emissions of particulate matter and carbon monoxide (CO) would be limited through proper combustion controls, and an oxidation catalyst would be installed to further control CO and possibly some volatile organic compound (VOC) emissions. Exhaust from the CTs would be dispersed through individual stacks approximately 225 feet high (Ref. 7.2-17, Section 3.0).

NMPNS assumes for this comparative analysis that the representative plant located at the NMP site would utilize closed-cycle cooling using mechanical-draft cooling towers, which are assumed to range in height from approximately 37 feet to 60 feet (Ref. 7.2-17, Section 5.6.5; Ref. 7.2-18, Section 16.3). Located at a greenfield site, the representative plant is assumed to use closed-cycle cooling with mechanical draft cooling towers or, in the event impacts associated with water use are a critical concern, air-cooled condensers such as are proposed for the Wawayanda Energy Center. Use of a once-through system would be expected to result in cooling water intake and discharge flows less than those currently required at NMP for Unit 1, primarily because the steam-cycle portion of the combined-cycle plant would be only one-third of the total plant capacity, or approximately 540 MW (net), compared to the Unit 1 net capacity of 615 MW. Based on estimated water-use requirements for the Wawayanda Energy Center (Ref. 7.2-17, Section 5.6.2), the cooling tower option would result in cooling water intake and discharge (cooling tower blowdown) flows of approximately 7,500 gallons per minute (gpm) and 1,500 gpm, respectively, on a daily average basis; the difference representing evaporative loss in the cooling towers. Comparable water requirements for an air-cooled condenser option are estimated to be approximately 510 gpm (Ref. 7.2-17, Section 5.6.2).

A minimum of 15 acres is required to accommodate a single-unit plant like the Wawayanda facility (Ref. 7.2-17, Section 5.5.4), corresponding to approximately 45 acres for the three-unit representative plant. NMPNS estimates that approximately 15 additional acres per unit could be needed to achieve an effective site-specific facility configuration and accommodate construction laydown, and therefore assumes an area requirement of approximately 90-acres for the representative plant. This amount of land is available on the NMP site to accommodate the representative plant, and NMPNS assumes for purposes of this assessment that it would be located on mostly undeveloped land immediately north and south of Lake Road just west of the transmission corridor, potentially requiring relocation of the Recreational Area and/or Firing Range (see Figure 2.1-3). Additional land for support infrastructure and buffer likely would be needed to locate the facility at a greenfield site. For example, the NRC estimates that 110 acres would be required for a 1,000 MW plant (Ref. 7.0-1, Table 8.1).

NMPNS assumes for conservatism in this comparative analysis that the representative plant, like the Wawayanda facility, would use natural gas as its only fuel, and that fuel supply infrastructure would be limited to a supply pipeline to the plant. However, the facility could be constructed with capability to fire oil as a backup fuel, which could be used in the winter during high demand periods for natural gas, thus improving gas supply capabilities and reducing the need for infrastructure improvements in the State (Ref. 7.2-19). Although adequate supplies of natural gas are expected to be available nationally, the need for additional pipeline capacity in the State is recognized (Ref. 7.2-1, pages 3-180, 3-181), and is being planned and implemented (Ref. 7.2-3, page 9).

The natural gas supply pipeline to the existing Independence Generating Station, located approximately two miles west of NMP, was designed with the capability to also supply a companion plant, the proposed 800 MW Heritage Station, which was cancelled. However, this existing pipeline could not supply a power plant of greater capacity. The nearest natural gas supply pipeline with potentially sufficient capacity to supply the representative plant is the Empire Pipeline, which runs from near Niagara Falls, New York, and terminates near Phoenix, New York, approximately 20 miles south of the NMP site. Some reinforcement of interstate supply infrastructure (e.g., compressor upgrades, additional pipelines) could be required to supply the representative plant. However, NMPNS assumes for this analysis that this pipeline would be a suitable fuel source, and that approximately 25 miles of pipeline to supply the site would be constructed, primarily within or along the existing pipeline route from the Empire Pipeline to the Independence Station or the transmission line corridor that extends southward from the site to within three miles of Phoenix. Consistent with plans for the Wawayanda Energy Center (Ref. 7.2-17, Section 9.6.1.1), NMPNS assumes right-of-way (ROW) widths of 75 feet and 50 feet for construction and operation, respectively.

Offsite infrastructure needed to locate the plant at a greenfield site is conjectural, but could reasonably include a natural gas supply pipeline, transmission line, and makeup water and discharge pipelines. The extent to which such infrastructure would be required is location-specific; however, such needs would be considered in siting the facility and would be subject to regulatory scrutiny under New York's Public Service Law Article VII or comparable process.

NMPNS assumes for this assessment that construction of the gas-fired units would be implemented as two projects timed to coincide with expiration dates of the NMP licenses; i.e., a one-unit project to be completed in 2009 and a two-unit project to be completed in 2026. Estimates supplied for the Wawayanda Energy Center (Ref. 7.2-17, Sections 3.3, 3.4 and Table 12-4), indicate that the first unit would be constructed in 2 to 2.5 years with average and peak onsite workforces of approximately 240 and 420 workers, respectively, and operated by a permanent workforce of 25 persons. Scaling from these values, NMPNS estimates that the second and third units would be built in approximately the same amount of time with an average and peak workforce of less than 480 and 840, respectively, and that approximately 50 permanent employees would be required to operate the completed three-unit plant.

7.2.2.3 Representative Coal-Fired Generation

For purposes of this analysis, NMPNS assumes development of a modern pulverized coal-fired power plant with state-of-the-art emission controls. The representative plant consists of three commercially available standard-sized units, each with a nominal net output of approximately 600 MW, for a total net plant capacity of approximately 1,800 MW. This standard configuration would result in somewhat more generating capacity than NMP's capacity of 1,759 MW, but NMPNS has assumed a capacity factor of 85 percent, slightly lower than the current weighted average capacity factor of the NMP units (see Section 7.1.2), and notes that the average capacity factor for nuclear power plants in the U.S. has trended upward in recent years to approximately 90 percent (Ref. 7.2-20).

Table 7.2-1 lists basic specifications for the representative plant. Based on this information, annual coal consumption for the facility would be approximately 5,110,000 tons[3]. The facility would be designed to meet BACT or LAER standards, as applicable, for control of criteria air emissions. As a minimum, NMPNS assumes that the plant would feature low-NO_x burners with overfire air to minimize formation of NO_x, and selective catalytic reduction for post-combustion NO_x control. Emissions of particulate matter and mercury would be limited by use of a fabric filter (baghouse), and sulfur oxide (SO_x) emissions would be controlled using a wet scrubber using limestone as the reagent. NMPNS estimates that approximately 200,000 tons of limestone would be needed annually for scrubber operation. Exhaust would be dispersed through stacks approximately 500 feet high, assuming application of good engineering practice [40 CFR 51.100(ii)] on the basis of a boiler building height of approximately 200 feet.

NMPNS estimates that the footprint for the generating facilities would minimally occupy 60 acres, and that an additional 120 acres would be needed to accommodate related onsite infrastructure (e.g., fuel and limestone transport, storage, and handling; transmission; cooling water pipelines; cooling towers; administration; parking). In addition, the coal-fired plant would produce substantial quantities of solid waste from air emissions control (ash and flue gas desulfurization waste). Although potential for recycling some of this material is likely to exist, NMPNS is unable to predict the amount and assumes all of this material would be landfilled, requiring approximately 560 acres over an assumed 40-year plant life. Therefore, the minimum total onsite land

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[3] Coal Combusted (tons/year) = Total Gross Capability (MW) x Heat Rate (Btu/kilowatt-hour) x 1000 (kilowatt/MW) x 1/Fuel Heat Value (Btu/lb) x 0.0005 (ton/lb) x Capacity Factor x 8,760 hr/year. Values are provided in Table 7.2-1.

TABLE 7.2-1

REPRESENTATIVE COAL-FIRED GENERATION ALTERNATIVE

Characteristic	Basis/Detail
Number of units: 3 Unit size: 660 MW (gross); 600 MW (net)	Standard size approximately equivalent to NMP total net capacity (vendor data).
Capacity factor: 85%	Within typical range of baseload plant, approximates combined annual electric output of NMP.
Firing mode: subcritical, tangential, dry-bottom pulverized coal	Widely demonstrated, reliable, economical; tangential firing minimizes NO_x emissions (Ref. 7.2-21, Table 1.1-3).
Fuel type: bituminous coal	Type used in New York (Ref. 7.2-22, Table 14).
Fuel heating value: 13,117 Btu/lb	New York average (Ref. 7.2-22, Table 22).
Heat rate: 9,100 Btu/kWh at full load	Vendor data.
Fuel ash content by weight: 7.11%	New York average (Ref. 7.2-22, Table 22).
Fuel sulfur content: 1.12 wt%; 0.86 lb/MMBtu	New York average (Ref. 7.2-22, Table 22).
Uncontrolled SO_x emissions: 42.6 lb/ton coal	EPA estimate calculated as 38 x wt% sulfur in coal (Ref. 7.2-21, Table 1.1-3).
Uncontrolled NO_x emissions: 10 lb/ton coal	EPA estimate (Ref. 7.2-21, Table 1.1-3).
Uncontrolled CO emissions: 0.5 lb/ton coal	EPA estimate (Ref. 7.2-21, Table 1.1-3).
Uncontrolled PM emissions: 71 lb/ton coal	EPA estimate calculated as 10 x percent of ash in coal (Ref. 7.2-21, Table 1.1-4).
Uncontrolled PM_{10} emissions: 16 lb/ton coal	EPA estimate calculated as 2.3 x percent of ash in coal (Ref. 7.2-21, Table 1.1-4).
NO_x control: low NO_x burners, overfire air, selective catalytic reduction (95% reduction)	Best available for minimizing NO_x emissions (Ref. 7.2-21, Table 1.1-2).
Particulate control: fabric filter (99.9% removal)	Best available for minimizing particulate emissions (Ref. 7.2-21, Section 1.1.4.1).
SO_x control: Wet limestone flue gas desulfurization (95% removal)	Best available for minimizing SO_x emissions (Ref. 7.2-21, Table 1.1-2).

% = percent
Btu = British thermal unit
CO = carbon monoxide
EPA = U.S. Environmental Protection Agency
kWh = kilowatt-hour
lb = pound
MW = megawatts
MMBtu = million Btu
NMP = Nine Mile Point Units 1 & 2
NO_x = nitrogen oxides
PM = filterable particulate matter
PM_{10} = filterable particulates with diameter less than 10 microns
Ref. = Reference
SO_x = sulfur oxides
wt% = percent by weight

requirement is assumed be approximately 740 acres. Additional land would be necessary to allow for onsite and peripheral buffer; for example, the NRC estimates that 1,700 acres would be required for a 1,000 MW plant (Ref. 7.0-1, Table 8.1).

NMPNS believes that the NMP site would not be a viable location for the representative plant. Considerations pertinent to this determination include the fact that undeveloped parts of the site amount to only approximately 500 acres, substantially less than the estimated 740 acres required, and configuration of the site property does not lend itself to efficient arrangement of associated facilities. Use of the site would necessitate offsite disposal of combustion waste. In addition, essential buffer with respect to surrounding areas, including the Lakeview Subdivision immediately west, would be jeopardized (see Figure 2.1-3). Finally, the numerous wetlands on the site would be eliminated and similar wetland impacts would likely result from disposal of ash on adjacent land if it could be acquired. Therefore, NMPNS assumes that the representative coal-fired plant would be located at a greenfield site in upstate New York, and that the location and design of the facility and any associated new offsite infrastructure (e.g., transmission, rail spur, cooling water pipelines) would be subject to substantial environmental review and approvals under New York’s current Article X, Article VII, or comparable process.

Consistent with the greenfield site option for the representative gas-fired plant, NMPNS assumes for this analysis that the representative coal-fired plant would use closed-cycle cooling with mechanical-draft cooling towers, which may be up to 100 feet high. Scaling from estimates cited above for the steam-cycle portion of the gas-fired alternative, NMPS estimates that cooling tower makeup and blowdown flows for the representative coal-fired plant would be approximately 25,000 gpm and 5,000 gpm, respectively.

NMPNS assumes for this assessment that construction of the coal-fired units would be implemented as two projects timed to coincide with expiration dates of the NMP licenses; i.e., a one-unit project to be completed in 2009 and a two-unit project to be completed in 2026. NMPNS estimates that the first unit could be constructed in approximately three years and the second and third units could be constructed in approximately four years, with average and peak onsite workforces of approximately 1,750–2,000 and 2,500-3,000 workers, respectively. Permanent workforces of approximately 250 persons and 300 persons would be required to operate the one unit plant and completed facility, respectively.

7.2.3 OTHER ALTERNATIVES CONSIDERED

In this section, NMPNS describes alternatives other than purchasing power and developing new coal- or natural gas-fired generation facilities that were considered to ensure system energy needs are met in the event that the NMP operating licenses are not renewed. The discussion includes the reasons why NMPNS does not consider these alternatives to be reasonable or feasible for purposes of this evaluation.

7.2.3.1 Generation Alternatives

In addition to coal-fired and natural gas-fired generation, representative examples of which are identified as feasible alternatives in Section 7.2.2, the NRC evaluated several other generation technologies in the GEIS (Ref. 7.0-1, Chapter 8.0). NMPNS has considered these options as potential alternatives to continued operation of NMP and determined them to be unreasonable on the basis of economics, high land-use impacts, low capacity factors, geographic limitations, insufficiently developed technology, or other reasons. Table 7.2-2 summarizes the results of the review.

7.2.3.2 Delayed Retirement of Existing Non-Nuclear Units

As the NRC noted in the GEIS (Ref. 7.0-1, Section 8.3.13), extending the lives of existing non-nuclear generating plants beyond the time they were originally scheduled to be retired represents another potential alternative to license renewal. Current generating capability in New York other than NMP that is directly controlled by NMP's owners, Constellation Energy Group and Long Island Power Authority, consists of 2,800 MW of generation from generic types often used for baseload service (i.e., steam turbine or combined cycle). This capability, located mostly downstate (Long Island), is composed of numerous, mostly small units, including 16 non-nuclear steam turbine plants firing oil or natural gas and one gas-fired combined-cycle unit. Although some of this capability may be suitable for baseload service, most (approximately 1,855 MW) is represented by units with in-service dates prior to 1970 (Ref. 7.2-7, Table III-2) and therefore would be at or beyond the normal design life of 40 years when the NMP operating licenses expire.

Older plants, such as those noted above, that may be candidates for retirement tend to use less efficient generation and pollution control technologies than modern plants. Therefore, substantial upgrades are typically required to achieve efficiencies necessary to cost-effectively extend their operations and meet applicable environmental standards. Considering only the plants noted above, upgrades would be necessary for numerous units to achieve capacity equivalent to that of NMP. In addition, NMPNS expects that the environmental impacts of implementing these upgrades and operating the upgraded plants are reasonably bounded by assessments presented in this chapter for the gas-fired and coal-fired alternatives.

NYISO load and capacity projections assume that nuclear generating units in the State will cease operation upon expiration of their current operating licenses, but do not acknowledge retirement of any non-nuclear generating units in the State from 2005 through 2021 (Ref. 7.2-7, Table V-2). Therefore, any such retirements that do occur in this period would merely act to further increase projected demand. As such, NMPNS does not consider delayed retirement to represent an appropriate alternative to consider further in this analysis.

TABLE 7.2-2

OTHER GENERATION TECHNOLOGY OPTIONS CONSIDERED

Alternative	Considerations/Reasons for Not Evaluating Further
Wind	Intermittency of adequate wind speed and expense of energy storage results in capacity factors too low for baseload generation, and land requirements are very large for the 1,759 MW required to replace NMP (Ref. 7.0-1, Section 8.3.1). Currently, approximately 48 MW is generated from wind power in New York State, and NYSERDA estimates that current program efforts will result in an additional 300 MW of wind-based generation (Ref. 7.2-3, page 3). Based on a partially complete NYSERDA study (Ref. 7.2-1, pages 3-59, 3-60), New York has the technical potential (the upper limit of renewable electricity production and capacity that could be brought on line over the next 20 years, without regard to cost, market acceptability, or market constraints) for roughly 17,000 MW of installed windpower capacity, of which slightly more than 3,000 MW could be assumed to be available during summer peak hours. Although technology-specific results are not yet available, based on past experiences and studies, estimates of achievable potential are expected to fall in the range of 10-50 percent of technical potential estimates. Wind farms, the most economical wind option, consist of 10-50 turbines in the 1 MW to 3 MW range. Factors constraining the full exploitation of wind energy include land availability and land-use patterns, surface topography, offshore conditions, infrastructure constraints, environmental constraints, wind turbine capacity factor, wind turbine availability, and grid availability (Ref. 7.2-1, pages 3-59, 3-60). From a practical perspective, the scale of this technology is too small to directly replace a power generating plant the size of NMP, and the functionality is not equivalent.
Solar Photovoltaic and Solar Central Receiver	Low solar resource availability in New York (e.g., less than 2.8 kWh/m^2 per day in western and central New York State, less than half of that available in the southwestern U.S.), intermittency of this resource, and expense of energy storage results in capacity factors too low for practical baseline generation. Land requirements are very large. Based on estimates presented in the GEIS, approximately 25,000 acres and 62,000 acres, respectively, would be required for 1,759 MW of solar thermal or solar photovoltaic generating capability to replace NMP, even in areas of high solar availability (Ref. 7.0-1, Sections 8.3.2, 8.3.3). The NYSERDA study (Ref. 7.2-1, pages 3-70, 3-71) did not evaluate central station solar technology. However, it did examine photovoltaics as a distributed resource, finding a technical potential for roughly 33,000 MW of installed photovoltaic capacity, with a summer peak contribution of roughly 8,500 MW and a winter peak contribution of about 1,500 MW. The cost of this technology was anticipated to remain quite high during the period studied, the size of the individual facilities were even smaller than the wind facilities, and the capacity factor was only slightly higher than that of wind, and much less than nuclear.

TABLE 7.2-2 (CONTINUED)

OTHER GENERATION TECHNOLOGY OPTIONS CONSIDERED

Alternative	Considerations/Reasons for Not Evaluating Further
Hydroelectric	Relatively low capacity factor, large land-use requirement (e.g., inundation of approximately 600,000 acres or more could be required for a new 600 MW plant just to replace Unit 1), and ecological impacts during operation (e.g., fish impingement, entrainment) are associated with this option (Ref. 7.0-1, Section 8.3.4). According to the NYSERDA study (Ref. 7.2-1, pages 3-60 through 3-63), future growth in hydroelectric capacity depends largely on the ability to implement public policies that eliminate or overcome legal and regulatory obstacles often related to environmental considerations. The study identified a technical potential for only 2,527 MW of additional installed hydroelectric capacity by the year 2022, only 909 MW of which represents summer peak capacity. Although the individual plants could be larger than wind turbines or photovoltaic installations, the capacity factor of these units would fall substantially short of wind or solar.
Geothermal	As noted in the GEIS, hydrothermal reservoirs in the U.S. are most prevalent in contiguous U.S. western states, Alaska, and Hawaii, and are limited in New York State (Ref. 7.0-1, Section 8.3.5). A study commissioned by NYSERDA and the DOE, and completed in 1996, found that there is some potential for geothermal electric power production in western upstate New York, but high cost continues to inhibit its development (Ref. 7.2-23).
Biomass	Biomass resources are classified as either closed-loop (grown exclusively to be used as energy feedstock) or open-loop (byproducts of the wood processing industry or clean woody waste materials retrieved from the municipal solid waste stream). The DOE estimates that approximately 12.3 billion kWh of electricity could be generated from biomass fuels in New York (Ref. 7.2-24), approximately equivalent to NMP generation. The NYSERDA study (Ref. 7.2-1, pages 3-63 through 3-67) examined both biomass technologies for their ability to contribute to New York's energy needs, although certain technologies (e.g., customer-sited combined heat and power facilities burning mill residues, animal manure digesters, and wastewater methane combustors) are primarily of value for individual end-use applications. Keeping this in mind, the study identified a technical potential of approximately 1,000 MW of installed biopower capacity, essentially all of which would contribute to summer peak. Only co-firing biomass with coal offers the technical potential capacity for the entire State greater than the current capacity of Unit 1 alone, and no biomass generation options have the capacity needed to replace Unit 2. As pointed out above, the economic and achievable potential are almost certain to be substantially less than the technical potential. Currently, several New York coal-fired units have or are awaiting approval for roughly 10 MW of co-firing capability—far from enough capacity to replace either of the NMP units.

TABLE 7.2-2 (CONTINUED)

OTHER GENERATION TECHNOLOGY OPTIONS CONSIDERED

Alternative	Considerations/Reasons for Not Evaluating Further
Municipal Solid Waste	As noted by the NRC, installed capital cost of a municipal solid-waste-fueled plant is higher than that of a wood-waste-fueled plant (Ref. 7.0-1, Section 8.3.7). Use of this option is primarily a waste management decision, and tipping fees, availability of landfill space, and reduced heat content of the waste stream due to segregation and recycling of high-heat-content components (e.g., wood, paper, plastics) affects economic viability. The NYSEPB points out in the 2002 State Energy Plan (Ref. 7.2-1, pages 3-113, 3-114) that there are ten waste-to-energy facilities operating today in New York, all of which became operational before 1994, for a total of 260 MW of installed capacity. Incineration technology is relatively mature. However, the NYSERDA study did examine the technical potential for producing electricity from landfill gas, a byproduct of municipal solid waste when it is covered to prevent windblown litter. Landfill gas has about half the heating value of typical natural gas. “Large” systems to take advantage of this fuel—where the quantity and location are very site-specific—are sized in the range of 3 MW to 5 MW, for a total technical potential of approximately 19 MW of installed capacity, all of which would be available for summer peak. Together, large and small systems would offer a total technical potential of 135 MW of installed capacity statewide.
Oil	As a result of relatively high cost and air emissions concerns, use of petroleum for electric generation in New York has been reduced in recent years in favor of natural gas. NYSERDA reports that electric generation from petroleum in New York fell approximately 48 percent, from 31,911 GWh in 1986 to 15,385 GWh in 2000, even as total generation increased by 17 percent, from 129,965 GWh to 156,632 GWh during that same period (Ref. 7.2-12). Based on projections reported by the NYSEPB (Ref. 7.2-1, pages 3-120, 3-121), electric generation from oil relative to other sources is expected to decline from 5.0 percent in 2002 to 4.1 percent in 2005, and then rise again toward 7.8 percent by 2020 as overall reserve margins in the State begin to decline.
Advanced Nuclear Reactor	Increased interest in the development of advanced reactor technology has been expressed recently by members of both industry and government. However, NMPNS considers it unlikely that a replacement for Unit 1 could be planned, licensed, constructed, and on line by the time its operating license expires in 2009. In addition, the economics of new plants are highly uncertain and, primarily because of the relatively favorable economics of competing technologies, no new nuclear facilities are expected to be built in the U.S. through 2025 (Ref. 7.2-25).

DOE = U.S. Department of Energy
GEIS = *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*
GWh = gigawatt hour(s)
kWh = kilowatt hour(s)
m^2 = square meter(s)
MW = megawatt(s)
NMP = Nine Mile Point Units 1 & 2
NMPNS = Nine Mile Point Nuclear Station, LLC
NRC = U.S. Nuclear Regulatory Commission
NYSEPB = New York State Energy Planning Board
NYSERDA = New York State Energy Research and Development Authority
Ref. = Reference

7.2.3.3 Conservation

The history, status, and projections of energy conservation initiatives in New York are summarized by the NYSEPB (Ref. 7.2-1, Section 3.2). As noted by the Board, energy efficiency programs in New York have changed substantially in recent years as the State has transitioned to a competitive retail electricity market. The most significant early investments in energy efficiency, in the 1980s, occurred under the DSM programs implemented by investor-owned utilities in the State. Initial focus of these programs was on load management, then the focus broadened to include other energy efficiency measures in response to regulatory actions in the early 1990s. By 1992, DSM program offerings were diverse, ranging from rebates for residential customers (e.g., for use of off-peak power or installation of energy-efficient appliances) to financial incentives for installing high-efficiency measures in industrial facilities. Annual expenditures by investor-owned utilities in New York for DSM programs peaked at $286 million in 1992, but declined in the mid-1990s due to market conditions. In 2001, investor-owned utility expenditures for DSM and related programs stood at $6.8 million, reflecting the transition to competitive energy markets and implementation of the systems benefit charge (SBC) program as an alternative means of fostering energy efficiency in the State (Ref. 7.2-1, page 3-13).

The NYSPSC established New York's SBC in 1996. The SBC consists of a charge on electric utility transmission and distribution systems, revenues from which are used to fund public policy initiatives in the area of energy efficiency, associated research and development, and other areas that are not expected to be adequately addressed by competitive markets. Administered by NYSERDA, the SBC program thus represents a transition from utility-sponsored rebate-driven offerings to market development initiatives. Utility spending for DSM- and SBC-funded initiatives remains a minor component of energy efficiency expenditures in the State. A diverse array of programs administered by NYSERDA, public power authorities including the Long Island Power Authority and New York Power Authority, and other federal and state agencies comprise the majority of expenditures and corresponding energy savings (Ref. 7.2-3, Section 3.2).

These combined energy efficiency initiatives were estimated to reduce summer peak demand statewide by nearly 1,600 MW (roughly 5 percent of total peak demand) between 1999 and 2000, and additional peak demand reductions on the order of 900 MW to 1,300 MW are projected to result from these efforts in the 2004-2006 time frame (Ref. 7.2-1, Section 3.2). However, DSM is acknowledged in load forecasts prepared by NYISO (e.g., see Ref. 7.2-7, Table V-2) and it is expected that projected energy efficiencies would be anticipated by the market. As a practical matter, it would be impossible to increase those energy savings by an additional 1,759 MW to replace NMP generating capability, particularly in upstate New York, which represents a relatively small fraction of electrical load in the State. For these reasons, NMPNS does not consider energy conservation to represent a reasonable alternative to renewal of the NMP operating licenses.

7.3 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

NMPNS evaluations of environmental impacts for the feasible generation alternatives are presented in the following sections. Section 7.3.1 addresses impacts of the purchased power alternative. Sections 7.3.2 and 7.3.3, respectively, address impacts associated with the natural gas-fired and coal-fired representative alternatives. These new generating plants would not be constructed only to operate for the period of extended operation of NMP. Therefore, NMPNS assumes for this analysis a typical design life of 25 years for the combined-cycle natural gas-fired plant and 40 years for the coal-fired plant. As discussed in Section 7.2, NMPNS assumes that construction of these plants would be phased to provide replacement capacity in 2009 and 2026 when the respective operating licenses for Unit 1 and Unit 2 expire.

NMPNS focuses its evaluation on the gas-fired alternative located at the NMP site, and noting key differences in impact that could be expected as a result of locating it at a greenfield site. Impacts of the coal-fired alternative are focused on a greenfield site location for reasons discussed in Section 7.2.2.3. Chapter 8 presents a summary comparison of the environmental impacts of license renewal and the alternatives discussed in this section.

7.3.1 PURCHASED POWER

As discussed in Section 7.2.2.1, NMPNS assumes that the generating technology employed under the purchased power alternative would be one of those that the NRC analyzed in the GEIS. NMPNS is adopting by reference the NRC analysis of the environmental impacts from those technologies. Therefore, under the purchased power alternative, environmental impacts would still occur, but would be located elsewhere in the region, the U.S., or Canada. NMPNS does not anticipate that new transmission facilities attributable to such power purchases would be needed (see Section 7.2.2.1).

7.3.2 GAS-FIRED GENERATION

Potential impacts associated with NMPNS's natural gas-fired representative alternative, as described in Section 7.2.2.2, are addressed in the following subsections by resource category.

Land Use

Development of the representative combined-cycle natural gas-fired plant at the NMP site would require approximately 90 acres, plus an additional 10-15 acres in the event relocation of existing facilities such as the Firing Range and Recreation Area are necessary. Parcels assumed to be affected consist primarily of woodlands north and south of Lake Road immediately west of existing plant facilities and the Scriba Substation. This configuration allows at least 1,000 feet of forest buffer between the new plant and the Lakeview Subdivision on the western border of the site. However, some wetlands (estimated to be three to five acres) could be lost, for which mitigation would likely be required. The assumed 25 miles of natural gas supply pipeline required for the plant would be located on a 75-foot ROW, which would be reduced to 50 feet following construction. The ROW is assumed to be located primarily on or adjacent to existing transmission line or pipeline ROW for most of its length. Land use along this route consists of forest and brushland with some agricultural land (see Section 2.3.2); development consists mostly of rural residences along roadways.

The onsite facilities would represent expansion of an existing industrial land use, and NMPNS expects there would be little or no adverse impact on land uses adjacent to the site. Some localized and mostly temporary disruption of current land uses, primarily farming, may occur along the pipeline route. On this basis, NMPNS considers that impact on land use from this alternative would be SMALL.

Additional acreage would likely be required to locate the representative plant at a greenfield site, for both onsite facilities and supporting offsite infrastructure (e.g., gas pipeline and transmission line connection). However, these facilities would be located and designed considering land-use impacts and protections afforded under Articles VII and X of New York’s Public Service Law, or comparable protections. NMPNS considers that impact on land use at a greenfield site could be small to moderate, depending on site-specific factors.

Water Use and Quality

As noted in Section 7.2.2.2, cooling water intake and discharge flows for the representative gas-fired plant, even for a once-through cooling system option, would be substantially lower than currently result from NMP operation, which has small impact with respect to water quality and use (see Section 4.1.1). Potable and service water use and other wastewater discharges would also be less and, like NMP, cooling water and wastewater discharges would be regulated under the federal Clean Water Act (CWA) and corresponding State programs by a State Pollutant Discharge Elimination System (SPDES) permit. Therefore, NMPNS concludes that impact on water use and quality for the representative plant located at the NMP site would be SMALL. For these same reasons, and considering also that air-cooled condensers could be used to minimize cooling water use where necessary, as is the case for the Wawayanda plant, NMPNS concludes that impacts on water use and quality also would be SMALL for the greenfield site alternative.

Air Quality

Potential for adverse impacts to air quality from a fossil-fueled power plant are substantially different from those of a nuclear power plant. The combustion process results in emissions of criteria pollutants including NO_x, SO_2, CO, and particulates, as well as carbon dioxide (CO_2), an unregulated “greenhouse gas” implicated as a potential contributor to climate change. Natural gas contains very little sulfur and other contaminants that are present in coal and oil, and is inherently a relatively clean-burning fossil fuel.

Scaling from values reported for the Wawayanda Energy Center (Ref. 7.2-17, Table 6-8) to account for differences in the number of combustion turbines and capacity factor, approximate emission rates for principal criteria pollutants from the representative gas-fired alternative plant would be: NO_x, 321 tons/year; SO_2, 100 tons/year; PM_{10}, 371 tons/year; and (assuming use of oxidation catalysts) CO, 195 tons/year. These emissions may result in a noticeable reduction in local air quality. However, these emission rates are relatively low and, as noted in Section 7.2.1.3, an offset of 1.15:1 would have to be obtained for NO_x emissions, which would act to improve regional air quality with respect to this constituent. The representative plant would add to regional concentrations of CO_2, a potential contributor to climate change. NMPNS concludes that the overall impact on air quality from this alternative, located either at the NMP site or a greenfield site elsewhere in upstate New York, would be SMALL to MODERATE.

Waste Management

Operation of the gas-fired alternative would generate small quantities of municipal and industrial waste, and could also include spent catalyst used for NO_x control. The amount of these wastes would be less than is currently generated from NMP operations, and would be disposed of in accordance with applicable regulations at a permitted offsite disposal facility, regardless of the plant's location. NMPNS concludes that the gas-fired generation waste management disposal impacts would be SMALL.

Ecological Resources

NMPNS expects that development of the gas-fired alternative plant at the NMP site would result in the displacement of up to approximately 90 acres of natural vegetation, consisting primarily of forest with some advanced shrubland formerly in agricultural use. Based on review of National Wetland Inventory maps, some wetland habitats within this area (estimated to be three to five acres) could also be lost, and require mitigation.

Construction of the 25-mile gas supply pipeline using an assumed construction ROW of 75 feet could disturb up to 230 acres of terrestrial habitat. However, the permanent ROW would be reduced to 50 feet and is assumed to be located on or near an existing transmission or pipeline corridor for most of its length. Potential habitats affected are indicated by those along the transmission line corridor, which consist of forest with some agricultural land; the transmission corridor itself is maintained as a low-growing plant community (see Section 2.3.2). Crossing of several small tributary streams and wetlands would also be necessary. NMPNS expects that some minor overall reduction of forest and shrubland habitat may result from the pipeline installation; however, shrubland could be restored and maintained in much of the ROW following installation, and wetland disturbance is likely to be temporary and amenable to restoration or appropriate mitigation. Stream crossing and wetland disturbance would be subject to provisions of a U.S. Army Corps of Engineers (USACE) permit (CWA Section 404), NYSDEC Protection of Waters Permit (6 NYCRR Part 608), and NYSDEC Wetlands Permit (6 NYCRR Parts 662-663), as applicable.

As noted in Section 2.3.2, habitats on the NMP site are typical of those found elsewhere in the region. With the exception of a rich shrub fen community, no habitats of unusual value are known to occur along the transmission line corridor, and no resident threatened or endangered species are known to occur on the NMP site or the transmission line corridor. NMPNS assumes comparable conditions would exist along the pipeline ROW.

The most significant potential impacts to aquatic communities relate to operation of the cooling water system. However, the cooling system for the plant would be designed and operated in compliance with the CWA, including SPDES limitations for physical and chemical parameters of potential concern and provisions of CWA Sections 316(a) and 316(b), which are respectively established to ensure appropriate protection of aquatic communities from thermal discharges and cooling water intakes. Moreover, the cooling water intake and discharge flows would be less than for NMP, the impact from which is considered to be SMALL (see Sections 4.2, 4.3, and 4.4).

Considering the quantity and quality of habitat permanently displaced by the plant, mitigation available to replace wetland values lost, and assumed environmental protections that would be afforded in routing the natural gas pipeline, including those under Article VII or comparable program, NMPNS concludes that development of the natural gas-fired plant at the NMP site would have little noticeable impact on ecological resources of the area, and impacts, therefore, would be SMALL.

Impact on ecological resources from construction and operation of the representative natural gas-fired plant and associated offsite infrastructure at a greenfield site in upstate New York is conjectural. However, ecological resources throughout much of the area would be similar to those for the NMP site alternative and the siting, design, and operation of the facility would be subject to the environmental protections noted above. NMPNS concludes that the associated impact on ecological resources would be SMALL to MODERATE.

Socioeconomics

Major sources of potential socioeconomic impacts from the representative gas-fired generation alternative include:

- temporary increases in jobs, economic activity, and demand for housing and public services in communities surrounding the site during the construction period, and
- net change in permanent jobs, tax revenues, and economic activity attributable to gas-fired plant operation and termination of operations of the NMP Units.

As discussed in Section 7.2.2.2, NMPNS assumes that construction of the representative gas-fired alternative would be implemented as two projects timed to coincide with expiration dates of the NMP operating licenses. Each project would be constructed in approximately 2 to 2.5 years; the one-unit project, due for completion in 2009, would employ average and peak onsite workforces of approximately 240 and

420 workers, respectively, and would be operated by a permanent workforce of 25 people. The two-unit project, due for completion in 2026, would employ average and peak construction workforces of less than 480 and 840, respectively. Approximately 50 permanent employees would be required to operate the completed three-unit plant.

With a 2001 labor pool of over 280,000 workers in the Oswego and Onondaga combined-County area (see Section 2.6), NMPNS expects that most workers for both projects would commute and relatively few would relocate into the area. Impacts to housing and public services that would result from those few workers that do choose to temporarily relocate with their families would be readily absorbed by the surrounding communities, assuming current housing vacancy rates and available capacities of public water systems persist (see Sections 2.8.1 and 4.10). The increase in economic activity would be expected to have a positive effect during that period. NMPNS concludes that impacts on local housing and infrastructure from plant construction would be SMALL.

The estimated 50 permanent jobs created by development of the representative gas-fired plant at the NMP site would provide a small, but positive, offset to the loss of approximately 1,280 comparable jobs resulting from shutdown of the two NMP reactors. In addition, property tax receipts resulting from development of the plant at NMP could substantially offset the potentially large adverse impacts to the Town of Scriba and the City of Oswego School District that are assumed to result from the termination of NMP operations (see Section 7.1.1). Therefore, NMPNS views these impacts as positive, absent consideration of operations termination. However, termination of NMP operations could result in the loss of as many as 960 jobs in Oswego County, which has a total workforce of 55,500 and an unemployment rate of 6.5 percent (see Section 7.1.1). Considering that these losses would be incremental over a period of years and proximity to potential job opportunities in the Syracuse area, NMPNS considers that the net loss of jobs would be clearly noticeable, but probably not destabilizing, a characteristic of MODERATE impact.

Transportation impacts related to the 50-person operating workforce for the completed three-unit plant would be small, particularly considering the reduction in workforce associated with termination of NMP operations. Transportation impacts associated with the construction workforce could result in short-term moderate to large impacts, given the current traffic capacities of intersections near the site (see Section 2.8.2). However, these impacts would be temporary and could be readily moderated through the use of staggered shifts, active traffic control, and other appropriate measures. In consideration of the temporary nature of these conditions, and assuming application of appropriate traffic control measures, NMPNS concludes that overall transportation impacts would be SMALL.

NMPNS concludes that development of the representative plant at the NMP site, considered alone, would result in substantial economic benefits and would preserve tax revenues in Oswego County. Considered in combination with termination of NMP operations and assuming substantial preservation of tax revenues from the new plant, NMPNS concludes that socioeconomic impacts for the gas-fired alternative located at the NMP site would be MODERATE due to the resulting net loss of jobs, which is likely to have noticeable but not destabilizing effects in Oswego County.

Socioeconomic impacts of constructing and operating the representative gas-fired alternative at a greenfield site in upstate New York would be highly location dependent. Not considering impacts from terminating NMP operations, community impacts resulting from location of the representative gas-fired plant in areas within reasonable distance to large population centers (e.g., Syracuse), would likely be small, with moderate impacts possible in more rural areas (Ref. 7.0-1, Section 8.3.10). However, communities in Oswego County in particular would experience losses in both employment and tax revenues due to NMP closure, assuming the gas-fired alternative plant is constructed outside the area (see Section 7.1.1). Considered in combination with NMP closure, overall socioeconomic impacts of the gas-fired alternative at a greenfield site would likely range from MODERATE to LARGE.

Human Health

In the GEIS, the NRC cites risk of accidents to workers and public risks (e.g., cancer, emphysema) from the inhalation of toxics and particulates associated with air emissions as potential risks to human health associated with the gas-fired generation alternative (Ref. 7.0-1). NMPNS assumes that regulatory requirements imposed on facility design and operations under the authority of the Occupational Safety and Health Act, Clean Air Act, and related statutes are designed to provide an appropriate level of protection to workers and the public with respect to these risks, and that compliance with those requirements would result in SMALL, if any, impacts on human health, regardless of plant location.

Aesthetics

Potential aesthetic impacts of construction and operation of a gas-fired plant include visual impairment resulting from the presence of a large industrial facility, including a 106-foot-high building housing the CTs and HRSGs, two 225-foot-high stacks, and, potentially, mechanical-draft cooling towers, which could be approximately 37- to 60-feet high, with associated condensate plumes. The stacks and condensate plumes from the mechanical-draft cooling towers, if used, would be visible for some distance from the site. However, development of the representative gas-fired plant at the NMP site would represent an incremental addition to an existing plant with similar characteristics, and a forest buffer provides a visual screen to residential developments bordering the site. Based on noise impact studies conducted for the proposed Heritage Station two miles west of the NMP site, which considered impact to nearby residences as close as approximately 1,000 feet, and assuming use of comparable noise abatement design provisions (Ref. 7.2-18, Section 11), NMPNS expects that the representative plant would comply with all applicable noise ordinances and standards. The gas supply pipeline route assumed by NMPNS is through sparsely populated areas. Associated aesthetic impacts from the pipeline are, therefore, considered to be small. Overall, NMPNS concludes that aesthetic impact from development of a gas-fired plant at the NMP site would be SMALL.

Any discussion of the potential aesthetic impact of the gas-fired alternative at a greenfield site in upstate New York is conjectural. However, NMPNS assumes that location and design of the plant and associated offsite infrastructure would be subject to review under New York's Public Service Law Articles VII and X, or comparable protections, and concludes that the impact could range from SMALL to MODERATE, depending on location.

Cultural Resources

The area developed for the gas-fired generating plant at the NMP site would be located on forested land subject to previous disturbance (e.g., agriculture). No archaeological or historic sites are known to exist on the plant property or along the transmission corridor along which NMPS assumes most of the length of the gas supply pipeline would be routed. In any event, NMPNS assumes that the gas supply pipeline would be routed with consideration of cultural resources under New York's Article VII program or a similar review and approval process, and that appropriate measures would be taken to recover or provide other mitigation for loss of any resources discovered during onsite or offsite construction. On this basis, NMPNS considers the potential adverse impact on cultural resources from this alternative to be SMALL.

NMPNS assumes that siting and development of a gas-fired plant and associated offsite infrastructure at a greenfield site would similarly consider cultural resource impacts, and that associated impacts would therefore be SMALL.

7.3.3 COAL-FIRED GENERATION

NMPNS presents its impact evaluations for the representative coal-fired generation alternative in the following subsections by resource category. As discussed in Section 7.2.2.3, NMPNS assumes the plant is located at a hypothetical greenfield site in upstate New York because sufficient land is not available at the NMP site to accommodate the coal-fired alternative.

Land Use

As discussed in Section 7.2.2.3, development of the representative coal-fired plant would require approximately 740 acres, of which up to approximately 560 acres would be used for waste disposal assuming a 40-year plant life. Additional land would be necessary to allow for onsite and peripheral buffer; the NRC estimates that 1,700 acres would be required for a 1000 MW plant (Ref. 7.0-1, Table 8.1), which NMPNS expects would be sufficient for the representative plant. Depending on the specific location of the plant, additional land could be required for offsite infrastructure, in particular transmission lines to connect the plant to the grid and facilities for coal and limestone delivery, most likely including a rail spur and possibly some upgrades to existing or recently abandoned rail lines; construction of a barge terminal could be a reasonable option for a plant located on Lake Ontario.

Land-use impacts from development of the plant at a greenfield site are conjectural. However, NMPNS assumes that location and design of the facilities would be subject to substantial regulatory scrutiny under Articles VII and X, or comparable programs, and that a reasonable potential exists that disposal areas eventually could be restored and developed for compatible uses that would not affect landfill integrity (e.g., recreation). Under these assumptions, NMPNS expects that land-use impacts would be clearly noticeable, but would not affect essential land-use characteristics in the vicinity of the plant, consistent with a rating of MODERATE impact.

Water Use and Quality

Construction-phase impacts on water quality of greatest potential concern at a greenfield site include erosion and sedimentation associated with land clearing operations and suspension of bottom sediments during construction of cooling water intake and discharge structures and from construction of barge delivery facilities (e.g., from navigation channel dredging) in the event that option is chosen. However, land clearing activities subject to stormwater protections in accordance with the SPDES program and work in waterways would be regulated by the USACE under the CWA Section 404 and Section 10 of the Rivers and Harbors Act, by the NYSDEC via permits issued under 6 NYCRR Parts 505 and 608, and by the New York Department of State under the State's Coastal Zone Management program (if located within the coastal zone). In addition, these adverse effects would be localized and temporary. NMPNS concludes that impacts on surface water quality associated with construction of the representative plant would be SMALL.

Potential impacts on water quality and use associated with operation of the representative plant would be to some extent site-specific. Cooling water and other wastewater discharges would be regulated by a SPDES permit, regardless of location. Cooling water intake and discharge flows for the representative coal-fired plant, assumed to use a closed-cycle cooling system, would be substantially lower than those for NMP Unit 1, which uses a once-through cooling system that results in small impacts. Therefore, a representative plant located at a site comparable to NMP on Lake Ontario would be expected to also result in small impacts. Considering also the environmental review of water use and quality issues afforded under Article X or an equivalent program, NMPNS concludes that the impacts of surface water use and quality from operation of a representative plant located at a greenfield site alternative would be SMALL.

Air Quality

The principal air emissions from a coal-fired power plant are the same as those noted in Section 7.3.2 for the natural gas alternative, and include the criteria pollutants NO_x, SO_2, CO, and particulates, as well as CO_2, which is currently unregulated. However, coal contains much higher concentrations of sulfur, and combustion is less efficient than for natural gas. As a result, even with application of appropriate control technologies, emission of these pollutants from a coal-fired facility are typically higher than for a natural gas-fired facility of comparable size. In addition, coal contains other constituents (e.g., mercury, beryllium) that are potentially emitted as hazardous air pollutants. Of these, beryllium is considered a criteria pollutant by New York State in its ambient air quality standards (6 NYCRR Part 257) and regulations to regulate mercury are under development at EPA.

As Section 7.2.2.3 indicates, NMPNS has assumed a plant design that includes BACTs to effectively minimize emissions of regulated air pollutants. Based on emission factors and estimated efficiencies for emission controls cited by the EPA and assumed design parameters listed in Table 7.2-1, operation of the plant would result in the following annual air emissions for criteria pollutants[4]: SO_2 = 5,440 tons; NO_x = 1,280 tons; CO = 1,280 tons; total particulates (filterable) = 181 tons; and particulates having a diameter of less than 10 microns (PM_{10}) = 41 tons.

NMPNS expects that these emissions would result in a detectable reduction in local air quality. However, as noted in Section 7.2.1.3, equivalent allowances for SO_2 emissions and credits to more than offset NO_x emissions, by a ratio of 1.15:1 would have to be obtained for operation to be feasible from a regulatory standpoint. Therefore, the plant would not add to regional SO_2 emissions and regional NO_x emissions would be somewhat lower. The representative plant would add to regional concentrations of other pollutants, including the criteria pollutants CO and particulates; hazardous air pollutants, such as beryllium and mercury; and CO_2, a potential contributor to global warming.

NMPNS concludes that the overall impact on air quality from this alternative, located at a greenfield site in upstate New York, would be MODERATE.

Waste Management

The representative coal-fired plant would annually consume approximately 5,110,000 tons of coal having an ash and sulfur content of 7.1 percent and 1.1 percent, respectively. Assumed air emission controls would remove 99.9 percent of the ash and 95 percent of the sulfur (see Table 7.2-1). Estimated annual waste generation amounts to approximately 363,000 tons/year of ash and 322,000 tons of flue gas desulfurization waste (dry basis), consisting primarily of hydrated calcium sulfate (gypsum) and excess limestone reactant. These wastes represent potentially usable products. However, considering the relatively large volume of this material and uncertainties in future demand, NMPNS has assumed the wastes would be disposed of at an onsite landfill (see Section 7.2.2.3). Assuming a fill depth of 30 feet, approximately 560 acres would

[4] Annual emissions of regulated air pollutants calculated as follows from amount of coal combusted and EPA estimates of uncontrolled air emissions and removal efficiencies (all necessary parameters are listed in Table 7.2-1): Pollutant Emissions (tons/yr) = Coal Combusted (tons/yr) x Uncontrolled Emissions (lb/ton) x 0.0005 (ton/lb) x [100 – removal efficiency (%)]. Removal efficiency for carbon monoxide is assumed to be zero.

be required for the landfill over an assumed plant operating life of 40 years. The coal-fired alternative plant could also generate relatively small quantities of the spent catalyst used for NO_x control at the plant. NMPNS assumes this waste would be disposed of in accordance with applicable regulations at a permitted offsite disposal facility.

NMPNS assumes that the ash and flue gas desulfurization waste landfill would be designed and operated to maintain landfill integrity and minimize the potential for escape of leachate, which could result in some local degradation of groundwater quality. NMPNS assumes that groundwater quality degradation, in the event it did occur, would be appropriately managed to ensure potential uses remain protected. After closure and revegetation of the disposal facility, the land could be made available for other noninvasive uses (e.g., recreation).

Considering the large volumes of waste that would be generated and potential for noticeable localized impacts on land use and groundwater quality resulting from its disposal, NMPNS concludes that waste management impacts for the coal-fired generation alternative would be MODERATE.

Ecological Resources

Potential impact on ecological resources from construction and operation of the representative coal-fired plant are highly site-specific. However, as much as 740 acres of terrestrial habitat could be displaced by the plant and onsite landfill, and additional terrestrial habitat could be adversely affected from development of offsite infrastructure (e.g., transmission line connection, rail spur construction).

Impact to aquatic communities as a result of construction could include some permanent alteration of habitat, particularly in the event a barge terminal were developed for delivery of coal and limestone. Fish and benthic communities would be initially disrupted, but would be expected to reestablish with accompanying localized changes in species composition and distribution in response to changes in bottom substrate availability, water depth, and other factors. Potential for some adverse impact on aquatic communities would persist through the operational period as a result of large boat traffic, periodic maintenance dredging, and potential for spills of coal, petroleum products, or other materials. However, construction and maintenance dredging would be conducted in accordance with the provisions of applicable permits from USACE and NYSDEC, as noted in Section 7.3.2. Similarly, spill prevention measures would be effective during the operational period.

Operation of the cooling water system for the plant is also a potential source of impact to aquatic communities. However, this system would be designed and operated in compliance with the CWA, including SPDES limitations for physical and chemical parameters of potential concern and provisions of CWA Sections 316(a) and 316(b), which are respectively established to ensure appropriate protection of aquatic communities from thermal discharges and cooling water intakes. The cooling water intake and discharge flows would be comparable to or less than for NMP, the impact from which is considered to be small (see Chapter 4). Therefore, associated impacts at a comparable site on Lake Ontario would also be expected to be small.

Considering the foregoing and the protections afforded by reviews required by New York's Article VII and X, or comparable programs, NMPNS concludes that development of the representative coal-fired plant at a greenfield site in upstate New York would have a SMALL to MODERATE impact on ecological communities.

Socioeconomics

As discussed in Section 7.2.2.3, NMPNS assumes that the representative coal-fired alternative would be constructed at a greenfield site as two projects timed to coincide with expiration dates of the NMP licenses. NMPNS estimates that a one-unit project, due for completion in 2009, would be constructed in approximately three years with average and peak onsite temporary workforces of approximately 1,750 and 2,000 workers. The two-unit project, assumed to be complete in 2026, would be constructed in approximately four years with average and peak workforces of approximately 2,500 and 3,000 workers. The permanent operating workforce for the completed three-unit plant is estimated to be 300 persons.

Potential impacts from construction of the coal-fired alternative at a greenfield site would be highly location dependent. As the NRC notes in the GEIS, socioeconomic impacts are expected to be larger at a rural site than at an urban site, because more of the peak construction work force would need to move to the area to work (Ref. 7.0-1, Section 8.3.9). Not considering impacts of terminating NMP operations, socioeconomic impacts at a remote rural site could be large, while impacts at a site in the vicinity of a more populated metropolitan area (e.g., Syracuse), could be small to moderate. However, communities in Oswego County in particular would experience losses in both employment and tax revenues due to NMP closure, assuming the plant is constructed outside the area (see Section 7.1.1). NMPNS concludes that overall socioeconomic impacts could range from MODERATE to LARGE, depending on location.

Human Health

In the GEIS, the NRC cites risk of accidents to workers and public risks (e.g., cancer, emphysema) from the inhalation of toxics and particulates associated with air emissions as potential risks to human health associated with the coal-fired generation alternative (Ref. 7.0-1). NMPNS assumes that regulatory requirements imposed on facility design and operations under the authority of the Occupational Safety and Health Act, Clean Air Act, and related statutes are designed to provide an appropriate level of protection to workers and the public with respect to these risks, and that compliance with those requirements would result in SMALL, if any, impacts on human health, regardless of plant location.

Aesthetics

Potential aesthetic impacts of construction and operation of the representative coal-fired plant include visual impairment resulting from the presence of a large industrial facility (including a building housing the boilers; turbine-generators; emission control equipment; 500-foot high stacks; fuel, limestone, and waste receiving/handling and storage facilities; stormwater runoff control basins; and mechanical-draft cooling towers, approximately 100-feet high, with associated condensate plumes). The stacks and condensate plumes from the mechanical-draft cooling towers could be visible some distance from the plant. Development of offsite infrastructure (e.g., transmission lines) and delivery of coal and limestone by rail or barge could also adversely affect aesthetics with respect to nearby areas. These impacts are highly site-specific. Therefore, NMPNS concludes that aesthetic impacts from development and operation of the coal-fired representative plant could range from SMALL to LARGE, depending on location.

Cultural Resources

NMPNS assumes that siting and development of a coal-fired plant and associated offsite infrastructure at a greenfield site would appropriately consider cultural resources under New York's Article VII and X, or similar approval processes, and that appropriate measures would be taken to recover or provide other mitigation for loss of any such resources that are not otherwise avoided. On this basis, NMPNS concludes that impacts on cultural resources would be SMALL.

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8.0 COMPARISON OF ENVIRONMENTAL IMPACT OF LICENSE RENEWAL WITH THE ALTERNATIVES

NRC

"To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form.…" 10 CFR 51.45(b)(3) as adopted by 51.53(c)(2)

Nine Mile Point Nuclear Station, LLC (NMPNS), evaluations of the environmental impacts associated with renewal of the Nine Mile Point Units 1 & 2 (NMP) operating licenses (the proposed action) are presented in Chapter 4, and those associated with the selected alternatives are described in Chapter 7. This chapter provides a comparative summary of these environmental impacts. The comparison addresses Category 2 issues associated with the proposed action and issues the U.S. Nuclear Regulatory Commission (NRC) identifies in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (Ref. 8.0-1, Section 8.1) as major considerations in an alternatives analysis. For example, the NRC concluded in the GEIS that air impacts from the proposed action would be small (Category 1), but indicated that there is a potential for major human health concerns associated with air emissions from fossil-fuel generation alternatives (Ref. 8.0-1, Table 8.2).

NMPNS provides a comparative summary of its conclusions regarding these issues in Table 8.0-1, and a more detailed comparison in Table 8.0-2.

TABLE 8.0-1

IMPACTS COMPARISON SUMMARY

Impact	Proposed Action (License Renewal)	No-Action Alternative[a]			
		Base (Terminate Operations & Decommission)	With Purchased Power	With Gas-Fired Generation	With Coal-Fired Generation
Land Use	SMALL	SMALL	All impacts are dependent on generation technologies used and location but would be comparable to the alternatives addressed in Section 8.3 of the GEIS.	SMALL	MODERATE
Water Use and Quality	SMALL	SMALL		SMALL	SMALL
Air Quality	SMALL	SMALL		SMALL to MODERATE	MODERATE
Waste Management	SMALL	SMALL		SMALL	MODERATE
Ecological Resources	SMALL	SMALL		SMALL	SMALL to MODERATE
Socioeconomics	SMALL	MODERATE to LARGE		MODERATE	MODERATE to LARGE
Human Health	SMALL	SMALL		SMALL	SMALL
Aesthetics	SMALL	SMALL		SMALL	SMALL to LARGE
Cultural Resources	SMALL	SMALL		SMALL	SMALL

a. Impact significance definitions (from 10 CFR 51, Subpart A, Appendix B, Table B-1, footnote 3):

SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE - Environmental effects are sufficient to alter noticeably but not to destabilize any important attribute of the resource.

LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

TABLE 8.0-2

IMPACTS COMPARISON DETAIL

	No-Action Alternative			
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
Description				
Renew operating licenses for NMP, extending operation of the Units approximately 20 years beyond the expiration of their current operating licenses in 2009 and 2026, respectively (see Chapter 3).	Terminate operations and decommission Unit 1 and Unit 2 following expiration of their current operating licenses in 2009 and 2026, respectively. Adopting, by reference, NRC description of associated activities provided in the GEIS Chapter 7 and Section 8.4, and in Supplement 1 to NUREG-0586 as representative of corresponding NMP activities (see Section 7.1.1).	Adopting by reference NRC description in the GEIS of alternate technologies. No new transmission lines expected to be required (see Section 7.2.2.1).	New plant at NMP site (see Section 7.2.2.2): Three 540 MW (net) combined-cycle units. Once-through cooling or closed-cycle cooling with mechanical-draft cooling towers or air-cooled condensers. Delivery of natural gas via new 25-mile-long pipeline. Air emission controls: NO_x: Dry-low NO_x combustor; selective catalytic reduction. PM and CO emissions limited through proper combustion controls. Exhaust dispersed via two 225-foot-tall stacks. Estimated workforce: Construction: < 480 average, < 840 peak Operation: 50	New plant at greenfield site in upstate New York (see Section 7.2.2.3): Three 600 MW (net) pulverized coal units. Closed-cycle cooling with mechanical-draft cooling towers. Coal and limestone delivery via barge or rail. Air emission controls: Particulates: fabric filter (99.9% removal) SO_x: wet limestone scrubber (95% removal) NO_x: low NO_x burners, overfire air, selective catalytic reduction (95% removal). Emissions dispersed through 500-foot-tall stacks. Estimated workforce: Construction: 1,750 average, 2,500 peak Operation: 300

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

	No-Action Alternative			
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
		Land Use Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 52, 53). Tax-driven and population-driven impacts on offsite land use are addressed below under Socioeconomic Impacts. No Category 2 issues.	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Section 8.4 and Supplement 1 to NUREG-0586. NMP decommissioning activities not expected to involve significant land-use disturbance off site (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of land use impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL – Approximately 90 acres converted to industrial use at existing power plant site and assumed 25 miles of natural-gas supply pipeline constructed through rural land on or adjacent to existing transmission or pipeline corridor requiring 50-foot-wide ROW (see Section 7.3.2).	MODERATE – Approximately 740 acres of land converted to industrial use, including 60 acres for power block, 120 acres for support facilities, 560 acres for waste disposal. Offsite land likely required for rail spur, transmission. Facilities siting/routing subject to regulatory review (see Section 7.3.3).
		Water Use and Quality Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 3, 5-12, 89). Unit 2 dewatering results in steep cone of depression and would not impact offsite wells, located one mile or more from Unit 2, or NMP onsite wetlands (Section 4.5, Issue 33).	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586 (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of water quality impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL – Construction impacts minimized by use of best management practices and regulatory controls. Operation-phase impacts less than those of NMP (see Section 7.3.2).	SMALL – Construction impacts reduced by use of best management practices and regulatory controls. Operation-phase impacts subject to regulatory control (e.g., SPDES permit), similar to or less than those of NMP if located at comparable Lake Ontario site (see Section 7.3.3).

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

		No-Action Alternative		
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
Air Quality Impacts				
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 51, 88). No applicable Category 2 issues.	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586 (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of air quality impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL to MODERATE - • 100 tons SO_2/yr • 321 tons NO_x/yr • 195 tons CO/yr • 371 tons PM_{10}/yr (see Section 7.3.2).	MODERATE – • 5,440 tons SO_2/yr • 1,280 tons NO_x/yr • 1,280 tons CO/yr • 181 tons PM/yr • 41 tons PM_{10}/yr (see Section 7.3.3).
Waste Management Impacts				
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 77-85, 87). No Category 2 issues.	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586 (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of waste management impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL –Relatively low waste generation (see Section 7.3.2).	MODERATE – Waste generated over assumed 40-year plant life disposed of on site in a 560-acre landfill designed to maintain integrity and minimize potential for escape of leachate (see Section 7.3.3).

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

		No-Action Alternative		
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
		Ecological Resource Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues [Issues 15-24, 45-48, 90 (both Units); 28-30 and 41-43 (Unit 2 only)]. Based on impingement and entrainment studies and impact evaluations through 1983, NYSDEC issued contingent CWA Section 316(b) approval subject to completion of further biological monitoring and demonstration of impacts similar to previous studies. Subsequent monitoring indicates no demonstrable effect on fish populations (see Sections 4.2, 4.3 for Issues 25, 26). Alternate thermal limitations for Unit 1 are included in the NMP SPDES permit revised by NYSDEC, and are supported by EPA Region II Administrator's 1982 Advisory Determination, CWA.	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586. NMP decommissioning activities not expected to involve significant activities beyond operational areas and no known threatened and endangered species are known to exist in the site vicinity (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of ecological resource impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL - Loss of 90 acres of natural vegetation communities on site, primarily forest and shrubland formerly used for agriculture, including approximately five acres of forested wetland that would be mitigated. Disturbance of up to approximately 230 acres of habitat, primarily forest and shrubland with some wetlands and agricultural land for natural gas supply pipeline, assumed to be mostly on or adjacent to existing utility corridor and subject to regulatory siting review.	SMALL to MODERATE- Loss of up to 740 acres of terrestrial habitat on site; potential additional habitat loss or alteration off site (e.g., transmission, rail spur); facilities siting would be subject to regulatory controls limiting impacts to ecological resources, including wetlands and threatened or endangered species. Impact on aquatic habitats and biota from dredging (e.g., for intake and discharge structures and, if applicable, barge terminal), cooling water withdrawal, and discharge would be subject to regulatory controls (see Section 7.3.3).

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

		No-Action Alternative		
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
Ecological Resource Impacts (continued)				
Section 316(a) Demonstration, and associated follow-up data and analyses (see Section 4.4, Issue 27). Potential for occurrence of resident threatened or endangered species in habitats affected by plant and transmission line operations is low and there have been no observed adverse impacts on such species during operational monitoring (see Section 4.7, Issue 49). USFWS concurrence obtained.			Occurrence of resident threatened or endangered species in potentially affected areas unlikely. Potential for impacts to aquatic ecology reduced by best management practices and regulatory controls. Cooling water intake and discharge impacts less than those for NMP (see Section 7.3.2).	
Socioeconomic Impacts				
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 64, 67, 91). Location in area of population without growth control measures that limit housing development minimizes potential for housing impacts (see Section 4.10, Issue 63).	MODERATE to LARGE – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586.	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of socioeconomic impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	MODERATE – Increased demand for housing and public services from nearby communities during construction reduced by proximity of Syracuse and assumed persistence of adequate housing and public services.	MODERATE to LARGE – Increased demand for housing and public services from nearby communities during construction likely to be small to moderate for plant location within commuting distance of large metropolitan area

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

		No-Action Alternative		
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
Socioeconomic Impacts (continued)				
Tax-driven land-use changes would be SMALL considering that property tax assessments for NMP are expected to be similar to or less than current levels and Oswego County, including the Town of Scriba, has an established development pattern and guides growth with regulatory measures such as zoning and comprehensive planning (see Section 4.13.2, Issue 69). Communities in the Onondaga and Oswego Counties combined area have potable water supplies with excess capacity or additional supply available by agreements with other water suppliers (see Section 4.11, Issue 65). Increase in traffic attributable to license renewal would be small and use of staggered shifts would be continued (see Section 4.14, Issue 70).	Decommissioning activities *per se* expected to result in SMALL impact. However, termination of operations could result in MODERATE to LARGE impacts from loss of approximately 935 permanent jobs in Oswego County and tax revenues that currently comprise approximately 24 percent and 26 percent of total revenues for the Town of Scriba and the City of Oswego School District, respectively (see Section 7.1.1).		Traffic impacts during construction would be temporary and could be mitigated using appropriate controls. Tax revenue would largely offset losses to Oswego County communities from NMP shutdown; however, the permanent operating workforce of 50 would not substantially offset the loss of approximately 1,280 permanent employees, most of which are assumed would reside in Oswego County. Net employment loss would likely be noticeable, but not destabilizing (see Section 7.3.2).	(e.g., Syracuse), but could be large if sited in a more remote location. The MODERATE to LARGE impacts from loss of permanent jobs in Oswego County and tax receipts by the Town of Scriba and the City of Oswego School District attributable to termination of NMP operations would not be offset, but would be transferred elsewhere if the greenfield site were located outside of these areas (see Section 7.3.3).

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

		No-Action Alternative		
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
		Human Health Impacts		
SMALL - Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 56, 58, 61-62, 86). Transmission line-induced currents conform to National Electric Safety Code® criteria (see Section 4.9, Issue 59).	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Chapter 7 (as codified in 10 CFR 51, Subpart A, Appendix B, Table B-1) and Section 8.4, and in Supplement 1 to NUREG-0586 (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of human health impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL – Same as for coal-fired alternative (see Section 7.3.2).	SMALL– Some risk of cancer and emphysema from air emissions and risk of accidents to workers, as the NRC notes in the GEIS. Regulatory controls assumed to reduce risks to acceptable levels (see Section 7.3.3).
		Aesthetic Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 73, 74). No Category 2 issues.	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Section 8.4 and Supplement 1 to NUREG-0586 (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of aesthetic impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL – Project represents incremental addition of existing impacts; wooded visual and noise buffer between plant and residential use would be retained (see Section 7.3.2).	SMALL to LARGE – Highly dependent on location. Stacks, cooling tower plumes likely visible for several miles. Offsite infrastructure (e.g., transmission) has adverse impact potential (see Section 7.3.3).

TABLE 8.0-2 (CONTINUED)

IMPACTS COMPARISON DETAIL

	No-Action Alternative			
Proposed Action (License Renewal) [a]	**Base (Terminate Operations & Decommission)** [a]	**With Purchased Power**	**With Gas-Fired Generation**	**With Coal-Fired Generation**
		Cultural Resource Impacts		
SMALL – No known archeological or historic resources on site or transmission line corridor; no plans for land-disturbing activities; SHPO concurrence obtained (see Section 4.15, Issue 71).	SMALL – Adopting by reference applicable NRC impact conclusions in the GEIS Section 8.4 and Supplement 1 to NUREG-0586. NMP decommissioning activities not expected to involve significant activities beyond operational areas (see Section 7.1.1).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of cultural resource impacts from alternate technologies (see Section 7.3.1; Ref. 8.0-1, Section 8.3).	SMALL – No cultural resources known to exist in affected area. Siting of pipeline would be subject to regulatory review, and mitigation measures could be implemented (see Section 7.3.3).	SMALL – Siting of facilities is subject to regulatory review, and mitigation measures could be implemented (see Section 7.3.3).

a. See Appendix A, Table A-1, for a list of issues and applicability.

Impact significance definitions (from 10 CFR 51, Subpart A, Appendix B, Table B-1, footnote 3):

SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

MODERATE – Environmental effects are sufficient to alter noticeably but not to destabilize any important attribute of the resource.

LARGE – For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

< = less than
% = percent
Btu = British thermal unit
CO = carbon monoxide
CWA = Clean Water Act
EPA = U.S. Environmental Protection Agency
GEIS = *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (Ref. 8.0-1)
MW = megawatt(s)
NMP = Nine Mile Point Units 1 & 2
NO_X = nitrogen oxide(s)
NRC = U.S. Nuclear Regulatory Commission
NYSDEC = New York State Department of Environmental Conservation
PM = particulate matter
PM_{10} = filterable particulates having diameter less than 10 microns
ROW = right-of-way
SHPO = State Historic Preservation Officer
SO_2 = sulfur dioxide
SO_x = sulfur oxide
SPDES = State Pollutant Discharge Elimination System
USFWS = U.S. Fish and Wildlife Service
yr = year

8.1 REFERENCES

8.0-1 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

9.0 STATUS OF COMPLIANCE

9.1 PROPOSED ACTION

9.1.1 GENERAL

Table 9.1-1 lists environmental authorizations that Nine Mile Point Nuclear Station, LLC (NMPNS), has obtained for the current operations of Nine Mile Point Units 1 & 2 (NMP). In this context, NMPNS uses “authorizations” to include any permits, licenses, approvals, or other entitlements. NMPNS expects to continue renewing these authorizations during the current license period and throughout the license renewal period. Based on the process used to identify new and significant information as described in Chapter 5, NMPNS concludes that both generating units are in compliance with all applicable environmental standards and requirements.

Table 9.1-2 lists additional environmental authorizations and consultations related to U.S. Nuclear Regulatory Commission (NRC) renewal of the NMP operating licenses. As indicated, NMPNS anticipates needing relatively few such authorizations and consultations. Sections 9.1.2 through 9.1.5 discuss some of these items in more detail.

9.1.2 THREATENED OR ENDANGERED SPECIES

Section 7 of the Endangered Species Act (16 USC 1531 et seq.) requires federal agencies to ensure that an agency action is not likely to jeopardize any species that is listed or proposed for listing as endangered or threatened. Depending on the action involved, the Act requires consultation with the U.S. Fish and Wildlife Service (FWS) regarding effects on non-marine species, the National Marine Fisheries Service (NMFS) for marine species, or both. The FWS and NMFS have issued joint procedural regulations that address consultation, at 50 CFR 402, Subpart B, and the FWS maintains the joint list of threatened and endangered species at 50 CFR 17.

Although not required of an applicant by federal law or NRC regulation, NMPNS has chosen to invite comment from federal and state agencies regarding potential effects that NMP license renewal might have. Appendix C to this environmental report includes copies of NMPNS correspondence with FWS regarding threatened and endangered species and critical habitat. NMPNS did not consult with NMFS because species under the auspices of NMFS are not known to be in the vicinity of NMP.

9.1.3 COASTAL ZONE MANAGEMENT PROGRAM COMPLIANCE

The Federal Coastal Zone Management Act (16 USC 1451 et seq.) imposes requirements on applicants for a federal license to conduct an activity that could affect a state’s coastal zone. The Act requires the applicant to certify to the licensing agency that the proposed activity would be consistent with the state’s federally approved coastal zone management program [16 USC 1456(c)(3)(A)]. The National Oceanic and Atmospheric Administration has promulgated implementing regulations indicating that

TABLE 9.1-1

ENVIRONMENTAL AUTHORIZATIONS FOR CURRENT OPERATIONS

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
New York State Department of Environmental Conservation	6 NYCRR Part 675	Water Withdrawal Registration	NYGLWWR-3811	11/07/05	Withdraw water from Lake Ontario
New York State Department of Environmental Conservation	6 NYCRR Part 175	New York State Fish and Wildlife License	LCP03-506	07/31/04	Collection and possession of fish and wildlife[1]
New York State Department of Environmental Conservation	6 NYCRR Part 596	Hazardous Substance Bulk Storage Registration Certificate	7-000058	11/07/05	Onsite bulk storage of hazardous substances
New York State Department of Environmental Conservation	6 NYCRR Part 750	State Pollutant Discharge Elimination System (SPDES) Permit	NY-0001015	12/01/04	Discharge of wastewaters to waters of the State
New York State Department of Environmental Conservation	6 NYCRR Part 613	Petroleum Bulk Storage Registration Certificate	7-429880	11/07/06	Onsite bulk storage of petroleum products
New York State Department of Environmental Conservation	6 NYCRR Part 373-3	Hazardous Waste Interim Status Authorization	NYD00073042	NA	Allows for accumulation and temporary storage onsite of mixed waste for greater than 90 days

[1] Permit held by EA Engineering.

TABLE 9.1-1 (CONTINUED)

ENVIRONMENTAL AUTHORIZATIONS FOR CURRENT OPERATIONS

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
New York State Department of Environmental Conservation	6 NYCRR Part 325	Pesticide Application Business Registration	79634	07/31/05	Pesticide application
State of Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68-202-206	Radioactive Shipment License	T-NY002-L04	Renewed Annually	Shipment of radioactive material to a licensed disposal/processing facility within Tennessee
South Carolina Department of Health and Environmental Control	SC ADC 61-83	South Carolina Radioactive Waste Transport Permit	0408-31-04-X	12/31/04	Transport of radioactive waste into South Carolina
Virginia Department of Emergency Management	9 VAC 20-110-121	Registration for Transport Radioactive Material	CE-043006	04/30/06	Registration to transport radioactive materials in Virginia
U.S. Department of Transportation	49 CFR Part 107, Subpart G	Certificate of Registration for Transportation of Hazardous Materials	070202001047KL	06/30/04	Transportation of hazardous materials
U.S. Nuclear Regulatory Commission	Atomic Energy Act (42 USC 2011 et seq.), 10 CFR 50.10	Facility Operating License	Unit 1 – DPR-63	08/22/09	License to operate a nuclear power plant
U.S. Nuclear Regulatory Commission	Atomic Energy Act (42 USC 2011 et seq.), 10 CFR 50.10	Facility Operating License	Unit 2- NPF-69	10/31/26	License to operate a nuclear power plant

TABLE 9.1-2

ENVIRONMENTAL AUTHORIZATIONS FOR LICENSE RENEWAL[1]

Agency	Authority	Requirement	Remarks
U.S. Nuclear Regulatory Commission	Atomic Energy Act (42 USC 2011 et seq.)	License renewal	Environmental report submitted in support of license renewal application
U.S. Fish and Wildlife Service	Endangered Species Act, Section 7 (16 USC 1536)	Consultation	Requires federal agency issuing a license to consult with FWS (see Appendix C to this ER)
New York State Department of State	Federal Coastal Zone Management Act (16 USC 1451 et seq.)	Certification	Requires an applicant to provide certification to the federal agency issuing the license that license renewal would be consistent with the federally approved state coastal zone management program; based on its review of the proposed activity, the State must concur with or object to the applicant's certification (see Appendix E to this ER)
New York State Office of Parks, Recreation, and Historic Preservation	National Historic Preservation Act, Section 106 (16 USC 470f)	Consultation	Requires federal agency issuing a license to consider cultural impacts and consult with State Historic Preservation Officer (see Appendix D to this ER)
New York State Department of Environmental Conservation	Clean Water Act, Section 401 (33 USC 1341)	Certification	Application submitted to NYSDEC using Joint Application for Permit form

[1] No renewal-related requirements identified for local or other agencies.

ER = environmental report

FWS = U.S. Fish and Wildlife Service

SPDES = State Pollutant Discharge Elimination System the requirement is applicable to renewal of federal licenses for activities not previously reviewed by the state [15 CFR 930.51(b)(1)]. The regulation requires that the license applicant provide its certification to the federal licensing agency and a copy to the applicable state agency [15 CFR 930.57(a)].

The NRC office of Nuclear Reactor Regulation has issued guidance to its staff regarding compliance with the Act. This guidance acknowledges that New York has an approved coastal zone management program (Ref. 9.1-1). NMP, located in Oswego County, is within the New York coastal zone. Concurrent with submitting the “Applicant’s Environmental Report – Operating License Renewal Stage,” to the NRC, NMPNS submitted a copy of the environmental report to the New York Department of State Coastal Zone Management Program in fulfillment of the regulatory requirement for submitting a copy of the coastal zone consistency certification to the appropriate state agency.

9.1.4 HISTORIC PRESERVATION

Section 106 of the National Historic Preservation Act (16 USC 470 et seq.) requires federal agencies having the authority to license any undertaking to, prior to issuing the license, take into account the effect of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. Council regulations provide for establishing an agreement with any State Historic Preservation Officer (SHPO) to substitute state review for Council review (36 CFR 800.2). Although not required by Federal law or NRC regulation, NMPNS has chosen to invite comment by the New York SHPO. Appendix D includes copies of NMPNS correspondence with the SHPO. Based on the NMPNS submittal and discussions, the SHPO concurred with the NMPNS conclusion that Nine Mile Point Units 1 & 2 license renewal would not affect known historic or archaeological properties.

9.1.5 WATER QUALITY (401) CERTIFICATION

Federal Clean Water Act, Section 401, requires an applicant for a federal license to conduct an activity that might result in a discharge into navigable waters to provide the licensing agency a certification from the state that the discharge will comply with applicable Clean Water Act requirements (33 USC 1341). The New York State Department of Environmental Conservation (NYSDEC) issued a Section 401 State Water Quality Certification for Nine Mile Point Unit 1 on April 9, 1974 (Ref. 9.1-2), and on February 23, 1977, for Unit 2 (Ref. 9.1-3). The NRC has indicated in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) that issuance of a National Pollutant Discharge Elimination System (NPDES) permit implies continued certification by the state (Ref. 9.1-4, page 4-4). The U.S. Environmental Protection Agency granted New York State authority to issue NPDES permits under its own program, the New York State Pollutant Discharge Elimination System (SPDES). NMPNS is applying to the NRC for a license renewal to continue NMP operations. Appendix B to this environmental report contains the SPDES permit that authorizes plant discharges at NMP. Consistent with the GEIS, NMPNS is providing the copy of its SPDES permit as evidence of state water quality (401) certification.

NYSDEC has taken the position (Ref. 9.1-5) that it will issue a new state water quality (401) certification in conjunction with the license renewal application, rather than relying on the SPDES permit as evidence of continued certification. To initiate the approval process, NMPNS filed the Joint Application for Permit with the NYSDEC for the water quality certification. Before NYSDEC can issue the water quality certification, it must satisfy the requirements of both the State Environmental Quality Review Act (SEQRA; 6 New York Code of Rules and Regulations Part 617) and the Uniform Procedures Act (6 NYCRR Part 621). The SEQRA process includes a Coastal Zone Consistency Review.

The most recent SPDES inspection at NMP, conducted by the NYSDEC in July 2002, found NMPNS to be in compliance with the permit. As identified in Table 9.1-1, the SPDES permit for discharges at NMP will expire on December 01, 2004. In accordance with SPDES regulations, NMPNS will file the SPDES permit renewal application at least 180 days prior to the current permit's expiration date.

9.2 FEASIBLE ALTERNATIVES

The coal- and gas-fired generation and purchase power alternatives that Section 7.2.2 discusses could be constructed and operated so as to comply with all applicable environmental quality standards. NMPNS notes that increasingly stringent air quality protection requirements could make construction of a large fossil-fuel-fired power plant infeasible in many locations.

Although construction and operation details for the purchase power alternative (see Section 7.2.2.1) are not known, it is reasonable to assume that any facility offering power for purchase would be in compliance.

9.3 REFERENCES

9.1-1 U.S. Nuclear Regulatory Commission. "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues." NRR Office Instruction LIC-203. Office of Nuclear Reactor Regulation. Washington, D.C. June 21, 2001.

9.1-2 Biggane, J. L. Commissioner, New York State Department of Environmental Conservation, Letter to R. C. Clancy, Manager, Environmental Engineering, Niagara Mohawk Power Corporation, dated April 9, 1974.

9.1-3 Garvey, W. L. Director, Bureau of Standards and Compliance, New York State Department of Environmental Conservation, Letter to J. M. Toennies, Director, Environmental Affairs, Niagara Mohawk Power Corporation, dated February 23, 1977.

9.1-4 U.S. Nuclear Regulatory Commission. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437. Office of Nuclear Regulatory Research. Washington, D.C. May 1996.

9.1-5 Memorandum from K. Merchant, New York State Department of Environmental Conservation, to NYSDEC RG&E Ginna Group, dated September 17, 2002.