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Acronyms and Abbreviations

%	percent
≤	less than or equal to
°F	degrees Fahrenheit
AC	alternating current
ACFB	atmospheric circulating fluidized bed
AEC	U.S. Atomic Energy Commission
AFW	auxiliary feedwater
AOCs	Areas of Concern
AOV	air-operated valve
AVT	all volatile treatment
BACT	best available control technology
Btu	British thermal unit(s)
Btu/hr	British thermal unit(s) per hour
CCW	component cooling water
CDF	core damage frequency
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CO_2	carbon dioxide
CT	combustion turbine
CWA	Clean Water Act
DC	direct current
DG	diesel generator
DOE	U.S. Department of Energy
DSM	demand-side management
EPA	U.S. Environmental Protection Agency
ER	environmental report
ESCo	energy service company
FES	Final Environmental Statement
FR	*Federal Register*
FTR	failure to run
FTS	failure to start
F-V	Fussell-Vesely
FWS	U.S. Fish and Wildlife Service

Acronyms and Abbreviations (continued)

GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants*
GLWQA	Great Lakes Water Quality Agreement
gpm	gallons per minute
GWh	gigawatt hour(s)
hp	horsepower
HRSG	heat recovery steam generator
IPE	Individual Plant Examination
ISLOCA	Interfacing System Loss-of-coolant Accident
JTU	Jackson Turbidity Unit(s)
kV	kilovolt(s)
kWh	kilowatt hour(s)
LAER	lowest achievable emission rate
lb/MMBtu	pound(s) per million British thermal units
LERF	large early release frequency
LOCA	loss-of-coolant accident
LOS	level of service
LSE	load-serving entity
m^2	square meter(s)
mA	milliampere(s)
MACCS	Melcor Accident Consequences Code System
MCWA	Monroe County Water Authority
mg/l	milligrams per liter
mgd	million gallons per day
MOV	motor-operated valve
msl	mean sea level
MW	megawatt(s)
MWC	Montezuma Wetlands Complex
MW(e)	megawatts (electric)
MW(t)	megawatts (thermal)
NA	not available; not applicable
NAAQS	national ambient air quality standards
NEPA	National Environmental Policy Act
NESC®	National Electric Safety Code®
NMFS	National Marine Fisheries Service

Acronyms and Abbreviations (continued)

No.	issue number
NO_2	nitrogen dioxide
NO_x	nitrogen oxide(s)
NOAA	National Oceanic & Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NSPS	new source performance standard(s)
NTU	Nephlometric Turbidity Unit(s)
NYCA	New York Control Area
NYISO	New York Independent System Operator
NYS	New York State
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
OLER	Operating License Environmental Report
PM	particulate matter
PM_{10}	particulates less than 10 microns in diameter
PORV	power-operated relief valve
ppm	parts per million
PSA	probabilistic safety assessment
PSD	prevention of significant deterioration
psi	pounds per square inch
PWR	pressurized water reactor
RAW	Risk Achievement Worth
RCS	reactor coolant system
Ref.	Reference
RG&E	Rochester Gas and Electric Corporation
RGS	RGS Energy Group, Inc.
RHR	risidual heat removal
ROW	right(s)-of-way
RWST	refueling water storage tank

Acronyms and Abbreviations (continued)

SAFW	standby auxiliary feedwater pump (if this was deleted)
SAMA	severe accident mitigation alternative
SBC	system benefits charge
SBO	station blackout
scf	standard cubic foot/feet
SHPO	State Historic Preservation Officer
SI	safety injection
SIP	state implementation plan
SMITTR	surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping
SO_2	sulfur dioxide
SPDES	State Pollution Discharge Elimination System
SW	service water
TDSA	Tribal Designated Statistical Area
UFSAR	Updated Final Safety Analysis Report
USACE	U.S. Army Corps of Engineers
V	volt
VCT	volume control tank
yr	year

1.0 INTRODUCTION

1.1 Purpose of and Need for Action

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act of 1954, as amended, and NRC implementing regulations. Rochester Gas and Electric Corporation (RG&E) operates the R. E. Ginna Nuclear Power Plant (Ginna Station) pursuant to NRC Operating License DPR-18, which will expire September 18, 2009. Ginna Station received a provisional operating license on September 19, 1969, and a full-term operating license on December 10, 1984.

RG&E has prepared this environmental report for submittal in conjunction with its application to the NRC to renew the Ginna Station operating license, as provided 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); and
- Title 10, Energy, CFR, Part 51, "Environmental Protection Requirements for Domestic Licensing and Related Regulatory Functions," Section 51.53, "Postconstruction Environmental Reports," Subsection 51.53(c), "Operating License Renewal Stage" [10 CFR 51.53(c)].

The NRC has defined the purpose and need for the proposed action, the renewal of the operating licenses for nuclear power plants such as Ginna Station, as follows:

> ...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... (Ref. 1.1-1)

The renewed operating license would allow for an additional 20 years of plant operation beyond the current Ginna Station licensed operating period of 40 years.

1.2 Environmental Report Scope and Methodology

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." This appendix to the Ginna Station license renewal application fulfills that requirement. In determining what information to include in the Ginna Station environmental report, RG&E has relied on NRC regulations and the following supporting documents that provide additional insight into the regulatory requirements:

- NRC supplemental information in the *Federal Register*: Vol. 61, pages 28467-28497 (Ref. 1.1-1); Vol. 61, pages 39555-39556 (Ref. 1.2-1); Vol. 61, pages 66537-66554 (Ref. 1.2-2); and Vol. 64, pages 48496-48507 (Ref. 1.2-3)
- *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (Ref. 1.2-4; Ref. 1.2-5)
- *Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses* (Ref. 1.2-6)
- *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. 1.2-7)
- *Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses* (Ref. 1.2-8)

RG&E has prepared Table 1.2-1 to verify conformance with regulatory requirements. Table 1.2-1 indicates where the environmental report responds to each requirement of 10 CFR 51.53(c). In addition, each responsive section in the report is prefaced by a boxed quote of the regulatory language and applicable supporting document language.

Table 1.2-1
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	7.3	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	Alternatives to the Proposed Action
	8.0	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	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.2	Mitigation
	7.3	Environmental Impacts of Alternatives
	8.0	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	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.3	Unavoidable Adverse Impacts
10 CFR 51.53(c)(3)(ii)(A)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(B)	4.2	Intake System Impacts
	4.3	Heat Shock
10 CFR 51.53(c)(3)(ii)(C)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(D)	4.1	Introduction
10 CFR 51.53(c)(3)(ii)(E)	4.4	Impacts of Refurbishment on Terrestrial Resources
	4.5	Threatened or Endangered Species
10 CFR 51.53(c)(3)(ii)(F)	4.6	Air Quality During Refurbishment (Nonattainment Areas)
10 CFR 51.53(c)(3)(ii)(G)	4.15	Impact on Public Health of Microbiological Organisms
10 CFR 51.53(c)(3)(ii)(H)	4.7	Electric Shock from Transmission Line-induced Currents

Table 1.2-1 (continued)
Environmental Report Responses to License Renewal
Environmental Regulatory Requirements

Regulatory Requirement	Responsive Environmental Report Section(s)	
10 CFR 51.53(c)(3)(ii)(l)	4.8	Housing Impacts
	4.9	Public Utilities: Public Water Supply Availability
	4.10	Education Impacts from Refurbishment
	4.11	Offsite Land Use
10 CFR 51.53(c)(3)(ii)(J)	4.12	Transportation
10 CFR 51.53(c)(3)(ii)(K)	4.13	Historic and Archaeological Resources
10 CFR 51.53(c)(3)(ii)(L)	4.14	Severe Accident Mitigation Alternatives
10 CFR 51.53(c)(3)(iii)	4.0	Environmental Consequences of the Proposed Action and Mitigating Actions
	6.2	Mitigation
10 CFR 51.53(c)(3)(iv)	5.0	Assessment of New and Significant Information
10 CFR 51, Appendix B, Table B-1, Footnote 6	2.7.3	Minority and Low-income Populations
	4.16	Environmental Justice

1.3 R.E. Ginna Nuclear Power Plant Licensee and Ownership

RG&E is currently the sole owner and licensed operator of Ginna Station. RG&E is a New York corporation engaged principally in the generation of electricity and the purchase, transmission, distribution, and sale of electric power and natural gas in western New York State. RG&E is a wholly owned subsidiary of Energy East, a super-regional energy services and delivery company with operations in New York, Connecticut, Massachusetts, Maine, and New Hampshire.

1.4 References

Ref. 1.1-1 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.

Ref. 1.2-1 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.

Ref. 1.2-2 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.

Ref. 1.2-3 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): 48496-507.

Ref. 1.2-4 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.

Ref. 1.2-5 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.

Ref. 1.2-6 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.

Ref. 1.2-7 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.

Ref. 1.2-8 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.

2.0 SITE AND ENVIRONMENTAL INTERFACES

2.1 Site Location and Environmental Setting

The R.E. Ginna Nuclear Power Plant (Ginna Station) site is in the town of Ontario, in the northwest corner of Wayne County, New York, on the south shore of Lake Ontario. The site is about 20 miles east of the center of the City of Rochester and 40 miles west-southwest of Oswego. Lake Road (County Route 101) provides road access to the plant and borders the site in an east-west direction approximately 1,700 feet south of the Station. Figures 2.1-1 and 2.1-2 show the site location and features within 50 and 6 miles, respectively. The surface of the land on the southern shore of Lake Ontario, at the site and east and west, is either flat or gently rolling. It increases in elevation to the south, from about 255 feet above mean sea level (msl) near the edge of the Lake; to 440 feet at Ridge Road [New York State (NYS) Route 104], 3.5 miles south of the Lake; and then to about 1,600 feet at the northern edge of the Appalachian Plateau, 30 to 40 miles to the south. Southward from NYS Route 104 the terrain progressively roughens, with a series of small abrupt hills commencing about 10 miles south of the site.

The site is owned by Rochester Gas and Electric Corporation (RG&E) and has increased from 338 acres at the time of preparation of the Ginna Station Operating License Environmental Report (OLER) (Ref. 2.1-1) to the current size of 488 acres. Correspondingly, the shoreline extent has increased from about one mile to 1.5 miles. Surface water features on site are limited to Mill Creek, which enters the site from the south, and Deer Creek, which enters the site from the west. These two creeks join southwest of the plant and empty into Lake Ontario just east of the plant. The general plant area is relatively well drained, with no topographic basins or swampy areas on the site. All drainage, both on surface and subsurface, ultimately proceeds toward the Lake. Figure 2.1-3 shows the site and its relationships to topographic features.

Approximately one half of the 488-acre site is leased and currently being used for agricultural production, primarily apple orchards and, to a lesser degree, corn and hay fields. Another 25 percent of the site has been left relatively undisturbed, having a combination of open fields, shrub brush, and trees. The remaining quarter of the site has been developed for the power station and ancillary facilities, with about 25 acres enclosed within the security fences. There are three occupied farm homes on the Ginna Station site, one of which has an occupied out-parcel. They are owned by RG&E and the occupants have leases that are renewable annually at the option of the Company. Two of the houses are located 4,100 feet and 2,900 feet, respectively, southwest of the plant, while the third, with its associated out-parcel, are about 2,300 feet and 1,900 feet southeast of the plant, respectively. All are located beyond the exclusion area boundary. Unoccupied buildings owned by RG&E include the Manor House (an employee meeting facility) and garage, about 900 feet east of the plant, horse barns (used for storage) about 1,500 feet south of the plant,

Figure 2.1-1
50-Mile Region

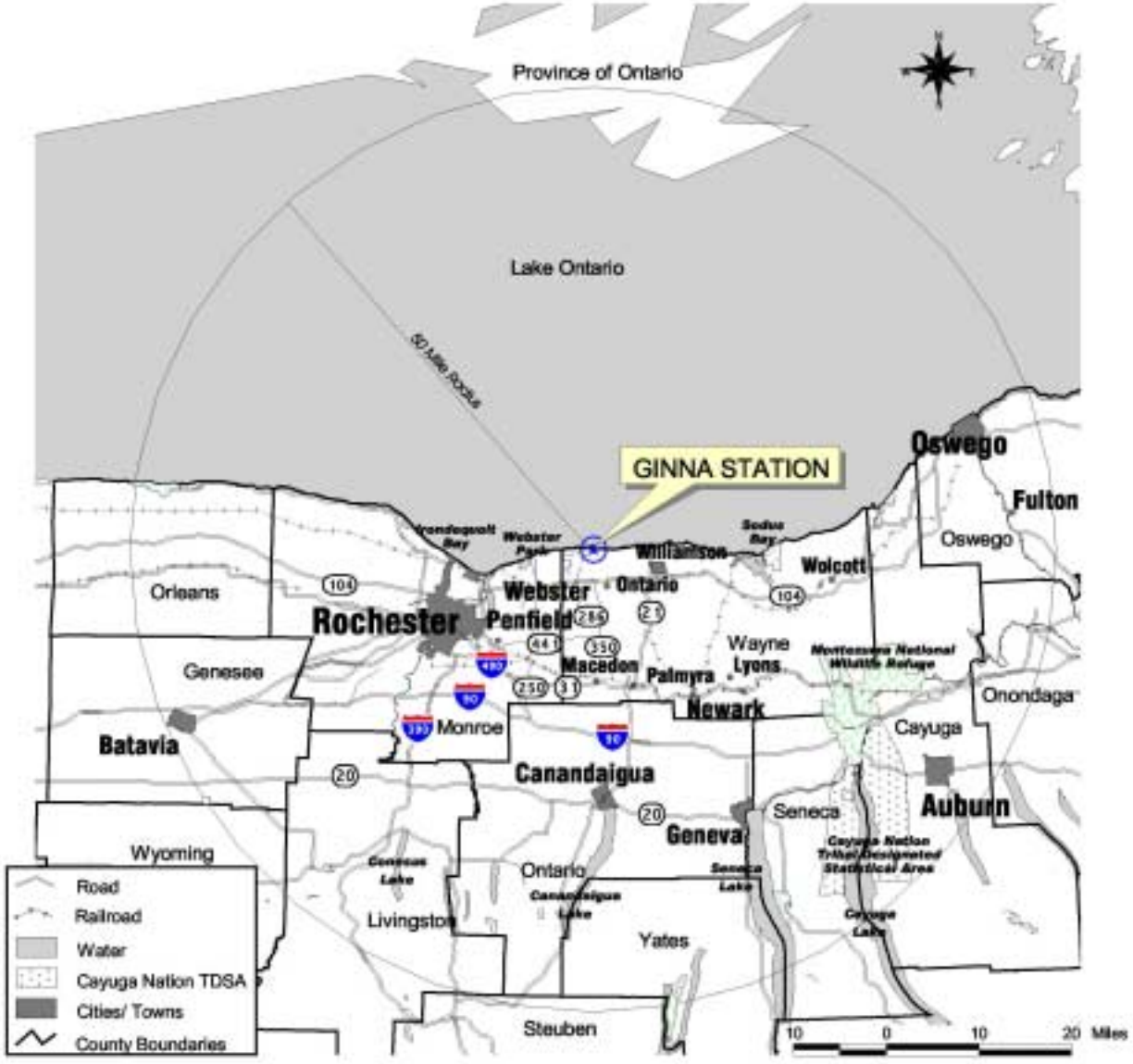
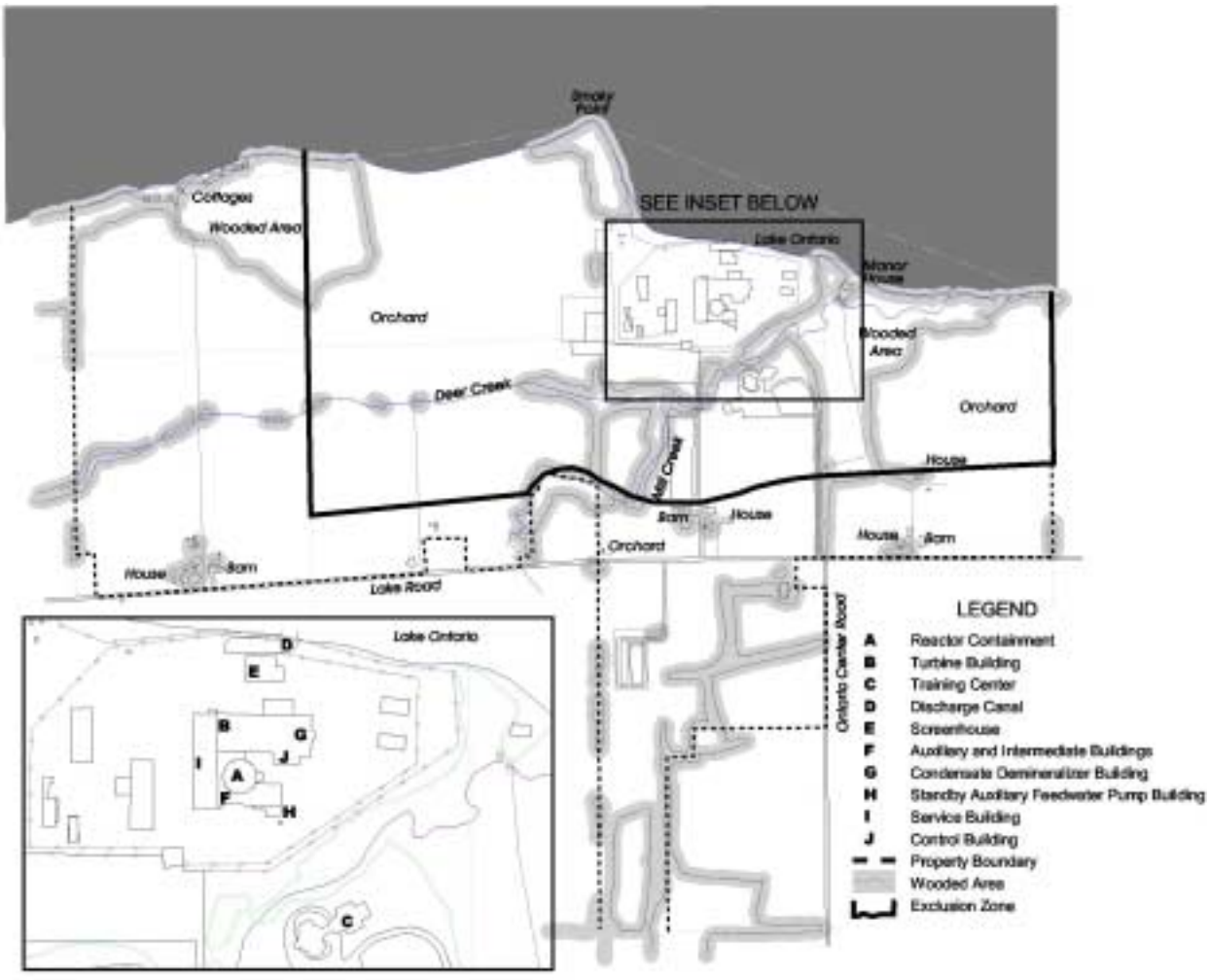


Figure 2.1-2
6-Mile Region

Figure 2.1-3
Site Map



and a house structure (used as a fitness for duty center) about 1,600 feet south of the plant.

While there are currently no plans for further development on the site, additional security features are being added at this time, primarily along the perimeter of the plant area. The addition of these security features are unrelated to and independent license renewal.

The following excerpt from the Ginna OLER in 1972 (Ref. 2.1-1) describes the conscious effort put forth to minimize the aesthetic impacts of the plant upon this rural setting:

> ...careful planning ... went into the design and construction of this plant in order to make the most discreet use of the site and its natural resources. Meetings were held, as early as four years prior to the plant's construction, with town officials, members of the local school board and land owners adjacent to the site. Many people were apprised of RG&E's intentions and assured that every effort would be made to preserve the natural beauty of the site. Several revisions were made in the plant's initial plans to preserve the orchards, grazing lands, and farm buildings which were part of the area's pastural heritage.
>
> To the casual passerby the visible structures do not appear to be a power plant. Ginna Station is the first of several stackless nuclear plants. The dome of the reactor building, which dominates many such facilities, is concealed by a facade blended into the architectural design of the structure. The color scheme of the outside of all buildings is a blend of green and blue to tie in with nature's own green terrain and the blue of the lake. ... Thus, the aesthetic impact of the Ginna plant is kept to a bare minimum. Maximum concern was focused by RG&E on preserving as much as possible of the original agricultural characteristic of this site. When originally acquired in 1958 the property contained three farm houses and two barns which have been preserved in their original locations by the Company. Several acres of mature forest trees dominate the area and most of the site. These trees are maintained by the Company in their original condition.

The following photograph shows the plant and site as they are today. From this photo it is evident that RG&E has continued to preserve the aesthetics of the site, as described in the 1972 environmental report.

The immediate area around the site is rural. There are no substantial population centers, industrial complexes, airports, transportation arteries, or parks within a 3-mile radius of the Ginna Station site, and the only recreational facility within this radius is the Bear Creek boat launch (about 1.5 miles from the site). The largest community within 10 miles of the site is Webster, located in Monroe County approximately 7 miles west-southwest, with a town population of 37,926 and a village population of 5,216 (Ref. 2.1-2). The largest metropolitan area within 50 miles is Rochester, approximately 17.5 miles west of the site, with a population of 219,773 (Ref. 2.1-2).

Webster Park, a 550-acre Monroe County park on the south shore of Lake Ontario, is approximately six miles west of the site. Facilities include a fishing pier, campground, day use shelters, lodges and cabins, picnic areas, tennis courts, baseball and soccer fields, hiking, and cross-country ski trails (Ref. 2.1-3). Approximately 35 miles from the Ginna property, in southeastern Wayne County along the border with Cayuga and Seneca Counties, is the Montezuma Wetlands Complex (MWC). The 36,000-acre complex includes the federally owned Montezuma National Wildlife Refuge, state-owned Northern Montezuma Wildlife Management Area, lands owned by conservation groups, and private property (Ref. 2.1-4). The area contains marshes and impoundments, forested wetlands, old fields, meadows, farm fields, and woodlands (Ref. 2.1-4).

There are two major federal projects planned in the area. In November 2001, the U.S. Congress approved spending for the Port of Rochester Harbor and Ferry Terminal project. The Port of Rochester is located approximately 15 miles west of the site. According to Congresswoman Louise Slaughter, who secured the funding in the U.S. House of Representatives, the monies will be spent for harbor and port construction and to pay for a portion of the terminal services for the ferry service and cruise and excursion services (Ref. 2.1-5). Congress also approved spending money on the planned Center of Excellence in Photonics and Optoelectronics Rochester. The Center will be located in the City of Rochester. The Center will combine federal, state, and private monies and will focus on developing technology transfer and pilot fabrication facilities for imaging and communications devices that can be shared between Center partners (including Kodak, Xerox, Corning, University of Rochester, and Rochester Institute of Technology) (Ref. 2.1-6).

2.2 Aquatic and Riparian Communities

The Ginna Station site comprises 488 acres located on the southern shore of Lake Ontario, including about 1.5 miles of shoreline. The surface of the land, at the site and east and west of it, is either flat or gently rolling and slopes towards the Lake. Mill Creek (Wayne County) enters the site from the south and Deer Creek enters the site from the west. These two creeks merge at a point southwest of the plant, then turn east, passing south of the plant and north of the Ginna Station Training Center, and empty into the Lake near the northeastern corner of the site. Mill Creek drains an area of approximately 15 square miles and flows almost directly north for nine miles to its confluence with Deer Creek (see Figure 2.1-2). Mill Creek has a continuous yield. At a culvert on Lake Road, 0.8 miles above its mouth, measured recorded flow was 0.04 cubic feet per second. The base flow consisted of discharge entering the stream channel from groundwater or other delayed sources. Deer Creek is a wet-weather stream that dries up during the summer months west of the site (Ref. 2.1-1, Section 2.5).

Lake Ontario is the smallest of the Great Lakes and measures approximately 190 miles long by 50 miles wide. It has a surface area of 7,340 square miles. The maximum depth is 802 feet. Its mean depth, 283 feet, is greater than that of the other Great Lakes, except Superior, and it is the eleventh largest lake in the world in volume. The mean surface elevation of Lake Ontario is about 246 feet above sea level. Depths of 40 to 100 feet occur within one to two miles off the United States shoreline in the site area. The major source of water, approximately 86 percent, to Lake Ontario is the outflow from Lake Erie via the Niagara River, located about 90 miles to the west of Ginna Station. The outflow from Lake Ontario is via the St. Lawrence River, about 60 miles east of Ginna Station, to the Atlantic Ocean. The predominant surface currents along Lake Ontario's southern shoreline are from west to east, and they tend to swing toward the south shore. This water movement would be expected due to the effect of prevailing winds and the Earth's rotation (Ref. 2.1-1).

The lake bottom off the Ginna Station is characterized by the presence of exposed bedrock in the form of a series of shelves with the long axis lying east-west. While this lake bottom has an overall fairly even slope of about 1:100, numerous irregularities are found scattered throughout this area, such as hollows three to four feet in depth, or areas of mixed boulder and cobble. These irregularities provide potential areas of inhabitation and refuge for fish and invertebrates.

In the near shore area, the overburden is predominantly smaller cobble and rubble, with the size of the material gradually increasing with depth into boulder-sized rocks. Further lakeward there is a general tendency for the flat bedrock to be exposed. Frequently, a thin layer of fine sediment will cover the bottom substrates.

Stable beds of cobble or boulders, and areas of exposed bedrock, are substrates that provide good habitat for the growth of *Cladophora*, which is the principal periphyton of the Lake and grows profusely in the area. Historically, *Cladophora* growth was generally limited to lake bottom depths of 20 feet or less, due to poor

water clarity and associated light limitations. With increased water clarity in recent years, however, *Cladophora* growth at depths up to 30 feet have been reported (Ref. 2.2-6).

To the west of the plant, Smoky Point juts out into the Lake for about 1,000 feet. The strong long-shore current carries suspended material around the tip of Smoky Point, where it gradually settles out as a long, tongue-shaped area extending eastward for almost 5,000 feet. This area of deposition lies at a depth of between 10 to 15 feet and curves shoreward beginning about 1,000 feet east of the point and then stretches eastward.

The shoreline of Lake Ontario, within the Ginna Station protected area, is covered by a revetment composed of large stones. The revetment was originally designed to provide surge flooding protection. The revetment has not been extended beyond the existing surge flood protection zone due primarily to a lack of need and the great expense associated with the installation of this type of large stone protection. RG&E notes that erosion is occurring both east and west of the protected area. Some shore erosion occurs east and west of the revetment, but does not affect the surge flood protection.

The water quality of Lake Ontario has changed dramatically since the Ginna Station OLER was submitted in 1972 (Ref. 2.1-1, Section 2.5). After years of environmental stresses such as overfishing, cultural eutrophication, and contaminant discharges resulting in degradation of water quality, loss of habitat, and depreciation of fish communities, two significant environmental legislative actions took place that reversed the downward water quality trends in Lake Ontario and throughout the Great Lakes in general.

The first was the Federal Water Pollution Control Act of 1972, and its 1977 amendments, known as the Clean Water Act (CWA). This legislation established the National Pollution Discharge Elimination System (NPDES) permitting program, and its subsequent implementation by New York State as the State Pollution Discharge Elimination System (SPDES) permitting program. This was the first comprehensive federal action to manage point-source pollution and the water quality of the Nation's waterbodies by authorizing water discharge permits, including numerical limits on pollutants of concern. Ginna Station's first SPDES Permit was issued in 1975, and has been subsequently renewed, per SPDES regulations, up to the current permit, which expires February 2003.

Second, under the auspices of the International Joint Commission, the Great Lakes Water Quality Agreement (GLWQA) was first signed by the U.S. and Canada in 1972, as a commitment by each country to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin ecosystem. The GLWQA includes a number of objectives and guidelines to achieve numeric water quality goals for the Great Lakes. A recent review of the Specific Objectives within Annex 1 of the GLWQA has indicated that many of the goals for organic persistent toxics are currently being met (Ref. 2.2-2). Data from the Rochester area (Ref. 2.2-3) show

that the Specific Objectives for inorganic persistent toxic substances (i.e., metals) are also being met.

To control critical pollutants, the GLWQA further included the development and implementation of localized remedial action plans for Areas of Concern (AOCs) and lakewide management plans. The identification of AOCs initiated a shift towards localized pollutant problem areas, recognizing improvements in lakewide water quality. Three AOCs are located on the New York side of Lake Ontario, with the two nearest to Ginna Station being the Rochester Embayment (about 20 miles to the west) and Oswego River and Harbor (about 40 miles to the east).

These water quality initiatives have been very successful in reducing the input and lowering Lake concentrations of such important parameters as nutrients (primarily phosphorus) and persistent toxic chemicals. The phosphorus levels in mid-lake were at 16.7 milligrams/liter (mg/l) in 1969, and were found to be below 10 mg/l in 1993 (Ref. 2.2-4). In 2001, representative Lake Ontario phosphorus levels were considered to be 4.79 mg/l (Ref. 2.2-2). Similarly, very substantial reductions in organic persistent toxins within Lake Ontario fish have been reported by the New York State Department of Environmental Conservation (NYSDEC) (Ref. 2.2-5). Concurrent with these improvements in water quality, there has also been a profound increase in water clarity as well from 1988 to 1993 (Ref. 2.2-4).

Table 2.2-1 provides certain water quality information from the time of the Ginna Station OLER (Ref. 2.1-1, Section 2.5), and recent data collected near Rochester at RG&E's Russell Station and the Monroe County Water Authority's intake, both of which are 20 miles west of Ginna Station on Lake Ontario. This table clearly shows the reduction in phosphorus levels discussed above. In addition, substantial reductions in turbidity are also evident, supporting the general consensus that water clarity has improved dramatically. While the turbidity values were reported in different units in 1971 and 2000, Nephlometric Turbidity Units (NTU, 2000) and Jackson Turbidity Units (JTU, 1971) are roughly equivalent. The eutrophic conditions of the Lake near Ginna Station at the time of initial operation were apparent, as described in the OLER (Ref. 2.1-1, Section 2.7.1), by the emphasis placed on the algae *Cladophora*, both in terms of the heavy *Cladophora* growth that was found in benthic surveys and the decomposing masses that would collect along the shoreline. Most telling, however, are the references to the fact that such algae growth was limited to water depths of 20 feet or less due to high Lake turbidity at that time (Ref. 2.1-1, Appendix E, page D2-1). While no recent benthic surveys have been conducted in the Ginna Station area, and masses of algae still occasionally wash ashore, it is known that in Lake Ontario the lake bottom can now be seen through 30-foot-deep water (Ref. 2.2-6). This increased water clarity allows *Cladophora* growth to now extend out to water depths of 30 feet or more.

Changes in the water quality (i.e., nutrient levels) of Lake Ontario are a prime contributor to significant changes in the biological communities of the Lake as well,

Table 2.2-1
Comparison of Lake Ontario Water Quality 2000 and 1971[a]

	MCWA[b] 2000	Ginna Station[c] 1971	Russell Station[d] 1971
Alkalinity	83	88	91
Total Hardness	125	134	129
pH (units)	7.6	8.3	8.2
Total Dissolved Solids	160	311	201
Nitrates	0.34	0.30	0.46
Phosphorus	0.00479[d]	0.42	0.03
Turbidity	0.09 (NTU)	5 (JTU)	9 (JTU)
Sulfates	28	11	10.3
Chlorides	22	30	33
Calcium	36	43	37.6
Copper	Not Detectable	0.011	0.013
Iron	Not Detectable	0.040	0.120
Magnesium	8.8	6	9
Sodium	12	14	13

a. All values milligrams per liter unless otherwise noted.
b. Ref. 2.2-3 (unless otherwise noted).
c. Ref. 2.1-1, Table 2.5-1.
d. Ref. 2.2-2.
JTU = Jackson Turbidity Units
MCWA = Monroe County Water Authority
NTU = Nephlometric Turbidity Units

since nutrient supply is the basis for overall productivity (Ref. 2.2-1). The Great Lakes Fishery Commission stated, "... the overall productivity of the Great Lakes appeared to be declining due to reduced inputs of nutrients. Reduced productivity translated to reduced catches" (Ref. 2.2-7). However, a number of other factors—such as the salmonid stocking program, the introduction of non-native invasive aquatic species, on-going anthropogenic impacts, and natural climatic variabilities—have also been major contributors to substantially altering the water quality and ecological communities within Lake Ontario over the past 25 to 30 years. The synergy of these factors has caused the state of relatively reduced productivity that currently exists in the Lake. This is supported by researchers who have suggested that Lake Ontario ecosystem management over the past three decades has resulted in oligotrophication of the Lake, i.e., the reverse of euthrophication (Ref. 2.2-8).

The Lake Ontario fish community existing at the time of initial Ginna Station operation, in the early-1970s, reflected the tumultuous changes to the fishery over the previous 150 years. Between the mid-1800s and the early-1970s, populations of top predatory species such as lake sturgeon (*Acipenser fulvescens*), atlantic salmon (*Salmon salar*), lake trout (*Salvelinus namaycush*), lake herring (*Coregonus artedii*), burbot (*Lota lota*), and deepwater ciscoes (*Coregonus johannae*) had all collapsed. This is attributed to such factors as overfishing, invasion of sea lamprey (*Petromyzon marinus*), habitat loss, and degraded water quality or eutrophication. The open lake fish community in 1970 was dominated by planktivores such as alewife (*Alosa pseudoharengus*) and smelt (*Osmerus mordax*) due to the lack of large predatory species. Annual alewife die-offs were common at that time, which contributed to the impaired conditions of the Lake and shoreline. In addition, the productive conditions near shore supported large numbers of warmwater gamefish and their prey. In the mid-1970s New York State and the Province of Ontario instituted a salmonid stocking program, of up to 8 million fish per year, aimed at utilizing the extensive forage base of alewife and smelt. For the next 20 years this program was very successful by both developing a world-class sport fishery on Lake Ontario as well as controlling the forage base population.

By the early 1990s, a number of factors came together to again drastically shift this ecosystem. The alewife population, facing strong ecological pressures, showed increased signs of stress and possible collapse. Paramount to this stress was the heavy predatory pressure exerted by the ever-increasing salmonid stocking program, to the point that concerns were raised that predatory demand was higher than could be supported by available prey (Ref. 2.2-4). In response to this concern, Canadian and U.S. fisheries managers proposed to reduce salmonid stocking by nearly 50 percent. As water quality improved and nutrients decreased, less phytoplankton were produced, resulting in reduced zooplankton populations, and thus reduced food supply for alewives. Another problem for alewives exists in their susceptibility to harsh weather conditions, in that they historically have die-offs following colder winters. This susceptibility becomes even more acute as food supplies dwindle, resulting in deteriorating condition factors (such as weight) and overall health.

Beginning in 1993, salmonid stocking was reduced substantially (Ref. 2.2-4) and in recent years has been at a level of 6 million fish (Ref. 2.2-9; Ref. 2.2-10). Concurrently, the alewife population has maintained itself, albeit at all-time low levels, since the reduced salmonid stocking was initiated and, in fact, the alewife population has increased in number in recent years (Ref. 2.2-11).

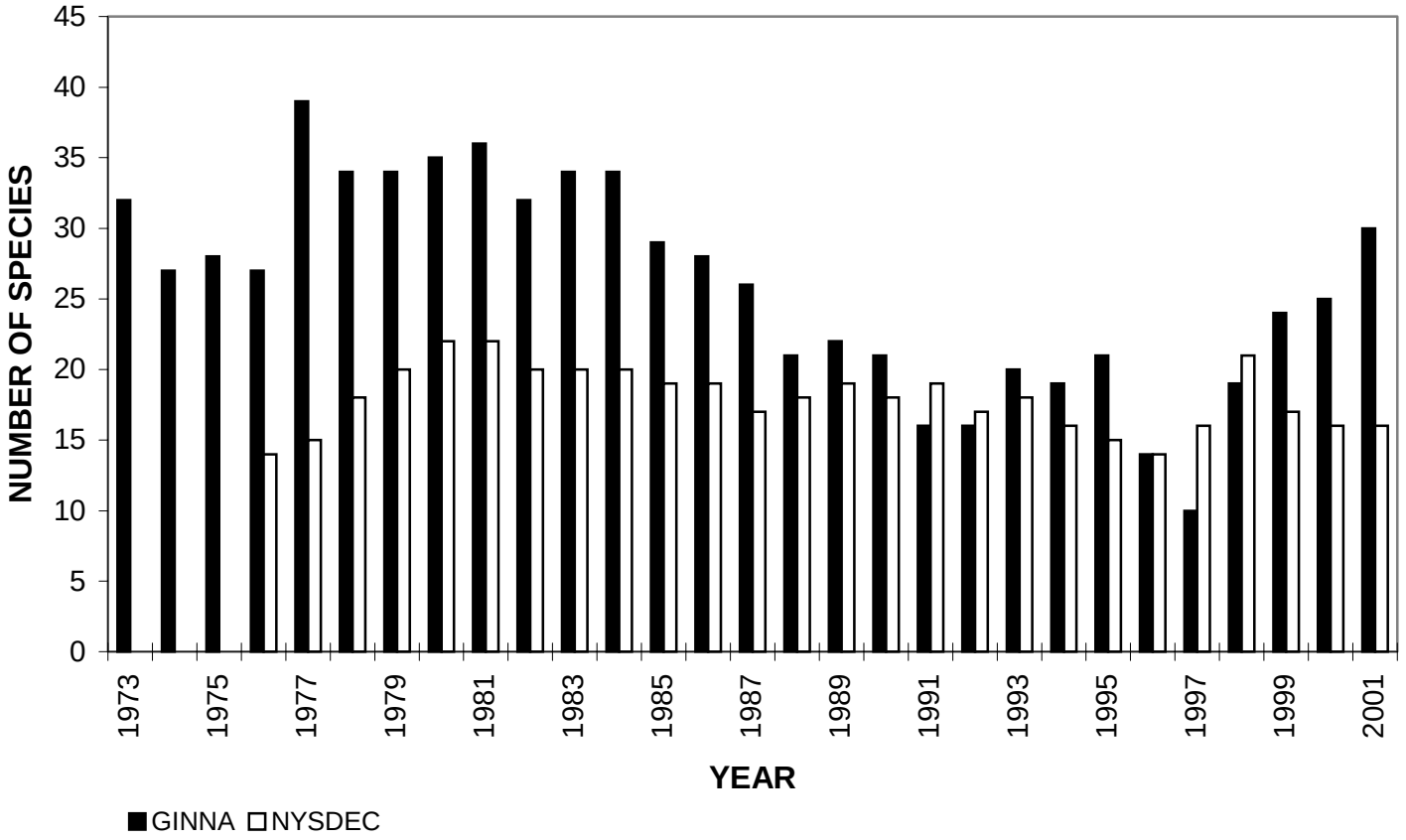
While the combination of extreme predatory pressure from salmonids, reduced food supply, and susceptibility to cold winters put the alewife population at risk, the invasion of the exotic species *Driessena spp*. (zebra and quagga mussels) contributed further impacts upon the ecosystem. As efficient filter feeders, driessenids reduced already impacted phytoplankton populations and removed other particles from the water column as well. Gaining nourishment from the algae and coagulating and depositing other water-borne detrital material on the lake bottom in the form of pseudofeces, driessenids have been credited with increasing the water clarity, or at least speeding up the results of reduced phytoplankton numbers. With driessenid numbers of greater than 20,000 per square meter often found on the bottom throughout the Lake, and filtering rates of 1 to 2 liters per day per mussel, the impact of these species has to be significant. Obvious ecological changes include the removal of organic material from the water column and deposition on the lake bottom, thus transferring production from the pelagic to the benthic communities. Driessenid impacts on benthic communities, however, are not yet understood (Ref. 2.2-12). Other exotic species have recently invaded Lake Ontario as well, although to date, none are credited with having impacts comparable to driessenids. These include the relatively large zooplankters *Cercopagis pengoi* and *Bythrotrephes cederstroemi*, commonly called the fish hook water flea and spiny water flea, respectively. While their ecological impacts may not be currently defined, the fish hook water flea has gained a reputation as a nuisance due to its tendency to clump and foul fishing lines. At Ginna Station, it has occasionally been found within various strainers of the cooling water system, but has not posed any particular operational problems. At the fishery level, while the round goby (*Neogobius melonostomus*) has been reported on occasion within Lake Ontario (Ref. 2.2-13), it is not yet routinely found, and has not been collected in the Ginna Station impingement sampling.

While the alewife and salmonid fisheries routinely dominate the Lake fishery status, trends in other species have been affected as well. One of the primary data sets available to provide insight on this is that of the Ginna Station Impingement Program (Ref. 2.2-14; Ref. 2.2-15). The Ginna Station Impingement Program has been conducted at regular intervals throughout each year since its inception in 1973. While the primary purpose of this program is to assess impingement impacts, especially upon alewife and smelt Lake populations, it also provides a valuable monitoring tool of the fishery community in the area of the Lake near Ginna Station. The Ginna Station Impingement Program's nearly 30-year monitoring data record is one of the longest consistent fishery databases on the Great Lakes. Another data set available is the warm water fishery assessment conducted by the NYSDEC in the eastern basin of Lake Ontario (Ref. 2.2-16). These two data sets were reviewed with respect to two biological indices regarding the overall status of the Lake Ontario

fishery: number of species and abundance (see Figures 2.2-1 and 2.2-2). With respect to number of species, the Ginna Station data show 30-35 species per year during the mid-1970s to mid-1980s, followed by a decline into the teens over the next ten- to twelve-year period [with the minimum number (10 species) found during 1997], and then an apparent rebound since 1997, up to 30 species in 2001 (Ref. 2.2-14; Ref. 2.2-15). The NYSDEC data, although not as dramatic, also show peak number of species to be found in the early-1980s, followed by a decrease in numbers during the mid-1990s and into recent years (Ref. 2.2-16). Concerning abundance, the Ginna Station data show relatively high numbers impinged during the mid-1970s (reflecting the large populations of alewives and smelt in the Lake at that time) followed by an overall continual decline in numbers over the years to the present (Ref. 2.2-15). Again, while not as extreme, the NYSDEC data show the continual decline in fish numbers from 1976 through 2001 (Ref. 2.2-16). These two data sets, used to gain an overview perspective of the Lake ecosystem, clearly demonstrate that productivity in Lake Ontario has decreased since the mid-1970s.

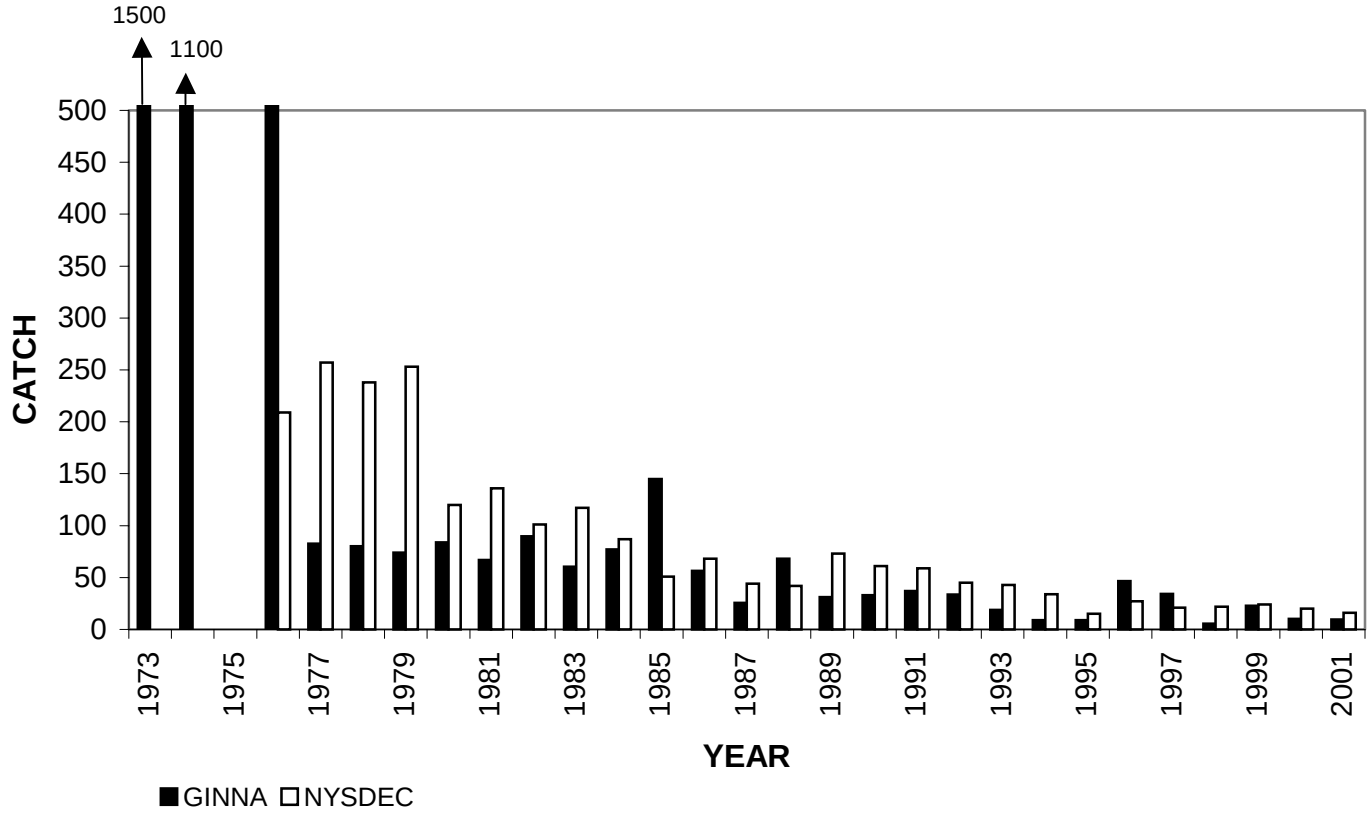
Ichthyoplankton (fish eggs and larvae) studies, conducted at the Ginna Station site in 1977 and 1978, characterize the site with respect to utilization of the Lake Ontario shoreline adjacent to the Ginna Station site for fish spawning and as a nursery area (Ref. 2.2-17; Ref. 2.2-18). More than 90 percent of the fish larvae found during both years were alewives. Also found both years, in the 1 percent to 5 percent range, were carp/goldfish (*Cyprinus carpio/Carrassius aurtus*), smelt, and johnny darters (*Etheostoma nigrum*). All of these species are common components of the local fish community, and typical of the fish communities found along the nearshore areas of Lake Ontario's southern shoreline. Conversely, there were no indications that the Ginna Station site area was unique to, or preferred by, any species with respect to spawning or nursery areas or both. Likewise, no threatened or endangered species were found in these studies. Ginna Station is not adjacent to any significant bays or other habitat features that may provide unique or important spawning or nursery areas. Studies conducted within Lake Ontario near Chaumont, Sodus, and Irondequoit Bays, during 1997 and 1998, show that alewife continues to dominate the ichthyoplankton population (Ref. 2.2-19), and that alewives' spawning locations are ubiquitous. Of particular interest given the dramatic reduction in productivity within the Lake is the fact that alewife larval densities found in both the late-1970s and the late-1990s were within the same order of magnitude. Further, these recent studies found similar species to those collected at Ginna Station in the 1970s, and generally support the previously stated conclusions concerning the spawning, nursery, and habitat conditions of the Ginna Station site.

Figure 2.2-1
Species Diversity Per Year, 1973–2001



Source: Ref. 2.2-14, Ref. 2.2-15, Ref. 2.2-16.

Figure 2.2-2
Fish Abundance Per Year, 1973–2001



Source: Ref. 2.2-14, Ref. 2.2-15, Ref. 2.2-16.

2.3 Groundwater Resources

Ginna Station does not use groundwater as a resource for any plant operations or as potable water resource. The water table at the Ginna Station site generally occurs in the overburden soils over most of the site, but lies beneath the rock surface in part of the southeastern sector where the bedrock surface rises. The mean low water elevation of the surface of Lake Ontario is approximately 244 feet above msl according to U.S Geological Survey data. Borings previously advanced at the site show that the water table rises to approximately 247 feet in the general plant area and that it continues to rise towards the south, gently towards the southwest and more steeply towards the southeast (Ref. 2.3-1).

Data collected previously also indicates that the rock elevation underlying the site rises towards the south. With the exception of the top few feet of rock (which is weathered and fractured in nature), the rock underlying the site has been described to have virtually no measurable vertical permeability. Any movement of water through the rock appears to occur in joints and fractures in the top few feet, and flows in a north to northwest direction towards Lake Ontario. This would be expected from normal hydrologic action in an area where the slightly fractured upper zone of rock follows the rock contours, and the rock contours rise southward from the lakefront. Local depressions in the bedrock surface may hold water because of the very low permeability of the rock, but ultimate drainage should be in the direction of the Lake (Ref. 2.1-1).

Finally, the rock has been described as being practically impermeable to depths sufficient to prevent relief of stresses and consequent open joints. Inspection of the reactor excavation and the relatively dry condition of the intake tunnel below Lake Ontario, both noted during construction, confirm this assessment (Ref. 2.1-1).

Surface water runoff in the vicinity of the plant area may proceed southward along normal surface contours, but the channels of Deer and Mill Creeks intercept this path and divert any flow to the Lake. Any percolating surface water that reaches the saturated zone of groundwater will ultimately flow in the direction of the Lake (Ref. 2.3-1).

Based on available information, the closest groundwater wells used as a drinking water source are located at distance greater than 1/2 mile from the Ginna Station site along Lake Road east and west of the Ginna Station site, with a few on Ontario Center Road, which runs south from Lake Road. The nearest known groundwater drinking well is approximately 1/2 mile southwest of the reactor building (Ref. 2.1-1). However, as discussed above, groundwater flow in proximity of Ginna Station is northward; thus, any wells in the area surrounding Ginna Station would not be affected by any effluent or inadvertent releases from the plant site.

2.4 Meteorology and Air Quality

Rochester's weather is influenced by its proximity to Lake Ontario. Weather systems coming from Canada across the Lake tend to pick up moisture and deposit it within 15-20 miles of the shoreline. The average high temperature in July is 80 degrees Fahrenheit (°F) with an average low of 59°F. During January, the region experiences an average high of 30°F and an average low of 16°F. Snowfall, as recorded at the Greater Rochester International Airport, averages approximately 93 inches per year, though communities closer to Lake Ontario tend to experience many "lake-effect" snow showers. According to the Northeast Regional Climate Center, Rochester's average precipitation is 31.96 inches (Ref. 2.4-1). Prevailing winds are from the west-southwest (away from Rochester) (Ref. 2.4-2).

Ginna Station is not located in an area designated by the National Ambient Air Quality Standards as a maintenance area or an area of nonattainment. The nearest area of nonattainment is Niagara County, which is classified as marginal for ozone (Ref. 2.4-3). According to data from the U.S. Environmental Protection Agency (EPA), between 1991 and 2000, the number of days when the air quality index was greater than 100 for ozone in the Rochester Metropolitan Statistical Area ranged from a high of 16 in 1991, to a low of 0 in 1993 and 1996. In 2000, the EPA reports one day when the air quality index for ozone was higher than 100 for this area (Ref. 2.4-4).[1]

1. The air quality index is a uniform index that provides general information to the public about air quality.

2.5 Critical and Important Terrestrial Habitats

The Ginna Station and the associated transmission line corridor are surrounded by a variety of very typical habitat types found in Central and Western New York State. These consist of mature woodlands, meadows, and early- and late-stage old fields. In addition, significant acreage is farmed for grains or is in use as apple orchards. The Station property and transmission line corridor that are farmed are leased to local residents. The other "natural" areas are left to go through natural succession and are not actively managed by RG&E.

The wildlife species that occur at the Ginna Station site and transmission line corridor are also very typical of those found in similar habitats throughout Central and Western New York State. Whitetail deer (*Odocileus virginianus*), woodchuck (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), grey (*Urocyon cinereoargenteus*) and red (*Vulpes vulpes*) fox, Eastern chipmunk (*Tamias striatus*), and meadow vole (*Microtus pennsylvanicus*) are commonly found mammals. Numerous bird species, including the ring-necked pheasant (*Phasianus colchicus*), American kestrel (*Falco sparverius*), screech owl (*Otus asio*), blue jay (*Cyanocitta cristata*), bluebird (*Sialia sialis*), American goldfinch (*Carduelis tristis*), and crow (*Corvus brachyrhynchos*) are common. Amphibians common to the site include American toad (*Bufo americanus*), leopard frog (*Rana pipiens*), green frog (*Rana clamitans*), and wood frog (*Rana sylvatica*). Reptiles include the Eastern garter snake (*Thamnophis sirtalis sirtalis*) and ribbon snake (*Thamnophis sauritus*) (Ref. 2.5-1).

Although endangered species such as the peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*) use the shoreline during spring migration, as does the threatened species northern harrier (*Circus cyaneus*), there is no habitat at the Ginna Station site or along the transmission line corridor that is considered to be critical habitat for these three species (Ref. 2.5-1).

There are no state regulated wetlands found either at the Ginna Station site or on the transmission line corridor. Contacts with environmental regulatory agencies also indicate no critical habitat type or species is found in either location (Ref. 2.5-2; Ref. 2.5-3).

Although there are no critical habitat areas either at the Ginna Station site or on the transmission line corridor, RG&E promotes environmental stewardship on all appropriate properties to enhance the opportunities for wildlife to exist. In an effort to enhance the Ginna Station property for wildlife and to educate the employees about the value of wildlife and habitat, various bird nesting boxes, including six boxes for kestrels and screech owls, have been erected on the property. Along with the nest boxes, a hiking trail system with benches is located primarily on the area known as the Manor House property. Built entirely by volunteer efforts, the Manor House property is an area available to employees to enjoy the natural beauty of the Ginna Station property.

2.6 Threatened or Endangered Species

A review of the federally threatened and endangered species listed for New York State revealed no species known to be resident on the Ginna Station site or transmission line corridor. One species, the bald eagle, which is federally listed as threatened, has been sighted in the vicinity of the Ginna Station during migratory periods (Ref. 2.5-3).

According to the Montezuma National Wildlife Refuge, no species on the Federal Endangered Species list is a resident at the MWC. Two species on the New York State Endangered Species List have been seen in the MWC area (35 miles from Ginna Station): the black tern (*Chlidonias niger*) and the peregrine falcon. Four species on the New York State Threatened Species list are present in the MWC area: the pied-bill grebe (*Podilymbus podiceps*), the least bittern (*Ixobrychus exilis*), the common tern (*Sterna hirundo*), and the sedge wren (*Cistothorus platensis*) (Ref. 2.6-1).

A review of the New York State Natural Heritage Program's databank indicated no records of rare species of flora or fauna on or within a mile of the Ginna Station site. A review of the New York State Breeding Bird Atlas produced a record of a New York State threatened species, the northern harrier (*Circus cyaneus*), that was "observed in possible breeding habitat, but no other indication of breeding noted." This sighting occurred over 15 years ago and no confirmed nest sites have ever been found on the Ginna Station property. A nesting colony of golden-winged warblers, a New York State species of special concern, was found in the transmission corridor south of the site in a recent survey (Ref. 2.6-2). Also, the southern shoreline of Lake Ontario is a traditional migratory pathway for numerous species of passerine birds and raptors. Bald eagles and peregrine falcons are occasionally seen during migratory periods, however, these sightings are transitory and none of these birds nests or resides within the Ginna Station property (Ref. 2.5-3).

The lake sturgeon, a threatened species in New York State, might be found in Lake Ontario near Ginna Station. One sturgeon was netted several years ago by the NYSDEC at Pultneyville, a village approximately 6 miles east of the Ginna Station (Ref. 2.5-2). No sturgeon has ever been reported at the Ginna Station site.

Though the range of the bog turtle (*Clemmys muhlenberoi*), a State-listed endangered species, includes the region along the southern shore of Lake Ontario, none has been seen or reported on the Ginna Station site and bog turtles would not be expected to occur there (Ref. 2.6-3).

Based upon the above information, RG&E concludes that there are no known Federal or State threatened or endangered species either on the Ginna Station site, on its associated transmission line corridor, or in close proximity to the site.

2.7 Demography

2.7.1 Regional Demography

The U.S. Nuclear Regulatory Commission's (NRC's) *Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants* (GEIS) presents a population characterization method that is based on two factors: “sparseness” and “proximity” (Ref. 2.7-1, Section C.1.4). “Sparseness” measures population density and city size within 20 miles of a site, while “proximity” measures population density and city size within 50 miles. The NRC uses the factors defined below to characterize the remoteness of the site.

Category		
		Sparseness
Most sparse	1	Less 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 less 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 less 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 less 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. 2.7-1.

The GEIS then uses the following matrix to rank the population category as low, medium, or high.

Sparseness \ Proximity	1	2	3	4
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. 2.7-1, page C-6.

RG&E used Year 2000 U.S. Census data (Ref. 2.7-2) and geographic information system software (Arcview®) to determine demographic characteristics in the Ginna Station vicinity at the block group level.

The population within 20 miles of the Ginna facility is approximately 564,000, which equals a population density of 449 people per square mile (Ref. 2.7-2). Applying the GEIS sparseness classification, the Ginna Station falls into Category 4 (greater than or equal to 120 persons per square mile within 20 miles).

As estimated from Year 2000 U.S. Census information, approximately 1.25 million people live within 50 miles of Ginna Station (Ref. 2.7-2). This equates to a population density of 165 persons per square mile within a 50-mile radius. Applying the GEIS proximity measure, Ginna Station falls into Category 3 (having one or more cities with 100,000 or more persons, and less than 190 persons per square mile within 50 miles). According to the GEIS sparseness and proximity matrix, Ginna Station's sparseness Category 4 and proximity Category 3 result in the conclusion that the plant is located in a high population area.

The City of Rochester, in Monroe County, with a population of 219,773 (Ref. 2.1-2), is the largest city within 50 miles of the Ginna Station facility. The next largest city is Auburn, in Cayuga County, with a population of 28,574; followed by Oswego, Oswego County (17,954); Geneva, Ontario County (13,617); Fulton, Oswego County (11,855); and Canandaigua, Ontario County (11,264) (Ref. 2.1-2). The largest eight

towns within 50 miles of Ginna Station are all suburbs of Rochester and are also located within Monroe County's borders.

As shown on Figure 2.1-1, all or parts of 13 counties are located within 50 miles of Ginna Station. Monroe (population 735,343), Ontario (100,224), and Wayne Counties (93,765) are wholly contained within this region. The remaining counties and the number of county residents within a 50-mile radius of the plant are: Cayuga (69,624), Livingston (54,655), Genesee (46,409), Onondaga (28,132), Orleans (30,641), Oswego (77,081), Seneca (30,254), Steuben (5,658), Yates (21,139), and Wyoming (6,110) (Ref. 2.7-2).

There are no Native American reservations within 50 miles of the facility. However, there is a Tribal Designated Statistical Area (TDSA) for the Cayuga Nation located within 50 miles of the facility. A TDSA is a geographical entity identified and delineated for the U.S. Census Bureau by federally recognized American Indian tribes that do not currently have a federally recognized land base (i.e., a territory that contains a Native American population over which a Federally recognized tribe has jurisdiction, or a territory in which a State-recognized tribe provides benefits and services to its members) (Ref. 2.7-3).

In 2000, the State of New York reported a state population count of almost 19 million, or 6.7 percent of the Nation's population (Ref. 2.7-4; Ref. 2.7-5). From 1990 to 2000, New York had a compound average annual growth rate of approximately 0.5 percent (Ref. 2.7-5). Wayne County's average for the same period was also 0.5 percent (Ref. 2.7-6; Ref. 2.7-7). Wayne County's total population, according to the 2000 Census, was 93,765 (Ref. 2.7-7). In order to provide the broadest perspective when presenting population growth information, the United States data have been included in this analysis. The United States reported a U.S. 2000 population total exceeding 280 million (281,421,906) (Ref. 2.7-8) with a compound average annual growth rate of 1.2 percent from 1990 to 2000 (Ref. 2.7-8). Wayne County's average growth rate is relatively slow when compared with the United States growth rate; however, it is roughly equivalent to the State growth rate.

The median age of Wayne County residents is 36.9 (Ref. 2.7-7). The average household in Wayne County has 2.64 individuals and the average family comprises 3.08 people (Ref. 2.7-9). Monroe County is home to approximately 735,000 people according to the latest U.S. Census figures, and the median age is 36.1 (Ref. 2.7-7). The average household in Monroe County contains 2.47 people and the average family size is 3.08 members (Ref. 2.7-9).

The 1973 Final Environmental Statement for Ginna Station forecasted that population within a 50-mile radius of the Ginna facility would be 2,327,329 in 2010 (Ref. 2.7-10). Currently, the population within this range is 1.3 million. The reason for the significantly slower pace of population growth in the region is based on the economics of the area. In 1973, Rochester was dominated by a number of large manufacturing companies. Eastman Kodak, Xerox, Gannett, and Bausch & Lomb

headquartered and had large manufacturing facilities in Monroe County. In addition, other manufacturing companies such as General Dynamics had large operations in Rochester.

During the intervening 29 years, many things have changed. General Dynamics has pulled its large operations out of the region; Xerox has relocated its headquarters out of state, even though it maintains large manufacturing and research and development facilities in Monroe County; Gannett has moved its headquarters out of state and shut down one of its two daily newspapers. Kodak's employment peaked in 1982, and the company continues to face challenges from domestic and international competitors. Bausch & Lomb, although still headquartered in Rochester, maintains a much smaller presence with only minimal manufacturing (Ref. 2.7-11).

Gaining in size has been Rochester's service sector. Companies such as Paychex have entered into markets that did not exist in 1973, and have been very successful. Drawing from their experiences working for a non-Bell telephone company, a number of former Rochester Telephone employees have branched out, starting their own telecommunications companies. This would not have been allowed in 1973, when all telecommunications markets were regulated and there was no choice in local or long distance phone service. Rochester also capitalizes on its intellectual capital from its colleges and universities. Home to the University of Rochester and Rochester Institute of Technology, Rochester produces many highly skilled college graduates each year. In addition, the research conducted at the University of Rochester and, especially, the University of Rochester Medical Center has resulted in numerous startup companies that remain in the Rochester area (Ref. 2.7-11).

The loss of tens of thousands of manufacturing jobs has been more than replaced by gains in services. However, employment growth has been slow by National standards, especially as job growth tends to remain strong in the South. The slow growth in jobs has led to below average population growth as a result (Ref. 2.7-11).

2.7.1.1 Population Projections

By the year 2020, New York State's population is projected to be 19.4 million, an increase of 2.1 percent from 2000 (Ref. 2.7-12). By the same year, Wayne County's population is projected to be 98,454, an increase of 5 percent over 20 years (Ref. 2.7-13). The United States population is expected to grow by 15.4 percent between 2000 and 2020, to a total population of 325 million (Ref. 2.7-14).

Decennial population numbers from 1980 to 2000 and projections out to the year 2040 for Wayne and Monroe Counties, New York State, and the United States are presented in Table 2.7-1.

2.7.2 Transient Populations

There is a summertime increase of about 500 people in the lakeside population within a 5-mile radius of the plant site, and a summertime increase of 4,000 to 5,000 people in the lakeside population within a 20-mile radius of the plant site. The

Table 2.7-1
Population Levels, 1980–2040

	Actual			Projected			
	1980	**1990**	**2000**	**2010**	**2020**	**2030**	**2040**
United States	226,542,199[a]	248,709,873[a]	281,421,906[b]	299,862,000[c]	324,927,000[c]	351,070,000[c]	377,350,000[c]
New York State	17,558,072[a]	17,990,455[a]	18,976,457[d]	NA	19,373,000[e]	NA	NA
Monroe County	702,238[a]	713,968[a]	735,343[d]	735,708[f]	742,150[f]	747,612[f]	751,350[g]
Wayne County	84,581[a]	89,123[a]	93,765[d]	96,931[f]	98,454[f]	99,744[f]	100,741[g]

NA = Not Available

a. Ref. 2.7-15
b. Ref. 2.7-8
c. Ref. 2.7-14
d. Ref. 2.7-7
e. Ref. 2.7-12
f. Ref. 2.7-13
g. Ref. 2.7-16

nearest group of houses are summer cottages, 0.8 miles west. Other groups are located at Bear Creek, 1.5 miles east, and at Ontario-on-the-Lake, a development located approximately 2 miles west (Ref. 2.4-2). Other than the summertime residents of the area, there are no large groups of transients within 5 miles of the Ginna Station site. The only parks near the site are Webster Beach Park in Monroe County, approximately 6 miles west of the plant site, and B. Forman Park in Wayne County, approximately 8 miles east of the plant site. There are no federal recreational facilities in the area. There are no state parks or special use areas within 10 miles of the plant site.

Wayne County does have a migrant labor population during the June-October season, primarily for apple picking. Approximately 115 farm-worker camps of five or more persons are scattered throughout Wayne County, with a total population of about 4,400 migrants. Information from Rural New York Farmworker Opportunities shows that there are only 12 camps, with about 130 migrants, located in the vicinity of the Ginna Station site (Ref. 2.4-2).

2.7.3 Minority and Low-income Populations

The NRC “Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues” defines a "minority" population as: American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, or Black races, or Hispanic ethnicity, other, multi-racial, and the aggregate of all minority races (Ref. 2.7-17). The guidance indicates that a minority population exists if:

Exceeds 50 Percent – the minority population percentage of the environmental impact site exceeds 50 percent, or

More than 20 Percent Greater – the minority population percentage of 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.

Where the environmental impact area falls entirely within the border of a state, the NRC has used a 50-mile radius as the environmental impact site and the state as the geographic area for comparative analysis. RG&E has adopted this approach for the Ginna Station environmental justice analysis. The NRC guidance calls for use of the most recent U.S. Census Bureau decennial census data.

RG&E used year 2000 U.S. Census data in determining the percentage of the total population within New York State for each minority category, and in identifying minority populations within 50 miles of Ginna Station. The U.S. Census Bureau provides updated annual population projections in addition to decennial data for selected portions of its demographic information; however, neither an updated projection based on the year 1990 census data nor year 2000 Census data was available at the block-group level for low-income populations at the time of this analysis. Therefore, RG&E used 1990 U.S. Census Bureau data (Ref. 2.7-18) to identify low-income populations within 50 miles of Ginna Station. RG&E divided U.S. Census Bureau population numbers for each racial/ethnic group within each Census block group by the total population for that Census block group to obtain the percentage of the block group's population represented by each minority (Ref. 2.7-2). For each of the 1,032 block groups within 50 miles of Ginna Station, RG&E calculated the percentage of the population in each minority category and compared the result to New York State's minority percentages to determine whether disproportionate minority populations exist in an area. U.S. Census Bureau data for New York State characterize 0.4 percent as American Indian or Alaskan Native, 5.5 percent Asian, 0.05 percent Native Hawaiian or other Pacific Islander, 15.9 percent Black races, 7.1 percent all other single race minorities, 3.1 percent multi-racial, 32.1 percent aggregate of minority races, and 15.1 percent Hispanic ethnicity (Ref. 2.7-2). Table 2.7-2 indicates how many census tracts within each county exceed the threshold for determining the presence of a low-income or minority population.

Based on the "more than 20 percentage points" criterion, Black minority populations exist in 122 block groups, out of the 1,032 examined (see Table 2.7-2). The vast majority (120) are in Monroe County, with one each in Cayuga and Wyoming Counties. Figure 2.7-1 displays the location of these Black minority block groups. Hispanic ethnicity minority populations exist in 10 block groups with all in Monroe County (see Table 2.7-2). Figure 2.7-2 displays the location of these Hispanic ethnicity minority block groups.

Aggregate minority populations exist in 127 block groups (see Table 2.7-2), Monroe County accounts for 125 block groups and Cayuga and Wyoming each have one

Table 2.7-2
Minority and Low-income Population Census Block Groups

County	Total 2000 Block Groups	Black	American Indian or Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	All Other Single Race Minorities	Multi-Racial Minorities	Aggregate of Minority Races	Hispanic Ethnicity	Total 1990 Block Groups	1990 Block Groups Low-Income
Cayuga	68	1	0	0	0	0	0	1	0	68	2
Genesee	44	0	0	0	0	0	0	0	0	58	0
Livingston	32	0	0	0	0	0	0	0	0	33	1
Monroe	601	120	0	1	0	3	0	125	10	670	94
Onondaga	23	0	0	0	0	0	0	0	0	22	0
Ontario	82	0	0	0	0	0	0	0	0	86	2
Orleans	17	0	0	0	0	0	0	0	0	16	0
Oswego	44	0	0	0	0	0	0	0	0	44	3
Seneca	33	0	0	0	0	0	0	0	0	35	0
Steuben	6	0	0	0	0	0	0	0	0	6	0
Wayne	57	0	0	0	0	0	0	0	0	60	1
Wyoming	5	1	0	0	0	0	0	1	0	5	0
Yates	20	0	0	0	0	0	0	0	0	25	0
Total	1032	122	0	1	0	3	0	127	10	1128	103
State Averages											
New York		15.9%	0.4%	5.5%	0.05%	7.1%	3.1%	32.1%	15.1%	NA	13.0%

Figure 2.7-1
Black Minority Population

Figure 2.7-2
Hispanic Ethnicity Population

block group. Figure 2.7-3 displays the location of the aggregate minority block groups.

Other single race minority populations exist in 3 block groups (see Table 2.7-2), all of which are located in Monroe County. Figure 2.7-4 displays the location of these other single race minority block groups.

Asian minority populations exist in 1 block group located in Monroe County (see Table 2.7-2). Figure 2.7-5 displays the location of Asian minority block groups.

No block groups contain Native Hawaiian or other Pacific Islander minority populations, American Indian or Alaskan Native populations or multi-racial minority populations (see Table 2.7-2).

In conclusion, there are minority populations of Blacks, Asians, aggregate minority, and other single race categories and the Hispanic ethnicity category within a 50-mile radius of Ginna Station. They tend to be concentrated within the City of Rochester, with a small number of block groups in other counties.

2.7.3.1 Low-income Populations

NRC guidance defines “low-income” using U.S. Census Bureau statistical poverty thresholds (Ref. 2.7-17). RG&E divided the number of low-income individuals in each census block group by the total number of individuals residing in each block group to obtain the percentage of low-income persons per block group. U.S. Census data characterized 13.0 percent of New York State persons as low-income in 1990 (Ref. 2.7-20). The guidance indicates a low-income population is considered to be present if the percentage of households below the poverty level in an environmental impact area is significantly greater (typically at least 20 percentage points) than the low-income population percentage in the geographic area chosen for comparative analysis (New York State).

Based on the “more than 20 percent” criterion, 103 of the 1,128 (1990) block groups contain a low-income population (see Table 2.7-2). The number of block groups in a defined geographic area changes with every decennial census. Monroe County contains 94 of these block groups, with Oswego County home to 3, and Cayuga and Ontario County each home to 2. Livingston and Wayne Counties each have one block group with a low-income population. Figure 2.7-6 shows the location of low-income block groups.

Figure 2.7-3
Aggregate Minority Population

Figure 2.7-4
Other Single Race Minority Population

Figure 2.7-5
Asian Minority Population

Figure 2.7-6
Low-income Population

2.8 Economic Base

Wayne County, in which the Ginna Station site is located, is primarily of a rural nature and sparsely populated.

Monroe County, located adjacent to and west of Wayne County, is the heart of the Rochester metropolitan area. Home to a number of large, well-known manufacturing companies, Monroe County's labor force remains more heavily concentrated in manufacturing than the Nation's even after significant job cuts at some of these companies.

In 2000, Wayne County's workforce was concentrated in services, which accounted for 31 percent of total employment according to the New York State Department of Labor. Manufacturing and trade each accounted for approximately 15 percent, with agriculture accounting for 3.6 percent and the rest in other sectors (Ref. 2.8-1). On average, 5.2 percent of Wayne County's labor force of 49,300 workers was unemployed during 2001 (Ref. 2.8-2).

According to the New York State Department of Labor, manufacturing employment in Monroe County during 2000 was 21.5 percent of total employment, while services led all categories at 40 percent, retail employment represented 16 percent, and agriculture accounted for less than 1 percent (Ref. 2.8-1). Monroe County's unemployment rate remained below the state and national averages during 2001, averaging just 4.3 percent out of a labor force of 377,400 (Ref. 2.8-2).

The construction industry plays a much smaller role in Wayne County, given its more agrarian nature, employing just 1,023 people, on average, during 2000. Monroe County's construction industry employed, on average, 13,442 during 2000 according to the New York State Department of Labor (Ref. 2.8-1).

Between 1990 and 2000, employment growth in Monroe and Wayne Counties averaged 0.5 percent per year. The manufacturing sector, which accounted for 27 percent of all jobs in 1990, retreated steadily during the past decade as major manufacturers reacted to changing market conditions. Average annual job losses of 1.2 percent during this time left manufacturing jobs accounting for 22 percent of all employment in 2000. Meanwhile, services employment continued to expand, from 34 percent of total employment in 1990 to 40 percent in 2000 (Ref. 2.8-1).

Monroe County is home to many well-known manufacturers, like Eastman Kodak and Bausch & Lomb. In addition, Xerox, founded in Rochester, retains a large manufacturing and marketing base in Monroe County. Photonics, biotechnology, computer and data services, telecommunications, and precision manufacturing each play an important role in the local economy (Ref. 2.7-11).

The future is expected to continue the current trends. Manufacturing concerns will continue to downsize while services, including computer software and business services, will grow. The region's higher education sector, anchored by the University of Rochester and Rochester Institute of Technology, produces many highly skilled

graduates. Many of these graduates stay in the area and start their own companies and this is likely to continue into the future (Ref. 2.7-11).

A number of public-works projects are either underway or in the planning stages in Wayne and Monroe Counties. Eight projects, ranging from $220,000 to over $3 million, are under consideration or have broken ground in Wayne County. The closest to the Ginna Station is a brownfields environmental restoration project in Sodus (Ref. 2.8-3). Monroe County, given its population base, has many more projects under consideration than does Wayne County. Included in these is an $850,000 project to improve Webster Park, currently planned for 2004 (Ref. 2.8-4).

The region's transportation network includes major highways, a train network, and an international airport. Rochester International Airport is located approximately 20 miles southwest of Ginna Station.

2.9 Housing

Wayne County had 38,767 housing units in 2000, with a vacancy rate less than 10 percent. Seasonal/recreational housing accounts for 44.7 percent of the vacant units. With a larger population base and a stronger employment market, Monroe County's housing market is a bit stronger. In Monroe County only 5.8 percent of 304,388 housing units is vacant (Ref. 2.9-1). Annual sales of existing homes in the Rochester metropolitan area totaled 10,754 during 2001 (Ref. 2.9-2). The number of housing permits in the Rochester metropolitan area has remained stable during the past 8 years (Ref. 2.9-3).

2.10 Regional Tax Structure

Property taxes are used to fund schools, police and fire protection, roads maintenance, and other municipal services. Property taxes may be levied by counties, cities, towns, villages, school districts, and special districts (Ref. 2.10-1).

According to the New York State Office of Real Property Services:

> The amount of a particular property's tax bill is determined by two things: the property's taxable assessment and the tax rates of the taxing jurisdictions in which the property is located. The tax rate is determined by the amount of the tax levy to be raised from all, or part, of an assessing unit, and the unit's taxable assessed value. The assessment is determined by the assessor and is based on the value of the property less any applicable property tax exemptions.

Ginna Station is located in the Town of Ontario, Wayne County, and the Wayne Central School District. RG&E tax payments for Ginna Station to these jurisdictions, are detailed in Table 2.10-1. Tax payments for Ginna Station averaged 13.2 percent of the total budget and 37.2 percent of total property taxes for the Town of Ontario for the period from 1995 to 2001. The Ginna Station site accounted for a smaller proportion of the Wayne County budget, only 2.0 percent of the total budget and 6.4 percent of total property taxes for the same period. The Ginna Station site accounted for 12.4 percent of the total budget for the period 1995 through 1999 for the Wayne Central School District.

It is evident from Table 2.10-1 that over time RG&E property tax payments for Ginna Station constitute a decreasing percentage of each taxing entity’s total budget. RG&E expects this trend to continue into the future, and with respect to the Town of Ontario and Wayne County School District, this trend is approaching a level that is ten percent or less of the taxing jurisdiction’s total budget. In an agreement with the three taxing jurisdictions, the assessed value of the facility is reduced by $13 million per year, through 2009 (Ref. 2.10-5). While this reduction does not directly translate to a percentage reduction in taxes, it does suggest that these levels will continue to go down, as is shown in Table 2.10-1.

Table 2.10-1
Property Tax Paid by Ginna Station; Property Tax Revenues and Total Budgets of Wayne County, Town of Ontario, and Wayne Central School District; 1995 - 2001

Year	Total Property Tax Revenues ($)	Property Tax Paid for Ginna Station ($)	Percent of Total Property Taxes (%)	Total Budget ($)	Percent of Total Budget (%)
			Wayne County		
1995	25,637,215[a]	1,977,607	7.7	79,315,166[a]	2.5
1996	26,040,581[a]	1,767,004	6.8	80,650,726[a]	2.2
1997	26,012,141[a]	1,661,234	6.4	82,669,765[a]	2.0
1998	25,923,815[a]	1,599,601	6.2	84,526,663[a]	1.9
1999	25,504,000[a]	1,597,823	6.3	85,934,651[a]	1.9
2000	26,911,005[a]	1,634,372	6.1	88,697,549[a]	1.8
2001	27,198,909[a]	1,489,193	5.5	92,486,009[a]	1.6
			Town of Ontario		
1995	1,486,983[b]	720,503	48.5	4,868,418[b]	14.8
1996	1,772,832[b]	683,209	38.5	5,105,070[b]	13.4
1997	1,984,839[b]	731,959	36.9	5,413,726[b]	13.5
1998	2,119,847[b]	765,647	36.1	5,552,530[b]	13.8
1999	2,174,857[b]	764,523	35.2	5,923,504[b]	12.9
2000	2,224,925[b]	749,000	33.7	5,889,192[b]	12.7
2001	2,225,607[b]	704,898	31.7	6,182,603[b]	11.4
			Wayne Central School District		
1995	NA	3,270,099	NA	23,865,546[c]	13.7
1996	NA	3,172,118	NA	23,635,950[c]	13.4
1997	NA	3,183,220	NA	24,964,558[c]	12.8
1998	NA	3,165,620	NA	27,248,584[c]	11.6
1999	NA	3,105,391	NA	28,927,432[c]	10.7
2000	NA	3,170,478	NA	NA	NA
2001	NA	3,182,172	NA	NA	NA

a. Ref. 2.10-2
b. Ref. 2.10-3
c. Ref. 2.10-4

2.11 Land Use

Wayne County is rich in agricultural history and terrain. The County's growth began in agriculture in the 1790s, and agriculture continues to play an important role in the County's economy. Wayne County had a 2000 population of 93,765, and is composed of 15 towns, each with an elected Town Supervisor (Ref. 2.11-1).

Wayne County's land use characteristics included 840 farms in 1997, the most recent year for which data are available, compared to 1,064 farms in 1987. The acreage used in farming has dropped from 191,309 acres to 167,190 over the same time period. Primary crops include corn (358 farms), hay and other grains (342 farms), orchards (apples, pears, peaches, etc.) (255 farms), beef and milk cows (223 farms), oats, potatoes, and vegetables. The county ranks 43rd nationwide in the number of acres dedicated to orchards (Ref. 2.11-2).

The land within a radius of 5 miles of the Ginna Station site is used for agricultural purposes, principally for growing apples, cherries, grapes, and field crops. There are three dairy farms within a 5-mile radius of the plant, with 50 to 75 milk cows per farm (Ref. 2.4-2, Section 2.1.1).

Monroe County is home to Rochester, the third largest city in New York State. The County is the dominant center of the Genesee Valley region. Monroe County comprises 19 towns, 10 villages, and the City of Rochester, with a combined population of approximately 750,000 residents and a land area of 663.21 square miles (Ref. 2.11-3). Monroe County is more industrialized than Wayne County (Ref. 2.4-2, Section 2.1.1).

The New York Constitution grants all cities, towns, and villages the right of "home-rule" power. County level land-use planning is therefore very limited in the State of New York. Rather, local governments in New York State have primary control over land use within their boundaries. While the Comprehensive Plan sets municipal development objectives, zoning ordinances are most commonly used to regulate land uses (Ref. 2.11-4).

In New York State, the three types of local laws that impact land-use control are: (1) Comprehensive Plans, which may follow General City Law, Town Law, or Village Law; (2) Zoning Ordinances, which must follow General City Law, Town Law, or Village Law; and (3) Subdivision Ordinances, which must follow General City Law, Town Law, or Village Law. Local government right to "home rule" means that local governments may adopt or amend local laws that relate to their "property, affairs, or government" as long as the local laws are not inconsistent with the Constitution or general laws (Ref. 2.11-4).

According to the Monroe County Planning Department (Ref. 2.11-5), Monroe County last passed a Comprehensive Plan in 1979. The document did not have any land-use authority, since land-use planning in New York State is done at the local level. The County sees its role as very minimal in land-use planning, and does not have any unusual restrictions to growth. The County did recently provide $2 million from

tobacco settlement dollars to leverage other local and state funding for the purpose of open space preservation. Suburban towns must initiate the open space actions. A town may approach the County and ask for up to 25 percent of the cost of acquiring the development rights to a piece of property targeted in the town's Comprehensive Plan for open space preservation. The remaining 75 percent of the cost must come from non-County sources. Such parcels are generally quite small, and do not exceed 70 acres.

The City of Rochester is essentially a "built-out" community. The City has declined in population over the last two decades, due to declining household size and movement to the suburbs. The City has made a concerted effort to remove obsolete housing units left in disrepair. In addition to the focus on removal of obsolete units, the City is also focused on infilling strategies with the objective of stabilizing the population. For example, some parcels that were traditionally non-residential have been converted to residential use and re-furbished to meet the demand for new, high-end residential units. No restrictions on growth are in place (Ref. 2.11-6).

The Town of Webster, in the northeast portion of Monroe County and the Monroe County town closest to the Ginna Station site, has a Comprehensive Plan passed in 1998. The Town has a functioning Planning Board and a Zoning Board of Appeals, but no Conservation Board. Site plan reviews are required for zoning/development changes or actions. Planned unit development and signage provisions are mandatory provisions in the Zoning Ordinance, Subdivision Ordinance, and Land Use Regulations of the Town. The Town encourages vegetation retention using trees. For erosion and sedimentation control purposes, the Town has placed restrictions on grading, filling, and excavation. The Town mandates mitigation measures for drainage and stormwater management practices, encourages development restrictions in flood-prone areas, and encourages addressing Federal Emergency Management Agency guidelines. Because the Town of Webster is on Lake Ontario, a substantial section of land is shoreline and can be subject to erosion; hence the focus on erosion and sedimentation control, flood-prone areas, etc. However, the Town does not have any development restrictions in environmentally sensitive areas, does not have dedication of open space, and has no open space easements or any open space conservation. Therefore, there is no reason to believe that any restrictions or growth control measures exist (Ref. 2.11-4).

According to the Wayne County Department of Development, the Wayne County towns abutting Lake Ontario do not have any overly restrictive ordinances placed on growth. There is no reason to suspect that a limit on building permits will occur in the vicinity of the Ginna Station site in the foreseeable future (Ref. 2.11-7).

2.12 Public Services

2.12.1 Public Utilities

The Ginna Station uses public utilities for potable water. Most of the water used in the generation of electricity is drawn from Lake Ontario and is, therefore, not from the public utility. As discussed in Section 3.1.3.1, the Ginna Station purchases its potable water from the Ontario Water District, Town of Ontario.

The Monroe County Water Authority (MCWA) has a capacity for 145 million gallons per day (mgd) with peak usage of 122 mgd. The MCWA has 23 mgd of excess capacity in its water system. At the present time, the MCWA has enough supply to handle an additional 9,200 households. The Authority estimates that the average household uses 250 gallons per day. Monroe County has two surface water sources: Lake Ontario water, which is treated at the Shoremont Plant and the Brockport Plant; and Hemlock Lake water, which is purchased from the City of Rochester and treated at the City's plant in Hemlock (Ref. 2.12-1).

The City of Rochester has its own water system that draws water from Hemlock and Canadice Lakes located to the south of Rochester. The City of Rochester owns over 7,000 acres of land in the watershed around these two Lakes. The City is permitted to draw, on average, 37 mgd from the two Lakes with a maximum daily usage of 48 mgd. If the City needs to supplement its water supply, it purchases water from the MCWA (Ref. 2.12-2).

While Monroe County's water system is organized at a county level, Wayne County's is organized mainly at a town level. The County purchases most of its water from area towns and villages, plus Monroe County (Ref. 2.12-3). Wayne County produces a small amount of water, with a capacity of 70,000 gallons per day and peak usage of 30,000 gallons per day (Ref. 2.12-3). Wayne County draws its water from the Third Creek basin (Ref. 2.12-3). The Wayne County Water and Sewer Authority estimates that the average residential customer uses 150-200 gallons of water per day (Ref. 2.12-3). There is no credible estimate on the percentage of households serviced by wells in Wayne County.

The Town of Ontario's water system has a 3.5 mgd capacity, with average daily usage of approximately 1.9 mgd. Of that usage, 51 percent of the volume is sold outside of the Town. The Town of Ontario's water system currently maintains 16 inch intake pipes. Plans are to increase the size of these pipes, by summer 2002, to double their intake capacity. While plans are not to immediately increase the water intake volume, the ability to do so will be available once the project is complete (Ref. 2.12-4). The Town of Ontario estimated that the number of its residents on private wells would be no more than a dozen, but indicated that they do not track that information. The Town of Williamson has a capacity of 4 mgd and peak usage of 2 mgd (Ref. 2.12-5); Newark has a capacity of 3.5 mgd and peak usage of 2.14 mgd (Ref. 2.12-6); Wolcott's capacity is 544,000 gallons per day with peak usage of approximately 330,000 gallons per day (Ref. 2.12-7); and Lyons Village has a capacity of 800,000 gallons per day and peak usage of 550,000 gallons per day

(Ref. 2.12-8). The Towns of Ontario, Williamson, and Wolcott draw their water from Lake Ontario. Newark draws its water from Canandaigua Lake, and Lyons Village buys water from Junius Ponds in Seneca County and produces its own via two wells. The groundwater source for the wells is the Fairport/Lyons Glacial Stream Channel (Ref. 2.12-8).

2.12.2 Transportation

The region's transportation network includes an international airport, a train network, and major highways. Rochester International Airport is located approximately 20 miles southwest of Ginna Station. A primary passenger railway, operated by Amtrak, runs east-west approximately 13.5 miles south of Ginna Station. In addition, the Ontario Midland Railroad is a local "shortline" that feeds into the CSX Transportation lines. Ontario Midland, a privately owned company, operates 47 miles of a T-shaped track in Wayne County. The tracks are used to transport both passengers and freight. The east-west portion of the "T" runs approximately 3 miles south of Ginna Station, from Webster to Wolcott. The north-south portion of the track runs from Sodus to Newark, 16 miles east of Ginna Station (Ref. 2.12-9; Ref. 2.12-10). The east-west portion of the "T" does not currently have direct access to Ginna Station. However, RG&E owns a corridor of property from the track to Ginna Station, and a 3-mile track could be laid to provide direct access to the plant if necessary. Ontario-Midland has delivered transformers to Ginna Station in the past (as close as possible given lack of direct access). The land under the east-west portion of the line is owned by RG&E (Ref. 2.12-11).

The transportation routes and road conditions in the vicinity of Ginna Station are described in the following paragraphs. The main east-west transportation routes that provide access to Ginna Station are County Route 101 (Lake Road) and NYS Route 104. Lake Road runs east-west and provides direct access to Ginna Station along much of the site's southern border. NYS Route 104 is the predominant east-west corridor in the area and runs parallel to Lake Road, approximately 3.5 miles south of Ginna Station. Town road Ontario Center Road runs north and south, connecting NYS Route 104 to Lake Road immediately south of Ginna Station. Several other secondary roads run north-south providing access to Lake Road from NYS Route 104. Lake Road and NYS Route 104, along with a number of north-south secondary roads linking the two, provide a number of routes for employees to access Ginna Station.

Employees commuting from Monroe County (and other points west) are likely to use east-west corridors, namely NYS Route 104, NYS Route 441, or NYS Route 286, to access Lake Road via north-south corridors NYS Route 250 or Ontario Center Road/NYS Route 350. Employees commuting from the south and east are likely to use north-south corridors NYS Routes 21 and 350 to reach NYS Route 104, and then use Ontario Center Road to Lake Road.

Lake Road is a two-lane road with a daily traffic count of approximately 2,150 vehicles (Ref. 2.12-12). Ontario Center Road is also a two-lane road, but

neither Wayne County nor the Town of Ontario has recent data on the daily traffic volume. A traffic count is planned for 2003 (Ref. 2.12-12).

State roads carry a "volume/capacity ratio," which indicates whether the road is being actively used over capacity (value greater than 1.0), at capacity (value of 1.0), or under capacity (value less than 1.0) (Ref. 2.12-13). State roads also carry "surface score ratings" ranging from a low of "1," or impassable, to a high of "10," which indicates new construction (Ref. 2.12-14 and 2.12-15). The volume/capacity ratios and surface score ratings for the roads cited as primary routes of commuting patterns to Ginna Station are described below.

The portion of NYS Route 104 between the Monroe County border and Furnace Road in the Town of Ontario is four lanes and has a surface rating of 6, classifying it as "fair." The most recent year in which work was done on this 4.75-mile stretch of road is 1991. This section of NYS Route 104 experiences heavy traffic, carrying just fewer than 20,000 vehicles per day, but has a volume/capacity ratio of 0.3, indicating that use is well under its volume/capacity. Between Furnace Road and NYS Route 21 in Williamson, the rating improves to 8, classifying this 4.83-mile stretch of road as "high good." This portion of the road is two lanes and has a volume/capacity ratio between 0.7 and 0.9, depending on the section of road.

Volume on NYS Route 104 picks up significantly in Monroe County. Between the Wayne County line and NYS Route 250, where the road is four lanes, volume ranges between 24,300 and 40,000 vehicles daily. This reflects those people working at Xerox in Webster and those commuting into Rochester. The road conditions deteriorate over this 2.85-mile portion of road with a rating dropping to 5, classifying the road as "high poor." The volume/capacity ratio for NYS Route 104 between Route 250 in Monroe County and the Wayne County border ranges between 0.3 and 0.57, indicating that volume on this portion of the road is not over capacity.

NYS Route 250 runs north-south and is likely to be used by Ginna Station employees living in the southeast portion of Monroe County. It is primarily a two-lane road, with a short four-lane portion where it crosses NYS Route 104. Commuters may take Route 250 north all the way to Lake Road, or to NYS Route 104 east in the Village of Webster, and continue to the Ginna Station site as described above. From its northernmost point at County Route 101, running south through the Village of Webster, Route 250 has a surface score between 8 and 9. North of the Village of Webster, the volume/capacity ratio is between 0.1 and 0.4, well below capacity. A small portion of Route 250 in the Village of Webster has a volume/capacity ratio of between 0.5 and 0.8, indicating it is under capacity. As it runs south through the Village, the ratio is between 0.4 and 0.7, and the surface rating is between 8 and 9. As Route 250 runs south out of the Village of Webster and through the Town of Penfield, it has a volume/capacity ratio of 0.5, indicating that the road is used at one-half of its capacity, and it has a surface score of between 7 and 9.

NYS Route 441 runs east and west, and may be used by commuters in eastern Monroe or western Wayne County to connect with either Route 250 or Route 350, both of which run north to NYS Route 104. From Route 250 into Wayne County, the

road is two lanes. In Monroe County the volume/capacity ratio of NYS Route 441 from Route 250 to the Wayne County line ranges from 0.7 to 1.0, indicating this stretch is below or at capacity. The same section has a surface rating between 5 and 6. The volume/capacity ratio is 0.2 along its entire length in Wayne County, indicating that it is running at one-fifth of its capacity. The surface score is 7 in Wayne County.

NYS Route 286 is a two-lane road running east and west just north of Route 441, and may also be used to reach Route 250 or Route 350, both of which run north to Lake Road. Route 286 has a volume/capacity ratio of 0.2 from Route 250 in Monroe County, to its end at Route 350 in Wayne County, indicating that it is running at one-fifth of its capacity. Its surface score along this length is 7.

NYS Route 21 is a two-lane road running north and south through the western portion of Wayne County. It may be used by commuters who reside in some portions of western Wayne County to drive north to NYS Route 104 west, then travel on to Ginna Station as described earlier. Route 21 has a volume/capacity ratio of between 0.2 and 0.3 running south from NYS Route 104, through the Village of Palmyra, approximately 12.5 miles south of Ginna Station. This indicates the road is running at between one-third and one-fifth of its capacity. The surface score along this length ranges from 8 to 9.

NYS Route 350 is a two-lane, north-south roadway directly south of Ginna Station, that begins at NYS Route 104 in Ontario Center, and runs south through Wayne County to the Village of Macedon. The volume/capacity ratios along the length of Route 350 indicate that it could handle substantially more traffic. The ratio on the entire length of Route 350 ranges from 0.2 to 0.4, indicating it is at 20 percent to 40 percent of its total capacity. The surface ratings near Ginna Station are between 5 and 6, with the most recent road work done in 1991 and 1992. Daily traffic volume is approximately 4,650 vehicles near Ginna Station. As Route 350 runs south, the volume/capacity ratio remains between 0.2 and 0.4 until it reaches the Village of Macedon. The surface score improves to between 7 and 8 from Route 441 south to the Village of Macedon. The daily traffic count drops to 4,400 vehicles as the road heads south from Route 441 to Route 31, and increases to 5,370 as the road leads into Macedon. Ontario Center Road extends NYS Route 350 north of NYS Route 104 to Lake Road; however, no data are available for this road.

2.13 Historic and Archaeological Resources

Both Monroe and Wayne Counties have a history of Native American inhabitation. Lake Ontario, Irondequoit Bay, and Sodus Bay provided vibrant trading routes for the Iroquois Indian Nations during the 15th and 16th centuries. The arrival of European settlers and the wars fought between the English and the Native Americans and between the Colonists and the British caused the Native American populations to fall dramatically. While some Native American history remains in the area, no significant Native American villages or other artifacts have been found or identified on or in close proximity to the Ginna Station site.

Four sites listed on the National and State Registers of Historic Places are located within the six-mile radius of the Ginna Station site. Two of these are in Pultneyville, six miles east of Ginna Station: Gates Hall and Pultneyville Public Square, and Pultneyville Historic District. The other two are Brick Church Corners (also known as Heritage Square) and the First Presbyterian Church, located one mile south-southwest and three miles south from the Ginna Station site, respectively (Ref. 2.13-1).

No archeological sites are known to exist in the vicinity of either the Ginna Station site or the electric transmission line corridor (Ref. 2.7-10).

2.14 References

Ref. 2.1-1 Rochester Gas and Electric Corporation. *R.E. Ginna Nuclear Power Plant Unit No. 1, Environmental Report.* Submitted to U.S. Atomic Energy Commission, Docket No. 50-244. Rochester, NY. 1972.

Ref. 2.1-2 U.S. Census Bureau. "GCT-PL. Race and Hispanic or Latino: 2000." Geographic Area: New York – Place and County Subdivision. http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_PL_U_GCTPL_ST7_geo_id=04000US36.html. Accessed March 26, 2002.

Ref. 2.1-3 Monroe County, New York. 2002. "Welcome to Webster Park." http://www.co.monroe.ny.us/parks/. Accessed June 28, 2002.

Ref. 2.1-4 New York State Department of Environmental Conservation. "Northern Montezuma: Wildlife Management Area." www.dec.state.ny.us/website/reg8/wma/nmontez.html. Accessed June 7, 2002.

Ref. 2.1-5 Slaughter, L. "Slaughter Announces Federal Funding for Rochester Harbor and Ferry Facilities," Press Release. November 30, 2001. http://www.house.gov/slaughter/news/prs_01/harborfunding.htm

Ref. 2.1-6 Pataki, G. "Governor Pataki, Senator Schumer Announce Major Private Sector Investment in Rochester," Press Release. January 22, 2001.

Ref. 2.2-1 Carpenter S.R., J. Kitchell, and J. Hodgson. "Cascading Trophic Interactions and Lake Productivity." *BioScience*, Vol. 35, No. 10. 1985.

Ref. 2.2-2 Limno-Tech, Inc. Workshop Presentation, "Review of Annex 1 of the Great Lakes Water Quality Agreement." *Review of Annex 1 of the Great Lakes Water Quality Agreement*. Sponsored by the Parties Implementation Work Group of the Science Advisory Board of the International Joint Commission in collaboration with the Great Lakes Commission. The Michigan League. Ann Arbor, MI. March 21, 2001.

Ref. 2.2-3 Monroe County Water Authority. "2000 Water Quality Monitoring Program Summary." *MCWA 2000 Annual Water Quality Report*. 2001.

Ref. 2.2-4 Ontario Ministry of Natural Resources and New York State Department of Environmental Conservation. "Ecosystem Watch: Status of the Lake Ontario Ecosystem." 1994.

Ref. 2.2-5 Skinner, L. "Great Lakes Fisheries Commission - Lake Ontario Committee March 1996 Annual Meeting." 1996.

Ref. 2.2-6 Makarewicz, J.C. "New York's North Coast, a Troubled Coastline." Lake Ontario Embayments Initiative. 2000.

Ref. 2.2-7 Great Lakes Fishery Commission. *Strategic Vision of the Great Lakes Fishery Commission for the First Decade of the New Millennium*. Great Lakes Fishery Commission. Ann Arbor, MI. 2001.

Ref. 2.2-8 Mills, E.L., J. Tryninewski, M. Hoffmann, L. Rudstam, R. McCullough, D. Bishop, W. Pearsall, S. LePan, B. Trometer, B. Lantry, and R. O'Gorman. Section 23, "2001 Status of the Lake Ontario Ecosystem: A Biomonitoring Approach." *2001 Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee*. NYSDEC Division of Fish, Wildlife and Marine Resources. 2002.

Ref. 2.2-9 Eckert, T.H. Section 1, "Lake Ontario Stocking and Marking Program 2000." *2000 Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee*. NYSDEC Division of Fish, Wildlife and Marine Resources. 2001.

Ref. 2.2-10 Ontario Ministry of Natural Resources. Appendix A, "Fish Stocked in the Province of Ontario Waters of Lake Ontario in 2000." *Lake Ontario Fish Communities and Fisheries: 2000 Annual Report of the Lake Ontario Management Unit*. Picton, Ontario, Canada. 2001.

Ref. 2.2-11 O'Gorman, R., R. Owens, T. Eckert, B. Lantry. Section 12, "Status of Major Prey Fish Stocks in the U.S. Waters of Lake Ontario, 2001." *2001 Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee*. NYSDEC Division of Fish, Wildlife and Marine Resources. 2002.

Ref. 2.2-12 Haynes, J.M., T. Stewart, and G. Cook. "Benthic Macroinvertebrate Communities in Southwestern Lake Ontario Following Invasion of Dreissena: Continuing Change." *J. Great Lakes Res*. 25(4):828-838, Internat. Assoc. Great Lakes Res. 1999.

Ref. 2.2-13 Hoyle, J.A., J. Bowlby, and T. Schaner. "Lake Ontario Nearshore Fish Community. Part I. Fish Communities." *Lake Ontario Fish Communities and Fisheries: 2000 Annual Report of the Lake Ontario Management Unit*. Ontario Ministry of Natural Resources. Picton, Ontario, Canada. 2001.

Ref. 2.2-14 Rochester Gas and Electric Corporation. *Fish Impingement Program, 1997-2001 Analysis Report, Ginna Nuclear Power Station*. RG&E Report No. B-13-389. Rochester, NY. 2002.

Ref. 2.2-15 Rochester Gas and Electric Corporation. Ginna Station Fish Impingement Data from 1973 through 2002. Unpublished Data Analysis. 2002.

Ref. 2.2-16 Eckert, T.H. Section 4, "Summary of 1976 - 2001 Warm Water Assessment." *2001 Annual Report, Bureau of Fisheries, Lake Ontario Unit and St. Lawrence River Unit to the Great Lakes Fishery Commission's Lake Ontario Committee*. NYSDEC Division of Fish, Wildlife and Marine Resources. 2002.

Ref. 2.2-17 Bio Systems Research, Inc. *1977 Fish Egg and Larvae Program, Lake/Screenhouse Surveys, Ginna Nuclear Power Station*. RG&E Report No. B-13-058. Rochester, NY. 1978.

Ref. 2.2-18 Bio Systems Research, Inc. *1978 Ichthyoplankton Program, Lake/Screenhouse Surveys, Ginna Nuclear Power Station*. RG&E Report No. B-13-103. Rochester, NY. 1979.

Ref. 2.2-19 Klumb, R.A., L. Rudstam, E. Mills, C. Schneider, and P. Sawyko. "Importance of Lake Ontario Embayments and Nearshore Habitats as Nurseries for Larval Alewives (*Alosa pseudoharengus*) and Other Species." Unpublished (in review).

Ref. 2.3-1 Dames & Moore. *Site Evaluation Study, Proposed Brookwood Nuclear Power Plant, Ontario, New York, Rochester Gas and Electric Corporation*. New York, NY. 1965.

Ref. 2.4-1 Northeast Regional Climate Center. "Comparative Climatic Data for the United States - Normal Precipitation." http://met-www.cit.cornell.edu/ccd/nrmpcp.html. Accessed March 12, 2002.

Ref. 2.4-2 Rochester Gas and Electric Corporation. *R.E. Ginna Nuclear Power Plant, Updated Final Safety Analysis Report*. Rev. 16. April 2001.

Ref. 2.4-3 U.S. Environmental Protection Agency. *Green Book, Nonattainment Areas for Criteria Pollutants*. http://www.epa.gov/oar/oaqps/greenbk. Accessed April 16, 2002.

Ref. 2.4-4 U.S. Environmental Protection Agency. "(Ozone Only) Number of Days with AQI Values Greater than 100 at Trend Sites, 1991-2000." www.epa.gov/oar/aqtrnd00/pdffiles/aqi02.pdf. Accessed June 4, 2002.

Ref. 2.5-1 Dames & Moore. *Terrestrial Biological Survey, Nuclear Power Plant Site and Environs, Ginna Nuclear Power Station*. Ontario, NY. December 8, 1971.

Ref. 2.5-2 Pearsall, W. New York State Department of Environmental Conservation. Threatened and Endangered Fish. Personal communication with D. Money. January 7, 2002.

Ref. 2.5-3 Woodruff, D. New York State Department of Environmental Conservation. Threatened and Endangered Species. Personal communication with D. Money. October 22, 2001.

Ref. 2.6-1 Gingrich, T. Montezuma Wildlife Refuge (FWS). Threatened and Endangered Species at Montezuma Wildlife Refuge. Personal communication with C. Milligan. November 8, 2001.

Ref. 2.6-2 Traver, D. and D. Traver. Bird Survey Results. Personal communication with D. Wegman (RG&E). July 15, 2002.

Ref. 2.6-3 Rochester Gas and Electric Corporation. *Environmental Evaluation, R.E. Ginna Nuclear Power Plant*. Docket No. 50-244. Rochester, NY. 1983.

Ref. 2.7-1 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.

Ref. 2.7-2 U.S. Census Bureau. "Table P7. Race[8] – Universe Total Population," and "Table P4: Hispanic or Latino, and Not Hispanic or Latino by Race [73]- Universe: Total Population." (e.g., Block Group 1, Census Tract 201.01, Wayne County, New York. Data pulled for all block groups within 50-mile radius of Ginna Station site.) http://factfinder.census.gov/servlet/DTTable?_ts=35218690200. Accessed October 15, 2001.

Ref. 2.7-3 U.S. Census Bureau. "Census 2000 Housing Unit Count for American Indian Areas." http://quickfacts.census.gov/units/aia.html. Accessed July 2, 2002.

Ref. 2.7-4 U.S. Census Bureau. "Table DP-1. Profile of General Demographic Characteristics for New York: 2000." http://www.census.gov/Press-Release/www/ 2001/tables/dp_ny_2000.PDF. Accessed March 26, 2002. "Table DP-1. Profile of General Demographic Characteristics for New York: 1990." http://www.census.gov/Press-Release/www/2001/tables/dp_ny_1990.PDF. Accessed March 26, 2002.

Ref. 2.7-5 U.S. Census Bureau. "Summary Characteristics for Governmental Units and Standard Metropolitan Statistical Areas: New York, 1980." PHC80-3-34. Department of Commerce. Table 1: Summary of General Population Characteristics: 1980.

Ref. 2.7-6 U.S. Census Bureau. "GCT-Pa. Age, Sex, and Group Quarters: 1990." Geographic Area New York--County. http://factfinder.census.gov/servlet/BasicFactsTable?_lang=en&_vt_name=DEC_1990_STF1_GCTPA_ST2&_geo_id=04000US36. Accessed March 27, 2002.

Ref. 2.7-7 U.S. Census Bureau. "GCT-P5, Age and Sex: 2000," Geographic Area: New York—County. http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF1_U_GCTP5_ST2_geo_id=04000US36.html. Accessed January 28, 2002.

Ref. 2.7-8 U.S. Census Bureau. "Table DP-1. Profiles of General Demographic Characteristics for the United States: 2000." http://www.census.gov/Press-Release/www/2001/tables/dp_us_2000.PDF. Accessed March 26, 2002. "DP-1. Profiles of General Demographic Characteristics for the United States: 1990." http://www.census.gov/Press-Release/www/2001/tables/dp_us_1990.PDF. Accessed March 26, 2002. "Population, Housing Units, Area Measurements, and Density: 1790 to 1990." Table 2 in 1990 Census of Population and Housing, "1990 Population and Housing Unit Counts: United States," (CPH-2). http://www.census.gov/population/censusdata/table-2.pdf. Accessed April 9, 2002.

Ref. 2.7-9 U.S. Census Bureau. "GCT-P7, Households and Families: 2000." Geographic Area: New York—County. http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF1_U_GCTP7_ST2_geo_id=04000US36.html. Accessed January 28, 2002.

Ref. 2.7-10 U.S. Atomic Energy Commission. *Final Environmental Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1, RG&E Corporation, Docket No. 50-244*. Washington, D.C. December 1973.

Ref. 2.7-11 Center for Governmental Research. "Close-Up on the NYS Economy" (quarterly); Gardner, K. expert opinion, 6-6-02; ongoing CGR analysis of NYS Department of Labor data, Bureau of Economic Analysis data. 2002.

Ref. 2.7-12 U.S. Census Bureau. "Projections of the Total Population of States: 1995 to 2025." http://www.census.gov/population/projections/state/stpjpop.txt. Accessed March 26, 2002.

Ref. 2.7-13 Genesee Finger Lakes Regional Planning Council. "1997 County and Subcounty Population Projections." http://www.gflrpc.org/DTRCenter/1997.htm. Accessed June 5, 2002.

Ref. 2.7-14 U.S. Census Bureau. (NP-T1) "Annual Projections of the Total Resident Population as of July 1: Middle, Lowest, Highest, and Zero International Migration Series, 1999 to 2100." http://www.census.gov/population/projections/nation/summary/np-t1.txt. Accessed March 26, 2002.

Ref. 2.7-15 U.S. Census Bureau. "Population of Counties by Decennial Census: 1900 to 1990." http://www.census.gov/population/cencounts/ny190090.txt. Accessed March 27, 2002.

Ref. 2.7-16 Center for Governmental Research. "2040 Population Projections." Rochester, NY. 2002.

Ref. 2.7-17 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.

Ref. 2.7-18 U.S. Census Bureau. "P117. Poverty Status in 1989 by Age—Universe: Persons for Whom Poverty Status is Determined." (e.g., Block Group 1, Census Tract 9501, Genesee County, New York. 1990. Data pulled for all block groups within 50-mile radius of Ginna Station site.); http://venus.census.gov/cdrom/lookup/1017261225. Accessed October 18, 2001.

Ref. 2.8-1 New York State Department of Labor, Division of Research and Statistics. Covered Employment and Wages. Personal communication with C. Milligan. December 20, 2001, and January 24, 2002.

Ref. 2.8-2 New York State Department of Labor. "2001 Local Area Unemployment Statistics." www.labor.state.ny.us. Accessed January 28, 2002.

Ref. 2.8-3 Lilla, S. Director. Wayne County Planning Department. Personal communication with C. Milligan. November 2, 2001.

Ref. 2.8-4 Doyle, J.D. County Executive. "2002-2007 Capital Improvement Program, Physical Services Sector." 2001.

Ref. 2.9-1 Census Bureau. "GCT-H5: General Housing Characteristics: 2000." Geographic Area: New York –County. http://factfinder.census.gov/bf/_lang=en_vt_name=DEC_2000_SF1_U_GCTH5_ST2_geo_id=04000US36.html. Accessed January 28, 2002.

Ref. 2.9-2 Greater Rochester Association of Realtors. "2001 Real Estate Activity Report." http://www.homesteadnet.com/data/tbCounty_Home_Sales/52_dec2001.pdf. Accessed January 28, 2002.

Ref. 2.9-3 U.S. Census Bureau. "Housing Units Authorized By Building Permits, Table 3 – Metropolitan Areas." 2001. http://www.census.gov/const/www/C40/table3.html. Accessed January 28, 2002.

Ref. 2.10-1 New York State Office of Real Property Services. "How the Property Tax Works." http://www.orps.state.ny.us/pamphlet/taxworks.htm. Accessed March 14, 2002.

Ref. 2.10-2 Kane, D. Wayne County Administrator. "Wayne County Budget History 1992-2002." November 29, 2001.

Ref. 2.10-3 Buckalew, L. Accounting Department. Town of Ontario. Personal communication with Y. Abernethy. July 2, 2002.

Ref. 2.10-4 New York State Education Department. Fiscal Profiles Data and Narrative Directory. Office of Management Services, Fiscal Analysis and Research Unit. www.oms.nysed.gov/faru/profiles/profiles_cover.html. Accessed June 2002.

Ref. 2.10.5 Clark, D. Town Supervisor, Town of Ontario. Personal communication with C. Milligan. November 13, 2001.

Ref. 2.11-1 Wayne County, NY, Homepage. "Welcome to Wayne County." http://cgazette.com/common/standing/county/county.htm. Accessed June 6, 2002.

Ref. 2.11-2 U.S. Department of Agriculture, National Agricultural Statistics Service. "Agriculture Census for Wayne County, NY." http://govinfo.library.orst.edu/cgi-bin/ag-list?01-117.nyc. Accessed June 6, 2002.

Ref. 2.11-3 Monroe County, NY, Homepage. "Monroe County." www.co.monroe.ny.us. Accessed June 6, 2002.

Ref. 2.11-4 Genesee Finger Lakes Regional Planning Council. "Regional Development Analysis Report." 2002.

Ref. 2.11-5 Johnson, P. Monroe County Department of Planning. Monroe County land use planning efforts. Personal communication with S. Boyce. June 4, 2002.

Ref. 2.11-6 Stid, L. City of Rochester Community Development Department. Nature of development in the City of Rochester. Personal communication with S. Boyce. June 6, 2002.

Ref. 2.11-7 Lilla, S. Director, Wayne County Planning Department. Presence of Wayne County restrictions on growth. Personal communication with S. Boyce . November 8, 2001.

Ref. 2.12-1 Metzger, R. Monroe County Water Authority. Personal communication with C. Milligan. November 14, 2001.

Ref. 2.12-2 City of Rochester. "Hemlock Water Filtration Plant." http://cityofrochester.gov/8525656C0065941F/0/5AC9B0D8536767280525656F00052140?Open&Highlight=0,hemlock. Accessed March 8, 2002.

Ref. 2.12-3 Aman, M. Wayne County Water & Sewer. Personal communication with C. Milligan. March 18, 2002, and November 14, 2001.

Ref. 2.12-4 Wykle, R. Town of Ontario Water Utilities Department. Personal communication with J. Boushie. November 14, 2001.

Ref. 2.12-5 Lewis, T. Town of Williamson Water Department. Personal communication with J. Boushie. January 30, 2002.

Ref. 2.12-6 Bower, J. Town of Newark Wastewater Treatment. Personal communication with J. Boushie. February 12, 2002.

Ref. 2.12-7 Tyler, E. Town of Wolcott Water Department. Personal communication with J. Boushie. January 30, 2002.

Ref. 2.12-8 Bretinal, H. Lyons Village Water Department. Personal communication with J. Boushie. March 18, 2002.

Ref. 2.12-9 Census TIGER File. CGR GIS & Technical Services Division. “Enhanced TIGER,” CGR maintained file. 2002.

Ref. 2.12-10 Calliper Corporation, 1999. Calliper Data CD. “U.S. Streets ’99.” Acquired 2001.

Ref. 2.12-11 Saracen, S. Ontario-Midland. Personal communication with S. Boyce regarding use of rail lines in Wayne County. June 26, 2002.

Ref. 2.12-12 Vanderlin, R. Wayne County Highway Department. Traffic volumes and size of county roads surrounding Ginna Station. Personal communication with S. Boyce. June 10, 2002.

Ref. 2.12-13 Pennella D. New York State Department of Transportation. The volume/capacity ratios of state roads surrounding Ginna Station. Personal communication with S. Boyce. June 7, 2002.

Ref. 2.12-14 Bittner, K. New York State Department of Transportation. Definition of surface ratings. Personal communication with J. Boushie. March 13, 2002.

Ref. 2.12-15 New York State Department of Transportation. “Highway Characteristics and Condition Data.” 2002.

Ref. 2.13-1 National Register Information System. National Register of Historic Places. www.nr.nps.gov. Accessed July 10, 2002.

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)

Rochester Gas and Electric Corporation (RG&E) proposes that the U.S. Nuclear Regulatory Commission (NRC) renew the R.E. Ginna Nuclear Power Plant (Ginna Station) operating license for an additional 20-year period, through September 18, 2029. Renewal would provide RG&E and the State of New York the option of relying on Ginna Station to meet the State's future needs for electricity generation. Section 3.1 provides a general description of plant design and operating features. Sections 3.2 through 3.4 address changes in aging management activities that will be required to support operations during the operating license renewal period.

3.1 General Plant Information

Ginna Station is owned and operated by RG&E whose principal offices are located in Rochester, New York. Ginna Station provides about 40 percent of the electrical load in the RG&E service territory, located primarily in upstate western New York, centered on the Rochester metropolitan area. The plant is located on the south shore of Lake Ontario (approximately 20 miles east of Rochester) and the site consists of 488 acres, including about one and one-half miles of shoreline.

General information about design and operational features of Ginna Station that are of interest from an environmental impact standpoint is available in several documents. Among the most comprehensive sources are the Final Environmental Statement (FES) prepared by the NRC's predecessor agency, the U.S. Atomic Energy Commission (AEC), and the Updated Final Safety Analysis Report (UFSAR), prepared and maintained by RG&E. The AEC issued an FES, in 1973, that addressed operation of Ginna Station (Ref. 3.1-1). RG&E maintains a UFSAR that provides current design information for the plant (Ref. 3.1-2). The NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) presents that agency's requirements regarding general plant information relevant to license renewal (Ref. 3.1-3). RG&E used these documents and other sources as a basis for the plant descriptive information presented in the remainder of Section 3.1.

3.1.1 Major Facilities

The arrangement of Ginna Station's major structures, including the reactor containment, auxiliary building, intermediate building, control building, turbine building, screenhouse, all-volatile-treatment (AVT) or condensate demineralizer building, standby auxiliary feedwater pump building, and the service building

containing offices, shops, and laboratories is shown in Figure 2.1-3. Additionally, the old steam generator storage facility is located northwest of the plant.

The screenhouse, located 115 feet north of the turbine building and 80 feet south of the Lake shore, contains the traveling screens, circulating water pumps, service water pumps, fire water pumps, plant heating boiler, the chlorination system, and some safety-related equipment.

Ginna Station has a nuclear reactor of a pressurized water type (i.e., a pressurized water reactor, or PWR) and has the capability to produce 490 net megawatts of electric power. The reactor containment is a vertical, cylindrical reinforced-concrete type with pre-stressed tendons in the vertical wall, a reinforced-concrete ring anchored to the bedrock, and a reinforced hemispherical dome. The major components of the reactor coolant system are located within the containment structure. The containment structure provides a physical barrier to protect the equipment from natural disasters and shielding to protect personnel from radiation emitted from the reactor core while at power. The reactor vessel is located in the center of the containment structure below ground level.

3.1.2 Nuclear Steam Supply System

The Ginna Station nuclear steam supply system consists of a PWR and its associated coolant system supplied by Westinghouse (Ref. 3.1-2, Section 5.1.1). The system is designed as two identical heat-transfer closed loops, each of which includes a reactor coolant pump and a steam generator connected to the reactor vessel. The system also includes a pressurizer, pressurizer relief tank, connecting piping, and instrumentation needed for operational control. Highly purified water, to which chemicals are added to control corrosion and to moderate the nuclear reaction, circulates under high pressure through the reactor and the tube side of the steam generators in these closed loops, called the primary system. Heat from the reactor is transferred to highly purified, treated water in the shell side of the steam generators to produce high-pressure saturated (less than 0.1 percent quality) steam that is routed through the steam turbines, condensed back to water in the main condensers, and pumped back to the steam generators, thus making up a secondary cooling loop isolated from the primary system.

The reactor was initially licensed to operate at a maximum power level of 1,300 megawatts-thermal. On the basis of additional safety and environmental evaluations, however, the AEC issued a license amendment (Amendment No. 2), March 1, 1972, to allow operation at the system's full-rated power level of 1,520 megawatts-thermal (Ref. 3.1-2, Section 1.1).

The Ginna Station reactor is licensed to use uranium-dioxide fuel that has a maximum enrichment of 5.0 percent by weight uranium-235 (Ref. 3.1-2, Section 9.1.2.1.2). Typical average enrichment is 4.20 percent by weight uranium-235.

The reactor core is composed of fuel rods fabricated with cylindrical, uranium-dioxide ceramic pellets enclosed in 144-inch-long cylindrical, zircaloy or ZIRLO tubes with welded end plugs. The 179 fuel rods are fabricated into 14 x 14 array fuel

assemblies with end fittings and grids to support and limit motion of the tubes. There are 121 of these fuel assemblies in the reactor core. The core also contains absorber rods made of silver-indium-cadmium, arranged in 29 control-element assemblies, to control the nuclear reaction.

RG&E regularly replaces about one-third (44) of the fuel assemblies in the reactor core at approximately 18-month intervals. The approximate maximum average burn-up for a fuel sub-batch discharged from the reactor core is less than 55,000 megawatt-days per metric ton uranium.

3.1.3 Cooling and Auxiliary Water Systems

3.1.3.1 Water Use Overview

Lake Ontario is the source for cooling and most auxiliary water systems. Ginna Station utilizes a once-through condenser cooling system with a submerged offshore intake and a surface shoreline discharge. The total nominal flow of circulating water through the turbine condenser and service water systems is about 354,600 gallons per minute (gpm). A flow of approximately 340,000 gpm is used in the turbine condenser system and the rest is available for use in the service cooling supply and fire protection systems. The water from these two systems is combined and is released to the discharge canal, which discharges into Lake Ontario. The circulating water system (condenser cooling system) is a completely separate system from the closed secondary system. The circulating water system also contains a condensate cooler that is used to cool condensate to the hydrogen coolers and air ejectors. In addition, domestic-quality water, at a flow of about 100,000 gallons per day, is purchased from the Ontario Water District, Town of Ontario, for drinking, sanitary purposes, auxiliary boiler feed, and condensate makeup and polishing. Sanitary waste from Ginna Station is discharged into the Town of Ontario New York's waste water treatment system.

3.1.3.2 Circulating Water System

The function of the circulating water system is to provide a reliable supply of water to condense the steam exhausted from the low-pressure turbines. The water source and heat sink for the circulating water system is Lake Ontario. The circulating water system functions to remove heat from the steam cycle via the main condensers and is designed to do so regardless of weather or Lake conditions. The system consists of an offshore intake structure designed specifically to minimize the possibility of clogging, an inlet tunnel, four traveling screens, two circulating water pumps, and shoreline discharge via a short discharge canal.

The intake structure is located 3,100 feet out from shore at a depth of about 33 feet of water at mean lake level, 244.7 feet, and is completely submerged below the surface of the Lake. Even an occurrence of historical low water level will result in no less than 15 feet of water covering the intake structure. The intake itself is an octagonal-shaped structure, 50.8 feet across, containing electrically heated screen racks in each of the eight 17.3-foot-wide by 10-foot-high ports. Heavy screen racks with bars spaced 10-14 inches apart, center to center, prevent large objects from

entering the system. At conditions of full flow (354,600 gpm) the velocity at the intake screen racks is 0.8 feet per second. Water enters the intake from all sides in a circle, protecting against stoppage by a single, large piece of material. The low velocity plus the submergence provide assurance that floating ice will not plug the intake. The only phenomenon that might contribute to the plugging would be the accumulation of frazil ice on the screen racks. Frazil ice is a type of spiny, crystallized ice that forms on objects in a turbulent stream of supercooled water. To minimize such a formation, the bars have been separated 10 inches to 14 inches on center, making it unlikely that frazil ice could support itself over a span of this distance. The electric heaters keep the metal bars above 32 degrees Fahrenheit (°F), thus minimizing the adhesive characteristics of frazil ice to metal surfaces.

To meet the high reliability requirements, the intake system is completely submerged below the surface of the Lake. A 10-foot diameter, reinforced-concrete-lined tunnel driven through bedrock extends 3,100 feet in a northern direction from the shoreline. From the intake, the tunnel slopes downward over its 3,100-foot length for a total elevation decrease of 10 feet. From underneath the screenhouse, the tunnel rises vertically and connects to a reinforced-concrete inlet plenum, or forebay, in the screenhouse. Warm water recirculation is provided in the screenhouse inlet forebay to temper the inlet water temperature and melt any ice that might reach or form at this point.

Before the cooling water reaches the two circulating water pumps that send it through the condensers, the water passes through one of four parallel traveling screens. The four originally installed traveling screens were fitted with steel wire mesh, having 3/8-inch openings, and are similar in concept to vertical conveyor belts. In an effort to enhance performance and durability, the original mesh has been replaced with 3/16-inch by 1-inch rectangular, stainless steel crimped-fit mesh on two of the four traveling screens. The mesh on the remaining screens is scheduled to be replaced with the new mesh by the end of 2003. The screens, which remove fish and debris from the cooling water system, are operated sequentially, each being washed for 15-20 minutes. There is at least one traveling screen in operation at all times when at least one of the circulating cooling water pumps is operating. The screens can operate at two speeds, slow and fast, and in two modes, automatic and manual. Service water is used to flush the debris off the screens into a 1.3-foot wide and up to 2.0-foot deep concrete trough, or screen washwater discharge fish/debris sluice. It runs from the four traveling screens to the discharge canal and has four turns, all greater than 145^{o} and more than 17 feet apart. Currently, water travels through the sluice at a flow rate of 40 gpm while the screens are in operation. All fish and debris, excluding collections during the impingement studies, are returned to Lake Ontario via this sluice.

Water leaves the condensers and discharges into two condenser discharge tunnels, which are each 8-feet wide and 7-feet high and are rectangular in shape. They run west 95 feet and then north towards the discharge canal. Six feet north of the turbine building the two tunnels direct flow into two 96-inch pre-stressed, reinforced-concrete pipes. These two pipes run 160 feet and enter the discharge canal at the

bottom of a seal well. The purpose of a seal well is to provide a water seal and prevent air from entering the condensers via the discharge lines. The floor rises gradually from the seal well (231.5 feet) to an elevation of 238 feet. This elevation is maintained throughout the rest of the canal. The discharge canal is on the north side of the screen house and is 40-feet wide. The canal is rectangular and is constructed of reinforced concrete. At a lake elevation of 246 feet, the discharge canal has an average water depth of 8 feet and the discharge flow velocity is 2.34 feet per second. The canal has a recirculation weir that can direct warm discharge water into the screenhouse inlet forebay, as previously discussed. The canal then turns north and extends another 35 feet, where it enters Lake Ontario at the shoreline. This last 35 feet is lined with armour stones. The discharge canal is protected from large debris by a submarine net placed inside the canal near the shoreline.

The thermal discharge from the Ginna Station once-through cooling water system is directed into Lake Ontario from the shoreline discharge canal onto the surface of the Lake. Normal temperature increase over ambient water at the point of discharge is about 20^{o}F, and the size of the thermal plume is normally about 175 acres. A complete description of the thermal discharge and related environmental impacts is contained in the Ginna Station Section 316(a) demonstration (Ref. 3.1-4).

3.1.3.3 Service Water System

The service water system consists of four service water pumps located in the screen house. They are two-stage, vertical turbine pumps (original specified rating of 5,300 gpm). Between 1995 and 1997, all four original 300-horsepower (hp) motors were replaced with 350-hp motors that have anti-reverse-rotation devices. The service water system circulates Lake Ontario water from the screenhouse to various heat exchangers and systems inside the containment and the auxiliary, intermediate, turbine, and diesel generator buildings. The service water system supplies cooling water to various turbine, as well as auxiliary reactor, plant loads. It provides multiple water source flow paths to ensure the availability of the ultimate heat sink. All portions of the service water distribution system serving safeguards equipment are designated as Seismic Category I. All other portions of the service water system serving non-safety loads are designated as non-seismic and are capable of being isolated from the Seismic Category I portion of the system through the use of redundant motor-operated isolation valves.

The preferred service water discharge flow path is to the discharge canal, then Lake Ontario. An alternate service water discharge flow path exists via a discharge structure to Deer Creek. This path is used very infrequently, primarily during surveillance testing or when maintenance work is required in the preferred service water discharge path. When in use, flows are documented in the monthly Discharge Monitoring Report submitted to the New York State Department of Environmental Conservation (NYSDEC). The only special limitation imposed on use of the alternate discharge flow path is that chlorine injection is not allowed, since this would be an unmonitored release point.

3.1.3.4 Treated Water System

The treated water system comprises the following secondary plant subsystems: demineralized water production; domestic (potable) water; secondary water chemical treatment; and non-radioactive liquid waste disposal (floor drains, secondary sample effluents, etc.). The treated water subsystems are non-safety related auxiliary systems that support the functionality of other process systems.

The principal components of the treated water system are pumps, tanks, ion exchange vessels, and the essential piping, hoses, and valves necessary for the subsystems to function. The primary water treatment system or mobile demineralizer trucks process domestic water to provide demineralized water to the reactor makeup water tank, the component cooling water surge tank, the condensate storage tanks, and various local locations throughout the plant via a piping distribution network. The AVT chemistry system uses chemical addition and ion exchange to treat condensate water in order to reduce the corrosion of equipment in the secondary system and minimize the fouling of heat transfer surfaces. The AVT regeneration wastes are collected in neutralization tanks and sampled to determine disposition methods. The catalytic oxygen removal system reduces condensate-dissolved oxygen by mixing hydrogen with the condensate and reducing the free oxygen to water by exposing the mixture to a metal catalyst surface. The secondary plant equipment and floor drains serve to route leakage from equipment and compartments in order to provide proper control of leakage, prevent uncontrolled communication between areas as necessary, and to allow monitoring of leakage prior to disposition. Where drains from safety-related areas are tied into drains from areas that contain a large quantity of flammable liquid, backflow protection is provided to prevent possible spread of a liquid fire via the drain system. An underground retention tank is the collection point for the various building floor and equipment drains, and provides retention of these effluents for sampling and treatment prior to discharging into the circulating water discharge.

3.1.3.5 Groundwater Monitoring Program

Ginna Station does not use groundwater in any of its water systems. There are no production wells on the site. However, RG&E has established a groundwater monitoring program. In the early 1990s, the presence of trace amounts of boric acid and radionuclides was discovered in the groundwater in the immediate vicinity of Ginna Station. The levels detected were consistent with the water content of the spent fuel pool and transfer canal.

RG&E initiated a program to (1) assess the leakage source, (2) determine the most probable groundwater flow direction, (3) initiate a monitoring program for tracking any potential offsite releases, and (4) evaluate the potential impact on plant equipment.

It was determined that the leakage of about 0.1 gpm emanated from welds in the transfer canal. Leakage occurs only when the transfer canal is filled with water, which occurs only during a small portion of each refueling outage. A sampling and

monitoring plan was initiated in 1996, and groundwater sampling was proceduralized. Data collected indicate groundwater flow is toward the Lake and that a conservative estimate of the total tritium released from the site into groundwater discharged to Lake Ontario is 0.002 curies. This value represents approximately 0.001 percent of the total average annual tritium (160 curies) released from Ginna Station. The tritium levels measured in the onsite groundwater wells are below the drinking water limits specified in 40 CFR 190.

Because of the negligible impact of this leakage, RG&E considers it acceptable to retain this arrangement and to continue the monitoring program to ensure continued regulatory compliance by monitoring these small release levels (Ref. 3.1-5).

3.1.4 Power Transmission Systems

Ginna Station generates electricity at 19 kilovolts (kV). This voltage is stepped up to 115kV at Ginna Station and is transmitted 0.6 miles, by four 115kV underground cables, to Substation 13A. Substation 13A is located south of the Ginna Station site on the south side of Lake Road. As shown on Figure 2.1-2 four 115kV overhead transmission lines (Circuits 908, 911, 912, and 913) emanate from Substation 13A and run approximately 3-1/2 miles in a southerly direction to connect to the transmission grid at Substation 204 (Fruitland), which is on the south side of New York State Route 104. These lines are supported on wooden structures with two lines per structure—Circuits 908 and 913 are on one set of structures and Circuits 911 and 912 are on the second set of structures. Only Circuits 908, 911, 912, and 913 were built as a direct result of Ginna Station construction, startup, and operation. There is a fifth 115kV line (Circuit 909) emanating from Substation 13A that serves as a distribution line and is located on its own structure on the east side of the transmission corridor. RG&E has not made any modifications to either the transmission corridor or the transmission lines since original installation.

The 500-foot-wide transmission corridor from Ginna Station to Substation 204 is entirely owned by RG&E. The portion of the corridor between Substation 13A and Substation 204 is in the Town of Ontario, Wayne County, and has road crossings at Brick Church Road, Kenyon Road, Slocum Road, and NYS Route 104. Locked gates limit corridor access at roadways. Land use in this area is predominantly agricultural with only a few homes adjacent to the transmission corridor.

The transmission corridor is characterized by low grasses with trees at the edge of the transmission corridor. RG&E has a New York State Public Service Commission-approved long-range vegetation management plan. This plan embodies the use of selected management techniques to foster the goal of maintaining a low-growing vegetative community.

Inspection of the 115kV lines from Substation 13A to Substation 204 occurs on a regular basis. Ongoing transmission corridor surveillance and maintenance of the facilities ensure continued conformance to design standards. RG&E performs semi-annual high-speed helicopter inspections and annual comprehensive low-speed helicopter inspections. RG&E also performs a comprehensive ground-level inspection of the 115kV circuits and the transmission corridor every 5 years. When

defects or deficiencies are found, critical defects are addressed as soon as possible with arrangements made through the Energy Control Center and Ginna Station. The Energy Control Center is responsible for the integrity of the electric transmission system while Ginna Station Operations is responsible for the integrity of Ginna Station. Any corrections as a result of critical defects have to be made with the appropriate holding authority keeping in mind the integrity of the electric transmission system and the Ginna Station. Non-critical maintenance issues are addressed during Ginna Station refueling and maintenance outages. These helicopter patrols and ground-level inspections confirm that there are no corridor encroachments and ensure that such encroachments are dealt with in an appropriate and timely manner.

Within the next few years, RG&E plans to extend Circuit 909 to Substation 121 (Quaker Road). This project will address current energy delivery issues (increased load growth in western Wayne County and eastern Monroe County) and is not related to the license renewal and continued operation of Ginna Station.

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. 3.1-3, Section 2.6.3.1, page 2-41.) ["SMITTR" defined at GEIS Section 2.4, page 2-30, as surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping]

In the GEIS (Ref. 3.1-3, Section 3.1 and Appendix B, Table B.2), the NRC identifies refurbishment activities that utilities might perform for license renewal. Performing such major refurbishment activities would necessitate changing administrative control procedures and modifying the facility. The 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 license renewal refurbishment activities that the NRC anticipated utilities might undertake. In identifying these activities, the GEIS 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 utility would undertake these activities solely for the purpose of extending plant operations beyond 40 years and would undertake them during the refurbishment period. The GEIS indicates that many plants will have undertaken various major refurbishment activities to support the current license period but that some plants might undertake such tasks only to support extended plant operations.

RG&E has performed some major construction activities at Ginna Station (e.g., steam generator replacement, seismic piping upgrade). However, the Ginna Station Integrated Plant Assessment that RG&E has conducted under 10 CFR Part 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 Ginna Station license renewal period or any other modifications related to license renewal. Therefore, no refurbishments or modifications have been identified that would directly affect the environment or plant effluents.

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. 3.1-3, Section 2.6.3.1, page 2-41.) ["SMITTR" defined at GEIS Section 2.4, page 2-30, as surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping]

Appendix A of this Ginna License Renewal Application contains RG&E's proposed license renewal-related amendments to the UFSAR. In accordance with NRC requirements [10 CFR 54.21(d)], the proposed amendments contain a description of the programs and activities for managing the effects of aging at Ginna Station. In addition to describing existing programs, the proposed amendments describe proposed modifications (enhancements) to existing programs and proposed new programs and activities.

3.4 Employment

3.4.1 Current Workforce

The Ginna Station facility currently employs approximately 500 people on a full-time basis, augmented by an additional 700-person workforce during outages. More than 80 percent of the normal operating workforce is composed of RG&E employees. Approximately 48 percent of the full-time employees lives in Wayne County and 44 percent in Monroe County. The remaining 8 percent is distributed among 10 counties, with 2.5 percent in Ontario County, 1.6 percent in Livingston County, and 1 percent or less in each of the other counties (Ref. 3.1-6).

RG&E refuels Ginna Station on an 18-month schedule. During refueling outages, site employment increases by as many as 700 workers for temporary (30 to 40 days) duty. These numbers are within the GEIS range of 200 to 900 additional workers per reactor outage.

3.4.2 License Renewal Increment

Performing the license renewal surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping (SMITTR) activities referred to in Section 3.3 could necessitate increasing Ginna Station staff workload by some increment. The size of this small increment would be a function of the schedule within which RG&E must accomplish the work and the amount of work involved.

In the GEIS, the NRC assumes that each nuclear power plant license renewal would be for a 20-year period plus the remaining duration of the current license and that the NRC would issue the renewal approximately 10 years prior to current license expiration. In other words, the renewed license would be effective for 30 years. The NRC determined that the utility would initiate SMITTR activities at the time of issuance and would conduct license renewal SMITTR activities throughout the remaining 30-year life of the plant, sometimes during full-power operation (Ref. 3.1-3, Section B.3.1.3) but mostly during normal refueling, and during 5-year and 10-year in-service inspections during refueling outages (Ref. 3.1-3, Table B.4).

RG&E has determined that the NRC's scheduling assumptions in the GEIS are reasonably representative of the Ginna Station incremental license renewal workload scheduling. Many Ginna-specific license renewal SMITTR activities would have to be performed during outages. Although some Ginna Station license renewal SMITTR activities would be one-time efforts, others would be recurring, periodic activities that would continue for the life of the plant.

The NRC estimates in the GEIS that no more than 60 additional personnel would be needed to perform license renewal SMITTR activities during the three-month duration of a 10-year in-service inspection refueling outage. Having established this upper value for what would be a single event in 20 years, the NRC uses this number 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…"(Ref. 3.1-3).

RG&E expects that existing capabilities for routine activities such as outages will enable plant staff to perform the increased SMITTR workload without adding Ginna Station personnel. However, for the purpose of performing its own bounding analyses in this environmental report, RG&E is adopting the NRC's GEIS approach and is assuming that Ginna Station would require no more than a total of 60 additional permanent workers to perform license renewal SMITTR activities.

Adding full-time employees to the plant workforce for continued operation during the license renewal period would have the indirect effect of creating additional jobs and related population growth in the community. Using 1999 data, RG&E calculated a regional employment multiplier appropriate for the electric services sector in the combined-county area of Monroe and Wayne Counties with IMPLAN 2.0. RG&E has used the calculated multiplier, 1.668, to estimate the number of direct and indirect jobs supported by additional Ginna Station employees that might be needed during the license renewal period. Applying the multiplier, a total of 100 (60 × 1.668) new jobs would be created in the Monroe and Wayne combined-county area, where total employment in 2000 was slightly over 426,700 persons. These 100 new direct and indirect jobs represent 0.01 percent of current total employment in the two counties (Ref. 3.1-7). In summary, RG&E is assuming that 60 additional permanent direct workers during the license renewal period would create an additional 40 indirect jobs in the community.

These 100 new jobs (60 direct and 40 indirect) could result in a population increase of 308 in the area [100 jobs multiplied by 3.08 average number of persons per household in the Wayne and Monroe combined-county area (Ref. 3.1-8)]. This increase represents less than 0.05 percent of the population in 2000 (829,108 persons) for the combined-county area.

3.5 References

Ref. 3.1-1 U.S. Atomic Energy Commission. *Rochester Gas & Electric Corporation. Docket No. 50-244*. *Final Environmental Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1.* Washington, D.C. 1973.

Ref. 3.1-2 Rochester Gas and Electric Corporation. *R.E. Ginna Nuclear Power Plant, Updated Final Safety Analysis Report*. Rev. 16. April 2001.

Ref. 3.1-3 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.

Ref. 3.1-4 Rochester Gas and Electric Corporation. Ginna Nuclear Power Plant, 316(a) Demonstration Supplement, NPDES Permit No. 0070 0X2 2 000079 (NY 0000493). RG&E Report No. BP-13-043. Rochester, NY. March 1977.

Ref. 3.1-5 Rochester Gas and Electric Corporation. *Spent Fuel Pool Leakage Release Path Assessment*. SEV-1123. Rochester, NY, Rev. 00. April 1999.

Ref. 3.1-6 Rochester Gas and Electric Corporation. Numbers of employees at Ginna Station. Personal communication with P. Sawyko. June 2002.

Ref. 3.1-7 Rumage, W. New York State Department of Labor, Division of Research and Statistics. Covered Employment and Wages. Personal communication with C. Milligan. December 20, 2001, and January 24, 2002.

Ref. 3.1-8 U.S. Census Bureau. "GCT-P7, Households and Families: 2000;" Geographic Area: New York -- County. http://factfindercensus.gov/bf/_lang=en_vt_name=DEC_2000_SF1_U_GCTP7_ST2_geo_id=04000US36.html. Accessed January 28, 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)

4.1 Introduction

Chapter 4 presents an assessment of the environmental consequences and potential mitigating actions associated with the renewal of the R.E. Ginna Nuclear Power Plant (Ginna Station) operating license. 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, Subpart A, Appendix B, Table B-1) 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 Ginna Station environmental report lists the 92 issues with their NRC-assigned categorizations, and identifies the environmental report and GEIS sections that address each issue. For those issues not applicable to Ginna Station, 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).

Rochester Gas and Electric Corporation (RG&E) has determined that of the 69 Category 1 issues, 12 do not apply to Ginna Station because they apply to design, operational, or location features that do not exist at the facility. These features include cooling water discharges in coastal areas, use of cooling towers, and use of cooling ponds. In addition, because RG&E 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 Ginna Station refurbishment impacts and do not apply. RG&E 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 Ginna Station. Therefore, RG&E adopts by reference the NRC findings for the 50 Category 1 issues that RG&E determined to be applicable to Ginna Station.

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 Ginna Station. These issues and their bases for exclusion are presented in the following table.

	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 Ginna Station is not equipped with cooling ponds or cooling towers.
33.	Groundwater use conflicts (potable, service, and dewatering; plants that use greater than 100 gallons per minute)	Not applicable because Ginna Station does not use groundwater (no dewatering; potable and service water are from municipal supply that draws from surface water sources).
34.	Groundwater use conflicts (plants using cooling towers withdrawing makeup water from a small river)	Not applicable because Ginna Station is not equipped with cooling towers.
35.	Groundwater use conflicts (Ranney wells)	Not applicable because Ginna Station does not use Ranney wells.
39.	Groundwater quality degradation (cooling ponds at inland sites)	Not applicable because Ginna Station is not equipped with cooling ponds.

Sections 4.2 through 4.15 of this environmental report address the Category 2 issues applicable to Ginna Station and the 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, the section explains the basis for this conclusion.

If the subject Category 2 issue has been determined by RG&E to be applicable to Ginna Station, 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 license for Ginna Station and discuss potential mitigative alternatives when applicable and to the extent required. RG&E has determined that 16 Category 2 issues warrant this detailed discussion. For each, RG&E 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, RG&E 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 impact finding definitions did not apply to two issues. RG&E included these issues in Appendix A to this environmental report. The NRC noted that applicants currently do not need to submit information on chronic effects from electromagnetic fields (10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 5). For the other NA issue, environmental justice, the NRC does not require information from applicants but noted that it will be addressed in individual license renewal reviews (10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 6). RG&E has included an environmental justice analysis in Section 4.16, along with supporting demographic information in Section 2.7.3.

4.2 Intake System Impacts

4.2.1 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 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 4.2.2.1.2). 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.

The SPDES permit and related correspondence, provided in Appendix B to this report, constitute State permits and documentation equivalent to a Clean Water Act 316(b) determination. Items 1 through 5 of the Additional Requirements in the SPDES permit address the 316(b) determination and approve RG&E's request pursuant to section 316(b) for the duration of the permit.

Entrainment sampling of Ginna Station intake waters for ichthyoplankton (fish eggs and larvae) was done during the years 1976 through 1981. The results of this sampling were used to develop annual entrainment number projections by species and lifestage. During this six-year period, fish egg entrainment projections averaged 89,000,000 per year, with a range of 14,000,000 to 168,000,000. Corresponding fish larvae numbers averaged 17,000,000, with a range of 7,000,000 to 37,000,000. Alewives (*Alosa pseudoharengus*), smelt (*Osmerus mordax*), and darters (*Etheostoma spp.*) were consistently found to be the principal larval species entrained, with alewives always strongly predominant.

As discussed in Section 2.2, RG&E conducted studies of ichthyoplankton in Lake Ontario during 1977 and 1978, and focused on characterizing the Lake ichthyoplankton population near the Ginna Station site as well as Ginna Station entrainment/Lake population interactions (Ref. 4.2-1 and 4.2-2). More recently, Lake

Ontario ichthyoplankton studies, conducted in 1997 and 1998 by Cornell University (Ref. 4.2-3), found the Lake ichthyoplankton population to be similar to that identified in RG&E's 1977 and 1978 surveys.

Fish species identified in the 1977 and 1978 entrainment studies generally corresponded to the species found in the Lake ichthyoplankton studies conducted during those same years. In both years alewives numerically dominated the ichthyoplankton and entrainment findings. Smelt and johnny darters (*Etheostoma nigrum*) were the next two most numerous species entrained, while carp/goldfish (*Cyprinus carpio*/*Carassius auratus*) were entrained in much reduced numbers relative to their rank in the ichthyoplankton studies.

The 1977 and 1978 studies confirmed that the entrainment situation at Ginna Station reflects the site ichthyoplankton community. The 1997 and 1998 studies showed that the Lake ichthyoplankton population is similar in community structure to that found at Ginna Station in 1977 and 1978, and is relatively similar along the entire Lake Ontario southern shoreline. Based upon these facts, RG&E concludes that the entrainment impacts of Ginna Station operations during the license renewal period will not be substantially different from those previously evaluated and approved within the State Pollution Discharge Elimination System (SPDES) permit process. As part of the current SPDES permit program, the New York State Department of Environmental Conservation (NYSDEC) has regularly reviewed the impacts of the Ginna Station intake system and has determined that further mitigative efforts are not warranted at this time. This is supported by Additional Requirement 1 of the current Ginna Station SPDES Permit and the September 1999 correspondence from NYSDEC, as provided in Appendix B.

As part of RG&E's communication with regulatory agencies and interested parties concerning this Ginna Station License Renewal environmental report, NYSDEC provided comments concerning entrainment at Ginna Station. RG&E believes that these comments will be appropriately addressed within the current Ginna Station SPDES permit process (see Section 9.1.5).

4.2.2 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 to the issue;

impingement impacts are small at many plants, but might be moderate or large at a few plants. 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.

The SPDES permit and related correspondence, provided in Appendix B to this report, constitute State permits and documentation equivalent to a Clean Water Act 316(b) determination. Items 1 through 5 of the Additional Requirements in the SPDES permit address the 316(b) determination and approve RG&E's request pursuant to section 316(b) for the duration of the permit.

Impingement has been extensively monitored and impingement impacts evaluated at Ginna Station each year since 1973. The Ginna Station SPDES Permit has always included a requirement for impingement monitoring and the submittal of annual reports detailing the subject year's program and assessing the results.

Impingement impact assessments for Ginna Station have developed over the years in consultation with NYSDEC. Since 1982, one of two assessment types is conducted depending upon species and population information available. For alewife and smelt, the total annual projected number impinged is compared to the Lake Ontario (New York waters) population for that species and year as reported by NYSDEC and the U.S. Fish and Wildlife Service (FWS). RG&E then calculates the percentage of the Lake population impinged and makes a determination of impact, which is reported to NYSDEC. Since Lake population information is not available for other species, a qualitative approach must be used, primarily utilizing Lake information provided by NYSDEC. This is the same information used to describe the current status of the Lake fishery in Section 2.2.

The annual percentages of the Lake Ontario alewife and smelt populations impinged by Ginna Station each year, for the period 1982 through 2001, are presented in Table 4.2-1. The 19-year average percentages impinged for alewives and smelt are 0.00100 and 0.00084, respectively. The maximum percentages for both species were about 0.00330, occurring in 1984. Using the maximum values, these findings show that only about three alewives for every 100,000 in the New York waters of Lake Ontario, and three smelt for every 100,000 in the New York waters of Lake Ontario would be impinged. The most recent RG&E Impingement Program Report (Ref. 4.2-4) states:

> ... RG&E concludes that impingement of alewives at Ginna Station should not impact the alewife population in Lake Ontario. This is based upon the fact that the impingement impact, i.e., the percentage of alewives impinged versus the total lake population, per year, is very low and must be considered negligible.

This conclusion is repeated with respect to smelt.

As previously stated, the impact determinations regarding impingement upon other species are limited to qualitative evaluations since there are no estimates of their populations within Lake Ontario. Section 2.2 discusses the overall lakewide

Table 4.2-1
Annual Percentages of Lake Ontario Alewife and Smelt Populations Impinged at Ginna Station

Year	Alewife (%)	Smelt (%)
1983	0.00108	0.00080
1984	0.00326	0.00330
1985	0.00246	0.00220
1986	0.00077	0.00248
1987	0.00070	0.00031
1988	0.00004	0.00016
1989	0.00016	0.00008
1990	0.00243	0.00035
1991	0.00022	0.00017
1992	0.00262	0.00057
1993	0.00046	0.00008
1994	0.00054	0.00027
1995	0.00014	0.00013
1996	0.00163	0.00127
1997	0.00172	0.00038
1998	0.00032	0.00023
1999	0.00026	0.00018
2000	0.00014	0.00280
2001	0.00003	0.00012
MIN	0.00003	0.00008
AVG	0.00100	0.00084
MAX	0.00326	0.00330

Source: Ref. 4.2-5.

reductions in fish populations as reported by NYSDEC through their annual assessments within the Eastern Basin of Lake Ontario (see Figures 2.2-1 and 2.2-2). Correspondingly, Ginna Station impingement numbers have declined substantially throughout the past 29 years (see Figure 2.2-2). The alewife and smelt impingement data indicate that the percentage of the Lake population impinged is fairly constant and reflective of the number available in the Lake. Given that no site-specific population data exist for other species impinged, it is reasonable to conclude that impingement of species other than alewife and smelt would also be some constant proportion of the fish available in the area. This is consistent with the impingement data, which show generally decreasing numbers, similar to what is being reported for the Lake over all.

In 1999, RG&E received correspondence from NYSDEC (see Appendix B) regarding the Department's review of the 1998 Ginna Station Impingement Program Report. In the September 22, 1999, letter NYSDEC states: "In light of this recent work and the degree of impact revealed through the monitoring program, the Department does not consider it necessary to pursue additional mitigative actions at the Ginna or Russell Power Stations at this time." Given this statement by NYSDEC and the continued Ginna Station impingement monitoring, RG&E concludes that the impingement impacts of Ginna Station operations will not be substantially different from those previously evaluated and approved within the SPDES process.

Impingement studies have consistently demonstrated that Ginna Station intake system operations have an extremely limited and minimal impact upon alewife and smelt populations. Likewise, impingement of other species has been consistent with lakewide trends and indicates no localized impacts. Based upon these facts, RG&E concludes that impingement impacts from Ginna Station operations during the license renewal period will not be substantially different from those previously evaluated and approved within the SPDES permit process. As part of the current SPDES permit program, NYSDEC has regularly reviewed the impacts of the Ginna Station intake system and has determined that further mitigative efforts are not warranted at this time. This is supported by Additional Requirement 1 of the current Ginna Station SPDES Permit and the September 1999 correspondence from NYSDEC, as provided in Appendix B.

As part of RG&E's communication with regulatory agencies and interested parties concerning the Ginna Station License Renewal environmental report, NYSDEC has provided additional comments concerning impingement at Ginna Station that further support the 1999 determinations. RG&E believes that these comments will be appropriately addressed within the current Ginna Station SPDES permit process. Further discussion is provided in Section 9.1.5.

4.2.3 Summary of Entrainment and Impingement Impacts

RG&E's SPDES permit for Ginna Station constitutes the State's equivalent Clean Water Act 316(b) determination. The findings of the Ginna Station Entrainment and Impingement Programs, along with corresponding site surveys of the adjacent area of Lake Ontario, all describe the fish communities that interact with the Ginna Station

intake system and, hence, may be impacted by its operation. The extensive impingement monitoring conducted by RG&E over the past 29 years provides a pertinent method of tracking the local populations over time, as well as allowing comparisons to concurrent changes in the Lake Ontario ecosystem as documented by NYSDEC, FWS, and others.

These studies, in conjunction with other lakewide assessments, confirm that any impact of operational water withdrawal will be upon a typical Lake Ontario nearshore fish community, common to most areas along the Lake's southern shoreline. Considering all data, RG&E concludes that the limited area affected by the Ginna Station operations will have negligible impact upon the identified species.

This conclusion is based, in part, on quantitative analysis, such as in the case of alewife and smelt impingement, and in part on qualitative analyses evaluating entrainment/impingement numbers and trends in light of known Lake Ontario information and ecosystem knowledge. RG&E believes that this "negligible impact" can best be put into perspective by comparison with some clearly significant changes that have occurred within Lake Ontario over the past 25-30 years. These changes, described in Section 2.2 and summarized below, are both man-made and natural in origin, but regardless of origin all have had significant impacts upon Lake Ontario resulting in dramatic and measurable changes in the ecosystem that greatly overshadow any impacts caused by operation of the Ginna Station intake system:

1. The water quality initiatives of the Clean Water Act and the Great Lakes Water Quality Agreement have reduced the productivity of Lake Ontario dramatically. This action has resulted in phenomenal water clarity and substantially reduced numbers of organisms at all trophic levels.
2. The Lake Ontario Salmonid Stocking Program originally reduced excessive alewife and smelt populations, and then continued to put such pressure on these populations that this forage base was put in jeopardy of collapse. In response, the stocking program was extensively cut back in the early 1990s.
3. The invasion of exotic species, especially *Driessena spp.*, have further clarified the water, changed biological energy pathways from the water column to the lake bottom, and reportedly changed lake benthic communities.

These three examples have resulted in measurable, significant impacts to Lake Ontario and demonstrate a dominating influence upon the entire Lake Ontario ecosystem. In contrast, the minor, localized impacts associated with Ginna Station intake system operation are considered inconsequential in nature. RG&E also notes that power plant operations have never been identified in any of the assessments analyzing the above three impacts, indicating intake system impacts have made no significant contribution. Nevertheless, RG&E has historically attempted to minimize impacts of Ginna Station operations upon the Lake to the greatest extent possible, and will continue this approach into the future. RG&E further believes that such Lake Ontario management efforts and natural uncertainties will continue throughout the Ginna Station License Renewal term. Therefore, RG&E concludes that Ginna

Station intake system impacts [entrainment (Issue 25) and impingement (Issue 26)] from continued operation during the license renewal period will continue to have a negligible effect on the local and lakewide fish communities and are SMALL.

Based upon the evaluations and conclusions discussed above, RG&E concludes that the operation of the Ginna Station intake system during the period of license renewal will have negligible, acceptable impacts upon fish eggs, fish larvae, and the entire fish community in the Ginna Station area of Lake Ontario and in Lake Ontario over all.

4.3 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 part 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.

RG&E originally submitted information in support of a Section 316(a) variance for Ginna Station July 30, 1974, and August 23, 1974. This original information was prepared and submitted prior to formal regulatory guidance being available; however, RG&E believed that such a submittal was necessary in anticipation of statutory requirements. On April 1, 1977, RG&E submitted the Ginna Nuclear Power Plant, 316(a) Demonstration Supplement (Ref. 4.3-1), which was prepared in accordance with U.S. Environmental Protection Agency (EPA) guidelines and is generally referred to as the Ginna 316(a) Demonstration. Correspondence documenting agreements between EPA and RG&E concerning the content of the Ginna 316(a) Demonstration is contained within the Supplement.

The potential for heat shock to fish was thoroughly analyzed within the Ginna Station 316(a) Demonstration and was not found to be a potential problem. RG&E concluded that:

> This supplement demonstrates that the shoreline surface discharge of the Ginna Nuclear Power Plant assures the protection and propagation of a balanced indigenous aquatic community as exemplified by the Representative Important Species at the Ginna Site (Ref. 4.3-1, p. xiii).

Operational experience has supported this conclusion, in that no heat-shock-related environmental concerns have ever been associated with Ginna Station operations.

Approval of the Section 316(a) variance was first documented by NYSDEC within the Ginna SPDES Permit effective May 1985, and in each subsequent SPDES Permit issued to Ginna Station NYSDEC has re-affirmed its original approval. In the current SPDES Permit (see Appendix B), Additional Requirement 6 states:

> The thermal discharge from this facility shall ensure the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on Lake Ontario. In this regard the Department has approved the permittee's request for alternative effluent limitations pursuant to Section 316(a) of the Clean Water Act for the five year life of the permit. The effluent limitations in this permit reflect this approval. The water temperature at the surface of Lake Ontario shall not be raised more than three Fahrenheit degrees over the temperature that existed before the addition of heat of artificial origin except that in a mixing zone consisting of an area of 320 acres from the point of discharge, this temperature may be exceeded.

As part of RG&E's communication with regulatory agencies and interested parties concerning the Ginna License Renewal environmental report, the NYSDEC provided comments concerning heat shock at Ginna Station. The NYSDEC comments pertain to the effect of exposing impinged fish to the elevated temperatures of the discharge canal and request a brief evaluation of this situation.

RG&E believes that two primary aspects need to be considered regarding the return of impinged fish to the discharge canal. One is the temperature rise to which the fish are subjected and the other is their residence time within the elevated temperatures of the discharge flow. The Ginna 316(a) Demonstration (Ref. 4.3-1) provides information that can assist in assessing both of these issues, namely, discharge flow rates and temperatures as well as fish thermal tolerance temperatures for selected species.

Discharge velocities range from two to five feet per second in the area of the discharge where impinged fish are returned. The fish return sluice enters the discharge canal near its centerline, about 100 feet from the discharge point of entry into the Lake. Therefore, fish would be subjected to an elevated temperature for approximately 20-50 seconds, at which time they could access cooler waters either within the discharge plume or return to ambient temperature water outside the boundaries of the plume. Upper lethal threshold temperatures for representative fish species and conditions were found to be within normal discharge temperature ranges (Ref. 4.3-1). Based upon this information, it is reasonable to conclude that a fish subjected to discharge temperatures for less than a minute would not be adversely affected. If a fish were disoriented upon entry into the discharge waters, it would be carried within the plume flow as it moves out into the Lake and incrementally cools with distance until ambient temperature is reached in the open Lake.

On the basis of these considerations, RG&E concludes that heat shock impacts (Issue 27) from continued operation of Ginna Station in the license renewal period would continue to be SMALL and, because the standard-setting process provides for minimizing environmental impact, further mitigation to support operation through the license renewal period would not be warranted.

4.4 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 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, RG&E has no plans for major refurbishment or other license renewal-related construction activities at Ginna Station.

4.5 Threatened or 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 2.2 and 2.5 describe aquatic and terrestrial habitats on and in the vicinity of the Ginna Station site and along the transmission line corridor of concern. Section 2.6 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 Ginna Station. 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, RG&E has no plans to conduct major refurbishment or construction activities at Ginna Station 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 2.6 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 endangered or threatened species are known to inhabit or frequent the site or 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 threatened and endangered species from continued plant operation is highly unlikely on the basis of plant operational history. In particular, there has been no perceptible impact on the population of any threatened or endangered species during the 30-year operation of Ginna Station.

RG&E has initiated contacts with FWS and NYSDEC regarding Ginna Station 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, RG&E concludes that impact to threatened and endangered species from continued operation of Ginna Station in the license renewal period (Issue 49) would be SMALL, and mitigation would be unwarranted.

4.6 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 additional staff 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 number of workers expected to be employed during the refurbishment outage (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.

Ginna Station is not located in or near a nonattainment or maintenance area. Detailed analysis is not required for this issue because, as Section 3.2 discusses, RG&E has no plans for major refurbishment at Ginna Station.

4.7 Electric Shock from Transmission Line-induced Currents

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, the NRC could not determine the significance of the electric 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 115/138kV level (Ref. 4.1-1, Sections 2.2.7 and 4.5.1). The GEIS also specifies that the transmission line of concern is located between the plant switchyard and the intertie to the transmission system. Information to be ascertained includes: (1) change in line use and voltage since last analysis; (2) conformance with NESC® (1991) standards; and (3) the potential change in land use along the transmission lines since the initial NEPA review.

The NESC® specifies minimum vertical clearances to the ground for electric lines. For electric lines operating at voltages exceeding 98kV alternating current (AC) to ground (Ref. 4.7-1), 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 degrees Fahrenheit (°F).

The transmission lines from the plant run underground to Substation 13A, which is located just south of Lake Road (County Route 101). Since these cables are grounded, there is no issue concerning shock from induced currents. The 115kV (phase to phase) transmission lines from Substation 13A and Substation 204 are above ground and are rated 66.4kV phase to ground. Given the phase-to-ground voltage is well below the NESC® provision, RG&E does not anticipate public health impacts from electric-field-induced shock.

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.

To support this conclusion, RG&E performed field measurements to confirm compliance with the NESC® 5mA electric-field-induced current limit.

First, the RG&E field survey confirmed that there are no structures in or next to the transmission corridor that connects Ginna Station and Substation 204 (Ref. 4.7-2). Second, RG&E field measurements for electric-field-induced currents ranged from 0.015mA to 0.9mA, well below the 5mA limit established by the NESC®. These measurements were taken at a height of 18 feet 6 inches, which bounds the largest anticipated vehicular object to pass underneath the lines. The largest vehicle allowed on New York State highways by regulation is a tractor-trailer with a maximum height of 13 feet 6 inches.

As discussed previously, the transmission lines associated with the Ginna Station and within the scope of NRC license renewal environmental review are below the size of concern for induced shock, and field measurements demonstrate the electric-field-induced currents are well below the NESC® recommendations for preventing electric shock from induced currents. Therefore, RG&E concludes the impact of electric shock (Issue 59) is of SMALL significance. Due to the small significance of the issue, mitigation measures are not warranted.

4.8 Housing Impacts

NRC

The environmental report must contain " …An assessment of the impact of the proposed action on housing availability…" 10 CFR 51.53(c)(3)(ii)(l)

"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

"…[S]mall 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 that the NRC could not predict for all plants at the time of GEIS publication (Ref. 4.1-1, Section 3.7.2). Local conditions to be ascertained are: (1) population categorization as small, medium, or high; and (2) applicability of growth control measures.

4.8.1 Refurbishment

Refurbishment activities and continued operations could result in housing impacts due to increased staffing. As described in Section 3.2, RG&E does not plan to perform major refurbishment activities in association with Ginna Station license renewal. RG&E concludes that there would be no refurbishment-related impacts to area housing and, therefore, no analysis is required.

4.8.2 License Renewal Term

As described in Section 2.7, the Ginna Station site is located in a high population area. Wayne and Monroe Counties, as noted in Section 2.11, are not subject to growth control measures that limit housing development. At 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 located in "high" population areas where growth control measures are not in effect. Therefore, RG&E concludes impacts to area housing would be small.

This conclusion is supported by the following site-specific housing analysis. The maximum impact to area housing is calculated using the following assumptions: (1) all direct and indirect jobs would be filled by in-migrating 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 described in Section 3.4, approximately 92 percent of the total number of Ginna employees resides in Wayne and Monroe Counties. Therefore, the focus of the housing impact analysis is on these two counties. As described in Section 3.4, RG&E's conservative estimate of 60 license renewal employees could generate the demand for 100

housing units (60 direct and 40 indirect jobs). If it is assumed that 92 percent of the 100 new workers would locate in the Wayne- and Monroe-County areas, consistent with current employee trends, a need for 92 new housing units would be created. In an area with a population of over 829,108 and vacancy rates of just under 10 percent in Wayne and 5.8 percent in Monroe, this additional housing demand would not create a discernible change in housing availability, change rental rates and housing values, or spur housing construction or conversion. Therefore, consistent with the NRC's conclusion in the GEIS, RG&E concludes that housing impacts from continued operations (Issue 63) would be SMALL. Given the magnitude of the impact, mitigative measures are not necessary.

4.9 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)(l)

"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 an increased problem with water availability may occur in conjunction with plant demand and plant-related population growth as a result of current water shortages in some areas (Ref. 4.1-1, Section 4.7.3.5). Local information needed would include: (1) a description of water shortages experienced in the area; and (2) 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 discussed in Section 3.2, RG&E plans no major refurbishment in association with license renewal, so plant demand would not be affected by major refurbishment activities.

The impact to the local water supply systems resulting from plant-related population growth can be determined by calculating the amount of water that would be required by these individuals. As described in Section 3.4, RG&E's conservative estimate of 60 license renewal employees could generate a total of 100 new jobs. This could result in an additional 100 new households or approximately 308 additional people in the area (based on the average household size). For this analysis, it is assumed half of the new households will be located in Monroe County and half will be in Wayne County.

The Monroe County Water Authority (MCWA) estimates that each household in its system uses approximately 250 gallons of water per day. Using this consumption rate, the plant-related population increase in Monroe County (50 households) would require approximately 12,500 gallons per day. The MCWA has an excess of 20 million gallons per day (Ref. 4.9-1).

The water supply system in Wayne County, comprising six municipal suppliers, has a combined capacity of 12.9 million gallons per day and a peak usage of 6.8 million gallons per day. The Wayne County Water and Sewer Authority estimates that the

average water usage by residential customers (i.e., individual families) is 150-200 gallons per day. Using this consumption rate, the plant-related population increase in Wayne County (50 households) would generate increased water demand of 10,000 gallons per day. The excess capacity in the systems in the County is 6.1 million gallons per day (Ref. 4.9-2). Both Monroe and Wayne Counties have sufficient excess capacity in their water systems to handle the 100 additional families.

Therefore, RG&E concludes that the impacts resulting from plant-related population growth to the public water supply (Issue 65) would be SMALL, and would not warrant mitigation.

4.10 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)(l)

"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

"…[S]mall 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 generally 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 project-related enrollment increases above 8 percent…." (Ref. 4.1-1, Section 3.7.4.1)

The NRC made impacts to education 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 described in Section 3.2, RG&E does not plan to perform major refurbishment activities at Ginna Station in association with license renewal. RG&E concludes that there would be no refurbishment-related impacts to education and, therefore, no analysis is required.

4.11 Offsite Land Use

4.11.1 Refurbishment

NRC

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

"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 as a result of 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.

As described in Section 3.2, RG&E does not plan to perform major refurbishment activities at Ginna Station in association with license renewal. RG&E concludes that there would be no refurbishment-related impacts to offsite land use and, therefore, no analysis is required.

4.11.2 License Renewal Term

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)(l)

"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). In the GEIS, the NRC presents an analysis of offsite land use for the renewal term that is characterized by two components, population-driven and tax-driven impacts (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. [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).] In Section 3.4.2, the assumed population growth associated with the license renewal term represents less than 0.05 percent of the 2000 population in the Wayne and Monroe County area. Based on GEIS case study analysis, the NRC concluded that 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 (Ref. 4.1-1, Section 3.7.5). RG&E agrees with this conclusion and, therefore, will only address potential tax-driven land-use impacts in this subsection.

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.

As described in Section 3.2, no major refurbishment or construction activities will be associated with Ginna Station license renewal. RG&E, therefore, does not anticipate any new tax payments that would influence offsite land use. As shown in Table 2.10-1, RG&E annual property tax payments to Wayne County for Ginna Station represented approximately 6.4 percent of the County's total annual property tax revenues for the period 1995 through 2001. For the same period, RG&E's payments to the County represented approximately 2.0 percent of Wayne County's annual total revenues. RG&E annual property tax payments to the Town of Ontario averaged 13.2 percent of the annual budget during the same period. Tax payments to the Wayne Central School District averaged 12.4 percent of total revenues for the period 1995 through 1999. Ginna tax payments have constituted a decreasing percentage of the three taxing jurisdictions' total revenues since 1995. RG&E expects this trend to continue into the future, with Ginna tax payments soon representing 10 percent or less of the taxing jurisdictions' total budgets.

The NRC has determined that the significance of tax payments is small if payments are less than 10 percent of a taxing jurisdiction's total revenues, moderate if payments are 10 percent to 20 percent of revenues, and large if payments represent greater than 20 percent of revenues (Ref. 4.1-1, Section 4.7.2.1). The NRC has further determined that if a plant's tax payments are projected to be small, license renewal tax-driven land-use changes would most likely be small with very little new development and minimal changes to the area's land-use patterns. If payments are projected to be moderate to large relative to the community's total revenue, new tax-

driven land-use charges would be moderate (Ref. 4.1-1, Section 4.7.4.1). Tax-driven land-use charges would most likely be small given that Wayne County and the Town of Ontario have established development patterns and are growing at relatively slow rates. RG&E concludes that tax-driven land-use impacts (Issue 69) would be SMALL and mitigative measures would not be warranted.

4.12 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 the 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 impact significance is determined primarily by 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). 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 described in Section 3.2, RG&E does not plan to perform major refurbishment activities at Ginna Station in association with license renewal. RG&E concludes that there would be no refurbishment-related impacts to local transportation and, therefore, no analysis is required.

As noted in Section 2.12.2, access to Ginna is via County Route 101 (Lake Road). New York State (NYS) Route 104 is an important east-west route for employees commuting to and from the site. Though LOS designation is not readily available for roads in New York State, the volume/capacity ratios can be used to associate current traffic conditions for the roads used by employees commuting to Ginna Station with the LOS designations. Table 4.12-1 presents the LOS definitions used by the NRC in the GEIS (Ref. 4.1-1) and presents a breakdown of the volume/capacity ratios used to approximate correlation of the available data for roads used to access the Ginna Station site to the LOS designations.

Correlating LOS designations with volume/capacity ratios, LOS ratings of A through D could be roughly related to ratios values less than 1.0. LOS ratings of E and F would roughly correlate to volume/capacity ratios of 1.0 and greater than 1.0, respectively. Using information presented in Section 2.12.2, Table 4.12-2 lists the sections of roadways that are most likely used by employees commuting to and from Ginna Station and for which data are available, the respective volume/capacity ratios, and the LOS rating equivalents.

Table 4.12-1
Level of Service Definitions

Level of Service[a]	Conditions[a]	Volume/ Capacity Ratios[b]
A	Free flow of the traffic stream; users are unaffected by the presence of others.	0 - 0.20
B	Stable flow in which the freedom to select speed is unaffected but the freedom to maneuver is slightly diminished.	0.21 - 0.4
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.	0.41 - 0.6
D	High-density, stable flow in which speed and freedom to maneuver are severely restricted; small increases in traffic will generally cause operational problems.	0.61 - 0.8
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.	0.81 - 1.0
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.	greater than 1.0

a. Ref. 4.1-1, Section 3.7.4.2.

b. RG&E estimates the volume/capacity ratio range by LOS category by dividing the range evenly over the number of categories.

Table 4.12-2
Likely Commuter Routes

Road Section	Volume/Capacity Ratio	LOS Rating
NYS Route 104		
East of Ontario to NYS Route 21	0.7 to 0.9	D to E
West of Ontario to Monroe County border	0.3	B
Wayne County border to NYS Route 250	0.3 to 0.57	B to C
NYS Route 250		
County Road 101 to Webster	0.1 to 0.4	A to B
In Webster	0.4 to 0.8	B to D
South of Webster	0.5	C
NYS Route 350 from NYS Route 104 to Macedon	0.2 to 0.4	A to B
NYS Route 21 from NYS Route 104 to Palmyra	0.2 to 0.3	B

LOS = level of service
NYS = New York State

In GEIS Section 3.7.4.2, the NRC concluded that LOS designations of A and B are associated with small impacts, LOS designations of C and D are associated with moderate impacts, and LOS designations of E and F are associated with large impacts.

As noted in Section 2.12.2, NYS Route 104 serves as the primary east-west corridor in this area, as indicated by the volume of traffic. Traffic volume ranges from 20,000 to 40,000 with the higher volumes existing near the entrance to Monroe County. Much of NYS Route 104 in the vicinity of the Ginna Station operates well below capacity, while some of the two-lane portions east of the Town of Ontario are characterized as near capacity. However, traffic volumes drop off dramatically on north-south routes crossing NYS Route 104 that provide access to County Route 101 (Lake Road) and subsequently to Ginna Station. Volume capacity ratios available for these roads indicate that flow on these roads is much less than capacity.

The bounding scenario of 60 additional license renewal staff represents less than 3 percent of the traffic volume on Lake Road, and if it is assumed that all employees used Ontario Center Road to access the site from NYS Route 104, an increase of 60 additional cars represents less than 1 percent of the volume. The north-south routes for which capacity information is available indicate that these roads are well below capacity (less than 50 percent) and are roughly analogous to LOS designations of A/B. Therefore, under the bounding scenario, RG&E anticipates that an additional

60 employees during the period of extended operations would not significantly impact flow conditions on the roads providing direct access to the site, and concludes that impacts to transportation (Issue 70) would be SMALL. Given the magnitude of the impact, mitigation measures such as increased traffic controls would not be warranted.

4.13 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 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 described in Section 3.2, RG&E does not plan to perform refurbishment activities at Ginna Station in association with license renewal. Therefore, RG&E concludes that there would be no refurbishment-related impacts to historic and archaeological resources and, therefore, no analysis is required.

No archaeological or historic sites or artifacts of significance have been identified at or in close proximity to the Ginna Station. No known archaeological or historic sites of significance have been identified on the transmission line corridor. Therefore, continued use of transmission lines and the associated corridor are projected to cause little or no impact.

RG&E has initiated discussions with the SHPO regarding Ginna Station license renewal, and the SHPO has determined that it is unlikely that historical properties would be affected by this undertaking. Copies of the correspondence with the SHPO are provided in Appendix D of this environmental report.

RG&E notes that appropriate care will be taken to protect archaeological and historic resources should any land-clearing or ground-disturbing activities be undertaken in previously undisturbed areas during the period of continued operations. RG&E concludes that continued operation would have no adverse impacts to historic resources; hence, there would be no impacts to mitigate. Because the definition of

"small" includes impacts that are not detectable, the appropriate characterization of the impact on historic and archaeological resources (Issue 71) is SMALL.

4.14 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 Ginna Station, 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 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 E.

4.14.1 Methodology Overview

The methodology used to perform the Ginna Station SAMA cost-benefit analysis is based primarily on the handbook used by the NRC to analyze the benefits and costs of its regulatory activities, NUREG/BR-0184 (Ref. 4.14-1), subject to Ginna Station-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, RG&E 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 this SAMA analysis:

- Establish the Base Case – Use NUREG/BR-0184 and the current Ginna Station probabilistic safety assessment (PSA) model 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 Ginna Station PSA model to determine the total accident frequency, which is 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 valuation of $2,000 per person-rem and present-worth discount factor.

  - Offsite economic costs – Monetary value of damage to offsite property:

    Use the Ginna Station PSA model to determine total accident frequency (core damage frequency and containment release frequency); MACCS to convert release input to offsite property damage; and 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 valuation of $2,000 per person-rem and 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:

  Ginna Station PSA 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; and NRC and industry documentation discussing potential plant improvements.

- Disposition of SAMAs – Eliminate candidates based on cost-benefit analysis:

  - SAMA impacts – Calculate impacts (i.e., onsite/offsite dose and damages) by using the plant model 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 can 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, if any, and implementation plans or bases for not implementing.

The RG&E SAMA analysis for Ginna Station is presented in the following sections. These sections provide a detailed discussion of the process presented above.

4.14.2 Establishing the Base Case

The purpose of establishing the base case is to provide the baseline for determining the risk reductions (benefits) that would be attributable to the implementation of potential SAMAs. The primary source of data relating to the base case is the Ginna Station PSA model. Severe accident risk is calculated through use of the Ginna Station PSA model and the MACCS2 Level 3 model. The Ginna Station PSA model uses PSA 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 Ginna Station PSA model includes internal events (e.g., loss of feedwater event, loss-of-coolant accident), external events (fires and flooding), and shutdown events. The model has been upgraded since completion of the Individual Plant Examination

and Individual Plant Examination for External Events (Ref. 4.14-2; Ref. 4.14-3; Ref. 4.14-4; Ref. 4.14-5), and it has been significantly modified to accommodate generic and plant-specific operating data, as well as risk-important plant design and procedural changes implemented since 1994 (e.g., relocation of service water piping to avoid battery room floods and steam generator replacement). Appendix Section E.1 provides additional information pertaining to the evolution of the Ginna Station PSA model, the current risk profile for the station, and risk-important modifications.

The Ginna Station PSA model describes the results of the first two levels of the Ginna Station probabilistic risk assessment for the plant. These levels are defined as follows: Level 1 determines core damage frequencies based on system analyses and human-factor evaluations; and 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.

Using the results of these analyses, the next step is to perform a Level 3 PSA analysis, which calculates 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 analysis, whereas the magnitude of the onsite impacts (in terms of cleanup and decontamination costs and occupational dose) are based on information provided in NUREG/BR-0184. The principal phenomena analyzed are: atmospheric transport of radionuclides; mitigating actions (i.e., evacuation, condemnation of contaminated crops and milk) based on dose projection; dose accumulation by a number of pathways, including food and water ingestion; and economic costs. Input for the Level 3 analysis includes the reactor core radionuclide inventory, Ginna Station source terms (as applied to the Ginna Station PSA model), site meteorological data, projected population distribution (within a 50-mile radius) for the year 2030, emergency response evacuation modeling, and economic data. Appendix Section E.2 describes the MACCS2 input data, assumptions, and results.

4.14.2.1 Offsite Exposure Costs

The Level 3 base case analysis shows an annual offsite exposure risk of 4.09 person-rem. This calculated value is converted to a monetary equivalent (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 NRC standard formula (Ref. 4.14-1):

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

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 plant 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 C value, approximately 10.76. The resulting monetary equivalent is $88,000.

4.14.2.2 Offsite Economic Costs

The Level 3 analysis shows that the offsite property loss factor multiplied by accident frequency yields an annual offsite economic risk of $24,100. 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 $259,000.

4.14.2.3 Onsite Exposure Costs

Values for occupational exposure associated with severe accidents are not derived from the Ginna Station PSA model, but instead are 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 ten-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):

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

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 Ginna Station's accident risk is:

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

$$= 3300 * F * \$2000 * \frac{1 - e^{-.07*20}}{.07}$$

The core damage frequency (CDF) for the base case is 3.97E-05 per year; therefore,

W_{IO} = $3,000

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:

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

$$= \left(F_S \times 20000\right) \$2000 * \frac{1 - e^{-.07*20}}{.07} * \frac{1 - e^{-.07*10}}{.07*10}$$

The CDF (F) for the base case is 3.97E-05 per year; therefore,

W_{LTO} = \$12,000

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) is equivalent to:

$W_O = W_{IO} + W_{LTO}$ = \$15,000

4.14.2.4 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) [MW(e)] reference plant.

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

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 a 490 MW(e) Ginna Station versus 910 MW(e) for the "generic" reactor, U_{RP} = $4.25E+09

Repair and Refurbishment

RG&E 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 (3.97E-05/year). Therefore, the total onsite economic cost is $630,000.

4.14.2.5 Maximum Attainable Benefit

The present-dollar value equivalent for severe accidents at Ginna Station is the sum of the offsite exposure costs, offsite economic costs, onsite exposure costs, and onsite economic costs. Table 4.14-1 lists each of these values for the base case as calculated in the previous sections. As shown, the monetized value of severe accident risk is approximately $992,000.

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 $992,000.

4.14.3 SAMA Identification

RG&E identified candidate modifications by focusing on station risk and design characteristics. RG&E considered insights into possible Ginna Station-specific improvements gained through the development and use of the Ginna Station PSA model over the past decade. RG&E focused on the dominant risk sequences identified by the model, as well as the results of other risk-importance studies to further focus the evaluation. Appendix Section E.1 provides details of the Ginna Station risk profile. Additional insights were gained from reviewing candidate modifications identified in previous license renewal SAMA evaluations submitted to the NRC by other licensees. As conceptual modifications were formulated, RG&E balanced the order-of-magnitude cost against the maximum attainable benefit. Those conceptual ideas whose cost would greatly exceed the maximum attainable benefit were not considered further.

4.14.4 Cost-Benefit Analysis

The cost-benefit analysis involved developing Ginna Station-specific SAMA descriptions and cost-benefit analyses for the viable candidate SAMAs. RG&E developed general descriptions as to how each potential SAMA would be implemented to provide a basis for bounding benefit and cost estimates. Each SAMA description provides the analysts with a detailed description that can be compared with the current plant configuration and processes. Appendix Section E.3 provides a description for each candidate SAMA.

Table 4.14-1
Estimated Present Dollar Value Equivalent
for Severe Accidents at Ginna Station

Parameter	Present Dollar Value
Onsite Economic Costs	$630,000
Offsite Economic Costs	$259,000
Onsite Exposure Costs	$15,000
Offsite Exposure Costs	$88,000
Total	**$992,000**

RG&E 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 4.14.2, RG&E 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 be a change in the Ginna Station 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 Ginna Station severe accident risk after implementation of each SAMA was calculated using the same methodology as for the base case. A spreadsheet was then used to combine the results of the Level 2 model with the Level 3 model to calculate the post-SAMA risks. The results of the benefit analysis for each of the SAMAs are presented in Section 4.14.5.

As described above for the base case, values for avoided public and occupational health risk (benefits) were converted to a monetary equivalent (dollars) via application of the NRC's conversion factor of $2,000 per person-rem (Ref. 4.14-1)

[2] Frequency x consequence = risk.

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 (COE) was derived by knowledgeable Ginna Station staff. RG&E staff prepared screening level plant-specific cost estimates that address the major cost considerations for implementing each SAMA. Additional detail for the candidate SAMA cost estimates is provided in Appendix Section E.3.

4.14.5 Results

RG&E used Revision 4.1 of the Ginna Station PSA model (dated May 2002) and developed a limited Level 3 model to conduct the SAMA analysis. Using these models, RG&E analyzed eight plant-specific alternatives for mitigating Ginna Station severe accident impacts. Table 4.14-2 presents the analysis results, including the percentage of CDF reduction, the estimated benefit, the estimated cost of the enhancement, and the net benefit for each of the candidate SAMAs evaluated. The cost-benefit evaluation indicates four candidate SAMAs are potentially cost beneficial for mitigating the consequences of a severe accident. These include:

- Obtaining a skid-mounted 480-volt (V) diesel generator (SAMA No. 1).
- Obtaining a third fire water source independent of the existing suction source for motor-driven and diesel-driven fire pumps (SAMA No. 2).
- Modifying procedures to allow charging pumps B and C to be manually aligned to Bus 14 (SAMA No. 4).
- Modifying air-operated valve (AOV) 112C to fail closed and AOV 112B to fail open on loss of instrument air (SAMA No. 7).

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

Table 4.14-2
Disposition of SAMAs Related to Ginna Station

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
1	Obtain a skid-mounted 480V diesel generator	14.8%	$813,000	$400,000	Positive net benefit of $413,000. Implementation would potentially mitigate all station blackout sequences. (Using a 3 percent discount rate, the net benefit is $739,000.)
2	Obtain a third fire water source independent of existing suction source for the motor- and diesel-driven fire pumps	5.5%	$303,000	$200,000	Positive net benefit of $103,000. Implementation would potentially mitigate the loss of all auxiliary feedwater due to failure of the service water suction source or a global failure of the screenhouse equipment due to fire or flooding. (Using a 3 percent discount rate, the net benefit is $224,000.)
3	Add a standby charging pump powered from a protected AC source	14.8%	$118,000	$1,100,000	Negative net benefit of $982,000. [Using a 3 percent discount rate, the net benefit is ($933,000).]
4	Modify procedures to allow charging pump B or C to be manually aligned to Bus 14	12.0%	$100,000	$20,000	Positive net benefit of $80,000. Implementation would potentially mitigate fires requiring entry into procedure “Alternative Shutdown for Control Complex Fire” or mitigate fires that would disable train B when the A charging pump fails to run. (Using a 3 percent discount rate, the net benefit is $122,000.)
5	Add redundant check valves in the two RHR injection lines to the RCS	3.3%	$844,000	$1,000,000	Negative net benefit of $156,000. (Using a 3 percent discount rate, the net benefit is $179,000.)

Table 4.14-2 (continued)
Disposition of SAMAs Related to Ginna Station

SAMA No.	Potential Enhancement	CDF Reduction	Estimated Benefit	Estimated Cost of Enhancement	Screening Result and Discussion
6	Modify motor-driven AFW pump cooling system to be independent of SW	5.8%	$40,000	$200,000	Negative net benefit of $160,000. [Using a 3 percent discount rate, the net benefit is ($143,000).]
7	Modify AOV 112C to fail closed and AOV 112B to fail open on loss of instrument air	6.3%	$63,000	$50,000	Positive net benefit of $13,000. Implementation would eliminate the need for manual operator actions on low VCT levels. (Using a 3 percent discount rate, the net benefit is $39,000.)
8	Reconfigure the PORVs so they transfer automatically from instrument air to N2 on low pressure and convert N2 supply line AOV to DC powered motor-operated valve	0.9%	$7,000	$400,000	Negative net benefit of $393,000. [Using a 3 percent discount rate, the net benefit is ($390,000).]

AC = alternating current
AFW = auxiliary feedwater
AOV = air-operated valve
CDF = core damage frequency
DC = direct current
ISLOCA = Interfacing System Loss-of-Coolant Accident
PORV = power-operated relief valve
RCS = reactor coolant system
RHR = residual heat removal
SW = service water
V = volt
VCT = volume control tank

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 increases for each of the candidate SAMAs, and one additional SAMA candidate (SAMA No. 5) was determined to be potentially cost beneficial.

It is important to note that an industry peer review of the Ginna Station PSA model (Revision 4.1) was conducted in May 2002. The results of this review will be incorporated into future updates of the model. RG&E will evaluate the extent to which the SAMA analysis will be affected by these model refinements. For the purposes of this submittal, RG&E, where possible, conducted a bounding analysis to account for potential model changes and recognizes that some of the benefits may be overestimated. RG&E considers this an appropriate approach for a screening-level analysis.

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. RG&E concurs with that conclusion and addressed site-specific measures to mitigate severe accidents in this analysis. RG&E determined 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, RG&E has historically identified and implemented various plant improvements at Ginna Station in order to reduce the CDF and the consequences of postulated accidents. Accordingly, RG&E will continue to refine the evaluation and consider implementation of these potentially cost-beneficial modifications through the current plant change process.

4.15 Impact on Public Health of Microbiological Organisms

NRC

**"If the applicant's plant uses a cooling pond, lake, or canal or discharges into a river having an annual average flow rate of less than 3.15 × 1012ft3/year (9 × 1010m3/year), an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided."
10 CFR 51.53(c)(3)(ii)(G)**

"These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals that discharge to small rivers. Without site-specific data, it is not possible to predict the effects generically." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 57

The NRC designated impacts to public health from thermophilic organisms a Category 2 issue, requiring plant-specific analysis, because the magnitude of the potential public health impacts associated with thermal enhancement of such organisms, particularly *Naegleria fowleri,* could not be determined generically. The NRC noted in the GEIS that impacts of nuclear power plant cooling towers and thermal discharges are considered to be of small significance if they do not enhance the presence of microorganisms that are detrimental to water quality and public health (Ref. 4.1-1, Section 4.3.6). The NRC requires [10 CFR 51.53(c)(3)(ii)(G)] an assessment of the potential impact on public health of thermophilic organisms in receiving waters for nuclear power plants that use cooling ponds, lakes, canals, or small rivers. Information to be ascertained includes: (1) thermal conditions for the enhancement of *Naegleria fowleri*; (2) thermal characteristics of the receiving water body; (3) thermal discharge temperature; and (4) impacts to public health.

Based on current security measures required by the NRC, recreational access within the immediate discharge area for Ginna Station is prohibited, thus the general public cannot be exposed to waters within the immediate discharge area. However, employee access for environmental sampling from discharge canal waters or within the immediate discharge area in the Lake is permitted, creating some potential for human exposure.

Thermophilic bacteria generally occur at temperatures of 77°F to 178°F, with maximum growth at 122°F to 140°F. Bacteria pathogenic to humans typically have optimum temperatures of approximately 99°F (Ref. 4.8-1). Populations of the pathogenic amoeba *Naegleria fowleri* can be enhanced in thermally altered water bodies at temperatures ranging from 95°F to 106°F or higher, but this organism is rarely found in water cooler than 95°F based on studies reviewed and coordinated by Tyndall et al. (Ref. 4.8-2).

As described in Section 2.2, Lake Ontario is approximately 190 miles long by 50 miles wide, and it is the eleventh largest lake in the world in volume. The Ginna Station 316(a) Demonstration Supplement (Ref. 4.3-1) provides expected and extreme Lake Ontario and Ginna Station discharge temperatures to the 95 percent confidence level. This means that temperatures above these values could occur

5 percent of the time. Expected ambient Lake Ontario water temperature in the summer was determined to be 65.8°F, and maximum temperature was 74.6°F. Therefore, ambient Lake Ontario conditions would not support the thermophilic organisms of concern.

Thermophilic organisms occurring in the water column, if any, that might be of concern are expected to be limited to those entrained in the condenser cooling water. These organisms would be subjected to a rapid temperature rise through the condenser followed by relatively rapid cooling as the discharge plume mixes with the ambient lake water. The normal summer discharge temperature of the Ginna Station discharge was determined to be 85.8°F, while the maximum temperature was 94.6°F. Again, these temperatures may be exceeded 5 percent of the time, however, the maximum discharge temperature would not go above the SPDES permit limitation of 102°F. For the few periods of time that discharge temperatures may be above 95°F, residence time in the plume would be short because of mixing in the plume as it rapidly (3-45 feet per second) moves into the Lake and reduces in temperature. The ensuing decline in temperature would create an adverse environment for thermophilic microbes. Based on the average temperatures of the discharge and receiving waters, species such as *Naegleria fowleri* and *Legionella spp*. would not be expected to proliferate in the vicinity of Ginna Station.

Given these poor conditions for supporting populations of thermophilic organisms, such organisms in the Ginna Station discharge do not constitute a significant public health issue. In addition, no pathway for significant human exposure exists because environmental sampling within these waters is infrequent, there is no mechanism for inhalation exposure from aerosol production (such as spray nozzles), and recreational uses in the immediate vicinity of the discharge are prohibited, precluding both direct contact and ingestion routes.

Based on the evaluation presented above, RG&E concludes that impacts on public health from thermophilic microbiological organisms are not likely to occur as a result of license renewal, and there would be no impacts to mitigate. Because the definition of “small” includes impacts that are not detectable, the appropriate characterization of the impact on public health of microbiological organisms from continued operation of Ginna Station during the license renewal period is SMALL, and further mitigation is unwarranted.

4.16 Environmental Justice

NRC

"The need for and the content of an analysis of environmental justice will be addressed in plant-specific reviews." 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 92

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" (Ref. 4.16-1), 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 the NEPA, to identify and address environmental justice concerns, "including human health, economic, and social effects, of Federal actions."

Although the NRC is not subject to Executive Order 12898, it has voluntarily committed to conduct environmental justice reviews of actions under its jurisdiction and has issued procedural guidance (Ref. 4.16-2, Attachment 4). The guidance does not provide a standard approach or formula for identifying and addressing environmental justice issues. Instead, it offers general principles for conducting an environmental justice analysis under the NEPA. The NRC guidance makes clear that if no significant impacts are anticipated from the proposed action, then "…no member of the public will be substantially affected" and, as a consequence, "…there can be no disproportionate high and adverse effects or impacts on any member of the public including minority or low income populations."

RG&E has reviewed and adopted by reference NRC findings for Category 1 issues that RG&E determined are applicable to Ginna Station license renewal (see Section 4.1). The NRC has concluded that environmental impacts for each of these issues would be SMALL. RG&E has addressed each Category 2 issue and has performed required analyses for those that RG&E determined are applicable to Ginna Station license renewal (see Sections 4.2 through 4.15 and Appendix A of this environmental report).

For applicable Category 2 issues requiring analysis, RG&E has concluded that the environmental impacts would be SMALL for the following:

- Entrainment, impingement, and heat shock;
- Threatened or endangered species;
- Electric shock from transmission line-induced currents;
- Housing, public water supply, offsite land use, and transportation;
- Historic and archaeological resources;
- Severe accident mitigation alternatives; and
- Public health impacts from microbiological organisms.

Based on the RG&E review, Ginna Station license renewal and continued operations would result in no significant impact. No member of the public would be substantially affected and, as a consequence, there would be no disproportionately high and adverse impacts on any member of the public, including minority and low-income populations. In such instances, a qualitative review of potential environmental justice impacts is adequate and no mitigation measures need be described.

4.17 References

Ref. 4.1-1 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.

Ref. 4.2-1 Bio Systems Research, Inc. *1977 Fish Egg and Larvae Program, Lake/Screenhouse Surveys, Ginna Nuclear Power Station*. RG&E Report No. B-13-058. Rochester, NY. 1978.

Ref. 4.2-2 Bio Systems Research, Inc. *1978 Ichthyoplankton Program, Lake/Screenhouse Surveys, Ginna Nuclear Power Station*. RG&E Report No. B-13-103. Rochester, NY. 1979.

Ref. 4.2-3 Klumb, R.A., L. Rudstam, E. Mills, C. Schneider, and P. Sawyko. "Importance of Lake Ontario Embayments and Nearshore Habitats as Nurseries for Larval Alewives (*Alosa pseudoharengus*) and Other Species." Unpublished (in review).

Ref. 4.2-4 Rochester Gas and Electric Corporation. *Fish Impingement Program, 1997-2001 Analysis Report, Ginna Nuclear Power Station*. RG&E Report No. B-13-389. Rochester, NY. 2002.

Ref. 4.2-5 Rochester Gas and Electric Corporation. Ginna Station Fish Impingement Data from 1973 through 2002. Unpublished Data Analysis. 2002.

Ref. 4.3-1 Rochester Gas and Electric Corporation. Ginna Nuclear Power Plant, 316(a) Demonstration Supplement, NPDES Permit No. 0070 0X2 2 000079 (NY 0000493). RG&E Report No. BP-13-043. Rochester, NY. March 1977.

Ref. 4.7-1 National Electric Safety Code®. Part 2, Rules 232A1 and 232B1. 1997 Edition. C2-1997.

Ref. 4.7-2 Rochester Gas and Electric Corporation. "Electric Field Induced Currents Survey of Circuits 908, 911, 912, and 913." Rochester, NY. October 18, 2001.

Ref. 4.9-1 Metzger, R. Monroe County Water Authority. Personal communication with C. Milligan. November 14, 2001.

Ref. 4.9-2 Aman, M. Wayne County Water and Sewer. Personal communication with C. Milligan. March 18 and November 14, 2001.

Ref. 4.14-1 U.S. Nuclear Regulatory Commission. *Regulatory Analysis Technical Evaluation Handbook*. NUREG/BR-0184. Office of Nuclear Regulatory Research. Washington, D.C. January 1997.

Ref. 4.14-2 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20." March 15, 1994.

Ref. 4.14-3 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20, Level 1 Probabilistic Safety Assessment (PSA)." January 15, 1997.

Ref. 4.14-4 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20, Level 2 Probabilistic Safety Assessment." August 30, 1997.

Ref. 4.14-5 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Ginna Station Fire IPEEE." June 30, 1998.

Ref. 4.15-1 Joklik, W.K. and H.P. Willett (eds.). *Microbiology*. 16th edition. Appelton-Centry-Crofts. New York, NY. 1972.

Ref. 4.15-2 Tyndall, R. L, K. S. Ironside, P. L. Metler, E. L. Tan, T. C. Hazen, and C.B Fliermans. "Effect of Thermal Additions on the Density and Distribution of a Thermophilic Amoebae and Pathogenic *Naegleria fowleri* in a Newly Created Cooling Lake." *Applied and Environmental. Microbiology*. 55(3): 722-732. 1989.

Ref. 4.16-1 "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.) www.access.gpo.gov/su_docs/aces/aaces002.html.

Ref. 4.16-2 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 an 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).

Rochester Gas and Electric Corporation (RG&E) assumes new and significant information would be the following:

- Information that identifies a significant environmental issue that the GEIS does not cover and is not codified in the regulation, or
- Information that 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, RG&E used guidance available in Council on Environmental Quality (CEQ) regulations. 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). 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). RG&E 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.

RG&E is aware of no new and significant information regarding the environmental impacts of R.E. Ginna Nuclear Power Plant (Ginna Station) license renewal.

5.1 References

Ref. 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

Rochester Gas and Electric Corporation (RG&E) has reviewed the environmental impacts associated with renewing the R.E. Ginna Nuclear Power Plant (Ginna Station) operating license and has concluded that all of the impacts would be small and would not require mitigation. This environmental report documents RG&E's bases for its conclusion. Section 4.1.1 incorporates by reference U.S. Nuclear Regulatory Commission (NRC) findings for the 50 Category 1 issues that apply to Ginna Station, all of which have impacts that are SMALL (see Appendix A). Subsections 4.2 through 4.15 of Chapter 4 analyze the 16 Category 2 issues that apply to Ginna Station, most of which have impacts that would be SMALL or non-existent due to the lack of refurbishment activities associated with Ginna Station license renewal. Section 4.16 discusses the basis for inclusion and appropriate depth of an environmental justice analysis, summarizing that there are no disproportionately high and adverse human health or environmental effects since impacts from all Category 1 and Category 2 issues applicable to Ginna Station are SMALL. Table 6.1-1 summarizes the impacts that Ginna Station license renewal would have on resources associated with Category 2 issues and environmental justice.

Table 6.1-1
Environmental Impacts Related to License Renewal at Ginna Station

No.	Issue[a]	Environmental Impact
	Surface Water Quality, Hydrology, and Use (for all plants)	
13	Water use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	NONE. The issue is not applicable because Ginna Station is not equipped with cooling ponds or cooling towers.
	Aquatic Ecology (for all plants with once-through and cooling pond heat dissipation systems)	
25	Entrainment of fish and shellfish in early life stages	SMALL. RG&E has a current SPDES permit that constitutes compliance with CWA Section 316(b) requirements to provide best available technology to minimize entrainment.
26	Impingement of fish and shellfish	SMALL. RG&E has a current SPDES permit that constitutes compliance with CWA Section 316(b) requirements to provide best available technology to minimize impingement.
27	Heat shock	SMALL. Ginna Station has an approved CWA Section 316(a) variance that allows for a 320-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)	NONE. The issue is not applicable because Ginna Station is not a direct user of groundwater (no dewatering; potable and service water are from municipal supply).
34	Groundwater use conflicts (plants using cooling towers withdrawing makeup water from a small river)	NONE. The issue is not applicable because Ginna Station is not equipped with cooling towers.
35	Groundwater use conflicts (Ranney wells)	NONE. The issue is not applicable because Ginna Station does not use Ranney wells.
39	Groundwater quality degradation (cooling ponds at inland sites)	NONE. The issue is not applicable because Ginna Station is not equipped with cooling ponds.
	Terrestrial Resources	
40	Refurbishment impacts	NONE. RG&E has no plans for major refurbishment at Ginna Station.
	Threatened or Endangered Species	
49	Threatened or endangered species	SMALL. Species of concern have a low potential for occurrence in habitats affected by plant operations and lack of observed impacts during operational monitoring.
	Air Quality	
50	Air quality during refurbishment (nonattainment and maintenance areas)	NONE. RG&E has no plans for major refurbishment at Ginna Station.

Table 6.1-1 (continued)
Environmental Impacts Related to License Renewal at Ginna Station

No.	Issue[a]	Environmental Impact
		Human Health
57	Microbiological organisms (public health) (plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)	SMALL. Water temperatures would not support viable populations of thermophilic microbiological organisms; thereby minimizing potential public health impacts.
59	Electromagnetic fields, acute effects (electric shock)	SMALL. All circuits meet National Electrical Safety Code® requirements for limiting current-induced shock.
		Socioeconomics
63	Housing impacts	SMALL. No impacts are anticipated because no additional employees are expected. Analyzed impact from adding as many as 60 employees during the license renewal term; 100 housing units would be required in an area with a population greater than 829,000. This impact would be small.
65	Public services: public utilities	SMALL. No impacts are anticipated because no additional employees are expected. Analyzed impact from adding as many as 60 employees during the license renewal term; this could result in as many as 308 new residents in Monroe and Wayne Counties and approximately 22,500 additional gallons of water per day demand on water systems in the two counties. This impact would be small.
66	Public services: education (refurbishment)	NONE. RG&E has no plans for major refurbishment at Ginna Station.
68	Offsite land use (refurbishment)	NONE. RG&E has no plans for major refurbishment at Ginna Station.
69	Offsite land use (license renewal term)	SMALL. RG&E annual property tax payments for Ginna Station averaged approximately 2.0 percent of Wayne County's total annual revenues, and are trending towards 10 percent for both the Town of Ontario's and the Wayne Central School District's total annual revenues. License renewal tax-driven land-use changes would generate very little new development and minimal changes in the area's land-use patterns.
70	Public services: transportation	SMALL. Analyzed impact from adding as many as 60 employees during the license renewal period; the impact would be small and mitigative measures such as increased traffic control would not be warranted.
71	Historic and archaeological resources	SMALL. No impacts to historic or archaeological resources were identified.

Table 6.1-1 (continued)
Environmental Impacts Related to License Renewal at Ginna Station

No.	Issue[a]	Environmental Impact
		Postulated Accidents
76	Severe accidents	SMALL. RG&E identified four potentially cost-beneficial severe accident mitigation measures that are subject to continued evaluation. None are related to aging and would not be implemented under 10 CFR 54. However, RG&E will continue to refine the evaluation and consider implementation of cost-beneficial modifications through the current plant change process.
		Environmental Justice
92	Environmental justice	SMALL. No disproportionately high or adverse impacts to minority or low-income populations.

a. 10 CFR 51, Subpart A, Appendix B, Table B-1.
CWA = Clean Water Act
gpm = gallons per minute
No. = Issue number
RG&E = Rochester Gas and Electric Corporation
SPDES = State Pollutant Discharge Elimination System

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 Ginna Station are small and would not require additional mitigation. RG&E implemented mitigative measure during original construction to minimize potential operational impacts. Ginna Station's once-through cooling system was designed and constructed so as to minimize impacts to aquatic life. The intake is located approximately 3,100 feet offshore and covered with a velocity cap, with the bottom of the port openings about four feet above the lake bottom, and an intake velocity of 0.8 feet per second. Placement of the intake off shore is preferable to locating it within the more productive nearshore areas. More organisms, including macroinvertebrates, ichthyoplankton, and fish, reside near the lake bottom (especially during daytime), thus keeping the intake ports off the lake bottom reduces entrainment into the intake. The velocity cap minimizes the formation of a vortex and establishes a horizontal intake current to which fish can better sense and respond. Finally, the relatively low intake velocity is well within the swimming speeds for most resident fish.

Current operations include mitigative activities that would continue during the term of Ginna Station's license renewal. RG&E has undertaken several protective measures that will lessen impacts on impinged aquatic life. The current SPDES Permit requires RG&E to modify the traveling screen debris/fish sluiceway to make it less injurious to fish being returned to the Lake. Such modifications were completed in July 1998. A modification was initiated, in 2000, to change the mesh on the traveling screens. The modification changed the 3/8-inch square, galvanized-wire woven mesh to 3/16-inch by 1-inch rectangular, stainless steel "crimped fit" mesh. The purpose of the change is to increase the ability of the screens to capture and remove lake algae, primarily *Cladophora,* so it does not enter the condenser cooling system, while still maintaining the required flow area through the screens. The original woven mesh design tended to trap such algae in the screens due to crevices in the woven joints. The new screens are smoother, and less algae is trapped. Also, the smoother texture helps to enhance fish survival, as the fish will experience less abrasion. Two of the four traveling screens had been replaced by May 2002. The other two replacements are scheduled to be completed before the end of 2003. One of the two replaced screens was coated with an anti-fouling material to further reduce the propensity to trap algae. Based on two years of operating experience, no difference in algae impingement was detected between the coated and uncoated screens, and wear from traveling screen use was causing the coating to become dislodged.

Further enhancements to the traveling screens will not employ the anti-fouling coating.

In response to SPDES permit conditions, RG&E has a water use minimization program in which one of the Ginna Station circulating pumps is typically shut down during refueling outages. To minimize stress upon impinged fish, RG&E has also modified the screen washwater fish/debris trough and operates each of the traveling screens 15 minutes of each hour. These actions reduce the impacts of operations on aquatic life in Lake Ontario.

Since 1994, RG&E has, as a part of its Environmental Stewardship Program, participated in several area conservation efforts including the Rochester Peregrine Falcon Project, the New York River Otter Project, the Famous Historic Trees Program, and the American Kestrel Nest Box Program. Current operations also include environmental monitoring activities that would continue during the license renewal term. These activities include the radiological environmental monitoring program, radiological effluents control program, and 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)

RG&E 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 Chapter 4.0, RG&E examined the 21 Category 2 issues the NRC identified in the GEIS and the environmental justice issue, and identified the following unavoidable adverse impacts of renewing the operating license for Ginna Station:

- The cooling water system would cause some early life stages of fish to be lost by entrainment during plant operation. Operational monitoring conducted at Ginna Station has indicated that an average of 89 million fish eggs and 17 million fish larvae pass through the system annually, predominantly alewife, smelt, and johnny darters. Considering the Lake ichthyoplankton community and the species entrained, it was concluded that entrainment losses from Ginna Station operation have minimal adverse effects on local fish populations in Lake Ontario (see Section 4.2.1).
- Some fish would be lost due to impingement on the traveling screens at Ginna Station. Impingement monitoring at Ginna Station has been conducted since 1973, with impinged fish consisting predominantly of alewife and smelt. The 19-year average impingement percentages for alewives and smelt are 0.00100 and 0.00084, respectively. Results of these studies indicated that the overall effects of impingement on Lake Ontario fish populations in the vicinity of Ginna Station were minimal (see Section 4.2.2).
- RG&E does not expect to add staff for the license renewal period. However, for the purpose of preparing a bounding analysis, RG&E assumed that license renewal could necessitate adding as many as 60 staff. The assumed addition of 60 direct workers to Wayne and Monroe Counties, where approximately 92 percent of the Ginna Station workforce resides, could result in small impacts to housing availability, public water supplies, and offsite land use. Impacts to the transportation infrastructure could also result in small impacts (see Sections 4.8, 4.9, 4.11, and 4.12).

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 Ginna Station for the license renewal term will result in irreversible and irretrievable resource commitments, including:

- Nuclear fuel, which is utilized in the reactor and converted to radioactive waste,
- Land required to permanently store or dispose of this spent nuclear fuel and the 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 Ginna Station site was set in 1969, when the unit began operating. The U.S. Atomic Energy Commission (AEC) documented its evaluation of this balance in its final environmental statement for Ginna Station (Ref. 6.5-1), noting the conversion of approximately 41 acres of land to electric power generation facilities. The AEC noted that, upon decommissioning, much of the facility could be dismantled and restored to its original condition for the long term.

RG&E notes that the current balance is now well established and can be expected to remain essentially unchanged by renewal of the operating license and extended operation of Ginna Station. Extended operation of the plant 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 RG&E's evaluation in this environmental report.

6.6 References

Ref. 6.5-1 U.S. Atomic Energy Commission. *Final Environmental Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1, RG&E Corporation, Docket No. 50-244*. Washington, D.C. December 1973.

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. Rochester Gas and Electric Corporation (RG&E) identifies in this chapter reasonable alternatives to renewal of the R. E. Ginna Nuclear Power Plant (Ginna Station) operating license and presents its evaluation of associated environmental impacts. This chapter also includes descriptions of alternatives RG&E considered but determined to be unreasonable to consider in detail, and associated supporting rationale.

In Section 7.1, RG&E addresses the "no-action" alternative in terms of the potential environmental impacts of not renewing the Ginna Station operating license independent of any actions taken to replace or compensate for the associated loss of generating capacity. RG&E describes, in Section 7.2, feasible alternative actions that could be taken, which also essentially are elements of the no-action alternative, and presents other alternatives RG&E does not consider to be reasonable. Section 7.3 presents RG&E's environmental impact evaluations of the reasonable alternatives.

The environmental impact evaluation of alternatives presented in this chapter is not intended to be exhaustive. Rather, the level of detail and analysis relies 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)].

RG&E 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, RG&E presents a summary comparison of environmental impacts of the proposed action and alternatives.

7.1 No-action Alternative

RG&E considers the no-action alternative addressed in this ER to be a scenario in which the NRC does not renew the Ginna Station operating license, RG&E ceases plant operation upon license expiration in 2009 and decommissions the facility, and RG&E and/or others take appropriate actions to meet system-generating needs created by discontinued operation of the plant. RG&E addresses only the impacts of decommissioning in this section.

In the GEIS, the NRC defines decommissioning as 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 use and termination of the license. Decommissioning options evaluated in the GEIS include immediate decontamination and dismantlement, and safe storage of the stabilized and defueled facility followed by decontamination and dismantlement. Regardless of the option chosen, decommissioning must be completed within 60 years after operations cease (10 CFR 50.82). In the event the NRC does not renew the Ginna Station operating license, RG&E currently plans to operate the plant until the current license expires, then initiate decommissioning activities in accordance with NRC requirements. The NRC's description of decommissioning activities in the GEIS is based on an evaluation of a reactor larger than Ginna Station (the pressurized water, 1,175 megawatt Trojan Nuclear Plant), which essentially bounds the decommissioning activities RG&E would conduct at Ginna Station.

The NRC presents in the GEIS (Ref. 7.0-1, Chapter 7 and Section 8.4) a generic evaluation of environmental impacts associated with decommissioning and associated changes resulting from license term extension based on its *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* (Ref. 7.1-1), which is currently being updated. The evaluation addresses occupational and public dose; impacts of waste management; and impacts to air, water, ecological, and socioeconomic resources. Based on its review, RG&E considers the generic evaluation appropriate to Ginna Station.

Decommissioning activities and their impacts are not discriminators between the proposed action and the no-action alternative. RG&E is required to decommission Ginna Station regardless of the NRC's decision on license renewal; renewal would merely postpone decommissioning for another 20 years. In the GEIS, the NRC established that the timing of decommissioning operations does not substantially influence the environmental impacts of decommissioning. RG&E adopts by reference the NRC's findings to the effect that delaying decommissioning until after the renewal term would have small environmental impacts (10 CFR 51, Subpart A, Appendix B, Table B-1, Decommissioning). The discriminators between the proposed action and the no-action alternative lie within the choice of generation replacement options that compose the no-action alternative. Section 7.3 presents RG&E's analysis of the impacts from these options.

RG&E concludes that the decommissioning impacts under the no-action alternative would not be substantially different from those the NRC identified in the GEIS as the impacts that would occur following license renewal. These impacts would be temporary and would occur at the same time as the impacts from meeting system generating needs.

7.2 Alternatives That Meet System Generating Needs

Ginna Station has a net summer capability of approximately 490 megawatts (MW) and, in the year 2000, Ginna generated approximately 3.8 terawatt-hours of electricity (Ref. 7.2-1, Table III-2). This power, equivalent to the energy used by approximately 560,000 residential customers, would be unavailable to the New York wholesale energy market and RG&E's retail customers in the event the Ginna Station operating license is not renewed. RG&E examines in this section potential alternatives to accommodate these losses in the event the Ginna Station operating license is not renewed.

In Section 7.2.1, RG&E 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 RG&E considers to be reasonable, for purposes of this analysis, to replace the generating capability that would be lost in the event the Ginna Station operating license is 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 considered and RG&E's rationale for not considering them to be reasonable options for replacing power produced by Ginna Station.

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; progress with respect to the plan and an assessment of need to update the plan are provided in NYSEPB Annual Reports (e.g., Ref. 7.2-2).

NYSEPB's 2002 State Energy Plan (Ref. 7.2-3, 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. 7.2-3, 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. Under terms of its NYSPSC-approved restructuring plan, RG&E is not required to divest its limited generating facilities, but has functionally separated its generating business from its other businesses (e.g., transmission and distribution) and allows all customers in its service territory the option to purchase electricity from either RG&E or other qualified energy service companies (ESCos).

Restructuring has resulted in additional responsibilities for the New York State Energy Research and Development Authority (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^{TM} 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. The program is paid for by a SBC on the electricity transmitted and distributed by the State's investor-owned utilities, 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 2001, the NYSRC set this installed capacity requirement at 18 percent over the NYCA year-2001 summer peak load (Ref. 7.2-1).

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. 7.2-7). 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 RG&E. 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 (Ref 7.2-1, pages 1, 2).

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 Public Service Commission 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. 7.2-8).

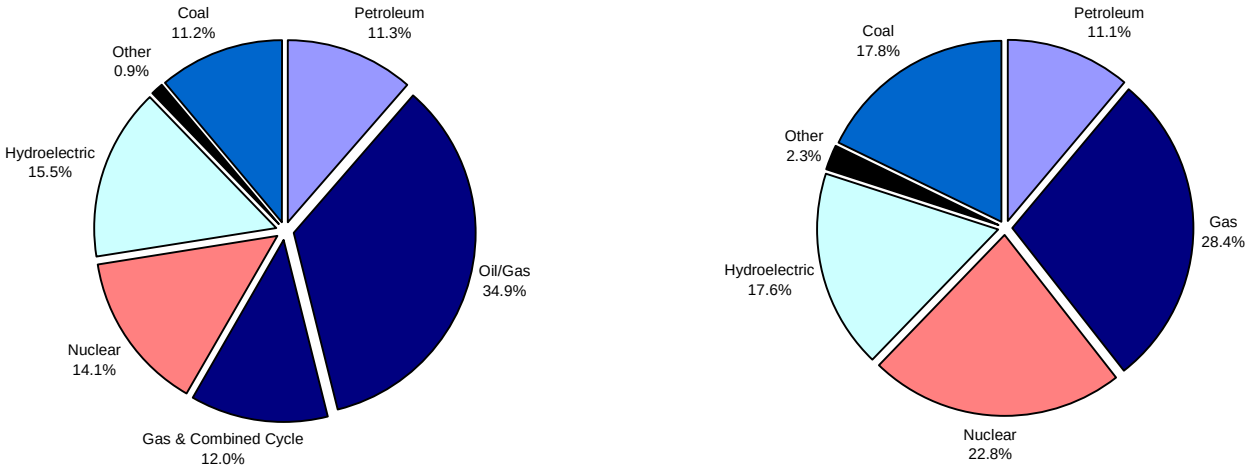
7.2.1.2 Generation and Utilization

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 technical and regulatory viability and energy markets, and offer insight regarding potentially reasonable alternatives to replace power produced by Ginna Station.

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, represent approximately 47 percent of generating capability in New York, followed by approximately 11 percent to 15 percent of generating capability each by hydroelectric, nuclear, petroleum-fired, and coal-fired facilities (Ref. 7.2-1). Comparison with actual utilization of this capability 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. 7.2-9). This condition reflects the relatively low fuel cost and baseload suitability for nuclear power 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 firing over oil firing, indicative of higher cost and air emissions associated with oil firing. 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 has compiled annual New York electric generation by fuel type for the period 1985 to 1999. The amount of New York electric power generated in 1999

Figure 7.2-1
New York Electric Capability and Utilization: 2000



Source: Ref. 7.2-1, Ref. 7.2-10.

compared to that in 1985 by source has increased substantially for natural gas (196 percent) and nuclear (54 percent), and decreased substantially for petroleum (48 percent). The amount of power from hydroelectric generation has decreased by 20 percent, while power from coal-fired plants generally exhibited a slight increase through this period (Ref. 7.2-10).

RG&E has limited generation resources, totaling approximately 887 MW. Approximately 56 percent of this capability is nuclear power (from the Ginna Station) and 28 percent is coal-fired (from RG&E's Russell Station). Most of its remaining capacity is gas-fired (8 percent), primarily for peaking, and conventional hydroelectric (6 percent). As noted above for the State as a whole, RG&E preferentially relies on nuclear power and coal-fired generation to meet its baseload generating requirements.

NYISO projections through 2020, which account for DSM load reductions and assume shutdown of nuclear generating facilities in the State, including Ginna Station, when their current operating licenses expire, indicate that the NYCA will need additional capacity beyond 2001 to meet an anticipated 18 percent reserve margin (Ref. 7.2-1). However, NYISO anticipates that the additional resources necessary to meet the reserve margin would be procured through the installed capacity market, noting that facilities representing substantial additional capacity had approved Article X applications or were in the pre-application phase of the Article X process (Ref. 7.2-1).

The NYSEPB (Ref. 7.2-3, page 1-11 and 3-108) indicates that, as of May 2002, seven new plants representing a net addition of 4,990 MW, were approved through the Article X process; applications for an additional eleven plants totaling 6,883 MW were filed; and another six plants totaling 4,325 MW were announced in the State. Some of these projects, however, are on hold, some have been abandoned, and decisions to drop others could occur. A review of proposed new generation projects that have filed Article X applications or have filed pre-application reports or pre-scoping statements (Ref. 7.2-11) 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. 7.2-3, pages 3-106, 3-107, 3-108, 1-29) points out that over the next 20 years, the State's dependence on natural gas for electric generation could increase from 25 percent to almost 40 percent. 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 risk exposure to fuel supply disruption and price swings, a concern expressed by the NYSEPB.

According to the NYSEPB in the New York State Energy Plan (Ref 7.2-3, pages 1-31, 3-172, 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. Nonetheless, adequate supplies are expected to be available and real prices are projected to drop slightly on average, although they will remain volatile. Even if no post-2003 pipeline expansion projects are built, the existing gas systems are expected to be adequate to meet all generation scenarios studied.

The 2002 New York State Energy Plan (Ref 7.2-3, pages 3-141 through 3-145, 1-30, 1-32) assumed that all nuclear plant licenses will 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 bituminous coal-fired power

plant, NSPS generally require that particulate matter emissions be reduced by at least 99 percent from uncontrolled levels and not exceed 0.03 pounds per million British thermal units (lb/MMBtu) heat input. Sulfur dioxide (SO_2) emissions must generally be reduced by at least 90 percent from uncontrolled levels and not exceed 1.20 lb/MMBtu, and nitrogen oxide (NO_x) emissions (expressed as nitrogen dioxide, NO_2) must not exceed 0.50 lb/MMBtu (for sub-bituminous coal combustion) or 0.60 lb/MMBtu (for bituminous or anthracite coal combustion). 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, and 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. 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 western upstate New York including the Ginna Station site region, these plants 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 significant 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 would be established on the basis of LAER, and offsets amounting to a ratio of at least 1.15:1 would be 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 has issued draft regulations under its Acid Rain Reduction Initiative which, when enacted, will 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 will effectively 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, RG&E considers that purchased power and new generating capacity represented by natural gas combined-cycle technology are reasonable alternatives to Ginna Station license renewal for purposes of detailed review in this ER.

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, RG&E includes a modern coal-fired plant featuring clean-coal technology in its evaluations for purposes of this ER.

Specific clean-coal generating technologies that would represent viable alternatives in the case of western upstate New York are uncertain. Modern pulverized coal plants with advanced, clean-coal technology air emission controls are commercially available, and integrated gasification combined-cycle and pressurized fluidized-bed-combustion technologies are at or near commercial viability. On the basis of in-house feasibility investigations, RG&E considers that atmospheric circulating fluidized-bed (ACFB) technology represents a potentially viable option in view of

overall economic, technical risk, and environmental performance considerations. In this technology, solid fuel (e.g., coal, coke) is crushed and mixed with pulverized limestone, which is blown into the bottom of the ACFB combustor, where it is suspended by hot, forced air as a "fluidized bed." Emissions of sulfur oxides and NO_x are controlled largely in the combustion process through capture of sulfur in the coal by the limestone and by low ignition temperatures, which reduce NO_x formation. The mixture of ash and other solid wastes from the combustion process, primarily calcium sulfate (i.e., gypsum, upon hydration) formed by the reaction of the limestone and sulfur, is a useful and potentially salable byproduct (Ref. 7.2-12, Sections 2.1.2, 2.1.4.2).

The potential viability of ACFB technology for some applications in the general region is indicated by development of a 520 MW addition to the Seward Power Plant in western Pennsylvania, which is designed to burn waste coal and is scheduled for commercial operation in 2004 (Ref. 7.2-13). In addition, the JEA CFB Combustor Project, a 297.5 MW (gross), 265 MW (net) repowering of JEA's Northside Generating Station Unit 2 steam turbine in Duval County, Florida, which uses ACFB technology, has been constructed and was in startup testing as of July 2002 (Ref. 7.2-14, Ref. 7.2-15, Ref. 7.2-16). The JEA project is being undertaken to demonstrate ACFB for large, baseload applications with sponsorship by the U.S. Department of Energy (DOE); however, JEA independently repowered a companion generating unit (Northside Unit 1) in identical fashion on a schedule that calls for completion approximately six months prior to completion of the Unit 2 repowering, indicating confidence in the viability of this technology. These units are scheduled for commercial operation in Fall 2002 (Ref. 7.2.2). Therefore, RG&E includes an ACFB coal-fired alternative for purposes of comparison in this ER.

Descriptions of these alternatives are provided in Sections 7.2.2.1 through 7.2.2.3. Other alternatives considered by RG&E 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, a regulatory structure is in place to appropriately anticipate and meet electricity demands, and RG&E has restructured to enable participation in the resulting wholesale electricity market. As an additional facet of this restructuring effort, retail customers in RG&E's service territory now may choose among RG&E and other sources (i.e., qualified ESCos) to supply their power, resulting in uncertainty with regard to future RG&E load obligations. In view of these conditions, RG&E assumes for purposes of this ER that adequate supplies of electricity would be available, and that purchased power would be a reasonable alternative to meet the Company's load requirements in the event the operating license for Ginna Station is not renewed.

The source of this purchased power is speculative, but may reasonably include new generating facilities developed within RG&E's service territory, elsewhere in the

State, or neighboring power pool jurisdictions. 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. RG&E 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.

RG&E does not anticipate that any additional transmission infrastructure would be needed in the event RG&E purchased power to replace Ginna Station capacity. From a local perspective, loss of the Ginna Station would not result in a load pocket that would require construction of new transmission lines, although RG&E expects that planned reinforcement of its 110 kilovolt distribution system would be implemented sooner to ensure local system stability. 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. 7.2-17, 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 western upstate New York and higher demand in the east and downstate. As noted by a recent NYISO-sponsored study (Ref. 7.2-18, 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, RG&E assumes development of a modern natural gas-fired combined-cycle plant with design characteristics similar to those being developed elsewhere in New York, and with a generating capacity similar to the Ginna Station. The Wawayanda Energy Center, a 540 MW (nominal) plant near Middletown, New York, meets these general criteria. Therefore, RG&E used characteristics of this plant as described in its Article X application (Ref. 7.2-19) and other relevant resources as bases for the representative plant description in this section and the associated environmental impact assessment in Section 7.3.2.

RG&E assumes that the representative plant would be located at the Ginna Station 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 RG&E's analysis of the gas-fired alternative considers as a variation of this alternative the location of the plant at a greenfield site in western upstate New York. Except for the plant location at the Ginna Station site, RG&E 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 or similar process.

Assuming a design comparable to the proposed Wawayanda Energy Center, the generating facilities for the representative plant would be housed in a 106-foot-high

building, and consist primarily of two 180 MW combustion turbines (CTs), associated heat recovery steam generators (HRSGs), and a 180 MW steam turbine generator. The total capacity of the combined-cycle unit, 540 MW (nominal), is comparable to the 490 MW net capacity of Ginna Station. Based on daily consumption estimates for Wawayanda (Ref. 7.2-19, Section 9.2.4), and assuming a capacity factor of 80 percent for the representative plant, annual natural gas consumption for the facility would be approximately 27 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, RG&E 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. Exhaust from the CTs would be dispersed through individual stacks approximately 225 feet high (Ref. 7.2-19, Section 3.0).

RG&E assumes for this comparative analysis that the representative plant located at the Ginna Station site could utilize either once-through cooling or closed-cycle cooling using mechanical-draft cooling towers, which would be approximately 60 feet high (Ref. 7.2-19, Section 5.6.5). 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 result in cooling water intake and discharge flows substantially less than those required for the Ginna Station, primarily because the steam-cycle portion of the combined-cycle unit would be only one-third of the total plant capacity. Based on estimated water-use requirements for the Wawayanda Energy Center (Ref. 7.2-19, Section 5.6.2), the cooling tower option would result in cooling water intake and discharge (cooling tower blowdown) flows of approximately 2,500 gallons per minute (gpm) and 500 gpm, respectively, the difference representing evaporative loss in the cooling towers. Water requirements for an air-cooled condenser option are estimated to be 170 gpm (Ref. 7.2-19, Section 5.6.2).

The Ginna Station site was originally planned to accommodate an additional nuclear power unit west of the existing plant. RG&E assumes the representative plant would be located in this area, and estimates that approximately 30 acres would be required to accommodate the facility. Additional land for support infrastructure and buffer likely would be needed to locate the facility at a greenfield site. For example, the Wawayanda Energy Center site consists of approximately 53 acres (Ref. 7.2-19, Section 3.2.1), and the NRC estimates that 110 acres would be required for a 1,000 MW plant (Ref. 7.0-1, Table 8.1).

Except for a gas supply pipeline, no offsite infrastructure would have to be constructed for the representative plant located at the Ginna Station site. The nearest natural gas supply pipeline likely to have sufficient capacity and pressure to supply the plant is the Empire Pipeline, which lies approximately 14 miles due south of the Ginna Station site. RG&E assumes for this analysis that this pipeline would be

a suitable fuel source, and that 16 miles of supply pipeline to the site would be constructed, primarily within or along the existing transmission line corridor that extends southward from the site. Consistent with plans for the Wawayanda Energy Center (Ref. 7.2-19, Section 9.6.1.1), RG&E 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.

Based on estimates provided for the Wawayanda Energy Center (Ref. 7.2-19, Sections 3.3, 3.4; Table 12-4), RG&E assumes that the representative plant would be constructed in two years with average and peak onsite workforces of approximately 240 and 420 workers, respectively, and that a permanent workforce of 25 persons would be required to operate the plant.

7.2.2.3 Representative Coal-fired Generation

For purposes of this analysis, RG&E assumes development of a coal-fired power plant utilizing ACFB combustion technology with design characteristics similar to those being developed elsewhere in the U.S., and with generating capacity similar to the Ginna Station. JEA's repowering of its Northside Generating Station Units 1 and 2 in Duval County, Florida, meets these general criteria. The companion units each have a capacity of 297.5 MW (gross) and 265 MW (net) and, except for the steam turbine-generators, virtually all major facilities (e.g., combustors; emission control equipment; stack; fuel, limestone, waste receiving/handling and storage facilities; stormwater runoff control basins) are new construction. RG&E used characterization of the JEA Northside Project and associated environmental impacts documented by the DOE (Ref. 7.2-12), and other relevant resources as bases for the representative plant description in this section and the associated environmental impact assessment in Section 7.3.3.

For purposes of this ER, RG&E assumes that the representative coal-fired plant would be located at the Ginna Station site, which offers potential advantages of existing infrastructure (e.g., cooling water system, transmission, roads, technical and administrative support facilities). However, the Ginna Station site lacks infrastructure for delivery of coal and limestone, which would necessitate construction of barge delivery and unloading facilities, or railway from the main CSX line in Rochester. Therefore, such a plant likely would be located elsewhere, and RG&E's analysis of the coal-fired generation alternative considers as a variation of this alternative the location of the plant of a greenfield site in western upstate New York. Except for plant location at the Ginna Station site, RG&E 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 or similar process.

The use of ACFB technology would enable the representative plant to burn a relatively broad range of coal types (Ref. 7.2-15). However, RG&E assumes for this analysis that the plant would burn medium-sulfur bituminous coal of the type currently used at its Russell Station. This coal originates in Pennsylvania and West Virginia. Average characteristics of this fuel include a heat content of 13,233 Btu/lb, a sulfur content of 2.22 percent by weight (1.68 lb/MMBtu), and an ash content of 7.35 percent by weight (Ref. 7.2-20). Scaling from DOE estimates for the Northside units, taking into account differences in fuel heat content and capacity factor, RG&E estimates that the plant would consume approximately 1.4 million tons of coal per year.

The JEA Northside Generating Station ACFB units are indicative of the size units that would potentially be available to replace the capacity of Ginna Station, and descriptive information is readily available from the DOE (Ref. 7.2-12). Therefore, RG&E assumes that the representative plant would have a capacity of 530 MW, consistent with the combined capacity of the JEA units. This capacity is somewhat higher than that of the Ginna Station. However, RG&E expects that availability of the ACFB units would be somewhat less than a nuclear power unit. To establish a better basis of comparison, RG&E has assumed for this analysis a capacity factor of 80 percent for the representative plant, which corresponds to annual net production of approximately 3.7 terawatt-hours of electricity, comparable to that of Ginna Station.

The facility would be designed to meet BACT or LAER standards, as applicable, for control of criteria air emissions. Specific air-emission controls and resulting emission rates are speculative. However, RG&E assumes for this analysis that they would be comparable to those described for the JEA Northside units (Ref. 7.2-12, Section 2.1.3, Table 2.1.1). Scaling from the DOE's estimate, accounting for differences in coal consumption as noted above and coal sulfur content, RG&E estimates that approximately 1.4 million tons of limestone would be used for combustion control of SO_2 emissions. Post-combustion emission controls would minimally include selective noncatalytic reduction for NO_x control and fabric filtration (baghouse) for 99.8 percent particulate emissions removal, and 98 percent of SO_2 would be removed through control of the combustion process and possible addition of a polishing scrubber. Expected emission rates for major criteria pollutants are: SO_2, 0.15 lb/MMBtu; NO_2, 0.09 lb/MMBtu; and particulates less than 10 microns in diameter (PM_{10}), 0.03 lb/MMBtu. Exhaust from the units would be dispersed through a common stack approximately 500 feet high (Ref. 7.2-12, Section 2.1.3, Table 2.1.1).

RG&E assumes for this comparative analysis that the representative plant located at the Ginna Station site could utilize either once-through cooling or closed-cycle cooling using mechanical-draft cooling towers, which may be up to 100 feet high. Located at a greenfield site, the representative plant is assumed to use closed-cycle cooling with mechanical-draft cooling towers. Use of a once-through system would result in cooling water intake and discharge flows slightly less than required for the Ginna Station, assuming a somewhat higher thermal efficiency of the ACFB units. Substantially smaller flows would result from the use of closed-cycle cooling.

However, water consumption, due to evaporation from the cooling towers, would be greater than for a once-through system.

The Ginna Station site was originally planned to accommodate an additional nuclear power unit west of the existing plant, and RG&E assumes that the power block for the representative plant would be located in this area. RG&E estimates that approximately 60 acres would be needed to accommodate the power block; fuel and limestone delivery, handling, and storage facilities; cooling towers; and related support facilities.

Additional land would be required for storage and disposal of combustion solid waste (predominantly ash and gypsum) from the facility. For purposes of this analysis, it is assumed that RG&E would actively market this material, but the amount that could be sold for beneficial uses would be conjectural. Scaling from estimates for the JEA Northside project (Ref. 7.2-12, Section 5.0) to account for differences in capacity factor and coal characteristics (i.e., heat value, sulfur and ash content) and assuming an average fill height of 30 feet, approximately 260 acres of land would be required to dispose of all such material generated during the entire 30-year life of the facility. Consistent with plans for the JEA Northside project (Ref. 7.2-12, Section 4.1.7.2), the disposal facility would feature a double liner, leachate collection system, and runoff controls.

Offsite infrastructure for delivery of coal and limestone would be needed to develop the coal-fired plant at the Ginna Station site. Potential options include reconstructing/upgrading approximately 18 miles of abandoned railroad from the CSX main line approximately 1 mile west of the Genessee River, in Rochester, to the site and constructing a new 3-mile spur segment into the site; or constructing a barge unloading terminal at the site. RG&E has not investigated the economic or regulatory viability of either of these options but, as with the coal-fired alternative as a whole, is including them in the interest of examining potential environmental impacts of generation alternatives compared to extended operation of the Ginna Station.

Locating the representative plant at a greenfield site may require more site acreage than for the Ginna Station siting alternative to provide for additional onsite support infrastructure and buffer areas. For example, scaling for plant size from the NRC's estimate for a 1,000 MW plant (Ref. 7.0-1, Table 8.1), a 900-acre site could be required. Offsite infrastructure needed to locate the plant at a greenfield site is conjectural, but could reasonably include construction of a rail spur or barge unloading terminal, 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.

Consistent with estimates provided by the DOE for the JEA Northside project (Ref. 7.2-12, Sections 2.1.4, 2.1.5), RG&E assumes that the representative coal-fired plant would be constructed in approximately three years with a peak onsite workforce of

approximately 820 workers, and that a permanent workforce of approximately 100-150 persons would be required to operate the plant.

7.2.3 Other Alternatives Considered

RG&E describes in this section 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 Ginna Station operating license is not renewed. The discussion includes the reasons why RG&E 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). RG&E has considered these options as potential alternatives to continued operation of Ginna Station 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 7.2-1 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. However, this option is not available to RG&E with respect to Ginna Station because Ginna Station constitutes over 50 percent of RG&E's current generating capability, and RG&E has only one other plant, the 257 MW Russell Station, that is designed for baseload service. RG&E is not aware of opportunities for delayed retirement that may be available to other energy suppliers in the State.

7.2.3.3 Conservation

The history, status, and projections of energy conservation initiatives in New York are summarized by the NYSEPB (Ref. 7.2-3, 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, including RG&E. 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 SBC program as an alternative means of fostering energy efficiency in the State (Ref. 7.2-3, 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 900-1,300 MW are projected to result from these efforts in the 2004-2006 time frame (Ref. 7.2-3, Section 3.2). However, DSM is acknowledged in load forecasts prepared by NYISO (e.g., see Ref. 7.2-10, 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 500 MW to replace Ginna Station generating capability, particularly in or near RG&E's service territory, which represents a relatively small fraction of electrical load in the State. For these reasons, RG&E does not consider energy conservation to represent a reasonable alternative to renewal of the Ginna Station operating license.

Table 7.2-1
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 500 MW capacity (Ref. 7.0-1, Section 8.3.1).
	Based on a partially complete NYSERDA study (Ref. 7.2-3, pages 3-59, 3-60), New York has the technical potential (the upper limit of renewable electricity production and capacity that could be brought online 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 available yet, 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 1-3 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. From a practical perspective, the scale of this technology is too small to directly replace a power plant of the size of Ginna, 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 RG&E's service territory, 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, and land requirements are very large. Based on estimates presented in the GEIS, approximately 7,000 acres and 17,500 acres, respectively, would be required for a 500 MW solar thermal or solar photovoltaic generating facility even in areas of high solar availability (Ref. 7.0-1, Sections 8.2.3, 8.3.3).
	The NYSERDA study (Ref. 7.2-3, 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, nowhere near comparable to nuclear.
Hydroelectric	Relatively low capacity factor, large land-use requirement (e.g., inundation of approximately 500,000 acres or more could be required for a new 500 MW plant), 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. 7.2-3, pages 3-61 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 approximately 7,000 MW of installed hydroelectric capacity, of which roughly one third would contribute to summer peak. 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.

Table 7.2-1 (continued)
Other Generation Technology Options Considered

Alternative	Considerations/Reasons for Not Evaluating Further
Geothermal	As noted by the NRC, 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. 7.2-21).
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 NYSERDA study (Ref. 7.2-3, pages 3-63 through 67) examined both 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 cofiring biomass with coal offers the technical potential capacity for the entire State greater than the current capacity of Ginna Station, and 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 waiting approval for roughly 10 MW of cofiring capability – far from enough capacity to replace a nuclear unit.
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. 7.2-3, 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 3-5 MW, for a total technical potential of approximately 19 MW of installed capacity, all of which would be available on summer peak. Together, large and small systems would offer a total technical potential of 135 MW of installed capacity statewide.

Table 7.2-1 (continued)
Other Generation Technology Options Considered

Alternative	Considerations/Reasons for Not Evaluating Further
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. 7.2-11). Based on projections reported by the NYSEPB (Ref. 7.2-3, 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 nuclear power plants has been expressed recently by members of both industry and government. However, RG&E has no plans to construct a new nuclear power plant, and considers it unlikely that a replacement for the Ginna Station could be planned, licensed, constructed, and on line by the time the operating license expires in 2009.

DOE = U.S. Department of Energy
GEIS = Generic Environmental Impact Statement for License Renewal of Nuclear Plants
GWh = gigawatt hours
kWh = kilowatt hour(s)
m^2 = square meter(s)
MW = megawatt(s)
NRC = U.S. Nuclear Regulatory Commission
NYSEPB = New York State Energy Planning Board
NYSERDA = New York State Energy Research and Development Authority
Ref. = Reference
RG&E = Rochester Gas and Electric Corporation
SBC = Systems Benefit Charge

7.3 Environmental Impacts of Alternatives

RG&E's 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 RG&E's 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 Ginna Station. Therefore, RG&E assumes for this analysis a design life of 30 years for the coal-fired plant, consistent with the design life established for the JEA Northside units (Ref. 7.2-12, Section 2.1.5), and a typical design life of 25 years for the combined-cycle natural gas-fired plant, and further assumes that these plants would be constructed on a schedule that would allow them to be in service in 2009 when Ginna Station would shut down.

RG&E focused its evaluation of these alternatives located at the Ginna Station site. However, key differences in impact that could be expected as a result of locating these plants at a greenfield site are noted. 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, RG&E assumes that the generating technology employed under the purchased power alternative would be one of those that the NRC analyzed in the GEIS. RG&E 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. RG&E 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 RG&E'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 Ginna Station site would require approximately 30 acres of the 488-acre site, parcels of which are variously actively cultivated, cleared and maintained, open land on and near the spoil pile from plant construction, and former cropland and orchard. The 16 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 on or adjacent to the existing transmission line ROW for most of its length. This route predominantly traverses rural agricultural land with some rural residential use along local roadways. More intensive development along

this route is confined primarily to the areas along and near New York State (NYS) Route 104.

Current agricultural use on the site would be precluded in the area required for the plant, and some localized and mostly temporary disruption of current land use (primarily farming) may occur along the pipeline route. However, the facility would represent expansion of an existing industrial use, the land area affected would be small, and environmental reviews and approvals that would be required under Article X would act to minimize potential adverse effects on land use. RG&E considers that impact on land use from this alternative would be small.

Additional onsite acreage would likely be required to locate the representative plant at a greenfield site, and supporting offsite infrastructure could also be required. However, these facilities would be located and designed in consideration of land-use impacts and protections afforded under Article X or comparable rules. RG&E considers that impact on land use at a greenfield site also would likely be small.

Water Use and Quality

As noted in Section 7.2.2.2, cooling water intake and discharge flows for the representative gas-fired plant would be substantially lower than currently occur for the Ginna Station, even for a once-through cooling system option. Potable and service water use and other wastewater discharges would also be less and, like Ginna Station, 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, RG&E concludes that impact on water use and quality for the representative plant located at the Ginna Station site would be small. For these same reasons, RG&E 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 as a result of the combustion process, which results in emissions of criteria pollutants including NO_2, SO_2, CO, and particulates, as well as carbon dioxide (CO_2), an unregulated "greenhouse gas" implicated as a potential contributor to global warming. 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. 7.2-19, Table 6-8) to account for assumed differences in capacity factor, approximate emission rates for principal criteria pollutants from the representative gas-fired alternative plant would be: NO_x, 95 tons/year; SO_2, 30 tons/year; PM_{10}, 110 tons/year; and (assuming use of oxidation catalysts) CO, 58 tons/year. These emissions may result in 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. RG&E concludes that the overall impact on air quality from this alternative, located either at the Ginna Station site or a greenfield site elsewhere in western 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 some spent catalyst used for NO_x control, a potentially hazardous waste. These wastes would be disposed of in accordance with applicable regulations at a permitted offsite disposal facility, regardless of the plant's location. RG&E concludes that the gas-fired generation waste management disposal impacts would be small.

Ecological Resources

Development of the gas-fired alternative plant at the Ginna Station site would result in the displacement of approximately 30 acres on site. Most of this area is actively cultivated, or cleared and maintained, and offers marginal habitat value. The plant communities on remaining areas represent early successional communities on formerly disturbed areas (former cropland and orchard). These old field habitats provide food and cover for wildlife species on the site, which are typical of those in the area (see Section 2.5).

Construction of the 16-mile long gas supply pipeline using an assumed construction ROW of 75 feet could disturb up to 145 acres of terrestrial habitat. However, the permanent ROW would be reduced to 50 feet and is expected to be located on or near the existing transmission corridor from the Empire Pipeline northward to the site. Most of this area consists of active agricultural land. The remainder of the area on and near the transmission ROW consists predominantly of shrubland and scattered woodlots, which would require clearing as necessary to accommodate the pipeline. Crossing of several small tributary streams would also be required, a few of which feature associated wetlands (e.g., along tributaries of Red Creek, which joins the Erie Canal approximately 13 miles south of the Ginna Station site). RG&E expects that some minor overall reduction of forest 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 Sections 2.5 and 2.6, habitats on and in the vicinity of the Ginna Station site and associated transmission corridor from the site to NYS Route 104 are typical of those found in central and western upstate New York, and no threatened or endangered species are known to reside in these areas. RG&E assumes comparable conditions exist along the remainder of the assumed pipeline ROW.

Potential impact to aquatic communities of greatest potential concern 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 Ginna Station, the impact from which is considered to be small (see Chapter 4).

Considering the foregoing and assumed environmental protections that would be afforded in routing the natural gas pipeline, including those under Article X or a comparable program, RG&E concludes that development of the natural gas-fired plant at the Ginna Station site would have essentially no noticeable impact on ecological resources of the area, and impacts, therefore, would be small.

Impact on ecological resources from construction and operation of the natural gas-fired representative plant and associated offsite infrastructure elsewhere in western upstate New York is conjectural. However, ecological resources throughout much of the area would be similar to those for the Ginna Station site alternative and the siting, design, and operation of the facility would be subject to the environmental protections noted above. RG&E 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
- Changes in permanent jobs and economic activity attributable to gas-fired plant operation and shutdown of Ginna Station.

RG&E estimates that the representative 540 MW gas-fired plant would be constructed in approximately two years with an average work force of 240 and a peak work force of 420. It is assumed that construction would take place while Ginna Station continues operation. With a large labor pool in the metropolitan area of Rochester, within 20 miles of the site, it is expected that most workers would commute and relatively few would relocate to Webster or other small communities in the area. The increase in demand for housing and public services that would result from those choosing to temporarily relocate with their families might be noticeable, but could be readily accommodated. The resulting impact is, therefore, considered to be small to moderate.

The communities surrounding the Ginna Station would realize temporary economic benefits during construction, including increased jobs and expenditures for the plant,

and the long-term benefit of a replacement tax base represented by the gas-fired plant. After construction, the communities would be impacted by the loss of some 475 jobs since the operating work force at the gas-fired plant is expected to be 25 workers as compared to the 500 permanent employees currently at Ginna Station. However, this net loss of direct jobs would take place over a period of several years as a result of decommissioning activities. As discussed in Section 3.4, 44 percent of all employees at Ginna Station resides in Monroe County, which is dominated by the Rochester metropolitan area. Considering that the Rochester metropolitan area had a year 2000 population of over one million (Ref. 7.2-22), the loss of these jobs would have a minor impact on the area. Approximately 48 percent of the current Ginna Station workforce resides in Wayne County, of which about 14 percent resides in the Town of Ontario (year 2000 population 9,778) and 8 percent resides in Williamson (year 2000 population 6,777); the remaining employees reside in 13 different communities. It is expected that the loss of jobs and reduction in general economic activity resulting from Ginna Station shutdown would be more noticeable in these local communities, but would not destabilize local economies, particularly considering proximity to the Rochester metropolitan area, which is within commuting distance of the site. In addition, the potential loss of tax revenues is expected to amount to 10 percent or less of the total annual budget of each taxing jurisdiction (see Section 2.10). The resulting impact is, therefore, considered to be small to moderate.

Transportation impacts from increased vehicular traffic associated with construction and operating personnel commuting to the site would be within the bounds of conditions currently experienced during outage periods and so would be small. Regular workforce numbers at Ginna Station are 500, with outages increasing the number of workers by 700. During the construction period, worker numbers would increase by 240 on average and peak at 420. If an outage were to occur during the construction period, however, worker numbers could reach 1,620, resulting in moderate impacts to the local transportation network. Transportation impacts from the operating workforce of 25 for the gas-fired plant would be negligible. RG&E, therefore, concludes the overall socioeconomic impact of this alternative would be small to moderate.

Location of the gas-fired alternative at a greenfield site in western upstate New York if located outside of Wayne County would result in corresponding loss of tax revenues and employment in the area. However, based on information noted above for the Ginna site alternative, these impacts may be noticeable, but would likely not be destabilizing. The greenfield site alternative would result in a temporary increase in demand for housing and public services in the communities surrounding the selected site during the construction phase. Projection of these impacts would be conjectural and could range from small to moderate. Factors influencing the magnitude of impacts include the location of the site, its proximity to the large population centers in RG&E's service area, and the degree to which growth in the communities surrounding the plant will offset the loss of jobs once construction is completed. There would also be the temporary economic benefits of increased jobs

and expenditures for the plant and the long-term benefit of the addition of the plant to the area's tax base. The addition of the 25 employees needed to operate the plant would have small positive impacts on the surrounding communities. Therefore, these impacts would be small to moderate.

Transportation impacts associated with construction personnel commuting to a greenfield site are conjectural and would depend on the condition of the transportation network in the area chosen. The impacts associated with the operational workforce of 25 would be negligible. RG&E assumes that appropriate infrastructure accommodations would be made such that impacts from development of a gas-fired plant would be small. In conclusion, the overall socioeconomic impacts of this alternative located at a greenfield site would be small to moderate.

Human Health

The NRC cites workplace accidents and inhalation of toxics and particulates associated with air emissions as potential human health risks from gas-fired generation (Ref. 7.0-1, Tables 8.1, 8.2). RG&E assumes that regulatory requirements related to occupational safety and health and air emissions are designed to protect human health and that compliance with those requirements would ensure that any associated impacts would be small.

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, approximately 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 Ginna Station site would represent an incremental addition to an existing plant with similar characteristics and would be remotely located relative to major thoroughfares and residential developments. The gas supply pipeline would likely be located on or near the transmission corridor from the Empire Pipeline northward to the site and so would be routed through sparsely populated areas. Associated aesthetic impacts from the pipeline are, therefore, considered to be small. Overall, RG&E concludes that aesthetic impact from development of a gas-fired plant at the Ginna Station site would be small.

Any discussion of the potential aesthetics impact of the gas-fired alternative at a greenfield site in western upstate New York is conjectural. However, RG&E assumes the plant location and design would be subject to review under New York's Article X or a comparable program, 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 Ginna Station site would be located on previously disturbed areas, primarily agricultural land, and no archaeological or historic sites are known to exist on the plant property. RG&E assumes that the gas supply pipeline would be routed with consideration of cultural resources under New York's Article X 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 such resources discovered during onsite or offsite construction. On this basis, RG&E considers the potential adverse impact on cultural resources from this alternative to be small.

RG&E 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

RG&E's impact evaluation for the representative coal-fired generation alternative is presented in the following subsections by resource category.

Land Use

Development of the representative ACFB coal-fired plant at the Ginna Station site would require approximately 60 acres of the 488-acre site for the power block; fuel and limestone delivery, handling, and storage facilities; cooling towers (if used); and related support facilities. Under assumptions of this analysis, none of the combustion solid waste (ash and gypsum) would be used beneficially, and 260 acres would be needed for disposal of this material (see Section 7.2.2.3) for a total land requirement of approximately 320 acres. RG&E assumes that development would be confined to on-site areas north of Lake Road, possibly with additional offsite lands dedicated to these uses. RG&E estimates that approximately 75 percent of this area consists of active cropland and orchards, and most of the remainder consists of cleared and maintained areas, or recently abandoned or fallow cropland/orchards available for agricultural use. Depending on the configuration of waste disposal areas, the three farmsteads on the property could be essentially isolated and possibly abandoned; it is assumed that woodlands on the site would remain essentially intact. Under either scenario, RG&E assumes, however, that the disposal areas eventually could be restored and developed as recreational areas consistent with regional land use.

Potential for adverse impact to offsite land uses could result from delivery of coal and limestone to the plant. As noted in Section 7.2.2.3, the rail option would likely involve construction of a rail line from the CSX main line in Rochester to the site, a distance of approximately 21 miles, 18 miles of which RG&E assumes would coincide with a rail line that once provided freight service to the area. Most of this rail line is now abandoned. However, a segment of the line, from approximately 1 mile west of Webster eastward to Sodus, remains in light-duty service, including use for sight-seeing tours; approximately 7 miles of this active segment would require upgrade to

accommodate deliveries to the plant. Considering the present use of this rail segment for recreation and tourism, and the developed nature of this rail corridor, particularly in and near Rochester, which includes residential areas, substantial land-use conflicts are likely associated with this option. Some potential for inhibition of lakeshore recreational use could result from perceived aesthetic impairment from barge terminal facilities and associated traffic in the barge delivery option.

On the basis of the above considerations, RG&E concludes that changes in land use associated with the barge delivery option would be clearly noticeable, but would not destabilize land use in the vicinity, a characteristic of moderate impact. Substantial land-use disruption could result from the rail delivery option, and RG&E therefore considers the associated impact from the rail option to be moderate to large.

Land-use impacts from development of the plant at a greenfield site are conjectural, though additional buffer areas would be possible with a larger site (e.g., 900 acres; see Section 7.2.2.3). RG&E assumes that the facility location and design would be subject to substantial regulatory scrutiny under Article X or a comparable program, and that associated land-use impacts would be moderate.

Water Use and Quality

Potential construction-phase impacts on water quality of greatest potential concern are those associated with development of infrastructure for coal and limestone delivery (e.g., navigation channel, shoreline protection, and terminal) in the event that option is chosen. Dredging, pile-driving, and related construction activities would be expected to result in suspension of bottom sediments and increased turbidity in affected areas of Lake Ontario. However, these activities would be regulated by the USACE under the CWA 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; and adverse effects would be localized and temporary.

As noted in Section 7.2.2.3, cooling water intake and discharge flows for the representative coal-fired plant would be comparable to those for Ginna Station for a once-through system, or substantially lower for a closed-cycle system that uses cooling towers. Wastewater discharges would be similarly regulated by a SPDES permit. Therefore, RG&E concludes that the impact on water use and quality for the representative plant located at the Ginna Station site would be small. For these same reasons, and considering the environmental review of water use and quality issues afforded under Article X or an equivalent program, RG&E concludes that the impacts would be also be small for a greenfield site alternative.

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_2, 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).

Scaling from values reported for the JEA Northside plant (Ref. 7.2-12, Table 2.1.1) to account for assumed differences in capacity factor, approximate emission rates for principal criteria pollutants from the coal-fired alternative plant would be: NO_x, 1,760 tons/year; SO_2, 2,933 tons/year; PM_{10}, 215 tons/year; and CO would be equal to or less than a proposed cap of 3,066 tons/year for the JEA Northside units. Emissions of beryllium and mercury would be less than 0.01 and 0.1 tons/year, respectively, assuming that the content of these constituents in coal used at the representative plant is substantially equivalent to typical coal used for the JEA Northside plant (Ref. 7.2-12, Table 4.1.5).

RG&E expects that these emissions would result in noticeable reduction in local air quality. However, as noted in Section 7.2.1.3, equivalent allowances for SO_2 emissions would have to be obtained and credits to more than offset NO_x emissions, by a ratio of 1.15:1, would have to be obtained. 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.

RG&E concludes that the overall impact on air quality from this alternative, located either at the Ginna Station site or a greenfield site elsewhere in western upstate New York, would be moderate.

Waste Management

The representative plant would produce substantial quantities of solid waste from the combustion process, consisting primarily of ash from the coal and calcium sulfate (gypsum, upon hydration). Consistent with plans for the JEA Northside plant, RG&E assumes that none of this material could be used beneficially, and that it would be disposed of in a 260-acre lined landfill (see Section 7.2.2.3). As noted by the DOE in its environmental review of the JEA Northside facility (Ref. 7.2-12, Section 4.1.7.2), leachate from this combustion waste would not be expected to exceed applicable regulatory thresholds. Considering these waste characteristics and protections that would be afforded by a double liner and design provisions for leachate and runoff management, RG&E would not expect significant impacts to groundwater quality from the facility. Upon closure of the facility, the area eventually could be restored to other uses (e.g., recreation area) that would not compromise the landfill integrity. Although impacts from disposal of this waste would be noticeable, it would not be expected to destabilize any important resource. RG&E concludes on this basis that

the impacts of waste disposal for the representative coal-fired plant would be moderate for both the Ginna Station site option and a greenfield location.

Ecological Resources

Development of the coal-fired alternative plant at the Ginna Station site would result in the displacement of approximately 320 acres. As noted in the *Land Use* discussion above, approximately 75 percent of this area consists of active cropland and orchards, which has marginal habitat value. The plant communities on remaining areas consist predominantly of early successional communities on formerly disturbed areas (former cropland and orchard). These old field habitats provide food and cover for wildlife species on the site, which are typical of those in the area (see Section 2.5). With appropriate configuration of facilities on the site, RG&E assumes that mature woodlands on the site would remain intact, and that any disturbance to Deer Creek and Mill Creek would be minor.

RG&E presumes that construction of a rail line to the site under the coal and limestone rail delivery option would involve removal of some early successional plant communities on and adjacent to abandoned segments of railroad bed, primarily in the Rochester urban area. Construction of a 3-mile spur from the existing rail line into the site likely would be located near the existing Ginna Station transmission corridor and thus would traverse mostly agricultural land; however, this new construction also likely would involve some clearing of shrubland and forested habitats. As noted in Sections 2.5 and 2.6, habitats on and in the vicinity of the Ginna Station site and associated transmission corridor from the site to NYS Route 104 are typical of those found in central and western New York, and no threatened or endangered species are known to reside in these areas. RG&E assumes comparable conditions exist along the route assumed for rail delivery.

Dredging of a navigation channel, turning basin, and dockage area, and construction of related terminal facilities for barge delivery of limestone and coal would result in permanent alteration of natural shoreline and nearshore habitats. 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 such as were noted in Section 7.3.2; similarly, spill prevention measures would be applied during the operational period.

Operation of the cooling water system for the plant is also a potential source of impact to aquatic communities. 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 comparable to or less than for Ginna Station, the impact from which is considered to be small (see Chapter 4).

Considering the foregoing, RG&E concludes that development of the coal-fired alternative plant at the Ginna Station site would have a small to moderate impact on ecological communities under the rail delivery option. Development of the plant under the barge delivery option would involve clearly noticeable, though localized, impacts on ecological resources in Lake Ontario, and the associated impact is therefore considered to be moderate. For the same reasons cited in Section 7.3.2, RG&E concludes that the impact on ecological resources from construction and operation of the coal-fired representative plant at a greenfield site would be small to moderate.

Socioeconomics

RG&E assumes that the representative ACFB coal-fired plant would be constructed in approximately three years with a peak onsite workforce of approximately 820 workers. It is assumed that construction would take place while Ginna Station continues operation with its regular permanent workforce of 500. Considering the nearness of the Ginna Station site to the Rochester metropolitan area, few workers are likely to relocate to Webster or other smaller communities in the area, and little increased demand for housing and public services would occur. The communities in the area would easily accommodate any increase that does occur. The resulting impact is considered to be small to moderate.

As RG&E indicates in Section 7.3.2 for the representative gas-fired alternative, location of the ACFB coal-fired plant at the Ginna Station site would provide the local communities with temporary economic benefits by way of increased jobs and expenditures for the plant during the construction phase. The ACFB coal-fired plant would provide a long-term economic benefit with the replacement tax base at the Ginna Station site as well. Since the ACFB coal-fired plant would have a permanent workforce of 100 to 150, implementation of this alternative would result in the eventual net loss of about 300 jobs and the associated economic activity from the shutdown of Ginna Station. However, this net loss of jobs would take place over a period of years as a result of decommissioning activities. As discussed in Section 7.3.2, impacts on Webster and the other surrounding communities would likely be small to moderate.

Transportation impacts from location of the ACFB coal-fired plant at the Ginna Station site would be associated with the increased vehicular traffic from the construction and operating workforce commuting to the site. During construction, the peak construction workforce of 820 would be added to the Ginna Station permanent workforce of 500, totaling some 1,320 workers on site. When Ginna Station outages occur during the construction period, an additional 700 workers would be on site.

The resulting impact on the transportation network could be moderate to large. However, RG&E assumes that appropriate mitigation measures, which could reasonably include staggered shifts and increased traffic control during peak periods, would be employed to ensure that impacts would be maintained at moderate levels. Transportation impacts from an operating workforce of 100-150 for the ACFB coal-fired plant would be small. RG&E therefore concludes the overall socioeconomic impact of this alternative to be small to moderate.

As RG&E noted in Section 7.3.2 for the gas-fired alternative, locating the ACFB coal-fired plant at a greenfield site in western upstate New York, depending on location, could result in a greater decrease in tax revenues and employment in local communities than would occur for the Ginna site option. However, for the same reasons cited in Section 7.3.2, these impacts may be noticeable, but likely not destabilizing. Location of the coal-fired plant at the greenfield site also would result in a temporary increase in demand for housing and public services in the communities surrounding the selected site during the construction phase. Projection of these impacts would be conjectural and could range from small to moderate. With the temporary economic benefit of increased jobs and expenditures for the plant, there would also be the long-term benefit of the addition of the plant to the area's tax base. The addition of approximately 100 to 150 employees to operate the coal-fired plant would have small positive impacts on the surrounding communities. The transportation impacts for the ACFB coal-fired plant located at a greenfield site in western upstate New York would be similar to those described in Section 7.3.2 for the gas-fired plant similarly located. Determination of impacts from the construction workforce, which would peak at 820 workers, would be conjectural and depend on the site chosen. These impacts could be small to large. Impacts associated with an operational workforce of as many as 150 would be less than those of the construction workforce and RG&E assumes that appropriate infrastructure accommodations would be made such that the impacts would be small. Considering the regulatory review assumed to occur under Article X or a comparable program, RG&E concludes that, overall, the socioeconomic impacts from locating the ACFB coal-fired plant at a greenfield site in western upstate New York would be small to moderate, 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). RG&E 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 an ACFB coal-fired plant include visual impairment resulting from the presence of a large industrial facility (including a building housing the combustors; turbine-generators; emission control equipment; one 500-foot stack; fuel, limestone, and waste receiving/handling and storage facilities; stormwater runoff control basins; and, potentially, mechanical-draft cooling towers, approximately 100-feet high, with associated condensate plumes). Noise and light from plant operations would be detectable off site. The stack and condensate plumes from the mechanical-draft cooling towers, if they are used, would be some distance from the plant. Development of the ACFB coal-fired plant at the Ginna Station site represents an incremental addition to an existing plant that is remotely located relative to major thoroughfares and residential developments. However, the Ginna Station site lacks the infrastructure for delivery of coal and limestone, so it would be necessary to construct barge delivery and unloading facilities on Lake Ontario or a railway from the main CSX line in Rochester. The associated aesthetic impacts are therefore considered to be moderate to large.

Any discussion of the potential aesthetics impact of the ACFB coal-fired alternative at a greenfield site in western upstate New York is conjectural, and the impact could range from small to large, depending on location.

Cultural Resources

The area developed for the coal-fired generating plant at the Ginna Station site would be located on previously disturbed areas, primarily agricultural land, and no archaeological or historic sites are known to exist on or near the plant property. RG&E assumes that facility development would take place with appropriate consideration of cultural resources under New York's Article X program or similar review and approval process, and that appropriate measures would be taken to recover or provide other mitigation for loss of any such resources discovered during construction.

RG&E has done no detailed investigation of potential cultural resources that may exist along the assumed route for delivery of coal and limestone by rail. However, RG&E assumes all but approximately 3 miles of the 21 miles of rail required would consist of reconstruction or upgrade of an abandoned or currently used light-duty railroad line (see *Land Use* subsection above) and that the construction would consider and mitigate, as appropriate, related impacts to cultural resources.

Considering the foregoing, RG&E concludes that the potential impact on cultural resources would be small for the representative coal-fired plant located at the Ginna Station site under either coal and limestone delivery option. RG&E 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 X program or similar approval process, and that any associated impacts also would be small.

7.4 References

Ref. 7.0-1 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.

Ref. 7.0-2 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.

Ref. 7.1-1 U.S. Nuclear Regulatory Commission. *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*. NUREG-0586. Office of Nuclear Regulatory Research. Washington, D.C. August 1988.

Ref. 7.2-1 New York Independent System Operator. *2001 Load and Capacity Data*. Accessible at http://www.nyiso.com/services/documents/planning/pdf/2001_gold_book.pdf.

Ref. 7.2-2 New York State Energy Planning Board. *Annual Report to the New York State Energy Plan and Final Environmental Impact Statement.* March 2001. Accessible at http://www.nyserda.org/sep.html.

Ref. 7.2-3 New York State Energy Planning Board. *New York State Energy Plan and Draft Environmental Impact Statement.* June 2002. Accessible at http://www.nyserda.org/sep.html.

Ref. 7.2-4 New York State Energy Research and Development Authority. "About NYSERDA." http://www.nyserda.org/about.html. Accessed June 5, 2002.

Ref. 7.2-5 New York State Energy Research and Development Authority. "New York Energy $mart™." http://www.nyserda.org/energysmart.html. Accessed June 5, 2002.

Ref. 7.2-6 New York State Reliability Council. "New York State Reliability Council – Welcome." http://www.nysrc.org/about.html. Accessed June 5, 2002.

Ref. 7.2-7 New York Independent System Operator. *New York Independent System Operator Statement of Energy Policies, Planning Objectives, and Strategies for New York State Energy Plan*. September 21, 2000. Accessible at http://www.nyiso.com/services/documents/planning.html.

Ref. 7.2-8 New York State Public Service Commission. *Guide to the Certification Review Process for Major Electric Generating Facilities Under Article X of the New York State Public Service Law.* Board on Electric Generation Siting and the Environment. February 11, 2002. http://www.dps.state.ny.us/articlex_process.html. Accessed June 6, 2002.

Ref. 7.2-9 Energy Information Administration. *Electric Power Annual 2000: Volume 1*. DOE/EIA-0348(2000)/1. Office of Coal, Nuclear, Electric and Alternate Fuels. Washington, D.C. August 2001. Accessible at http://www.eia.doe.gov/cneaf/electricity/epav1/epav1_sum.html.

Ref. 7.2-10 New York State Energy Research and Development Authority. *Patterns and Trends – New York State Energy Profiles: 1986-2000.* Albany, New York. December 2001. Accessible at http://www.nyserda.org/energyinfo.html.

Ref. 7.2-11 New York State Board on Electric Generation Siting and the Environment. *Department of Public Service Article X Cases.* Revised May 30, 2002. Accessible at http://www.dps.state.ny.us/xtable.PDF.

Ref. 7.2-12 U.S. Department of Energy. *Final Environmental Impact Statement for the JEA Circulating Fluidized Bed Combustor Project, Jacksonville, Florida.* DOE/EIS-0289. June 2000.

Ref. 7.2-13 Environmental News Network. "New 'Clean Coal' Power Plant Set for Pennsylvania." July 31, 2001. Accessible at http://www.enn.com/news/enn-stories/2001/07/07312001/coal_44470.asp.

Ref. 7.2-14 U.S. Department of Energy. "JEA Large-Scale CFB Combustion Demonstration Project." Project Fact Sheet. Office of Fossil Energy. http://www.lanl.gov/projects/cctc/factsheets/jacks/jackeademo.html. Accessed May 25, 2002.

Ref. 7.2-15 U.S. Department of Energy. *The JEA Atmospheric Fluidized Bed Clean Coal Project, Repowering Northside Units 1 and 2.* National Energy Technology Laboratory, Pittsburgh, PA. October 2001. Accessible at http://www.lanl.gov/projects/cctc/resources/library/bibliography/demonstration/aepg/baepgfb_jackea.html#program.

Ref. 7.2-16 Ducan, J. JEA. Current Status – JEA Northside Atmospheric Fuidized Bed Combustion (AFBC) Project. Personal communication with G. DeCamp. July 22, 2002.

Ref. 7.2-17 New York State Energy Planning Board. *Report on the Reliability of New York's Electric Transmission and Distribution Systems.* November 2000. Accessible at http://www.nyserda.org/t&dreport.pdf.

Ref. 7.2-18 Sanford, M., V. Banunarayanan, and K. Wirgau. *Implications of Capacity Additions in New York on Transmission System Adequacy.* MAPS study performed for the New York Independent System Operator. Rev. 2, March 2, 2001. Accessible at http://www.nyiso.com/services/planning.html#tpr.

Ref. 7.2-19 Wawayanda Energy Center. LLC (Calpine). *Article X Application for Wawayanda Energy Center*. New York State Department of Public Service Case No. 00-F-1256. August 27, 2001. Accessible at http://www.wawayanda-energy.com/pages/frame.html.

Ref. 7.2-20 Energy Information Administration. *Cost and Quality of Fuels for Electric Utility Plants 2000 Tables*: Table 24, "Origin of Coal Received by Electric Utility and Plant, 2000." DOE/EIA-0191(00). August 2001. Accessible at http://www.eia.doe.gov/cneaf/electricity/cq/cq_sum.html

Ref. 7.2-21 New York State Energy Research and Development Authority. *Renewable & Indigenous Energy R&D Program – Indigenous Resources*. http://www.nyserda.org/energyresources/indigenous.html. Accessed October 7, 2001.

Ref. 7.2-22 U.S. Census Bureau. Table DP-1, "Profile of General Demographic Characteristics: 2000." Geographic Area: Rochester, NY MSA. http://www.census.gov. Accessed July 12, 2002.

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)

Rochester Gas and Electric Corporation's (RG&E's) evaluations of the environmental impacts associated with the R.E Ginna Nuclear Power Plant (Ginna Station) operating license renewal (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 (see Section 7.2.1.3).

RG&E 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			
		Base (Decommis-sioning)	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
Land Use	SMALL	SMALL	MODERATE to LARGE	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.
Water Use and Quality	SMALL	SMALL	SMALL	SMALL	
Air Quality	SMALL	SMALL	MODERATE	SMALL to MODERATE	
Waste Management	SMALL	SMALL	MODERATE	SMALL	
Ecological Resources	SMALL	SMALL	SMALL to MODERATE	SMALL	
Socioeconomics	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	
Transportation	SMALL	SMALL	SMALL to MODERATE	SMALL	
Human Health	SMALL	SMALL	SMALL	SMALL	
Aesthetics	SMALL	SMALL	MODERATE to LARGE	SMALL	
Cultural Resources	SMALL	SMALL	SMALL	SMALL	

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 (10 CFR 51, Subpart A, Appendix B, Table B-1, footnote 3).

Table 8.0-2
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
		Description		
Ginna Station license renewal for 20 years, followed by decommissioning (see Chapter 3).	Decommissioning following expiration of current Ginna Station license. Adopting, by reference, NRC description in the GEIS as bounding Ginna decommissioning (see Section 7.1).	New construction at Ginna Station site. Plant characteristics as follows (see Section 7.2.2.3): Two 265 MW (net) atmospheric circulating fluidized-bed combustion units; capacity factor 0.8. Either once-through cooling or closed-cycle cooling with mechanical draft cooling towers. Assumed fuel pulverized bituminous coal; 13,233 Btu/pound; 7.35% ash; 2.22% sulfur. Fuel consumption 1.4 million tons coal/yr. Delivery of coal and limestone via barge and newly constructed barge terminal, or by rail via 18 miles of reconstructed/ upgraded line and new 3-mile-long spur. Selective noncatalytic reduction for NO_x control.	New construction at Ginna Station site. Plant characteristics as follows (see Section 7.2.2.2): One combined-cycle 540 MW (nominal) unit; consisting of two 180 MW combustion turbines and a 180 MW steam turbine generator; capacity factor 0.8. Either once-through cooling or closed-cycle cooling with mechanical draft cooling towers or air-cooled condensers. Natural gas consumption: 27 billion scf/yr. Delivery via new 16-mile-long pipeline on 50-foot-wide ROW (75-foot-wide for construction). Dry-low NO_x combustor; selective catalytic reduction. PM and CO emissions limited through proper combustion controls. Exhaust from	Adopting by reference NRC description in the GEIS of alternate technologies (see Section 7.2.1.3).

Table 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
		Description (continued)		
		Fabric filtration (99.8% removal efficiency) for particulate control. Limestone addition and, if needed, polishing scrubber (98% removal efficiency for SO_2). Emissions dispersed through single 500-foot-tall stack. Peak construction work force: 820. Operating work force: 150.	combustion turbines dispersed through two 225-foot-tall stacks. Construction work force: 240 average, 420 peak. Additional operating work force: 25.	
		Land Use Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 52, 53).	SMALL – Not an impact evaluated in the GEIS (Ref. 8.0-1, Section 7.3).	MODERATE to LARGE – Approximately 320 acres of land converted to industrial use at existing plant site, including 60 acres for power block and related support facilities and 260 acres for waste disposal. Construction of 21 miles of rail line (18 miles on abandoned or existing rail corridor), which traverses some urban	SMALL – Approximately 30 acres of land converted to industrial use at existing plant site. Sixteen miles of natural-gas supply pipeline to be constructed through rural agricultural land on 50-foot-wide constructed ROW (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of land use impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

Table 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
Land Use Impacts (continued)				
		residential and recreational areas, could result in large land use impact (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). No applicable Category 2 issues.	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 89). No Category 2 issues.	SMALL – Construction impacts reduced by use of best management practices and regulatory controls. Operation-phase impacts similar to or less than those of Ginna Station (see Section 7.3.3).	SMALL – Construction impacts minimized by use of best management practices and regulatory controls. Operation-phase impacts less than those of Ginna Station (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of water quality impacts from alternate technologies (Ref. 8.0-1, Section 8.3).
Air Quality Impacts				
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issue (Issue 51). No applicable Category 2 issues.	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 88). No Category 2 issues.	MODERATE – • 2,933 tons SO_2/yr • 1,760 tons NO_x/yr • $\leq$ 3,066 tons CO/yr • 215 tons PM_{10}/yr (see Section 7.3.3).	SMALL to MODERATE - • 30 tons SO_2/yr • 95 tons NO_x/yr • 58 tons CO/yr • 110 tons PM_{10}/yr (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of air quality impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

Table 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
		Waste Management Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 77-84). No Category 2 issues.	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 87). No Category 2 issues.	MODERATE – Waste disposed of on site in a 260-acre lined landfill (see Section 7.3.3).	SMALL –Relatively low waste generation (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of waste management impacts from alternate technologies (Ref. 8.0-1, Section 8.3).
		Ecological Resource Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 15-24, 45-48). Ginna Station has a current New York SPDES permit, which constitutes compliance with CWA Section 316(b) requirements to provide best available technology to minimize entrainment and impingement (see Section 4.2.1, Issue 25; Section 4.2.2, Issue 26). The NYSDEC has approved the Ginna Nuclear Power Plant 316(a) Demonstration, which analyzed the potential	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 90). No Category 2 issues.	SMALL to MODERATE- Loss of 320 acres, approximately 75% of which consists of cropland and orchards. Rail delivery option: construction of 3-mile-long spur to existing rail line likely to involve minor clearing of shrubland and forested habitats. Barge delivery option: Dredging of navigation channel, turning basin, dockage area, and related construction-induced alteration of shoreline and nearshore	SMALL - Loss of 30 acres of mostly actively cultivated or cleared land on site. Potential for impacts to aquatic ecology reduced by best management practices and regulatory controls. Cooling water discharge impacts comparable to or less than those for Ginna Station (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of ecological resource impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

TABLE 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
Ecological Resource Impacts (continued)				
for heat shock and found no problem (see Section 4.3, Issue 27). Impacts to threatened and endangered species expected to be small due to low potential for occurrence in habitats affected by plant operation and lack of observed impacts during operational monitoring (see Section 4.5, Issue 49).		habitats; continued disturbance during operation from maintenance dredging, barge traffic. Potential for impacts to aquatic ecology reduced by best management practices and regulatory controls. Cooling water intake- and discharge-related impacts comparable to or less than those for Ginna Station (see Section 7.3.3).		
Socioeconomic Impacts				
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 64, 67). Location in area of high population minimizes potential for housing impacts (see Section 4.8.2, Issue 63). Tax-driven land-use changes would be small given that the county has an established development pattern and is	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 91). No Category 2 issues.	SMALL to MODERATE – Increased demand for public services from nearby communities during construction, and net loss of jobs in Webster and surrounding communities with associated reduction in economic activity from shutdown of Ginna Station may result in	SMALL to MODERATE – Increased demand for public services from nearby communities during construction, and net loss of jobs in Webster and surrounding communities with associated reduction in economic activity from shutdown of Ginna Station may result in	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of socioeconomic impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

TABLE 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
		Socioeconomic Impacts (continued)		
growing at a relatively slow rate (see Section 4.11.2, Issue 69). Capacity of public water supply minimizes potential for related impacts (see Section 4.9, Issue 65).		noticeable, but not destabilizing, impacts (see Section 7.3.3).	noticeable, but not destabilizing, impacts (see Section 7.3.2).	
		Transportation Impacts		
SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 85). Traffic capacity of NYS Route 104 and secondary roads providing access to Lake Road minimizes potential for transportation impacts (see Section 4.12, Issue 70).	SMALL – Not an impact evaluated in the GEIS (Ref. 8.0-1, Section 7.3).	SMALL to MODERATE – Temporary increase in traffic of 820 (maximum) vehicle round-trips per day during construction. Operating workforce of 100 to 150 would result in small impacts (see Section 7.3.3).	SMALL - Temporary increase in traffic of 420 (maximum) vehicle round-trips per day during construction. Negligible impacts from operational workforce of 25 (see Section 7.3.2).	Impact dependent on generation technology and location. Not an impact evaluated in the GEIS.
		Human Health Impacts		
SMALL - Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 56, 58, 61, 62). SMALL – Water temperatures would not support viable	SMALL – Adopting by reference applicable NRC finding for GEIS Category 1 issue (Issue 86). No Category 2 issues.	SMALL– Some risk of cancer and emphysema from air emissions and risk of accidents to workers, as the NRC notes in the GEIS.	SMALL – Same as for coal-fired alternative (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of human health impacts from alternate

TABLE 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
		Human Health Impacts (continued)		
populations; thereby, minimizing public health impacts from thermophilic microbiological organisms (see Section 4.15, Issue 57). Risk due to transmission line-induced currents minimal due to conformance with National Electric Safety Code® criteria (see Section 4.7, Issue 59).		Regulatory controls assumed to reduce risks to acceptable levels (see Section 7.3.3).		technologies (Ref. 8.0-1, Section 8.3).
		Aesthetic Impacts		
SMALL – Adopting by reference applicable NRC findings for GEIS Category 1 issues (Issues 73,74). No Category 2 issues.	SMALL – Not an impact evaluated in the GEIS (Ref. 8.0-1, Section 7.3).	MODERATE to LARGE – Construction and operation of new barge delivery and unloading facilities on site, or railway line to Rochester may result in significant aesthetic impacts (see Section 7.3.3).	SMALL – No significant aesthetic impacts anticipated for development at Ginna Station site (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of aesthetic impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

TABLE 8.0-2 (continued)
Impacts Comparison Detail

Proposed Action (License Renewal) [a]	No-Action Alternative			
	Base (Decommissioning) [a]	With Coal-Fired Generation	With Gas-Fired Generation	With Purchased Power
Cultural Resource Impacts				
SMALL – Lack of cultural resources and SHPO consultation minimize potential for impact (see Section 4.13, Issue 71).	SMALL – Not an impact evaluated in the GEIS (Ref. 8.0-1, Section 7.3).	SMALL – No known cultural resources in affected onsite areas; mitigation measures, if necessary, would minimize impact (see Section 7.3.3).	SMALL – Same as coal-fired alternative (see Section 7.3.2).	Impact dependent on generation technology and location. Adopting by reference NRC description in the GEIS of cultural resource impacts from alternate technologies (Ref. 8.0-1, Section 8.3).

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

Impact Definitions:

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.

(10 CFR 51, Subpart A, Appendix B, Table B-1, footnote 3).

≤ = less than or equal to
% = percent
Btu = British thermal unit
CO = carbon monoxide
CWA = Clean Water Act
GEIS = *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (Ref. 8.0-1)
MW = megawatt(s)
NO_X = nitrogen oxide(s)
NRC = U.S. Nuclear Regulatory Commission
NYS = New York State
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
scf = standard cubic feet
SHPO = State Historic Preservation Officer
SO_2 = sulfur dioxide
SPDES = State Pollutant Discharge Elimination System
yr = year

8.1 References

Ref. 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

NRC

"The environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection."
10 CFR 51.45(d), as required by 10 CFR 51.53(c)(2)

9.1.1 General

Table 9.1-1 lists environmental authorizations that Rochester Gas and Electric Corporation (RG&E) has obtained for current R.E. Ginna Nuclear Power Plant (Ginna Station) operations. In this context, RG&E uses "authorizations" to include any permits, licenses, approvals, or other entitlements. RG&E expects to continue renewing these authorizations during the current license period and throughout the proposed license renewal period. Based on the new and significant information identification process described in Chapter 5, RG&E concludes that Ginna Station is in compliance with 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 Ginna Station license to operate. As indicated, RG&E 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 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. FWS and NMFS have issued joint procedural regulations, at 50 CFR 402, Subpart B, that address consultation, and 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, RG&E has chosen to invite comment from federal and state agencies regarding potential effects that Ginna Station license renewal might have. Appendix C includes copies of RG&E correspondence with FWS and the New York State Department of Environmental Conservation (NYSDEC). RG&E did not consult with NMFS because species under the auspices of NMFS are not known to be in the Ginna Station vicinity.

Table 9.1-1
Environmental Authorizations for Current Operations

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
New York State Department of Environmental Conservation	NYS ECL Part 675	Water Withdrawal Registration	NYGLWR-0002810	07/10/02[a]	Withdraw water from Lake Ontario
State of Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68-202-206	Radioactive Shipment License	T-NY004-L01	12/31/02	Shipment of radioactive material to a licensed disposal/processing facility within Tennessee
Utah Department of Environmental Quality	R313-26 of the Utah Radiation Control Rules	Utah Department of Environmental Quality Division of Radiation Control Generator Site Access Permit Accessing A Land Disposal Facility Within Utah	0109 000 005	06/30/03	Delivery of radioactive wastes to a land disposal facility located within Utah
South Carolina Department of Health and Environmental Control	Act No. 429 of 1980 (South Carolina Radioactive Waste Transportation and Disposal Act)	South Carolina Radioactive Waste Transport Permit	0034-31-01	12/31/02	Transport of radioactive waste into South Carolina
New York State Department of Environmental Conservation	NYS ECL 11-0515 (1), NYCRR Part 175	New York State Fish and Wildlife License	LCP01-756	12/31/02	Collection and possession of fish and wildlife
New York State Department of Environmental Conservation	NYS ECL Article 40	Hazardous Substance Bulk Storage Registration Certificate	8-000170	07/18/03	Registration of hazardous substance bulk storage on site
New York State Department of Environmental Conservation	NYS ECL Title 8 of Article 17	State Pollution Discharge Elimination System (SPDES) Permit	NY-0000493	02/01/03	Discharge of wastewaters to waters of the State
U.S. Department of Transportation	49 CFR Part 107, Subpart G	Certificate of Registration for Transportation of Hazardous Materials	06200255003K	06/30/03	Transportation of hazardous materials

Table 9.1-1 (continued)
Environmental Authorizations for Current Operations

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
U.S. Nuclear Regulatory Commission	Atomic Energy Act (42 USC 2011 et seq.), 10 CFR 50.10	Facility Operating License	DPR-18	09/18/09	License to operate a nuclear power plant

a. Registration renewal submitted June 24, 2002.

Table 9.1-2
Environmental Authorizations for License Renewal[a]

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)
New York State Department of Environmental Conservation	Clean Water Act, Section 401 (33 USC 1341)	Certification	SPDES permit documents compliance with Clean Water Act standards
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)
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 F)

a. No renewal-related requirements identified for local or other agencies.

Based on the RG&E submittals and other information, as discussed in detail in Section 4.5, the agencies concur with the RG&E conclusion that Ginna Station license renewal would not adversely affect threatened or endangered species or critical habitat.

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 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). Ginna Station, located in Wayne County, is within the New York coastal zone. Concurrent with submitting the "Applicant's Environmental Report - Operating License Renewal Stage" to the NRC, RG&E 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 Committee on Historic Preservation an opportunity to comment on the undertaking. Committee regulations provide for establishing an agreement with any State Historic Preservation Officer (SHPO) to substitute state review for Committee review (35 CFR 800.7). Although not required of an applicant by federal law or NRC regulation, RG&E has chosen to invite comment by the New York SHPO. Appendix D includes copies of RG&E correspondence with the SHPO regarding potential effects that Ginna Station license renewal might have on historic or cultural resources.

Based on the RG&E submittal and other information, as discussed in detail in Section 4.13, the New York SHPO concurred with RG&E's conclusion that Ginna Station license renewal would not affect known historic or archaeological properties.

9.1.5 Water Quality (401) Certification

Federal Clean Water Act Section 401 requires applicants 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 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 certification by the state (Ref. 9.1-2, 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). RG&E is applying to the NRC for a license renewal to continue Ginna Station operations. Appendix B contains the Ginna Station SPDES permit, which authorizes plant discharges. Consistent with the GEIS, Ginna Station is providing the copy of its SPDES permit as evidence of state water quality (401) certification.

The most recent NYSDES SPDES inspection, conducted on March 20, 2002, found Ginna Station to be in compliance with the permit. As identified in Table 9.1-1, the Ginna Station SPDES permit will expire on February 1, 2003. In accordance with SPDES regulations, the Ginna SPDES permit renewal application will be filed at least 180 days prior to current permit expiration.

As part of RG&E's communication with regulatory agencies and interested parties concerning the Ginna License Renewal environmental review, the NYSDEC provided comments concerning entrainment and impingement at Ginna Station.

The NYSDEC comments pertaining to entrainment can be summarized as requesting an updated study of in-plant entrainment. RG&E acknowledges the value of such a study, and agrees to work with NYSDEC to include a mutually acceptable program within the on-going Ginna SPDES Permit.

The NYSDEC comments pertaining to impingement are summarized below.

1. Previous impingement reports should be utilized to summarize Ginna potential impact to Lake Ontario fish populations.
2. Gobies should be added as a target species within the impingement program.
3. Yellow perch should remain a target species within the impingement program.
4. Impingement mitigation requirements contained within the current SPDES Permit have been met.
5. The NYSDEC has reviewed the current traveling water screen replacement program, and agrees that such an upgrade is acceptable to meet Best Technology Available standards.

As part of the current SPDES program, RG&E has incorporated items 1, 2, and 3 above into the annual Fish Impingement Program Report required by the current Ginna SPDES Permit (Ref. 9.1-3).

9.2 Feasible Alternatives

The coal- and gas-fired generation and purchase power alternatives that Section 7.2.2 discusses probably could be constructed and operated so as to comply with all applicable environmental quality standards. RG&E 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

Ref. 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.

Ref. 9.1-2 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.

Ref. 9.1-3 Rochester Gas and Electric Corporation. *Fish Impingement Program, 1997-2001 Analysis Report, Ginna Nuclear Power Station*. RG&E Report No. B-13-389. Rochester, NY. 2001.

APPENDIX A. DISCUSSION OF NRC LICENSE RENEWAL NATIONAL ENVIRONMENTAL POLICY ACT ISSUES

Rochester Gas and Electric Corporation (RG&E) has prepared this *Environmental Report - Operating License Renewal Stage; Ginna Station* in accordance with the requirements of U.S. Nuclear Regulatory Commission (NRC) regulation 10 CFR 51.53. The NRC included in the regulation a list of National Environmental Policy Act (NEPA) issues for license renewal of nuclear power plants. Table A-1 lists these 92 issues with assigned categorization and identifies where RG&E addressed each issue in the environmental report. A cross-reference to the section in the NRC's *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (Ref. A.1-1; Ref. A.1-2) containing the NRC's generic analysis is also presented for the issues applicable to Ginna Station license renewal. For expediency, RG&E has assigned numbers to each issue and uses the issue numbers throughout the environmental report.

Table A-1
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
1.	Impacts of refurbishment on surface water quality	1	NA[c]	
2.	Impacts of refurbishment on surface water use	1	NA[c]	
3.	Altered current patterns at intake and discharge structures	1	4.1	4.2.1.2.1/4-4
4.	Altered salinity gradients	1	NA[d]	
5.	Altered thermal stratification of lakes	1	4.1	4.2.1.2.3/4-6
6.	Temperature effects on sediment transport capacity	1	4.1	4.2.1.2.3/4-6
7.	Scouring caused by discharged cooling water	1	4.1	4.2.1.2.3/4-6
8.	Eutrophication	1	4.1	4.2.1.2.3/4-6
9.	Discharge of chlorine or other biocides	1	4.1	4.2.1.2.4/4-10
10.	Discharge of sanitary wastes and minor chemical spills	1	4.1	4.2.1.2.4/4-10
11.	Discharge of other metals in waste water	1	4.1	4.2.1.2.4/4-10
12.	Water use conflicts (plants with once-through cooling systems)	1	4.1	4.2.1.3/4-13
13.	Water use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	NA[e]	
14.	Refurbishment impacts to aquatic resources	1	NA[c]	
15.	Accumulation of contaminants in sediments or biota	1	4.1	4.2.1.2.4/4-10
16.	Entrainment of phytoplankton and zooplankton	1	4.1	4.2.2.1.1/4-15

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
17.	Cold shock	1	4.1	4.2.2.1.5/4-18
18.	Thermal plume barrier to migrating fish	1	4.1	4.2.2.1.4/4-17
19.	Distribution of aquatic organisms	1	4.1	4.2.2.1.6/4-19
20.	Premature emergence of aquatic insects	1	4.1	4.2.2.1.7/4-20
21.	Gas supersaturation (gas bubble disease)	1	4.1	4.2.2.1.8/4-21
22.	Low dissolved oxygen in the discharge	1	4.1	4.2.2.1.9/4-23
23.	Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	1	4.1	4.2.2.1.10/4-24
24.	Stimulation of nuisance organisms (e.g., shipworms)	1	4.1	4.2.2.1.11/4-25
25.	Entrainment of fish and shellfish in early life stages for plants with once-through and cooling pond heat dissipation systems	2	4.2	4.2.2.1.2/4-16
26.	Impingement of fish and shellfish for plants with once-through and cooling pond heat dissipation systems	2	4.2	4.2.2.1.3/4-16
27.	Heat shock for plants with once-through and cooling pond heat dissipation systems	2	4.3	4.2.2.1.4/4-17
28.	Entrainment of fish and shellfish in early life stages for plants with cooling-tower-based heat dissipation systems	1	NA[e]	
29.	Impingement of fish and shellfish for plants with cooling-tower-based heat dissipation systems	1	NA[e]	

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
30.	Heat shock for plants with cooling-tower-based heat dissipation systems	1	NA[e]	
31.	Impacts of refurbishment on groundwater use and quality	1	NA[c]	
32.	Groundwater use conflicts (potable and service water; plants that use less than 100 gpm)	1	NA[f]	
33.	Groundwater use conflicts (potable, service water, and dewatering; plants that use greater than 100 gpm)	2	NA[f]	
34.	Groundwater use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	NA[f]	
35.	Groundwater use conflicts (Ranney wells)	2	NA[g]	
36.	Groundwater quality degradation (Ranney wells)	1	NA[g]	
37.	Groundwater quality degradation (saltwater intrusion)	1	NA[f]	
38.	Groundwater quality degradation (cooling ponds in salt marshes)	1	NA[e]	
39.	Groundwater quality degradation (cooling ponds at inland sites)	2	NA[e]	
40.	Refurbishment impacts to terrestrial resources	2	4.4	3.6/3-6
41.	Cooling tower impacts on crops and ornamental vegetation	1	NA[e]	
42.	Cooling tower impacts on native plants	1	NA[e]	

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
43.	Bird collisions with cooling towers	1	NA[e]	
44.	Cooling pond impacts on terrestrial resources	1	NA[e]	
45.	Power line right-of-way management (cutting and herbicide application)	1	4.1	4.5.6.1/4-71
46.	Bird collisions with power lines	1	4.1	4.5.6.2/4-74
47.	Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	1	4.1	4.5.6.3/4-77
48.	Floodplains and wetlands on power line right-of-way	1	4.1	4.5.7/4-81
49.	Threatened or endangered species	2	4.5	3.9/3-48, 4.1/4-1
50.	Air quality during refurbishment (nonattainment and maintenance areas)	2	4.6	3.3/3-2
51.	Air quality effects of transmission lines	1	4.1	4.5.2/4-62
52.	Onsite land use	1	4.1	3.2/3-1
53.	Power line right-of-way land-use impacts	1	4.1	4.5.3/4-62
54.	Radiation exposures to the public during refurbishment	1	NA[c]	
55.	Occupational radiation exposures during refurbishment	1	NA[c]	
56.	Microbiological organisms (occupational health)	1	4.1	4.3.6/4-48

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
57.	Microbiological organisms (public health)(plants using lakes or canals, or cooling towers or cooling ponds that discharge to a small river)	2	4.15	4.3.6/4-48
58.	Noise	1	4.1	4.3.7/4-49
59.	Electromagnetic fields, acute effects (electric shock)	2	4.7	4.5.4.1/4-66
60.	Electromagnetic fields, chronic effects	NA[h]	4.1.3	4.5.4.2/4-67
61.	Radiation exposures to public (license renewal term)	1	4.1	4.6.2/4-87
62.	Occupational radiation exposures (license renewal term)	1	4.1	4.6.3/4-95
63.	Housing impacts	2	4.8	3.7.2/3-10, 4.7.1/4-101
64.	Public services: public safety, social services, and tourism and recreation	1	4.1	3.7.4/3-14, 3.7.4.3/3-18, 3.7.4.4/3-19, 3.7.4.6/3-20, 4.7.3/4-104, 4.7.3.3/4-106, 4.7.3.4/4-107, 4.7.3.6/4-107
65.	Public services: public utilities	2	4.9	3.7.4.5/3-19, 4.7.3.5/4-107
66.	Public services, education (refurbishment)	2	4.10	3.7.4.1/3-15
67.	Public services, education (license renewal term)	1	4.1	4.7.3.1/4-106
68.	Offsite land use (refurbishment)	2	4.11.1	3.7.5/3-20
69.	Offsite land use (license renewal term)	2	4.11.2	4.7.4/4-107
70.	Public services, transportation	2	4.12	3.7.4.2/3-17, 4.7.3.2/4-106
71.	Historic and archaeological resources	2	4.13	3.7.7/3-23, 4.7.7/4-114

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

	Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
72.	Aesthetic impacts (refurbishment)	1	NA[c]	
73.	Aesthetic impacts (license renewal term)	1	4.1	4.7.6/4-111
74.	Aesthetic impacts of transmission lines (license renewal term)	1	4.1	4.5.8/4-83
75.	Design basis accidents	1	4.1	5.3.2/5-11, 5.5.1/5-114
76.	Severe accidents	2	4.14	5.3.3/5-12, 5.5.2/5-114
77.	Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level radioactive waste)	1	4.1	6.2.4/6-27, 6.6/6-87
78.	Offsite radiological impacts (collective effects)	1	4.1	6.2.4/6-27, 6.6/6-88
79.	Offsite radiological impacts (spent fuel and high-level radioactive waste disposal)	1	4.1	6.2.4/6-28, 6.6/6-88
80.	Nonradiological impacts of the uranium fuel cycle	1	4.1	6.2.2.6/6-20, 6.2.2.7/6-20, 6.2.2.8/6-21, 6.2.2.9/6-21, 6.6/6-90
81.	Low-level radioactive waste storage and disposal	1	4.1	6.4.2/6-36, 6.4.3/6-37, 6.4.4/6-48, 6.6/6-90
82.	Mixed waste storage and disposal	1	4.1	6.4.5/6-63, 6.6/6-91
83.	Onsite spent fuel	1	4.1	6.4.6/6-70, 6.6/6-91
84.	Nonradiological waste	1	4.1	6.5/6-86, 6.6/6-92
85.	Transportation	1	4.1	Addendum 1 (Ref. A.1-2)
86.	Radiation doses (decommissioning)	1	4.1	7.3.1/7-15, 7.4/7-25
87.	Waste management (decommissioning)	1	4.1	7.3.2/7-19, 7.4/7-25

Table A-1 (continued)
Ginna Station Environmental Report
Discussion of License Renewal NEPA Issues

Issue[a]	Category[a]	Section of this Environmental Report	GEIS Cross Reference[b] (Section/Page)
88. Air quality (decommissioning)	1	4.1	7.3.3/7-21, 7.4/7-25
89. Water quality (decommissioning)	1	4.1	7.3.4/7-21, 7.4/7-25
90. Ecological resources (decommissioning)	1	4.1	7.3.5/7-21, 7.4/7-25
91. Socioeconomic impacts (decommissioning)	1	4.1	7.3.7/7-24, 7.4/7-25
92. Environmental justice	NA[h]	4.16	

a. 10 CFR 51, Subpart A, Appendix B, Table B-1 (Issue numbers added to facilitate discussion).

b. Ref. A.1-1.

c. NRC findings are not applicable because RG&E has no plans for major refurbishment.

d. Not applicable because Ginna Station discharges to a large freshwater lake.

e. Not applicable because Ginna Station is not equipped with cooling ponds or cooling towers.

f. Not applicable because Ginna Station is not a direct user of groundwater (no dewatering; potable water is from municipal supply and service water is from Lake Ontario).

g. Not applicable because Ginna Station does not use Ranney wells.

h. Not applicable. Regulation does not categorize this issue.

CFR = *Code of Federal Regulations*

GEIS = *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*

gpm = gallons per minute

NA = Not applicable

NEPA = National Environmental Policy Act

NRC = U.S. Nuclear Regulatory Commission

RG&E = Rochester Gas and Electric Corporation

A.1 References

Ref. A.1-1 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.

Ref. A.1-2 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.

APPENDIX B. SPDES PERMIT AND 316 DOCUMENTATION

Section Page

B.1 NYSDEC SPDES Discharge Permit B-2

B.2 NYSDEC Correspondence Regarding Ginna Station Intake System Evaluations B-16

B.1 NYSDEC SPDES Discharge Permit

91-20-2 (1/89)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

DISCHARGE PERMIT

Special Conditions (Part I)

RECEIVED
JAN 15 1998

Industrial Code: 4911
Discharge Class (CL): 03
Toxic Class (TX): T
Major Drainage Basin: 03
Sub Drainage Basin: 02
Water Index Number: Ontario
Compact Area:

SPDES Number: NY - 0000493
DEC Number: 8-5434-00010/00003-0
Effective Date (EDP): 02/01/98
Expiration Date (ExDP): 02/01/03
Modification Date(s):
Attachment(s): General Conditions (Part II) Date: 11/90

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act as amended, (33 U.S.C. Section 1251 et. seq.)(hereafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Attention: Manager Environmental Health & Safety

Name: Rochester Gas & Electric Corporation
Street: 89 East Avenue
City: Rochester State: NY Zip Code: 14649
is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: Ginna Nuclear Power Plant - Station 13
Location (C,T,V): Ontario (T) County: Wayne
Facility Address: 1503 Lake Road
City: Ontario State: NY Zip Code: 14519
NYTM - E: . NYTM - N: 4 .
From Outfall No.: 001 at Latitude: 43° 16' 44" & Longitude: 77° 18' 34"
into receiving waters known as: Lake Ontario Class: A Special
and; (list other Outfalls, Receiving Waters & Water Classifications)

001A to 001D	Lake Ontario	Class A - Special
002, 003	Lake Ontario	Class A - Special
004, 005, 006	Mill Creek	Class D - C

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in Special Conditions (Part I) and General Conditions (Part II) of this permit.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: Ginna Nuclear Power Plant - Station 13
Street: 89 East Avenue
City: Rochester State: NY Zip Code: 14649
Responsible Official or Agent: Jeffrey L. Williams Phone: (716)724-8129

This permit and the authorization to discharge shall expire on midnight of the expiration date shown and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for a permit renewal no less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

Permit Administrator:	Robert K. Scott
Address:	[illegible]
Signature:	Robert K. Scott Date: 1/9/98

91-20-2a (1/89)

SPDES No.: NY-000 0493

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FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning February 1, 1998
and lasting until February 1, 2003
the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
001 Circulating Cooling Water					
Flow	Monitor	490	MGD	Continuous	Pump Logs
Discharge Temperature	Monitor	102	^{o}F	Continuous	Recorder
*Intake-Discharge Temperature	Difference	28	^{o}F	Continuous	Recorder
Total Residual Chlorine	Monitor	0.2	mg/l	Continuous during period of chlorination [a]	
pH (Range)	6.0 - 9.0		SU	Weekly	Grab
001-A House Service Boiler Blowdown					
Flow	Monitor	Monitor	GPD	Annual	Estimate
Oil & Grease	Monitor	15	mg/l	Annual	Grab
Suspended Solids	30	100	mg/l	Annual	Grab
pH (Range)	6.0 - 9.0		SU	Annual	Grab [b]
Iron	NA	4.0	mg/l	Annual	Grab
Copper	NA	1.0	mg/l	Annual	Grab
001-B High Conductivity Waste Tank Discharge (Includes Steam Generator Blowdown)					
Flow	NA	Monitor	GPD	Quarterly	Instantaneous
Oil & Grease	Monitor	15	mg/l	2/year	Grab
Suspended Solids	NA	50	mg/l	Quarterly	Grab
Chromium, Total	NA	1.5	mg/l	Monthly	Grab
Copper	NA	1.0	mg/l	Monthly	Grab
Zinc	NA	0.3	mg/l	Monthly	Grab
Boron	NA	20	mg/l	Monthly	Grab
Iron	NA	4.0	mg/l	Monthly	Grab
Arsenic	NA	0.15	mg/l	Monthly	Grab

* One second temperature readings of untempered intake and discharge water will be used to compute the hourly average temperature difference. Twenty four hourly average temperatures would be used to compute the daily average temperature difference. The highest hourly temperature difference recorded during the day would be the maximum reported.

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FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning February 1, 1998
and lasting until February 1, 2003
the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
001-C Radiation Waste Holdup and Treatment System (Includes Condensate Tank, A&B Monitor Tanks, Laundry Tanks)					
Flow	NA	Monitor	GPD	Quarterly	Grab
Oil & Grease	NA	15	mg/l	Quarterly	Grab
Suspended Solids	30	100	mg/l	Quarterly	Grab
pH (Range)	6.0 - 9.0		SU	Quarterlye	Grab[b]
Boron	40	NA	lbs/day	Quarterly	Grab
001-D Screenwash Return Water					
(No monitoring required)					

NOTES:

a. Chlorine may be discharged up to 120 minutes per day.

b. The pH limit may be exceeded when conductivity is less than 10 micro mhos per cm^2. Conductivity monitoring is only required when the pH limit is exceeded.

91-20-2a (1/89)

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FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning February 1, 1998

and lasting until February 1, 2003

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
002 - Storm Water Runoff & Low Volume Wastes					
(No monitoring required)					
002-A Retention Tank (Includes Demineralizer Regeneration Wastes and Floor Drains)					
Flow	Monitor	Monitor	GPD	Monthly	Instantaneous
Oil & Grease	Monitor	15	mg/l	Monthly	Grab
Suspended Solids	30	100	mg/l	Monthly	Grab
pH*	6.0 - 9.0 (Range)		SU	Continuous	Recorder
Copper	NA	1.0	mg/l	Monthly	Grab
Iron	NA	4.0	mg/l	Monthly	Grab
003 - Storm Water Runoff					
(No monitoring required)					
004 - Storm Water Runoff					
(No monitoring required)					
005 - Storm Water Runoff					
(No monitoring required)					
006 - Redundant House Service Water Testing					
Flow	Monitor	Monitor	Each Discharge		Estimate

*Where pH is continuously recorded, the permittee is allowed excursions from the designated, allowable pH range, subject to the following conditions:

(1) The total time during which the pH values of each discharge are outside the required range shall not exceed 7 hours and 26 minutes in any calendar month.

(2) No individual excursion shall exceed 60 minutes in duration.

(3) No excursion shall cause or contribute to a contravention of water quality standards.

91-20-2a (1/89) SPDES No.: NY-000 0493

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EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning February 1, 1998

and lasting until February 1, 2003

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfall 001					
Chlorine, Total Residual	N/A	0.1	mg/l	Daily*	Grab

* Samples shall be collected and analyzed daily for Total Residual Chlorine during periods of chlorine addition for Zebra Mussel control.

Special Conditions

The chlorine program for zebra mussel control, approved by letter dated June 24, 1993 to J. Williams of RG&E, is allowed with the following conditions concerning circulating cooling water:

1. Each individual chlorine zebra mussel control shall be limited to a maximum of 30 days of continuous treatment.

2. Chlorine treatments for zebra mussel control shall be limited to a maximum of four treatments annually. Treatment shall be separated by at least 30 days.

3. Records of chlorine dosage concentration, effluent flow and effluent concentration of total residual chlorine during addition and discharge must be maintained. The flow shall be measured at the frequency specified for flow elsewhere in this permit or at the frequency of the parameter specified above, whichever is more frequent.

4. The Regional Water Engineer shall be notified not less than 48 hours prior to initiation of zebra mussel control program.

5. The reports describing the results of the effectiveness of the zebra mussel control program and effluent analysis for total residual chlorine shall be submitted to the Regional Water Engineer, NYSDEC, by March 1st of the year following such treatments.

6. This permit modification is issued based on the best environmental and aquatic toxicity information available at this time. This authorization is subject to modification or revocation any time new information becomes available which justifies such modification or revocation.

91-20-2e (2/89)

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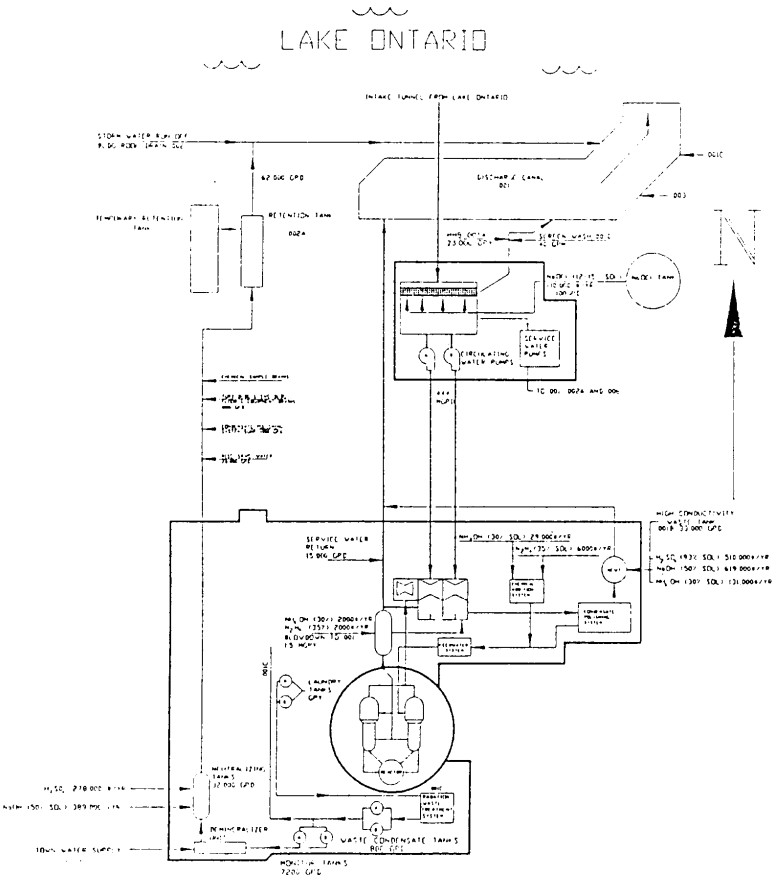
DEFINITIONS OF DAILY AVERAGE AND DAILY MAXIMUM

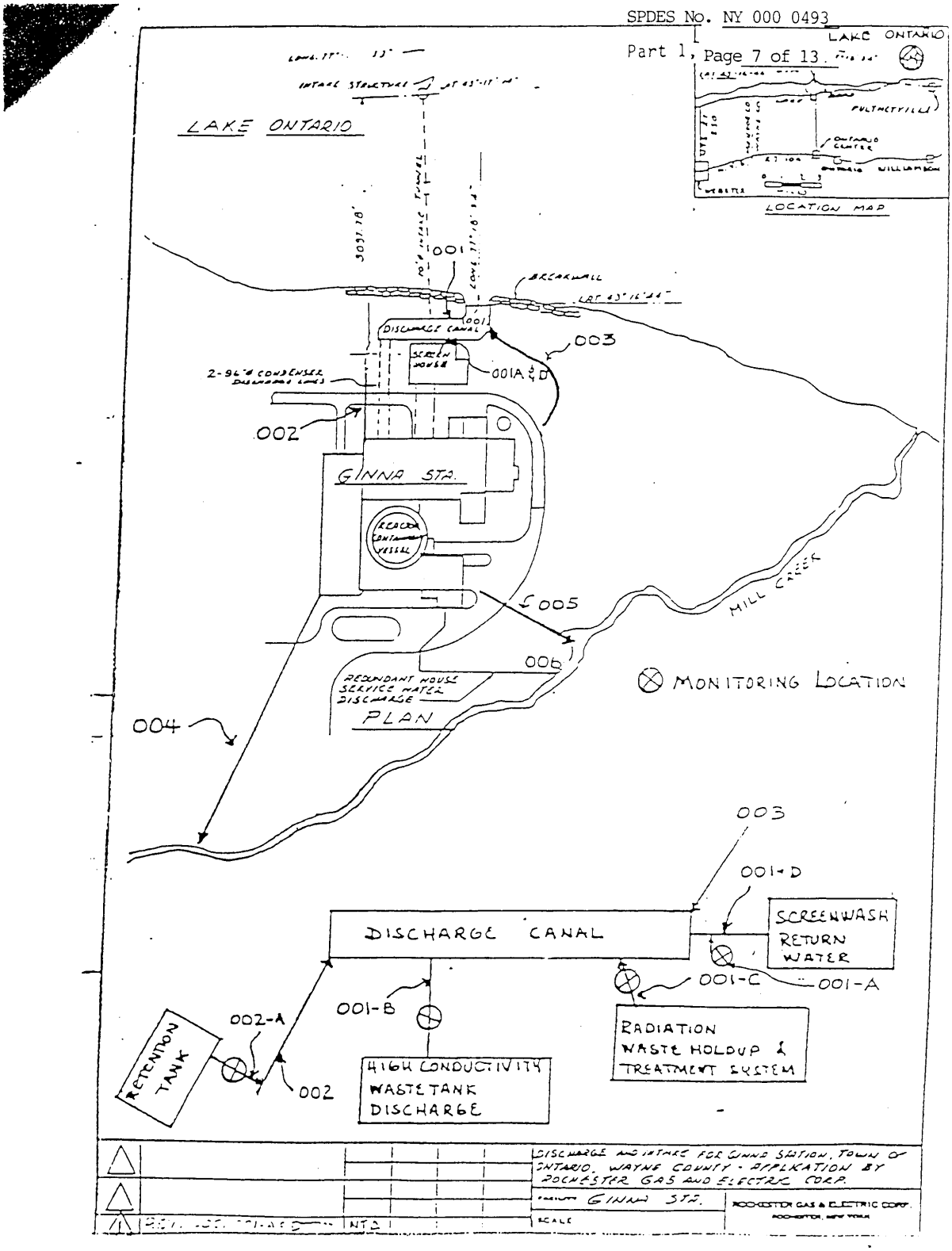
The daily average discharge is the total discharge by weight or in other appropriate units as specified herein, during a calendar month divided by the number of days in the month that the production or commercial facility was operating. Where less than daily sampling is required by this permit, the daily average discharge shall be determined by the summation of all the measured daily discharges in appropriate units as specified herein divided by the number of days during the calendar month when measurements were made.

The daily maximum discharge means the total discharge by weight or in other appropriate units as specified herein, during any calendar day.

MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the location(s) indicated below: (Show sampling locations and outfalls with sketch or flow diagram as appropriate) (see page 7 of 13)

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LAKE ONTARIO
INTAKE STRUCTURE
LAKE ONTARIO
LOCATION MAP
001
BREAKWALL
DISCHARGE CANAL
SCREEN HOUSE
001A & D
003
2-96"ø CONDENSER DISCHARGE LINES
002
GINNA STA.
REACTOR CONTAINMENT VESSEL
005
006
MILL CREEK
RESIDUANT HOUSE SERVICE WATER DISCHARGE
PLAN
MONITORING LOCATION
004
003
001-D
DISCHARGE CANAL
SCREENWASH RETURN WATER
001-C
001-A
001-B
002-A
RETENTION TANK
002
HIGH CONDUCTIVITY WASTE TANK DISCHARGE
RADIATION WASTE HOLDUP & TREATMENT SYSTEM
DISCHARGE AND INTAKE FOR GINNA STATION, TOWN OF ONTARIO, WAYNE COUNTY - APPLICATION BY ROCHESTER GAS AND ELECTRIC CORP.
GINNA STA.
ROCHESTER GAS & ELECTRIC CORP.
NTS

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Additional Requirements

1. The Department has tentatively approved the permittee's request pursuant to Section 316(b) of the Clean Water Act for the 5-year life of this permit. A Biological monitoring program to evaluate future compliance with this section is outlined in Additional Requirement #4.

2. The permittee shall submit written notification, which shall include detailed descriptions and appropriate figures, to the DEC Chief, ~~X~~ Bureau of Environmental Protection, Regional Fisheries Manager and Regional Engineer at least 60 days in advance of any change which results in the alteration of the location, design, construction, operations or capacity of the cooling water intake structure. The permittee shall submit, with its written notification a demonstration that the change reflects the best technology currently available for minimizing adverse environmental impact. Prior DEC approval is required before initiating such change. A permit modification may be required.

3. Each impingement report submitted during this permit period shall include figures and a complete description of the cooling water intake system including trash racks; traveling screen type, size, mesh, and standard operating procedures; screen washwater discharge sluice configuration and disposition of screen washings, and the nature and estimated quantities of debris collected at this facility.

4. Impingement Monitoring Program.

   a. An annual impingement monitoring program is required in order to document the impact of this facility on the aquatic environment of Lake Ontario. The methodologies described in Ginna Nuclear Power Station Impingement Plan of Study, RG&E Report No. B-13-293 (July 1985) are required with the following modification:

      i. The wire mesh collection basket that fits into the screenwash sluiceway shall be constructed of mesh that is approximately 1/2 of the bar mesh of the traveling screens in order to minimize loss of organisms washed off the traveling screens.

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ii. By October 1, 1997 the permittee shall submit to the offices noted in Additional Requirement 2, for review and approval, a plan to conduct a special study to quantify the loss of impinged organisms through the standard impingement collection device. The study shall be implemented within 2 months of approval of the study plan.

b. At the permittee's option a modified impingement abundance program may be submitted for DEC review and approval. The goal of the modified program would be to reduce the cost of impingement monitoring while continuing to provide adequate information for the department's determination to 6NYCRR 704 and the Clean Water Act Section 316. The impingement program identified in 4.a above shall continue in effect until an alternative is approved by the DEC.

5. Impingement Mitigation

a. During any time when a circulating pump is operational each traveling screen shall be washed for approximately fifteen (15) minutes each hour, excepting when a screen is inoperable due to required maintenance.

b. By January 1, 1998 the permittee shall submit a plan for review and approval to those individuals indicated in Additional Requirement 2, that provides for the resurfacing of the screen washwater/fish and debris sluice in order to minimize any additional trauma imposed on viable fish washed from the intake traveling screens and being returned to Lake Ontario. By July 1, 1998. the permittee shall report to the offices noted in Additional Requirement 2, either compliance with the plan approved by DEC, or provide an estimate of the additional time and efforts needed to achieve compliance.

c. No sampling gear other impediments to the return of impinged fish to Lake Ontario shall be placed int he washwater sluice excepting those necessary to conduct studies approved by the DEC.

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d. By January 1, 1998, the permittee shall provide the offices noted in 2 above a plan for minimizing water use at this facility. The plan must consider options such as increased recirculation of cooling water and/or operation on one circulating water pump (CWP) during winter months, installation of variable speed CWP's complete cessation of CWP operation during outages lasting more than a few days, and other possible means of reducing the use of cooling water. It is understood that special studies may be needed to establish suitable operational parameters under reduced flow conditions. Once completed, those elements of this plan acceptable to both the permittee and the DEC shall become condition of this permit.

6. The thermal discharge from this facility shall assure the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on Lake Ontario. In this regard, the Department has approved the permittee's request for alternative effluent limitations pursuant to Section 316(a) of the Clean Water Act for the 5 year life of the permit. The effluent limitations in this permit reflect this approval. The water temperature at the surface of Lake Ontario shall not be raised more than three Fahrenheit degrees over the temperature that existed before the addition of heat of artificial origin except that in a mixing zone consisting of an area of 320 acres from the point of discharge, this temperature may be exceeded.

7. Reporting

a. A copy of all reports pertaining to environmental impacts on water resulting from this facility, which the applicant submits to any federal, state or local agency, shall also be submitted to the Department of Environmental Conservation offices in Avon and Albany. The permittee shall also notify the Department within one week from the time of submission to the Nuclear Regulatory Commission of any requested change in the environmental technical specifications which could effect the requirements of this permit.

b. Copies of all reports regarding water and biological parameters related to intake and discharge considerations, whether generated for this permit or otherwise, shall be sent to the offices in Section 2 above.

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c. Report(s) submitted in fulfillment of permit conditions shall clearly identify on the title page the permit number and the specific section(s) by character and number that the report(s) fulfill. Each section of the text of such report shall identify the section(s) of the permit that it fulfills.

d. The annual impingement monitoring report shall be submitted by July 1 of the following year. The analyses, content and appendices shall follow that provided in previous impingement abundance reports as in RG&E Report No. B-13-357- Rochester Gas and Electric Corporation Fish Impingement Program Analysis Report.

8. Biological specimens may be required to be submitted to NYSDEC upon request if notice by the Department is given prior to collection.

9. There shall be no discharge of auxiliary boiler chemical cleaning wastes and other metal cleaning wastewaters other than those using boric acid.

10. In regards to general condition #11.5 items c and d shall be reported annually to NYSDEC offices in Avon.

11. The permittee shall submit on a quarterly basis a report to the Department's offices in Albany and Avon by the 28th of the month next following the end of the period:

a. Daily minimum, average, and maximum station electrical output shall be determined and logged.

b. Daily minimum, average, and maximum water use shall be directly or indirectly measured or calculated and logged.

c. Daily minimum, average, and maximum intake and discharge temperatures shall be logged.

d. Measurement in a,b, and c shall be taken on an hourly basis.

12. There shall be no discharge of PCB's from this facility.

13. Radioactivity: Concentrations of radioactivity in effluent are subject to the requirements of the U.S. Nuclear Regulatory Commission license conditions.

91-20-2C (2/91) SPDES No.: NY-000 0493

Part 1, Page 12 of 13

SCHEDULE OF COMPLIANCE

a) The permittee shall comply with the following schedule.

Action Code	Outfall Number(s)	Compliance Action	Due Date
50008	001D	Special study to quantify the loss of impinged organisms through standard impingement collection device.	10/1/97
34599	001D	Annual impingement monitoring report on the program required in Additional Requirement #4 of this permit.	July 1 of the following year from data collection
01299	001D	Submit plan for resurfacing of screen washwater/fish debris sluice (as required A.R. #5b)	1/1/98
59499	001D	Construction schedule to achieve compliance with Item above (A.R. #5b)	7/1/98
01299	001	Water use minimization plan (A.R. #5d)	1/1/98
030MS	002, 003, 004, 005	Stormwater pollution prevention plan	9/98

b) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice under terms of the General Conditions (Part II), Section 5. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

c) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS, unless otherwise specified in this permit or in writing by the Department.

91-20-2f (5/94)

SPDES No.: **NY** 0000493

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RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of three years from the date of the sampling for subsequent inspection by the Department or its designated agent. **Also;**

[X] (if box is checked) monitoring information required by this permit shall be summarized and reported by submitting completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

Send the **original** (top sheet) of each DMR page to:

Department of Environmental Conservation
Division of Water
Bureau of Watershed Compliance Programs
50 Wolf Road
Albany, New York 12233-3506

Phone: (518) 457-3790

Send the **first copy** (second sheet) of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer
Region 8
6274 East Avon-Lima Road
Avon, New York 14414

c) A monthly "Wastewater Facility Operation Report..." (form 92-15-7) shall be submitted (if box is checked) to the [ ] Regional Water Engineer and/or [ ] County Health Department or Environmental Control Agency listed above.

d) **Noncompliance** with the provisions of this permit shall be reported to the Department as prescribed in the attached General Conditions (Part II).

e) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

f) If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording on the Discharge Monitoring Reports.

g) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

h) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

i) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockefeller State Plaza, Albany, New York 12201.

B.2 NYSDEC Correspondence Regarding Ginna Station Intake System Evaluations

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Bureau of Habitat, Room 576
50 Wolf Road, Albany, New York 12233-4756
Phone: (518) 457-6178 • **FAX:** (518) 485-8424
Website: www.dec.state.ny.us

John P. Cahill
Commissioner

September 7, 1999

Mr. Paul. Sawyko
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, N.Y. 14649-0001

Dear Mr. Sawyko:

Thank you for submitting the fish impingement reports for the Ginna Nuclear Power Station and the Russell Power Station. The 5 year monitoring study (1994-1998) reported impingement totals at the Russell Power Station to be approximately 1,800-15,000 fish/year, and at the Ginna Nuclear Power Station to be approximately 10,00-55,000 fish/year. The reports concluded that the impingement losses have negligible effects on fish populations in Lake Ontario.

Both NYCRR Part 704.5 and Part 316(b) of the federal Clean Water Act require the use of best technology available (BTA) to minimize adverse environmental impacts at cooling water intake systems. Consistent with these state and federal requirements, the Department's goal is to seek elimination, if possible, and otherwise minimization of mortality to fish at cooling water intakes. Although impingement at these stations is lower than at most other major steam-electric plants utilizing open cycle cooling, it has yet to be determined whether the cooling water intakes represent BTA for minimizing adverse environmental impacts.

With the proliferation of new merchant plants under a deregulated electric industry, it is important now more than ever to mitigate the impacts of electric generation on our aquatic resources. Currently, mitigation of impingement impacts are underway at older power plants across the state, and new proposals under the PSC Article X regulations are being met with very stringent requirements to protect aquatic resources. I will be contacting you shortly to begin discussions on the future operations at the Ginna and Russell Power Stations, and what alternatives are available to minimize the loss of fish at these plants.

I look forward to discussing this important matter with you. If you have any questions, please call me at 518-457-9439.

Sincerely,

Michael J. Calaban
Conservation Biologist

cc: E. Radle

mjc/imprep1

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Bureau of Habitat, Room 576
50 Wolf Road, Albany, New York 12233-4756
Phone: (518) 457-6178 • **FAX:** (518) 485-8424
Website: www.dec.state.ny.us

John P. Cahill
Commissioner

September 22, 1999

Mr. Paul. Sawyko
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, N.Y. 14649-0001

Dear Mr. Sawyko:

In my September 7th letter to you I discussed the results of the 5 year biological monitoring program and the need to look at alternatives available to minimize mortality to fish impinged at the Ginna and Russell Power Stations. Subsequently, I have become aware that RG&E has been working with the Department to reduce impacts of their cooling water intake structures such as redesigning the fish return sluice at the Ginna NGS, and shutting off pumps during unit outages to reduce cooling water use. In light of this recent work and the degree of impact revealed through the monitoring program, the Department does not consider it necessary to pursue additional mitigative actions at the Ginna or Rusell Power Stations at this time. However, I strongly urge you to keep this office informed of any significant changes to be made to the plants intake systems or other large related capital improvements. Such activities may provide cost effective opportunities to minimize impingement mortality. The Department is strongly committed to eliminate, if possible, or otherwise minimize the loss of fish at water intake systems.

Thank you very much for your cooperation. Please call me at 518-457-9439 if you have any additional questions.

Sincerely,

Michael J. Calaban
Conservation Biologist

mjc/imprep2

APPENDIX C. THREATENED AND ENDANGERED SPECIES CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

February 25, 2002

Mr. Paul M. Sawyko
Ginna License Renewal
Environmental Report Lead
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, NY 14649-0001

Dear Mr. Sawyko:

This responds to your letter of January 23, 2002, requesting information on the presence of endangered or threatened species in the vicinity of the Ginna Nuclear Power Plant in the Town of Ontario, Wayne County, New York.

Except for occasional transient individuals, no Federally listed or proposed endangered or threatened species under our jurisdiction are known to exist in the project impact area. In addition, no habitat in the project impact area is currently designated or proposed "critical habitat" in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Therefore, no Biological Assessment or further Section 7 consultation under the Endangered Species Act is required with the U.S. Fish and Wildlife Service (Service). Should project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered. A compilation of Federally listed and proposed endangered and threatened species in New York is enclosed for your information.

The above comments pertaining to endangered species under our jurisdiction are provided pursuant to the Endangered Species Act. This response does not preclude additional Service comments under other legislation.

For additional information on fish and wildlife resources or State-listed species, we suggest you contact the appropriate New York State Department of Environmental Conservation regional office(s) as shown on the enclosed map, and:

New York State Department of Environmental Conservation
New York Natural Heritage Program Information Services
625 Broadway
Albany, NY 12233
(518) 402-8935

Since wetlands may be present, you are advised that National Wetlands Inventory (NWI) maps may or may not be available for the project area. However, while the NWI maps are reasonably accurate, they should not be used in lieu of field surveys for determining the presence of wetlands or delineating wetland boundaries for Federal regulatory purposes. Copies of specific NWI maps can be obtained from:

Cornell Institute for Resource Information Systems
302 Rice Hall
Cornell University
Ithaca, NY 14853
(607) 255-4864

Work in certain waters and wetlands of the United States may require a permit from the U.S. Army Corps of Engineers (Corps). If a permit is required, in reviewing the application pursuant to the Fish and Wildlife Coordination Act, the Service may concur, with or without stipulations, or recommend denial of the permit depending upon the potential adverse impacts on fish and wildlife resources associated with project implementation. The need for a Corps permit may be determined by contacting the appropriate Corps office(s) as shown on the enclosed map.

If you require additional information please contact Michael Stoll at (607) 753-9334.

Sincerely,

Mark W. Clough

Acting For
David A. Stilwell
Field Supervisor

Enclosures

cc: NYSDEC, Avon, NY (Environmental Permits)
NYSDEC, Albany, NY (Natural Heritage Program)
COE, Buffalo, NY

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK

Common Name	Scientific Name	Status	Distribution
FISHES			
Sturgeon, shortnose*	*Acipenser brevirostrum*	E	Hudson River & other Atlantic coastal rivers
REPTILES			
Turtle, bog	*Clemmys muhlenbergii*	T	Albany, Columbia, Dutchess, Genesee, Orange, Oswego, Putnam, Seneca, Sullivan, Ulster, Wayne, and Westchester Counties
Turtle, green*	*Chelonia mydas*	T	Oceanic summer visitor coastal waters
Turtle, hawksbill*	*Eretmochelys imbricata*	E	Oceanic summer visitor coastal waters
Turtle, leatherback*	*Dermochelys coriacea*	E	Oceanic summer resident coastal waters
Turtle, loggerhead*	*Caretta caretta*	T	Oceanic summer resident coastal waters
Turtle, Atlantic ridley*	*Lepidochelys kempii*	E	Oceanic summer resident coastal waters
BIRDS			
Eagle, bald	*Haliaeetus leucocephalus*	T	Entire state
Plover, piping	*Charadrius melodus*	E	Great Lakes Watershed
			Critical Habitat - Eastern Lake Ontario shoreline from Salmon River (Oswego County) to Stony Point (Jefferson County)
		T	Remainder of coastal New York
Tern, roseate	*Sterna dougallii dougallii*	E	Southeastern coastal portions of state
MAMMALS			
Bat, Indiana	*Myotis sodalis*	E	Entire state
Cougar, eastern	*Felis concolor couguar*	E	Entire state - probably extinct
Whale, blue*	*Balaenoptera musculus*	E	Oceanic
Whale, finback*	*Balaenoptera physalus*	E	Oceanic
Whale, humpback*	*Megaptera novaeangliae*	E	Oceanic
Whale, right*	*Eubalaena glacialis*	E	Oceanic
Whale, sei*	*Balaenoptera borealis*	E	Oceanic
Whale, sperm*	*Physeter catodon*	E	Oceanic

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

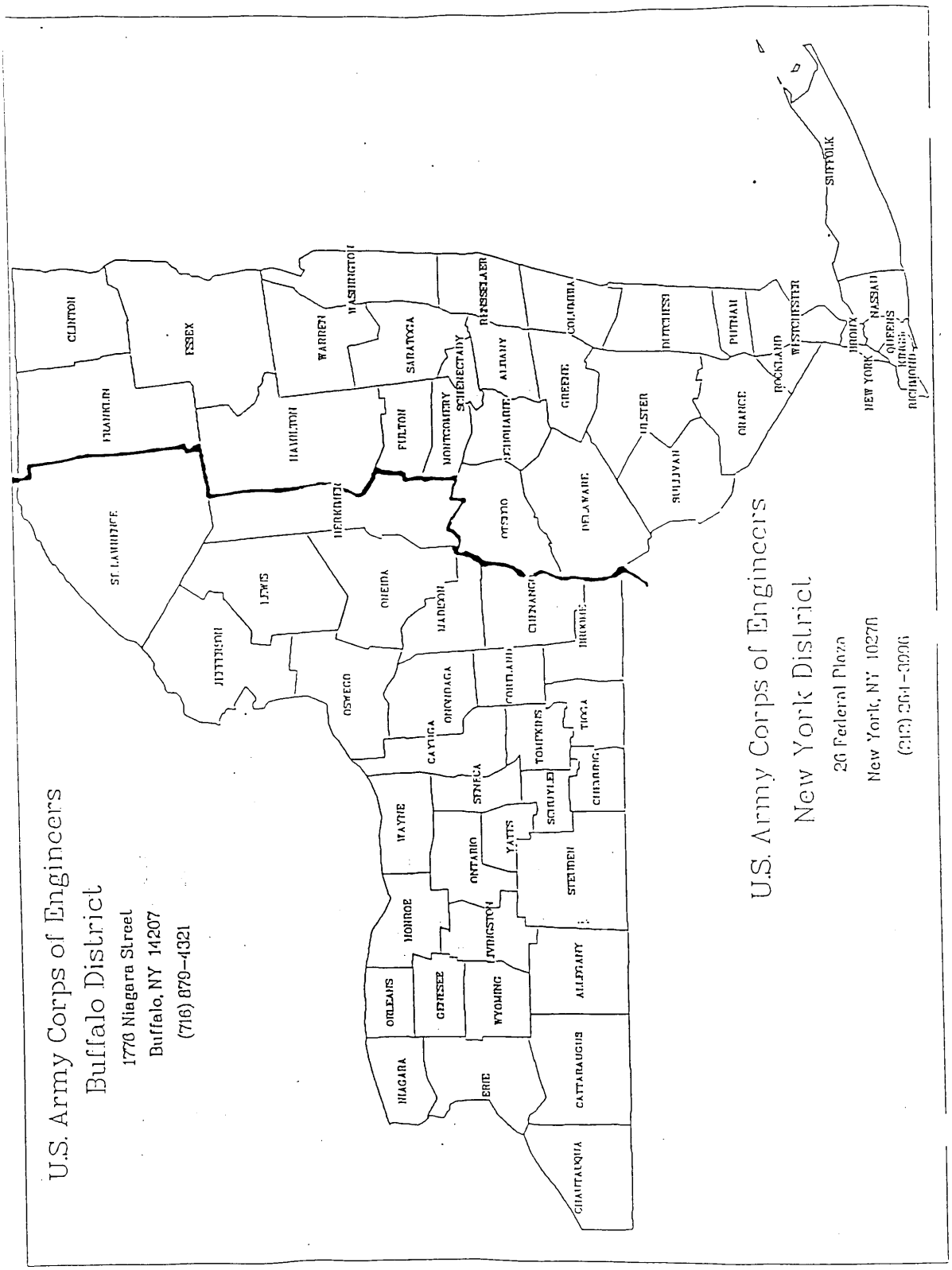
Region 5 - 12/13/01 - 2 pp.

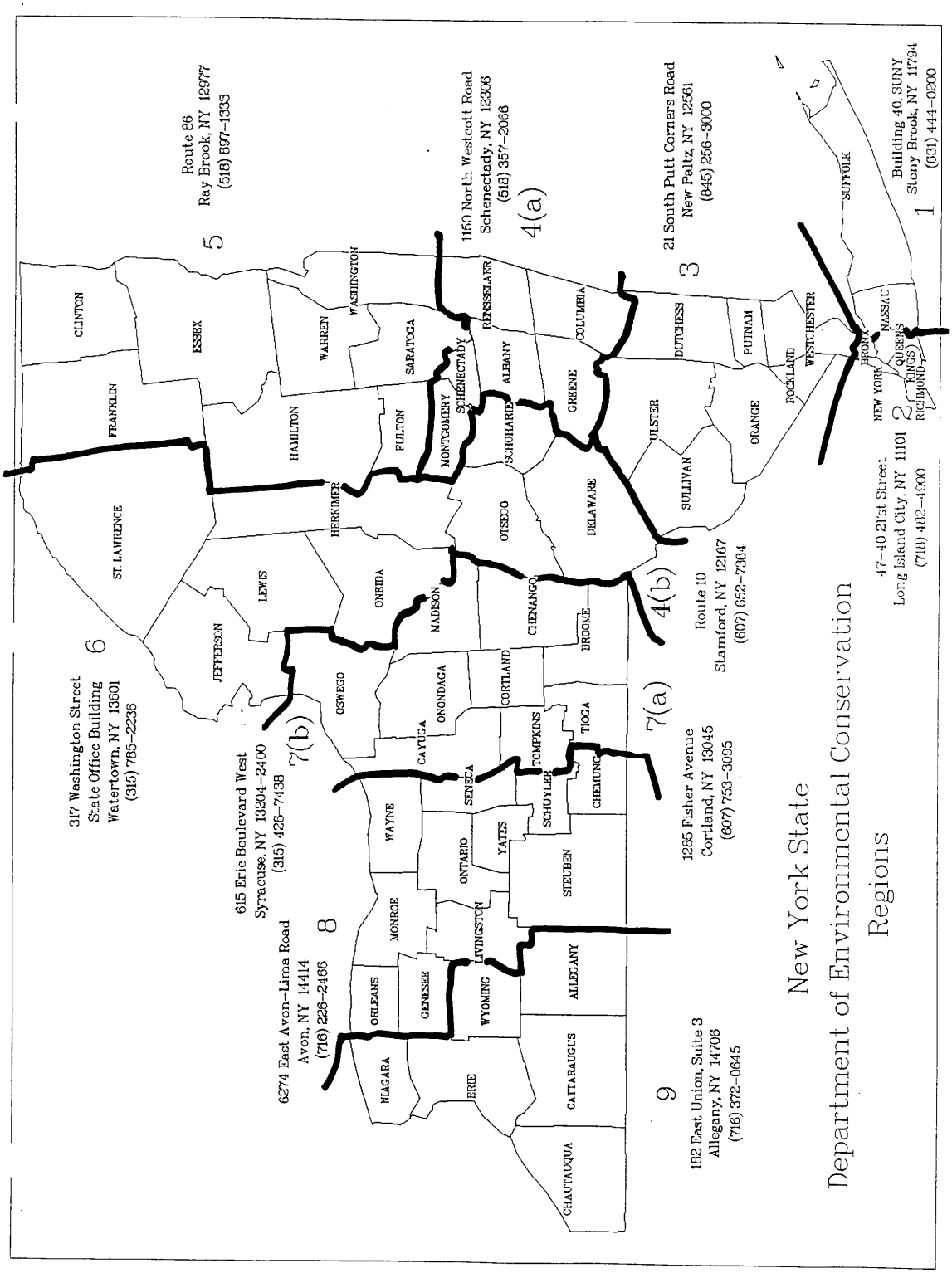
FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK (Cont'd)

Common Name	Scientific Name	Status	Distribution
MOLLUSKS			
Snail, Chittenango ovate amber	*Novisuccinea chittenangoensis*	T	Madison County
Mussel, dwarf wedge	*Alasmidonta heterodon*	E	Orange County - lower Neversink River Delaware and Sullivan Counties - Delaware River
BUTTERFLIES			
Butterfly, Karner blue	*Lycaeides melissa samuelis*	E	Albany, Saratoga, Warren, and Schenectady Counties
PLANTS			
Monkshood, northern wild	*Aconitum noveboracense*	T	Ulster, Sullivan, and Delaware Counties
Pogonia, small whorled	*Isotria medeoloides*	T	Entire state
Swamp pink	*Helonias bullata*	T	Staten Island - presumed extirpated
Gerardia, sandplain	*Agalinis acuta*	E	Nassau and Suffolk Counties
Fern, American hart's-tongue	*Asplenium scolopendrium* var. *americana*	T	Onondaga and Madison Counties
Orchid, eastern prairie fringed	*Platanthera leucophea*	T	Not relocated in New York
Bulrush, northeastern	*Scirpus ancistrochaetus*	E	Not relocated in New York
Roseroot, Leedy's	*Sedum integrifolium* ssp. *Leedyi*	T	West shore of Seneca Lake
Amaranth, seabeach	*Amaranthus pumilus*	T	Atlantic coastal plain beaches
Goldenrod, Houghton's	*Solidago houghtonii*	T	Genesee County

E=endangered T=threatened P=proposed

Region 5 - 12/13/01 - 2 pp.


U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, NY 14207
(716) 879-4321
U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278
(212) 264-3996
CLINTON
ESSEX
WARREN
WASHINGTON
SARATOGA
RENSSELAER
COLUMBIA
DUTCHESS
PUTNAM
WESTCHESTER
ROCKLAND
SUFFOLK
NASSAU
QUEENS
NEW YORK
FRANKLIN
HAMILTON
FULTON
MONTGOMERY
SCHENECTADY
ALBANY
GREENE
ULSTER
ORANGE
SULLIVAN
DELAWARE
OSWEGO
ONEIDA
HERKIMER
MADISON
CHENANGO
BROOME
TIOGA
CAYUGA
ONONDAGA
CORTLAND
TOMPKINS
SENECA
SCHUYLER
CHEMUNG
WAYNE
ONTARIO
YATES
STEUBEN
MONROE
LIVINGSTON
ORLEANS
GENESEE
WYOMING
ALLEGANY
NIAGARA
ERIE
CATTARAUGUS
CHAUTAUQUA


New York State
Department of Environmental Conservation
Regions
1
Building 40, SUNY
Stony Brook, NY 11794
(631) 444-0200
2
47-40 21st Street
Long Island City, NY 11101
(718) 482-4900
3
21 South Putt Corners Road
New Paltz, NY 12561
(845) 256-3000
4(a)
1150 North Westcott Road
Schenectady, NY 12306
(518) 357-2066
4(b)
Route 10
Stamford, NY 12167
(607) 652-7364
5
Route 86
Ray Brook, NY 12977
(518) 897-1333
6
317 Washington Street
State Office Building
Watertown, NY 13601
(315) 785-2236
7(a)
1285 Fisher Avenue
Cortland, NY 13045
(607) 753-3095
7(b)
615 Erie Boulevard West
Syracuse, NY 13204-2400
(315) 426-7438
8
6274 East Avon-Lima Road
Avon, NY 14414
(716) 226-2466
9
182 East Union, Suite 3
Allegany, NY 14706
(716) 372-0645
CLINTON
ESSEX
WASHINGTON
WARREN
FRANKLIN
HAMILTON
SARATOGA
RENSSELAER
COLUMBIA
ST. LAWRENCE
FULTON
MONTGOMERY
SCHENECTADY
ALBANY
GREENE
DUTCHESS
PUTNAM
HERKIMER
SCHOHARIE
ULSTER
ROCKLAND
WESTCHESTER
JEFFERSON
LEWIS
ONEIDA
OTSEGO
DELAWARE
SULLIVAN
ORANGE
NEW YORK
BRONX
NASSAU
SUFFOLK
QUEENS
KINGS)
RICHMOND)
OSWEGO
MADISON
CHENANGO
BROOME
ONONDAGA
CAYUGA
CORTLAND
TIOGA
SENECA
TOMPKINS
CHEMUNG
SCHUYLER
WAYNE
ONTARIO
YATES
STEUBEN
MONROE
LIVINGSTON
ORLEANS
GENESEE
WYOMING
ALLEGANY
NIAGARA
CATTARAUGUS
ERIE
CHAUTAUQUA

APPENDIX D. CULTURAL RESOURCES CORRESPONDENCE

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

October 31, 2001

Dennis J. Mooney
Principal Environmental Analyst
Rochester Gas and Electric Corporation
89 East Avenue
Rochester, New York 14649-0001

Dear Mr. Mooney:

Re: NRC
Ginna Nuclear Power Plant/2640 Lake Rd/Extend License
Ontario/Wayne County
01PR5031

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966.

Based upon our review, it is the SHPO's opinion that your project will have No Effect upon cultural resources in or eligible for inclusion in the National Register of Historic Places.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Ruth L. Pierpont
Director

RLP: cmp

APPENDIX E. SEVERE ACCIDENT MITIGATION ALTERNATIVES

E.1 Ginna Station PSA Model and Risk Profile

E.1.1 PSA Model Background

In response to Generic Letter 88-20, "Individual Plant Examination of Severe Accident Vulnerabilities," and its supplements, Rochester Gas and Electric Corporation (RG&E) performed a Level 1 and full-scale Level 2 probabilistic safety assessment (PSA) for R.E. Ginna Nuclear Power Plant (Ginna Station). In March 1994, RG&E submitted a report to the U.S. Nuclear Regulatory Commission (NRC) documenting the methodology and a summary of the final results. This original Individual Plant Examination (IPE) constituted what has been historically designated as Revision 0 of the Ginna Station PSA (Ref. E.1-1). The purpose of the IPE was to achieve the following objectives:

a. Develop an appreciation for severe accident behavior;

b. Understand the most likely severe accident sequences that could occur;

c. Gain a more quantitative understanding of the overall probabilities of core damage and fission product releases; and

d. Reduce, if necessary, the overall probabilities of core damage and fission product releases by modifying, where appropriate, hardware and procedures that would prevent or mitigate severe accidents.

In addition, the information obtained through achievement of the above objectives has been used for many other purposes (e.g., on-line maintenance). As such, RG&E incorporated many other features and attempted to address additional issues beyond those required by Generic Letter 88-20. Consequently, the IPE is considered a subset of the PSA since the PSA is intended to be used for future issues and concerns.

Since that time, RG&E has expanded the original models and factored into the analysis several items, such as a change to an 18-month fuel cycle; replacement of the steam generators; conversion to Improved Technical Specifications; monitoring of system, structure, and component performance under the Maintenance Rule; and analysis of the risk from internal fires, floods, and shutdown operation. In addition, the NRC raised several questions concerning the original models, and these questions have subsequently been addressed. All these updates constitute model Revisions 1 through 4, with the most recent having been submitted to the NRC in February 2002. The following paragraphs provide a brief summary of each revision.

Revision 1 (Ref. E.1-2) was produced primarily in response to questions raised by the NRC as a result of the original IPE submittal. An extensive re-analysis of the Level 1 PSA was performed, including significant enhancement of the modeling for human reliability.

Revision 2 (Ref. E.1-3) provided a supplement to Revision 1 and provided a detailed Level 2 (containment performance) analysis. This submittal completed the response to the original IPE questions.

Revision 3 was completed in January 2000, and incorporated the risk from internal fires and the risk during shutdown operation. Additional upgrades were performed in the model for internal flooding and quantification of initiating event frequencies and common-cause failures to incorporate the most recent operating data and industry advances. Additional human reliability analysis was performed to address operator actions during fires, floods, and shutdown. The Level 2 analysis was also updated by merging selected results from the previous detailed Level 2 analysis with the simplified methodology advocated by the NRC in NUREG/CR-6595.

Revision 4 (Ref. E.1-4) accounts for a major modification performed in December 2000, to eliminate the dominant contributor to core damage frequency that was identified during the updated flooding analysis in Revision 3 (large Service Water flood in the Battery rooms). The generic and plant-specific data for component failures have been updated from the time frame used in the original IPE (1980s) to account for industry and plant-specific operation through 2000. RG&E also explicitly modeled the risk from hydrogen and other exothermic explosions.

An industry peer review was performed in May 2002. In preparation for the peer review, RG&E conducted an internal self-assessment. Incorporation of the results of this self assessment generated Revision 4.1, which was used for the peer review and the severe accident mitigation alternative (SAMA) analysis. The findings of the peer review will be incorporated into future revisions of the model. While the peer review findings could not be incorporated into the model in time to support this submittal, RG&E did account for anticipated model impacts in the analysis of the candidate SAMAs.

E.1.2 Ginna Station Risk Profile

The current total core damage frequency (CDF) is 3.97E-05. Table E.1-1 provides a ranking of the accident scenarios contributing greater than two 2 percent of the overall CDF, and Table E.1-2 illustrates the distribution of accident types. As these tables indicate, external events dominate the risk profile for Ginna Station. Specifically, floods within the Auxiliary Building and fires within the Control Room, Diesel Generator rooms, Turbine Building, or battery rooms dominate the results. Fire events are dominated by Control Room fires where evacuation is required and only a limited set of equipment is available. Other fire locations fail either alternating current or direct current electrical trains, which also limits the available equipment. Flooding events are dominated by floods within the Auxiliary Building, as floods in this location can fail all charging, safety injection, residual heat removal, and spent fuel pool pumps.

As noted earlier, the full-scope Level 2 analysis has been replaced by a simplified approach based on NUREG/CR-6595. The large early release frequency is 2.09E-06. The results of the Level 2 analysis are shown in Table E.1-3 and indicate that the large early release frequency is dominated by steam generator tube ruptures and spent fuel pool cooling with subsequent pool boiling. However, the results are

Table E.1-1
Contributions to CDF by Accident Scenario

Scenario	Percent Contribution
Fire – Control Room	15
Shutdown – residual heat removal	14
Flood – Auxiliary Building	11
Fire – Turbine Building	9
Fire – Battery Room	8
Steam generator tube rupture	7
Loss of service water	6
Fire – diesel generator	4
Small loss-of-coolant accident	4
Flood – Turbine Building	3
At power fuel handling accident/Spent Fuel Pool cooling	3
Interfacing system loss-of-coolant accident	2
Fire – Auxiliary Building	2
Flood – Relay Room	2
Other	10

Table E.1-2
Contribution to CDF by Accident Type

Accident Type	Percent Contribution
Fire	39.20
Flood	18.15
Shutdown	16.25
Small break loss-of-coolant accident	11.79
Transient	5.70
Fuel handling accident/Spent Fuel Pool cooling	3.37
Large break loss-of-coolant accident	3.10
Station blackout	2.43
Anticipated transient without scram	0.02

Table E.1-3
Contribution to the Large Early Release Frequency by Accident Type

Accident Type	Percent Contribution
Steam generator tube rupture	35.7
Spent Fuel Pool cooling	22.4
Loss of containment heat removal	19.1
Containment failure at high reactor coolant system pressure when the reactor vessel ruptures	16.2
Containment isolation failures	3.1
Temperature-induced steam generator tube rupture	2.3
Containment failure at low reactor coolant system pressure when the reactor vessel ruptures	0.9
Interfacing system loss-of-coolant accident	0.3

dominated by flooding scenarios that flood the Auxiliary Building basement (thus potentially removing a water source) and loss of spent fuel pool cooling under full-core-offload conditions. The next highest percentage contributor is loss of containment heat removal functions attributable to fire and flood events that lead to core damage and also directly impact containment spray and containment recirculation fan coolers

E.1.3 Importance Analysis

The importance of systems and components is a significant insight into the risk profile for Ginna Station. RG&E has generated two types of importance measures, Fussell-Vesely (F-V) and Risk Achievement Worth (RAW), the results of which are briefly summarized below. To support the Ginna Station PSA, RG&E combined these two importance measures with the F-V value greater than 0.05 at the system level (greater than 0.05 at the component level) and the RAW greater than 10 at the system level (greater than 2 at the component level) to indicate “high” risk significance.

Initiating events identified as high risk significance include fire in the Control Room requiring evacuation, loss of offsite power during 24-hour period when shut down, loss of residual heat removal during shutdown, and total loss of service water.

Test and maintenance events identified as high risk significance include three scenarios: the turbine-driven auxiliary feedwater pump is out of service; the motor-driven auxiliary feedwater train A and steam generator A are out of service due to testing or maintenance; and test or maintenance renders charging pump A unavailable.

Systems identified as high risk significance include 125 volt direct current power, 480 volt alternating current power, auxiliary feedwater, component cooling water

(CCW), chemical and volume control, diesel generator, fire protection, offsite power, reactor coolant, residual heat removal, standby auxiliary feedwater (SAFW), safety injection, and service water.

Components identified as high risk significance include the following:

Motor-operated valves:	738A fails open
	738B fails open
Air-operated valves:	Pressure control valve 430 fails to reseat after steam relief
	Pressure control valve 431C fails to reseat after steam relief
Pumps/compressors/fans:	CCW pump PAC02A fails to start
	CCW pump PAC02B fails to start
	Spent fuel pool recirculation pump A fails to start on demand
	Failure of SAFW pump 1C
Major electrical components:	Local faults on 480 volt alternating current Bus 16
	120 volt alternating current instrument Bus C faults
	Diesel generator A fails to start/run
	Diesel generator B fails to start/run
Check valves:	Check valve 853A fails to remain closed
	Check valve 853B fails to remain closed

E.1.4 Station Design Features and Improvements

There are several unique and important features of the Ginna Station that contribute to core damage prevention. In addition, as a result of the insights obtained from the Ginna Station PSA, several identified vulnerabilities have resulted in station modifications and procedural changes.

E.1.4.1 Station Design Features Important to Core Damage Prevention

Station design features that are important to core damage prevention include the SAFW system, limited requirements for ventilation, the service water system design, and use of the City Water system. These are briefly discussed in the following paragraphs.

The SAFW system comprises two 100 percent motor-driven pumps that are completely redundant to the preferred auxiliary feedwater system. The SAFW system was installed to mitigate the potential common-mode failures of the preferred auxiliary feedwater system (e.g., high energy line breaks in the Intermediate Building). As such, four motor-driven auxiliary feedwater pumps and one turbine-driven auxiliary feedwater pump are available, any one of which can facilitate steam generator cooling.

The Ginna Station layout typically does not include the use of compartments or rooms to protect various trains from one another. Instead, system components are generally grouped together on one floor level. This configuration eliminates the need for dynamic equipment cooling by enabling passive cooling to occur via the large air volumes and recirculation.

The service water system design is one of a large loop header that is supplied by four pumps. Two pumps are powered from one electrical train and two pumps are powered from a second electrical train. In-series motor-operated valves are also provided at various points to isolate non-critical loads on the loop header. Any one of the four service water pumps can provide cooling water to any system load. This design allows significant flexibility, which reduced the service water contribution to core damage.

The City Water system is used to supply plant domestic loads and the yard fire loop. The yard fire loop consists of the fire hydrants that are located outside the power block. Sprinkler systems and hose reels within the power block are supplied by two onsite fire pumps (one motor- driven and one diesel-driven). In the event that all service water is lost, the City Water system can be used to supply the SAFW system and provide cooling water to the diesel generators.

E.1.4.2 Summary of Station Modifications

As a result of the insights gained from the Ginna Station PSA, RG&E has implemented station modifications or procedural changes to address identified vulnerabilities. The following vulnerabilities have been addressed:

- **Standby auxiliary feedwater system out-of-service activities** – The SAFW system is specifically credited for providing steam generator cooling water in the event of a high energy line break in the Intermediate or Turbine Building. Procedural modifications were made to avoid situations in which both trains of the SAFW system could be taken out of service at the same time.
- **Removal of large service water piping within battery rooms** – The service water piping that ran through the two battery rooms was relocated to avoid the potential loss of both battery rooms due to failure in isolating non-safety related service water line breaks prior to flooding the rooms and failing direct-current equipment.
- **Procedural guidance for relay room internal floods** – The procedure, “Alternate Shutdown for Control Complex Fire,” was revised to also apply to relay room floods. Previously the relay room procedure only addressed fire.

- **Fire in the diesel generator B vault** – A new procedure was developed to instruct plant personnel to manually close the Bus 18 breakers to prevent a station blackout condition in the event of a worst-case fire that fails the B electrical train (Buses 16 and 17) and offsite power and control power to Bus 18 of electrical train A, which, in turn, would result in loss of all service water.
- **Guidance in control room evacuation due to fires** – Changes were made to the control room evacuation procedures to require entry into the emergency operating procedures to provide necessary core cooling.

E.2 Melcor Accident Consequences Code System Modeling

This section of Appendix E describes the assumptions made and the results of modeling performed to assess the risks and consequences of severe accidents (U.S. Nuclear Regulatory Commission Class 9).

The Level 3 analysis was performed using the Melcor Accident Consequences Code System (MACCS) 2 code (Ref. E.2-1). MACCS2 simulates the impacts of severe accidents at nuclear power plants upon the surrounding environment. The principal phenomena considered in MACCS2 are atmospheric transport, mitigative actions based on dose projections, dose accumulation by a number of pathways including food and water ingestion, early and latent health effects, and economic costs. Input for the Level 3 analysis includes the reactor core radionuclide inventory, source terms from the Ginna Station PSA model, site meteorological data, projected population distribution (within a 50-mile radius), emergency response evacuation modeling, and economic data. These inputs are described in the following section.

E.2.1 Input Data

The input data required by MACCS2 are outlined below.

E.2.1.1 Core Inventory

RG&E calculated the core inventory activity for fission products and actinides for the purpose of developing sources for use in dose calculations. The core inventory data are presented in Table E.2-1. The core inventory was evaluated at the end of a 525-day fuel cycle and was conservatively based on plant operation at 102 percent of the power level [1,550 megawatts (thermal)] to allow for calibration error. The equilibrium core at the end of a fuel cycle is assumed to consist of fuel assemblies with three different burnups, i.e., approximately 1/3 of the core is subjected to one fuel cycle, 1/3 of the core to two fuel cycles, and 1/3 of the core to three fuel cycles. Minor variations in fuel irradiation times and duration of refueling outages will have a slight impact on the estimated inventory of long-lived isotopes in the core. However, these changes will have an insignificant impact on the radiological consequences of postulated accidents.

E.2.1.2 Source Terms

The atmospheric source terms used in the MACCS2 model were obtained from the latest Level 2 Ginna Station PSA model analysis.

E.2.1.3 Meteorological Data

Ginna Station meteorological data for calendar years 1992, 1993, and 1994, were considered. For these years, consecutive hourly meteorological data (wind speed, wind direction, stability class, and precipitation) were placed in MACCS2 format. Where data blocks were missing in the source files, supplementary information was

Table E.2-1
Ginna Station Core Inventory

Nuclide	Fraction	Nuclide	Fraction
Kr-85	4.98E+05	Tc-99m	6.94E+07
Kr-85m	1.11E+07	Ru-103	6.34E+07
Kr-87	2.13E+07	Ru-105	4.34E+07
Kr-88	3.00E+07	Ru-106	2.25E+07
Xe-131m	4.55E+05	Rh-105	3.98E+07
Xe-133	8.19E+07	Sb-127	4.50E+06
Xe-133m	2.67E+06	Sb-129	1.34E+07
Xe-135	2.17E+07	Te-127	4.45E+06
Xe-135m	1.67E+07	Te-127m	5.81E+05
Xe-138	7.04E+07	Te-129	1.32E+07
I-131	4.16E+07	Te-129m	1.96E+06
I-132	6.03E+07	Te-131m	6.05E+06
I-133	8.53E+07	Te-132	5.93E+07
I-134	9.35E+07	Ba-139	7.62E+07
I-135	7.97E+07	Ba-140	7.34E+07
Rb-86	1.01E+05	La-140	7.87E+07
Cs-134	9.46E+06	La-141	6.95E+07
Cs-136	2.48E+06	La-142	6.72E+07
Cs-137	5.43E+06	Ce-141	6.97E+07
Sr-89	4.07E+07	Ce-143	6.47E+07
Sr-90	3.94E+06	Ce-144	5.43E+07
Sr-91	5.06E+07	Pr-143	6.27E+07
Sr-92	5.47E+07	Nd-147	2.79E+07
Y-90	4.09E+06	Pu-238	1.98E+05
Y-91	5.25E+07	Pu-239	1.61E+04
Y-92	5.49E+07	Pu-240	2.44E+04
Y-93	6.34E+07	Pu-241	5.41E+06
Nb-95	7.13E+07	Np-239	8.45E+08
Zr-95	7.07E+07	Am-241	6.87E+03
Zr-97	7.03E+07	Cm-242	1.48E+06
Mo-99	7.92E+07	Cm-244	2.10E+05

derived from meteorological data obtained from the National Oceanic & Atmospheric Administration (NOAA) from the Rochester Airport, approximately 15 miles west of Ginna Station (Ref. E.2-2). The available NOAA data were insufficient to calculate the stability factors; therefore, these factors were taken from the National Climatic Data Center (Ref. E.2-3). Comparison of the meteorological data for years 1992-1994 were used to demonstrate that the 1992 data set is both a reasonable and conservative data year for use as a representative year for the offsite risk calculation (see Appendix Section E.2.3 for a discussion of the sensitivity case for weather).

E.2.1.4 Emergency Response

To determine the appropriate emergency response assumptions, RG&E reviewed the Ginna Station Nuclear Emergency Response Plan (Ref. E.2-4) and the New York State Radiological Emergency Preparedness Plan (Ref. E.2-5) coupled with local geographic and demographic characteristics. RG&E determined that a 7,200-second evacuation delay time and a 1.8 meters per second evacuation speed were appropriate. RG&E also assumed that 95 percent of the population surrounding the plant would evacuate in an emergency.

E.2.1.5 Population Distribution

For consistency within the site data file, RG&E initially used a projected year-2000 population distribution in the base case analysis and performed a sensitivity analysis on the projected year-2030 population distribution (see Section E.2.3) to determine the effect of increased population on the offsite consequences. The results indicate that the average increase across all the release categories is greater than 20 percent for both dose and economic cost and, therefore, the year 2030 population projection is used in the analysis. This also accounts for increased population near the end of plant life.

To generate the population input data, RG&E used the RSICC code SECPOP90: Sector Population, Land Fraction, and Economic Estimation Program (Ref. E.2-6) as the baseline population distribution for estimating the projected population used in the analysis. The 50-mile region includes the Rochester Metropolitan Area and 13 counties that are completely or partially within the 50-mile radius. SECPOP90 provides the population distribution by sectional rosette centered on the Station and divided into 9 radial intervals out to 50 miles. The rosette consists of 16 directional sectors, the first of which is centered on due north, the second on 22.5 degrees east of north, and so on. The total 1990 population residing in the 50-mile radius region was estimated to be 1,222,212 persons.

SECPOP90 uses year 1990 block level census data to calculate the population within each rosette section. Given that the year 2000 census data at the block level were not available at the time the Level 3 model was prepared, the SECPOP90 population data input file could not be updated by block group before the rosette population matrix was generated. Therefore, the 1990 population numbers were updated by rosette sector after running SECPOP90. RG&E extracted county-level data from the year 2000 census data to develop a weighted average population projection for each rosette section. Changes in population between 1990 and 2000 were calculated under the assumption that increase or decrease in the population for

each rosette section within a given county were the same as those for the county as a whole and that residents are uniformly distributed throughout each county and within the portion of the county contained within a rosette section. Specifically, the 1990 rosette population value was projected for year 2000 by using the ratio of 1990 to 2000 county populations multiplied by the estimated fraction of each county included within the respective rosette section. The county population change factors were applied to the respective rosette section to generate a population distribution for year 2000. The total year 2000 50-mile radius population estimate is 1,260,679 persons.

The 50-mile population data presented in Section 2.7 of the environmental report were calculated using Geographic Information System techniques and year 2000 census data at the census block level. Using this technique the 50-mile population was estimated to be 1.25 million. This comparison demonstrates that the projection method used in the Level 3 model is reasonable.

The year 2000 to year 2030 projection was developed using the same methodology with county population projections obtained from Cornell University for year 2020 (Ref. E.2-7) as input for determining long-term population trends. Yearly growth rates for each county between 1990 to 2000, 2000 to 2020, and 1990 to 2020, were averaged and used to calculate a 30-year growth rate that was applied to the year 2000 population projection, thus creating a year 2030 projection. To account for non-linear population growth, RG&E incorporated a 10 percent population multiplier into the projection. The total 50-mile population projected for year 2030 is estimated to be 1.57 million.

E.2.1.6 Land Fractions

Land fractions represent the portions of the total surface area which are land for each sector, and they are calculated using an algorithm that weights the county-level land fraction data. This is possible because the code contains a county level database with the land fractions for each county and every record in the block level database includes the area of the block and a code to indicate which county in the U.S. the block resides.

RG&E used the values generated by the SECPOP90 code for each rosette section directly in the analysis.

E.2.1.7 Regional Economic Data

Agricultural economic data required for MACCS2 include (Tables E.2-2 and E.2-3):

1) the fraction of land devoted to farming;

2) the farmland property values;

3) the total annual farm sales; and

4) the fraction of farm sales resulting from dairy production.

The SECPOP90 database includes county economic data derived from the year 1990 census and various other government documents dated 1992 to 1994. For

Table E.2-2
MACCS2 Agricultural Data

County	Fraction of Land Devoted to Farming	Fraction of Farm Sales Resulting from Dairy Production	Total Annual Farm Sales ($/hectare)	Farmland Property Values ($/hectare)
Cayuga	0.567551	0.548727	1,133	3,270
Genesee	0.540334	0.446257	1,585	3,324
Livingston	0.487920	0.547562	913	3,354
Monroe	0.244337	0.126225	1,149	5,329
Onondaga	0.294566	0.528181	1,192	3,753
Ontario	0.450810	0.421387	1,036	4,333
Orleans	0.572415	0.110997	1,071	3,279
Oswego	0.168057	0.348064	7,58	3,468
Seneca	0.564681	0.362439	864	3,245
Steuben	0.391511	0.531443	557	2,295
Wayne	0.432344	0.140398	1,590	4,777
Wyoming	0.513566	0.818453	1,707	3,431
Yates	0.484063	0.423508	949	4,654

Table E.2-3
Per Capita Regional Economic Data

County	Farm Wealth Value ($/hectare)	Non-Farm Wealth Value ($/person)
Cayuga	3,270	100,317
Genesee	3,324	108,797
Livingston	3,354	107,174
Monroe	5,329	139,306
Onondaga	3,753	129,254
Ontario	4,333	128,273
Orleans	3,279	90,333
Oswego	3,468	101,637
Seneca	3,245	104,222
Steuben	2,295	129,213
Wayne	4,777	110,002
Wyoming	3,431	88,504
Yates	4,654	93,849

preparation of the Ginna Station Level 3 model the SECPOP90 site input file was manually updated to circa 2000 for the 13 counties within 50 miles of the plant. Therefore, the Level 3 input files contain updated values for each economic region and, hence, for each sector. The agricultural economic data were updated using available data from the 1997 Census of Agriculture (Ref. E.2-8) supplemented by data available through other federal agencies (Ref. E.2-9; Ref. E.2-10; Ref. E.2-11; Ref. E.2-12).

Additional regional economic data factored into the Ginna Station risk analysis includes the value of farm wealth, the fraction of farm wealth in the region due to improvements, and the value of non-farm wealth. The value of farm wealth and non-farm wealth by county are presented in Table E.2-3. The fraction of farm wealth in the region due to improvements was calculated to be 0.11 using the average farm wealth (Table E.2-3) and the average value of farm real estate (Ref. E.2-9).

E.2.1.8 Food Pathway Assumptions

The MACCS2 ingestion model preprocessor, COMIDA2, was used to model the ingestion pathway. Crop season and share data were not used, as the ingestion model uses diet assumptions versus agricultural production to define food intake. However, the COMIDA2 code does require input for waterborne nuclides of concern for the water ingestion model, as well as, food. RG&E identified the four nuclides, Sr-89, Sr-90, Cs-134, and Cs-137, as input to the ingestion model.

Based on the size, Lake Ontario could be treated as an ocean watershed with zero uptake. However, RG&E conservatively treated the Lake as a lake watershed since, unlike an ocean, it is a source of drinking and irrigation water.

E.2.1.9 Deposition Velocities

RG&E calculated a Ginna Station specific deposition velocity value of 0.2 meters per second. The range of values recommended in NUREG/CR-4551 (Ref. E.2-13) is 0.03 to 3.0 with a specific recommendation of 0.3. Considering the surrounding terrain and the formula provided in NUREG/CR-4551, a site-specific value was calculated.

E.2.2 Results

The result of the Level 3 model is a matrix of offsite exposure and offsite property costs associated with a postulated severe accident in each release category. This matrix was combined with the results of the Level 2 model to yield the probabilistic offsite dose and probabilistic offsite property damage resulting from the analyzed plant configuration. Using the bounding base case (year 2030 population projection plus 10 percent and 10 percent source term increase), the offsite exposure risk for Ginna Station is 4.09 person-rem per year. Table E.2-4 provides the baseline exposures associated with each release category. The offsite exposure risk was calculated by multiplying the frequency of the release by the dose.

The bounding base case offsite economic risk is $24,100 per year. Table E.2-4 also provides the base case offsite economic costs associated with each release

Table E.2-4
Summary of Offsite Consequences

Release Category	Frequency	Offsite Dose (person-rem)	Offsite Dose Risk	Offsite Economic Costs ($)	Offsite Economic Risk ($)
Intact Containment	3.75E-05	2.27E+04	0.851	2.82E+07	$1,058
ISLOCA	4.00E-09	1.76E+07	0.070	2.27E+10	$91
LOCI	1.51E-07	3.38E+06	0.510	1.11E+10	$1,676
SGTR WET	1.020E-06	1.15E+06	1.171	9.43E+09	$9,600
SGTR DRY	0.0	4.62E+06	0.000	1.82E+10	$0
SGTR ARV Cycle	9.25E-09	6.89E+05	0.006	5.62E+09	$52
Late Failure Global	5.65E-07[a]	9.39E+05	0.531	9.41E+09	$5,317
Late Failure Small	5.65E-07[a]	4.51E+05	0.255	2.19E+09	$1,237
TISGTR	1.84E-08	4.72E+06	0.087	1.90E+10	$350
HPRCS	4.43E-07	1.36E+06	0.602	1.06E+10	$4,696
LPRCS	3.40E-08	1.94E+05	0.007	8.07E+08	$27
Total	3.97E-05		4.09		$24,100

a. This value represents the total release frequency for both “global” and “small” containment failures
ARV = atmospheric relief valve
HPRCS = high pressure reactor coolant system break
ISLOCA = interfacing system loss-of-coolant accident
LOCI = loss of containment isolation
LPRCS = low pressure reactor coolant system break
SGTR = steam generator tube rupture
TISGTR = thermally induced steam generator tube rupture

category. The economic risk for each release category was calculated by multiplying its frequency by the corresponding economic costs.

The final result of a Level 3 evaluation of a SAMA is a value of the cumulative dose expected to be received by offsite individuals and a value of the expected offsite property losses due to severe accidents given the plant configuration under evaluation.

E.2.3 Sensitivity Analysis

Sensitivity analyses were performed to assess variations in certain input factors including weather, population projections, and fission product release.

E.2.3.1 Weather

Data from the years 1992 to 1994 were input into the MACCS2 code for the base case. Dose and cost results for each release category was compared to the average for the three-year period. The results show that the total dose and cost results for the most severe release category (ISLOCA) are within 12 percent of the average. This indicates that the offsite consequences are not highly sensitive to year-to-year

variations in weather for the years evaluated. While there is no single year in which all release cases yield the most conservative results, the 1992 data yield results above the three-year average for all releases. Therefore, the 1992 meteorological data are both reasonable and conservative for use in the base case calculation.

E.2.3.2 Population

The initial base case evaluation was performed using year 2000 data, and a sensitivity case was performed using projections to year 2030 plus 10 percent. The results indicate the projected population would increase 25 percent over the year 2000 50-mile population, and the resulting effect on the offsite consequences averaged greater than a 20 percent increase for both offsite dose and economic costs. Given the significance of this increase, the year 2030 population projection plus 10 percent was used in the analysis.

E.2.3.3 Fission Product Release

A sensitivity analysis was performed for a 10 percent increase in fission product release. The core inventory was increased by 10 percent while maintaining the release fractions. While short-term dose effects are proportional to the releases, the impact of long-term dose effects associated with groundshine, resuspension, and ingestion is limited by the use of MACCS2 interdiction triggers, which are based on U.S. Environmental Protection Agency Protective Action Guide dose limits. These triggers impact population relocation, ingestion, and long-term land uses. A 10 percent increase in the source term results in an approximate 7 percent increase in population dose increase.

E.2.3.4 Conclusion

The magnitude of the results presented above indicates that the variation in population and source term should be considered in the offsite consequence calculation. Therefore, in order to bound these uncertainties, RG&E used the year 2030 population projection plus 10 percent and the 10 percent source term increase as input into the MACCS2 model for the base case calculation, as well as the evaluation of each potential modification. This represents a bounding analysis for the purposes of evaluating the offsite consequences for Ginna Station during the period of extended operation.

E.3 SAMA Assessment Sheets

This section includes an evaluation summary for each of the eight SAMAs RG&E evaluated in the cost-benefit analysis. Each summary includes a Ginna Station-specific description of the candidate SAMA, a discussion of the potential benefits, a summary of the evaluation and resulting benefits, and a discussion of the associated implementation costs.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 1
TITLE: Obtain a skid-mounted 480V diesel generator

Description:
Obtain a skid-mounted 480 volt (V) diesel generator that could be directly connected to one train of the safeguards buses in the event of a failure of the two existing diesel generators. Rather than relying on station blackout (SBO) mitigation equipment that is alternating current (AC)-independent, an additional skid-mounted diesel capable of carrying SBO mitigation loads could be added to make the SBO mitigation strategy be alternate AC. The size of the diesel is 1000 kilowatts. The diesel would not be safety-related, and would be subject to quality assurance controls per NRC Regulatory Guide 1.155.

SAMA Benefits:
RG&E assumes that all SBO sequences would be mitigated with the availability of a skid-mounted diesel generator.

Evaluation:
RG&E assumes that the failure rate for the skid-mounted diesel generator is the same as for the existing diesel generators (i.e., failure to start (FTS) = 1.01E-02 and failure to run (FTR) = 4.46E-02). Analysts conservatively assume a failure rate of 0.01 for the operators correctly connecting the diesel generator to a safeguards train. This was simulated by changing the value of SBO from 1.0 to 0.0647 (i.e., 0.0101 + 0.0446 + 0.01) in both the CDF and large early release frequency (LERF) cutset files. The resulting delta CDF value is 5.88E-06, and the delta LERF is 1.52E-07. The reduction in population dose is estimated to be 4.39 person-rem per year.

Cost of Implementation:
RG&E estimates the cost of the skid-mounted diesel to be approximately $250,000. Additional costs related to training, procedure revision, and documentation are estimated at $100,000, and breakers, cabling, fuel storage, and oil abatement facilities are estimated to cost an additional $50,000, for a total cost of $400,000.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 2
TITLE: Obtain a third fire water source independent of existing suction source for the motor- and diesel-driven fire pumps

Description:
Obtain a third fire water source independent of existing suction source for the motor- and diesel-driven fire pumps (potentially a portable connection to the discharge canal). This would be used in the event of a total loss of the screenhouse due to a fire or flood or loss of all service water section due to environmental causes (e.g., frazile ice, seagrass, etc.). The pump should be of comparable size to the current pumps, since the functions would be comparable. The pump could be connected to the existing fire water piping and used for fire suppression or as a source of suction to the auxiliary feedwater pumps. It need not be safety-related, but would be subject to specified quality assurance requirements.

SAMA Benefits:
This SAMA would mitigate the loss of all auxiliary feedwater due to a failure of the service water suction source or a global failure of the screenhouse equipment due to fire or flooding (either in the screenhouse or other areas that will fail the equipment e.g., relay room), or loss of service water section due to environmental concerns.

Evaluation:
RG&E assumes that the failure rate for the new diesel-driven fire pump is the same as for the existing one (i.e., FTS = 9.36E-04 and FTR = 3.18E-03). Analysts assume a failure rate of 0.1 for the operators correctly connecting the new diesel-driven pump to the SAFW system. Since use of the yard loop is always an option in these cases (i.e., event AXHFDCITYW or AXHFDSAFWX is in all of the cutsets), the value of 0.1 assumes dependence with these other events (i.e., if operators fail to use the yard loop, there is an increased probability that they will fail to use the portable diesel pump). Simulate this by changing the value of AXHFDCITYW from 1.5E-02 to 1.5E-03 (i.e., 1.5E-02 * 0.1, since this failure dominates the equipment failures) and AXHFDSAFWX from 5.2E-03 to 5.2E-04 in both the CDF and LERF cutset files. Resulting CDF and LERF reduction values are 2.13E-06 and 5.0E-09, respectively.

This new pump could also be used to recover fire events where the existing diesel-driven fire pump fails. Again, assume that the failure rate for the new diesel-driven fire pump is the same as for the existing one (i.e., FTS = 9.36E-04 and FTR = 3.18E-03). In this case, however, the operator failure would be independent of any other human failure and is estimated at 0.01. Simulating this model change by changing the value of events FSDGFPFP01 and FSDGAPFP01 from 3.18E-03 and 9.36E-04, respectively, to 4.19E-05 [i.e., 3.18E-03 * (3.18E-03 + 0.01)] and 1.02E-05 [i.e., 9.36E-04 * (9.36E-04 + 0.01)] results in a CDF reduction of 7.0E-08 and a 9.0E-09 reduction in the LERF.

Thus the total expected change is 2.13E-06 + 7.0E-08 = 2.20E-06 for CDF and 5.0E-09 + 9.0E-09 = 1.40E-08 for LERF. The reduction in population dose is estimated to be 1.63 person-rem per year.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 2 (continued)
TITLE: Obtain a third fire water source independent of existing suction source for the motor- and diesel-driven fire pumps

Cost of Implementation:
RG&E estimates the cost of the electric motor-driven pump to be $100,000, and estimates the associated procedure revisions, training, and documentation to be $50,000. The breaker and cabling would add an additional $50,000, for total cost of $200,000.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 3
TITLE: Add a standby charging pump powered from a protected AC source

Description:
This SAMA involves adding a standby charging pump powered from a protected power source and located in the Intermediate or Turbine Building, or SAFW Pump Building. These locations would avoid the failure mechanisms discussed below. It would not have to be safety-related, and so could be powered from Bus 13 or 15 in the Turbine Building. It would have to be mounted so its failure would not adversely affect safety-related equipment. Connections to existing charging lines would have to be safety-related. Bus 13 or 15 would have to be upgraded to achieve the quality assurance requirements for a protected AC source. Significant technical issues to resolve include providing a high volume, primary-grade-quality water source, including the capability to inject borated water.

SAMA Benefits:
This new pump could be used to mitigate fires requiring entry into procedure "Alternate Shutdown for Control Complex Fire" or fires disabling train B, where the A charging pump is out of service or fails to run. It could also be used to mitigate fires in the Charging Pump Room, floods in the Auxiliary Building that fill the basement to a level that will fail all charging, or other failures of all three pumps.

Evaluation:
RG&E assumes that all cutsets that have the following:

a) Charging pump A out of service or failed directly (i.e., not by the initiator or support system failure), or

b) an Auxiliary Building flood that is sufficiently large to fill the basement to a critical height and disable all three charging pumps (event IFAZDABISL), or

c) a Charging Pump Room fire (event FI000CHG),

can be mitigated by using the Intermediate Building charging pump powered from Bus 14. Analysts assume that the Intermediate Building pump would autostart on low flow or pressure (i.e., without operator action). The failure rates for starting and running of the pump are 5.11E-05 and 7.22E-04, respectively (i.e., the same as the existing pumps). RG&E simulated this modification by:

a) Changing the value of CVTMCHPMPA from 7.04E-02 to 5.44E-05 [i.e., 7.04E-02 * (5.11E-05 + 7.22E-04)] in both the CDF and LERF cutset files;

b) Changing the value of CVMPAPCH1A from 5.11E-05 to 2.61E-09 [i.e., 5.11E-05 * 5.11E-05] and CVMPFPCH1A from 7.22E-04 to 5.21E-07 [i.e., 7.22E-04 * 7.22E-04];'

c) Changing the value of IFAZDABISL from 0.1 to 7.73E-5 [i.e., 0.1 * (5.11E-05 + 7.22E-04)] in both the CDF and LERF cutset files. Note that this is a very conservative number in that it does not take into account failures of the support systems for the new pump (i.e., suction source, AC power, etc.); and

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 3 (continued)
TITLE: Add a standby charging pump powered from a protected AC source

d) Changing the value of FI000CHG from 5.4E-03 to 4.17E-06 [i.e., 5.4E-03 * (5.11E-05 + 7.22E-04)] in both the CDF and LERF cutset files. (Note that event FI000CHG does not appear in either file).

The resulting delta CDF is 5.86E-06, and the delta LERF is 1.29E-07. The reduction in population dose is estimated to be 0.23 person-rem per year.

Cost of Implementation:
Cost of hardware modifications is estimated to be greater than $1,000,000 for the pump, piping, valves, engineering analysis, hangers, supports, bus upgrades, cabling, and instrumentation. Procedure revisions, training, and documentation are estimated at $100,000, for a total of $1.1 million.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 4
TITLE: Modify procedures to allow charging pump B or C to be manually aligned to Bus 14

Description:
This SAMA involves a procedure modification to allow charging pump B or C to be manually realigned to Bus 14. This alignment could be used to mitigate fires requiring entry into procedure "Alternative Shutdown for Control Complex Fire" or fires disabling train B, where the A charging pump is out of service or fails to run. An existing spare cable could be routed from Bus 14 to either pump B or C using existing connections.

SAMA Benefits:
This alignment could be used to mitigate fires requiring entry into procedure "Alternative Shutdown for Control Complex Fire" or fires disabling train B, where the A charging pump is out of service or fails to run.

Evaluation:
RG&E assumes all cutsets in which charging pump A is out of service or failed directly (i.e., not by the initiator or support system failure), can be mitigated by swinging the B or C pump to Bus 14. Analysts conservatively assume that the failure rate for the operators swapping the pump over is 2.0E-03 (0.1 times the value of CVHFDSUCTN), and the failure rates for starting and running the pump are 5.11E-05 and 7.22E-04, respectively. RG&E simulated this modification by:

a) Changing the value of CVTMCHPMPA from 7.04E-02 to 1.94E-04 [i.e., 7.04E-02 * (0.002 + 5.11E-05 + 7.22E-04)] in both the CDF and LERF cutset files; and

b) Changing the value of CVMPAPCH1A from 5.11E-05 to 1.42E-07 [i.e., 5.11E-05 * (0.002 + 5.11E-05 + 7.22E-04)] and CVMPFPCH1A from 7.22E-04 to 2.00E-06 [i.e., 7.22E-04 * (0.002 + 5.11E-05 + 7.22E-04)] in both the CDF and LERF cutset files.

The resulting delta CDF is 4.78E-06, and the delta LERF is 1.31E-07. The reduction in population dose is 0.21 person-rem per year.

Cost of Implementation:
RG&E estimates the modification to the procedure and associated training costs to be $20,000.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 5
TITLE: Add redundant check valves in the two RHR injection lines to the RCS

Description:
Install redundant check valves upstream of check valves 853A and 853B. Currently, the position of the 853A and 853B check valve obturators are checked on a refueling outage frequency to ensure the check valves have properly closed. However, if the check valve fails or leaks in between refueling outages, there is no indication of this condition. A spurius safety injection (SI) would cause motor-operated valves (MOV) 852A and 852B to open, allowing the 2250 pounds per square inch (psi) reactor coolant to directly interface with the 600 psi residual heat removal (RHR) piping, potentially resulting in a loss-of-coolant accident (LOCA) in the Auxiliary Building, which could not be isolated. A second check valve in these lines would reduce the probability of this event. The new check valves would be Safety Class 1, 2500 psi rated, safety related.

SAMA Benefits:
Adding redundant check valves in series with check valves 853A and 853B would reduce the ISLOCA frequency in the two RHR injection lines.

Evaluation:
This modification would reduce the ISLOCA frequency for those two lines through penetration 111 (although it would not affect the line containing 720 and 721), since the new alignment would require failure of both check valves and the MOV, or both check valves and an inadvertent opening of the MOV, or a spurious SI signal which opens the MOV.

Based on Table 8-4 equation 2 from the PSA final report, the probability of an ISLOCA in a line with two check valves and a normally closed MOV is:

$$\lambda T = \{[T2(\lambda L2 + 2\lambda L\lambda R + \lambda R2) + \lambda HT(\lambda L + \lambda R) + T(CCFR + CCFL)] * [T(\lambda ML + \lambda MR) + \lambda MH]\}/PCF$$

However, this equation assumes that the MOV is locked closed and, therefore, not subject to an operator opening the valve, or opening due to an inadvertent SI. Since that is not the case for this line, equation 2 must be modified to account for these two events. In addition, there is the potential for the operators to close the MOV, if it is inadvertently opened or opens on a spurious SI. Per Table 7-15 from the PSA final report, the probability that operators fail to close the MOV is 0.04. Therefore, the equations becomes:

$$\lambda T = \{[T2(\lambda L2 + 2\lambda L\lambda R + \lambda R2) + \lambda HT(\lambda L + \lambda R) + T(CCFR + CCFL)] * [T(\lambda ML + \lambda MR) + \lambda MH + (0.04)\lambda MO] + [T2(\lambda L2 + 2\lambda L\lambda R + \lambda R2) + \lambda HT(\lambda L + \lambda R) + T(CCFR + CCFL)] * TSI(\lambda MS)(0.04)\}/PCF$$

This simplifies to:

$$\lambda T = \{[T2(\lambda L2 + 2\lambda L\lambda R + \lambda R2) + \lambda HT(\lambda L + \lambda R) + T(CCFR + CCFL)] * [T(\lambda ML + \lambda MR) + \lambda MH + (0.04)(\lambda MO + TSI(\lambda MS))]\}/PCF$$

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 5 (continued)
TITLE: Add redundant check valves in the two RHR injection lines to the RCS

Using the data values from Table 8-5 of the PSA final report gives:

λT = {[(6570 hr)2((6.8E-07/hr)2 + 2(6.8E-07/hr)(1.0E-07/hr) + (1.0E-07/hr)2) + (2.7E-04)(6570 hr)(6.8E-07/hr + 1.0E-07/hr) + (6570 hr)((3.0E-03)(6.8E-07/hr) + (3.0E-03)(1.0E-07/hr))] * [(6570 hr)(5.7E-07/hr + 1.6E-09/hr) + 2.7E-04 + (0.04)(2.68E-04 + (6570 hr)(6.30E-06/hr))}/.923

= {[(6570 hr)2(6.084E-13/hr2) + (6570 hr)(2.106E-10/hr) + (6570 hr)(2.34E-09/hr)]*[(6570 hr)(5.716E-07/hr) + 2.7E-04 + (0.04)(4.166E-02)]}/.923

= {[2.626E-05 + 1.384E-06 + 1.537E-05]*[3.755E-03 + 2.7E-04 + 1.67E-3]}/.923

= {4.301E-05 * 5.69E-03}/.923

= (2.447E-07)/.923

= 2.652E-07/yr

Multiplying this by 2 and adding to the CDF from the third line in this penetration (i.e., the line containing 720 and 721) results in a total CDF from this penetration of:

2*2.652E-07 + 1.05E-05 = 1.10E-05

Adding in the pipe break probability of 2.29E-02 results in a total CDF of:

1.10E-05 * 2.29E-02 = 2.53E-07

Since a third of the RHR piping that would be exposed to Reactor Coolant System (RCS) pressure is inside containment, it was assumed that the LERF for this penetration would be a third of the CDF, or 8.433E-08. The current CDF contribution from this penetration is 1.576E-06, while the current LERF is 5.25E-07; therefore, the resulting delta CDF is 1.32E-06, and the delta LERF is 4.41E-07. The population dose reduction would be 17.6 person-rem per year.

Cost of Implementation:
RG&E estimates the purchase, installation, analysis, and documentation of this modification is estimated to be at least $1,000,000. There is little room for installation of these check valves, which adds to the complexity of the installation/analysis. It is expected that additional supports would also be required to maintain this piping Seismic Category I.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 6
TITLE: Modify the motor-driven AFW pump cooling system to be independent of SW

Description:
Modify the motor- and turbine-driven AFW pump cooling system to be independent of SW. This would route AFW flow from the discharge of the pumps through a breakdown orifice to self-cool the outboard bearings and lube oil coolers. This would eliminate the dependency on the SW and fire water systems for cooling those components.

SAMA Benefits:
This SAMA would prevent failure of the motor-driven AFW pumps in the event of a loss of all suction to the fire and SW pumps, or a loss of the screenhouse due to fire or flood.

Evaluation:
RG&E assumes all cutsets that involve a loss of all AFW due to a failure of the SW suction source or a global failure of the screenhouse equipment due to fire or flooding [either in the screenhouse or other areas that will fail the equipment (e.g., relay room)] will no longer lead to core damage due to the availability of the motor-driven pumps. Failure rates for the motor-driven AFW pumps to start and run are 9.85E-04 and 3.58E-04, respectively. Analysts simulate this by changing the value of AXHFDCITYW from 1.5E-02 to 2.01E-05 [i.e., 1.52E-02 * (9.85E-04 + 3.58E-04)] and AXHFDSAFWX from 5.2E-03 to 6.97E-05 [i.e., 5.2E-02 * (9.85E-04 + 3.58E-04)] in both the CDF and LERF cutset files. The expected delta CDF is estimated to be 2.32E-06 and the delta LERF is estimated to be 6.00E-09. The resulting reduction in population dose is estimated to be 0.05 person-rem per year.

Cost of Implementation:
RG&E estimates the cost of this safety-related modification, including parts, construction, analysis, testing, and documentation to be approximately $200,000.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 7
TITLE: Modify AOV 112C to fail closed and AOV 112B to fail open on loss of instrument air

Description:
This SAMA involves a modification to air-operated valve (AOV) 112C to fail closed and AOV 112 B to fail open on loss of instrument air. This change would allow the refueling water storage tank (RWST) to become the suction source for charging, instead of the volume control tank (VCT) which has limited volume.

SAMA Benefits:
This SAMA would eliminate the need for manual operator actions on low VCT levels (manual actions are required to prevent introducing air into the charging system when the VCT voids).

Evaluation:
This modification would eliminate the need for operators to manually switch over the suction source from the VCT to the RWST (event CVHFDSUCTN). RG&E assumes all cutsets that contain event CVHFDSUCTN can be mitigated by this modification. Analysts simulate this change by setting CVHFDSUCTN to false in both the CDF and LERF cutset files. The resulting reduction in CDF is 2.51E-06 and the reduction in LERF is 1.44E-07. The resulting reduction in population dose is estimated to be 0.19 person-rem per year.

Cost of Implementation:
This change would require swapping the valve operators as well as making post-modification control system adjustments and operating procedure changes. RG&E expects the cost of this modification to be approximately $50,000 for components, design, engineering, analysis, testing, and documentation.

SEVERE ACCIDENT MITIGATION ALTERNATIVE ASSESSMENT SHEET

SAMA No. 8
TITLE: Reconfigure the PORVs so they transfer automatically from instrument air to N2 on low pressure and convert N2 supply line AOV to DC powered motor-operated valve

Description:
This SAMA involves reconfiguration of the power-operated relief valves (PORVs) so they transfer automatically from instrument air to N2 on low pressure and convert the N2 supply line AOV to DC powered motor-operated valve.

SAMA Benefits:
This SAMA would mitigate scenarios where the PORVs are not available due to a loss of instrument air, particularly for feed-and-bleed operations or rapid depressurization of the RCS.

Evaluation:
In order to quantify the effect of this modification, the model was altered to add a flag event to the gates representing failures of instrument air to the PORVs (430 and 431C). The following changes were made:

a) Under RC302A, replace RC321 with SDR1011 AND RC321 RCAAIA0430

b) Under RC310A, replace RC351 with SDR1014 AND RC351 RCAAIA431C

c) Under RC320, replace RC321 with SDR1011

d) Under RC350, replace RC351 with SDR1014

RCAAIA0430 and RCAAIA431C are flag events with a value of 1.0 that can be used to identify sequences where the PORVs fail due to loss of instrument air. Setting RCAAIA0430 and RCAAIA431C equal to 4.76E-03 (the failure rate of the components in the nitrogen system) results in a delta CDF of 3.60E-07 and a delta LERF of 5.00E-09. Note that these values are conservative since the failure rate for the nitrogen system does not include support systems failures (e.g., direct current power) that may fail independently or be failed by the other failures in the cutset. The reduction in population dose is estimated to be 0.01 person-rem per year.

Cost of Implementation:
Implementation of this SAMA would require logic and instrumentation changes as well as replacement of one or two safety-related environmentally qualified solenoid valves. Reanalysis of certain accident scenarios, such as anticipated transients without scram, may also be needed. Extensive changes to procedures, training, and documentation would also be needed. RG&E estimates the cost to be approximately $400,000.

E.4 References

Ref. E.1-1 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20." March 15, 1994.

Ref. E.1-2 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20, Level 1 Probabilistic Safety Assessment (PSA)." January 15, 1997.

Ref. E.1-3 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC), "Generic Letter 88-20, Level 2 Probabilistic Safety Assessment." August 30, 1997.

Ref. E.1-4 R.C. Mecredy (RG&E) letter to the Document Control Desk (NRC). "Ginna Station Probabilistic Safety Assessment (PSA), Final Report." Revision 4. February 15, 2002.

Ref. E.2-1 Oak Ridge National Laboratory. RSICC Computer Code Collection, MACCS2, Version 1.12, CCC-652 Code Package. 1997.

Ref. E.2-2 National Oceanic & Atmospheric Administration, National Climatic Data Center (NCDC). "Theoretical Meteorological Year (TMY) Data for Rochester, NY – DATSAV3 Surface." CD-ROM (TMY Data for 1992, 1993, and 1994).

Ref. E.2-3 National Oceanic & Atmospheric Administration, National Climatic Data Center (NCDC). "Theoretical Meteorological Year (TMY) Data for Rochester, NY." http://rredc.nrel.gov/solar/old_data/nsrdb/tmy2/State.html. Accessed February 22, 2002.

Ref. E.2-4 RG&E. *Ginna Station Nuclear Emergency Response Plan (NERP)*. Revision 20. Rochester, NY. October 19, 2000.

Ref. E.2-5 New York State Emergency Management Office. *New York State Radiological Emergency Preparedness Plan*. Available at: http://www.nysemo.state.ny.us/radiological.html. Accessed January 14, 2002.

Ref. E.2-6 S. L. Humphreys, et al. "SECPOP90: Sector Population, Land Fraction, and Economic Estimation Program," NUREG/CR-6525. January 1999.

Ref. E.2-7 New York Statistical Information System. "New York State Data, Population Projections." http://www.nysis.cornell.edu/data.html. Accessed October 25, 2001.

Ref. E.2-8 U.S. Department of Agriculture. *1997 Census of Agriculture – New York State and County Data*. AC97-A-32, Volume 1. Geographic Area Series, Part 32.

Ref. E.2-9 U.S Department of Agriculture, National Agricultural Statistics Service, "Agricultural Land Values, Final Estimates 1994 – 1998." Statistical Bulletin Number 957. Available at: http://www.usda.gov/nass/pubs/histdata.htm#sb.

Ref. E.2-10 U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Price Index – U.S. City Average." ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt. Accessed May 7, 2002.

Ref. E.2-11 U.S. Department of Commerce. "Statistical Abstract of the United States: 2000." March 2000. Available at: http://www.census.gov/prod/www/statistical-abstract-us.html.

Ref. E.2-12 Bureau of Economic Analysis, "Regional Accounts Data, Local Area Personal Income, Per Capita Personal Income." Available at: http://www.bea.doc.gov/bea/regional/reis. Accessed May 9, 2002.

Ref. E.2-13 J.L. Spring, et al. *Evaluation of Severe Accident Risks: Quantification of Major Input Parameters MACCS Input*. NUREG/CR-4551, SAND86-1309. Vol. 2, Rev. 1, Part 7. December 1990.

APPENDIX F. COASTAL MANAGEMENT PROGRAM CONSISTENCY DETERMINATION

COASTAL MANAGEMENT PROGRAM CONSISTENCY DETERMINATION

New York has an approved coastal zone management program documented by the U.S. Nuclear Regulatory Commission (NRC) (Ref. 1). Rochester Gas and Electric Corporation (RG&E) has determined that the proposed R. E. Ginna Nuclear Power Plant (Ginna Station) license renewal complies with the New York-approved coastal management program and will be conducted in a manner consistent with such program.

Proposed Activity

RG&E operates Ginna Station pursuant to NRC Operating License DPR-18, which will expire September 18, 2009. RG&E is applying to the NRC for renewal of the license, which would permit RG&E to operate Ginna Station for an additional 20 years (i.e., until September 18, 2029). License renewal would give RG&E the option of relying on Ginna Station to meet a portion of New York's future needs for electric generation.

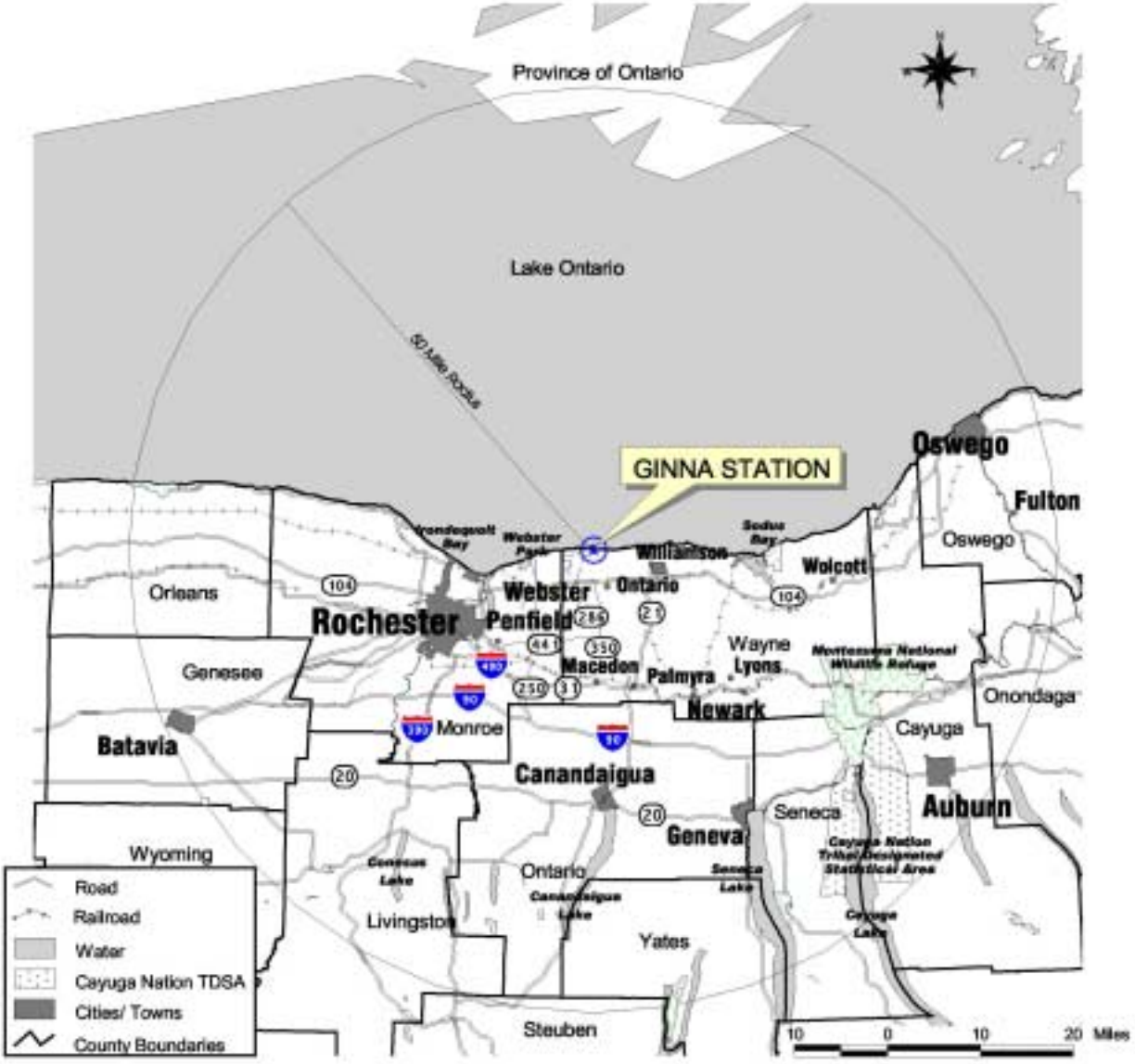
Ginna Station is located on the southern shore of Lake Ontario in the Town of Ontario, in the northwest corner of Wayne County, New York, approximately 20 miles east of the center of the City of Rochester and 40 miles west-southwest of Oswego (see Figures 1 and 2).

Ginna Station is shown in Figure 3. The plant consists of a pressurized light-water reactor with two steam generators that produce steam that turns turbines to generate electricity. The plant is capable of an output of 1,520 megawatts (thermal) [MW(t)], with a corresponding net electrical output of approximately 490 megawatts (electric) [MW(e)].

Ginna Station utilizes a once-through heat dissipation system that withdraws cooling water from and discharges to Lake Ontario. RG&E uses small amounts of chlorine in the cooling water system that discharges to offsite surface waters. There are eleven outfalls permitted under the site's State Pollutant Discharge Elimination System permit. The main outfall is associated with the once-through and intake cooling water systems discharging through the discharge canal to Lake Ontario. The next seven of these are internal outfalls, discharging to the discharge canal and ultimately to Lake Ontario. The last three outfalls discharge to Mill Creek (as designated in the SPDES permit) and consist of two unmonitored storm water runoff outfalls and a Redundant House service water discharge.

Ginna Station uses once-through cooling water from Lake Ontario to remove waste heat from the electricity generation process in a two-loop, three-stage heat-transfer design. The primary and secondary loops are closed systems utilizing demineralized water that has been treated to control chemistry and corrosion. The final stage of the heat transfer system involves the circulating water system, which is unconfined. Lake water is withdrawn through an offshore intake structure into a concrete-lined

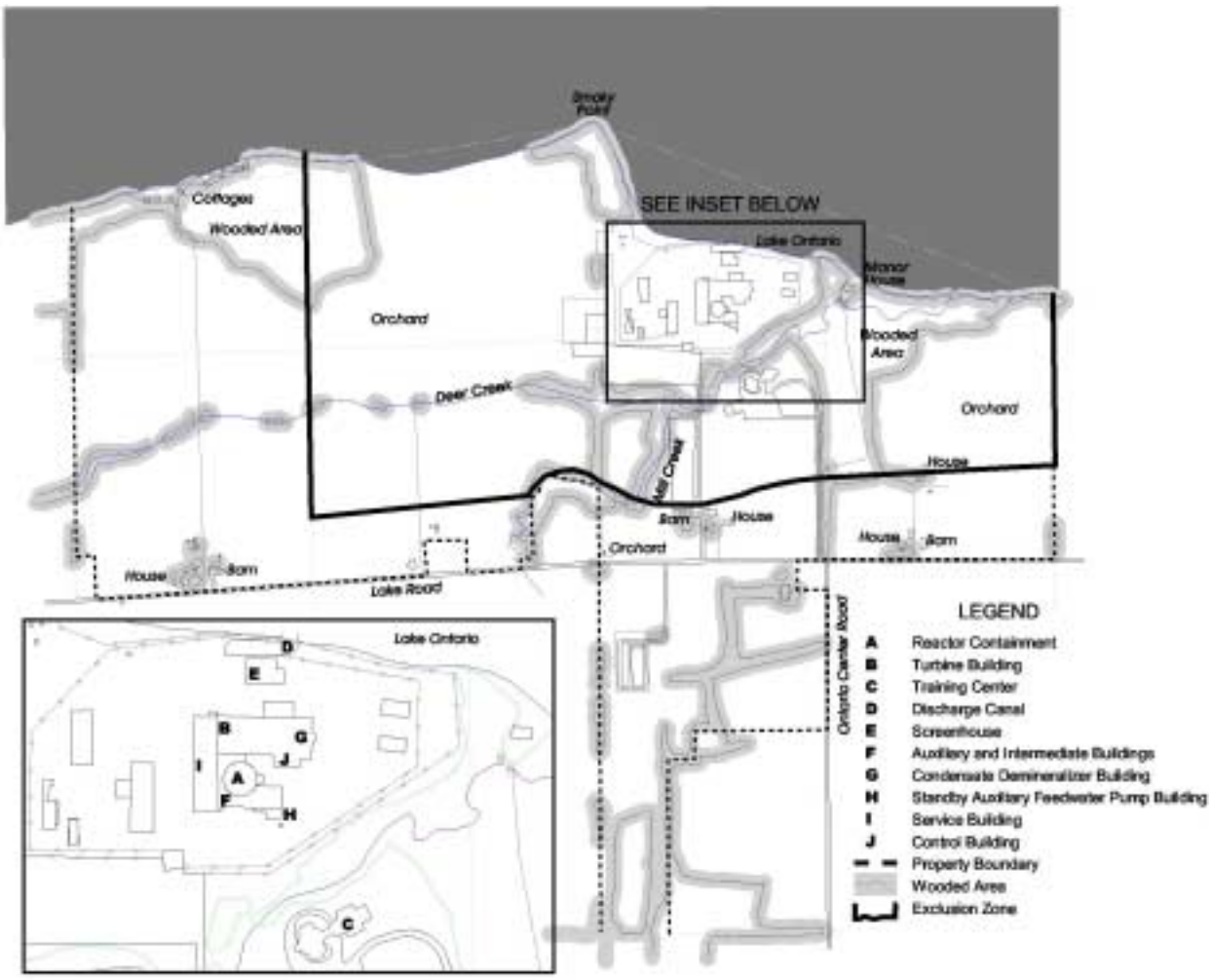
Figure 1
50-Mile Region



TSDA: Tribal Designated Statistical Area

Figure 2
6-Mile Region

Figure 3
Site Map



tunnel, which directs the water into the screenhouse. This water then passes through the four parallel traveling screens before it is pumped through the main condensers to the discharge canal. The heated water is discharged back to Lake Ontario at the shoreline. The cooling water intake structure is located approximately 3,100 feet offshore at a depth of about 33 feet of water at mean lake level (244.7 feet) and is completely submerged below the surface of the Lake. Even an occurrence of historical low water level will result in no less than 15 feet of water covering the intake structure. The intake itself is an octagonal-shaped structure, 50.8 feet across, containing electrically heated screen racks in each of the eight 17.3-foot-wide by 10-foot-high ports. Heavy screen racks with bars spaced 10-14 inches apart, center to center, prevent large objects from entering the system. At conditions of full flow (354,600 gallons per minute), the velocity at the intake screen racks is 0.8 feet per second. Water enters the intake from all sides in a circle, protecting against stoppage by a single, large piece of material. The low velocity plus the submergence provide assurance that floating ice will not plug the intake.

The discharge canal transports the heated cooling water to Lake Ontario, where it is discharged at the shoreline to the surface of the Lake. Normal temperature increase over ambient water at the point of discharge is about 20 degrees Fahrenheit (^{o}F), and the size of the thermal plume is normally about 175 acres. Temperature of the discharged cooling water and extent of the thermal plume is limited by the State Pollutant Discharge Elimination System permit for Ginna Station.

The service water system for Ginna Station is also a once-through cooling system, but uses much less water than the circulating water system. Up to 14,600 gallons per minute of lake water are pumped from the screenhouse through heat exchangers for non-contact cooling for a wide variety of plant equipment. Discharge is to the discharge canal and low-level chlorination is used to control biofouling of the system. An alternate service water discharge flow path exists via a discharge structure to Deer Creek. This path is used very infrequently, primarily during surveillance testing or when maintenance work is required in the preferred service water discharge path. When in use, flows are documented in the monthly Discharge Monitoring Report submitted to the New York State Department of Environmental Conservation and chlorine injection is not allowed in the system.

Ginna Station uses approximately 100,000 gallons of water per day from the Ontario Water District in the Town of Ontario. This municipal water is the source of supply for the plant's process (auxiliary boiler feed and condensate to makeup and polishing), potable, and sanitary water systems. Ginna Station discharges treated waste process water into the discharge canal. These discharges are regulated under the plant's State Pollutant Discharge Elimination System permit. Sanitary wastewater is not disposed on site, but is piped to the Town of Ontario, New York's, wastewater treatment system for treatment and disposal.

RG&E employs a permanent workforce of approximately 500 employees at Ginna Station. Approximately 48 percent of the workforce lives in Wayne County and 44 percent lives in Monroe County. The site workforce increases by as many as 700 workers for temporary (30 to 40 days) duty during refueling outages that occur about

once every eighteen months. RG&E does not anticipate the need for additional staff to support operations during extended operations.

In compliance with the NRC regulations, RG&E has analyzed the effects of plant aging and identified activities needed for Ginna Station to operate for an additional 20 years. RG&E conservatively assumes that renewal of the Ginna Station operating license would require the addition of no more than 60 workers to perform the additional license renewal surveillance, monitoring, inspection, testing, trending, and reporting. Ginna Station license renewal would involve no plant refurbishment.

Ginna Station transmission lines connect the plant through corridors to the State's electric grid at Substation 204 (Fruitland), south of the plant (see Figure 2). Four underground cables transmit electricity from the plant to Substation 13A, which is located south of the plant on the south side of Lake Road. Four overhead transmission lines emanate from Substation 13A and run in a southerly direction to connect to the transmission grid at Substation 204. RG&E owns the transmission corridor from Ginna Station to Substation 204 and maintains it as a low-growing vegetative community with selected management techniques under a New York State Public Service Commission-approved long-range vegetation management plan

Ginna Station provides about 40 percent of the electrical load in the RG&E service territory, located primarily in upstate western New York. In other words, the extended operation of Ginna Station would meet the electrical needs of approximately one million people in the RG&E nine-county service area.

State Program

New York's coastal management program is administered by the New York Department of State, Division of Coastal Resources. For federal agency activities, the Division reviews projects to ensure adherence to the State program or an approved Local Waterfront Revitalization Program. Applicants for federal agency approvals or authorizations are required to submit copies of federal applications to the Division, together with a Federal Consistency Assessment Form and consistency certification. The Department reviews the consistency certification and proposal for consistency with the State of New York Coastal Management Program as documented in 44 specific policies established in the Department's 1982 Final Environmental Impact Statement. The policies articulate the State's vision for its coast by addressing the following areas:

- Development
- Fish and Wildlife
- Flooding and Erosion Hazards
- General
- Public Access
- Recreation
- Historic and Scenic Resources
- Agricultural Lands

- Energy and Ice Management
- Water and Air Resources

Tables 1 and 2 identify licenses, permits, consultations and other approvals necessary for Ginna Station continued operation and license renewal, respectively.

RG&E consulted with the Federal and State regulator agencies listed below to inform them of plans to seek license renewal for Ginna Station. RG&E described for the agencies its license renewal efforts and requested input from the agency representatives regarding issues of concern.

Federal
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

State of New York
Department of State
Department of Environmental Conservation
Office of Parks, Recreation, and Historic Preservation

Probable Effects

The NRC has prepared a *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) which analyzes the environmental impacts associated with the renewal of nuclear power plant operating licenses (Ref. 2; Ref. 3). The NRC has codified its findings by rulemaking (10 CFR Part 51, Subpart A, Appendix B, Table B-1). The codification identifies 92 potential environmental issues, 69 of which are generically identified as having small impacts and are called "Category 1" issues. Absent findings of new and significant information, the NRC will rely on its codified findings, as amplified by supporting information in the GEIS, for its assessment of environmental impacts associated with license renewal. The codification and GEIS discuss the following types of Category 1 environmental issues:

- Surface water quality, hydrology, and use;
- Aquatic ecology;
- Groundwater use and quality;
- Terrestrial resources;
- Air quality;
- Land use;
- Human health;
- Socioeconomics;

Table 1
Environmental Authorizations for Current Operations
R.E. Ginna Nuclear Power Plant

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
New York State Department of Environmental Conservation	NYS ECL Part 675	Water Withdrawal Registration	NYGLWR-0002810	07/10/02[a]	Withdraw water from Lake Ontario
State of Tennessee Department of Environment and Conservation	Tennessee Code Annotated 68-202-206	Radioactive Shipment License	T-NY004-L01	12/31/02	Shipment of radioactive material to a licensed disposal/processing facility within Tennessee
Utah Department of Environmental Quality	R313-26 of the Utah Radiation Control Rules	Utah Department of Environmental Quality Division of Radiation Control Generator Site Access Permit Accessing A Land Disposal Facility Within Utah	0109 000 005	06/30/03	Delivery of radioactive wastes to a land disposal facility located within Utah
South Carolina Department of Health and Environmental Control	Act No. 429 of 1980 (South Carolina Radioactive Waste Transportation and Disposal Act)	South Carolina Radioactive Waste Transport Permit	0034-31-01	12/31/02	Transport of radioactive waste into South Carolina
New York State Department of Environmental Conservation	NYS ECL 11-0515 (1), NYCRR Part 175	New York State Fish and Wildlife License	LCP01-756	12/31/02	Collection and possession of fish and wildlife
New York State Department of Environmental Conservation	NYS ECL Article 40	Hazardous Substance Bulk Storage Registration Certificate	8-000170	07/18/03	Registration of hazardous substance bulk storage on site

Table 1 (continued)
Environmental Authorizations for Current Operations
R.E. Ginna Nuclear Power Plant

Agency	Authority	Requirement	Number	Expiration Date	Authorized Activity
New York State Department of Environmental Conservation	NYS ECL Title 8 of Article 17	State Pollution Discharge Elimination System (SPDES) Permit	NY-0000493	02/01/03	Discharge of wastewaters to waters of the State
U.S. Department of Transportation	49 CFR Part 107, Subpart G	Certificate of Registration for Transportation of Hazardous Materials	06200255003K	06/30/03	Transportation of hazardous materials
U.S. Nuclear Regulatory Commission	Atomic Energy Act (42 USC 2011 et seq.), 10 CFR 50.10	Facility Operating License	DPR-18	09/18/09	License to operate a nuclear power plant

a. Registration renewal submitted June 24, 2002.

Table 2
Environmental Authorizations for
R.E. Ginna Nuclear Power Plant License Renewal[a]

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
New York State Department of Environmental Conservation	Clean Water Act, Section 401 (33 USC 1341)	Certification	SPDES permit documents compliance with Clean Water Act standards
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
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

a. No renewal-related requirements identified for local or other agencies.
FWS = U.S. Fish and Wildlife Service
SPDES = State Pollutant Discharge Elimination System

- Uranium fuel cycle and waste management; and
- Decommissioning.

For plants such as Ginna Station that are located within the coastal zone, many of these issues involve impact to the coastal zone. RG&E has adopted by reference the GEIS analysis for all Category 1 issues.

The NRC review of environmental impacts arising out of license renewal identified 21 issues as "Category 2," for which license renewal applicants must submit additional, site-specific information.[1] There are 16 Category 2 issues that are applicable to Ginna Station.[2] The applicable issues and conclusions for these issues are as follows:

Aquatic ecology – RG&E has a current State Pollutant Discharge Elimination System permit and related correspondence equivalent to Clean Water Act Section 316(b) determination. It has been documented that the existing intake structure reflects the best technology available for minimizing entrainment and impingement impacts. Thermal plume studies indicated the thermal discharge from Ginna Station complies with New York Water Quality Standards and has an approved Clean Water Act Section 316(a) variance. Consequently, the impacts of continued plant operation from entrainment, impingement, and heat shock would be small.

Terrestrial resources – RG&E has no plans to perform major refurbishment activities; therefore, impacts due to refurbishment are not expected.

Threatened and endangered species – RG&E has no plans to perform major refurbishment activities; therefore, impacts due to refurbishment are not expected and impacts to these species through license renewal would be small.

Air quality – RG&E has no plans to perform major refurbishment activities; therefore, impacts due to refurbishment are not expected.

Human Health – Ginna Station transmission lines meet the National Electric Safety Code® recommendations for preventing electric shock from induced currents; therefore, the impact from electric shock would be small.

Socioeconomics – RG&E has no plans for refurbishment activities; therefore, impacts to the local education system and transportation due to refurbishment are not expected. RG&E's conservative bounding analysis of 60 additional license renewal personnel would not result in significant impacts to available housing or local water systems.

Offsite land use – RG&E has no plans to perform major refurbishment activities; therefore, impacts due to refurbishment are not expected. The tax-related impacts of continued operations would be small.

[1] 10 CFR 51, Subpart A, Appendix B, Table B-1, also identifies two issues as "NA," for which the NRC could not come to a conclusion regarding categorization. RG&E believes that these issues, chronic effects of electromagnetic fields and environmental justice, do not affect the "coastal zone" as that phrase is defined by the Coastal Zone Management Act [16 USC 1453(1)].

[2] Some Category 2 issues are applicable to plants having features that are not present at Ginna Station (e.g., cooling towers).

Historic and archeological resources – RG&E has no plans to perform major refurbishment activities; therefore, impacts due to refurbishment are not expected, and continued operations would have no impacts.

Severe accident mitigation alternatives – RG&E identified four potentially cost-beneficial modifications that would reduce the impacts of a severe accident.

Findings

1. The NRC has determined that the significance of Category 1 issue impacts is small. A small significance level is defined by the NRC as follows:

   > For the issue, 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 purpose of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small as the term is used in this table. (10 CFR Part 51, Subpart A, Appendix B, Table B-1)

   RG&E has adopted by reference the NRC findings for Category 1 issues.

2. For applicable Category 2 issues, RG&E has determined that the environmental impacts are small as that term is defined by the NRC. Impact to the coastal zone, therefore, would also be small.

3. To the best of its knowledge, RG&E is in compliance with New York licenses, permits, approvals, and other requirements as they apply to Ginna Station impacts on the New York coastal zone.

4. Ginna Station license renewal and continued operation of Ginna Station facilities, and their effects, are all consistent with the enforceable policies of the New York Coastal Management Program.

State Notification

By this certification, the State of New York is notified that the Ginna Station license renewal is consistent with the New York Coastal Management Program. Attachment 1 to this Report is a completed New York State Department of State Federal Consistency Assessment Form. The State's concurrence, objections, or notification of review status shall be sent to the following contacts:

Sam Lee, Branch Chief
License Renewal and Standardization Branch
Office of Nuclear Reactor Regulation
U.S Nuclear Regulatory Commission
One White Flint
11555 Rockville Pike
Rockville, Maryland 20555
(301) 415-1183

George Wrobel, License Renewal Project Manager
Rochester Gas and Electric Corporation
89 East Avenue
Rochester, New York 14649-0001
(716) 546-2700

References

Ref. 1 U.S. Nuclear Regulatory Commission. "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues." Revision 2. Office of Nuclear Reactor Regulation. Washington, D.C. 1999.

Ref. 2 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.

Ref. 3 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.

Attachment

New York State Department of State

Coastal Management Program

Federal Consistency Assessment Form

NEW YORK STATE DEPARTMENT OF STATE
COASTAL MANAGEMENT PROGRAM
Federal Consistency Assessment Form

An applicant, seeking a permit, license, waiver, certification or similar type of approval from a federal agency which is subject to the New York State Coastal Management Program (CMP), shall complete this assessment form for any proposed activity that will occur within and/or directly affect the State's Coastal Area. This form is intended to assist an applicant in certifying that the proposed activity is consistent with New York State's CMP as required by U.S. Department of Commerce regulations (15 CFR 930.57). It should be completed at the time when the federal application is prepared. The Department of State will use the completed form and accompanying information in its review of the applicant's certification of consistency.

A. APPLICANT (please print)

1. Name: **Rochester Gas & Electric Corporation**
2. Address: **89 East Avenue, Rochester, NY 14649-001**
3. Telephone: Area Code **(585) 546-2700**

B. PROPOSED ACTIVITY

1. Brief description of activity:

   Rochester Gas & Electric Corporation is applying to the U.S. Nuclear Regulatory Commission to renew the operating license of the R. E. Ginna Nuclear Power Plant for an additional 20 years of plant operation.

2. Purpose of activity:

   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.

3. Location of activity:

   Wayne County **Town of Ontario** **1503 Lake Road**

4. Type of federal permit/license required: **U. S. Nuclear Regulatory Commission Operating License Renewal**

5. Federal application number, if known: **NRC Operating License DPR-18**

6. If a state permit/license was issued or is required for the proposed activity, identify the state agency and provide the application or permit number, if known: **Not Applicable**

C. COASTAL ASSESSMENT Check either "YES" or "NO" for each of these questions. The numbers following each question refer to the policies described in the CMP document (see footnote on page 2) which may be affected by the proposed activity.

		YES	NO
1.	Will the proposed activity result in any of the following:		
	a. Large physical change to a site within the coastal area which will require the preparation of an environmental impact statement? (11, 22, 25, 32, 37, 38, 41, 43)		X
	b. Physical alteration of more than two acres of land along the shoreline, land under water or coastal waters? (2, 11, 12, 20, 28, 35, 44)		X
	c. Revitalization/redevelopment of a deteriorated or underutilized waterfront site? (1)		X
	d. Reduction of existing or potential public access to or along coastal waters? (19, 20)		X
	e. Adverse effect upon the commercial or recreational use of coastal fish resources? (9,10)		X
	f. Siting of a facility essential to the exploration, development and production of energy resources in coastal waters or on the Outer Continental Shelf? (29)		X
	g. Siting of a facility essential to the generation or transmission of energy? (27)		X
	h. Mining, excavation, or dredging activities, or the placement of dredged or fill material in coastal waters? (15, 35)		X
	i. Discharge of toxics, hazardous substances or other pollutants into coastal waters? (8, 15, 35)	X	
	j. Draining of stormwater runoff or sewer overflows into coastal waters? (33)	X	
	k. Transport, storage, treatment, or disposal of solid wastes or hazardous materials? (36, 39)	X	
	l. Adverse effect upon land or water uses within the State's small harbors? (4)		X

		YES	NO
2.	Will the proposed activity affect or be located in, on, or adjacent to any of the following:		
	a. State designated freshwater or tidal wetland? (44)		X
	b. Federally designated flood and/or state designated erosion hazard area? (11, 12, 17,)	X	
	c. State designated significant fish and/or wildlife habitat? (7)		X
	d. State designated significant scenic resource or area? (24)		X
	e. State designated important agricultural lands? (26)		X
	f. Beach, dune or barrier island? (12)		X
	g. Major ports of Albany, Buffalo, Ogdensburg, Oswego or New York? (3)		X
	h. State, county, or local park? (19, 20)		X
	i. Historic resource listed on the National or State Register of Historic Places? (23)		X

		YES	NO
3.	Will the proposed activity require any of the following:		
	a. Waterfront site? (2, 21, 22)		X
	b. Provision of new public services or infrastructure in undeveloped or sparsely populated sections of the coastal area? (5)		X
	c. Construction or reconstruction of a flood or erosion control structure? (13, 14, 16)		X
	d. State water quality permit or certification? (30, 38, 40)	X	
	e. State air quality permit or certification? (41, 43)		X

		YES	NO
4.	Will the proposed activity occur within and/or affect an area covered by a State approved local waterfront revitalization program? (see policies in local program document)		X

D. ADDITIONAL STEPS

1. If all of the questions in Section C are answered "NO", then the applicant or agency shall complete Section E and submit the documentation required by Section F.

2. If any of the questions in Section C are answered "YES", then the applicant or agent is advised to consult the CMP, or where appropriate, the local waterfront revitalization program document*. The proposed activity must be analyzed in more detail with respect to the applicable state or local coastal policies. On a separate page(s), the applicant or agent shall: (a) identify, by their policy numbers, which coastal policies are affected by the activity, (b) briefly assess the effects of the activity upon the policy; and, (c) state how the activity is consistent with each policy. Following the completion of this written assessment, the applicant or agency shall complete Section E and submit the documentation required by Section F.

E. CERTIFICATION

The applicant or agent must certify that the proposed activity is consistent with the State's CMP or the approved local waterfront revitalization program, as appropriate. If this certification cannot be made, the proposed activity shall not be undertaken. If this certification can be made, complete this Section.

"The proposed activity complies with New York State's approved Coastal Management Program, or with the applicable approved local waterfront revitalization program, and will be conducted in a manner consistent with such program."

Applicant/Agent's Name: **Robert C. Mecredy, Vice President, Nuclear Operations**
Address: **R.E. Ginna Nuclear Power Plant, 1503 Lake Road, Ontario, NY 14519**

Telephone: Area Code **(585) 771-3494**

Applicant/Agent's Signature:_____ Date:_____

F. SUBMISSION REQUIREMENTS

1. The applicant or agent shall submit the following documents to the New York State Department of State, Division of Coastal Resources, 41 State Street - 8th Floor, Albany, New York 12231.

   a. Copy of original signed form.
   b. Copy of the completed federal agency application.
   c. Other available information which would support the certification of consistency.

2. The applicant or agent shall also submit a copy of this completed form along with his/her application to the federal agency.

3. If there are any questions regarding the submission of this form, contact the Department of State at (518) 474-6000.

*These state and local documents are available for inspection at the offices of many federal agencies, Department of Environmental Conservation and Department of State regional offices, and the appropriate regional and county planning agencies. Local program documents are also available for inspection at the offices of the appropriate local government.

R.E. GINNA NUCLEAR POWER PLANT OPERATING LICENSE RENEWAL
FEDERAL CONSISTENCY ASSESSMENT FORM SUPPLEMENTAL INFORMATION

The following table contains a listing of the New York State Coastal Management Program Polices affected by the proposed activity, license renewal of the R. E. Ginna Nuclear Power Plant. Discussion follows the table, detailing how the proposed activity affects the individual policies. Policies 11, 15, and 35 are not included in the discussion because there are no plans to construct new buildings or structures or to conduct mining, excavation, or dredging in coastal waters as part of the proposed activity.

Table 1. New York State Coastal Management Program Policies Affected by R. E. Ginna License Renewal

Policy 8	Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bio-accumulate in the food chain or which cause significant sublethal or lethal effect on those resources.
Policy 12	Activities or development in the coastal area will be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands, and bluffs.
Policy 17	Non-structural measures to minimize damage to natural resources and property from flooding and erosion shall be used whenever possible.
Policy 30	Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to state and national water quality standards.
Policy 33	Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters.
Policy 36	Activities related to the shipment and storage of petroleum and other hazardous materials will be conducted in a manner that will prevent or at least minimize spills into coastal water; all practicable efforts will be undertaken to expedite the cleanup of such discharges; and restitution for damages will be required when these spills occur.
Policy 38	The quality and quantity of surface water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.
Policy 39	The transport, storage, treatment and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner so as to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources.
Policy 40	Effluent discharged from major steam electric generating and industrial facilities into coastal waters will not be unduly injurious to fish and wildlife and shall conform to state water quality standards.

With regard to Policy 8, the renewal of the R. E. Ginna Nuclear Power Plant operating license would have no additional effect on the fish and wildlife resources through the introduction of hazardous wastes and other pollutants. Hazardous wastes and other pollutants which bio-accumulate in the food chain that Ginna Station operations would generate or have on site would be present in the following: effluent discharges from operations, pesticides used for facility and property maintenance, petroleum bulk storage, chemical bulk storage, and mixed and hazardous wastes generated by operations. State and federal programs regulate these potential sources of hazardous materials. All effluent discharges are regulated under the New York State Department of Environmental Conservation through the State Pollutant Discharge Elimination System (SPDES) permit program and Ginna Station has been issued a SPDES permit (NY-0000493) with effluent limitations, monitoring requirements, and other conditions that ensures that all discharges are in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and the Clean Water Act as amended (33 U.S.C. Section 1251 et seq.). Ginna Station is in compliance with its SPDES permit and is meeting all requirements and conditions set forth in the permit and is, therefore, protecting fish and wildlife resources in the Lake Ontario area where the plant is located.

Pesticide use is regulated by the New York State Department of Environmental Conservation (NYSDEC) under 6 NYCRR Part 325. Ginna Station has in place the NYSDEC Pesticide Business Registration and labels, prepares the required annual reports to the State, and maintains appropriate applicator certifications to ensure that pesticide use

and storage on site are done properly and in accordance with regulations and is, therefore, protecting fish and wildlife resources in the Lake Ontario area where the plant is located.

Petroleum bulk storage on site is regulated by the New York State Department of Environmental Conservation under 6 NYCRR Parts 612.2-3, 613.6, and 613.8-9. Ginna Station facilities have the appropriate registrations and procedures are in place for spill prevention, response, and reporting. Chemical bulk storage on site is regulated by the New York State Department of Environmental Conservation under 6 NYCRR Parts 595.3, 596.2, 596.4, 596.6, 598.1, 598.4-5, and 598.7-10. Ginna Station has in place a Spill Prevention, Control, and Countermeasures Plan as required under 40 CFR 112 to prevent the discharge of oil to surface waters or surface water tributaries. Ginna Station facilities have the appropriate registrations and procedures in place for proper materials handling and storage; spill prevention, response, and reporting; and storage systems inspection, maintenance, and repair. Ginna Station has in place processes and procedures to ensure that hazardous chemicals stored and used on site are handled and stored in accordance with applicable State and Federal regulations. Ginna Station is, therefore, protecting fish and wildlife resources in the Lake Ontario area.

Mixed and hazardous wastes generated on site are packaged, temporarily stored, and shipped off site for processing and disposal. The New York State Department of Environmental Conservation regulates these activities under 6 NYCRR Parts 372.2, 373.1.1, 373.2, and 373.3. Ginna Station has in place processes and procedures to ensure that mixed and hazardous wastes are packaged, stored, and shipped so as to comply with the applicable State and Federal regulations, thus ensuring that fish and wildlife resources are protected. In summary, the hazardous wastes and other pollutants, which bio-accumulate in the food chain and could be introduced into the environment as a result of Ginna Station operations, are minimized through compliance with applicable environmental regulations. Fish and wildlife resources in the Lake Ontario area are, therefore, protected and the proposed activity is consistent with Policy 8.

With respect to Policies 12 and 17, a revetment composed of large stones covers the shoreline of Lake Ontario, within the Ginna Station protected area. The revetment was originally designed to provide surge flooding protection. The continued operation of the Ginna Station during the license renewal period will not involve any activities that would disturb the shoreline either to the east or west of the revetment. There are no plans for activities along the shoreline in the protected area. Ginna Station has no plans for activities or development along the shoreline as a part of the proposed activity, and so the proposed activity is consistent with Policies 12 and 17.

With respect to Policy 30, the effluent discharges from Ginna Station are regulated under the New York State Department of Environmental Conservation through the State Pollutant Discharge Elimination System (SPDES) permit program. Ginna Station has been issued a SPDES permit (NY-0000493) with effluent limitations, monitoring requirements, and other conditions, that ensures that all discharges are in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and the Clean Water Act as amended (33 U.S.C. Section 1251 et seq.). Ginna Station is in compliance with its SPDES permit and is meeting all requirements and conditions set forth in the permit and the proposed activity is therefore consistent with Policy 30.

With respect to Policy 33, Ginna Station has in place a Storm Water Pollution Prevention Plan. Best management practices to control storm water runoff and sewer overflows are an element of that plan. The New York State Department of Environmental Conservation regulates storm water management under 6 NYCRR, Part 751, ECL 17-0701 and 17-0808, and GP-98-03. The U.S. Environmental Protection Agency has authority under 40 CFR 122. The proposed activity is therefore consistent with Policy 33.

With respect to Policy 36, Ginna Station has in place procedures to ensure that petroleum and other hazardous materials used on site are safely handled and stored. The New York State Department of Environmental Conservation regulates petroleum bulk storage under the authority of 6 NYCRR Parts 612.2-3, 613.6, and 613.8-9. Ginna Station facilities have the appropriate registrations and procedures are in place to prevent and report spills. Chemical bulk storage on site is regulated by the New York State Department of Environmental Conservation under 6 NYCRR Parts 595.3, 596.2, 596.4, 596.6, 598.1, 598.4-5, and 598.7-10. Ginna Station has in place a Spill Prevention, Control, and Countermeasures Plan as required under 40 CFR 112 to prevent the discharge of oil to surface waters or surface water tributaries. Ginna Station facilities have the appropriate registrations and procedures in place for proper materials handling and storage; spill prevention, response, and reporting; and storage systems inspection, maintenance, and repair. Ginna Station has in place processes and procedures to ensure that hazardous

chemicals stored and used on site are handled and stored in accordance with applicable State and Federal regulations so as to prevent the release of these materials to coastal waters. Therefore, the proposed activity is consistent with Policy 36.

With respect to Policy 38, Ginna Station does not use groundwater as a resource for any plant operations or as a potable water resource. Processes and procedures are in place for the handling and storage of hazardous materials on site to prevent spills and to respond to any that occur so as to minimize impacts to groundwater or surface water resources. Effluents from plant operations are regulated under Ginna Station's SPDES permit so as to minimize the impacts to surface water supplies (Deer and Mill Creeks and Lake Ontario) and minimize water use. A Stormwater Pollution Prevention Plan is in place to protect surface water resources. Ginna Station has in place a Spill Prevention, Control, and Countermeasures Plan as required under 40 CFR 112 to prevent the discharge of oil to surface waters or surface water tributaries. Ginna Station has in place processes and procedures that conserve and protect both groundwater and surface water resources. Therefore, the proposed activity is consistent with Policy 38.

With respect to Policy 39, Ginna Station does not dispose of solid waste on site. Mixed and hazardous wastes generated on site are packaged, temporarily stored, and shipped off site for processing and disposal. The New York State Department of Environmental Conservation regulates these activities under 6 NYCRR Parts 372.2, 373.1.1, 373.2, and 373.3. Ginna Station has in place processes and procedures to ensure that mixed and hazardous wastes are packaged, stored, and shipped so as to comply with the applicable State and Federal regulations, thus ensuring that groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources are protected. The proposed activity is therefore consistent with Policy 39.

With respect to Policy 40, the effluent discharges from Ginna Station are regulated under the New York State Department of Environmental Conservation through the State Pollutant Discharge Elimination System (SPDES) permit program. Ginna Station has been issued a SPDES permit (NY-0000493) with effluent limitations, monitoring requirements, and other conditions that ensure that all discharges are in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and the Clean Water Act as amended (33 U.S.C. Section 1251 et seq.). Ginna Station is in compliance with its SPDES permit and is meeting all requirements and conditions set forth in the permit and so is minimizing impacts to fish and wildlife. The proposed activity is, therefore, consistent with Policy 40.