NUREG-1437
Supplement 14

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Supplement 14

Regarding
R.E. Ginna Nuclear Power Plant

Draft Report for Comment

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, DC 20555-0001

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Regarding R.E. Ginna Nuclear Power Plant

Draft Report for Comment

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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Abstract

The U.S. Nuclear Regulatory Commission (NRC) considered the environmental impacts of renewing nuclear power plant operating licenses (OLs) for a 20-year period in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, and codified the results in 10 CFR Part 51. The GEIS (and its Addendum 1) identifies 92 environmental issues and reaches generic conclusions related to environmental impacts for 69 of these issues that apply to all plants or to plants with specific design or site characteristics. Additional plant-specific review is required for the remaining 23 issues. These plant-specific reviews are to be included in a supplement to the GEIS.

This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the NRC by the Rochester Gas and Electric Corporation (RG&E) to renew the R.E. Ginna Nuclear Power Plant (Ginna) OL for an additional 20 years under 10 CFR Part 54. This draft SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes the staff's preliminary recommendation regarding the proposed action.

Regarding the 69 issues for which the GEIS reached generic conclusions, neither RG&E nor NRC staff identified information that is both new and significant for any of these issues that apply to Ginna. Therefore, the staff concludes that the impacts of renewing the Ginna OL will not be greater than impacts identified for these issues in the GEIS. The GEIS conclusion is that the impacts are of SMALL[a] significance (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel, which were not assigned a single significance level).

The remaining issues that apply to Ginna are addressed in this draft SEIS. For each applicable issue, the staff concludes that the significance of the potential environmental impacts of renewal of the OL is SMALL. The staff also concludes that additional mitigation measures are not likely to be sufficiently beneficial as to be warranted. The staff determined that information provided during the scoping process did not identify any new issue that requires site-specific assessment.

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

Abstract

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Ginna are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by RG&E; (3) consultation and discussions with Federal, state, and local agencies; (4) the staff's own independent review, and (5) the staff's consideration of public comments received during the scoping process.

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Executive Summary

By letter dated July 30, 2002, the Rochester Gas and Electric Corporation (RG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for the R.E. Ginna Nuclear Power Plant (Ginna) for an additional 20-year period. If the OL is renewed, state regulatory agencies and RG&E will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the state's jurisdiction or the purview of the owners. If the OL is not renewed, then the plant must be shut down at or before the expiration date of the current OL, which is September 18, 2009.

Section 102 of the National Environmental Policy Act (NEPA) (42 USC 4321), directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 CFR Part 51, which identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2.[a]

Upon acceptance of the RG&E application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping. The staff visited Ginna in November 2002 and held public scoping meetings on November 6, 2002, in Webster, New York. In preparing this draft supplemental environmental impact statement (SEIS) for Ginna, the staff reviewed the RG&E Environmental Report (ER) for Ginna and compared it to the GEIS; consulted with other agencies; conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*; and considered the public comments received during the scoping process. The public comments received during the scoping process and the staff's response to the comments are provided in Appendix A, Part 1, of this draft SEIS.

The staff will hold two public meetings near Ginna in August 2003 to describe the preliminary results of the NRC environmental review, answer questions, and provide members of the public with information to assist them in formulating comments on this SEIS. When the comment period ends, the staff will consider and disposition all of the comments received. These comments will be addressed in Appendix A, Part 2, of the final SEIS. Additional details concerning the meetings will be provided in a future meeting notice and in the Notice of Availability concerning this draft SEIS in the *Federal Register*.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

This draft SEIS includes the NRC staff's preliminary analysis that considers and weighs the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures for reducing or avoiding adverse effects. It also includes the staff's preliminary recommendation regarding the proposed action.

The Commission has adopted the following statement of purpose and need for license renewal from the GEIS:

> 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) decisionmakers.

The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is to determine

> ...whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that, even if an OL is renewed, there are other factors that will ultimately determine whether an existing nuclear power plant continues to operate beyond the period of the current OL.

NRC regulations (10 CFR 51.95(c)(2)) contain the following statement regarding the content of SEISs prepared at the license renewal stage:

> The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in 51.23(a) ["Temporary storage of spent fuel after cessation of reactor operation–generic determination of no significant environmental impact"] and in accordance with 51.23(b).

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. It evaluates 92 environmental issues using the NRC's three-level standard of significance – SMALL, MODERATE, or LARGE – developed using Council on Environmental Quality guidelines. The following definitions of the three significance levels are set forth in a footnote to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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

For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS led to the following conclusions:

(1) 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 characteristics.

(2) 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 waste and spent fuel disposal).

(3) 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 not likely to be sufficiently beneficial to warrant implementation.

These 69 issues were identified in the GEIS as Category 1 issues. The staff relies on conclusions as amplified by supporting information in the GEIS for issues designated as Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated on a generic basis and must be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This draft SEIS documents the staff's evaluation of all 92 environmental issues considered in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the OL for Ginna) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration, gas- and coal-fired generation appear to be the most likely power-generation alternatives if the power from Ginna is replaced. These alternatives are evaluated assuming that the replacement power generation plant is located at either the Ginna site or some other unspecified alternate location.

RG&E and the staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. RG&E and the staff did not identify information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. Neither the scoping process nor the staff review has identified any new issue applicable to Ginna. Therefore, the staff relies upon the conclusions of the GEIS for all of the Category 1 issues that are applicable to Ginna.

The Ginna ER presents an analysis of the Category 2 issues that are applicable to Ginna. In addition, the staff has evaluated the two uncategorized issues, environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the RG&E analysis for each issue and has conducted an independent review of each issue. Six Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at Ginna. Four Category 2 issues are not discussed in this draft SEIS because they are specifically related to refurbishment. RG&E has stated that its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of Ginna for the license renewal period. In addition, any replacement of components or additional inspection activities that are within the bounds of normal plant operation are not expected to affect the environment outside of the bounds of the plant operations evaluated in the *Final Environmental Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1, Rochester Gas and Electric Corporation,* issued by the U.S. Atomic Energy Commission in 1973.

Ten Category 2 issues related to operational impacts and one related to postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are discussed in detail in this draft SEIS. Five of the Category 2 issues and environmental justice apply to both refurbishment and to operation during the renewal term and are only discussed in this draft SEIS in relation to operation during the renewal term. For all 11 Category 2 issues and environmental justice, the staff preliminarily concludes that the potential environmental effects are of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for Ginna and the plant improvements already made, the staff concludes that two of the candidate SAMAs are cost beneficial. However, these SAMAs do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

Mitigation measures were considered for each Category 2 issue. Current measures to mitigate the environmental impacts of plant operation were found to be adequate, and no additional mitigation measures were deemed sufficiently beneficial to be warranted.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where Ginna license renewal impacts are deemed to be SMALL, the staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

If the Ginna OL is not renewed and the plant ceases operation on or before the expiration of the current OL, then the adverse impacts of likely alternatives will not be smaller than those associated with continued operation of Ginna. The impacts may, in fact, be greater in some areas.

The preliminary recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for Ginna are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable at the license renewal stage. This recommendation is based on (1) the analysis and findings in the GEIS; (2) the ER submitted by RG&E; (3) consultation with other Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public comments received during the scoping process.

Abbreviations/Acronyms

μm	micrometer
ac	acre(s)
AC	alternating current
ACC	averted cleanup and decontamination costs
ADAMS	Agencywide Document Access and Management System
AEA	Atomic Energy Act of 1954, as amended
AEC	U.S. Atomic Energy Commission
AFW	auxiliary feedwater
ALARA	as low as reasonably achievable
AOC	averted offsite property damage costs
AOE	averted occupational exposure
AOSC	averted onsite costs
AOV	air-operated valve
APE	averted public exposure
ATWS	anticipated transient(s) without scram
BACT	best available control technology
Bq	becquerel(s)
Bq/mL	becquerel(s) per milliliter
Btu	British thermal unit(s)
°C	degrees Celsius
CAA	Clean Air Act of 1970, as amended
CDF	core damage frequency
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Ci	curie(s)
cm	centimeter(s)
COE	cost of enhancement
CWA	Clean Water Act of 1977 (also known as Federal Water Pollution Control Act)
DBA	design-basis accident
DC	direct current
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSM	demand-side management

EIA	Energy Information Administration (of DOE)
EIS	environmental impact statement
ELF-EMF	extremely low frequency-electromagnetic field
EPA	U.S. Environmental Protection Agency
ER	Environmental Report
ESA	Endangered Species Act
°F	degrees Fahrenheit
FAA	U.S. Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FES	Final Environmental Statement
FR	Federal Register
ft	foot/feet
ft^3	cubic foot/feet
F-V	Fussel-Vessely
FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act of 1977)
FWS	U.S. Fish and Wildlife Service
g	gram(s)
gal	gallon(s)
GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437
Ginna	R.E. Ginna Nuclear Power Plant
GJ	gigajoule(s)
gpd	gallon(s) per day
gpm	gallon(s) per minute
GWh	gigawatt hour(s)
ha	hectare(s)
hr	hour(s)
Hz	hertz
IEEE	Institute of Electrical and Electronics Engineers
in.	inch(es)
IPE	individual plant examination
IPEEE	individual plant examination of external events
ISLOCA	interfacing system loss-of-coolant accident
J	joule(s)

kg	kilogram(s)
kJ	kilojoule(s)
km	kilometer(s)
kV	kilovolt(s)
kWh	kilowatt hour(s)
L	liter(s)
L/d	liter(s) per day
L/s	liter(s) per second
LAER	lowest achievable emissions rate
lb	pound(s)
LERF	large early release frequency
LOCA	loss-of-coolant accident
m	meter(s)
mA	milliampere(s)
MAB	maximum attainable benefit
MACCS2	MELCOR Accident Consequence Code System 2
MBq	megabecquerel(s)
MCWA	Monroe County Water Authority
MGD	million gallons per day
m/s	meter(s) per second
m^3/d	cubic meter(s) per day
m^3/min	cubic meter(s) per minute
m^3/s	cubic meter(s) per second
mi	mile(s)
min	minute(s)
MJ/m^3	megajoule(s) per cubic meter
ml	milliliter(s)
MMBtu	million British thermal units of heat
MOV	motor-operated valve
mrem	millirem(s)
msl	mean sea level
mSv	millisievert(s)
MT	metric ton(s) (or tonne[s])
MTHM	metric ton(s) (or tonne[s]) heavy metal
MTU	metric ton(s) uranium
MW	megawatt(s)
MWd	megawatt-day(s)
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal

MWh	megawatt hour(s)
NA	not applicable
NAS	National Academy of Sciences
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act of 1969
NESC	National Electrical Safety Code
ng	nanograms
NHPA	National Historic Preservation Act of 1966
NIEHS	National Institute of Environmental Health Sciences
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxide(s)
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
ODCM	Offsite Dose Calculation Manual
OL	operating license
PARS	Publicly Available Records portion of ADAMS
PCB	polychlorinated biphenyl(s)
pCi	picocurie(s)
PCR	plant change request
PM_{10}	particulate matter with aerodynamic diameter ≤ 10 μm
PORV	power-operated relief valves
PRA	probabilistic risk assessment
PSA	probabilistic safety assessment
PSD	prevention of significant deterioration
psig	pounds per square inch gauge
PWR	pressurized water reactor
RAI	request for additional information
RAW	risk achievement worth
RCP	reactor coolant pump
RCRA	Resource Conservation and Recovery Act of 1976
RCS	reactor coolant system

rem	special unit of dose equivalent, equal to 0.01 Sv
REMP	radiological environmental monitoring program
RG&E	Rochester Gas and Electric Corporation
RHR	residual heat removal
RMWT	reactor makeup water tank
ROC	Greater Rochester International Airport
RPC	replacement power cost
RWST	refueling water storage tank
s	second(s)
SAFW	standby auxiliary feedwater
SAMA	severe accident mitigation alternative
SAR	safety analysis report
SBO	station blackout
SCR	selective catalytic reduction
SEIS	supplemental environmental impact statement
SEP	systematic evaluation program
SER	safety evaluation report
SGTR	steam generator tube rupture
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
SO_x	sulfur oxides
SPDES	State Pollutant Discharge Elimination System
SQUG	Seismic Qualification Utility Group
STC	source term category
Sv	sievert, special unit of dose equivalent
SW	service water
THPO	Tribal Historic Preservation Officer
UFSAR	updated final safety analysis report
USC	United States Code
USCB	U.S. Census Bureau
USI	unresolved safety issue
VAC	volt(s) alternating current
VCT	volume control tank
WEC	Westinghouse Electric Company

1.0 Introduction

Under the Nuclear Regulatory Commission's (NRC) environmental protection regulations in Title 10 of the Code of Federal Regulations (CFR) Part 51, which implement the National Environmental Policy Act (NEPA) of 1969, renewal of a nuclear power plant operating license (OL) requires the preparation of an environmental impact statement (EIS). In preparing the EIS, the NRC staff is required first to issue the statement in draft form for public comment and then issue a final statement after considering public comments on the draft. To support the preparation of the EIS, the staff has prepared a *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS is intended to (1) provide an understanding of the types and severity of environmental impacts that may occur as a result of license renewal of nuclear power plants under 10 CFR Part 54, (2) identify and assess the impacts that are expected to be generic to license renewal, and (3) support 10 CFR Part 51 to define the number and scope of issues that need to be addressed by the applicants in plant-by-plant renewal proceedings. The GEIS guides the preparation of complete plant-specific information in support of the OL renewal process.

The Rochester Gas and Electric Corporation (RG&E) operates the R.E. Ginna Nuclear Power Plant (Ginna) in northwestern New York, under OL DPR-18 issued by the Atomic Energy Commission. This OL will expire on September 18, 2009. On July 30, 2002, RG&E submitted an application to the NRC to renew the Ginna OL for an additional 20 years under 10 CFR Part 54. RG&E is a *licensee* for the purposes of its current OL and an *applicant* for the renewal of the OL. Pursuant to 10 CFR 54.23 and 51.53(c), RG&E submitted an Environmental Report (ER) (RG&E 2002), in which RG&E analyzed the environmental impacts associated with the proposed license renewal action, considered alternatives to the proposed action, and evaluated mitigation measures for reducing adverse environmental effects.

This report is the draft, plant-specific supplement to the GEIS (i.e., the supplemental EIS [SEIS]) for the RG&E license renewal application for Ginna. This SEIS is a supplement to the GEIS because it relies, in part, on the findings of the GEIS. The staff will also prepare a separate safety evaluation report in accordance with 10 CFR Part 54.

1.1 Report Contents

The following sections of this introduction (1) describe the background for the preparation of this SEIS, including the development of the GEIS and the process used by the staff to assess

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

the environmental impacts associated with license renewal, (2) describe the proposed Federal action to renew the Ginna OL, (3) discuss the purpose and need for the proposed action, and (4) present the status of RG&E's compliance with environmental quality standards and requirements that have been imposed by Federal, state, regional, and local agencies that are responsible for environmental protection.

The ensuing chapters of this SEIS closely parallel the contents and organization of the GEIS. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. Chapters 3 and 4, respectively, discuss the potential environmental impacts of plant refurbishment and plant operation during the renewal term. Chapter 5 contains an evaluation of potential environmental impacts of plant accidents and includes consideration of severe accident mitigation alternatives. Chapter 6 discusses the uranium fuel cycle and solid waste management. Chapter 7 discusses decommissioning, and Chapter 8 discusses alternatives to license renewal. Finally, Chapter 9 summarizes the findings of the preceding chapters and draws conclusions about any adverse impacts that cannot be avoided, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitment of resources. Chapter 9 also presents the staff's preliminary recommendation with respect to the proposed license renewal action.

Additional information is included in appendixes. Appendix A contains public comments received on the environmental review for license renewal and staff responses. Appendixes B through G, respectively, list the following:

- the contributors to the supplement

- the chronology of environmental review correspondence related to RG&E license renewal for the Ginna OL

- the organizations contacted during the development of this SEIS

- RG&E's compliance status in Table E-1 (this appendix also contains copies of consultation correspondence prepared and sent during the evaluation process)

- GEIS environmental issues that are not applicable to Ginna

- the NRC staff's safety evaluation of severe accident mitigation alternatives for Ginna.

1.2 Background

Use of the GEIS, which examines the possible environmental impacts that could occur as a result of renewing individual nuclear power plant OLs under 10 CFR Part 54, and the established license renewal evaluation process support thorough evaluation of the impacts of renewal of the OLs.

1.2.1 Generic Environmental Impact Statement

The NRC initiated a generic assessment of the environmental impacts associated with the license renewal term to improve the efficiency of the license renewal process by documenting the assessment results and codifying the results in the Commission's regulations. This assessment is provided in the GEIS, which serves as the principal reference for all nuclear power plant license renewal EISs.

The GEIS documents the results of the systematic approach that was taken to evaluate the environmental consequences of renewing the licenses of individual nuclear power plants and operating them for an additional 20 years. For each potential environmental issue, the GEIS (1) describes the activity that affects the environment, (2) identifies the population or resource that is affected, (3) assesses the nature and magnitude of the impact on the affected population or resource, (4) characterizes the significance of the effect for both beneficial and adverse effects, (5) determines whether the results of the analysis apply to all plants, and (6) considers whether additional mitigation measures would be warranted for impacts that would have the same significance level for all plants.

The NRC's standard of significance of impacts was established using Council on Environmental Quality (CEQ) terminology for "significantly" (40 CFR 1508.27, which requires consideration of both "context" and "intensity"). Using the CEQ terminology, the NRC established three significance levels – SMALL, MODERATE, or LARGE. The definitions of the three significance levels are set forth in a footnote to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, 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.
>
> MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
>
> LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The GEIS assigns a significance level to each environmental issue, assuming that ongoing mitigation measures would continue.

The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues were then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, **Category 1** issues are those that meet all of the following criteria:

(1) 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.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required in this SEIS unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria of Category 1, and therefore, additional plant-specific review for these issues is required.

In the GEIS, the staff assessed 92 environmental issues and determined that 69 qualified as Category 1 issues, 21 qualified as Category 2 issues, and 2 issues were not categorized. The last two issues, environmental justice and chronic effects of electromagnetic fields, are to be addressed in a plant-specific analysis. Of the 92 issues, 11 are related only to refurbishment, 6 are related only to decommissioning, 67 apply only to operation during the renewal term, and 8 apply to both refurbishment and operation during the renewal term. A summary of the findings for all 92 issues in the GEIS is codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

1.2.2 License Renewal Evaluation Process

An applicant seeking to renew its OLs is required to submit an ER as part of its application. The license renewal evaluation process involves careful review of the applicant's ER and assurance that all new and potentially significant information not already addressed in or available during the GEIS evaluation is identified, reviewed, and assessed to verify the environmental impacts of the proposed license renewal.

In accordance with 10 CFR 51.53(c)(2) and (3), the ER submitted by the applicant must

- contain a description of the proposed action, including the applicant's plans to modify the facility or its administrative control procedures as described in accordance with 10 CFR 54.21

- describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment

- discuss the environmental impacts of alternatives and any other matters described in 10 CFR 51.45

- contain analyses of the environmental impacts of the proposed action, including the impacts of refurbishment activities, if any, associated with license renewal

- describe the impacts of operation during the renewal term, for those issues identified as Category 2 issues in 10 CFR 51, Subpart A, Appendix B.

In accordance with 10 CFR 51.53(c)(2), the ER does not need to discuss

- issues not related to the environmental effects of the proposed action and the alternatives

- any aspect of the storage of spent fuel for the facility within the scope of the generic determination in 51.23(a) and in accordance with 51.23(b)

- the need for power or the economic costs and economic benefits of the proposed action or 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

- other issues not related to the environmental effects of the proposed action and the alternatives

- any aspect of the storage of spent fuel for the facility within the scope of the generic determination in 51.23(a) and in accordance with 51.23(b).

New and significant information is (1) information that identifies a significant environmental issue not covered in the GEIS and codified in Table B-1 of 10 CFR Part 51, Subpart A,

Appendix B, or (2) information that was not considered in the analyses summarized in the GEIS and that leads to an impact finding that is different from the finding presented in the GEIS and codified in 10 CFR Part 51.

In preparing to submit its application to renew the Ginna OL, RG&E developed a process to ensure that information not addressed in, or available, during the GEIS evaluation regarding the environmental impacts of license renewal for Ginna would be properly reviewed before submitting the ER and that such new and potentially significant information related to renewal of the licenses for Ginna would be identified, reviewed, and assessed during the period of NRC review. RG&E reviewed the Category 1 issues that appear in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, to verify that the conclusions of the GEIS remained valid with respect to Ginna. This review was performed by personnel from RG&E and its support organization who were familiar with NEPA issues and the scientific disciplines involved in the preparation of a license renewal ER.

The NRC staff also has a process for identifying new and significant information. That process is described in detail in *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*, NUREG-1555, Supplement 1 (NRC 2000). The search for new information includes (1) review of an applicant's ER and the process for discovering and evaluating the significance of new information; (2) review of records of public comments; (3) review of environmental quality standards and regulations; (4) coordination with Federal, state, and local environmental protection and resource agencies; and (5) review of the technical literature. New information discovered by the staff is evaluated for significance using the criteria set forth in the GEIS. For Category 1 issues where new and significant information is identified, reconsideration of the conclusions for those issues is limited in scope to the assessment of the relevant new and significant information; the scope of the assessment does not include other facets of the issue that are not affected by the new information.

Chapters 3 through 7 discuss the environmental issues considered in the GEIS that are applicable to Ginna. At the beginning of the discussion of each set of issues, a table identifies the issues to be addressed and lists the sections in the GEIS where the issue is discussed. Category 1 and Category 2 issues are listed in separate tables. For Category 1 issues for which there is no new and significant information, the table is followed by a set of short paragraphs that state the GEIS conclusion codified in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, and the staff's analysis and conclusion. Section 4.7 contains a discussion of shoreline erosion. For Category 2 issues, in addition to the list of GEIS sections where the issue is discussed, the tables list the subparagraph of 10 CFR 51.53(c)(3)(ii) that describes the analysis required and the SEIS sections where the analysis is presented. The SEIS sections that discuss the Category 2 issues are presented immediately following the table.

The NRC prepares an independent analysis of the environmental impacts of license renewal and compares these impacts with the environmental impacts of alternatives. The evaluation of the RG&E license renewal application began with publication of a notice of acceptance for docketing and opportunity for a hearing in the *Federal Register* (NRC 2002a) on September 30, 2002. The staff published a notice of intent to prepare an EIS and conduct scoping (NRC 2002b) for Ginna on October 10, 2002. Two public scoping meetings were held on November 6, 2002, in Webster, New York. Comments received during the scoping period were summarized in the *Environmental Impact Statement Scoping Process: Summary Report – R.E. Ginna Nuclear Power Plant, New York* (NRC 2003). These comments are presented in Part 1 of Appendix A.

The staff followed the review guidance contained in *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*, NUREG-1555, Supplement 1 (NRC 2000). The staff and its contractors retained to assist the staff visited Ginna during November 5-7, 2002, to gather information and to become familiar with the site and its environs. The staff also reviewed the comments received during scoping and consulted with Federal, state, regional, and local agencies. A list of the organizations contacted is provided in Appendix D. Other documents related to Ginna were reviewed and are referenced.

This draft SEIS presents the staff's analysis that considers and weighs the environmental effects of the proposed renewal of the Ginna OL, the environmental impacts of alternatives to license renewal, and mitigation measures available for avoiding adverse environmental effects. Chapter 9, "Summary and Conclusions," provides the NRC staff's preliminary recommendation to the Commission on whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

A 75-day comment period will begin on the date of publication of the U.S. Environmental Protection Agency Notice of Filing of the draft SEIS to allow members of the public to comment on the preliminary results of the NRC staff's review. During this comment period, two public meetings will be held near Ginna in August 2003. During these meetings, the staff will describe the preliminary results of the NRC environmental review and answer questions to provide members of the public with information to assist them in formulating their comments.

1.3 The Proposed Federal Action

The proposed Federal action is renewal of the OL for Ginna, which is located in the town of Ontario, New York, in the northwest corner of Wayne County and on the south shore of Lake Ontario. The plant has a pressurized water reactor with the capability to produce 490 net megawatts of electric power. Plant cooling is provided by a once-through cooling system to remove waste heat from the reactor steam-electric system. Cooling water is withdrawn from Lake Ontario. Ginna produces enough electricity to supply the needs of approximately 560,000 residential customers. The current OL expires on September 18, 2009. By letter dated July 30, 2002, RG&E submitted an application to the NRC (RG&E 2002) to renew this OL for an additional 20 years of operation (i.e., until September 18, 2029).

1.4 The Purpose and Need for the Proposed Action

Although a licensee must have a renewed license to operate a reactor beyond the term of the existing OL, the possession of that license is just one of a number of conditions that must be met for the licensee to continue plant operation during the term of the renewed license. Once an OL is renewed, state regulatory agencies and the owners of the plant will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the state's jurisdiction or the purview of the owners.

Thus, for license renewal reviews, the NRC has adopted the following definition of purpose and need from GEIS Section 1.3 (NRC 1996):

> 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) decisionmakers.

This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review required by the Atomic Energy Act of 1954 or findings in the NEPA environmental analysis that would lead the NRC to reject a license renewal application, the NRC does not have a role in the energy-planning decisions of state regulators and utility officials as to whether a particular nuclear power plant should continue to operate. From the perspective of the licensee and the state regulatory authority, the purpose of renewing an OL is to maintain the availability of the nuclear plant to meet system energy requirements beyond the current term of the plant's license.

1.5 Compliance and Consultations

RG&E is required to hold certain Federal, state, and local environmental permits, as well as meet relevant Federal and state statutory requirements. In its ER, RG&E provided a list of the authorizations from Federal, state, and local authorities for current operations as well as environmental approvals and consultations associated with Ginna license renewal. A full list of authorizations and consultations related to the proposed OL renewal action is provided by RG&E and included in Appendix E.

The staff has reviewed the list and consulted with the appropriate Federal, state, and local agencies to identify any compliance or permit issues or significant environmental issues of concern to the reviewing agencies. The New York State Department of Environmental Conservation submitted comments regarding shoreline erosion. This issue is discussed n Section 4.7. RG&E states in its ER that it is in compliance with applicable environmental standards and requirements for Ginna.

1.6 References

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

40 CFR Part 1508. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 1508, "Terminology and Index."

Atomic Energy Act of 1954 (AEA). 42 USC 2011, et seq.

National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

Rochester Gas and Electric (RG&E). 2002. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License, Volume 2, Appendix E – Environmental Report*. Rochester, New York.

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants Main Report*, "Section 6.3 – Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal.* NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2002a. "Rochester Gas and Electric Corporation, R.E. Ginna Nuclear Power Plant; Notice of Acceptance for Docketing of the Application and Notice of Opportunity for a Hearing Regarding Renewal of License No. DPR 18 for an Additional 20-Year Period." *Federal Register.* Vol. 67, No. 189, pp. 61354-61355 (September 30, 2002).

U.S. Nuclear Regulatory Commission (NRC). 2002b. "Rochester Gas and Electric Corporation R.E. Ginna Nuclear Power Plant; Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register.* Vol. 67, No. 197, pp. 63171-63173 (October 10, 2002).

U.S. Nuclear Regulatory Commission (NRC). 2003. *Environmental Impact Statement Scoping Process: Summary Report – R.E. Ginna Nuclear Power Plant, Webster, New York.* Washington, D.C.

2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment

The R.E. Ginna Nuclear Power Plant (Ginna) is located 6 km (4 mi) north of Ontario, New York, in the northwest corner of Wayne County and on the south shore of Lake Ontario. The Ginna site is approximately 32 km (20 mi) east of the city of Rochester and 64 km (40 mi) west-southwest of Oswego, New York. The plant consists of one unit equipped with a nuclear steam supply system supplied by Westinghouse Electric Corporation that uses a pressurized water reactor (PWR) and a once-through cooling system. The plant and its environs are discussed in Section 2.1, and the plant's interactions with the environment are presented in Section 2.2.

2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term

The immediate area around the Ginna site is rural. There are no substantial population centers, industrial complexes, airports, transportation arteries, or parks within a 5-km (3-mi) radius of the site, and the only recreational facility within this radius is the Bear Creek boat ramp located about 2.4 km (1.5 mi) east of the site. The largest community within 16 km (10 mi) of the site is Webster, which is located in Monroe County. Webster, with a town population of about 38,000, is about 11 km (7 mi) west-southwest of the site (RG&E 2002a). The largest metropolitan area within an 80-km (50-mi) radius is Rochester, which is approximately 32 km (20 mi) west of the site and has with a population of about 220,000. Figures 2-1 and 2-2 show the location of Ginna in relationship to the counties and important cities and towns within an 80-km (50-mi) and 10-km (6-mi) radius, respectively.

The Ginna site is owned by the Rochester Gas and Electric Corporation (RG&E). The site has increased from 137 ha (338 ac) in 1972 to the present size of 197 ha (488 ac), and correspondingly, the shoreline extent has increased from about 0.6 km (1 mi) to 0.9 km (1.5 mi).

There are three occupied farm houses on the site that are owned by RG&E, and the occupants have leases that are renewable annually at the option of RG&E. There are a number of unoccupied buildings on the site. With the exception of some physical security improvements, there are no plans for additional building onsite. The physical security improvements are not related to license renewal.

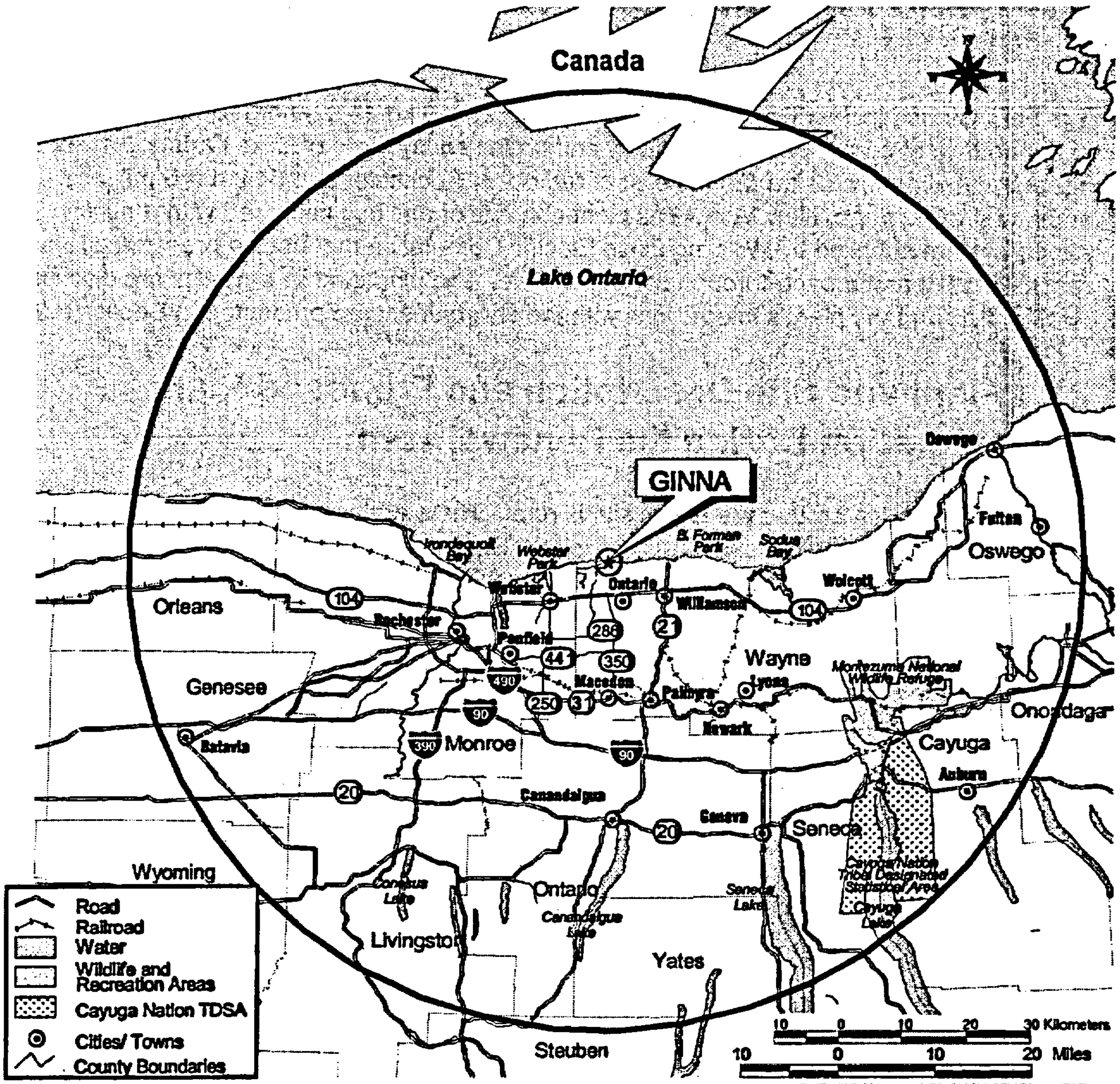
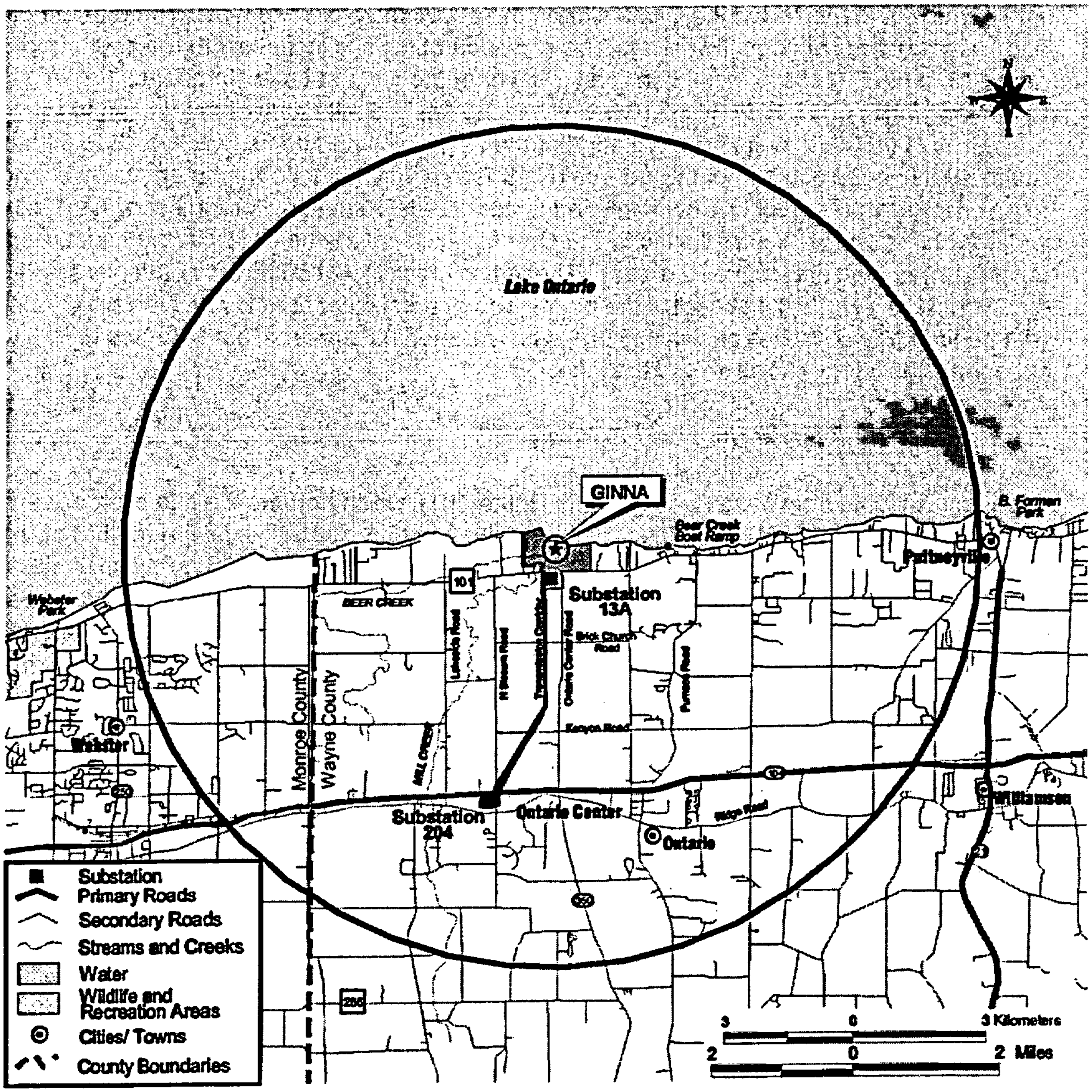


Figure 2-1. Location of R.E. Ginna Nuclear Power Plant, 80-km (50-mi) Region



1 Figure 2-2. Location of R.E. Ginna Nuclear Power Plant, 10-km (6-mi) Region

The surface of the terrain at the Ginna site on the south shore of Lake Ontario and to the east and west is either flat or gently rolling. The elevation of the site increases to the south from about 78 m (255 ft) above mean sea level (msl) near the edge of Lake Ontario; to 134 m (440 ft) at New York State (NYS) Route 104, which is 5.5 km (3.5 mi) south of the lake; and then to about 488 m (1600 ft) at the northern edge of the Appalachian Plateau, which is 48 to 64 km (30 to 40 mi) to the south. Southward from NYS Route 104, the topography gradually changes to a series of small abrupt hills commencing about 16 km (10 mi) south of the site. Surface-water features on the site are limited to Mill Creek, which enters the site from the south, and Deer Creek, which enters 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 surface and subsurface, ultimately flows toward the lake.

2.1.1 External Appearance and Setting

The plant is visible from Lake Road (County Route 101), which borders the site in an east-west direction approximately 518 m (1700 ft) south of the plant. A distinctive design feature of the plant is a facade that conceals the dome of the reactor containment building, thus minimizing the aesthetic impact of the plant on the surrounding community. The area around the site is rural and the agricultural production and undisturbed land onsite enhances this appearance.

Major structures in addition to the reactor building are the auxiliary building, intermediate building, control building, turbine building, screen house, condensate demineralizer building, standby auxiliary feedwater pump building, and the service building containing offices, shops, and laboratories. Figure 2-3 identifies the major buildings on the site.

The Ginna site is located in the lake plain, a slender band of land bordering Lake Ontario that is about 8 to 48 km (5 to 30 mi) wide. The terrain is flat-to-rolling and contains numerous short streams that flow northward directly into Lake Ontario (AEC 1973). The surrounding region has agricultural land and rural communities.

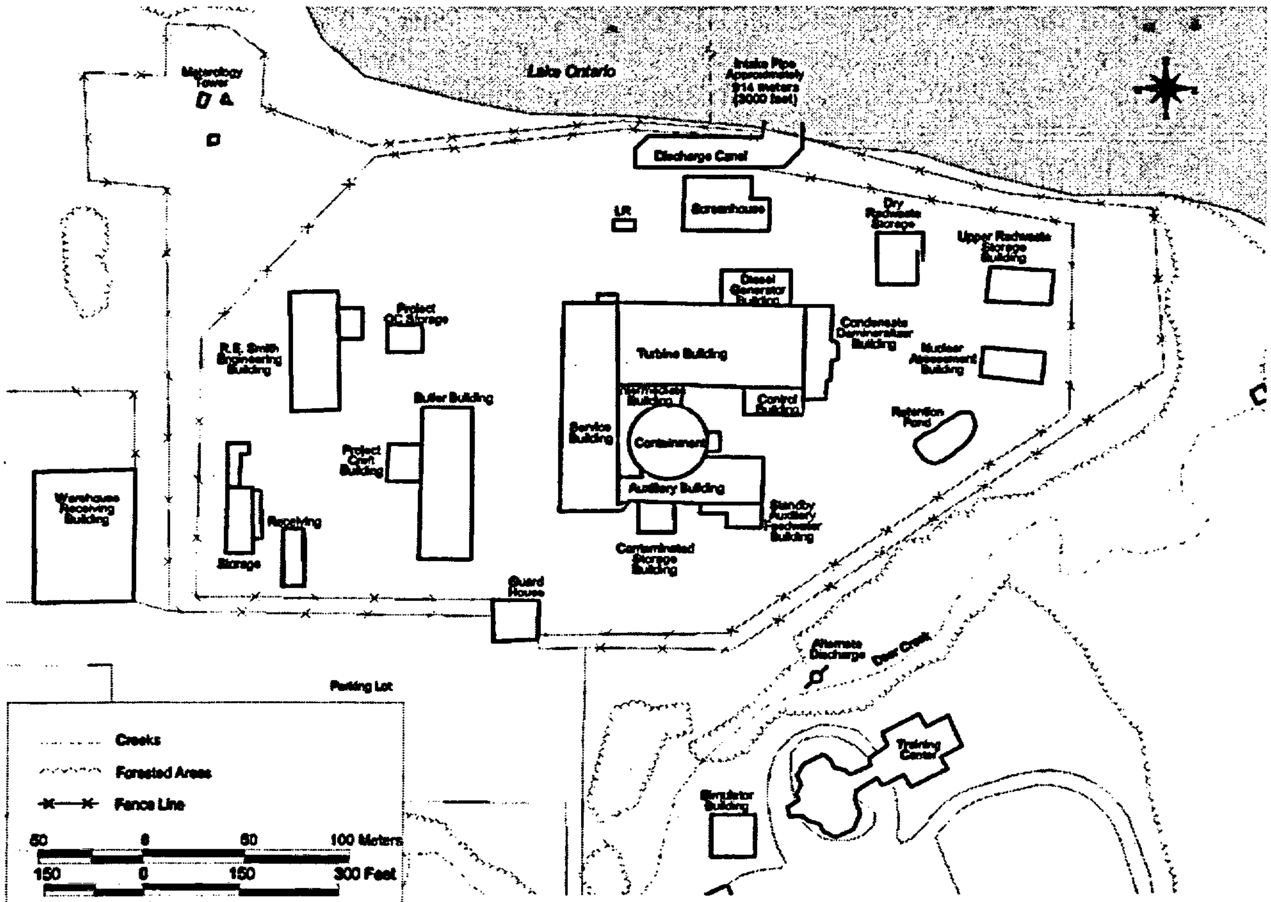


Figure 2-3. R.E. Ginna Nuclear Power Plant Layout

2.1.2 Reactor Systems

The Ginna reactor is a pressurized light-water-moderated and -cooled system designed by Westinghouse Electric Corporation. The system has two identical heat-transfer closed loops, each of which includes a reactor coolant pump and a steam generator connected to the reactor vessel. Ginna began commercial operation in July 1970 at a licensed output of 1300 megawatts thermal power (MW[t]) and at 420 MW net electrical power (MW[e]). On March 1, 1972, on the basis of additional safety and environmental evaluations, the licensed output was increased to 1520 MW(t) and the net electrical output was increased to 490 MW(e).

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 semi-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. A welded steel liner is attached to the inside face of the concrete shell to provide leak-tightness. The reactor vessel is located in the center of the containment structure below ground level. The reactor is licensed to use uranium dioxide fuel that has a maximum enrichment of 5.0 percent uranium-235 by weight. Typical average enrichment is 4.2 percent uranium-235 by weight. The approximate maximum average burnup is less than 55,000 megawatt-days per metric ton uranium (MWd/MTU).

2.1.3 Cooling and Auxiliary Water Systems

Lake Ontario is the source of water for the turbine condenser cooling and most auxiliary water systems at Ginna. Water from Lake Ontario reaches Ginna through a submerged offshore intake. Water returns to Lake Ontario through a surface shoreline discharge. The total nominal flow of water for these systems is about 22,370 L/s (354,600 gpm). A flow of approximately 21,245 L/s (340,000 gpm) is used to cool the turbine condenser, and the rest of the water is available for auxiliary systems such as service water and fire protection.

The turbine condenser cooling system removes heat via the main condensers. 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 945 m (3100 ft) from shore at a depth of about 10 m (33 ft) water at mean lake level. Even an occurrence of a historical low water level will result in no less than 4.6 m (15 ft) of water covering the intake structure. Screen racks with bars spaced 25 to 35 cm (10 to 14 in.) apart prevent large objects from entering the system. At full-flow conditions (22,370 L/s [354,600 gpm]), the velocity at the intake screen racks is about 0.2 m (0.8 ft) per second. A 3-m (10-ft) diameter, reinforced-concrete-lined tunnel cut through bedrock extends 945 m (3100 ft) in a northerly direction from the shoreline. Before the intake water reaches the two circulating water pumps that send it through the plant, the water passes through one of four parallel traveling screens. Some of this water is used to flush the debris off the screens into the discharge canal. All fish and debris, excluding collections taken during impingement studies, are returned to Lake Ontario via this discharge canal.

Water used to cool the turbine condenser is discharged into the discharge canal. The water discharged into the canal enters Lake Ontario at the shoreline. The normal temperature increase over the ambient water temperature at the point of discharge is about 11°C (20°F), and the size of the thermal plume is normally about 71 ha (175 ac).

The auxiliary system includes service water, fire protection, and other uses. This is about 1125 L/s (14,600 gpm) of the total water volume pumped by these systems. The service water system consists of four service water pumps located in the screen house. The service water system circulates lake water from the screen house 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 for various plant needs. It provides multiple water source flow paths to ensure the availability of the ultimate heat sink, which is the lake.

The treated water system, one of the auxiliary systems, is used in the following secondary plant subsystems: demineralized water production, 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.

Domestic-quality potable water, at a flow of about 378,000 L/d (100,000 gpd), is purchased by RG&E from the Ontario Water District for drinking, sanitary purposes, auxiliary boiler feed, and condensate makeup and polishing. Sanitary waste from Ginna is discharged into the wastewater treatment system operated by the town of Ontario.

2.1.4 Radioactive Waste Management Systems and Effluent Control Systems

Ginna uses liquid, gaseous, and solid radioactive waste management systems to collect and process the wastes that are by-products of reactor operation. These systems reduce the radioactive effluents before they are released to the environment. Discharge streams are appropriately monitored, and safety features are incorporated to preclude releases in excess of the limits specified in 10 CFR Part 20 and to maintain radioactive discharges to levels as low as reasonably achievable (ALARA) according to the requirements of 10 CFR Part 50, Appendix I.

Waste disposal facilities are designed so that discharge of effluents and offsite shipments are in accordance with applicable U.S. Nuclear Regulatory Commission (NRC) regulations and guidelines. Radioactive fluids entering the waste disposal system are collected in sumps and tanks until a determination of subsequent treatment can be made. The waste is sampled and analyzed to determine the quantity of radioactivity, and an isotopic breakdown is determined if necessary. Before any attempt is made to discharge this waste, it is processed as required and then released under controlled conditions. The system design and operation are directed toward minimizing releases to unrestricted areas.

Radioactive gases are pumped by compressors through a manifold to one of the gas decay tanks where the gases are held for a suitable period of time for decay. Cover gases in the nitrogen blanketing system are reused to minimize gaseous wastes. During normal operation, gases are discharged intermittently at a controlled rate from these tanks through the monitored plant vent. The system is provided with discharge controls so that environmental conditions do not restrict the release of radioactive effluents to the atmosphere.

The waste disposal system is designed to package all solid waste in standard liners and other approved packages for removal to burial or processing facilities. The types of solid waste that are produced at Ginna, in addition to dry active waste, are sludge, oily waste, bead resin, and filters.

Fuel rods that have exhausted a certain percentage of their fuel and then removed from the reactor core for disposal are called spent fuel. Spent fuel is stored onsite in the spent fuel pool. As a result of the Phase-1 rerack and after allowing for a full core discharge capability, sufficient positions remain in the spent fuel pool (based upon projected discharges of 44 fuel assemblies per cycle) to store the projected spent fuel discharge resulting from operation through the spring of 2010 (if Ginna were to continue operating beyond its current license period, which ends in September 2009) (RG&E 2001a).

The Offsite Dose Calculation Manual (ODCM) (RG&E 2002b), which is subject to NRC inspection, describes the methods and parameters used for calculating offsite doses resulting from radioactive liquid and gaseous effluents. It provides monitoring alarm/trip points for release of effluents, and operational limits for releasing liquid and gaseous effluents are specified to ensure compliance with NRC regulations.

2.1.4.1 Liquid Waste Processing Systems and Effluent Controls

Liquid wastes are generated primarily by plant maintenance and service operations. Source term influents to the waste disposal system have changed considerably since the original design of the system. However, the current influent quantities into the system are smaller than the quantities for which the system was originally designed. Actual liquid waste discharge quantity figures are provided in the Radioactive Effluent Release Report required by the plant technical specifications (RG&E 2001b).

Radioactive fluids entering the waste disposal system are collected in sumps and tanks until a determination regarding subsequent treatment can be made. The fluids are sampled and analyzed to determine the quantity of radioactivity, and an isotopic breakdown is determined if necessary. Before any attempt is made to discharge, the waste is processed as required and then released under controlled conditions. The system design and operation are directed toward minimizing releases to unrestricted areas. Discharge streams are monitored and safety features are incorporated to preclude releases in excess of the limits of 10 CFR Part 20 and to maintain radioactive discharges to ALARA levels according to the requirements of 10 CFR Part 50, Appendix I.

The waste holdup tank (about 79,500 L [21,000 gal]) is the collection point for most primary liquid wastes, via gravity drain where possible. Other drains, such as basement-level drains, drain to a 1419-L (375-gal)-capacity sump tank that is then pumped to the waste holdup tank.

The bulk of the radioactive liquids discharged from the reactor coolant system are processed and retained inside the plant by the chemical and volume control system recycle train. This recycle approach minimizes liquid input to the waste disposal system, which processes relatively small quantities of generally low-activity wastes. The processed water from waste disposal, from which most of the radioactive material has been removed, is discharged through a monitored line into the circulating water discharge. Liquid wastes are processed to remove most of the radioactive materials.

From the waste holdup tank, the wastewater can be processed through a demineralization system to one of two monitor tanks and then either released to the circulating water discharge canal or recycled to the reactor makeup water tank. The waste holdup tank vent line is routed through the auxiliary building charcoal filters. The spent resin is sluiced to a shipping container for disposal.

The 1419-L (375-gal)-capacity auxiliary building sump tank serves as a collecting point for equipment drain water discharged to the basement-level drain header. The drain header receives equipment drains from the refueling water storage tank, residual heat exchangers, chemical and volume control system holdup tanks and recirculation pump, gas stripper feed pumps, boric acid evaporator, spent resin storage tanks, seal water filter, charging pump seal leakoff tank, charging pumps, spray additive tank, seal water heat exchanger, and nonregenerative heat exchanger.

The 189,200 L (50,000 gal), carbon-steel, high-conductivity waste tank is the collection point for condensate polisher regenerant and high-conductivity wastes. These wastes are retained in the tank prior to release into the circulating water system.

The retention tank is the collection point for the various building floor and equipment drains. The tank retains this waste prior to discharging it into the circulating water discharge. The tank's contents are continuously monitored for pH and radioactivity.

The neutralizing tank collects regenerant wastes from the primary makeup water demineralizer system. The tank retains the waste for neutralization prior to discharge to the retention tank.

The monitor tanks are part of the chemical and volume control system. These tanks retain the waste until it is discharged to the circulating water discharge or recycled through the demineralization system to the reactor makeup water tank. The contents of the tanks are sampled for radioactivity prior to discharge.

Liquid batch releases are controlled individually, and each batch release is authorized based on sample analysis and the existing dilution flow in the discharge canal. Plant procedures establish the methods for sampling and analysis of each batch prior to release. A release rate limit is calculated for each batch based on analysis, dilution flow, and all procedural conditions being met before it is authorized for release. The waste stream entering the discharge canal is continuously monitored, and the release would be automatically terminated if the preselected monitor setpoint is exceeded (RG&E 2001a).

If gross beta analysis is performed for each batch release in lieu of gamma isotopic analysis, a weekly composite for principal gamma emitters and iodine-131 is performed. Additional monthly and quarterly composite analyses are performed as specified. The methodology and equations used to calculate activity are included in the Ginna ODCM (RG&E 2002b).

2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls

The gaseous waste management system is designed to collect waste gases from various tanks and sampling systems throughout the plant. The primary source of gas received by the waste disposal system is cover gas displaced from the chemical and volume control system holdup tanks as they fill with liquid. Gaseous wastes consist primarily of (1) hydrogen stripped from coolant discharged to the chemical and volume control system holdup tanks during boron dilution, (2) nitrogen and hydrogen gases purged from the chemical and volume control system volume control tank when degassing the reactor coolant, and (3) nitrogen from the closed gas blanketing system. The gas decay tank capacity allows a 45-day decay period before the waste gas is discharged.

Radioactive gases are pumped to one of the gas decay tanks where they are held for a suitable period of time. Cover gases in the nitrogen blanketing system are reused to minimize gaseous wastes. During normal operation, gases are discharged intermittently at a controlled rate from these tanks through the monitored plant vent. The system is provided with discharge controls so that environmental conditions do not restrict the release of radioactive effluents to the atmosphere.

Because the chemical and volume control system holdup tank cover gases must be replaced when they are emptied during processing, provisions are made to return the gas from the gas decay tanks to the chemical and volume control system holdup tanks via a reuse header.

The gas decay tanks are about 13,300 L (470 ft^3) each, with a design pressure of 1.4 kPa (200 psig), and normally operate between 0 and 750 kPa (0 and 110 psig). They can be lined up for draining, gas analyzer sampling, or pressurization with nitrogen. Gas held in the decay tanks can either be returned to the chemical and volume control system holdup tanks via the reuse header, or it can be discharged to the atmosphere if it has decayed sufficiently for release. Before a tank can be emptied to the environment, it is sampled and analyzed to determine and record the activity to be released, and only then discharged to the plant vent at a controlled rate through a radiation monitor. Samples are taken manually from the gas analyzers. During release (through charcoal filters), a trip valve in the discharge line is closed automatically by a high activity level indication in the plant vent.

The waste disposal panel contains pressure gauges for the tanks using cover gas and also for the gas decay tanks and the vent header. A local plant stack radiation monitor is also provided for the operator's use during releases. All gas system manual operations and releases are controlled locally at the waste disposal panel by the operator. The alarm conditions that are associated with the gaseous waste management system are (1) moisture separator level, (2) vent header pressure, (3) gas analyzer oxygen, (4) plant stack monitor radiation, (5) gas decay tank pressure, and (6) gas decay tank new standby selection. High-pressure alarms are installed on the tanks that vent to the vent header. An alarm on the waste disposal panel will light an annunciator on the main control board.

An automatic gas analyzer is provided to monitor the concentrations of oxygen and hydrogen in the cover gas of the waste disposal system and the chemical and volume control system tanks. The gas analyzer system sequentially selects samples from vessels of the waste disposal system, analyzes the samples for oxygen and hydrogen, records the results of the analysis, and provides alarms when a hazardous operating condition exists. Upon indication of a high oxygen level, provisions are made to purge the systems to the gaseous waste system with an inert gas.

Gaseous effluent monitor setpoints are established at concentrations that permit some margin for corrective action to be taken before exceeding offsite dose rates corresponding to 10 CFR Part 20 limitations. The ODCM (RG&E 2002b) establishes the methods for sampling and analysis for continuous ventilation releases and for containment purge releases, as well as the methods for sampling and analysis prior to gas decay tank releases. The dose rates are determined using methodology included in the Ginna ODCM (RG&E 2002b). Calculations were performed in 1976 to demonstrate conformity with numerical guides on design objectives presented in Appendix I to 10 CFR Part 50 for gaseous effluents.

2.1.4.3 Solid-Waste Processing

The waste disposal system is designed to package solid waste in standard liners and other approved packages for removal to burial or processing facilities. In addition to dry active waste, solid waste produced at Ginna includes sludge, oily waste, bead resin, and filters.

There are two onsite solid waste storage facilities with a combined capacity sufficient to accommodate approximately 5 years of operation. The upper radioactive waste storage facility typically provides temporary storage for plant solid waste. The high-integrity container storage facility is a concrete-walled, open-topped structure designed as a shadow shield for the storage of spent resin. The resin is stored in shielded casks that are ready for shipment. Additionally, a reinforced concrete structure houses the old steam generators and is designed for long-term storage.

Suspended solids and other sludges occasionally require processing. Oily waste is processed at an offsite facility. An alternative method of disposal is to solidify and bury the waste at a licensed burial site.

Bead resin is used to remove chemical impurities and radioactive contamination from the reactor coolant, the chemical and volume control system, the spent fuel pool, and the liquid waste processing system. When the resin is exhausted or reaches a radiation limit, the spent resin is sluiced to one of two 4247-L (1122-gal) spent resin storage tanks. After sufficient resin has been collected, a transport cask sufficient for the radioactivity present is ordered. Spent resin is slurried from the spent resin storage tank into a liner with water used for sparging and mixing the resin, and nitrogen gas pressure is used to move the resin. A representative sample of the resin is obtained and the concentration of each radioisotope is calculated. After the resin is dewatered, the liner is capped and sealed and the top is put on the transport cask. The cask is surveyed for radiation and contamination and properly labeled and marked. The resin is then transported to a licensed disposal facility.

When filters become saturated or have a high dose rate, they are dewatered and then replaced. The spent filters are placed in a high-integrity container or solidified in an approved media and shipped in accordance with 10 CFR Part 71, 10 CFR Part 61, and burial site licenses. Dry active waste is shipped in bulk form to a vendor for volume reduction and packaging for delivery to the disposal site (RG&E 2001a).

The Ginna ODCM (RG&E 2002b) controls the establishment of a program that outlines the method for processing wet solid wastes and solidifying liquid wastes. It includes applicable process parameters and evaluation methods used at Ginna to ensure compliance with the requirements of 10 CFR Part 71 prior to shipment of containers of radioactive waste from the site.

A radioactive waste sampling and analysis program has been instituted to ensure compliance with 10 CFR Part 61. Scaling factors have been developed to calculate concentrations of hard-to-measure isotopes from more easily determined isotopes. The scaling factors will enable concentrations of all required isotopes to be determined for each radioactive waste shipment.

All radioactive waste is shipped to a licensed burial site in accordance with applicable NRC, U.S. Department of Transportation, and State regulations, including burial site regulation requirements. To ensure that personnel exposure is minimized, ALARA considerations are addressed in all phases of the solidification process. The quantities shipped offsite for processing and burial are reported to the NRC in the Radioactive Effluent Release Report (RG&E 2001b).

2.1.5 Nonradioactive Waste Systems

Hazardous, non-radioactive waste is regulated under the Resource Conservation and Recovery Act (RCRA) administered by the New York State Department of Environmental Conservation (NYSDEC), which classifies Ginna as a "small quantity generator and a treater, storer and/or disposer of hazardous waste." Following their annual inspection in January 2001, NYSDEC concluded that Ginna was in compliance with all New York State hazardous waste regulations (NYSDEC 2001). This conclusion was consistent with their findings during prior annual inspections.

The most common types of hazardous waste generated at Ginna are chemical degreasers, acids, and caustics used to clean parts and rags and paper products contaminated with chemicals regulated under RCRA. There are also chemical products that are discarded due to procedural changes, and minor amounts of asbestos and equipment contaminated with polychlorinated biphenyls (PCBs) due to asbestos and PCB abatement efforts. RG&E's 2001 Hazardous Waste Regulatory Fee form estimated that 1570 kg (1.73 tons) of hazardous waste was produced at Ginna in 2000 (RG&E 2001c).

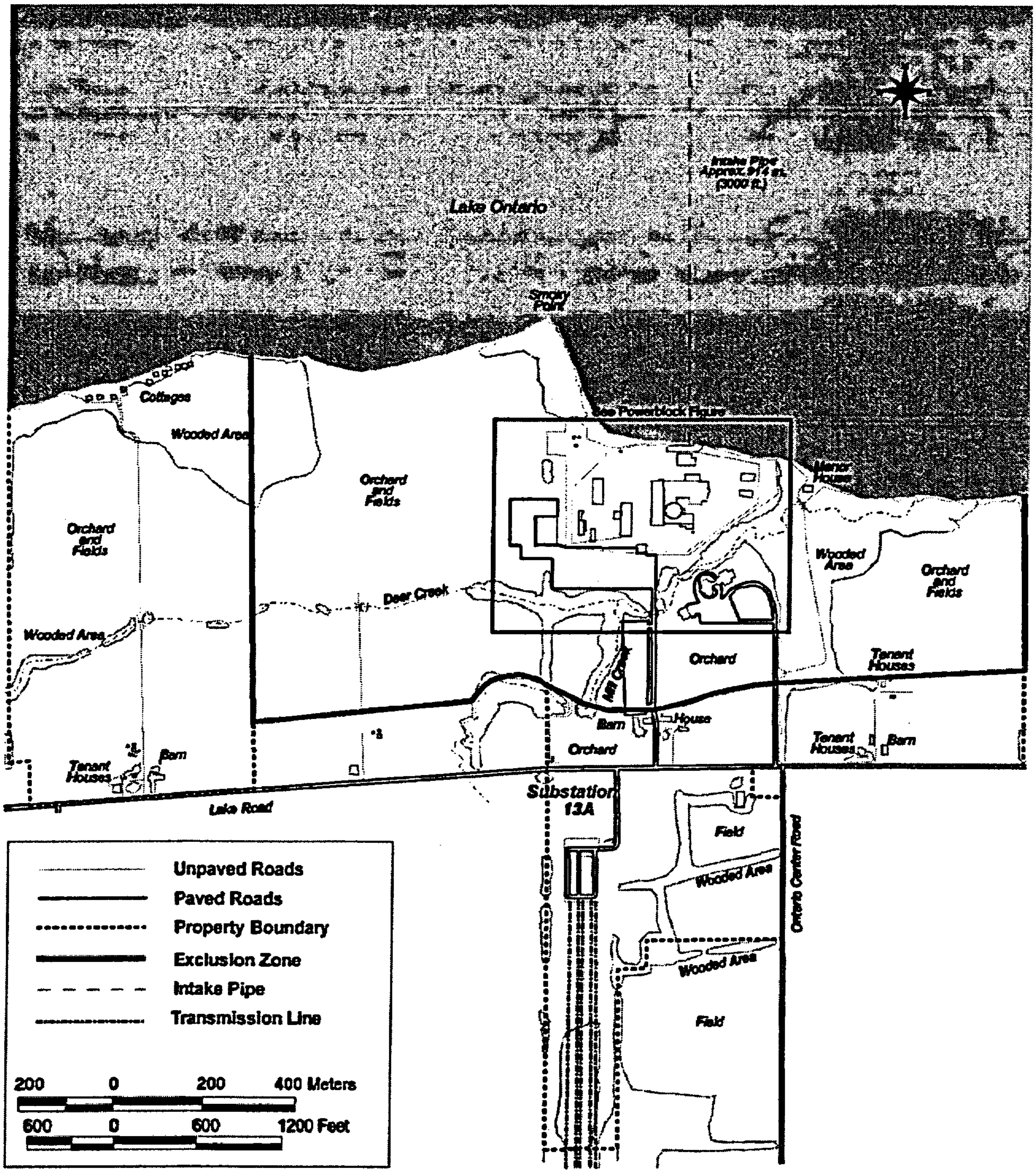
2.1.6 Plant Operation and Maintenance

Maintenance activities conducted at Ginna include inspection, testing, and surveillance to maintain the current licensing basis of the plant and ensure compliance with environmental and safety requirements. Certain activities can be performed while the reactor is operating, but some activities require that the plant be shut down. Long-term outages are scheduled for refueling and for certain types of repairs or maintenance, such as replacement of a major component. RG&E refuels the Ginna nuclear unit on an 18-month schedule, generally resulting in a refueling every other year. During refueling outages, site employment increases by as many as 700 workers for temporary duty (typically lasting from 28 to 35 days) (RG&E 2002a).

An updated final safety analysis report supplement (RG&E 2002c) regarding the effects of aging on systems, structures, and components was included as Appendix A of the Application for Renewed Operating License, in accordance with 10 CFR Part 54. Chapter 3 and Appendix B of the Ginna license renewal application describe the programs and activities that will manage the effects of aging during the license renewal period. RG&E expects to conduct activities related to the management of aging effects during plant operation or normal refueling and other outages, but plans no outages specifically for the purpose of refurbishment. RG&E has no plans to add additional full-time staff (non-outage workers) at the plant during the period of the renewed license.

2.1.7 Power Transmission System

The *Final Environmental Statement for the R.E. Ginna Plant, Unit 1. Rochester Gas and Electric Corporation* (AEC 1973) describes four transmission lines, running in the same right-of-way, that connect the plant with the transmission system. RG&E has not made any modifications to either the right-of-way or the transmission lines since original installation (RG&E 2002a). Ginna generates electricity at 19 kilovolts (kV). This voltage is stepped up to 115 kV at the plant and is transmitted 1.0 km (0.6 mi) by four 115-kV underground cables to Substation 13A, which is located south of Ginna on the south side of Lake Road (Figure 2-4). Four 115-kV overhead transmission lines were installed as a direct result of the construction, startup, and operation of Ginna. These lines emanate from Substation 13A and run approximately 5.6 km (3.5 mi) in the same right-of-way in a southerly direction to connect to the transmission grid at Substation 204 (Fruitland), which is on the south side of NYS Route 104 (Table 2-1). These lines are supported by wooden structures with two lines per structure. There is a fifth 115-kV line emanating from Substation 13A that serves as a distribution line and is located on its own structures on the east side of the transmission lines right-of-way between Substations 13A and 204. This fifth line was not installed as a direct result of construction, startup, or operation of Ginna.



1 **Figure 2-4. R.E. Ginna Nuclear Power Plant Transmission Lines**

The 500-foot-wide transmission lines right-of-way from Ginna to Substation 204 is owned by RG&E. The portion of the right-of-way between Substation 13A and Substation 204 is in the town of Ontario and Wayne County and has road crossings at Brick Church Road, Kenyon Road, North Slocum Road, and NYS Route 104 (Figure 2-2). Locked gates limit access to the right-of-way from roadways. Land use in this area is predominantly agricultural with only a few homes adjacent to the right-of-way.

The transmission lines right-of-way is characterized by low- to medium-sized shrubs with an understory of grasses and forbs, and with trees at the edge of the right-of-way. RG&E manages the right-of-way in accordance with a New York State Public Service Commission-approved long-range vegetation management plan (RG&E 1995). This plan uses selected management techniques with the goal of maintaining a low-growing vegetative community. A relatively thick shrub layer is maintained, with the intention of discouraging the sprouting and growth of larger trees within the right-of-way. Mowing or brush cutting is rare and, when done, is typically performed only in small areas as needed to clear access to towers. Trees that may interfere with the electrical conductors are either trimmed or are cut at the base. Herbicides are generally only used as spot applications to prevent tree or shrub regrowth. RG&E uses only non-restricted-use herbicides, and all applications are performed under the supervision of licensed applicators. RG&E maintains a vegetative buffer along stream crossings and does not mow or treat vegetation with herbicides within wetland areas or stream crossings unless specific, individual trees need to be trimmed or removed to maintain safe operation of the right-of-way.

Table 2-1. R.E. Ginna Nuclear Power Plant Transmission Lines Right-of-Way

Substation	Number of Lines	kV	Approximate Distance		Corridor Direction	Corridor Width		Corridor Area	
			km	mi		m	ft	hectares	(acres)
204 (Fruitland)	4	115	5.6	3.5	South	152	500	85	212

Source: RG&E 2002a

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment near Ginna. Detailed descriptions also are provided, where needed, to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term, as discussed in Chapters 3 and 4. Section 2.2.9 describes the historic and archaeological resources in the area, and Section 2.2.10 describes possible impacts of other Federal project activities.

2.2.1 Land Use

Ginna is in the town of Ontario, New York, in the northwest corner of Wayne County and on the south shore of Lake Ontario. Surface-water features onsite 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.

Ginna is about 32 km (20 mi) east of the center of Rochester and 64 km (40 mi) west-southwest of Oswego. The immediate area around the site is rural. There are no substantial population centers, industrial complexes, airports, transportation arteries, or parks within a 4.8-km (3.0-mi) radius. The largest community within 16 km (10 mi) of the site is Webster, located in Monroe County approximately 11.2 km (7.0 mi) west-southwest, with a town population of about 38,000 (RG&E 2002a). The largest metropolitan area within 80 km (50 mi) is Rochester, with a population of about 220,000. Approximately, 48 percent of the workforce at Ginna lives in Wayne County and 44 percent lives in Monroe County. The remaining 8 percent live elsewhere.

The 197-ha (488-ac) Ginna site is owned by RG&E. The land at the site and along the transmission line right-of-way is zoned by the town of Ontario for limited industrial uses, while adjacent lands are zoned for large lot residential uses (exceeding 1858 m^2 [20,000 ft^2). The original site area was 134 ha (338 ac) at the time of preparation of the 1972 Environmental Report for Ginna (RG&E 1972). During July 1976, approximately 49 ha (122 ac) of additional land was acquired from an adjoining farm, and another 6.7 ha (16.0 ac) was purchased during 1988 on the western side of the site. Correspondingly, the shoreline extent has increased from about 1.6 to 2.4 km (1.0 to 1.5 mi). More recently, during 2002, a 68-m (224-ft)-wide strip along the western boundary and frontage at the corner of Lake and Slocum Roads was sold by RG&E to a developer who is building a small subdivision. Approximately half of the site is leased and currently is used for agricultural production, primarily apple orchards and, to a lesser degree, corn and hay fields. Another quarter 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 10 ha (25 ac) enclosed within the security fences.

There are three occupied farm houses on the Ginna site, one of which has an occupied out-building. These houses are owned by RG&E, and the occupants have leases that are renewable annually at the option of the RG&E. Two of the houses are located 1250 m (4100 ft) and 884 m (2900 ft), respectively, southwest of the plant, while the third house and its associated out-building are about 701 m (2300 ft) and 579 m (1900 ft) southeast of the plant, respectively. All are located beyond the exclusion area boundary.

Unoccupied buildings owned by RG&E include the Brookwood Estate Manor House (used as an employee meeting facility) and garage, located about 274 m (900 ft) east of the plant and fronting the lake; horse barns (used for storage), located about 457 m (1500 ft) south of the plant; and a house (used as a fitness-for-duty center), located about 488 m (1600 ft) south of the plant. While there are currently no plans for further development on the site, additional security features have been added, primarily along the perimeter of the plant area. The addition of these security features are unrelated to and independent of license renewal.

Webster Park, a 223-ha (550-ac) Monroe County park on the south shore of Lake Ontario, is approximately 9.6 km (6.0 mi) 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. Approximately 56 km (35 mi) from Ginna, in southeastern Wayne County along the border with Cayuga and Seneca counties, is the Montezuma Wetlands Complex. The 14,569-ha (36,000-ac) complex includes the Federally owned Montezuma Wildlife Preserve, state-owned Northern Montezuma Wildlife Management Area, lands owned by conservation groups, and private property. The area contains marshes and impoundments, forested wetlands, old fields, meadows, farm fields, and woodlands (RG&E 2002a).

2.2.2 Water Use

Lake Ontario is the source of water for cooling and most auxiliary water systems. Ginna uses a once-through condenser cooling system with a submerged offshore intake and a surface shoreline discharge. The average daily withdrawal from and return to the lake for the cooling water and other service water systems is about 22,370 L/s (354,600 gpm).

In addition, potable water, at a flow of about 378,000 L/d (100,000 gpd), is purchased by RG&E from the Ontario Water District for drinking, sanitary purposes, auxiliary boiler feed, and condensate makeup and polishing. Sanitary waste from Ginna is discharged to the wastewater treatment system operated by the town of Ontario.

2.2.3 Water Quality

Lake Ontario provides water of a quality sufficient to serve a variety of needs, including propagation of fish and wildlife and contact recreation. However, the lake is listed on the New York State 2002 Section 303(d) List of Impaired Waters as impaired due to fish consumption advisories as a result of contamination by PCBs, Mirex, and Dioxin.

Pursuant to the Clean Water Act, the water quality of the plant effluents is regulated through the National Pollutant Discharge Elimination System (NPDES). The Division of Environmental

Permits within the NYSDEC is delegated by U.S. Environmental Protection Agency (EPA) to issue NPDES permits, which it refers to as State Pollutant Discharge Elimination System (SPDES) permits. The current permit (NY0000493) was issued February 1, 2003, and is due to expire February 1, 2008. Any new regulations promulgated by the EPA or the State of New York would be reflected in future permits.

The current permit requires monitoring of discharges from the circulating cooling water system, house service boiler blowdown system, the high-conductivity water tank discharge system (including steam generator blowdown), and the radiation waste holdup and treatment system. Discharge limitations exist on flow, maximum discharge temperature, incremental temperature difference, chlorine, boron, oil and grease, suspended solids, pH, iron, copper, zinc, arsenic, and chromium.

2.2.4 Air Quality

Ginna has a typical northeastern-U.S. humid climate that is moderated by the influence of Lake Ontario. The nearest national weather station is at the Greater Rochester International Airport (ROC) located about 32 km (20 mi) southwest and inland from the site. The ROC data define the regional climate. The local climate shows lake-effect influences on temperature, moisture, and precipitation.

Climatological records from 1971 to 2000 at ROC indicate that the normal daily maximum temperatures for the region range from -0.6°C (31.0°F) in January to a high of 27.2°C (81.0°F) in July (NOAA 2002). Normal minimum temperatures range from -8.5°C (17.0°F) in January to 15.6°C (60.0°F) in July.

The regional prevailing winds are from the west-southwest. Based on monitoring data for the period 1992 to 1994 at Ginna, local winds are predominantly from south to west-northwest with the peak direction from the south-southwest. The average annual precipitation measured at ROC is 86.31 cm (33.98 in.). Based on statistics for the 30 years from 1954 through 1983, the probability of a tornado striking the site is expected to be about 2×10^{-5} per year (Ramsdell and Andrews 1986).

Locally, weather systems coming from Canada tend to pick up moisture as they cross Lake Ontario and deposit it within 24 to 32 km (15 to 20 mi) of the shoreline. Regional snowfall, as recorded at ROC, averages approximately 236 cm (93 in.) per year. Locations closer to the lake, such as the Ginna site, tend to experience many "lake-effect" snow showers and may have more snowfall than recorded at ROC.

Wind energy potential along the shore of Lake Ontario in the vicinity of Ginna is rated as 3 to 4 on a scale of 1 to 7, with a rating of 5 estimated to exist offshore (Elliott et al. 1986). These ratings indicate that wind is a viable energy resource in the area.

The air quality in the region is designated as better than national standards, in attainment, or unclassified for all criteria pollutants in 40 CFR 81.316 and 40 CFR 81.328. The nearest area of nonattainment is Niagara County, New York, which is classified as marginal for ozone (EPA 2003a). There are no mandatory Class I Federal areas in which visibility is an important value designated in 40 CFR Part 81 within 160 km (100 mi) of Ginna. According to the 1991 to 2000 data from the EPA, the number of days when the air quality index was greater than 100 for ozone in the Rochester Metropolitan Statistical Area (i.e., "Poor Air Quality") ranged from a low of 0 in 1993 and 1996 to a high of 16 in 1991 (EPA 2003b). The EPA reports 1 day in 2001 when the air quality index for ozone was higher than 100 for this area.

Emissions from diesel generators, boilers, and other activities and facilities associated with Ginna operations are regulated under New York state and Federal regulations. Emissions from these Ginna sources are lower than the thresholds specified in the applicable New York State and Federal air quality regulations. Therefore, RG&E is not required to have air quality permits for Ginna.

2.2.5 Aquatic Resources

Aquatic resources in the vicinity of Ginna are associated with Lake Ontario, which is the smallest of the Great Lakes and the eleventh largest lake in the world in terms of volume. The lake is approximately 306 km (190 mi) long by 80 km (50 mi) wide, with a surface area of about 19,000 km^2 (7340 mi^2). The maximum depth is 244 m (802 ft) and the mean depth is 86 m (283 ft), which is greater than the other Great Lakes, except Lake Superior. Depths of 12 to 30 m (40 to 100 ft) are within 0.6 to 1.2 km (1.0 to 2.0 mi) off the southern shore in the area of Ginna. The major source of water for the lake is from Lake Erie via the Niagara River. Water flows from Lake Ontario via the St. Lawrence River to the Atlantic Ocean. The predominant surface currents in front of the station are west to east, and the flows tend to swing towards the southern shoreline (RG&E 2002a).

There are also two creeks that cross the property of the station and the southern shore of Lake Ontario. Mill Creek crosses the site from the south and flows into Deer Creek. Deer Creek enters the site from the west, joins with Mill Creek, and then flows into Lake Ontario. Deer Creek is a wet-weather stream that dries up in the summer months so there is no direct flow into Lake Ontario during that time of the year (RG&E 2002a). Mill Creek, while flowing year-round, does not have sufficient flow to cross over a rise in the land around the mouth of the creek during the summer months. Flow from Mill Creek is possible through the subsurface;

however, aquatic resources could not easily swim in and out of Mill Creek to Lake Ontario during the summer. These creeks do not receive water from Ginna on a routine basis except for occasional storm water runoff. There is a surface impoundment for emergency use that could discharge into Deer Creek.

The aquatic resources associated with Ginna, especially those in Lake Ontario, are an important resource for fishing, recreation, navigation, tourism, and conservation. Currently, the principal fish in Lake Ontario's offshore pelagic fish community are alewife (*Alosa pseudoharengus*) and Atlantic rainbow smelt (*Osmerus m. mordax*), and their salmonid predators, including chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*) and Atlantic salmon (*Salmo salar*), lake trout (*Salvelinus namaycush*), rainbow trout (*O. mykiss*), and brown trout (*S. trutta*). Other less abundant pelagic species include threespine stickleback (*Gasterosteus aculeatus*), emerald shiner (*Notropis atherinoides*) and gizzard shad (*Dorosoma cepedianum*) (Schaner et al. 2002). The principal fish in the offshore benthic community include lake trout, lake whitefish (*Coregonus clupeaformis*) and slimy sculpin (*Cottus cognatus*). Additional species include burbot (*Lota lota*), round whitefish (*Prosopium cylindraceum*) and deepwater sculpin (*Triglopsis thompsonii*) (Hoyle and Schaner 2002). The salmon and trout populations are maintained chiefly by stocking programs conducted by the NYSDEC and the Ontario Ministry of Natural Resources. While these stocking programs were initially designed to control non-native fish overpopulation, the salmon and trout are now an important commercial and recreational resource resulting in annual expenditures of over $70 million (Kraft and Carothers 2002).

The Lake Ontario fish community that existed when Ginna began operations during the early 1970s reflected the changes to the fishery over the previous 150 years. The Lake Ontario fishery has been significantly altered over the past 150 years due to frequent introductions of non-native species. Non-native species such as the alewife, rainbow smelt, burbot, threespine stickleback, and several salmon species have profoundly altered the Lake Ontario fishery over the past 100 years. Between the mid-1800s and the early 1970s, populations of important species such as lake sturgeon (*Acipenser fulvescens*), Atlantic salmon, lake trout, lake herring (*Coregonus artedi*), burbot, and deepwater ciscoes (*C. johannae*) had all collapsed. This collapse has been 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 and smelt 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. During 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 using the extensive forage base of alewife and smelt. For the next 20 years, this program was very successful in both developing a world-class sport fishery on Lake Ontario as well as controlling the forage fish population (RG&E 2002a).

Water quality in Lake Ontario has changed since the initial plans for Ginna during 1972. There has been a substantial decrease in nutrient loading (particularly phosphorus) and the presence of persistent toxic chemicals. As the water quality has improved, the aquatic community has responded. Other factors in the change of the aquatic resources within the lake over time include control measures for alewife (including the salmonid stocking program), the introduction of non-native aquatic species, ongoing anthropogenic impacts, and natural climate variability (RG&E 2002a).

Evidence of the recent changes in aquatic resources can be seen in the dramatic drop of fish abundance, increases in *Cladophora* sp. (algae), and increases in non-native mollusks of the genus *Dreissena* (zebra and quagga mussels). Fish abundance decreased substantially around 1977 when controls for alewife started to take effect. While numbers of fish have decreased based on data collected by RG&E and by the NYSDEC, the diversity of aquatic species has not changed much and even appears in the last 4 years to be on an upward trend around Ginna. *C.* sp. have been noted to be growing at greater depths in Lake Ontario as the water clarity has improved over the last decade. Mollusks have also been found to be increasing in numbers based on studies by RG&E and by the NYSDEC (RG&E 2002a).

Ichthyoplankton (fish eggs and larvae) studies conducted at the Ginna site during 1977 and 1978 characterize the site with respect to utilization of the Lake Ontario shoreline adjacent to the Ginna site for fish spawning and as a nursery area. More than 90 percent of the fish larvae found during both years were alewives. Also found both years, in the 1-5 percent range, were carp/goldfish (*Cyprinus carpio/Carassius auratus*), 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 near shore areas of Lake Ontario's southern shoreline. Conversely, there were no indications that the Ginna site area was unique to, or preferred by, any species as a spawning or nursery area.

Ginna 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 and that alewife-spawning locations are ubiquitous. Of particular interest, given the dramatic reduction in productivity within the lake, is the fact that alewife larval densities found during both the late 1970s and the late 1990s were within the same order of magnitude. This indicates the density of alewife larvae available for recruitment have remained fairly constant over time. Further, these recent studies found similar species to those collected at the Ginna intake during the 1970s, and generally support the previously stated conclusions concerning the spawning, nursery, and habitat conditions of the Ginna site (RG&E 2002a).

There are no aquatic species Federally listed as threatened or endangered under the Endangered Species Act (ESA) in the vicinity of Ginna. Through consultation with U.S. Fish and Wildlife Service (FWS), no aquatic species (fish, mollusks, or plants) were identified in Wayne County or any counties near Wayne County (FWS 2002).

There are two State-listed aquatic species known to occur within Wayne County (Table 2-2). Through discussions with NYSDEC, one endangered fish was determined to be near Wayne County (NYSDEC 2003a). The pugnose shiner (*Notropis anogenus*) was reported from Sodus Bay of Lake Ontario, approximately 32 km (20 mi) west of Ginna. However, the pugnose shiner has not been reported near Ginna, nor has it ever been captured during studies conducted by RG&E (RG&E 2002a). The lake sturgeon is a threatened species within New York state and might be found near Ginna (NYSDEC 2003a). One sturgeon was netted several years ago by NYSDEC at Pultneyville, a village approximately 9.6 km (6 mi) east of Ginna. No sturgeon has ever been reported from the vicinity of Ginna (RG&E 2002a).

Table 2-2. Aquatic Species Listed by the New York State Department of Environmental Conservation as Endangered, Threatened, or of Special Concern that are Known to Occur Within Wayne County, New York

Scientific Name	Common Name	State Status
Fish		
Notropis anogenus	pugnose shiner	Endangered
Acipenser fulvescens	lake sturgeon	Threatened

Source: (NYSDEC 2003a).

2.2.6 Terrestrial Resources

The Ginna site lies within the eastern great lakes/Hudson lowlands ecoregion (Omernik 1987). Prior to European settlement, the area was dominated by beech-maple forest that was typical of the region. Throughout the region, much of this forest type has been converted to other vegetation types, primarily various forms of farmland such as orchards, pastures, or crop land (AEC 1973).

The site and its associated transmission line right-of-way are surrounded by a variety of very typical habitat types found in central and western New York state: mature woodlands, meadows, and early- and late-stage old fields. In addition, significant acreage is farmed for grains or is in use for apple production. Portions of the property and the transmission line right-of-way are currently farmed under a lease arrangement with local residents. The other "natural" areas within the boundaries of the site are left to go through the natural succession process and are not actively managed by the applicant (RG&E 2002a). There are no State or Federally regulated wetlands found either at the Ginna site or on the transmission line right-of-way.

The wildlife species that occur at the Ginna site and transmission line right-of-way are also very typical of those found in similar habitats throughout central and western New York state. Whitetail deer (*Odocoileus virginianus*), woodchuck (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), grey (*Urocyon cinereoargenteus*) and red fox (*Vulpes vulpes*), 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 (*R. clamitans*), and wood frog (*R. sylvatica*). Reptiles include the eastern garter snake (*Thamnophis s. sirtalis*) and ribbon snake (*T. sauritus*) (Dames and Moore 1971).

No Federally listed threatened or endangered terrestrial species are known to occur in the vicinity of Ginna or its associated transmission line right-of-way. Table 2-3 lists species known to occur or potentially occur in Wayne County. Bald eagles (*Haliaeetus leucocephalus*) will occasionally be observed in the vicinity, but the nearest known nesting site is approximately 88 km (55 mi) southeast near Montezuma National Wildlife Refuge (NYSDEC 2003a).

Table 2-3. Terrestrial Species Listed as Threatened or Endangered by the U.S. Fish and Wildlife Service that Occur or Potentially Occur Within Wayne County, New York

Scientific Name	Common Name	Federal Status[(a)]
Reptiles		
Clemmys muhlenbergii	bog turtle	T
Birds		
Haliaeetus leucocephalus	bald eagle	T
Charadrius melodus	piping plover	E
Mammals		
Myotis sodalis	Indiana bat	E
Plants		
Isotria medeoloides	small-whorled pogonia	T
Plantanthera leucophaea	prairie fringed orchid	T

(a) E = endangered, T = threatened
Source: FWS 2002.

The Piping plover (*Charadrius melodus*) could potentially forage on the shoreline near the Ginna site, but it has never been reported in the vicinity and is not known to nest in the area. The nearest designated critical habitat for piping plover is approximately 145 km (90 mi) from the Ginna site on the eastern shore of Lake Ontario (FWS 2001).

The Ginna site is within the historic range of the bog turtle (*Clemmys mulenbergii*), but there are very few known populations remaining along the south coast of Lake Ontario. The nearest known populations are in northern Seneca and in western Oswego Counties (NYSDEC 2003c). Suitable bog turtle habitat is not known to occur on the Ginna Site or its associated transmission line right-of-way (FWS 2000).

The Indiana bat (*Myotis sodalis*) is thought to potentially occur in almost all of New York state, although firm knowledge of the distribution is primarily limited to eight known wintering sites, all located well east of the Ginna site (NYSDEC 1998). Some studies indicate that, although the Indiana bat range extends from the west and south across Pennsylvania to eastern New York, western New York is clearly excluded from the distribution maps (Humphrey 1982; Cope 1999). Relatively little is known about the summer range or habitat requirements of this species.

Neither of the two plant species listed in Table 2-3 (small-whorled pogonia [*Isotaria medeoloides*] and eastern prairie fringed orchid [*Plantanthera leucophaea*]) has been observed recently in New York State, and neither is likely to be present in the vicinity of the Ginna site. The FWS officially lists the small-whorled pogonia as potentially occurring in New York State (FWS 2002), but the listing documentation for this species indicates only historic records in New York State (FWS 1994). The NYSDEC does not list Wayne County in its list of potential counties of occurrence for the small-whorled pogonia (NYSDEC 2002). The NYSDEC does list Wayne County as a potential county of occurrence for the eastern prairie fringed orchid, but also indicates that there are no confirmed occurrences of this species anywhere in New York State (NYSDEC 2002). The FWS listing documentation for the eastern prairie fringed orchid also indicates that this species has not been introduced in New York State (FWS 1989).

Additional species that are listed by NYSDEC as threatened, endangered, rare, or otherwise of concern in New York state that are known to occur in Wayne County are listed in Table 2-4. None of these species are known to occur at Ginna or within the transmission lines right-of-way. The NYSDEC has also listed numerous additional species that it considers as potentially occurring in Wayne County (NYSDEC 2002). Because there are no recent records of any of these additional species from Wayne County, the staff did not consider these further.

Table 2-4. Terrestrial Species Listed by the New York State Department of Environmental Conservation as Endangered, Threatened, or of Special Concern that Occur Within Wayne County, New York

Scientific Name	Common Name	State Status[a]
Reptiles		
Clemmys guttata	spotted turtle	SC
Clemmys muhlenbergii	bog turtle	E
Apalone spinifera spinifera	eastern spiny softshell turtle	SC
Birds		
Accipiter cooperii	Cooper's hawk	SC
Accipiter striatus	sharp-shinned hawk	SC
Botaurus lentiginosus	American bittern	SC
Caprimulgus vociferus	whip-poor-will	SC
Charadrius melodus	piping plover	E
Childonias niger	black tern	E
Chordeiles minor	common nighthawk	SC
Circus cyaneus	northern harrier	T
Dendroica cerulea	cerulean warbler	SC
Eremophila alpestris	horned lark	SC
Haliaeetus leucocephalus	bald eagle	T
Melanerpes erythrocephalus	red-headed woodpecker	SC
Vermivora chrysoptera	golden-winged warbler	SC
Mammals		
Myotis leibii	eastern small-footed myotis	SC
Myotis sodalis	Indiana bat	E
Neotoma magister	Allegheny woodrat	E
Syvilagus transitionalis	New England cottontail	SC
Plants		
Aster borealis	rush aster	T
Carex frankii	Frank's sedge	E
Diplachne maritima	salt-meadow grass	E
Isotria medeoloides	small-whorled pogonia	E
Listera australis	southern twayblade	E
Plantanthera leucophoea	eastern prarie fringed orchid	E
Sacheuchzeria palustris	pod grass	R
Scirpus maritimus	seaside bulrush	E

(a) State status: E = endangered, T = threatened, SC = species of special concern, R = rare.
Source: NYSDEC 2002, 2003b, 2003c.

2.2.7 Radiological Impacts

RG&E conducts a radiological environmental monitoring program (REMP) at the Ginna site. Through this program, radiological impacts to workers, the public, and the environment are monitored, documented, and compared to the appropriate standards. The objectives of the REMP are to

- provide representative measurements of radiation and radioactive materials in the exposure pathways and of the radionuclides that have the highest potential for radiation exposures to members of the public

- supplement the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of effluent measurements and the modeling of the environmental exposure pathways.

Radiological releases are summarized in the Annual Radiological Environmental Operating Report (RG&E 2001d) and the Radioactive Effluent Release Report (RG&E 2001b). The limits for all radiological releases are specified in the Ginna ODCM (RG&E 2002b), and these limits are designed to meet Federal standards and requirements. The REMP includes monitoring of the aquatic environment (fish, invertebrates, and shoreline sediment), atmospheric environment (airborne radioiodine, gross beta, and gamma), terrestrial environment (vegetation), and direct radiation.

RG&E's review of historical data on releases and the resultant dose calculations revealed that the doses to maximally exposed individuals in the vicinity of Ginna have been a small fraction of the limits specified in the Ginna ODCM (RG&E 2002b) to meet EPA radiation standards in 40 CFR Part 190 as required by 10 CFR 20.1301(d). For 2001, dose estimates were calculated based on actual liquid and gaseous effluent release data (RG&E 2001b). Calculations were performed by RG&E using the plant effluent release data, onsite meteorological data, and appropriate pathways identified in the ODCM (RG&E 2002b).

During 2001, Ginna did not release any strontium-90 or strontium-89 in either its gaseous or liquid effluents. In 1999 and 2000, there were minor gaseous releases of strontium-89 (1.3×10^{-6} MBq [3.42×10^{-11} Ci] during 1999 and 6.3×10^{-3} MBq [1.69×10^{-7} Ci] during 2000). An assessment of doses to the maximally exposed individual from gaseous and liquid effluents was performed by RG&E for locations representing the maximum dose. In all cases, doses were well below the technical specification limits as defined in the ODCM (RG&E 2002b). During 1999 and 2000, doses had been elevated above 1998 levels due to gaseous effluent activity from a fuel cladding defect in cycle 28 (May 1999 to October 2000). Following the repair of the fuel cladding defect in cycle 29, dose levels during 2001 were more consistent with those in 1998.

The RG&E assessment of radiation dose to the general public from radioactive effluents assumed a person is located in the vicinity of the National Guard outpost for 10 hours/day, 5 days/week, 50 weeks/year. Although the National Guard post is just within the site boundary, it houses non-RG&E employees who are considered "members of the public." Doses were assessed based on the noble gas exposure, inhalation, ground-plane, and ingestion pathways. For 2001, the total body dose was estimated to be 0.048 mSv (4.8 mrem) total body (0.048 mSv [4.8 mrem] direct radiation plus 1.4×10^{-4} mSv [1.4×10^{-2} mrem] all other pathways) and 2.3×10^{-4} mSv (2.3×10^{-2} mrem) thyroid (maximum organ dose). The ODCM (RG&E 2002b) and 40 CFR Part 190 limits for the total dose to members of the public due to radiation and radioactivity from uranium fuel cycle sources are <0.25 mSv (<25 mrem) total body or any organ and <0.75 mSv (<75 mrem) thyroid for a calendar year. Therefore, doses from Ginna are only a fraction of the regulatory limit.

The applicant does not anticipate any significant changes to the radioactive effluent releases or exposures from Ginna operations during the renewal period; therefore, the impacts to the environment are not expected to change.

2.2.8 Socioeconomic Factors

The staff reviewed the Ginna ER (RG&E 2002a) and information obtained from several county, city, and economic development staff during a site visit to Wayne and Monroe Counties from November 4 through 7, 2002. The following information describes the economy, population, and communities near Ginna.

2.2.8.1 Housing

Ginna employs approximately 500 people on a full-time basis, with more than 80 percent of the normal operating workforce composed of RG&E employees. Approximately 48 percent of these employees (plant and contract employees) live in Wayne County, 44 percent in Monroe County, 2.5 percent in Ontario County, 1.6 percent in Livingston County, with the remainder living in other locations (Table 2-5). Because approximately 92 percent of the Ginna employees live in Wayne and Monroe counties and Wayne County is where the plant is located, the focus of the socioeconomic analysis is on these two counties.

Table 2-5. R.E. Ginna Nuclear Power Plant Employee and Contractor Employee Residence by County in New York State

County	Number of Personnel	Percent of Total Personnel
Wayne	240	48
Monroe	220	44
Ontario	15	3
Livingston	10	2
Other	15	3
Total	500	100

Source: RG&E 2002a

RG&E refuels Ginna on an 18-month cycle. During refueling, the number of employees increases by as many as 700 temporary workers for a period of 30 to 40 days. These temporary employees primarily stay at hotels, motels, and temporary rental housing available in Wayne and Monroe counties (RG&E 2002a).

Table 2-6 provides the number of housing units and housing unit vacancies for Wayne and Monroe counties for 1990 and 2000. Wayne County had approximately 38,800 housing units in 2000, with a vacancy rate less than 10 percent. Monroe County, which has a larger population base and a relatively stronger employment market, had a vacancy rate of approximately

Table 2-6. Total Occupied and Vacant (Available) Housing Units in Wayne and Monroe Counties in New York State, 1990 and 2000

	1990	2000	Approximate Percent Change
		WAYNE COUNTY	
Housing Units	35,188	38,767	10
Occupied Units	31,977	34,908	9
Vacant Units	3,211	3,859	20
		MONROE COUNTY	
Housing Units	285,524	304,388	6
Occupied Units	271,944	286,512	5
Vacant Units	13,580	17,876	32

Sources: USCB 1990, 2000

6 percent in 2000 based on a housing stock of approximately 304,400 units (USCB 2000a). Wayne and Monroe counties are not subject to growth-control measures that limit housing development.

Table 2-7 contains data on population, estimated population, and annual population growth rates for Wayne and Monroe Counties. Both counties saw similar growth in population during the 1990s.

Table 2-7. Population Growth in Monroe and Wayne Counties in New York State from 1970 to 2020

	Monroe County		Wayne County	
	Population	**Percent Change (in 10-year increments)**	**Population**	**Percent Change (in 10-year increments)**
1970[a]	711,917	--	79,404	--
1980[a]	702,238	(-1.4)	84,581	6.4
1990[a]	713,968	1.7	89,123	5.4
2000[a]	735,343	3.0	93,765	5.2
2010[b]	735,708 (est)	0.0	96,931 (est)	3.4
2020[b]	742,150 (est)	1.0	98,454 (est)	1.6

-- = No data available.
(a) USCB 1995, USCB 2000a
(b) GFLRPC 1997

2.2.8.2 Public Services

Public services include water supply, education, and transportation.

- **Water Supply**

The water system of Monroe County is organized at a county level by the Monroe County Water Authority (MCWA), while Wayne County's water system is organized mainly at a town level. Although there is no available estimate of the percentage of households serviced by private wells in the two counties, officials from the Ontario Water District estimate that no more than a dozen households are serviced by private wells. The two counties have five primary surface potable water sources: Lake Ontario, Hemlock Lake, Canadice Lakes, Third Creek Basin, and Canadaigua Lake. In addition, Lyons Village purchases water from Junius Ponds in Seneca County and draws additional water from two wells that are supplied by the Fairport/Lyons Glacial Stream Channel (RG&E 2002a).

The daily consumption and areas served by the major public water supply districts are listed in Table 2-8. The primary public water service providers in Wayne County are the Ontario Water District and the town of Williamson. The Ontario Water District plans to increase the size of its intake pipes, which would result in a doubling of the intake capacity.

The MCWA has a capacity for 585,825 m^3/day (145 MGD) with a peak usage of 461,770 m^3/day (122 MGD). Presently, the MCWA has enough supply to handle an additional 9200 households. Rochester has its own water system with over 2800 ha (7000 ac) of land in the watershed around Hemlock and Canadice Lakes. The city is permitted to draw, on average, 140,045 m^3/day (37 MGD), with a maximum daily usage of 181,680 m^3/day (48 MGD). If the city needs supplemental water, it purchases from the MCWA.

Table 2-8. Major[(a)] Public Water Supply Systems in Monroe and Wayne Counties in New York State

Water System	County	Source	Permitted Capacity m^3/d (MGD)	Average Daily Demand m^3/d(MGD)	Peak Demand Per Day m^3/d (MGD)	Area Served
MCWA	Monroe	Surficial Aquifer	5.5×10^5 (145)	2.3×10^5 (60)	4.6×10^5 (122)	Monroe County except for City of Rochester
City of Rochester	Monroe	Surficial Aquifer	1.8×10^5 (48)	1.4×10^5 (37)	1.8×10^5 (46.5)	City of Rochester
Ontario Water District	Wayne	Surficial Aquifer	1.3×10^4 (3.5)	7.2×10^3 (1.9)	1.3×10^4 (3.5)	Town of Ontario
Town of Williamson	Wayne	Surficial Aquifer	1.5×10^4 (4.0)	6.8×10^3 (1.8)	1.4×10^4 (3.7)	Town of Williamson
Newark	Wayne	Surficial Aquifer	1.3×10^4 (3.5)	5.3×10^3 (1.4)	7.9×10^3 (2.1)	Newark

(a) Only permitted plants with a treatment capacity greater than 3.785×10^3 m^3/day (1 MGD) are listed in the table.
Source: RG&E 2002a, 2002b

- **Transportation**

There are 13 counties wholly or partially within the 80-km (50-mi) radius of Ginna. The 13-county area is served by a network of interstate freeways including Interstate 90 (I-90), I-390, I-490, and I-81. In addition to interstate freeways, the region's transportation network includes an international airport and a train network. The Port of Rochester, at the mouth of the Genesee River, is also available to a limited number of cargo ships and passenger ferries.

I-90 runs east-west through the region connecting the urban area of Rochester with Buffalo and Syracuse. I-390 enters Monroe County from the south and flows into a beltway system that connects the Rochester suburbs, and I-81 runs through Syracuse along the east side of the 13 counties bordering Ginna. The main east-west transportation routes providing access to Ginna are County Route 101 (Lake Road) and NYS Route 104. Lake Road, a two-lane road, provides direct access to Ginna along much of the southern border of the site. NYS Route 104, the predominant east-west corridor near the plant, runs parallel to Lake Road, approximately 5.8 km (3.6 mi) south of Ginna. Ontario Center Road in the town of Ontario runs north-south, connecting NYS Route 104 to Lake Road immediately south of Ginna. Several other secondary roads run north-south providing access to Lake Road from NYS Route 104. Employees commuting from Monroe County and other points west of Ginna are likely to use NYS Routes 104, 441, or 286 to access Lake Road. 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 (RG&E 2002a).

State roads are rated with a "volume/capacity ratio," which indicates whether the road is being actively used over-capacity (value > 1.0), at-capacity (value = 1.0), or under-capacity (value < 1.0) (RG&E 2002a). In addition, state roads carry "surface score ratings" ranging from a low of "1" (impassable) to a high of "10" (new construction). The highest volume/capacity ratio around Ginna is in Monroe County on a stretch of NYS Route 441 from Route 260 to the Wayne County line. The volume/capacity ratio for this stretch of road ranges from 0.7 to 1.0, which indicates the road is just under- or at-capacity. NYS Route 104 in Monroe County between the Wayne County line and NYS Route 250 has a surface score rating of 5 (i.e., "high-poor" condition), which is the lowest rating of the state roads surrounding Ginna. This is primarily a reflection of the high volume on this stretch of road due to people working for Xerox in Webster and for people commuting to Rochester. In addition, the surface ratings of NYS Route 350 near Ginna and NYS Route 441 between Route 260 and the Wayne County line are rated between 5 and 6; however, most of the state road surfaces in the area are rated around 7 (i.e., "good" condition) (RG&E 2002a).

The Greater Rochester International Airport is located in southwest Rochester just off of I-390, approximately 32 km (20 mi) from Ginna. A primary passenger railway, operated by Amtrak, runs east-west approximately 21.6 km (13.5 mi) south of Ginna. In addition, the Ontario Midland Railroad, a local privately owned "shortline" that feeds into the CSX Transportation lines, operates both passenger and freight service. The east-west portion of the "T" runs approximately 5 km (3 mi) south of Ginna from Webster to Wolcott. The north-south portion of the track runs from Sodus to Newark, 26 km (16 mi) east of Ginna. RG&E owns a corridor of property from the railroad mainline track; however, no track has been built on this corridor (RG&E 2002a).

The Port of Rochester, located on Lake Ontario at the mouth of the Genesee River, was decommissioned as a commercial port in 1980. It now is used by only two cruise ships in the summer. In addition, a cement freighter passes by the Port, but docks farther south on the Genesee River at a cement plant (RG&E 2002b). In recent years the City of Rochester has invested millions of dollars into infrastructure improvements to the port as part of the City's Local Waterfront Revitalization Program. The program involves redeveloping about 11 ha (28 ac) of land and includes the construction of new streets, pedestrian amenities, a new bridge, boat marinas, and infrastructure to support a high-speed ferry operation between Rochester and Toronto, Canada (City of Rochester 2002).

2.2.8.3 Offsite Land Use

Wayne and Monroe Counties are located along Lake Ontario's south shore. The Genesse Finger Lakes Regional Planning Council produces an annual report that contains land-use coverage data based on remote sensing satellite imagery. The results of the 1999 study are found in Table 2-9 (GFLRPC 2001). The Council notes that eastern Monroe and western Wayne Counties are among the fastest growing areas in the region. The following are discussions of land use in each of these two counties.

Table 2-9. Land Use in Wayne and Monroe Counties in New York State

	Wayne County			Monroe County		
Land Use	Square Kilometers	Square Miles	Percent of Total	Square Kilometers	Square Miles	Percent of Total
Water	29.5	11.4	2.0	20.9	8.1	1.0
Urban/Built Up	11.1	4.3	1.0	125.6	48.5	7.0
Forested Areas	821.7	317.4	52.0	517.8	200.0	30.0
Fields	722.1	278.9	45.0	1061.5	410.0	62.0
Total	1584.4	612.0	100.0	1725.8	666.6	100.0

Source: GFLRPC 2001

- **Wayne County**

Wayne County is rich in agriculture, with approximately 840 farms present in 1997. Although the acreage used in farming dropped from 77,423 ha (191,309 ac) to 67,662 ha (167,190 ac) between 1987 and 1997, the county ranks forty-third nationwide in the number of acres dedicated to orchards (255 farms). Other primary crops include corn (358 farms), hay and other grains (342 farms), beef and milk cows (223 farms), oats, potatoes, and vegetables. The land within 8-km (5-mi) radius of Ginna is used principally for growing apples, cherries, grapes, and field crops (RG&E 2002a).

Most of the Wayne County land that is farmland, pastures, grassland, and other areas of non-forested vegetation would be included in the "Fields" category in Table 2-9. The amount of land made up of low-density, large-lot residential developments has increased in recent years, particularly along the west side of the county within a short commute distance from Rochester. There has been relatively little retail or commercial growth. This is also evident from the annual land use census conducted by RG&E to determine land-use changes and identify the nearest gardens and locations of milk animals used for commercial production within 8 km (5 mi) of the station (RG&E 2002d). The NYS Route 104 corridor has been the primary conduit for this growth. In Table 2-9, residential land would be part of the land use categories "Forested Areas," which are all areas with moderate to dense tree coverage, and "Urban/Built Up" land, which includes developed areas as well as roads and parking lots (GFLRPC 2001).

Wayne County is composed of 15 towns, each with an elected Town Supervisor. According to Wayne County Department of Development, the Wayne County towns abutting Lake Ontario do not have any restrictive ordinances placed on growth and development, and there is no reason to suspect that there will be limitations placed on building in the vicinity of Ginna in the foreseeable future (RG&E 2002a).

- **Monroe County**

Monroe County is more developed and industrialized than Wayne County and is home to Rochester, the third largest city in New York State. Monroe County comprises 19 towns, 10 villages, and the city of Rochester. The New York State Constitution grants all cities, towns, and villages the right of "home-rule" power; therefore, county-level, land-use planning is very limited. The county sees its role as very minimal in land-use planning and does not have any restrictions to growth. Recently, however, Monroe County provided $2 million from a tobacco settlement to leverage other local and state funding for the purpose of open space preservation. The suburban towns, however, must initiate the open space actions (RG&E 2002a).

The town of Webster in eastern Monroe County is the fastest growing municipality in the county. It had 14 major projects out of 123 major projects proposed in Monroe County in 2001. The town issued 227 building permits, which accounted for 16 percent of all permits issued in Monroe County that year. Townhouses and apartments comprised 57 percent of these permits (RG&E 2002d). Lot sizes for single family residences are a minimum of about 0.2 ha (0.5 ac), but the average size is 1.2 ha (3.0 ac) because of the lack of sewer systems. Recently, the town of Webster defeated a ballot measure that would have provided funds to preserve 1214 ha (3000 ac) as open space, although there is an ongoing effort to identify and retain farm properties in agriculture using tax incentives with the purchase of development rights. The MCWA is planning to expand capacity on the east side of the county with a new intake line into Lake Ontario.[a]

The city of Rochester has declined in population over the last two decades, due to declining household size and movement to the suburbs. No restrictions on growth are in place in Rochester. The town of Webster, which is the town closest to Ginna in Monroe County, passed a comprehensive plan to control building zones and development in 1998; however, there are no growth control measures in place (RG&E 2002a).

2.2.8.4 Visual Aesthetics and Noise

Ginna is located in Wayne County just off the south shore of Lake Ontario. The Ginna site occupies an area of 197 ha (488 ac) and includes 0.6 km (1.5 mi) of shoreline. The topography of the site is either flat or gently rolling. The land in the area increases in elevation to the south, from about 78 m (255 ft) above mean sea level (msl) near the edge of the lake; to 134 m (440 ft) at Ridge Road about 5.6 km (3.5 mi) south of the plant; to 488 m (1600 ft) at the northern edge of the Appalachian Plateau, about 56 km (35 mi) to the south. Southward from NYS Route 104, the terrain progressively roughens, with a series of small abrupt hills commencing about 16 km (10 mi) south of the site (RG&E 2002a).

Surface-water features onsite include Mill Creek, which enters the site from the south, and Deer Creek, which enters the site from the west. Both 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 onsite. Approximately half of the site is leased and currently being used for agricultural production, primarily apple orchards and, to a lesser degree, corn and hay fields. Another quarter 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 104 ha (256 ac) enclosed within the security fences (RG&E 2002a).

Approaching from the south on State Road 350, the Ginna site is not visible until approximately 1 km (0.6 mi) from the main entrance of the site. The view of the plant is fairly well blocked by woods and vegetation from the southwest and southeast. However, the transmission lines from the plant are visible from greater distances due to their elevation.

From Lake Ontario, the plant is visible from the north with limited visibility directly east and west. Many upscale homes have been built on Lake Ontario, but few are in sight of the plant. The

(a) Discussion with Gary Kleist, Commissioner of Public Works, Webster, New York (October 6, 2002).

lights from the plant, however, are noticeable to residents along the lake several miles from the plant, particularly in the winter when the light is reflected off snow on the ground. Noise from Ginna, at locations on the plant site, is barely noticeable except very close to the reactor containment building.

The immediate area around the site is rural. There are no substantial population centers, industrial complexes, airports, transportation arteries, or parks within a 4.8-km (3.0-mi) radius of Ginna, and the only recreational facility within this radius is the Bear Creek boat ramp, about 2.4 km (1.5 mi) from the site. The largest municipality within 16 km (10 mi) of Ginna is Webster, located in Monroe County, and approximately 11 km (7 mi) west-southwest of Ginna. Webster Park, a 223-ha (550-ac) Monroe County park on the south shore of Lake Ontario, is approximately 10 km (6 mi) west of the site. The nearest wildlife refuge is the Montezuma Wetlands Complex, located approximately 56 km (35 mi) from the Ginna site, in southeastern Wayne County. This complex is composed of 15,000 ha (36,000 ac) of marshes, forested wetlands, old fields, meadows, farm fields, and woodlands under Federal, State, and private control (RG&E 2002a).

2.2.8.5 Demography

- **Resident Population Within 80 km (50 mi)**

Population was estimated from the Ginna site out to 80 km (50 mi) in 16-km (10-mi) annular rings. An estimated 581,745 people live within 32 km (20 mi) of Ginna, and 1.25 million people live within 80 km (50 mi) (USCB 2000b). The largest population center within a portion of the 16-km (10-mi) area is Webster (town population 37,926 and village population of 5216) (USCB 2000b). Between 1990 and 2000, the Wayne County population grew by about 5 percent (which was the same growth rate as New York State during these years). The Monroe County population grew by about 3 percent.

- **Workforce**

The economy in Wayne County is much more closely linked to Ginna activities than Monroe County, as RG&E is one of the largest employers in Wayne County and pays more in property tax than any other single tax paying entity. The largest employer in Wayne County is the county government itself. In addition to the county and Ginna, most other larger employers are moderately sized manufacturing plants, including Garlock (manufacturing gaskets, seals, and rubber goods), Parker Hannifin Corporation (manufacturing refrigeration and air-conditioning products), and IEC Electronics (assembling electronic parts for computers) (WCEDC 1996). The Ames department stores were also a major employer in the area until their closure in 2002. This closure is expected to have a negative impact on the economy of Wayne County, not only because of the loss of employment from its three stores, but also because it was one of the primary sources of sales tax revenue in the county. Wayne County has relatively few sources of sales tax revenue, as most of the larger retail centers are found in neighboring counties. The Wayne County economy is also struggling with the recent downsizing of IEC Electronics which went from 1300 employees in 1996 to approximately 200 in 2002.[a]

One factor that could potentially counter some of the negative impact from recent business closures and downsizing in Wayne County is its recent designation as an "Empire Zone" by the State of New York. The Empire Zone classification entitles the county to reduce certain State taxes on businesses that choose to site themselves in the county. The State also provides, as part of its Empire Zone program, a certain amount of funding to the county to attract new businesses to the area.[a]

Table 2-10 presents information on the major employment sectors and number of employees for Wayne and Monroe counties.

Table 2-10. Major Employment Sectors in Wayne and Monroe Counties in New York State (2000)

	Number of Employees	
Employment Sector	**Wayne**	**Monroe**
Services	15,280	150,960
Retail trade	7,400	60,380
Manufacturing	7,400	81,140
Agriculture	1,780	11,320
Construction	1,020	13,440
Other	13,860	43,930
Unemployed	2,560	16,230
Total jobs – full- and part-time	49,300	377,400

Source: RG&E 2002a

- **Transient Populations**

During the summer months, the lakeside population increases by about 500 people within a 8-km (5-mi) radius of the plant site and by about 4000 people within a 32-km (20-mi) radius.

(a) Discussion with Jim Armstrong, Wayne County Economic Development Corporation (November 4, 2002).

The nearest group of houses are summer cottages located 1.3 km (0.8 mi) west of the site. Other than the summertime residents of the area, there are no large groups of transients within 8 km (5 mi) of Ginna (RG&E 2002a).

- **Migrant Labor**

Migrant farm workers are individuals whose employment requires travel to harvest agricultural crops. These workers may or may not have a permanent residence. Some migrant workers may follow the harvesting of crops, particularly fruit, throughout the northeastern U.S. rural areas. Others may be permanent residents near Ginna who travel from farm to farm harvesting crops.

Migrant workers can be members of minority or low-income populations. Because they travel and can spend a significant amount of time in an area without being actual residents, migrant workers may be unavailable for counting by census takers. If uncounted, these workers would be "underrepresented" in U.S. Census Bureau (USCB) minority and low-income population counts (RG&E 2002a).

Wayne County does have a migrant labor population, with most of these workers arriving after May and staying through October, primarily for the apple-picking season. Approximately 115 farm-worker camps of five or more persons are scattered throughout Wayne County, with a total population of about 4400 workers. Information from Rural New York Farmworker Opportunities shows that there are about 12 camps with about 130 migrant workers located in the vicinity of the Ginna site (RG&E 2002a).

The majority of the migrant farm laborers in rural New York state come from Mexico and speak Spanish. In addition, there are several hundred Haitian workers, and other workers come from Jamaica, Puerto Rico, Guatemala, Honduras, and other countries in the Caribbean and Central America. There are also some African-American migrant workers who come to New York state from Florida.[a]

There are an estimated 1000 children of migrant workers, ranging in age from infants to 21, who qualify for the migrant education program in Wayne County. Some workers and their families are in the county for as long as 9 months, but the vast majority are present for a relatively short time (usually from the end of August until October). Also, there are some

(a) Cornell Migrant Program. Personal communications (e-mail) with Kay Embrey, Senior Extension Associate, Department of Human Development, College of Human Ecology, Cornell University, Alton, New York (October 30, 2002).

seasonal (as opposed to migratory) workers who live in Wayne County all year and work on the farms doing many of the same seasonal tasks as the migrant workers.[a]

2.2.8.6 Taxes

Property taxes are used to fund schools, police and fire protection, road maintenance, and other municipal services. Property taxes may be levied by counties, cities, towns, villages, school districts, and special districts. Ginna is located in the town of Ontario, Wayne County, and the Wayne Central School District. RG&E tax payments for Ginna to these jurisdictions are detailed in Table 2-11. Tax payments for Ginna averaged 13.2 percent of the total revenue collected and 37.2 percent of total property taxes for Ontario for the period from 1995 to 2001 (RG&E 2002a).[b] Ginna accounted for a smaller proportion of the Wayne County total revenue, an average of 2.0 percent of the total revenue and 6.4 percent of total property taxes for the same period. Ginna accounted for an average of 12.4 percent of the total revenue for the period 1995 through 1999 for the Wayne Central School District (RG&E 2002a).

Over time, tax payments from Ginna constitute a decreasing percentage of each taxing entity's revenues and budgets. RG&E expects this trend to continue into the future, and with respect to the town of Ontario and Wayne Central School District, this trend is approaching a level that is 10 percent or less of the taxing jurisdiction's total revenue. In an agreement with the three taxing jurisdictions, the assessed value of the facility will be reduced by $13 million per year through 2009. While this reduction does not directly translate to a percentage reduction in taxes, it does suggest that these levels will continue to decline, as shown in Table 2-11.

(a) Cornell Migrant Program. Personal communications (e-mail) with Kay Embrey, Senior Extension Associate, Department of Human Development, College of Human Ecology, Cornell University, Alton, New York (October 30, 2002).

(b) Tax payments for Ginna as a percentage of the town budget would be significantly higher than percentage of total revenue, as the total revenue includes fees collected for dedicated funds, such as the water fund and debt service. In 2001, the town of Ontario's budget for items supported by taxes totaled $3.9 million dollars. The total amount paid by RG&E for Ginna to the town was $700,000 or approximately 18 percent of the budget (Discussion with Richard Clark, Town of Ontario Supervisor, November 6, 2002.)

Table 2-11. Property Taxes Paid to the Town of Ontario, Wayne County, and Wayne Central School District in New York State by RG&E for R.E. Ginna Nuclear Power Plant

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

Source: RG&E 2002a
NA = not applicable

There is relatively little tax revenue generation from sales tax in Wayne County due to the low number of retail centers in the county. The tax revenue generated by property taxes makes up a significant portion of the overall revenue generated by Wayne County and the town of

Ontario. Despite the fact that most property in the county is used for agricultural purposes, most of the property tax revenue comes from the residential sector (nearly 70 percent). The tax revenue generated by Ginna alone makes up about 6 percent of property tax revenues, while all other commercial properties generate approximately 10 percent of the property revenues for the county.[a]

2.2.9 Historic and Archaeological Resources

This section discusses the historic and archaeological background of the Ginna site and the surrounding area.

2.2.9.1 Historic and Archaeological Background

There is evidence that Native American populations lived and foraged in what is now Wayne County from at least 10,000 B.C. until they were displaced by Euro-American populations in the late eighteenth and early nineteenth centuries (Secor 1987). However, known archaeological sites are sparse in the area immediately south of Lake Ontario. In most periods, this area seems to have been used temporarily for hunting, gathering, and fishing. Larger, more permanent settlements tended to be located farther south.

Paleoindian hunters appear to have been attracted to the tundra and spruce woodland environment characteristic of the area by the presence of large game animals such as mammoth and bison. They preferred to make their hunting camps on well-drained hills or rises. The fluted chipped stone projectile points that mark this period have been found near Savannah in southeastern Wayne County (Secor 1987). By 8000 B.C., deciduous forests associated with smaller game had spread into the area around Lake Ontario. Early and Middle Archaic (7000 to 4000 B.C.) populations adapted to these new resources by taking a wider variety of game and by using a greater variety of smaller stone tools. By the end of the Middle Archaic (4000 B.C.), the area was part of the Lake-Forest biome and the associated Lake-Forest culture area. At this time, fishing and forest hunting and gathering provided the subsistence base for small, mobile bands. This more efficient exploitation of the environment allowed Archaic groups to remain in larger camps for longer periods of time (Funk 1978). By 3000 B.C., the area around Lake Ontario was home to essentially modern fauna. Archaeological sites from the period yield thick, parallel-sided projectile points and, by 3000 B.C., ground stone axes and adzes. During the Late Archaic Meadowood Phase (4000 to 1500 B.C.), small habitation sites with circular houses are found along sizable streams, suggesting the continuing dependence of small bands on fishing (Tuck 1978a).

(a) Discussion with Robert Diener, Director of Real Property Tax Service, Wayne County, New York (November 4, 2002).

The appearance of pottery at about 1000 B.C. marks the onset of the Early Woodland Period (1000 B.C. to A.D. 100). Experiments with plant domestication, greater sedentism, and larger settlements characterize this period. The typical Early Woodland settlement pattern is one of larger base settlements and dispersed smaller camps associated with the seasonal exploitation of specific resources. The evidence from Wayne County suggests small-scale hunting and fishing camps. Larger settlements were located farther south and to the west along the Genesee River (Versaggi 1999).

During the Middle Woodland Period (A.D. 100 to 1000), intensive hunting and fishing continued in the Lake-Forest Zone, with an emphasis on fishing. Horticulture based on maize, beans, and squash was introduced to the area by A.D. 1000 and was practiced along with foraging. The earliest horticultural villages that have been discovered still retain good access to streams and other water sources.

During the Late Woodland Period, the antecedents of the historical Iroquois tribes begin to emerge out of the Middle Woodland traditions. The Owasco phases begin around 1000 and the Iroquois phases begin around 1350. The Seneca appear to have developed in an area stretching from the Genesee River Valley to Seneca Lake that reaches north to Lake Ontario including Wayne County. Beginning with small, seasonally occupied campsites situated on knolls and terraces along the Genesee River, the increased reliance on horticulture led to the consolidation of settlement into larger, palisaded, hilltop hamlets after 1350 (Niemczycki 1984). These semi-sedentary villages included longhouse-like dwellings, thought to have provided communal shelter for extended, probably matrilineal families (Tuck 1978b), and cemeteries. Archaeological investigations along the Genesee River suggest a post-1450 settlement pattern composed of pairs of large agricultural villages located well south of the lake that changed location about every 20 years, associated with a large number of smaller special-use camps (Wray et al. 1991).

By 1550, five Iroquois nations, including the Seneca and their eastern neighbors the Cayuga, had formed a league or confederacy. After European contact, the Iroquois became increasingly dependent on European metal goods, which they obtained through trade for furs. After depleting the supply of beaver in their own lands, the Iroquois sought to control the fur trade passing through their lands. They actively resisted the activities of French fur traders along the Great Lakes, expanded their control over neighboring Native American groups, and sent war parties great distances to take captives and to maintain control of trade routes and trade (Abrams 1976). In 1687, the French reacted by burning the main Seneca villages. The Seneca sought refuge with the Cayuga and eventually established more dispersed communities closer to the Cayuga, east of the Genesee Valley and west of Canandaigua Lake, well inland from Lake Ontario (Niemczycki 1984).

The Iroquois' enmity with the French caused them to ally with the British, whom they supported in colonial conflicts. Initial agreements with British colonial governments recognized the claims of six Iroquois nations to northwestern Pennsylvania and western New York. Constant warfare with European powers and an influx of smallpox eventually diminished the Seneca population. During the American Revolution, the Iroquois were initially neutral, but eventually sided with the British. The colonies sent troops into western New York to subdue the Iroquois League. The Treaty of Fort Stanwix in 1784 acknowledged the American victory but reserved for the Iroquois much of western New York. About a third of the reserve, including the Wayne County area, was acquired by land speculators Oliver Phelps and Nathaniel Gorham in 1787, thus opening up the area to Euro-American settlement. By 1797, the Seneca had lost control of all but 11 relatively small parcels of their land. By 1802, when their lands had been further reduced, the Seneca had become increasingly Americanized. Longhouses no longer marked their settlements, and individuals began to own land. The number of Seneca in western New York further declined as a result of the Indian Removal Act of 1820, but a core population remained. Today, they own four reservations in New York state (Abrams 1976).

Euro-American settlement increased dramatically after the Revolutionary War. At the conclusion of the war, both Massachusetts and New York held territorial claims to western New York state. In a compromise settlement, Massachusetts relinquished claims to sovereignty over territory in exchange for the authority to sell the right to acquire land from the Iroquois. Phelps and Gorham purchased these rights for a large section of western New York. They had the land surveyed and divided into tracts for sale, and then sold their rights to this area to the Pultney of London Company in 1801 (Scully-Hill 1993). The first Euro-American settlers arrived in the Wayne County area in 1789. Finding the area thickly forested, they first settled along the lakeshore. Lake Ontario served as their main transportation route until the Erie Canal was built in 1823. The town of Ontario was formed in 1807, and Wayne County was formed in 1823.

Lakeshore property, such as that now occupied by Ginna, was the first to be settled and cleared. Although the area was eventually farmed, small-scale industry arose along the lake during the clearing process. Noah Fuller discovered a salt spring on Smoky Point, and salt production began there in 1810 (McIntosh 1975). With plenty of wood for fuel, brick kilns are said to have been located in the same vicinity, where bricks were produced for the Brick Church located on Ontario Center Road about a mile south of Ginna.[a] Hematite deposits that crop out south of the Ginna site between Lake Road and Ridge Road were first recognized in 1811. Surface mining and iron production were underway in the area by 1820. The first blast furnace was built in 1835. The large Furnaceville Iron Company furnace went into production in 1880.

(a) Personal communication (e-mail) with Ray Todd, Ontario Historical and Landmark Preservation Society, Ontario, New York (November 6, 2002).

This new large furnace triggered a mining boom. Ontario became a mining town and remained so until the end of World War I. The pits left from the mining activity filled with water and served as reservoirs until 1953. Hematite continued to be mined as pigment for a local paint mill until 1948 (Scully-Hill 1993). The transmission line right-of-way from Ginna appears to pass through the mining area before reaching Substation 204. After the decline of mining and iron production, Ontario returned to its rural character, which it retains today.

In the early part of the 20th century, during the Country Place Era of American architecture, the stretch of shoreline now occupied by Ginna attracted Rochester residents seeking a summer retreat. Beginning as early as 1907, at least 11 summer cottages, known as the Gates Grove Cottages, were built along the lakeshore on the western end of the Ginna property. The area is currently wooded, and three cottages remain. In 1913, Laura Ellwanger, daughter-in-law of prominent Rochester businessman and horticulturalist George Herman Ellwanger, purchased approximately 31 ha (77 ac), on which she built a summer residence called Brookwood. The estate included a Tudor Revival "manor house," a carriage house, pool, extensive gardens, and other out-buildings.[a]

The Brookwood Estate, the neighboring Bailey Farm, and adjacent parcels were acquired by RG&E for the site of a nuclear power plant in 1958 (Hammer 1967). Ground was broken for Ginna (initially called Brookwood) in 1966. The plant was substantially completed in 1969 and became operational in 1970. Most of the structures constructed for the plant are located on the former Bailey Farm.

2.2.9.2 Historic and Archaeological Resources at Ginna Site

Ginna is currently located on a 197-ha (488-ac) parcel of land on the shores of Lake Ontario. Roughly a quarter of the land has been developed for the power plant itself and ancillary structures. About half the land is leased for agricultural use, and the remaining quarter has been left relatively undisturbed and consists of open fields, shrub-brush, and trees. Two streams, Deer Creek and Mill Creek, drain the area and empty into the lake just east of the plant. These resources are likely to have made this part of Wayne County attractive for human use in both prehistoric and historic times. While no archaeological sites have been recorded at Ginna, archaeological sites have been found along both creeks in relative proximity to the site. The New York State Historic Preservation Officer (SHPO) states that the Ginna property is located in an archaeologically sensitive area.[b]

(a) Personal communication (e-mail) with C. Howk, Landmark Society of Western New York, Rochester, New York (January 9, 2003).

(b) Personal communication (e-mail) with Nancy Todd, New York State Office of Parks, Recreation, and Historic Preservation, Waterford, New York (December 27, 2002).

Iroquoian Native American tribes were contacted by letter to determine the area's traditional cultural importance (see Appendix C). Of these, the Seneca Nation of New York responded. The Seneca consider the location and area of the Ginna site to be part of their traditional range and to be culturally highly sensitive (Mitchell and Maybee 2002).

During 1958, RG&E acquired 137 ha (388 ac) for the construction of Ginna. During planning and construction of the plant, care was taken to preserve the rural character of the area. The Brookwood Manor House, four original farm houses with barns located along Lake Road, and the Gates Grove Cottages were preserved. The SHPO considers the Brookwood Estate to embody the distinctive characteristics of the Country Place Era and to be eligible for inclusion in the National Register of Historic Places (NRHP). The four farms on Lake Road all appear on the 1858 plat of the area and were initially occupied by pioneer Ontario families. The Bailey Farm belonged to the Hodges family, which first arrived in Ontario in 1811, while the remaining farms came to be owned by the Gates family, who came to Ontario as early as 1816. The existing farm houses range in date from 1866 to 1920 (Kemmet 2002). In the opinion of the SHPO, the farms are not eligible for listing on the NRHP. The Gates Grove Cottages are not owned by RG&E, although it does own the property. These cottages are likewise not considered eligible for listing on the NRHP.[a]

There are two historic properties in the town of Ontario currently listed on the NRHP. Brick Church Corners, also known as Ontario Heritage Square, is a historic district located at the intersection of Brick Church and Ontario Center Roads about a mile south of Ginna, and just east of the transmission line right-of-way. This 121-ha (300-ac) district includes eight early- to mid-19th-century structures. The second is the First Presbyterian Church of Ontario Center located 4.8 km (3 mi) south of Ginna at 1638 Ridge Road in Ontario Center. It is noted for its period (1900 to 1924) Tudor Revival architecture. Three other historic sites, located between 1.6 to 3.2 km (1 to 2 mi) from Ginna, may be eligible for listing on the NRHP: the Albright School (SHPO A117-08-002), Bear Creek Harbor (SHPO A117-08-0026), and Furnaceville (SHPO A117-08-0028).[a] These sites are all associated with the development of the community of Ontario.

2.2.10 Related Federal Project Activities and Consultations

The staff reviewed the possibility that activities of other Federal agencies might impact the operation of Ginna during the license renewal term. Any such activities could result in cumulative environmental impacts and the possible need for the Federal agency to become a cooperating agency for preparation of the SEIS.

(a) Personal communication (letter) with Wayne Boyko, Rochester Museum and Science Center, Rochester, New York (January 13, 2003).

There are two major Federal projects planned for the region. In November 2001, the U.S. Congress approved funding for the Port of Rochester Harbor and Ferry Terminal Project, locally known as the "fast ferry." The Port of Rochester is located approximately 24 km (15 mi) west of the Ginna 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. Congress also approved spending money on the planned Center of Excellence in Photonics and Optoelectronics to be located in 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, Coming, the University of Rochester, and the Rochester Institute of Technology). There is also a Federally owned wildlife preserve discussed in Section 2.2.5.

After reviewing the Federal activities in the vicinity of the Ginna plant, the staff determined that there were no Federal project activities that would make it desirable for another Federal agency to become a cooperating agency for preparation of the SEIS.

NRC is required under Section 102 of National Environmental Policy Act of 1969 to consult with and obtain the comments of any Federal agency that has jurisdiction by law or special expertise with respect to any environmental impact involved. NRC consulted with the FWS. Consultation correspondence is included in Appendix E.

2.3 References

10 CFR Part 20. Code of Federal Regulations, Title 10, *Energy*, Part 20, "Standards for Protection Against Radiation."

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, "Early Site Permits; Standard Design Certifications and Combined Licenses for Nuclear Power Plants."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 61. Code of Federal Regulations, Title 10, *Energy*, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

10 CFR Part 71. Code of Federal Regulations, Title 10, *Energy*, Part 71, "Packaging and Transportation of Radioactive Material."

40 CFR Part 81. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 81, "Designation of Areas for Air Quality Planning Purposes."

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3.0 Environmental Impacts of Refurbishment

Environmental issues associated with refurbishment activities are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) 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.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required in this supplemental environmental impact statement (SEIS) unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1 and, therefore, additional plant-specific review of these issues is required.

License renewal actions may require refurbishment activities for the extended plant life. These actions may have an impact on the environment that requires evaluation, depending on the type of action and the plant-specific design. Environmental issues associated with refurbishment that were determined to be Category 1 issues are listed in Table 3-1.

Environmental issues related to refurbishment considered in the GEIS for which these conclusions could not be reached for all plants, or for specific classes of plants, are Category 2 issues. These are listed in Table 3-2.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

Table 3-1. Category 1 Issues for Refurbishment Evaluation

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
SURFACE-WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)	
Impacts of refurbishment on surface-water quality	3.4.1
Impacts of refurbishment on surface-water use	3.4.1
AQUATIC ECOLOGY (FOR ALL PLANTS)	
Refurbishment	3.5
GROUNDWATER USE AND QUALITY	
Impacts of refurbishment on groundwater use and quality	3.4.2
LAND USE	
Onsite land use	3.2
HUMAN HEALTH	
Radiation exposures to the public during refurbishment	3.8.1
Occupational radiation exposures during refurbishment	3.8.2
SOCIOECONOMICS	
Public services: public safety, social services, and tourism and recreation	3.7.4; 3.7.4.3; 3.7.4.4; 3.7.4.6
Aesthetic impacts (refurbishment)	3.7.8

Category 1 and Category 2 issues not applicable to the R.E. Ginna Nuclear Power Plant (Ginna) are listed in Appendix F.

The potential environmental effects of refurbishment actions would be identified, and the analysis would be summarized within this section, if such actions were planned. The Rochester Gas and Electric Corporation (RG&E) indicated that it has performed an evaluation of structures and components pursuant to 10 CFR 54.21 to identify activities that are necessary to continue operation of Ginna during the requested 20-year period of extended operation. These activities include replacement of certain components as well as new inspection activities and are described in the Environmental Report (ER) (RG&E 2002).

However, RG&E stated in their ER that the replacement of these components and the additional inspection activities are within the bounds of normal plant component replacement and inspections; therefore, they are not expected to affect the environment outside the bounds of plant operations for Ginna as evaluated in the final environmental statement (AEC 1973). In

Table 3-2. Category 2 Issues for Refurbishment Evaluation

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53 (c)(3)(ii) Subparagraph
TERRESTRIAL RESOURCES		
Refurbishment impacts	3.6	E
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)		
Threatened or endangered species	3.9	E
AIR QUALITY		
Air quality during refurbishment (nonattainment and maintenance areas)	3.3	F
SOCIOECONOMICS		
Housing impacts	3.7.2	I
Public services: public utilities	3.7.4.5	I
Public services: education (refurbishment)	3.7.4.1	I
Offsite land use (refurbishment)	3.7.5	I
Public services, transportation	3.7.4.2	J
Historic and archaeological resources	3.7.7	K
ENVIRONMENTAL JUSTICE		
Environmental justice	Not addressed[a]	Not addressed[a]

(a) Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. If an applicant plans to undertake refurbishment activities for license renewal, environmental justice must be addressed in the applicant's environmental report and the staff's environmental impact statement.

addition, RG&E's evaluation of structures and components as required by 10 CFR 54.21 did not identify any major plant refurbishment activities or modifications necessary to support the continued operation of Ginna beyond the end of the existing operating licenses. Therefore, refurbishment is not considered in this draft SEIS.

3.1 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

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4.0 Environmental Impacts of Operation

Environmental issues associated with operation of a nuclear power plant during the renewal term are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) 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.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required.

This chapter of the draft supplemental environmental impact statement (SEIS) addresses the issues related to operation during the renewal term that are listed in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, and are applicable to the R.E. Ginna Nuclear Power Plant (Ginna). Section 4.1 addresses issues applicable to the Ginna cooling system. Section 4.2 addresses issues related to transmission lines and onsite land use. Section 4.3 addresses the radiological impacts of normal operation, and Section 4.4 addresses issues related to the socioeconomic impacts of normal operation during the renewal term. Section 4.5 addresses issues related to groundwater use and quality, while Section 4.6 discusses the impacts of renewal-term operations on threatened or endangered species. Section 4.7 addresses potential new information that was raised during the scoping period. The results of the

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

evaluation of environmental issues related to operation during the renewal term are summarized in Section 4.8. Finally, Section 4.9 lists the references cited in the chapter. Category 1 and Category 2 issues that are not applicable because they are related to plant design features or site characteristics not found at Ginna are listed in Appendix F.

4.1 Cooling System

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, that are applicable to the operation of the Ginna cooling system during the renewal term are listed in Table 4-1. Rochester Gas and Electric Corporation (RG&E) stated in its Environmental Report (ER) (RG&E 2002a) that it is not aware of any new and significant information associated with the renewal of the Ginna operating license (OL). The staff has not identified any new and significant information related to operation of the cooling system during its independent review of the Ginna ER, the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information including the State Pollutant Discharge Elimination System (SPDES) permit for Ginna issued by the New York State Department of Environmental Conservation (NYSDEC) (Permit No. NY0000493). Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the staff concluded in the GEIS that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, for each of these issues follows.

<u>Altered current patterns at intake and discharge structures</u>. Based on information in the GEIS, the Commission found that

> Altered current patterns have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of altered current patterns during the renewal term beyond those discussed in the GEIS.

Table 4-1. Category 1 Issues Applicable to the Operation of R.E. Ginna Nuclear Power Plant Cooling System During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
SURFACE-WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)	
Altered current patterns at intake and discharge structures	4.2.1.2.1; 4.3.2.2; 4.4.2
Altered thermal stratification of lakes	4.2.1.2.2; 4.4.2.2
Temperature effects on sediment transport capacity	4.2.1.2.3; 4.4.2.2
Scouring caused by discharged cooling water	4.2.1.2.3; 4.4.2.2
Eutrophication	4.2.1.2.3; 4.4.2.2
Discharge of chlorine or other biocides	4.2.1.2.4; 4.4.2.2
Discharge of sanitary wastes and minor chemical spills	4.2.1.2.4; 4.4.2.2
Discharge of other metals in wastewater	4.2.1.2.4; 4.3.2.2; 4.4.2.2
Water use conflicts (plants with once-through cooling systems)	4.2.1.3
AQUATIC ECOLOGY (FOR ALL PLANTS)	
Accumulation of contaminants in sediments or biota	4.2.1.2.4; 4.3.3; 4.4.3; 4.4.2.2
Entrainment of phytoplankton and zooplankton	4.2.2.1.1; 4.3.3; 4.4.3
Cold shock	4.2.2.1.5; 4.3.3; 4.4.3
Thermal plume barrier to migrating fish	4.2.2.1.6; 4.4.3
Distribution of aquatic organisms	4.2.2.1.6; 4.4.3
Premature emergence of aquatic insects	4.2.2.1.7; 4.4.3
Gas supersaturation (gas bubble disease)	4.2.2.1.8; 4.4.3
Low dissolved oxygen in the discharge	4.2.2.1.9; 4.3.3; 4.4.3
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	4.2.2.1.10; 4.4.3
Stimulation of nuisance organisms	4.2.2.1.11; 4.4.3
HUMAN HEALTH	
Noise	4.3.7

- Altered thermal stratification of lakes. Based on information in the GEIS, the Commission found that

  Generally, lake stratification has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of lake stratification during the renewal term beyond those discussed in the GEIS.

- Temperature effects on sediment transport capacity. Based on information in the GEIS, the Commission found that

  > These effects have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of temperature on sediment transport during the renewal term beyond those discussed in the GEIS.

- Scouring caused by discharged cooling water. Based on information in the GEIS, the Commission found that

  > Scouring has not been found to be a problem at most operating nuclear power plants and has caused only localized effects at a few plants. It is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of scouring during the renewal term beyond those discussed in the GEIS.

- Eutrophication. Based on information in the GEIS, the Commission found that

  > Eutrophication has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of eutrophication during the renewal term beyond those discussed in the GEIS.

- Discharge of chlorine or other biocides. Based on information in the GEIS, the Commission found that

  > Effects are not a concern among regulatory and resource agencies, and are not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of discharge of chlorine or other biocides during the renewal term beyond those discussed in the GEIS.

- Discharge of sanitary wastes and minor chemical spills. Based on information in the GEIS, the Commission found that

  > Effects are readily controlled through NPDES permit and periodic modifications, if needed, and are not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of discharges of sanitary wastes and minor chemical spills during the renewal term beyond those discussed in the GEIS.

- Discharge of other metals in wastewater. Based on information in the GEIS, the Commission found that

  > These discharges have not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems and have been satisfactorily mitigated at other plants. They are not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of discharges of other metals in wastewater during the renewal term beyond those discussed in the GEIS.

- Water-use conflicts (plants with once-through cooling systems). Based on information in the GEIS, the Commission found that

  > These conflicts have not been found to be a problem at operating nuclear power plants with once-through heat dissipation systems.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of water-use conflicts during the renewal term beyond those discussed in the GEIS.

- Accumulation of contaminants in sediments or biota. Based on information in the GEIS, the Commission found that

> Accumulation of contaminants has been a concern at a few nuclear power plants but has been satisfactorily mitigated by replacing copper alloy condenser tubes with those of another metal. It is not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of accumulation of contaminants in sediments or biota during the renewal term beyond those discussed in the GEIS.

- <u>Entrainment of phytoplankton and zooplankton</u>. Based on information in the GEIS, the Commission found that

> Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of entrainment of phytoplankton and zooplankton during the renewal term beyond those discussed in the GEIS.

- <u>Cold shock</u>. Based on information in the GEIS, the Commission found that

> Cold shock has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems, has not endangered fish populations or been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds, and is not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of cold shock during the renewal term beyond those discussed in the GEIS.

- <u>Thermal plume barrier to migrating fish</u>. Based on information in the GEIS, the Commission found that

> Thermal plumes have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of thermal plumes during the renewal term beyond those discussed in the GEIS.

- Distribution of aquatic organisms. Based on information in the GEIS, the Commission found that

  > Thermal discharge may have localized effects but is not expected to effect the larger geographical distribution of aquatic organisms.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of distribution of aquatic organisms during the renewal term beyond those discussed in the GEIS.

- Premature emergence of aquatic insects. Based on information in the GEIS, the Commission found that

  > Premature emergence has been found to be a localized effect at some operating nuclear power plants but has not been a problem and is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of premature emergence of aquatic insects during the renewal term beyond those discussed in the GEIS.

- Gas supersaturation (gas bubble disease). Based on information in the GEIS, the Commission found that

  > Gas supersaturation was a concern at a small number of operating nuclear power plants with once-through cooling systems but has been satisfactorily mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of gas supersaturation during the renewal term beyond those discussed in the GEIS.

- Low dissolved oxygen in the discharge. Based on information in the GEIS, the Commission found that

  > Low dissolved oxygen has been a concern at one nuclear power plant with a once-through cooling system but has been effectively mitigated. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of low dissolved oxygen in the discharge during the renewal term beyond those discussed in the GEIS.

- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses. Based on information in the GEIS, the Commission found that

  > These types of losses have not been found to be a problem at operating nuclear power plants and are not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of losses from predation, parasitism, and disease among organisms exposed to sublethal stresses during the renewal term beyond those discussed in the GEIS.

- Stimulation of nuisance organisms. Based on information in the GEIS, the Commission found that

  > Stimulation of nuisance organisms has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where previously it was a problem. It has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds and is not expected to be a problem during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of stimulation of nuisance organisms during the renewal term beyond those discussed in the GEIS.

- Noise. Based on information in the GEIS, the Commission found that

  > Noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of noise during the renewal term beyond those discussed in the GEIS.

The Category 2 issues related to cooling system operation during the renewal term that are applicable to Ginna are listed in Table 4-2 and are discussed in Sections 4.1.1, 4.1.2, and 4.1.3.

Table 4-2. Category 2 Issues Applicable to the Operation of R.E. Ginna Nuclear Power Plant Cooling System During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
AQUATIC ECOLOGY (FOR PLANTS WITH ONCE-THROUGH HEAT-DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	4.2.2.1.2; 4.3.3	B	4.1.1
Impingement of fish and shellfish	4.2.2.1.3; 4.3.3	B	4.1.2
Heat shock	4.2.2.1.4; 4.3.3	B	4.1.3

4.1.1 Entrainment of Fish and Shellfish in Early Life Stages

Entrainment of fish and shellfish in early life stages at Ginna has been investigated as part of the NYSDEC SPDES Permit (RG&E 2002a) and compared to studies conducted in a similar region of Lake Ontario. Review of impacts due to entrainment continues to be conducted by NYSDEC.

Entrainment sampling of Ginna intake waters for ichthyoplankton (fish eggs and larvae) took place between 1976 and 1981. Over the 6-year sampling program, an estimated annual average of 89 million fish eggs (range of 14 to 168 million eggs) and 17 million fish larvae (range of 7 to 37 million larvae) were entrained. The principal larval species were alewives *(Alosa pseudoharengus)*, smelt *(Osmerus mordax)*, and darters *(Etheostoma* spp.), with alewives the predominant species (RG&E 2002a).

During 1977 and 1978, RG&E conducted additional studies of the ichthyoplankton community in Lake Ontario in the vicinity of Ginna. The fish species found in the lake studies were similar to the entrainment studies conducted at the same time. Alewives were the dominant species in both studies, followed by smelt and johnny darters (*E. nigrum*) (RG&E 2002a).

Cornell University conducted ichthyoplankton studies of Lake Ontario during 1997 and 1998 (Klumb et al. 2003). The results of these studies showed a similar community structure to that found by RG&E during 1977 and 1978. In addition, the studies showed that the community structure along the entire southern shoreline of Lake Ontario was similar to that identified by RG&E in its study. RG&E concluded that entrainment impacts due to the plant's operations during the license renewal period will not be substantially different from those previously evaluated (RG&E 2002a).

Information from these studies has been incorporated into the SPDES permit, and NYSDEC has regularly reviewed and approved the results. NYSDEC has determined that further mitigative efforts are not warranted at this time (RG&E 2002a). Further evaluation of entrainment of the ichthyoplankton community by Ginna is required as part of the NYSDEC SPDES permit program. SPDES permits are renewed every 5 years. The most recent SPDES permit, (Appendix E), which expires in February 2008, requires that RG&E conduct an entrainment study of the aquatic organisms in the station's cooling-water flow in 2003 (NYSDEC 2003a).

The studies by RG&E and others confirm that any impact of operational water withdrawal by Ginna will be on a nearshore fish community that is typical for the southern shoreline of Lake Ontario. Ginna operations only affect a small region of the southern shoreline of the lake. Thus, RG&E concluded in the ER that Ginna operations will have a negligible impact on the identified species.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the NYSDEC, the scoping process, and other public sources. Using this information, the staff evaluated the potential impacts due to entrainment of early life stages of fish and shellfish by continued operation and maintenance of Ginna. It is the staff's preliminary conclusion that the potential impacts due to entrainment of fish and shellfish in early life stages during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on the assessment to date, the staff expects that the measures in place at Ginna (e.g., placement of the intake structure) provide mitigation for impacts related to entrainment, and no new mitigation measures are warranted.

4.1.2 Impingement of Fish and Shellfish

Impingement has been extensively monitored and impingement impacts evaluated at Ginna each year since 1973. NYSDEC has required submittal of annual reports on impingement monitoring as part of Ginna's SPDES permit. From 1997 through 2001, on average, over 625 fish per billion liters (165 fish per billion gallons) of water were impinged at Ginna. Table 4-3 lists the principal species collected in the impingement program. The three most common species impinged are all introduced species to Lake Ontario.

Table 4-3. List of the Fish from Lake Ontario Impinged at the R.E. Ginna Nuclear Power Plant from 1997 Through 2001 (RG&E 2002b)

		Average Fish Impingement Rate		Percent of Individuals Collected
Scientific Name	**Common Name**	**(Fish per Billion Liters)**	**(Fish per Billion Gallons)**	**(Average over 5 years)**
Gasterosteus aculeatus	threespine stickleback	281.04	(74.25)	44.93
Osmerus mordax	rainbow smelt	132.93	(35.12)	21.25
Alosa pseudoharengus	alewife	118.85	(31.40)	19.00
Notropis hudsonius	spottial shiner	29.90	(7.90)	4.78
Cottus bairdi	mottled sculpin	11.58	(3.06)	1.85
Micropterus dolomieui	smallmouth bass	10.79	(2.85)	1.72
Cottus cognatus	slimy sculpin	9.27	(2.45)	1.48
Salvelinus namaycush	lake trout	7.87	(2.08)	1.26
Dorosoma cepedianum	gizzard shad	6.62	(1.75)	1.06
Noturus flavus	stonecat	3.75	(0.99)	0.60
	All other species	13.02	(3.44)	2.07

Impingement impact assessments for Ginna have been developed over the years in consultation with NYSDEC. For alewife and smelt, the total annual projected number impinged is compared to the Lake Ontario (New York state 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. Because lake population information is not available for other species, a qualitative approach must be used, primarily using information provided by NYSDEC.

Based on information collected from 1983 through 2001, Ginna has impinged an estimated 0.001 percent of the alewife population and 0.0008 percent of the smelt population in Lake Ontario. These impingement losses are considered negligible in relation to the lake populations for both species. Using the maximum values, these findings show that only about three alewives for every 100,000 in the New York state waters of Lake Ontario, and three smelt for every 100,000 in the New York state waters, would be impinged. The most recent RG&E Impingement Program Report concluded that the impingement impact per year for alewife and smelt is very low and must be considered negligible (RG&E 2002b).

Impingement impact determinations regarding other species are limited to qualitative evaluations because there are no estimates of their populations within Lake Ontario. Section 2.2.5 discusses the overall lakewide reductions in fish populations as reported by NYSDEC through their annual assessments within the Eastern Basin of Lake Ontario. Correspondingly, Ginna impingement numbers have declined substantially throughout the past 29 years.

The alewife and smelt impingement data indicate that the percentage of the lake population impinged is fairly constant and correlates with abundance in the lake. NYSDEC studies since 1976 have shown that the alewife and smelt populations in Lake Ontario have declined. This is consistent with the impingement data, which show generally decreasing numbers, similar to what is being reported for the lake overall.

Impingement studies have consistently demonstrated that Ginna 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 on these facts, RG&E concluded in the ER that impingement impacts from Ginna operations during the license renewal period will not be substantially different from those previously evaluated and approved within the SPDES permit process (RG&E 2002a). The current SPDES permit includes similar requirements on assessing impingement, including annual reports on the impingement monitoring reports, and does not call for mitigative efforts at this time (NYSDEC 2003a).

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the NYSDEC, the scoping process, and other public sources. Using this information, the staff evaluated the potential impacts due to impingement of fish and shellfish by continued operation and maintenance of Ginna. It is the staff's preliminary conclusion that the potential impacts due to impingement of fish and shellfish during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is

considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on the assessment to date, the staff expects that the measures in place at Ginna (e.g., the offshore, underwater intake) provide mitigation for all impacts related to impingement, and no new mitigation measures are warranted.

4.1.3 Heat Shock

The issue of heat shock to fish and shellfish resources from thermal discharges into Lake Ontario has been investigated by RG&E in support of the Clean Water Act Section 316(a) variance for Ginna (RG&E 1977) and in compliance with subsequent NYSDEC SPDES permits (RG&E 2002a). Of primary concern is the impact of heat shock on impinged fish that are returned to the discharge canal and subsequently into Lake Ontario. In addition to heat shock, fish impinged at Ginna are subjected to the stress of being impinged on the intake screen and passage through the fish return system.

Heat shock to fish is a function of the temperature increase that the fish are subjected to in the discharge canal and the residence time of the fish in the elevated temperatures of the discharge flow (Fry 1971; Dean 1973). Residence time at Ginna is determined by the discharge velocity and the distance that the fish have to travel before reaching cooler temperatures. Discharge velocities in the area where the impinged fish are returned range from 0.6 to 1.5 m/s (2.0 to 5.0 fps). The distance that the fish have to travel before reaching the point of entry into the lake, and ambient water temperatures, is about 30 m (100 ft). Thus, the residence time the fish would be in elevated temperatures is approximately 20 to 50 seconds. RG&E concluded that a fish subjected to discharge temperatures for less than a minute would not be adversely affected. There are areas within the discharge canal that can reach upper lethal threshold temperatures for representative fish. However, the residence time for even a fish that becomes disoriented from the heat would be less than would be expected to cause death (RG&E 2002a). This conclusion is further supported in a recent review by Beitinger et al. (Beitinger 2000) concerning temperature tolerances of North American freshwater fishes that includes many of the representative important species identified for Ginna.

The Ginna 316(a) Demonstration Supplement (RG&E 1977) discussed the potential of heat shock to impinged fish and concluded:

> 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.

Since 1985, NYSDEC has approved the conclusion in the Ginna 316(a) Demonstration Supplement in the SPDES permit for the operation of Ginna. The current SPDES permit states:

> 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.

Further evaluation of heat shock on impinged fish returned to the discharge canal may be required as part of the NYSDEC SPDES permit program. NYSDEC issued a proposed modification to the SPDES permit for review and comment that would require RG&E to conduct an assessment of the potential for increased mortality to impinged fish returned to the discharge canal due to thermal stress (NYSDEC 2003c). This study, if incorporated into the SPDES permit, would be required to be completed in 2004, at which time NYSDEC would determine whether additional mitigation is required.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the NYSDEC, the scoping process, and other public sources. Using this information, the staff evaluated the potential impacts to aquatic resources due to heat shock during continued operation and maintenance of Ginna. It is the staff's preliminary conclusion that the potential impacts to aquatic resources due to heat shock during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on the assessment to date, the staff expects that the measures in place at Ginna (e.g., design and placement of the discharge) provide mitigation for all impacts related to heat shock, and no new mitigation measures are warranted.

4.2 Transmission Lines

The *Final Environmental Statement Related to Operation of Ginna Nuclear Power Plant Unit 1, Rochester Gas and Electric Corporation* (AEC 1973) describes four transmission lines running in the same right-of way that connect Ginna with the transmission system. This transmission line right-of-way covers approximately 85 ha (210 ac) over a total length of approximately 5.6 km (3.5 mi). Tree trimming is normally only required at mid-span. Herbicides are used occasionally, primarily applied to individual trees or shrubs to prevent re-sprouting. Mowing is used only to provide access to individual towers when needed. The applicant uses only non-restricted-use herbicides, and these are applied under the supervision of licensed pesticide applicators. Buffer strips are left adjacent to wetlands and stream crossings. RG&E has a New York State Public Service Commission-approved long-range vegetation management plan for its transmission line rights-of-way (RG&E 1995).

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to transmission lines from Ginna are listed in Table 4-4. In the Ginna ER, RG&E stated that it is not aware of any new and significant information concerning the transmission lines or right-of-way maintenance for the Category 1 issues associated with the renewal of the Ginna OL. The staff conducted an independent review of the Ginna ER, a site visit, the scoping process, consultation with the FWS and NYSDEC, and an evaluation of other available information. The staff concludes that there are no impacts related to the Category 1 issues discussed in the GEIS or for the new issue identified during scoping. For all of these issues, the staff's preliminary conclusions are that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-4. Category 1 Issues Applicable to R.E. Ginna Nuclear Power Plant Transmission Lines During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
TERRESTRIAL RESOURCES	
Power line right-of-way management (cutting and herbicide application)	4.5.6.1
Bird collisions with power lines	4.5.6.2
Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	4.5.6.3
Flood plains and wetland on power line right-of-way	4.5.7
AIR QUALITY	
Air-quality effects of transmission lines	4.5.2
LAND USE	
Onsite land use	4.5.3
Power line right-of-way	4.5.3

A brief description of the staff's review and GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, for each of these issues follows.

- Power line right-of-way management (cutting and herbicide application). Based on information in the GEIS, the Commission found that

> The impacts of right-of-way maintenance on wildlife are expected to be of small significance at all sites.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of power line right-of-way maintenance during the renewal term beyond those discussed in the GEIS.

- Bird collisions with power lines. Based on information in the GEIS, the Commission found that

> Impacts are expected to be of small significance at all sites.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of bird collisions with power lines during the renewal term beyond those discussed in the GEIS.

- Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock). Based on information in the GEIS, the Commission found that

> No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified. Such effects are not expected to be a problem during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of electromagnetic fields on flora and fauna during the renewal term beyond those discussed in the GEIS.

- Flood plains and wetlands on power line right-of-way. Based on information in the GEIS, the Commission found that

> Periodic vegetation control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetland. No significant impact is expected at any nuclear power plant during the license renewal term.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of power line rights-of-way on flood plains and wetlands during the renewal term beyond those discussed in the GEIS.

- Air-quality effects of transmission lines. Based on the information in the GEIS, the Commission found that

  > Production of ozone and oxides of nitrogen is insignificant and does not contribute measurably to ambient levels of these gases.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no air quality impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

- Onsite land use. Based on the information in the GEIS, the Commission found that

  > Projected onsite land use changes required during ... the renewal period would be a small fraction of any nuclear power plant site and would involve land that is controlled by the applicant.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no onsite land-use impacts during the renewal term beyond those discussed in the GEIS.

- Power line right-of-way (land use). Based on information in the GEIS, the Commission found that

  > Ongoing use of power line right of ways would continue with no change in restrictions. The effects of these restrictions are of small significance.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of power line rights-of-way during the renewal term beyond those discussed in the GEIS.

Category 2 and uncategorized issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to transmission lines from Ginna are listed in Table 4-5, and are discussed in Sections 4.2.1 and 4.2.2.

Table 4-5. Category 2 and Uncategorized Issues Applicable to the R.E. Ginna Nuclear Power Plant Transmission Lines During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
HUMAN HEALTH			
Electromagnetic fields, acute effects (electric shock)	4.5.4.1	H	4.2.1
Electromagnetic fields, chronic effects	4.5.4.2	NA	4.2.2

4.2.1 Electromagnetic Fields—Acute Effects

In the GEIS, the Commission found that without a review of the conformance of each nuclear plant transmission line to the criteria established in the National Electrical Safety Code (NESC) (IEEE 1997), it was not possible to determine the significance of the electric shock potential. Evaluation of individual plant transmission lines is necessary because the issue of electric shock safety was not addressed in the licensing process for some plants. For other plants, land use in the vicinity of transmission lines may have changed, or power distribution companies may have chosen to upgrade line voltage. To comply with 10 CFR 51.53(c)(3)(ii)(H), an applicant must provide an assessment of the potential shock hazard if the transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the NESC for preventing electric shock from induced currents.

To support its conclusion that the four 115-kV transmission lines at Ginna are in compliance with the NESC 5-mA, electric-field-induced current limit, RG&E performed field measurements. These measurements demonstrated compliance. The Ginna transmission lines are within the scope of the U.S. Nuclear Regulatory Commission (NRC) license renewal environmental review, and are below the size of concern for induced shock. Field measurements demonstrate the electric-field-induced currents from these transmission lines are well below the NESC recommendations for preventing electric shock from induced currents (RG&E 2002a).

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, and other public sources. Using this information, the staff evaluated the potential impacts for electric shock resulting from operation of Ginna and associated transmission lines. It is the staff's preliminary conclusion that the potential impacts for electric shock during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is

considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on the assessment to date, the staff expects that the measures in place at Ginna (e.g., transmission lines in compliance with the NESC) provide mitigation for all impacts related to acute effects of electromagnetic fields, and no new mitigation measures are warranted.

4.2.2 Electromagnetic Fields—Chronic Effects

In the GEIS, the chronic effects of 60-hz electromagnetic fields from power lines were not designated as Category 1 or 2, and will not be categorized until a scientific consensus is reached on the health implications of these fields.

The potential for chronic effects from these fields is not known at this time and continues to be studied. The National Institute of Environmental Health Sciences (NIEHS) directs related research through the U.S. Department of Energy. A NIEHS report (NIEHS 1999) contains the following conclusion:

> The NIEHS concludes that ELF-EMF [extremely low frequency-electromagnetic field] exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In our opinion, this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern.

This statement is not sufficient to cause the staff to change its position with respect to the chronic effects of electromagnetic fields. The staff considers the GEIS finding of "not applicable" still appropriate and will continue to follow developments on this issue.

4.3 Radiological Impacts of Normal Operations

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to Ginna in regard to radiological impacts are listed in Table 4-6. RG&E stated in the Ginna ER that it is not aware of any new and significant information associated with the renewal of the Ginna OL. No new and significant information on these issues has been identified by the staff during its independent review of the Ginna ER, the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the

GEIS. For these issues, the staff concluded in the GEIS that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-6. Category 1 Issues Applicable to Radiological Impacts of Normal Operations During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
HUMAN HEALTH	
Radiation exposures to public (license renewal term)	4.6.2
Occupational radiation exposures (license renewal term)	4.6.3

A brief description of the staff's review and the GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, for each of these issues follows.

- Radiation exposures to public (license renewal term). Based on information in the GEIS, the Commission found that

  > Radiation doses to the public will continue at current levels associated with normal operations.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of radiation exposures to the public during the renewal term beyond those discussed in the GEIS.

- Occupational radiation exposures (license renewal term). Based on information in the GEIS, the Commission found that

  > Projected maximum occupational doses during the license renewal term are within the range of doses experienced during normal operations and normal maintenance outages, and would be well below regulatory limits.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of occupational radiation exposures during the renewal term beyond those discussed in the GEIS.

There are no Category 2 issues related to radiological impacts of routine operations.

4.4 Socioeconomic Impacts of Plant Operations During the License Renewal Term

Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to socioeconomic impacts during the renewal term are listed in Table 4-7. RG&E stated in the Ginna ER that it is not aware of any new and significant information associated with the renewal of the Ginna OL. The staff has not identified any new and significant information during its independent review of the RG&E ER, the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For these issues, the staff concluded in the GEIS that the impacts are SMALL, and additional plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-7. Category 1 Issues Applicable to Socioeconomics During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
SOCIOECONOMIC	
Public services: public safety, social services, and tourism and recreation	4.7.3; 4.7.3.3; 4.7.3.4; 4.7.3.6
Public services: education (license renewal term)	4.7.3.1
Aesthetic impacts (license renewal term)	4.7.6
Aesthetic impacts of transmission lines (license renewal term)	4.5.8

A brief description of the staff's review and the GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, for each of these issues follows.

- Public services – public safety, social services, and tourism and recreation. Based on information in the GEIS, the Commission found that

  > Impacts to public safety, social services, and tourism and recreation are expected to be of small significance at all sites.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts on public safety, social services, and tourism and recreation during the renewal term beyond those discussed in the GEIS.

- Public services – education (license renewal term). Based on information in the GEIS, the Commission found that

  Only impacts of small significance are expected.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts on education during the renewal term beyond those discussed in the GEIS.

- Aesthetic impacts (license renewal term). Based on information in the GEIS, the Commission found that

  No significant impacts are expected during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no aesthetic impacts during the renewal term beyond those discussed in the GEIS.

- Aesthetic impacts of transmission lines (license renewal term). Based on information in the GEIS, the Commission found that

  No significant impacts are expected during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no aesthetic impacts of transmission lines during the renewal term beyond those discussed in the GEIS.

Table 4-8 lists the Category 2 socioeconomic issues that require plant-specific analysis and environmental justice, which was not addressed in the GEIS. These issues are discussed in Sections 4.4.1 through 4.4.6.

Table 4-8. Environmental Justice and GEIS Category 2 Issues Applicable to Socioeconomics During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
	SOCIOECONOMIC		
Housing impacts	4.7.1	I	4.4.1
Public services: public utilities	4.7.3.5	I	4.4.2
Offsite land use (license renewal term)	4.7.4	I	4.4.3
Public services, transportation	4.7.3.2	J	4.4.4
Historic and archaeological resources	4.7.7	K	4.4.5
Environmental justice	Not addressed[a]	Not addressed[a]	4.4.6

(a) Guidance related to environmental justice was not in place at the time the GEIS and the associated revision to 10 CFR Part 51 were prepared. Therefore, environmental justice must be addressed in the licensee's ER and the staff's environmental impact statement.

4.4.1 Housing Impacts During Operations

Impacts on housing are considered SMALL when a small or not easily discernible change in housing availability occurs. Impacts are considered MODERATE when there is discernible but short-lived reduction in available housing units because of project-induced migration. Impacts are considered LARGE when project-related housing demands result in very limited housing availability and would increase rental rates and housing values well above normal inflation (NRC 1996).

In determining housing impacts, the applicant chose to follow Appendix C of the GEIS (NRC 1996), which presents a population characterization method that is based on two factors, "sparseness" and "proximity." Sparseness measures population density within 32 km (20 mi) of the site, and proximity measures population density and city size within 80 km (50 mi). Each factor has categories of density and size (GEIS Table C.1), and a matrix is used to rank the population category as low, medium, or high (GEIS Figure C.1).

During 2000, the population living within 32 km (20 mi) of Ginna was estimated to be approximately 581,745 (USCB 2000). This total converts to a population density of about 357 persons/km^2 (926 persons/mi^2) living on the land area within a 32-km (20-mi) radius of

Ginna.[a] This concentration falls into the GEIS sparseness Category 4 (i.e., having greater than or equal to 46 persons/km^2 [120 persons/mi^2]) (USCB 2000).

An estimated 1.25 million people live within 80 km (50 mi) of the Ginna site (USCB 2000), equating to a population density of around 124 persons/km^2 (318 persons/mi^2) on the available land area.[b] Applying the GEIS proximity measures (NRC 1996), Ginna is classified as Category 4 (i.e., having greater than or equal to 73 persons/km^2 [190 persons/mi^2] within 80 km [50 mi] of the site). According to the GEIS criteria, these sparseness and proximity scores place Ginna in a high-population area.

10 CFR Part 51, Subpart A, Appendix B, Table B-1, states that impacts on housing availability are expected to be of SMALL significance at plants located in a high-population area where growth-control measures are not in effect. The Ginna site is located in a high-population area. Monroe and Wayne Counties are not subject to growth-control measures that would limit housing development.

SMALL impacts result when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and no housing construction or conversion is required to meet new demand (NRC 1996). The GEIS assumes that an additional staff of 60 permanent per-unit workers might be needed during the license renewal period to perform routine maintenance and other activities. RG&E does not plan any new refurbishment activity as part of the license renewal process; therefore, employment will not change in the area as result of license renewal. Thus, RG&E concludes that there are no impacts to housing from license renewal activities (RG&E 2002a). However, to establish an upper bound on possible increased employment during the license renewal term, RG&E assumes the hiring of 60 additional permanent workers. It is assumed that the hiring of these additional 60 employees would result in 40 indirect jobs, or an increased demand for a total of 100 housing units. Using the fact that 92 percent of its employees live in Monroe and Wayne Counties (Table 2-5), RG&E concludes that a demand for 92 housing units would be created in the two counties. The demand for the housing units could be met with the construction of new houses or the use of existing, unoccupied houses. In 2000, Wayne and Monroe Counties had a total of 343,000 housing units (Table 2-6), and vacancy rates in both counties were more than 5 percent. The increase in projected housing units would not create a discernible change in

(a) These numbers differ from those presented in the Ginna ER. In their calculations, RG&E took the surface area in the 32-km (20-mi) and 80-km (50-mil) radii and distributed the population evenly within the circles. However, the circles encompass a large area of Lake Ontario. It was assumed that the lake encompasses half the area for the 32-km (20-mi) and 80-km (50-mi) circles. As such, the population concentrations were adjusted, resulting in higher population concentrations than those reported in the Ginna ER.

(b) Note that these conclusions differ from the Ginna ER for the reasons stated in footnote (a).

housing availability, a change in rental rates or housing values, or spur new construction or conversion. As a result, RG&E concludes that the impacts would be SMALL, and mitigation measures would not be necessary or effective (RG&E 2002a).[a]

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff evaluated the potential housing impacts resulting from operation of Ginna during the license renewal term. It is the staff's preliminary conclusion that the potential housing impacts during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on this assessment, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to housing, and no new mitigation measures are warranted.

4.4.2 Public Services: Public Utility Impacts During Operations

Impacts on public utility services are considered SMALL if there is little or no change in the ability of the system to respond to the level of demand, so there is no need to add capital facilities. Impacts are considered MODERATE if overtaxing of service capabilities occurs during periods of peak demand. Impacts are considered LARGE if existing levels of service (e.g., water or sewer services) are substantially degraded and additional capacity is needed to meet ongoing demands for services. The GEIS indicates that, in the absence of new and significant information to the contrary, the only impacts on public utilities that could be significant are impacts on public water supplies (NRC 1996).

Analysis of impacts on the public water supply system considered both plant demand and plant-related population growth. Section 2.2.2 describes the Ginna-permitted withdrawal rate and actual use of water. RG&E plans no refurbishment at Ginna, so plant demand would not change beyond current demands (RG&E 2002a).

In the ER, RG&E assumed, for the purposes of impact analysis only, an increase of 60 employees to perform license renewal activities. RG&E also assumed the generation of 100 new jobs and a net overall population increase of approximately 308 as a result of those

(a) The RG&E estimate of 100 housing units (92 units for Monroe and Wayne Counties) is likely to be an extreme "upper bound" estimate. Most of the potentially new jobs would likely be filled by existing area residents, thus creating no, or little, net demand for housing.

jobs.[a] The plant-related population increase would increase demand for water by an additional 60 to 90 m^3/d (1.6×10^{-2} to 2.3×10^{-2} MGD) (RG&E 2002a). This amount is within the total residual capacity of the water treatment plants serving Monroe and Wayne Counties (Table 2-8).

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff evaluated the potential impacts of increased water use resulting from the potential increase in employment. It is the staff's preliminary conclusion that the potential impacts of increased water use resulting from the potential increase in employment during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on this assessment, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to public services, and no new mitigation measures are warranted.

4.4.3 Offsite Land Use During Operations

Offsite land use during the license renewal term is a Category 2 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1). Table B-1 of 10 CFR Part 51 Subpart A, Appendix B, notes that "significant changes in land use may be associated with population and tax revenue changes resulting from license renewal."

Section 4.7.4 of the GEIS defines the magnitude of land-use changes as a result of plant operation during the license renewal term as follows:

SMALL – Little new development and minimal changes to an area's land-use pattern.

MODERATE – Considerable new development and some changes to the land-use pattern.

LARGE – Large-scale new development and major changes in the land-use pattern.

For the purposes of impact analysis, RG&E has identified the need for a maximum of 60 additional employees to perform license renewal activities during the license renewal term plus an additional 40 indirect jobs (total 100) in the community (RG&E 2002a). Section 3.7.5 of the

(a) Calculated by assuming that the average number of persons per household is 3.08 in the State of New York (100 jobs × 3.08 = 308) (USCB 2000).

GEIS (NRC 1996) states that if plant-related population growth is less than 5 percent of the study area's total population, offsite 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 23 persons/km^2 (60 persons/mi^2), and at least one urban area with a population of 100,000 or more within 80 km (50 mi). In this case, population growth will be less than 5 percent of the area's total population, the area has established patterns of residential and commercial development (Table 2-9), a population density of well over 23 persons/km^2 (60 persons/mi^2), and an urban area with a population of 100,000 or more within 80 km (50 mi). Consequently, the staff concludes that population changes resulting from license renewal are likely to result in SMALL offsite land-use impacts.

Tax revenue can affect land use because it enables local jurisdictions to provide the public services (e.g., transportation and utilities) necessary to support development. Section 4.7.4.1 of the GEIS states that the assessment of tax-driven land-use impacts during the license renewal term should consider (1) the size of the plant's payments relative to the community's total revenues, (2) the nature of the community's existing land-use pattern, and (3) the extent to which the community already has public services in place to support and guide development. If the plant's tax payments are projected to be small relative to the community's total revenue, 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. Section 4.7.2.1 of the GEIS states that if tax payments by the plant owner are less than 10 percent of the taxing jurisdiction's revenue, the significance level would be SMALL (NRC 1996). If a plant's tax payments are projected to be medium-to-large relative to the community's total revenue, the impact of new tax-driven, land-use changes would be MODERATE. The average percentage of the total revenue for Wayne County, the town of Ontario, and the Wayne Central School District derived from property taxes paid by RG&E for Ginna are 2 percent (1995 to 2001), 13.2 percent (1995 to 2001), and 12.4 percent (1995 to 1999), respectively.

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff evaluated the potential impacts on offsite land use resulting from operation of Ginna. While the tax receipts are large enough to potentially result in moderate impacts on land use, these receipts are expected to decrease in the future. Tax receipts from past operation of Ginna have not resulted in significant changes in land use in Wayne County. Development has been focused on the west side of the county, and appears to be driven by residential demand within a short commute distance from Rochester. There has also been little retail or commercial development in the county. The criteria in the GEIS (Section C.4.1.5.2) results in the assignment of an impact level of MODERATE when tax levels are greater than 10%. However, the case study assumed a certain level of refurbishment. As no major refurbishment activities are planned at Ginna to support license renewal, no new sources of plant-related tax payments are expected that could significantly affect land use in Wayne County. Based on these considerations, it is the staff's preliminary conclusion that the tax-related land-use impacts are likely to be SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on this assessment, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to offsite land use, and no new mitigation measures are warranted.

4.4.4 Public Services: Transportation Impacts During Operations

On October 4, 1999, 10 CFR 51.53(c)(3)(ii)(J) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, were revised to clearly state that "Public Services: Transportation Impacts During Operations" is a Category 2 issue (see NRC 1999 for more discussion of this clarification). The issue is treated as such in this draft SEIS.

As noted in Section 2.2.8.2, NYS Route 104 serves as the primary east-west corridor in this area, as indicated by volume of traffic. Traffic volume ranges from 20,000 to 40,000 vehicles with the higher volumes existing near the entrance to Monroe County. Traffic volume on much of NYS Route 104 in the vicinity of Ginna is well below capacity, while some of the two-lane portions east of the town of Ontario are characterized as near capacity. Traffic volumes, however, drop off dramatically on north-south routes crossing NYS Route 104 that access County Route 101 and, subsequently, Ginna (RG&E 2002a).

The bounding scenario of 60 additional license renewal staff represents less than 3 percent of the traffic volume on County Route 101, and if it is assumed that all employees would use Ontario Center Road (Figure 2-4) to access the site from NYS Route 104, an increase of 60 additional vehicles 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). Based on these facts, RG&E concluded that the impacts on transportation during the license renewal term would be SMALL, and no mitigative measures would be warranted (RG&E 2002a).

The staff has reviewed the available information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources. Using this information, the staff evaluated the potential impacts to transportation service resulting from operation of Ginna. It is the staff's preliminary conclusion that the potential impacts to transportation service degradation during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on this assessment, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to transportation, and no new mitigation measures are warranted.

4.4.5 Historic and Archaeological Resources

The National Historic Preservation Act (NHPA) requires that Federal agencies take into account the effects of their undertakings on historic properties, including significant archaeological sites. The historic preservation review process mandated by Section 106 of the NHPA is outlined in regulations issued by the Advisory Council on Historic Preservation at 36 CFR Part 800. Renewal of an OL is an undertaking that could potentially affect historic properties. Therefore, according to the NHPA, the NRC is required to make a good faith effort to identify historic properties in the areas of potential effects. The NRC is required to notify the State Historic Preservation Officer (SHPO) of the results of those efforts and of any properties that might be adversely affected by the undertaking before proceeding. If it is determined that historic properties are present, the NRC is required to assess and resolve possible adverse effects of the undertaking in consultation with the SHPO.

The Ginna site includes one structure eligible for inclusion in the National Register of Historic Places (NRHP). The transmission line that leads south from the plant is in proximity to an historic district listed on the NRHP. The 197-ha (488-ac) Ginna site lies in an area considered archaeologically sensitive by the SHPO[a] and culturally highly sensitive by the Seneca Nation of New York (Mitchell and Maybee 2002).

The Brookwood Estate Manor House is considered historically significant and eligible for inclusion in the NRHP by the SHPO[a]. RG&E initially used the home for meetings and gatherings, but later it fell into disuse. The structure has been restored and is now once again used by Ginna staff for meetings and social events. It is also used by the Wayne Central High School for an alternative special education program. Current RG&E management of the

(a) Personal communication (e-mail) with Nancy Todd, New York State Office of Parks, Recreation and Historic Preservation, Waterford, New York (December 27, 2002).

Brookwood Estate Manor House appears to be an effective adaptive reuse of the structure that preserves the historic qualities of the building.

While the transmission line right-of-way passes directly west of the Brick Church Corners historic district, it does not adversely affect the historical setting of the district. The transmission lines are hung from wooden supports, and the edges of the right-of-way are tree-lined. When the trees are in leaf, the transmission lines are mostly obscured from sight. Renewal of the OL should not affect any of the other historic properties near Ginna.

Since no archaeological surveys have been conducted at the Ginna site, it is not known whether archaeological sites eligible for inclusion in the NRHP exist there. Archaeological sites have been recorded in proximity to Ginna. The proximity of Ginna to Lake Ontario, the two streams that run through the property and empty into the lake, and the existence of archeological sites along other reaches of those streams have led the SHPO to determine that the undeveloped and agriculturally developed portions of the Ginna site are archaeologically sensitive[a].

It is likely that the Ginna site was used in prehistoric times for hunting and fishing. Lake Ontario also provided a trade route used in both prehistoric and proto-historic times. The area lies within the traditional range of the Seneca. The Seneca Nation of New York has determined that the area has a high probability of including traditional Native American cultural properties, and finds the area culturally highly sensitive (Mitchell and Maybee 2002).

The proposed action includes no new construction or refurbishment. Thus, any historic or archaeological resources at Ginna should not be adversely impacted by renewal of the OL. If there is future development at the Ginna site, the development could adversely affect historic or archaeological resources. Development actions that could impact resources include ground-disturbing activities beyond current practices and any actions that would damage or significantly change the Brookwood Manor House. The impacts of such actions could be mitigated through appropriate measures, including regular maintenance of the estate, timely consultation, avoidance, and data recovery.

The staff reviewed information provided by the applicant, the staff's site visit, the SHPO, the Seneca Nation of New York, the scoping process, and other public sources. Using this information, the staff evaluated the potential impacts on historic and archaeological resources resulting from continued operation of Ginna for an additional 20 years. It is the staff's preliminary conclusion that the potential impacts to known historic and archaeological resources during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is

considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered and no additional mitigation is required.

4.4.6 Environmental Justice

Environmental justice refers to a Federal policy that requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its actions on minority[a] or low-income populations. The memorandum accompanying Executive Order 12898 (59 FR 7629) directs Federal executive agencies to consider environmental justice under the National Environmental Policy Act of 1969 (NEPA). The Council on Environmental Quality (CEQ) has provided guidance for addressing environmental justice (CEQ 1997). Although the Executive Order is not mandatory for independent agencies, the NRC has voluntarily committed to undertake environmental justice reviews. Specific guidance is provided in NRC Office of Nuclear Reactor Regulation Office Instruction LIC-203, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues" (NRC 2001).

The staff examined the geographic distribution of minority and low-income populations within 80 km (50 mi) of the Ginna site, employing the 2000 census for low-income and minority populations (USCB 2000). The populations within an 80-km (50-mi) radius of Ginna encompassed parts of 13 counties. The staff supplemented its analysis by field inquires to county planning departments, social service agencies, personnel in Wayne and Monroe Counties, and a private social service agency in Wayne County.

For the purpose of the staff's review, a minority population is defined to exist if the percentage of each minority, or aggregated minority category within the census block groups[b] potentially affected by the license renewal of Ginna, exceeds the corresponding percentage of minorities in the entire State of New York by 20 percent, or if the corresponding percentage of minorities

(a) The NRC Guidance for performing environmental justice reviews defines "minority" as American Indian or Alaskan Native, Asian or Pacific Islander, Black not of Hispanic Origin, or Hispanic (NRC 2001).

(b) A census block group is a combination of census blocks, which are statistical subdivisions of a census tract. A census block is the smallest geographic entity for which the U.S. Census Bureau (USCB) collects and tabulates decennial census information. A census tract is a small, relatively permanent statistical subdivision of counties delineated by local committees of census data users in accordance with USCB guidelines for the purpose of collecting and presenting decennial census data. Census block groups are subsets of census tracts (USCB 2001).

within the census block group is at least 50 percent. A low-income population is defined to exist if the percentage of low-income population within a census block group exceeds the corresponding percentage of low-income population in the entire State of New York by 20 percent, or if the corresponding percentage of low-income population within a census block group is at least 50 percent.

The staff followed the convention of employing 2000 census block group data to identify minority and low-income block groups within the 80-km (50-mi) radius of Ginna. Using this convention, the 80-km (50-mi) radius includes 143 census block groups for minority populations and 173 census block groups for low-income populations (Figures 4-1 and 4-2) (USCB 2000). The "more than 20 percentage points" above the comparison area criterion was used to determine whether a census block group should be counted as containing minority or low-income populations. Because the 20 percentage points criterion is a lower threshold, the 50 percent criterion was not used (RG&E 2002a).

The staff followed the convention of employing census block groups and counts of individuals in minority or low-income status. Figure 4-1 shows the distribution of minority populations (shaded areas) within the 80-km (50-mi) radius. Minority populations are present in all counties within the 80-km (50-mi) radius of the Ginna site. Minority populations are primarily concentrated in the urban center of Rochester. Monroe County contains 142 of the 143 block groups containing significant minority populations.

Data from the 2000 census characterize low-income populations within the 80-km (50-mi) radius of the Ginna site. Applying the NRC criterion of "more than 20 percent greater," the census block groups containing low-income populations were identified. Figure 4-2 shows the locations of the low-income populations within 80 km (50 mi) of the Ginna site. The lower income populations are concentrated around the urban center of Rochester, where 137 of the 173 low-income block groups are found. Wayne County has 34 low-income block groups (USCB 2000).

With the locations of minority and low-income populations identified, the staff evaluated whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner. Based on staff guidance (NRC 2001), air, land, and water resources within about 80 km (50 mi) of the Ginna site were examined. Within that area, a few potential environmental impacts could affect human populations, but all of these impacts were considered SMALL for the general population.

The pathways through which the environmental impacts associated with Ginna license renewal can affect human populations are discussed in each associated section. During its review of the information, including that provided by the applicant, the staff's site visit, the scoping process, discussions with other agencies, and other public sources, the staff found no unusual resource dependencies or practices such as subsistence agriculture, hunting, or fishing through which

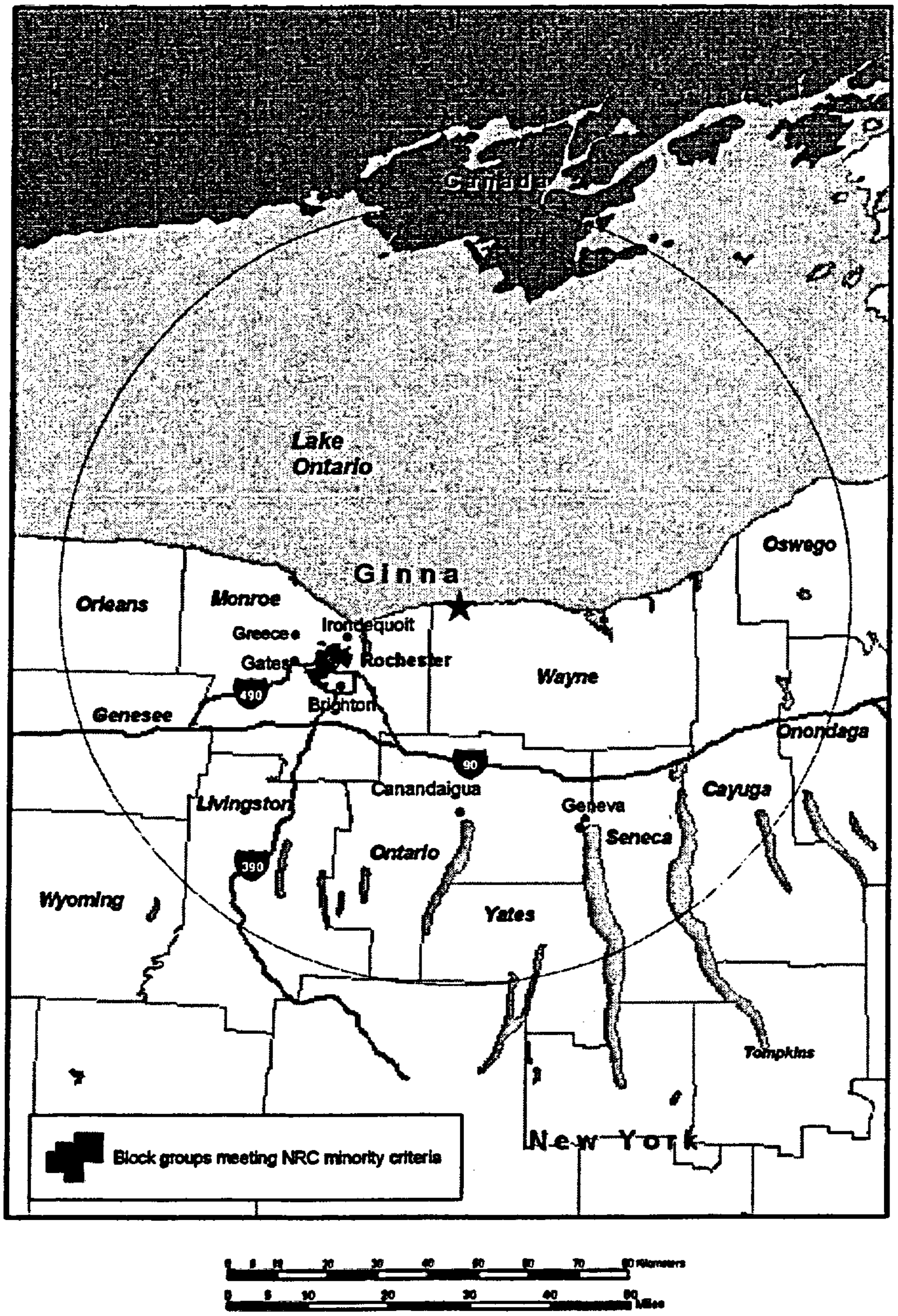
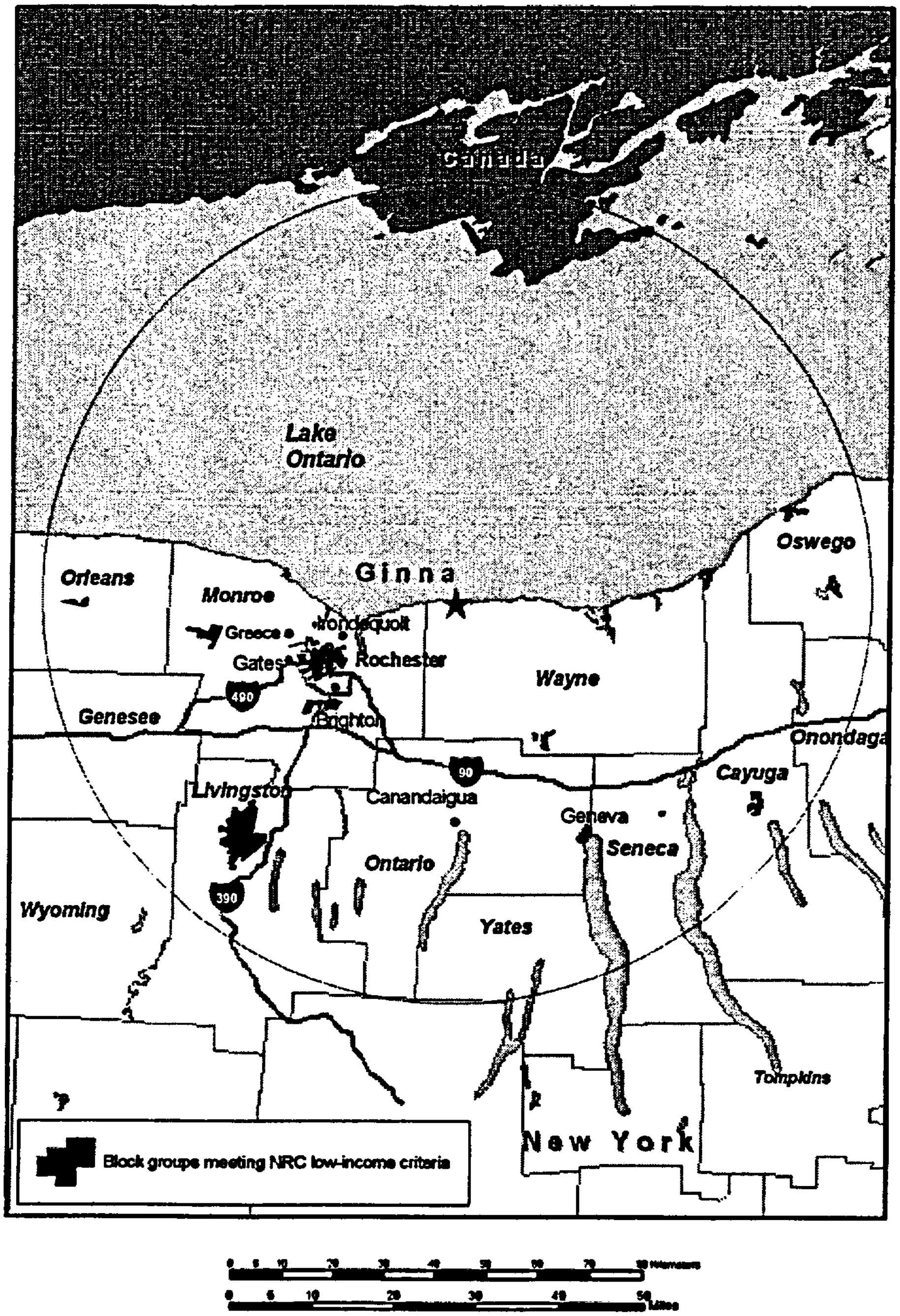


Figure 4-1. Geographic Distribution of Minority Populations (shown in shaded areas) Within 80 km (50 mi) of the R.E. Ginna Nuclear Power Plant Site Based on Census Block Group Data



1
2 **Figure 4-2.** Geographic Distribution of Low-Income Populations (shown in shaded areas)
3 Within 80 km (50 mi) of the R.E. Ginna Nuclear Power Plant Site Based on
4 Census Block Group Data

minority and/or low-income populations could be disproportionately highly and adversely affected. In addition, the staff did not identify any location-dependent disproportionately high and adverse impacts that would affect these minority and low-income populations. The staff's preliminary conclusion is that potential offsite impacts from Ginna to minority and low-income populations during the renewal term are SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on the assessment to date, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to environmental justice, and no new mitigation measures are warranted.

4.5 Groundwater Use and Quality

There are no groundwater withdrawals at Ginna, and RG&E imports less than 4 m^3/min (100 gpm) for plant use. Therefore, the Category 1 issue, groundwater use and quality, in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, is applicable to Ginna. This issue is listed in Table 4-9. RG&E stated in the Ginna ER that it is not aware of any new and significant information associated with the renewal of the Ginna OL. The staff has not identified any new and significant information on this issue during its independent review of the ER, the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information. Therefore, the staff concludes that there are no impacts related to this issue beyond those discussed in the GEIS. For this issue, the staff concludes that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 4-9. Category 1 Issue Applicable to Groundwater Use and Quality During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
GROUNDWATER USE AND QUALITY	
Groundwater-use conflicts (potable and service water; plants that use <100 gpm).	4.8.1.1

A brief description of the staff's review and the GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, 10 CFR Part 51, follows.

- Groundwater-use conflicts (potable and service water; plants that use <100 gpm).

  Based on information in the GEIS, the Commission found that

  > Plants using less than 100 gpm are not expected to cause any ground-water use conflicts.

  Ginna groundwater use is less than 4 m^3/min (100 gpm). The staff has not identified any new and significant information on this issue. Therefore, the staff concludes that there are no groundwater-use conflicts during the renewal term beyond those discussed in the GEIS.

There are no Category 2 issues related to groundwater use and quality for Ginna.

4.6 Threatened or Endangered Species

Threatened or endangered species are listed as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue is listed in Table 4-10.

Table 4-10. Category 2 Issue Applicable to Threatened or Endangered Species During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
THREATENED OR ENDANGERED SPECIES (FOR ALL PLANTS)			
Threatened or endangered species	4.1	E	4.6

This issue requires consultation with appropriate agencies to determine whether threatened or endangered species listed under the Endangered Species Act are present and whether they would be adversely affected by continued operation of the nuclear plant during the license renewal term. The presence of threatened or endangered species in the vicinity of the Ginna site is discussed in Sections 2.2.5 and 2.2.6 of this draft SEIS.

Consultation with the FWS was initiated by RG&E in January 2002 with a letter requesting information about the presence of threatened or endangered species in the vicinity of the Ginna (RG&E 2002d). The FWS responded on February 25, 2002, stating that except for occasional transient individuals, no listed, proposed, or candidate species were likely to occur in the site vicinity and that no biological assessment or further consultation under Section 7 was required (FWS 2002; ESA 1972). Staff analysis of data provided by the applicant and/or obtained from the NYSDEC (NYSDEC 2003b), and surveys of the Ginna site and surrounding environments confirmed the FWS conclusions.

The staff has reviewed the available information including that provided by the applicant, FWS, NYSDEC, the scoping process, and other public information sources. Based on this review and its independent analysis, the staff's preliminary conclusion is that continued operation of the plant and continued operation and maintenance of the transmission lines and right-of-way under license renewal is likely to have no effect on any Federally listed, threatened, or endangered species within the terrestrial or aquatic environs in the immediate vicinity of the Ginna site or the associated transmission lines. Further, the staff's preliminary conclusion is that continued operation of Ginna will not affect any New York State-listed terrestrial or aquatic species. *Therefore, it is the staff's preliminary determination that the impact on threatened or endangered* species of an additional 20 years of operation of the Ginna and of continued maintenance activities of the transmission right-of-way would be SMALL.

During the course of the SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. When continued operation for an additional 20 years is considered as a whole, all of the specific effects on the environment (whether or not "significant") were considered. Based on this assessment, the staff expects that the measures in place at Ginna provide mitigation for all impacts related to threatened or endangered species, and no new mitigation measures are warranted.

4.7 Evaluation of Potential New and Significant Information on Impacts of Operations During the Renewal Term

During the scoping period, comments were received from the State of New York and the FWS related to shoreline erosion at the Ginna site. The issues raised are discussed in the following section.

4.7.1 Shoreline Erosion

During the Ginna site audit, on November 5, 2002, the NRC staff met with representatives from the NYSDEC. NYSDEC staff expressed a concern over the shoreline erosion rates occurring at the Ginna site. In a December 11, 2002, letter providing the NRC staff with scoping comments, NYSDEC again expressed its concern over shoreline erosion. In a January 6, 2003, letter the FWS also commented on the issue of shoreline erosion at the site.

To protect the shoreline immediately in front of the Ginna site, a revetment composed of riprap or large stones was installed during plant construction. The length of the protected shoreline has been extended during the plant operating period. Shoreline erosion is occurring both east and west of the portion of the shoreline not protected by the revetment. A revetment may redirect a portion of the erosional forces onto adjacent unprotected portions of the shoreline, thereby increasing erosion on the shoreline unprotected by the revetment. Shoreline erosion is a natural phenomenon, an endless redistribution process that continually alters the shoreline. Shorelines have always been areas of continuous and sometimes dramatic change. The force of waves, seiches, and ice movement on the shoreline of Lake Ontario all contribute to shoreline erosion. A variety of options are available to protect against continued shoreline erosion, including: bulkheads, revetments, breakwaters, groins, vegetation, and drainage controls. The NYSDEC has estimated the average annual erosion rate of the unprotected bluffs in the vicinity of Ginna to be between 0.3 and 0.5 m (1.0 and 1.5 ft) per year. Based on these estimates of shoreline erosion rates, the additional 20 years to the end of the proposed renewal period an additional 6 to 10 m (20 to 35 ft) of shoreline loss can be expected. Some portion of this erosion may be attributable to enhanced erosion resulting from presence of the revetment. This flank erosion, that is, erosion at the edges of the revetment, is localized and not quantitatively significant. The staff believes that any additional shoreline erosion that might occur at the east and west terminus of the revetment will not result in significant additional shoreline erosion a short distance from the riprap due to the localized nature of the flank erosion.

NYSDEC also expressed concern that the shoreline erosion could adversely affect Lake Ontario water quality in the vicinity of the site. Again, the erosion is an incremental quantity and is not expected to be detectable or destabilizing. Any erosion at the flanks of the revetment is expected to quickly be redistributed within the lake by natural processes. The staff believes that the amount of material that could be resuspended due to the increased erosion at the east and west terminus of the revetment would be inconsequential relative to the volume of water and would have no measurable impact on local water quality.

At the request of NYSDEC, RG&E has recently performed a survey of the shoreline in the vicinity of the Ginna site. This survey will help to understand the degree to which the revetment that RG&E has constructed has altered the natural erosion process. If additional surveys indicate that the natural erosion rate has been significantly altered, the State of New York may require that some mitigation measures be taken and other permits or permit modifications may be required. Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act of 1977, as amended, provides the authority to the U.S. Army Corps of Engineers to permit construction lakeward of the high-water mark on the banks of Lake Ontario. Such a permit would be required for most mitigation options, such as changes to the revetment.

The staff has reviewed the information about shoreline erosion and the design of the revetment at Ginna. The staff preliminarily concludes that the comments made by the NYSDEC do not represent information that would call into question the Commission's conclusions regarding GEIS Category 1 issues that impacts on aquatic and terrestrial resources and land use from continued operation of Ginna are SMALL and that additional plant-specific mitigation measures are not warranted at this time.

4.8 Cumulative Impacts of Operations During the Renewal Term

The staff considered potential cumulative impacts during the evaluation of information applicable to each of the potential impacts of operations during the renewal term identified within the GEIS. For the purposes of this analysis past actions were those related to the resources at the time of the plant licensing and construction, present actions are those related to the resources at the time of current operation of the power plant, and future actions are considered to be those that are reasonably foreseeable through the end of plant operation. Therefore, the analysis considers potential impacts through the end of the current license term, as well as the 20-year renewal license term. The geographical area over which past, present, and future actions that could contribute to cumulative impacts is dependent on the type of action considered, and is described below for each impact area.

The impacts of the proposed action, as described in Section 4.0, are combined with other past, present, and reasonably foreseeable future actions at Ginna regardless of what agency (Federal or non-Federal) or person undertakes such other actions. These combined impacts are defined as "cumulative" in 40 CFR 1508.7 and include individually minor but collectively significant actions taking place over a period of time. It is possible that an impact that may be SMALL by itself could result in a MODERATE or LARGE impact when considered in combination with the impacts of other actions on the affected resource. Likewise, if a resource is regionally declining or imperiled, even a SMALL individual impact could be important if it contributes to or accelerates the overall resource decline.

4.8.1 Cumulative Impacts Resulting from Operation of the Plant Cooling System

For the purposes of this analysis, the geographic area considered is Lake Ontario. As described in Section 4.1, the staff found no new and significant information indicating that the conclusions regarding any of the cooling system-related Category 1 issues as related to Ginna are inconsistent with the conclusions in the GEIS. Additionally, the staff determined that none of the cooling system-related Category 2 issues were likely to have greater than a SMALL impact on local water quality or aquatic resources.

In general, the overall water quality of Lake Ontario and the status of the fishery and other aquatic resources have greatly improved since Ginna started operations. Therefore, there is no basis to conclude that the SMALL impacts of Ginna operations, including entrainment of fish and shellfish, impingement of fish and shellfish, heat shock, or any of the cooling system-related Category 1 issues are contributing to an overall decline in water quality or in the status of the fishery or other aquatic resources.

During 1987, the governments of Canada and the United States made a commitment, as part of the Great Lakes Water Quality Agreement, to develop a Lakewide Management Plan for each of the five Great Lakes. According to the 1987 Agreement, the plans embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in the lakes. The plans address sources of lake-wide critical pollutants. The plans are coordinated with other efforts that are best suited to address issues of local concern. In addition, the plans utilize linkages to other natural resource management activities, such as the development of Lake Ontario fish community objectives by the Great Lakes Fishery Commission and the Lake Ontario Committee of fisheries managers. The plans address impairments found in open waters of the lake and nearshore areas. Tributaries, including the Niagara River, are treated as inputs to the lake. The St. Lawrence River is treated as an output from the lake.[a] Given the lake-wide management plans in place to protect Lake Ontario and its environs, the staff concludes that potential cumulative effects will be carefully assessed and managed over time.

As described in Section 2.2.8.2, local water utilities withdraw potable water primarily from five surface water sources, including Lake Ontario. The average daily water demand by the communities in the area is about 378 million liters (100 million gallons). To meet current demand and anticipated future growth, the Ontario Water District plans to increase the size of its intake pipes. This expansion will represent a minor increase over current surface water withdrawals, and will be regulated and controlled by New York State and other governmental agencies.

The staff, while preparing this assessment, assumed that other industrial, commercial, or public installations will be located in the general vicinity of Ginna prior to the end of Ginna operation. The intake of water from, and the discharge of water to Lake Ontario for these facilities would be regulated by the NYSDEC and other agencies, just as the Ginna plant is presently regulated. The intake and discharge limits for each installation are set considering the overall or cumulative impact of all of the other regulated activities in the area. Therefore, the staff concludes that the potential cumulative impacts of continued operation of Ginna will be SMALL, and that no additional mitigation measures are warranted.

4.8.2 Cumulative Impacts Resulting from Continued Operation of the Transmission Lines

The continued operation of the Ginna electrical transmission facilities was evaluated to determine if there is the potential for interactions with other past, present, and future actions that could result in adverse cumulative impacts to terrestrial resources such as wildlife populations, and the size and distribution of habitat areas; aquatic resources such as wetlands and

(a) *http://www.epa.gov/glnpo/lakeont/summary.html, accessed on June 4, 2002.*

floodplains; and both the acute and chronic effects of electromagnetic fields. For the purposes of this analysis, the geographic area that encompasses the past, present and foreseeable future actions that could contribute to adverse cumulative effects is the area within 80 km (50 mi) of the Ginna site, as depicted in Figure 2-1.

As described in Section 4.2, the staff found no new and significant information indicating that the conclusions regarding any of the transmission line-related Category 1 issues as related to Ginna are inconsistent with the conclusions within the GEIS. The applicant follows right-of-way management procedures (RG&E 1995) over all of its rights-of-way that are protective of wildlife and habitat resources, including floodplains and wetlands. There are no State or Federally regulated wetlands at the Ginna site or within the transmission line right-of-way connecting Ginna to the power grid. Therefore, continued operation and maintenance of this right-of-way is not likely to contribute to a regional decline in wetland or floodplain resources. The maintenance procedures ensure minimal disturbance to wildlife and in many ways improve the habitat within the rights-of-way relative to many of the surrounding land-uses.

The staff determined that the electric-field-induced currents from the Ginna transmission lines are well below the National Electrical Safety Code (NESC) recommendations for preventing electric shock from induced currents. Therefore, the Ginna transmission lines do not detectably affect the overall potential for electric shock from induced currents within the analysis area. With respect to chronic effects of electromagnetic fields, although the staff considers the GEIS finding of "not applicable" to be appropriate in regard to Ginna, the Ginna transmission lines are not likely to detectably contribute to the regional exposure to extremely low frequency-electromagnetic fields (ELF-EMF). The Ginna transmission lines pass through a sparsely populated, rural area with very few residences or business close enough to the lines to have detectable ELF-EMF.

Therefore, the staff has determined that the cumulative impacts of the continued operation of the Ginna transmission lines will be SMALL, and that no additional mitigation is warranted.

4.8.3 Cumulative Radiological Impacts

The radiological exposure limits for protection of the public and for occupational exposures have been developed assuming long-term exposures, and therefore incorporate cumulative impacts. As described in Section 2.2.7, the public and occupational doses resulting from Ginna are well below regulatory limits, and as described in Section 4.3, the impacts of these exposures are SMALL. For the purposes of this analysis, the geographical area is the area included within a 80-km (50-mi) radius of the Ginna Site (Figure 2-1). The NRC would regulate any reasonably foreseeable future actions in the vicinity of Ginna that could contribute to cumulative radiological impacts.

Therefore, the staff determined that the cumulative radiological impacts of continued operation of Ginna will be SMALL, and that additional mitigation is not warranted.

4.8.4 Cumulative Socioeconomic Impacts

Much of the analyses of socioeconomic impacts presented in Section 4.4 of this SEIS already incorporate cumulative impact analysis because the metrics used for quantification only make sense when placed in the total or cumulative context. For instance, the impact of the total number of additional housing units that may be needed can only be evaluated with respect to the total number that will be available in the impacted area. Therefore, the geographical area of the cumulative analysis varies depending on the particular impact considered, and may depend on specific boundaries, such as taxation jurisdictions or may be distance related, as in the case of Environmental Justice.

The continued operation of Ginna is not likely to add to any cumulative socioeconomic impacts beyond those already evaluated in Sections 4.4. In other words, the impacts of issues such as transportation or offsite land-use are likely to be non-detectable beyond the regions previously evaluated and will quickly decrease with increasing distance from the site. The staff determined that the impacts on housing, public utilities, public services, and environmental justice would all be SMALL. The staff determined that the impact on off-site land-use is SMALL because, even though Ginna provides greater than 10% of the property tax revenue for the Town of Ontario and the Wayne Central School District there are no refurbishment actions planned at Ginna. There are no reasonably foreseeable scenarios that would alter these conclusions in regard to cumulative impacts.

Related to historic resources, there is one structure eligible for the inclusion in the NRHP on the Ginna site, and the transmission line is located near a historic district that is included on the NRHP. The current management of the Ginna site has functioned to protect these properties and the staff concluded that the impacts of license renewal would be SMALL. There is no reason to believe that the continued operation and maintenance of the Ginna site and transmission right-of-way would impact any properties beyond the site or right-of-way boundaries, and therefore the contribution to a cumulative impact on historic resources would be negligible.

The Seneca Nation has determined that it is likely that the Ginna site was used in prehistoric times, that it is culturally highly sensitive, and that the site has a high potential of including traditional Native American cultural properties (Section 4.4.5). These findings probably also apply to much of the Lake Ontario shoreline to the east and west of the Ginna site and it is reasonable to expect that these activities could impact shoreline areas (e.g., a Toronto company, Lake Ontario Fast Ferry Corp., is proposing daily passenger- and car-ferry service between Rochester, New York and Toronto, Ontario.). Therefore, the increased development of the shoreline along the southern shore of Lake Ontario may have a cumulative adverse effect on these Native American cultural properties. However, because there are no plans for refurbishment or other major changes at the Ginna site, the land and shoreline within the Ginna boundaries is protected from further development or adverse impacts, at least through the period of decommissioning.

Based on these considerations, the staff concludes that continued operation of Ginna is not likely to make a detectable contribution to the cumulative effects associated with any of the socioeconomic issues discussed in Section 4.4, and therefore, the cumulative impacts will be SMALL and no additional mitigation measures are warranted.

4.8.5 Cumulative Impacts on Groundwater Use and Quality

There are no groundwater withdrawals at Ginna, and RG&E imports less than 4 m^3/min (100 gpm) of potable water from local utilities for plant use. As noted previously, surface water is the primary source of potable water for local water utilities. The impact of current water usage has been determined in Section 4.5 to be SMALL. Because there are no groundwater withdrawals at Ginna and there are none anticipated in the future, the Ginna site is not causing a detectable change in the regional groundwater usage, and therefore the cumulative impact is SMALL and no mitigation measures are warranted.

4.8.6 Cumulative Impacts on Threatened or Endangered Species

The geographic area considered in the analysis of potential cumulative impacts to threatened or endangered species includes Wayne County and the waters of Lake Ontario near Wayne County. As discussed in Sections 2.2.5 and 2.2.6, there are several threatened or endangered species that occur within this area. However, the staff determined in Section 4.6, that continued operation of Ginna would have no effect on any of these species, primarily because none are known to occur near the Ginna site or its transmission line right-of-way. Therefore, the continued operation of Ginna will not contribute to a regional cumulative impact on these species, regardless of whether or not other actions occur that could have adverse impacts. There are no species currently considered to be candidates or proposed for listing as threatened or endangered known to occur in the vicinity of Ginna. Also, it is unlikely that any listed species will increase its known range to an extent that it would become adversely affected by continued plant operation.

Therefore, the staff has determined that the cumulative impacts to threatened or endangered species due to continued operation of the Ginna site and associated transmission line will be SMALL, and that additional mitigation measures would not be warranted.

4.9 Summary of Impacts of Operations During the Renewal Term

RG&E and the staff discovered no new and significant information related to any of the applicable Category 1 issues associated with Ginna operation during the renewal term. Therefore, the staff concludes that the environmental impacts associated with the Category 1 issues are bounded by the impacts described in the GEIS. For each of the issues, the GEIS concluded that the impacts would be SMALL and that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

Plant-specific environmental evaluations were conducted for 11 Category 2 issues applicable to Ginna operation during the renewal term and for environmental justice and chronic effects of electromagnetic fields. For all 11 issues and environmental justice, the staff's preliminary conclusion is that the potential environmental impact of renewal-term operations of Ginna would be of SMALL significance in the context of the standards set forth in the GEIS and that further mitigation is not warranted. In addition, the staff determined that a consensus has not been reached by appropriate Federal health agencies regarding chronic adverse effects from electromagnetic fields. Therefore, no evaluation of this issue is required.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where Ginna license renewal impacts are deemed to be SMALL, the staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

4.10 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

36 CFR Part 800. Code of Federal Regulations, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic Properties"

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5.0 Environmental Impacts of Postulated Accidents

Environmental issues associated with postulated accidents were discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) 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.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required.

This chapter describes the environmental impacts from postulated accidents that might occur during the license-renewal term.

5.1 Postulated Plant Accidents

Two classes of accidents are evaluated in the GEIS. These are design-basis accidents (DBA) and severe accidents, as discussed in the following sections.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

5.1.1 Design-Basis Accidents

To receive U.S. Nuclear Regulatory Commission (NRC) approval to operate a nuclear power facility, an applicant for an initial operating license must submit a Safety Analysis Report (SAR) as part of its application. The SAR presents the design criteria and design information for the proposed reactor and comprehensive data on the proposed site. The SAR also discusses various hypothetical accident situations and the safety features that are provided to prevent and mitigate accidents. The staff reviews the application to determine whether the plant design meets the Commission's regulations and requirements and includes, in part, the nuclear plant design and its anticipated response to an accident.

The DBAs are evaluated by both the licensee and the staff to ensure that the plant can withstand normal accidents and abnormal transients and a broad spectrum of postulated accidents without undue hazard to the health and safety of the public. A number of these postulated accidents are not expected to occur during the life of the plant but are evaluated to establish the design basis for the preventive and mitigative safety systems of the facility. The acceptance criteria for DBAs are described in 10 CFR Part 50 and 10 CFR Part 100.

The environmental impacts of DBAs are evaluated during the initial licensing process, and the ability of the plant to withstand these accidents is demonstrated to be acceptable before issuance of the operating license (OL). The results of these evaluations are found in this section and in license documentation such as the applicant's final safety analysis report (FSAR), the staff's safety evaluation report (SER), and the Final Environmental Statement (FES). A licensee is required to maintain the acceptable design and performance criteria throughout the life of the plant, including any extended-life operation. The consequences for these events are evaluated for the hypothetical maximally exposed individual; as such, changes in the plant environment will not affect these evaluations. Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for license renewal, the environmental impacts as calculated for DBAs should not differ significantly from initial licensing assessments over the life of the plant, including the license renewal period. Accordingly, the design of the plant relative to DBAs during the extended period is considered to remain acceptable and the environmental impacts of those accidents were not examined further in the GEIS.

The Commission has determined that the environmental impacts of DBAs are of SMALL significance for all plants because the plants were designed to successfully withstand these accidents. Therefore, for the purposes of license renewal, design-basis events are designated as a Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue, applicable to the R.E. Ginna Nuclear Power Plant (Ginna), is listed in Table 5-1. The early resolution of the DBAs makes them a part of the current licensing basis of the plant; the current licensing basis of the plant is to be maintained by the licensee under its current license and, therefore, under the provisions of 10 CFR 54.30, is not subject to review under license renewal.

Table 5-1. Category 1 Issue Applicable to Postulated Accidents During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
POSTULATED ACCIDENTS	
Design-basis accidents (DBAs)	5.3.2; 5.5.1

Based on information in the GEIS, the Commission found that

> The NRC staff has concluded that the environmental impacts of design-basis accidents are of *small significance* for all plants.

In its Environmental Report (ER), Rochester Gas and Electric Corporation (RG&E) stated that "no new information existed for the issues that would invalidate the GEIS conclusions" (RG&E 2002). The staff has not identified any new and significant information during its independent review of the Ginna ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to this issue beyond those discussed in the GEIS.

5.1.2 Severe Accidents

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. In the GEIS, the staff assessed the impacts of severe accidents during the license renewal period, using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the renewal period.

Severe accidents initiated by external phenomena such as tornadoes, floods, earthquakes, and fires have not traditionally been discussed in quantitative terms in FESs and were not considered specifically for the Ginna site in the GEIS (NRC 1996). However, in the GEIS, the staff did evaluate existing impact assessments performed by the NRC and by the industry at 44 nuclear plants in the United States and concluded that the risk from beyond-design-basis earthquakes at existing nuclear power plants is SMALL. Additionally, the staff concluded that the risks from other external events are adequately addressed by a generic consideration of internally initiated severe accidents.

Based on information in the GEIS, the Commission found that

> The probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, 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.

Therefore, the Commission has designated mitigation of severe accidents as a Category 2 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. This issue, applicable to Ginna, is listed in Table 5-2.

Table 5-2. Category 2 Issue Applicable to Postulated Accidents During the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
	POSTULATED ACCIDENTS		
Severe Accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.4; 5.5.2	L	5.2

The staff has not identified any new and significant information with regard to the consequences from severe accidents during its independent review of the Ginna ER, the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of severe accidents beyond those discussed in the GEIS. However, in accordance with 10 CFR 51.53(c)(ii)(L), the staff has reviewed severe accident mitigation alternatives (SAMAs) for Ginna. The results of its review are discussed in Section 5.2.

5.2 Severe Accident Mitigation Alternatives

10 CFR 51.53(c)(3)(ii)(L) requires that license renewal applicants consider alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an environmental impact statement (EIS) or related supplement or in an environmental assessment. The purpose of this consideration is to ensure that plant changes (i.e., hardware, procedures, and training) with the potential for improving severe accident safety performance are identified and evaluated. SAMAs have not been previously considered for Ginna; therefore, the remainder of Chapter 5 addresses those alternatives.

5.2.1 Introduction

This section presents a summary of the SAMA evaluation for Ginna conducted by RG&E and described in the ER (RG&E 2002) and of the NRC's review of that evaluation. The details of the review are described in the NRC staff evaluation that was prepared by the staff with contract assistance from Information Systems Laboratories, Inc. The entire evaluation is presented in Appendix G.

The SAMA evaluation for Ginna was a four step process. In the first step, RG&E quantified the level of risk associated with potential reactor accidents using the plant-specific probabilistic safety assessment (PSA) and other risk models.

The second step was the examination of the major risk contributors to identify areas where plant improvements might have the greatest chance to reduce risk. Then possible ways of reducing those risks were identified. Common ways of reducing risk are changes to components, systems, procedures, and training. RG&E identified approximately 200 potential SAMAs. Using a set of screening criteria, the number of SAMAs requiring further consideration was reduced to 20. Further refinement and review of these 20 SAMAs eliminated 12 from further consideration.

In the third step, the benefits and costs for the remaining eight candidate SAMAs were estimated. Estimates were made of how much each proposed SAMA could reduce risk. Those estimates were developed in terms of dollars in accordance with NRC guidance for performing regulatory analyses (NRC 1997). The costs of implementing the proposed SAMAs were also estimated.

Finally in the fourth step, the costs and benefits of each of the eight final SAMAs were compared to determine whether the SAMA was cost-beneficial, meaning the benefits of the SAMA were greater than the costs (a positive cost-benefit). In the final analysis, two of these SAMAs were determined to be cost-beneficial for Ginna.

Each of these four steps is discussed in more detail in the sections that follow.

5.2.2 Estimate of Risk for Ginna

RG&E submitted an assessment of SAMAs for Ginna as part of the ER (RG&E 2002) and provided a revised assessment in response to staff information requests (RG&E 2003). This assessment was based on the most recent Ginna PSA (including the Level 1 and 2 analyses), a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) (essentially a Level 3 PSA model), and the Ginna Individual Plant Examination of External Events (IPEEE) (RG&E 1997a, 1998a, 1998b, 1998c).

The most recent PSA is a refinement of the plant-specific PSA presented in the Ginna Individual Plant Examination (IPE) (RG&E 1994, 1997b, 1997c). The baseline core damage frequency (CDF) for Ginna is approximately 4.0 x 10^{-5} per year, based on internally-initiated events at power and at shutdown, and fire and internal flooding events at power. RG&E did not include the contribution to CDF from seismic events in these estimates. RG&E concluded that the existing IPEEE and Seismic Qualification Utility Group (SQUG) evaluations had adequately identified potential plant improvements to address seismic events. The breakdown of CDF by initiating event/accident class is summarized in Table 5-3. Fires, internal floods, shutdown events, and steam generator tube ruptures are the dominant contributors to the CDF.

Table 5-3. Core Damage Frequency for R.E. Ginna Nuclear Power Plant (Revision 4.2 of PSA)

Contributor	CDF (per year)	Percent of Total CDF
Internal Events – At Power		
Transients	1.0 x 10^{-6}	3
Station Blackout (SBO)	2.1 x 10^{-6}	5
Anticipated transient without scram (ATWS)	2.0 x 10^{-7}	1
Steam generator tube rupture (SGTR)	6.0 x 10^{-6}	15
Loss of coolant accidents (LOCAs) <2 inches	2.6 x 10^{-6}	6
LOCAs >2 inches	7.0 x 10^{-7}	2
Interfacing system LOCA (ISLOCA)	2.5 x 10^{-7}	1
Internal Events – Shutdown	6.8 x 10^{-6}	17
Total CDF from internal events	**2.0 x 10^{-5}**	**50**
External Events		
Fire	1.1 x 10^{-5}	28
Flood	8.8 x 10^{-6}	22
Total CDF from external events	**2.0 x 10^{-5}**	**50**
Total CDF	**4.0 x 10^{-5}**	**100**

RG&E estimated the dose from all postulated accidents to the population within 80 km (50 mi) of the Ginna site to be approximately 0.163 person-Sv (16.300 person-rem). The breakdown of the population dose by containment release mode is summarized in Table 5-4. Bypass events

(SGTR and interfacing system LOCA) and late containment failures dominate the population dose.

Table 5-4. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose Person-Sv Per Year	(Person-Rem Per Year)	Percent Contribution
SGTR[a]	0.063	6.300	39
ISLOCAs	0.044	4.400	27
Early containment failure	0.020	2.000	12
Late containment failure[b]	0.030	3.000	19
No containment failure	0.006	0.600	3
Total	0.163	16.300	100

(a) Includes thermally induced SGTR
(b) Includes contribution from shutdown events

The staff has reviewed RG&E's data and evaluation methods and concludes that the quality of the risk analyses is adequate to support an assessment of the risk reduction potential for the candidate SAMAs. Accordingly, the staff based its assessment of offsite risk on the CDF and offsite doses provided by RG&E.

5.2.3 Potential Design Improvements

Once the most risk significant parts of the plant design and operation were identified, RG&E searched for ways to reduce those risks. To identify potential plant improvements, RG&E reviewed improvements identified in the Ginna IPE and IPEEE processes, SAMA analyses submitted for other nuclear power plants, and NRC and industry documents discussing potential plant improvements. RG&E also reviewed the importance measures and dominant cutsets of the Ginna PSA and considered insights provided by Ginna plant staff. RG&E identified approximately 200 potential risk-reducing improvements to plant components, systems, procedures, and training (SAMAs).

All but 20 of these SAMAs were removed from further consideration because (1) the SAMA was not applicable at Ginna due to design differences, (2) the SAMA would involve major plant design and/or structural changes that would clearly be well in excess of the maximum attainable benefit, or (3) the SAMA would provide only minimal risk reduction.

These 20 candidate SAMAs were further defined and then reviewed based on the following considerations: (1) ability to implement the change at Ginna (i.e., assessment of design challenges or physical limitations), (2) the risk reduction that would realistically be achieved, and (3) whether implementation of the change would increase vulnerabilities in other areas.

Using this evaluation process, all but eight of the candidate SAMAs were removed from further consideration.
The staff reviewed the screening methods used by RG&E and their results and concluded that they were systematic and comprehensive.

5.2.4 Evaluation of Risk Reduction Potential and Cost of Design Improvements

RG&E calculated the potential risk reduction for the remaining eight SAMAs. The potential benefits were developed by adding the estimated present dollar value of the averted public exposure, offsite property damage, occupational exposure, and onsite costs associated with each SAMA. RG&E estimated the costs of implementing the eight remaining SAMAs through application of engineering judgement and site-specific cost estimates.

The staff reviewed RG&E's calculations of the potential risk reduction and concluded that they are reasonable and conservative. Therefore, the staff based its estimates of averted risk for the SAMAs on RG&E's risk reduction estimates. The staff reviewed the cost estimates and concluded that they are sufficient and appropriate for use in the SAMA evaluation.

5.2.5 Cost-Benefit Comparison

Based on the more detailed evaluations of potential risk reduction and cost discussed above, RG&E determined that two of the eight remaining SAMAs were cost beneficial. RG&E performed additional analyses to determine the impact of certain parameter choices such as the discount rate on the calculations. RG&E also evaluated the impact on SAMA results if the 95th- percentile values of the CDF were used in the cost-benefit analysis instead of the best-estimate CDF values. These analyses did not result in identifying any additional cost-beneficial SAMAs. Therefore, RG&E finally concluded that there were two cost-beneficial SAMAs.

The two SAMAs considered to be potentially cost beneficial include (1) obtaining a skid-mounted, 480-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; and (2) modifying procedures to allow certain charging pumps to be manually aligned to an alternate power source in the event of a control complex fire, or a fire that disables safeguards train B when the train A charging pump is out of service or fails to run.

The staff reviewed calculation methods and logic arguments used by RG&E in the final cost-benefit comparisons and agreed with their conclusion that two of the original approximately 200 SAMAs are cost beneficial.

5.2.6 Conclusions

The staff reviewed the SAMA analysis provided by RG&E and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs, the generally large negative net benefits, and the inherently small baseline risks support the general conclusion that the SAMA evaluations performed by RG&E are reasonable and sufficient for the license renewal submittal.

Based on its review of the RG&E SAMA analysis, the staff concludes that two of the candidate SAMAs are cost-beneficial. This is based on conservative treatment of costs and benefits. This conclusion is consistent with the low residual level of risk indicated in the Ginna PSA and the fact that Ginna has already implemented many plant improvements identified from the IPE and IPEEE process. Although two SAMA candidates appear to be cost beneficial, they do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54. RG&E stated that it will consider implementation of these SAMAs through its current plant change process.

5.3 References

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy,* Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 100. Code of Federal Regulations, Title 10, *Energy,* Part 100, "Reactor Site Criteria."

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Rochester Gas & Electric Corporation (RG&E). 1997a. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: IPEEE Seismic Evaluation Report (prepared by Stevenson & Associates), Rochester Gas and Electric, Robert E. Ginna Station, Attachment to Letter. January 31, 1997.

Rochester Gas & Electric Corporation (RG&E). 1997b. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: Generic Letter 88-20, Level 1 Probabilistic Safety Assessment (PSA). January 15, 1997.

Rochester Gas & Electric Corporation (RG&E). 1997c. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: Generic Letter 88-20, Level 2 Probabilistic Safety Assessment. August 30, 1997.

Rochester Gas & Electric Corporation (RG&E). 1998a. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: Ginna Station Fire IPEEE. June 30, 1998.

Rochester Gas & Electric Corporation (RG&E). 1998b. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: IPEEE High Winds and Transportation Report. August 19, 1998.

Rochester Gas & Electric Corporation (RG&E). 1998c. Letter from R. C. Mecredy, RG&E, to the U.S. Nuclear Regulatory Commission. Subject: Supplement to High Winds and Transportation Report. September 8, 1998.

Rochester Gas and Electric Corporation (RG&E). 2002. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License, Appendix E – Environmental Report.* Rochester, New York.

Rochester Gas & Electric Corporation (RG&E). 2003. Letter from R. C. Mecredy, RG&E, to U.S. Nuclear Regulatory Commission. Subject: Response to December 26, 2002, Request for Additional Information Regarding Severe Accident Mitigation Alternatives. February 28, 2003.

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997. *Regulatory Analysis Technical Evaluation Handbook.* NUREG/BR-0184, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report,* "Section 6.3 – Transportation, Table 9.1 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

6.0 Environmental Impacts of the Uranium Fuel Cycle and Solid Waste Management

Environmental issues associated with the uranium fuel cycle and solid waste management were discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) 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 characteristics.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria of Category 1, and therefore, additional plant-specific review of these issues is required.

This chapter addresses the issues that are related to the uranium fuel cycle and solid waste management during the license renewal term that are listed in 10 CFR Part 51, Subpart A, Appendix B, and are applicable to the R.E. Ginna Nuclear Power Plant (Ginna). The generic potential impacts of the radiological and nonradiological environmental impacts of the uranium fuel cycle and transportation of nuclear fuel and wastes are described in detail in the GEIS, based in part on the generic impacts provided in 10 CFR 51.51(b), Table S-3, "Table of Uranium Fuel Cycle Environmental Data," and in 10 CFR 51.52(c), Table S-4, "Environmental

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor." The GEIS also addresses the impacts from radon-222 and technetium-99. There are no Category 2 issues for the uranium fuel cycle and solid waste management.

6.1 The Uranium Fuel Cycle

Category 1 issues from 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to Ginna from the uranium fuel cycle and solid waste management are listed in Table 6-1.

Table 6-1. Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid Waste Management During the License Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste)	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
Offsite radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4, 6.6
Offsite radiological impacts (spent fuel and high-level waste)	6.1; 6.2.2.1; 6.2.3; 6.2.4, 6.6
Nonradiological impacts of the uranium fuel cycle	6.1; 6.2.2.6; 6.2.2.7; 6.2.2.8; 6.2.2.9; 6.2.3; 6.2.4; 6.6
Low-level waste storage and disposal	6.1; 6.2.2.2; 6.4.2; 6.4.3; 6.4.3.1; 6.4.3.2; 6.4.3.3; 6.4.4; 6.4.4.1; 6.4.4.2; 6.4.4.3; 6.4.4.4; 6.4.4.5; 6.4.4.5.1; 6.4.4.5.2; 6.4.4.5.3; 6.4.4.5.4; 6.4.4.6, 6.6
Mixed waste storage and disposal	6.4.5.1; 6.4.5.2; 6.4.5.3; 6.4.5.4; 6.4.5.5; 6.4.5.6; 6.4.5.6.1; 6.4.5.6.2; 6.4.5.6.3; 6.4.5.6.4, 6.6
Onsite spent fuel	6.1; 6.4.6; 6.4.6.1; 6.4.6.2; 6.4.6.3; 6.4.6.4; 6.4.6.5; 6.4.6.6; 6.4.6.7; 6.6
Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6, Addendum 1

In the Ginna Environmental Report (ER) (RG&E 2002), Rochester Gas and Electric Corporation (RG&E) stated that "no new information existed for the issues that would invalidate the GEIS conclusions." The staff has not identified any new and significant information on this issue during its independent review of the Ginna ER, the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of those GEIS issues, the staff concluded that the impacts are SMALL except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, as discussed below, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff review and the GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, for each of these issues follows.

- Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high-level waste). Based on information in the GEIS, the Commission found that

  > Off-site impacts of the uranium fuel cycle have been considered by the Commission in Table S-3 of this part [10 CFR 51.51(b)]. Based on information in the GEIS, impacts on individuals from radioactive gaseous and liquid releases including radon-222 and technetium-99 are small.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no offsite radiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Offsite radiological impacts (collective effects). Based on information in the GEIS, the Commission found that

  > The 100 year environmental dose commitment to the U.S. population from the fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be about 14,800 person rem [148 person Sv], or 12 cancer fatalities, for each additional 20-year power reactor operating term. Much of this, especially the contribution of radon releases from mines and tailing piles, consists of tiny doses summed over large populations. This same dose calculation can theoretically be extended to include many tiny doses over additional thousands of years as well as doses outside the U.S. The result of such a calculation would be thousands of cancer fatalities from the fuel cycle, but this result assumes that even tiny doses have some statistical adverse health effect which will not ever be mitigated (for example no cancer cure in the next thousand years), and that these doses projected over thousands of years are meaningful. However, these assumptions are questionable. In particular, science cannot rule out the

possibility that there will be no cancer fatalities from these tiny doses. For perspective, the doses are very small fractions of regulatory limits, and even smaller fractions of natural background exposure to the same populations.

Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA [National Environmental Policy Act] implications of these matters should be made and it makes no sense to repeat the same judgement in every case [NEPA 1969]. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission has not assigned a single level of significance for the collective effects of the fuel cycle, this issue is considered Category 1.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no offsite radiological impacts (collective effects) from the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- <u>Offsite radiological impacts (spent fuel and high-level waste disposal)</u>. Based on information in the GEIS, the Commission found that

For the high level waste and spent fuel disposal component of the fuel cycle, there are no current regulatory limits for offsite releases of radionuclides for the current candidate repository site. However, if we assume that limits are developed along the lines of the 1995 National Academy of Sciences (NAS) report, "Technical Bases for Yucca Mountain Standards," and that in accordance with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository can and likely will be developed at some site which will comply with such limits, peak doses to virtually all individuals will be 100 millirem [1 mSv] per year or less. However, while the Commission has reasonable confidence that these assumptions will prove correct, there is considerable uncertainty since the limits are yet to be developed, no repository application has been completed or reviewed, and uncertainty is inherent in the models used to evaluate possible pathways to the human environment. The NAS report indicated that 100 millirem [1 mSv] per year should be considered as a starting point for limits for individual doses, but notes that some measure of consensus exists among national and international bodies that the limits should be a fraction of the 100 millirem [1 mSv] per year. The lifetime individual risk from 100 millirem [1 mSv] annual dose limit is about 3×10^{-3}.

Estimating cumulative doses to populations over thousands of years is more problematic. The likelihood and consequences of events that could seriously compromise the integrity of a deep geologic repository were evaluated by the Department of Energy in the "Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste," October 1980 [DOE 1980]. The evaluation estimated the 70-year whole-body dose commitment to the maximum individual and to the regional population resulting from several modes of breaching a reference repository in the year of closure, after 1,000 years, after 100,000 years, and after 100,000,000 years. Subsequently, the NRC and other federal agencies have expended considerable effort to develop models for the design and for the licensing of a high level waste repository, especially for the candidate repository at Yucca Mountain. More meaningful estimates of doses to population may be possible in the future as more is understood about the performance of the proposed Yucca Mountain repository. Such estimates would involve very great uncertainty, especially with respect to cumulative population doses over thousands of years. The standard proposed by the NAS is a limit on maximum individual dose. The relationship of potential new regulatory requirements, based on the NAS report, and cumulative population impacts has not been determined, although the report articulates the view that protection of individuals will adequately protect the population for a repository at Yucca Mountain. However, EPA's [Environmental Protection Agency] generic repository standards in 40 CFR Part 191 generally provide an indication of the order of magnitude of cumulative risk to population that could result from the licensing of a Yucca Mountain repository, assuming the ultimate standards will be within the range of standards now under consideration. The standards in 40 CFR Part 191 protect the population by imposing "containment requirements" that limit the cumulative amount of radioactive material released over 10,000 years. Reporting performance standards that will be required by EPA are expected to result in releases and associated health consequences in the range between 10 and 100 premature cancer deaths with an upper limit of 1,000 premature cancer deaths world-wide for a 100,000 metric tonne (MTHM) repository.

Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA implications of these matters should be made and it makes no sense to repeat the same judgement in every case. Even taking the uncertainties into account, the Commission concludes that these impacts are acceptable in that these impacts would not be sufficiently large to require the NEPA conclusion, for any plant, that the option of extended operation under 10 CFR Part 54 should be eliminated.

Accordingly, while the Commission has not assigned a single level of significance for the impacts of spent fuel and high level waste disposal, this issue is considered Category 1.

Since the GEIS was originally issued in 1996, the EPA has published radiation protection standards for Yucca Mountain, Nevada, at 40 CFR Part 197, "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada," on June 13, 2001 (66 FR 32132). The Energy Policy Act of 1992 (42 USC 10101) directed that the NRC adopt these standards into its regulations for reviewing and licensing the repository. The NRC published its regulations at 10 CFR Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada," on November 2, 2001 (66 FR 55792). These regulations include the following requirements: (1) 0.15 mSv/year (15.00 mrem/year) dose limit for members of the public during the storage period prior to repository closure; (2) 0.15 mSv/year (15.00 mrem/year) dose limit for the reasonably maximally exposed individual for 10,000 years following disposal; (3) 0.15.00 mSv/year (15.00 mrem/year) dose limit for the reasonably maximally exposed individual as a result of a human intrusion at or before 10,000 years after disposal; and (4) a groundwater protection standard that states for 10,000 years of undisturbed performance after disposal, radioactivity in a representative volume of groundwater will not exceed (a) 0.19 Bq/L (5.00 pCi/L) (radium-226 and radium-228), (b) 0.56 Bq/L (15 pCi/L) (gross alpha activity), and (c) 0.04 mSv/year (4.00 mrem/year) to the whole body or any organ (from combined beta- and photon-emitting radionuclides).

On February 15, 2002, subsequent to receipt of a recommendation by Secretary Abraham, U.S. Department of Energy, the President recommended the Yucca Mountain site for the development of a repository for the geologic disposal of spent nuclear fuel and high-level nuclear waste.

This change in regulatory status does not cause the staff to change its position with respect to the impact of spent fuel and high-level waste disposal. The staff still considers the Category 1 classification in the GEIS appropriate.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no offsite radiological impacts related to spent fuel and high-level waste disposal during the renewal term beyond those discussed in the GEIS.

- Nonradiological impacts of the uranium fuel cycle. Based on information in the GEIS, the Commission found that

  > The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an operating license for any plant are found to be SMALL.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no nonradiological impacts of the uranium fuel cycle during the renewal term beyond those discussed in the GEIS.

- Low-level waste storage and disposal. Based on information in the GEIS, the Commission found that

  > The comprehensive regulatory controls that are in place and the low public doses being achieved at reactors ensure that the radiological impacts to the environment will remain small during the term of a renewed license. The maximum additional on-site land that may be required for low-level waste storage during the term of a renewed license and associated impacts will be small. Nonradiological impacts on air and water will be negligible. The radiological and nonradiological environmental impacts of long-term disposal of low-level waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient low-level waste disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of low-level waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- Mixed waste storage and disposal. Based on information in the GEIS, the Commission found that

  > The comprehensive regulatory controls and the facilities and procedures that are in place ensure proper handling and storage, as well as negligible doses and exposure to toxic materials for the public and the environment at all plants. License renewal will not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants. The radiological and non-radiological environmental impacts of long-term disposal of mixed waste from any individual plant at licensed sites are small. In addition, the Commission concludes that there is reasonable assurance that sufficient mixed waste

> disposal capacity will be made available when needed for facilities to be decommissioned consistent with NRC decommissioning requirements.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of mixed waste storage and disposal associated with the renewal term beyond those discussed in the GEIS.

- <u>Onsite spent fuel</u>. Based on information in the GEIS, the Commission found that

> The expected increase in the volume of spent fuel from an additional 20 years of operation can be safely accommodated on site with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage is not available.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of onsite spent fuel associated with license renewal beyond those discussed in the GEIS.

- <u>Nonradiological waste</u>. Based on information in the GEIS, the Commission found that

> No changes to generating systems are anticipated for license renewal. Facilities and procedures are in place to ensure continued proper handling and disposal at all plants.

The staff has not identified any new and significant information. Therefore, the staff concludes that there are no nonradiological waste impacts during the renewal term beyond those discussed in the GEIS.

- <u>Transportation</u>. Based on information contained in the GEIS, the Commission found that

> The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by NRC up to 62,000 MWd/MTU and the cumulative impacts of transporting high-level waste to a single repository, such as Yucca Mountain, Nevada are found to be consistent with the impact values contained in 10 CFR 51.52(c), Summary Table S-4 – Environmental Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor. If fuel enrichment or burnup conditions are not met, the applicant must submit an assessment of the implications for the environmental impact values reported in 51.52.

Ginna meets the fuel-enrichment and burnup conditions set forth in Addendum 1 to the GEIS. The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of transportation associated with license renewal beyond those discussed in the GEIS.

6.2 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 63. Code of Federal Regulations. Title 10, *Energy*, Part 63, "Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

40 CFR Part 191. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Waste."

40 CFR Part 197. Code of Federal Regulations. Title 40, *Protection of Environment*, Part 197, "Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada."

Energy Policy Act of 1992. 42 USC 10101, et seq.

National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

Rochester Gas and Electric Corporation (RG&E). 2002. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License, Appendix E – Environmental Report.* Rochester, New York.

U.S. Department of Energy (DOE). 1980. *Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste.* DOE/EIS 00046-G, Vols. 1-3, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 2001. "Part 197 – Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada." 66 FR 32132.

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report,* "Section 6.3 – Transportation, Table 9.1 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2001. "Part 63 – Disposal of High-Level Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada." 66 FR 55792. November 2, 2001.

7.0 Environmental Impacts of Decommissioning

Environmental issues associated with decommissioning, which result from continued plant operation during the renewal term, are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a] The GEIS includes a determination of whether the analysis of the environmental issues could be applied to all plants and whether additional mitigation measures would be warranted. Issues were then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

(1) 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 characteristics.

(2) 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 waste and spent fuel disposal).

(3) 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.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that did not meet one or more of the criteria of Category 1, and therefore, additional plant-specific review of these issues is required. No Category 2 issues are related to decommissioning the R.E. Ginna Nuclear Power Plant (Ginna).

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, that are applicable to Ginna decommissioning following the renewal term are listed in Table 7-1. In its Environmental Report (ER) (RG&E 2002), Rochester Gas and Electric Corporation (RG&E) stated "no new information exists for the issues that would invalidate the GEIS conclusions." The staff has not identified any new and significant information during its independent review of the Ginna ER (RG&E 2002), the staff's site visit, the scoping process, discussions with other agencies, or its evaluation of other information. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues,

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

the staff concluded in the GEIS that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

Table 7-1. Category 1 Issues Applicable to Decommissioning of R.E. Ginna Nuclear Power Plant Following the Renewal Term

ISSUE – 10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
DECOMMISSIONING	
Radiation Doses	7.3.1; 7.4
Waste Management	7.3.2; 7.4
Air Quality	7.3.3; 7.4
Water Quality	7.3.4; 7.4
Ecological Resources	7.3.5; 7.4
Socioeconomic Impacts	7.3.7; 7.4

A brief description of the staff's review and the GEIS conclusions, as codified in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, for each of the issues follows:

- Radiation doses. Based on information in the GEIS, the Commission found that

  > Doses to the public will be well below applicable regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no more than 1 man-rem [0.01 person-Sv] caused by buildup of long-lived radionuclides during the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no radiation doses associated with decommissioning following license renewal beyond those discussed in the GEIS.

- Waste management. Based on information in the GEIS, the Commission found that

  > Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of solid waste associated with decommissioning following the license renewal term beyond those discussed in the GEIS.

- Air quality. Based on information in the GEIS, the Commission found that

  > Air quality impacts of decommissioning are expected to be negligible either at the end of the current operating term or at the end of the license renewal term.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of license renewal on air quality during decommissioning beyond those discussed in the GEIS.

- Water quality. Based on information in the GEIS, the Commission found that

  > The potential for significant water quality impacts from erosion or spills is no greater whether decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of license renewal on water quality during decommissioning beyond those discussed in the GEIS.

- Ecological Resources. Based on information in the GEIS, the Commission found that

  > Decommissioning after either the initial operating period or after a 20-year license renewal period is not expected to have any direct ecological impacts.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of license renewal on ecological resources during decommissioning beyond those discussed in the GEIS.

- Socioeconomic Impacts. Based on information in the GEIS, the Commission found that

  > Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year relicense period, but they might be decreased by population and economic growth.

  The staff has not identified any new and significant information. Therefore, the staff concludes that there are no impacts of license renewal on the socioeconomic impacts of decommissioning beyond those discussed in the GEIS.

7.1 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

Rochester Gas and Electric Corporation (RG&E). 2002. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License, Appendix E – Environmental Report.* Rochester, New York.

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report,* "Section 6.3 – Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

8.0 Environmental Impacts of Alternatives

This chapter examines the potential environmental impacts associated with denying the renewal of the operating license (OL) (i.e., the no-action alternative); the potential environmental impacts from electric generating sources other than the R.E. Ginna Nuclear Power Plant (Ginna); the possibility of purchasing electric power from other sources to replace power generated by Ginna and the associated environmental impacts; the potential environmental impacts from a combination of generating and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of power generated by Ginna. The environmental impacts are evaluated using the U.S. Nuclear Regulatory Commission's (NRC) three-level standard of significance – SMALL, MODERATE, or LARGE – developed using Council on Environmental Quality (CEQ) guidelines and set forth in the footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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

The impact categories evaluated in this chapter are the same as those used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999)[a] with the additional impact category of environmental justice.

8.1 No-Action Alternative

The NRC's regulations implementing National Environmental Policy Act (NEPA) of 1969 specify that the no-action alternative be discussed in an NRC EIS (10 CFR Part 51, Subpart A, Appendix A[4]). For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the Ginna OL and RG&E would then cease operations at the plant and initiate the decommissioning of the plant.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

RG&E will be required to comply with NRC decommissioning requirements whether or not the OL is renewed. If the Ginna OL is renewed, decommissioning activities will not be avoided but may be postponed for up to an additional 20 years. If the OL is not renewed, RG&E would conduct decommissioning activities according to the requirements in 10 CFR 50.82.

The environmental impacts associated with decommissioning following a license renewal period of up to 20 years or following the no-action alternative would be bounded by the discussion of impacts in Chapter 7 of the relicensing GEIS, (NRC 1999), Chapter 7 of this supplemental environmental impact statement (SEIS), and the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, NUREG-0586 Supplement 1 (NRC 2002). The impacts of decommissioning after 60 years of operation are not expected to be significantly different from those occurring after 40 years of operation.

The no-action alternative, that is, ceasing operations after the current license expires, would result in a net reduction in power production. The power not generated by Ginna during the license renewal term would likely be replaced by (1) demand-side management (DSM) and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than Ginna, or (4) some combination of these options. This replacement power would produce additional environmental impacts as discussed in Section 8.2.

The staff's assessments of the impacts of the no-action alternative on each impact category are provided in the following sections. The assessment of each impact category is supplemented with information about the potential impacts of decommissioning.

- **Land Use**

Cessation of plant operations would result in a reduced use of the Ginna site. Land use on and off the site will be reduced and eventually eliminated resulting from plant operations. During decommissioning, some temporary changes in onsite land use could occur. These changes may include additional or expanded staging and laydown areas or construction of temporary buildings and parking areas. No offsite land-use changes are expected as a result of decommissioning. After cessation of operations and following decommissioning, the Ginna site would likely be retained by RG&E for other corporate purposes. Eventual sale or transfer of the site, however, could result in changes to land use. Notwithstanding this possibility, the impacts of the no-action alternative and decommissioning on land use are considered SMALL.

- **Ecology**

Impacts on aquatic ecology should be reduced immediately following cessation of plant operations. Water withdrawal and discharge of heated water will end when the reactor is shut down. Decommissioning activities may have some short-term impacts to site ecology. Impacts on aquatic ecology could result from removal of in-water pipes and structures or the filling of the discharge canal. Impacts to aquatic ecology would likely be short-term and could be mitigated. The aquatic environment is expected to recover naturally. Impacts on terrestrial ecology, following cessation of operations, should be greatly reduced because there will be less use of the land on and off the site. Impacts on terrestrial ecology, related to decommissioning activities, could occur as a result of land disturbance for additional laydown yards, stockpiles, and support facilities. Land disturbance is expected to be minimal and would result in relatively short-term impacts that can be mitigated using best management practices. The land is expected to recover naturally. Overall, the impacts associated with the no-action alternative and decommissioning on terrestrial and aquatic ecology are considered SMALL.

- **Water Use and Quality**

Cessation of plant operations would result in a significant reduction in water use because reactor cooling will no longer be required. As plant staff size decreases, the demand for potable water is expected to also decrease. Water use during decommissioning is expected to be less than during operation. The water quality is unlikely to be adversely affected unless onsite disposal of demolition debris is utilized. Overall, water use and quality impacts of the no-action alternative and decommissioning are considered SMALL.

- **Air Quality**

Emission from diesel generators, boilers, and other activities associated with Ginna operations will cease or be greatly reduced. During normal operations, emissions from these Ginna sources are lower than the thresholds in New York state and Federal air-quality regulations. Decommissioning activities that can adversely affect air quality include dismantlement of systems and equipment, demolition of buildings and structures, and the operation of internal combustion engines. The most likely adverse impact would be the generation of fugitive dust. Best management practices, such as seeding and wetting, could be used to minimize the generation of fugitive dust. Air-quality impacts associated with the no-action alternative and decommissioning are considered SMALL.

- **Waste**

Liquid, gaseous, and solid radioactive wastes are by-products of reactor operations. Liquid wastes are generated primarily by plant maintenance and service operations. The primary source of gas is displaced from the chemical and volume control system tanks used to store liquids. Solid wastes include dry active waste, sludge, oil, bead resin, and filters. These wastes will be eliminated or greatly reduced by the cessation of operations. Decommissioning activities would result in the generation of radioactive and non-radioactive waste. The staff concluded in NRC (2002) that the volume of low-level waste generated during decommissioning could vary greatly depending on the type and size of the plant, the length of time it operated, the decommissioning option chosen, and the waste treatment and volume reduction procedures used. Low-level radioactive waste must be disposed of in a facility licensed by NRC or a state with authority delegated by NRC. Recent advances in volume reduction and waste processing have significantly reduced waste volumes. A permanent repository for high-level waste is not currently available. The NRC has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations (10 CFR 51.23(a)). Onsite and offsite licensed disposal facilities would be used for disposal of non-radioactive waste. Overall, waste impacts associated with the no-action alternative and decommissioning are considered SMALL.

- **Human Health**

During operation of Ginna, releases and the resultant dose revealed that the doses to maximally exposed individuals in the vicinity of Ginna have been a small fraction of the limits specified to meet U.S. Environmental Protection Agency (EPA) standards. The assessment of radiation dose to the general public from effluents indicates the dose is only a fraction of the regulatory limit. These potential exposures will be reduced following cessation of plant operations. Radiological doses to occupational workers during decommissioning activities are estimated to average approximately 5 percent of the dose limits in 10 CFR Part 20, and to be similar to, or lower than, the doses experienced by workers in operating nuclear power plants. Effluent releases from decommissioning activities are estimated to be well below the limits in 10 CFR Part 20, and to be similar to, or lower than, effluent releases from operating nuclear power plants. These effluent releases will result in doses to the public well below 10 CFR Part 20 requirements. Occupational injuries to workers engaged in decommissioning activities are possible. However, historical injury and fatality rates at nuclear power plants have been lower than the average U.S. industrial rates. For years, America's commercial nuclear energy industry has ranked among the safest places to work in the United States. In 2000, its industrial safety accident rate, which tracks the number of accidents that result in lost work time, restricted work, or fatalities, was 0.26 per 200,000 worker-hours. This is lower than the accident rate for the U.S. manufacturing industry, at 3.95, and even lower than the accident rate for the workplaces of the U.S. finance, insurance, and real estate industries, at 0.62 (NEI 2003). Overall, the human health impacts associated with the no-action alternative and decommissioning are considered SMALL.

- **Socioeconomics**

If Ginna ceased operation, there would be a decrease in employment and tax revenues associated with the closure. Employment (primary and secondary) impacts and impacts on population would occur over a wide area. Employees working at Ginna reside in a number of New York counties including Wayne, Monroe, Ontario, and Livingston (RG&E 2002). Tax-related impacts would occur in Wayne County. In 2001, RG&E paid property taxes for Ginna to Wayne County, the town of Ontario, and the Wayne Central School District in the amount of $5,376,263 (RG&E 2002). This payment represented approximately 1.6 percent of total revenues in Wayne County and approximately 11 percent of total revenues for the town of Ontario. Payments to the Wayne Central School District accounted for 12.4 percent of the total district revenue between 1995 and 1999.

The no-action alternative would result in the loss of the taxes attributable to Ginna as well as the loss of plant payrolls 20 years earlier than if the OL was renewed. There would also be an adverse impact on housing values and the local nearby economy if Ginna ceased operations.

RG&E employees working at Ginna currently contribute time and money toward community involvement, including schools, churches, charities, and other civic activities. It is likely that with a reduced presence in the community following decommissioning, community involvement efforts by RG&E and its employees in the region would be less.

Both Chapter 7 of the GEIS and Supplement 1 to NUREG-0586 (NRC 2002) note that socioeconomic impacts would be expected as a result of the decision to close a nuclear power plant, and that the direction and magnitude of the overall impacts would depend on the state of the economy, the net change in workforce at the plant, and the changes in local government tax receipts. The socioeconomic impacts of decommissioning activities are expected to be SMALL. Appendix J of Supplement 1 to NUREG-0586 shows that the overall socioeconomic impact of plant closure plus decommissioning could be greater than SMALL.

The staff has concluded that when the property tax revenue from a nuclear power plant comprises less than 10 percent of the tax revenue of a local jurisdiction, the socioeconomic impacts associated with the loss of the plant's tax revenue as a result of plant closure is considered SMALL. The property taxes that RG&E pays for Ginna comprise less than 10 percent of total revenue of Wayne County; however, it comprises slightly more than 10 percent of the total revenue for both the town of Ontario and the Wayne Central School District; consequently, the socioeconomic impacts resulting from loss of this revenue are considered SMALL to MODERATE.

Employees at Ginna constitute approximately 1 percent of total employment in Wayne County. Loss of these jobs is considered to have a SMALL socioeconomic impact.

Overall, the staff concludes that the socioeconomic impacts associated with the no-action alternative are considered SMALL to MODERATE and the impacts of decommissioning are considered SMALL.

- **Aesthetics**

Cessation of plant operations would probably result in the dismantlement of buildings and structures at the site resulting in a positive aesthetic impact. Operational noise would be reduced or eliminated. Decommissioning would result in the eventual dismantlement of buildings and structures at the site resulting in a positive aesthetic impact. Noise would be generated during decommissioning operations that may be detectable offsite; however, the impact is unlikely to be of large significance and can normally be mitigated. Thus, the aesthetic impacts associated with the no-action alternative and decommissioning are considered SMALL.

- **Historic and Archaeological Resources**

Use of land resources at Ginna would be reduced following plant closure. The site would likely be retained by RG&E for other corporate purposes. Sale or transfer of the site could follow closure. Reduced use of the property will reduce the likelihood of adversely impacting historic and archaeological resources. The amount of undisturbed land needed to support the decommissioning process will be relatively small. The staff concluded in NRC (2002) that decommissioning activities conducted within the operational areas of a nuclear power plant are not expected to have a detectable effect on important cultural resources because these areas have been impacted during the operating life of the plant. Minimal disturbance of land outside the licensee's operational area for decommissioning activities is expected. Historic and archaeological resources on undisturbed portions of the site should not be adversely affected. Following decommissioning, the site would likely be retained by RG&E for other corporate purposes. Eventual sale or transfer of the site, however, could result in adverse impacts to cultural resources if the land-use pattern changes dramatically. Notwithstanding this possibility, the impacts of the no-action alternative and decommissioning on historic and archaeological resources are considered SMALL.

- **Environmental Justice**

Current operations at Ginna have no disproportionate impacts on the minority and low-income populations of Wayne and surrounding counties. No environmental pathways have been identified that would cause disproportionate impacts if the no-action alternative is implemented. Closure of Ginna would result in decreased employment opportunities and tax revenues in Wayne and surrounding counties, with possible negative and disproportionate impacts on minority or low-income populations. Ginna is located near a relatively urban area with many employment opportunities. Decommissioning activities are not expected to adversely impact the minority and low-income populations of Wayne and surrounding counties. Thus, the environmental justice impacts under the no-action alternative and decommissioning are considered SMALL.

- **Summary of the No-Action Alternative**

The environmental impacts associated with the no-action alternative are summarized in Table 8-1. Implementation of the no-action alternative would also have certain positive impacts in that adverse environmental impacts associated with current operation of Ginna (for example, solid waste generation and impingement or entrainment of aquatic life) would be eliminated.

Table 8-1. Summary of Environmental Impacts of the No-Action Alternative and Decommissioning Related to Renewal of the R.E. Ginna Nuclear Power Plant Operating License

Impact Category	Impact	Comment
Land Use	SMALL	Closure will result in decreased land use. Decommissioning onsite impacts expected to be temporary. No offsite impacts expected or plant closure or decommissioning.
Ecology	SMALL	Plant closure will immediately reduce impacts to terrestrial and aquatic ecology. Decommissioning impacts to ecology are expected to be temporary and will be mitigated using best management practices.
Water Use and Quality	SMALL	Water use will decrease. Water quality unlikely to be adversely affected unless onsite disposal of demolition debris is utilized.
Air Quality	SMALL	All emissions will decrease following closure. During decommissioning, the greatest impact is likely to be from fugitive dust; impact can be mitigated by good management practices.
Waste	SMALL	Low-level radioactive waste will be disposed of in licensed facilities. A permanent disposal facility for high-level waste is not currently available.
Human Health	SMALL	Radiological doses to workers and members of the public are expected to be within regulatory limits and comparable to, or lower than, doses from operating plants. Occupational injuries, during decommissioning, are possible, but injury rates at nuclear power plants are below the U.S. average industrial rate.
Socioeconomics	SMALL to MODERATE	Following plant closure there will be a decrease in employment in Wayne and surrounding counties and tax revenues in Wayne County. There will be some employment created during decommissioning.
Aesthetics	SMALL	Positive impact from eventual removal of buildings and structures. Some noise impact during decommissioning operations.

Table 8-1. (contd)

Impact Category	Impact	Comment
Historic and Archaeological Resources	SMALL	Use of the properties will decrease following plant closure and will be controlled during decommissioning.
Environmental Justice	SMALL	Some loss of employment opportunities and social programs is expected.

8.2 Alternative Energy Sources

This section describes the environmental impacts associated with alternative sources of electric power to replace the power generated by Ginna, assuming that the OL is not renewed. The order of presentation of alternative energy sources in Section 8.2 does not imply which alternative would be most likely to occur or to have the least environmental impacts. The following generation alternatives are considered in detail:

- coal-fired generation at the Ginna site or at an alternate site (Section 8.2.1)
- natural-gas-fired generation at the Ginna site or at an alternate site (Section 8.2.2)
- nuclear generation at the Ginna site or at an alternate site (Section 8.2.3).

The alternative of purchasing power from other sources to replace power generated by Ginna is discussed in Section 8.2.4. Other power generation alternatives and conservation alternatives considered by the staff and found not to be reasonable replacements for Ginna are discussed in Section 8.2.5. The environmental impacts of a combination of generation and conservation alternatives are discussed in Section 8.2.6.

The Ginna site is approximately 197 ha (488 ac) and was originally planned to accommodate an additional nuclear power unit west of the existing plant. A replacement power plant, regardless of fuel type, could be placed at this site and could therefore use existing infrastructure (e.g., cooling water system, transmission, roads, and technical and administrative support facilities). However, for other reasons, such as fuel-delivery infrastructure limitations, there may be advantages to locating any replacement power plants elsewhere in western New York state.

Each year the Energy Information Administration (EIA), a component of the U.S. Department of Energy (DOE), issues an annual energy outlook. In its *Annual Energy Outlook 2003*, EIA projects that natural-gas-fired combined-cycle or combustion turbine technology (including distributed generation capacity), will make up 80 percent of new electric-generating capacity through the year 2025 (DOE/EIA 2003). Both technologies are designed primarily to supply peak and intermediate capacity, but combined-cycle technology can also be used to meet base-load[a] requirements. Coal-fired plants are projected by EIA to account for approximately 17 percent of new capacity during this period. Coal-fired plants are generally used to meet base-load requirements. Renewable energy sources, primarily wind, geothermal, and municipal solid waste units, are projected by EIA to account for the remaining 3 percent of capacity additions. EIA's projections are based on the assumption that providers of new generating capacity will seek to minimize cost while meeting applicable environmental requirements. Combined-cycle plants are projected by EIA to have the lowest generation cost in 2005 and 2025, followed by coal-fired plants and then wind generation (DOE/EIA 2003).

EIA projects that oil-fired plants will account for very little new generation capacity in the United States through the year 2025 because of higher fuel costs and lower efficiencies (DOE/EIA 2003).

EIA also projects that new nuclear power plants will not account for any new generation capacity in the United States through the year 2025 because natural-gas and coal-fired plants are projected to be more economical (DOE/EIA 2003). In spite of this projection, a new nuclear plant alternative for replacing power generated by Ginna is considered for reasons stated in Section 8.2.3. NRC established a New Reactor Licensing Project Office in 2001 to prepare for and manage future reactor and site licensing applications (NRC 2001).

If an alternative generating technology were selected to replace power generated by Ginna, Ginna would be decommissioned. Environmental impacts associated with decommissioning are discussed in Section 8.1 and are not otherwise addressed in Section 8.2.

8.2.1 Coal-Fired Generation

Environmental impact information for a replacement coal-fired power plant using closed-cycle cooling with cooling towers is presented in Section 8.2.1.1 and using once-through cooling in Section 8.2.1.2.

The staff assumed construction of two coal-generating companion units, each producing 265-megawatt electric [MW(e)] units,[b] which is consistent with RG&E's Environmental Report (ER) for Ginna (RG&E 2002). This assumption will slightly overstate the impacts of replacing

(a) A base-load plant normally operates to supply all or part of the minimum continuous load of a system and consequently produces electricity at an essentially constant rate. Nuclear power plants are commonly used for base-load generation (i.e., these units generally run near full load).

(b) The units would have a rating of 297.5 gross MW(t) and 265 net MW(e). The difference between "gross" and "net" is electricity consumed on the plant site.

the 490 MW(e) from Ginna; however, an additional assumption is made that these power plants would operate at 80 percent capacity to correspond with the annual net production of 422 MW(e) from Ginna.

Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are from the Ginna ER (RG&E 2002). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating the coal-fired alternative for 40 years is considered (as a reasonable projection of the operating life of a coal-fired plant).

The coal-fired alternative is analyzed for the Ginna site and an unspecified greenfield alternate site in western upstate New York. RG&E assumes in its ER 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 30,775 kJ/kg (13,233 Btu/lb), a sulfur content of 2.22 percent by weight (7.2×10^{-4} g/kJ [1.68 lb/MMBtu]), and an ash content of 7.35 percent by weight. Scaling from DOE estimates for comparable units, taking into account differences in fuel heat content and capacity factor, RG&E estimates that the plant would consume approximately 1.3 million MT (1.4 million tons) of coal per year. Construction of a new electric power transmission line to connect to existing lines and a rail spur to the plant site may be needed.

8.2.1.1 Closed-Cycle Cooling System

The overall impacts at either the Ginna or alternate sites of the coal-fired generating system using a closed-cycle cooling system with cooling towers are discussed in the following sections. The magnitude of impacts for the alternate site will depend on the location of the particular site selected. The Ginna plant currently uses a once-through cooling system. For the purposes of comparison with an alternative site, however, it is assumed that the replacement coal-fired plant sited on the Ginna site would use a closed-cycle cooling system, which would most likely require the acquisition of additional land adjacent to the site.

- **Land Use**

The coal-fired generation alternative at the Ginna site would necessitate converting approximately 130 ha (320 ac) to industrial use for the power block, infrastructure and support facilities, coal storage and handling, and landfill disposal of ash, spent selective catalytic reduction (SCR) catalyst (used for control of nitrogen oxide [NO_x] emissions), and scrubber sludge (RG&E 2002). Of this amount, disposal of ash and sludge over a 40-year plant life would require approximately 105 ha (260 ac) (RG&E 2002). Additional land could be needed for an electric power transmission line, and a rail spur or barge slip and supporting facilities. Although the Ginna site has an existing once-through cooling system, it is likely that the system would need to be significantly modified to accommodate a coal plant with a closed-cycle cooling system. The alternate site would require construction of pipelines for cooling-water intake and discharge. During construction of the coal plant on the Ginna site, it is likely that the land requirements would exceed the size of the existing Ginna site, which would necessitate the acquisition of additional land adjacent to the site.

Locating the plant at an alternate 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 1000 MW plant (NRC 1996), a 900-ac site could be required.

Land-use changes would occur offsite in an undetermined coal-mining area to supply coal for the plant. In the GEIS, the staff estimated that approximately 8900 ha (22,000 ac) would be affected for mining the coal and disposing of the waste to support a 1000 MW(e) coal plant during its operational life (NRC 1996). A replacement coal-fired plant for Ginna would generate 425 MW(e), so proportionately less land would be affected. Partially offsetting this offsite land use would be the elimination of the need for uranium mining and processing to supply fuel for Ginna. In the GEIS, the staff estimated that approximately 400 ha (1000 ac) would be affected for mining and processing the uranium during the operating life of a 1000 MW(e) nuclear power plant (NRC 1996).

The impact of a coal-fired generating unit with a closed-cycle cooling system on land use located at either the Ginna site or at an alternate New York site is considered as MODERATE to LARGE. The impact would be greater than the alternative of renewing the OLs.

- **Ecology**

The coal-fired generation alternative at the Ginna site would use undeveloped areas of the site, which is primarily made up of wooded areas and orchards. In addition, there are two streams that flow through the site that would most likely be impacted. If the rail delivery option is chosen, it would require the construction of a 4.8-km (3.0-mi)-long rail spur to an existing rail line and the use of a 29-km (18-mi) corridor that is not currently used. If the barge delivery option is chosen, a navigable channel would need to be dredged and a dockage area would need to be constructed. Barge delivery would require maintenance dredging during operation of the plant. Cooling tower drift could result in some minor impacts.

Because construction would result in the loss of hundreds of acres of habitat for the plant, infrastructure and waste disposal, the staff considers the ecological impacts of a new coal-fired plant with a closed-cycle cooling system at the Ginna site to be MODERATE.

Coal-fired generation at an alternative site would introduce construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts would alter the ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Use of cooling makeup water from a nearby surface-water body could have adverse impacts on aquatic resources. If needed, construction and maintenance of an electric power transmission line and a rail spur would have ecological impacts. There would be some impact on terrestrial ecology from water drift from the cooling towers. Overall, the ecological impacts of constructing a coal-fired plant with a closed-cycle cooling system at an alternate site are considered to be MODERATE to LARGE and would be greater than renewal of the Ginna OL.

- **Water Use and Quality**

Coal-fired generation at the Ginna site would likely use water from Lake Ontario for cooling. It is possible that some of the existing intake and discharge structures could be used, but the construction of additional cooling infrastructure would be needed to accommodate a closed-cycle cooling system. Plant discharges would consist mostly of cooling tower blowdown, characterized primarily by an increased temperature and concentration of dissolved solids relative to the receiving water body and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary wastewater may also be discharged. All discharges would be regulated by the New York State Department of Environmental Conservation (NYSDEC) through a State Pollution Discharge Elimination System (SPDES) permit. There would be a consumptive use of water due to evaporation from the cooling towers. Some erosion and sedimentation would likely occur during construction (NRC 1996). The staff considers the impacts to surface-water use and quality of a new coal-fired plant with a closed-cycle cooling system located at the Ginna site to be SMALL.

Cooling water at an alternate site would likely be withdrawn from a surface-water body and would be regulated by permit. Depending on the source water body, the impacts of water use for cooling system makeup water and the effects on water quality due to cooling tower blowdown could have noticeable impacts. Therefore, the staff considers the impacts of a new coal-fired plant utilizing a closed-cycle cooling system at an alternate site to be SMALL to MODERATE.

Use of groundwater at the Ginna site is unlikely, but is possible for a coal-fired plant at an alternate site. Groundwater withdrawal could require a permit. Overall, impacts to groundwater use and quality of a new coal-fired plant with a closed-cycle cooling system at the Ginna site are considered SMALL and the impacts to groundwater use and quality of such a plant at an alternate site are considered SMALL to MODERATE, depending on the volume of groundwater withdrawn.

- **Air Quality**

The air-quality impacts of coal-fired generation differ considerably from those of nuclear generation due to emissions of sulfur oxides (SO_x), NO_x, particulates, carbon monoxide, hazardous air pollutants such as mercury, and naturally occurring radioactive materials.

A new coal-fired generating plant would likely need a prevention of significant deterioration (PSD) permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants set forth in 40 CFR Part 60, Subpart Da. The standards establish emission limits for particulate matter and opacity (40 CFR 60.42a), sulfur dioxide (SO_2) (40 CFR 60.43a), and NO_x (40 CFR 60.44a). The facility would be designed to meet Best Available Control Technology (BACT) or Lowest Achievable Emissions Rate (LAER) standards, as applicable, for control of criteria air emissions.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified for criteria pollutants[a] under the Clean Air Act. All of the RG&E potential power plant sites are most likely in areas that are designated as attainment or unclassified for criteria pollutants.

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future, and remedying existing, impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. In addition, EPA regulations provide that for each mandatory Class I Federal area located within a state, the state must establish goals that provide for reasonable progress toward achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period [40 CFR 51.308(d)(1)]. The Ginna site and the surrounding region are not located within a Class I Federal area.

Impacts for specific pollutants are as follows:

- <u>Sulfur oxides</u>. A new coal-fired power plant would be subject to the requirements in Title IV of the Clean Air Act. Title IV was enacted to reduce emissions of SO_2 and NO_x, the two principal precursors of acid rain, by restricting emissions of these pollutants from power plants. Title IV caps aggregate annual power plant SO_2 emissions and imposes controls on SO_2 emissions through a system of marketable allowances. EPA issues one allowance for each ton of SO_2 that a unit is allowed to emit. New units do not receive

(a) Criteria pollutants under the Clean Air Act are ozone, carbon monoxide, particulates, SO_2, lead, and NO_x. Emission standards for criteria pollutants are set forth in 40 CFR Part 51.

allowances, but are required to have allowances to cover their SO_2 emissions. Owners of new units must therefore either acquire allowances from owners of other power plants by purchase or reduce SO_2 emissions at other power plants they own. Allowances can be banked for use in future years. Thus, a new coal-fired power plant would not add to net regional SO_2 emissions, although it might do so locally. Regardless, SO_2 emissions would be greater for the coal alternative than the OL renewal alternative since a nuclear power plant releases almost no SO_2 during normal operations.

RG&E estimates that by using the best technology to minimize SO_2 emissions, the total annual stack emissions would be approximately 2661 MT (2933 tons) of SO_2 (RG&E 2002). RG&E states in its ER that an alternative coal-fired plant would use wet limestone flue-gas desulfurization technology (RG&E 2002).

- Nitrogen oxides. Section 407 of the Clean Air Act establishes technology-based emission limitations for NO_x emissions. The market-based allowance system used for SO_2 emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to the new source performance standard for such plants at 40 CFR 60.44a(d)(1), which limits the discharge of any gases that contain NO_x (expressed as NO_2) to 200 ng/J of gross energy output (1.6 lb/MWh), based on a 30-day rolling average.

  RG&E estimates that by using low-NO_x burners with overfire air and SCR, the total annual NO_x emissions for a new coal-fired power plant would be approximately 1597 MT (1760 tons) (RG&E 2002). Regardless of the control technology, this level of NO_x emissions would be greater than the OL renewal alternative, because a nuclear power plant releases almost no NO_x during normal operations.

- Particulates. RG&E estimates that the total annual stack emissions of particulates would include approximately 195 MT (215 tons) of PM_{10} (particulate matter having an aerodynamic diameter less than or equal to 10 μm). Fabric filters or electrostatic precipitators would be used for control (RG&E 2002). In addition, coal-handling equipment would introduce fugitive particulate emissions. Particulate emissions would be greater under the coal alternative than the OL renewal alternative since a nuclear plant releases few particles during normal operations.

  During the construction of a coal-fired plant, fugitive dust would be generated. In addition, exhaust emissions would come from vehicles and motorized equipment used during construction.

- Carbon monoxide. RG&E estimates that total carbon monoxide emissions would be approximately 2781 MT (3066 tons) per year (RG&E 2002). This level of emissions is greater than the OL renewal alternative.

- Hazardous air pollutants including mercury. In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (EPA 2000a). The EPA determined that coal- and oil-fired electric utility steam-generating units are significant emitters of hazardous air pollutants. Coal-fired power plants were found by EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (EPA 2000a). The EPA concluded that mercury is the hazardous air pollutant of greatest concern. The EPA found that (1) there is a link between coal consumption and mercury emissions; (2) electric utility steam-generating units are the largest domestic source of mercury emissions; and (3) certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures resulting from consumption of contaminated fish (EPA 2000a). Accordingly, EPA added coal- and oil-fired electric utility steam-generating units to the list of source categories under Section 112(c) of the Clean Air Act for which emission standards for hazardous air pollutants will be issued (EPA 2000a).

- Uranium and thorium. Coal contains uranium and thorium. Uranium concentrations are generally in the range of 1 to 10 parts per million. Thorium concentrations are generally about 2.5 times greater than uranium concentrations (Gabbard 1993). One estimate is that a typical coal-fired plant had an annual release of approximately 4.7 MT (5.2 tons) of uranium and 11.6 MT (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose equivalent from the uranium and thorium releases and daughter products produced by the decay of these isotopes has been calculated to be significantly higher than that from nuclear power plants (Gabbard 1993).

- Carbon dioxide. A coal-fired plant would have unregulated carbon dioxide emissions that could contribute to global warming.

The GEIS analysis did not quantify emissions from coal-fired power plants but implied that air impacts would be substantial. The GEIS also mentioned global warming from unregulated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as potential impacts (NRC 1996). Adverse human health effects from coal combustion such as cancer and emphysema have been associated with the products of coal combustion. Although local air quality would noticeably be reduced from the presence of a coal plant, equivalent regional allowances for SO_2 emissions would have to be obtained and credits to more than offset NO_x emissions by a ratio of 1.15:1.00 would also have to be obtained. The appropriate characterization of air impacts from coal-fired generation at either the Ginna site or an alternate site are considered to be MODERATE. The impacts would be clearly noticeable, but would not destabilize air quality.

- **Waste**

Coal combustion generates waste in the form of ash, and equipment for controlling air pollution generates additional ash, spent SCR catalyst, and scrubber sludge. One 422-MW(e) coal-fired plant would annually generate approximately 148,000 MT (163,000 tons) of ash and 138,000 MT (152,000 tons) of scrubber sludge. Spent SCR catalyst would be regenerated or disposed of offsite. Construction-related debris would be generated during construction activities. Waste impacts to groundwater and surface water could extend beyond the operating life of the plant if leachate and runoff from the waste storage area occurs. Disposal of the waste could noticeably affect land use and groundwater quality but, with appropriate management and monitoring, it would not destabilize any resources. After closure of the waste site and revegetation, the land could be available for some other uses.

In May 2000, the EPA issued a "Notice of Regulatory Determination on Wastes From the Combustion of Fossil Fuels" (EPA 2000). The EPA concluded that some form of national regulation is warranted to address coal combustion waste products because (1) the composition of these wastes could present danger to human health and the environment under certain conditions; (2) EPA has identified 11 documented cases of proven damage to human health and the environment by improper management of these wastes in landfills and surface impoundments; (3) present disposal practices are such that, in 1995, these wastes were being managed in 40 percent to 70 percent of landfills and surface impoundments without reasonable controls in place, particularly in the area of groundwater monitoring; and (4) EPA identified gaps in state oversight of coal combustion wastes. Accordingly, EPA announced its intention to issue regulations for disposal of coal combustion waste under subtitle D of the Resource Conservation and Recovery Act.

For all of the preceding reasons, the impacts from waste generated by a coal-fired plant using once-through cooling at either the Ginna site or at an alternate site are considered to be MODERATE; the impacts would be clearly noticeable but would not destabilize any important resource.

- **Human Health**

Coal-fired power generation introduces worker risk from coal and limestone mining, worker and public risk from coal and lime/limestone transportation, worker and public risk from disposal of coal combustion wastes, and public risk from inhalation of stack emissions.

Emission impacts can be widespread and health risk is difficult to quantify. The coal alternative also introduces the risk of coal pile fires and attendant inhalation risk.

The staff stated in the GEIS that there could be human health impacts (cancer and emphysema) from inhalation of toxins and particulates from a coal-fired plant, but the GEIS does not identify the significance of these impacts (NRC 1996). In addition, the discharges of uranium and thorium from coal-fired plants can potentially produce radiological doses in excess of those arising from nuclear power plant operations (Gabbard 1993).

Regulatory agencies, including the EPA and state agencies, set air emission standards and requirements based on human health impacts. These agencies also impose site-specific emission limits as needed to protect human health. As discussed previously, the EPA has recently concluded that certain segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating populations) are believed to be at potential risk of adverse health effects due to mercury exposures from sources such as coal-fired power plants. However, in the absence of more quantitative data, human health impacts from radiological doses and inhaling toxins and particulates generated by a coal-fired plant at either the Ginna or alternate site are considered to be SMALL.

- **Socioeconomics**

If a coal-fired power plant were built on the Ginna site, the community would not lose the tax base; however, they would experience a net loss of operational jobs, down from 500 to 100-150 plant employees. If a coal-fired power plant were built at an alternate site to replace power produced by Ginna, the communities around the Ginna site would experience the impact of Ginna operational job loss and the town of Ontario, the Wayne Central School District, and Wayne County would lose the Ginna tax base. These losses would have SMALL to MODERATE socioeconomic impacts, given the fact that Ginna provides less than 10 percent of the total revenue in Wayne County and slightly over 10 percent of the total revenue in the town of Ontario and the Wayne Central School District (Section 8.1.7).

During construction of the new coal-fired plant, communities near the construction site would experience demands on housing and public services that could have a MODERATE impact around the Ginna site and possibly a MODERATE to LARGE impact at an alternative site. After construction, the nearby communities would be impacted by the loss of the construction jobs. The construction of the representative coal-fired plant would require a peak onsite workforce of approximately 820 workers and would take approximately three years to complete. It is estimated that the completed coal plant would employ approximately 100-150 workers. The coal-fired plant would provide a new tax base for the local jurisdiction at an alternative site. The staff stated in the GEIS that socioeconomic impacts at a rural site would be larger than at an urban site because more of the peak construction workforce would need to move to the area to work (NRC 1996). Socioeconomic impacts at a rural site could be MODERATE. Transportation-related impacts associated with commuting construction and plant operating personnel at the Ginna site would likely be SMALL. Transportation-related impacts associated with commuting construction workers at an alternate site are site-dependent, but could be SMALL to MODERATE. Transportation impacts related to commuting of plant operating personnel would also be site-dependent, but can be characterized as SMALL.

Coal and lime/limestone would likely be delivered to both the Ginna and alternative site by rail or barge. Socioeconomic impacts associated with rail transportation would likely be SMALL to MODERATE. For example, there would be delays to highway traffic as trains pass and there could be negative impacts on the value of property close to the train tracks. Barge delivery of coal and lime/limestone would likely have SMALL socioeconomic impacts.

Overall, the socioeconomic impacts of constructing and operating a coal-fired generating plant at the Ginna site are considered to be SMALL to MODERATE. The socioeconomic impacts of a coal-fired plant at an alternate site are considered to be MODERATE to LARGE depending on the alternate site location.

- **Aesthetics**

The two coal-fired power block units could be as much as 61 m (200 ft) tall and be visible from offsite during daylight hours. The exhaust stacks could be as much as 152 m (500 ft) high. The stacks would likely be highly visible in daylight hours for distances greater than 16 km (10 mi). Cooling towers and associated plumes would also have an aesthetic impact. Natural draft towers could be up to 160 m (520 ft) high. Mechanical draft towers could be up to 30 m (100 ft) high. The stacks would be visible from parks, other recreational areas, and wildlife refuges in the vicinity of the plant. The power block units and associated stacks and cooling towers would also be visible at night because of outside lighting. The U.S. Federal Aviation Administration (FAA) generally requires that all structures exceeding an overall height of 61 m (200 ft) above ground level have markings and/or lighting so as not to impair aviation safety (FAA 2000). Visual impacts of a new coal-fired plant could be mitigated by landscaping and color selection for buildings that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting, provided the lighting meets FAA requirements, and appropriate use of shielding. Overall, the coal-fired units and the associated exhaust stacks and cooling towers would likely have a MODERATE to LARGE aesthetic impact. There would also be an aesthetic impact that could be LARGE if construction of a new electric power transmission line is needed.

Coal-fired generation would introduce mechanical sources of noise that would be audible offsite. Sources contributing to the noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment associated with normal plant operations and mechanical draft cooling towers. Intermittent sources include the equipment related to coal handling, solid waste disposal, transportation related to coal and lime/limestone delivery, use of outside loudspeakers, and the commuting of plant employees. Noise impacts associated with rail delivery of coal and lime/limestone would be most significant for residents living in the vicinity of the facility and along the rail route. Although noise from passing trains significantly raises noise levels near the rail corridor, the short duration of the noise reduces the impact. Nevertheless, given the frequency of train transport and the fact that many people are likely to be within hearing distance of the rail route, the impacts of noise on residents in the vicinity of the facility and the rail line is considered MODERATE. Noise associated with barge transportation of coal and lime/limestone would be SMALL. Noise and light from the plant would be detectable offsite. Aesthetic impacts at the plant site would be mitigated if the plant were located in an industrial area or adjacent to other power plants.

Overall, the aesthetic impacts associated with locating a coal-fired plant with a closed-cycle cooling system at either the Ginna or an alternate New York site are considered to be MODERATE to LARGE.

- **Historic and Archaeological Resources**

An historic and archaeological resources inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archaeological resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-way). Historic and archaeological resource impacts can generally be managed or mitigated to some extent. Therefore, the impacts of a new coal-fired plant at either the Ginna or an alternate site could be SMALL to MODERATE.

- **Environmental Justice**

If a coal-fired plant were located on the Ginna site, the environmental impacts on minority and low-income populations around the site would most likely be SMALL. There may be some impacts on housing that occur during construction; however, the impacts on minority and low-income populations should be similar to those experienced by the population as a whole. The loss of Ginna operating jobs would be SMALL due to the proximity of the plant to a diverse urban job market.

Environmental impacts on minority and low-income populations associated with a replacement coal-fired plant built at an alternate site in New York state would depend upon the site chosen and the nearby population distribution. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of Ginna would result in the loss of approximately 500 operating jobs. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, Ginna is located in a relatively urban area with many employment possibilities. Wayne County would also experience a loss of property tax revenue, which could affect its ability to provide services and programs. However, these losses would likely have SMALL environmental justice impacts given the moderate proportion of the tax base in Wayne County attributable to Ginna (Section 8.1.7). Overall, impacts of a new coal-fired plant at either the Ginna or an alternate site are considered to be SMALL.

- **Summary**

The potential impacts of replacing the power produced by Ginna with a coal-fired generating plant with a closed-cycle cooling system are summarized in Table 8-2.

Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation Using Closed-Cycle Cooling at the R.E. Ginna Nuclear Power Plant Site and an Alternate Site in New York State

	Ginna Site		Alternate Site	
Impact Category	**Impact**	**Comments**	**Impact**	**Comment**
Land Use	MODERATE to LARGE	Uses up to approximately 130 ha (320 ac) for power block; coal handling, storage, and transportation facilities; infrastructure facilities; and waste disposal. Additional land impacts for coal and limestone mining. Additional impacts would occur for rail spur and closed-cycle cooling-water intake and discharge piping.	MODERATE to LARGE	May use up to approximately 360 ha (320 ac) for power block; coal handling, storage, and transportation facilities; infrastructure facilities; and waste disposal. Additional land impacts for coal and limestone mining. Additional impacts would occur for electric power transmission line, rail spur, and cooling-water intake and discharge piping.

Table 8-2. (contd)

Impact Category	Ginna Site		Alternate Site	
	Impact	Comments	Impact	Comment
Ecology	MODERATE	Uses undeveloped areas in current site and possibly other nearby land and existing transmission corridor. Construction of barge slip and dredged channel or 4.8-km (3.0-mi) rail spur needed; impacts to terrestrial ecology from cooling tower drift.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and electric power transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity; impacts to terrestrial ecology from cooling tower drift.
Surface-Water Use and Quality	SMALL	Partial use of existing intake and discharge structures. Operational impacts similar to or less than Ginna.	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged, the constituents in the discharge water, and the characteristics of the surface-water body. Discharges would be regulated by NYSDEC.
Groundwater Use and Quality	SMALL	Use of groundwater is unlikely.	SMALL TO MODERATE	Impact will depend on the volume of groundwater withdrawn.
Air Quality	MODERATE	Sulfur oxides • 2661 MT/yr (2933 tons/yr) 0.25 g/GJ (0.15 lb/MMBtu) Nitrogen oxides • 1597 MT/yr (1760 tons/yr) 0.15 g/GJ (0.09 lb/MMBtu) Particulates • 195 MT/yr (215 tons/yr) of PM_{10} Carbon monoxide • 2781 MT/yr (3066 tons/yr) Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium	MODERATE	Same as Ginna site.

Table 8-2. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comments	Alternate Site Impact	Alternate Site Comment
Waste	MODERATE	Total waste volume would be approximately 148,000 MT/yr (163,000 tons/yr) of ash, spent catalyst, and 138,000 MT/yr (152,000 tons/yr) of scrubber sludge requiring approximately 105 ha (260 ac) for disposal during the 40-year life of the plant.	MODERATE	Same as Ginna site.
Human Health	SMALL	Impacts are uncertain, but considered SMALL in the absence of more quantitative data.	SMALL	Same as Ginna site.
Socioeconomics	SMALL to MODERATE	Increased demand for public services during construction (up to 820 workers needed during 3-year construction period). Net loss of jobs during operation (from 500 to approximately 150 employees); tax base preserved. Transportation of coal and limestone could have MODERATE impact if rail line is used. For barge transportation, the impact is considered SMALL.	MODERATE to LARGE	Construction impacts depend on location, but could be LARGE if plant is located in a rural area. Wayne County would experience loss of the Ginna site tax base and employment, but impacts are likely to be SMALL to MODERATE. Impacts during operation would be SMALL. Transportation impacts associated with construction workers could be MODERATE to LARGE. For rail transportation of coal and lime/limestone, the impact is considered MODERATE to LARGE. For barge transportation, the impact is considered SMALL.

Table 8-2. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comments	Alternate Site Impact	Alternate Site Comment
Aesthetics	MODERATE to LARGE	Visual impact of large industrial facility with stacks and cooling towers on lake shore could be significant. Construction and operation of new barge facilities or railway line to Rochester could also impact aesthetics. Noise impacts from plant operations and intermittent sources such as rail transportation of coal could be MODERATE.	MODERATE to LARGE	Impact would depend on the site selected and the surrounding land features. Power block, exhaust stacks, cooling towers, and cooling tower plumes will be visible from nearby areas. If needed, a new electric power transmission line could have a LARGE aesthetic impact. Noise impact from plant operations and intermittent sources such as rail transportation of coal could be MODERATE.
Historic and Archaeological Resources	SMALL to MODERATE	Impacts can generally be managed or mitigated.	SMALL to MODERATE	Same as Ginna site.
Environmental Justice	SMALL	Impacts on minority and low-income populations should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction. Loss of Ginna operating jobs would be SMALL due to the proximity of the plant to a diverse urban job market.	SMALL	Impacts at alternate site vary depending on population distribution and makeup at site. Wayne County would lose tax revenue and jobs, however, the impacts on minority and low-income populations would likely be SMALL.

8.2.1.2 Once-Through Cooling System

The environmental impacts of constructing a coal-fired generation system at the Ginna site and an alternate site in New York state using once-through cooling are similar to the impacts for a coal-fired plant using a closed-cycle cooling system. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-3 summarizes the incremental differences.

Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation with Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or an Alternate Site in New York State

	Ginna Site		Alternate Site	
Impact Category	**Impact**	**Comparison with Closed-Cycle Cooling System**	**Impact**	**Comparison with Closed-Cycle Cooling System**
Land Use	MODERATE to LARGE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.	MODERATE to LARGE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	MODERATE	Slightly less loss of terrestrial habitat and elimination of potential cooling tower impacts. Increased water withdrawal, but aquatic impacts would be similar to current Ginna operations.	MODERATE to LARGE	Slightly reduced habitat loss, and no impacts to terrestrial resources from cooling towers, but increased water withdrawal may impact aquatic resources.
Surface-Water Use and Quality	SMALL to MODERATE	No discharge of cooling tower blowdown. Increased water withdrawal and more thermal load on receiving body of water.	SMALL to MODERATE	Impact will depend on the characteristics of the surface-water body, volume of water withdrawn, and characteristics of the discharge.
Groundwater Use and Quality	SMALL	No change	SMALL	It is unlikely that groundwater would be used for once-through cooling, but could be used for sanitary water.
Air Quality	MODERATE	No change	MODERATE	No change
Waste	MODERATE	No change	MODERATE	No change
Human Health	SMALL	No change	SMALL	No change
Socioeconomics	SMALL to MODERATE	No change	MODERATE to LARGE	No change
Aesthetics	SMALL to MODERATE	Reduced aesthetic impact because cooling towers would not be used.	SMALL to MODERATE	Reduced aesthetic impact because cooling towers would not be used.

Table 8-3. (contd)

Impact Category	Ginna Site: Impact	Ginna Site: Comparison with Closed-Cycle Cooling System	Alternate Site: Impact	Alternate Site: Comparison with Closed-Cycle Cooling System
Historic and Archaeological Resources	SMALL to MODERATE	Less land impacted	SMALL to MODERATE	Less land impacted
Environmental Justice	SMALL	No change	SMALL	No change

8.2.2 Natural-Gas-Fired Generation

The environmental impacts of a natural-gas-fired plant using combined-cycle combustion turbines are examined in this section for both the Ginna site and an alternate site in New York state. For the Ginna site, the staff assumed that the plant would use at least part of the existing once-through cooling canal system.

RG&E concluded in its ER that the Ginna site would be a reasonable site for location of a natural-gas-fired generating unit. In its ER, RG&E chose to evaluate gas-fired generation using combined-cycle turbines. The environmental impact analysis in the ER is based on the Wawayanda Energy Center plant, near Middletown, New York. The Wawayanda Energy Center plant operates at a nominal 540 MW(e), which is slightly more than the 490 MW(e) net capacity of Ginna; therefore, a net capacity factor of 80 percent for the representative gas-fired plant is assumed.

For construction at an alternate site, a new pipeline would need to be constructed from the plant site to a supply point where a reliable supply of natural gas would be available.

The staff assumed that a replacement natural-gas-fired plant would use combined-cycle combustion turbines as described by RG&E (RG&E 2002). RG&E estimates that the plant would consume approximately 765 million m^3 (27 billion ft^3) of natural gas annually (RG&E 2002).

Unless otherwise indicated, the assumptions and numerical values used throughout this section are from the Ginna ER (RG&E 2002). The staff reviewed this information and compared it to environmental impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of operating the natural-gas-fired alternative for 40 years is considered a reasonable projection of the operating life of a natural-gas-fired plant.

The impacts of a plant with a closed-cycle cooling system with cooling towers are discussed in Section 8.2.2.1 and the impacts of a plant with once-through cooling are discussed in Section 8.2.2.2.

8.2.2.1 Closed-Cycle Cooling System

The overall impacts of the natural-gas-generating system with a closed-cycle cooling system located either at the Ginna site or an alternate New York site are discussed in the following sections. The magnitude of impacts at an alternate site will depend on the location of the particular site selected.

- **Land Use**

The natural-gas-fired alternative would require converting approximately 12 ha (30 ac) to industrial use for the power block, cooling towers, and infrastructure and support facilities (RG&E 2002). Additional land would likely be impacted for construction of an electric power transmission line, natural gas pipeline, and water intake/discharge pipelines to serve the plant. The Ginna ER assumes that these activities could impact up to 59 ha (145 ac) (RG&E 2002). Locating the facility at an alternate site may require greater land area devoted to transmission rights-of-way, but potentially less for gas pipelines. At the Ginna site, there is sufficient land available within the existing plant boundaries for the power block, cooling tower, and support facilities. A natural gas pipeline to the Ginna site would likely follow the existing transmission lines right-of-way. For any new natural-gas-fired power plant, additional land would be required for natural gas wells and collection stations. In the GEIS, the staff estimated that approximately 1500 ha (3600 ac) would be needed for a 1000 MW(e) plant (NRC 1996). Proportionately less land would be needed for a natural-gas-fired plant replacing the 490 MW(e) from Ginna. Partially offsetting these offsite land requirements would be the elimination of the need for uranium mining and processing to supply fuel for Ginna. NRC staff stated in the GEIS (NRC 1996) that approximately 400 ha (1000 ac) would be affected for mining and processing the uranium during the operating life of a 1000 MW(e) nuclear power plant.

Overall, land-use impacts for a natural-gas-fired plant with a closed-cycle cooling system at the Ginna site are considered SMALL, and the impacts to land use of a new natural-gas-fired plant with a closed-cycle cooling system located at an alternate site are considered to be MODERATE.

- **Ecology**

There would be ecological impacts related to habitat loss and cooling tower drift associated with siting of the gas-fired plant. If needed, there would also be temporary ecological impacts associated with bringing a new underground gas pipeline and/or electric power transmission line to the site. Ecological impacts would depend on the nature of the land converted for the plant and the possible need for a new transmission line and/or gas pipeline. To accommodate a gas-fired plant at the Ginna site, a 26-km (16-mi) gas supply pipeline would need to be constructed, which, assuming a construction right-of-way of 75 feet, could disrupt 59 ha (145 ac) of terrestrial habitat. Ecological impacts to the plant site and utility easements could include impacts on threatened or endangered species, wildlife habitat loss and reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Cooling makeup water intake and discharge could impact aquatic resources. There would be some impact on terrestrial ecology from drift from the cooling towers. Because it would use existing site land areas and infrastructure, a new natural-gas-fired plant with closed-cycle cooling at the Ginna site is considered to have a SMALL impact on ecological resources. A new natural-gas-fired plant with closed-cycle cooling at an alternate site will have SMALL to MODERATE impacts on ecological resources.

- **Water Use and Quality**

Natural-gas-fired generation at the Ginna site would likely use water from Lake Ontario for cooling. It is possible that some of the existing intake and discharge structures could be used, but the construction of additional cooling infrastructure would be needed to accommodate a closed-cycle system. Plant discharges would consist mostly of cooling tower blowdown, characterized primarily by an increased temperature and concentration of dissolved solids relative to the receiving water body and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary wastewater may also be discharged. All discharges would be regulated by NYSDEC through an SPDES permit. There would be a consumptive use of water due to evaporation from the cooling towers. Some erosion and sedimentation would likely occur during construction (NRC 1996). The staff considers the impacts to surface-water use and quality of a new natural-gas-fired plant with a closed-cycle cooling system located at the Ginna site to be SMALL.

Cooling water at an alternate site would likely be withdrawn from a surface-water body and would be regulated by permit. Depending on the source water body, the impacts of water use for cooling system makeup water and the effects on water quality due to cooling tower blowdown could have noticeable impacts. Therefore, the staff considers the impacts of a new natural-gas-fired plant utilizing a closed-cycle cooling system at an alternate site to be SMALL to MODERATE.

Use of groundwater at the Ginna site is unlikely, but is possible for a natural-gas-fired plant at an alternate site. Groundwater withdrawal could require a permit. Overall, impacts to groundwater use and quality of a new gas-fired plant with a closed-cycle cooling system at the Ginna site are considered SMALL and the impacts to groundwater use and quality of such a plant at an alternate site are considered SMALL to MODERATE, depending on the volume of groundwater withdrawn.

- **Air Quality**

Natural gas is a relatively clean-burning fuel. The gas-fired alternative would release similar types of emissions, but in lesser quantities than the coal-fired alternative.

A new gas-fired generating plant would likely need a PSD permit and an operating permit under the Clean Air Act. A new combined-cycle, natural-gas-fired power plant would also be subject to the new source performance standards for such units specified in 40 CFR Part 60, Subparts Da and GG. These regulations establish emission limits for particulates, opacity, SO_2, and NO_x. The facility would be designed to meet BACT or LAER standards, as applicable, for control of criteria air emissions.

The EPA has various regulatory requirements for visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for review of any new major stationary source in areas designated as attainment or unclassified under the Clean Air Act. All of the RG&E preferred and potential power plant sites (RG&E 2002) are in areas that are designated as attainment or unclassified for criteria pollutants.

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future impairment of visibility and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. In addition, EPA regulations provide that for each mandatory Class I Federal area located within a state, the state must establish goals that provide for reasonable progress towards achieving natural visibility conditions. The reasonable progress goals must provide for an improvement in visibility for the most-impaired days over the period of the implementation plan and ensure no degradation in visibility for the least-impaired days over the same period [40 CFR 51.308(d)(1)].

RG&E estimates that a natural-gas-fired plant equipped with appropriate pollution control technology would have the following emissions (RG&E 2002):

- sulfur oxides – 27 MT/yr (30 tons/yr)

- nitrogen oxides – 86 MT/yr (95 tons/yr)

- carbon monoxide – 53 MT/yr (58 tons/yr)

- PM_{10} particulates – 100 MT/yr (110 tons/yr).

A natural-gas-fired plant would also have unregulated carbon dioxide emissions that could contribute to global warming.

In December 2000, the EPA issued regulatory findings on emissions of hazardous air pollutants from electric utility steam-generating units (EPA 2000a). Natural-gas-fired power plants were found by EPA to emit arsenic, formaldehyde, and nickel (EPA 2000a). Unlike coal- and oil-fired plants, EPA did not determine that regulation of emissions of hazardous air pollutants from natural-gas-fired power plants should be regulated under Section 112 of the Clean Air Act.

Construction activities would result in temporary fugitive dust. Exhaust emissions would also come from vehicles and motorized equipment used during the construction process.

Impacts of emissions from a gas-fired plant would be clearly noticeable, but would not be sufficient to destabilize air resources as a whole. The overall air-quality impact for a new natural-gas-generating plant sited at either the Ginna site or an alternate site in New York State is considered MODERATE.

- **Waste**

In the GEIS the staff concluded that waste generation from gas-fired technology would be minimal (NRC 1996). Gas firing results in few combustion by-products because of the clean nature of the fuel. Other than spent SCR catalyst, waste generation at an operating gas-fired plant would be largely limited to typical office wastes. Construction-related debris would be generated during construction activities. Overall, the waste impacts are considered to be SMALL for a natural-gas-fired plant located at either the Ginna site or an alternate site.

- **Human Health**

In the GEIS, the staff identified cancer and emphysema as potential health risks from natural-gas-fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to ozone formation, which in turn contributes to health risks. For a plant sited in New York, NO_x emissions would be regulated by NYSDEC. Human health effects are expected to be undetectable or sufficiently minor that they would neither destabilize nor noticeably alter any important attribute of the resource. Overall, the impacts on human health of a natural-gas-fired plant at either the Ginna site or an alternate site are considered SMALL.

- **Socioeconomics**

Construction of a natural-gas-fired plant would take approximately two years. Peak employment could be up to 420 workers (RG&E 2002). The staff assumed that construction would take place while Ginna continues operation and would be completed by the time Ginna permanently ceases operations. During construction, the communities immediately surrounding the plant site would experience demands on housing and public services that could have SMALL to MODERATE impacts. These impacts would be tempered by construction workers commuting to the site from more distant communities. After construction, the communities would be affected by the loss of jobs. The current Ginna workforce (500 workers) would decline through a decommissioning period to a minimal maintenance size. The new natural-gas-fired plant would provide a new tax base at an alternate site and provide approximately 25 permanent jobs (RG&E 2002). Siting at an alternate site in New York state would result in the loss of the nuclear plant tax base in Wayne County and associated employment. These losses would have SMALL to MODERATE socioeconomic impacts, given the fact that Ginna provides less than 10 percent of the total revenue in Wayne County and slightly over 10 percent of the total revenue in the town of Ontario and the Wayne Central School District (Section 8.1.7).

In the GEIS, the staff concluded that socioeconomic impacts from constructing a natural-gas-fired plant would not be very noticeable and that the small operational workforce would have the lowest socioeconomic impacts of any nonrenewable technology (NRC 1996).

Compared to the coal-fired and nuclear alternatives, the smaller size of the construction workforce, the shorter construction time frame, and the smaller size of the operations workforce would mitigate socioeconomic impacts.

Transportation impacts associated with construction personnel commuting to the plant site would depend on the population density and transportation infrastructure in the vicinity of the site. The impacts can be classified as MODERATE. Impacts associated with operating personnel commuting to the plant site would be SMALL.

Overall, socioeconomic impacts resulting from construction of a natural-gas-fired plant either at the Ginna site or at an alternate site would be SMALL to MODERATE.

- **Aesthetics**

The turbine buildings, exhaust stacks (approximately 61 m [200 ft] tall), cooling towers, and the plume from the cooling towers would be visible from offsite during daylight hours. The gas pipeline compressors also would be visible. Noise and light from the plant would be detectable offsite. If a new electric power transmission line is needed, the aesthetic impact at an alternate site could be LARGE. Aesthetic impacts would be mitigated if the plant were located in an industrial area adjacent to other power plants. Overall, the aesthetic impacts associated with a replacement natural-gas-fired plant with a closed-cycle cooling system at either the Ginna site or an alternate site in New York state are categorized as MODERATE to LARGE, with site-specific factors determining the final categorization.

- **Historic and Archaeological Resources**

An historic and archaeological resource inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archaeological resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated rights-of-way where new construction would occur (e.g., roads, transmission and pipeline rights-of-way, or other rights-of-way). Impacts to historic and archaeological resources can be managed and mitigated to a certain extent under current laws and regulations. Therefore, impacts to historical and archaeological resources from a natural-gas-fired plant are considered to be SMALL to MODERATE.

- **Environmental Justice**

Environmental impacts on minority and low-income populations associated with a replacement natural-gas-fired plant built at an alternate site in New York state would depend upon the site chosen and the nearby population distribution. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of Ginna would result in the loss of approximately 500 operating jobs. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, Ginna is located in a relatively urban area with many employment possibilities. Wayne County would also experience a loss of property tax revenue, which could affect its ability to provide services and programs. However, these losses would likely have SMALL environmental justice impacts, given the moderate proportion of the tax base in Wayne County attributable to Ginna (Section 8.1.3) considered. Overall, impacts of a new natural-gas-fired plant at either the Ginna or an alternate site are considered to be SMALL.

- **Summary**

The environmental impacts of a new gas-fired electrical power generation facility with closed-cycle cooling are summarized in Table 8-4.

Table 8-4. Summary of Environmental Impacts of Natural-Gas-Fired Generation Using Closed-Cycle Cooling at an Alternate Site in New York State

Impact Category	Ginna Site		Alternate Site	
	Impact	Comments	Impact	Comment
Land Use	SMALL	12 ha (30 ac) of existing site land for power blocks, office, roads, and parking areas. Additional impact of up to approximately 59 ha (145 ac) for construction of underground gas piping.	MODERATE	12 ha (30 ac) for power block, switchyard, cooling towers, and infrastructure support facilities. Additional impact of up to 53 ha (130 acres) for electric power transmission line, natural gas pipeline, and cooling-water intake/discharge piping.
Ecology	SMALL	Uses previously-disturbed areas at current Ginna site. Some effects from gas pipeline construction. Impacts to terrestrial ecology from cooling tower drift.	SMALL to MODERATE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and possible electric power transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity; impacts to terrestrial ecology from cooling tower drift.
Surface-Water Use and Quality	SMALL	Uses part of the existing once-through cooling system. Discharge of cooling tower blowdown will have impacts.	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge, the constituents in the discharge water, and the characteristics of the surface water body. Discharge of cooling tower blowdown will have impacts.
Groundwater Use and Quality	SMALL	Use of groundwater very unlikely.	SMALL to MODERATE	Impacts will depend on the quality of water withdrawn.

Table 8-4. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comments	Alternate Site Impact	Alternate Site Comment
Air Quality	MODERATE	Sulfur oxides • 27 MT/yr (30 tons/yr) Nitrogen oxides • 86 MT/yr (95 tons/yr) Carbon monoxide • 53 MT/yr (58 tons/yr) PM_{10} particulates • 100 MT/yr (110 tons/yr) Some hazardous air pollutants.	MODERATE	Same as Ginna site.
Waste	SMALL	Minimal waste product from fuel combustion.	SMALL	Same as Ginna site.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Same as Ginna site.
Socio-economics	SMALL to MODERATE	During construction impacts would be SMALL to MODERATE. Up to 420 additional workers during the peak of the two-year construction period, followed by reduction from current Ginna workforce from 500 to 25; tax base preserved. Impacts during operation would be SMALL.	SMALL to MODERATE	During construction impacts would be SMALL to MODERATE. Up to 420 additional workers during the peak of the two-year construction period. Wayne County would experience loss of the tax base and employment associated with Ginna with potentially SMALL impacts. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.
Aesthetics	MODERATE to LARGE	Aesthetic impact due to impact of plant unit, and cooling towers and associated plume stacks.	MODERATE to LARGE	MODERATE impact from plant, stacks, and cooling towers and associated plumes. Additional impact that could be LARGE if a new electric power transmission line is needed.
Historic and Archaeological Resources	SMALL to MODERATE	Impacts can generally be managed or mitigated.	SMALL to MODERATE	Same as Ginna site.

Table 8-4. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comments	Alternate Site Impact	Alternate Site Comment
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of Ginna operating jobs on minority and low-income populations would most likely be SMALL due to the proximity of the plant to diverse urban job market.	SMALL	Impacts at alternate site vary depending on population distribution and makeup at site. Wayne County would lose tax revenue and jobs, however the impacts on minority and low-income populations would likely be SMALL.

8.2.2.2 Once-Through Cooling System

The environmental impacts of constructing a natural-gas-fired generation system at an alternate site in New York state using a once-through cooling system are similar to the impacts for a natural-gas-fired plant using closed-cycle cooling with cooling towers. However, there are some environmental differences between the closed-cycle and once-through cooling systems. Table 8-5 summarizes the incremental differences.

Table 8-5. Summary of Environmental Impacts of Natural-Gas-Fired Generation with Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or at an Alternate Site in New York State

	Ginna Site		Alternate Site	
Impact Category	**Impact**	**Comparison with Closed-Cycle Cooling System**	**Impact**	**Comparison with Closed-Cycle Cooling System**
Land Use	SMALL to MODERATE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.	SMALL to MODERATE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	SMALL	Less terrestrial habitat lost and cooling tower effects eliminated. Increased water withdrawal, but aquatic impact would be similar to current Ginna operations.	SMALL to MODERATE	Impact would depend on ecology at the site. No impact to terrestrial ecology from cooling tower drift. Increased water withdrawal and possible greater impact to aquatic ecology.
Surface-Water Use and Quality	SMALL	No discharge of cooling tower blowdown containing dissolved solids. Increased water withdrawal would be insignificant to Lake Ontario.	SMALL to MODERATE	No discharge of cooling tower blowdown. Increased water withdrawal and more thermal load on receiving body of water.
Groundwater Use and Quality	SMALL	No change	SMALL	It is unlikely that groundwater would be used for once-through cooling, but could be used for sanitary water.
Air Quality	MODERATE	No change	MODERATE	No change
Waste	SMALL	No change	SMALL	No change
Human Health	SMALL	No change	SMALL	No change
Socioeconomics	SMALL to MODERATE	No change	SMALL to MODERATE	No change

Table 8-5. (contd)

	Ginna Site		Alternate Site	
Impact Category	Impact	Comparison with Closed-Cycle Cooling System	Impact	Comparison with Closed-Cycle Cooling System
Aesthetics	SMALL to MODERATE	Reduced aesthetic impact because cooling towers would not be used.	SMALL to MODERATE	Reduced aesthetic impact because cooling towers would not be used.
Historic and Archaeological Resources	SMALL to MODERATE	Less land affected.	SMALL to MODERATE	Less land affected.
Environmental Justice	SMALL	No change	SMALL	No change

8.2.3 Nuclear Power Generation

Since 1997, the NRC has certified three new standard designs for nuclear power plants under 10 CFR Part 52, Subpart B. These designs are the U.S. Advanced Boiling Water Reactor (10 CFR Part 52, Appendix A), the System 80+ Design (10 CFR Part 52, Appendix B), and the AP600 Design (10 CFR Part 52, Appendix C). All of these plants are light-water reactors. Although no applications for a construction permit or a combined license based on these certified designs have been submitted to the NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. Recent volatility in prices of natural gas and electricity have made new nuclear power plant construction more attractive from a cost standpoint. Additionally, Entergy Nuclear, Exelon, and Dominion Power recently announced that they will submit applications for early site permits for new advanced nuclear power plants under the procedures in 10 CFR Part 52 Subpart A (NEI 2002). Therefore, construction of a new nuclear power plant, either at the Ginna site or at an alternate site in New York state using both closed- and open-cycle cooling is considered in this section. The staff assumed that the new nuclear plant would have a 40-year lifetime.

The NRC has summarized environmental data associated with the uranium fuel cycle in Table S-3 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would be associated with a replacement nuclear power plant built to one of the certified designs. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect replacement of Ginna, which has a capacity of 490 MW(e). The environmental impacts associated with transporting fuel and waste to and from a light-water-cooled nuclear power reactor are summarized in Table S-4 of 10 CFR 51.52. The summary of NRC's findings on NEPA issues for license renewal of nuclear power plants in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, is also relevant, although not directly applicable, for consideration of environmental impacts associated with the operation of a replacement nuclear power plant. Additional environmental impact information for a replacement nuclear power plant using closed-cycle cooling with cooling towers is presented in Section 8.2.3.1 and using once-through cooling in Section 8.2.3.2.

8.2.3.1 Closed-Cycle Cooling System

The overall impacts of a new nuclear electrical-generating plant utilizing a closed-cycle cooling system at the Ginna site or an alternate site are discussed in the following sections. The extent of impacts at an alternate site will depend on the location of the particular site selected.

- **Land Use**

According to the GEIS, land-use requirements for a new nuclear unit at an alternate site would be approximately 200 to 400 ha (500 to 1000 ac) (NRC 1996). Additional land could be needed for an electric power transmission line, a rail spur to bring construction materials to the plant site, and/or pipelines to supply cooling-water intake and discharge. Depending particularly on transmission line routing, siting a new nuclear plant with closed-cycle cooling at an alternate site would result in MODERATE to LARGE land-use impacts.

If a new nuclear plant were to be constructed at the Ginna site, the staff assumed that the existing facilities would be used to the extent practicable, reducing the amount of new construction that would be required. Specifically, the staff assumed that a replacement nuclear power plant would use the existing cooling system, switchyard, offices, and transmission right-of-way. A replacement nuclear unit constructed at the Ginna site would be expected to require less land area than a unit at a greenfield site, but would still require at least several hundred acres. It is not clear whether there is enough usable land for a replacement unit at the Ginna site, and additional land beyond the current Ginna boundary may be needed to construct a new nuclear power plant while the current Ginna plant continues to operate. Therefore, the siting of a new nuclear plant with closed-cycle cooling at the Ginna site would likely result in a MODERATE to LARGE impact. The impact would be greater than the OL renewal alternative.

There would be no net change in land needed for uranium mining because land needed to support the new nuclear plant would offset land needed to supply uranium for fuel for the existing Ginna reactor.

- **Ecology**

A new nuclear plant at an alternate site would introduce construction impacts and new incremental operational impacts. Even assuming siting at a previously disturbed area, the impacts likely would alter the ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity. Intake and discharge of cooling water from a nearby surface-water body could have adverse aquatic resource impacts. If needed, construction and maintenance of an electric power transmission line would have ecological impacts. There would be some impact on terrestrial ecology from cooling tower drift. Overall, the ecological impacts of a new nuclear plant with closed-cycle cooling at an alternate site would be MODERATE to LARGE.

A new nuclear plant with a closed-cycle cooling system at the Ginna site would also result in impacts to the ecology of the site. Most of the land area that would be used for a new plant at the Ginna site is currently used for apple orchards, but the more natural wooded areas of the site also would be adversely impacted. There would be some impact on terrestrial ecology from cooling tower drift. Overall, the ecological impacts of a new nuclear plant with closed-cycle cooling at the Ginna site would be MODERATE and would be greater that renewal of the Ginna OL.

- **Water Use and Quality**

New nuclear generation at the Ginna site would likely use water from Lake Ontario for cooling. It is possible that some of the existing intake and discharge structures could be used, but the construction of additional cooling infrastructure would be needed to accommodate a closed-cycle system. Plant discharges would consist mostly of cooling tower blowdown, characterized primarily by an increased temperature and concentration of dissolved solids relative to the receiving water body and intermittent low concentrations of biocides (e.g., chlorine). Treated process waste streams and sanitary wastewater may also be discharged. All discharges would be regulated by NYSDEC through an SPDES permit. There would be a consumptive use of water due to evaporation from the cooling towers. Some erosion and sedimentation would likely occur during construction (NRC 1996). The staff considers the impacts to surface-water use and quality of a new nuclear plant with a closed-cycle cooling system located at the Ginna site to be SMALL.

Cooling water at an alternate site would likely be withdrawn from a surface-water body and would be regulated by permit. Depending on the source water body, the impacts of water use for cooling system makeup water and the effects on water quality due to cooling tower blowdown could have noticeable impacts. Therefore, the staff considers the impacts of a new nuclear plant utilizing a closed-cycle cooling system at an alternate site to be SMALL to MODERATE.

Use of groundwater at the Ginna site is unlikely, but is possible for a nuclear plant at an alternate site. Groundwater withdrawal could require a permit. Overall, impacts to groundwater use and quality of a new nuclear plant with a closed-cycle cooling system at the Ginna site are considered SMALL and the impacts to groundwater use and quality of such a plant at an alternate site are considered SMALL to MODERATE, depending on the volume of groundwater withdrawn.

- **Air Quality**

Construction of a new nuclear plant at either the Ginna site or at an alternate site would result in fugitive dust emissions during the construction process. Exhaust emissions would come from vehicles and motorized equipment during the construction process and after operation commences. An operating nuclear plant would have minor air emissions associated with diesel generators. These emissions would be regulated by NYSDEC. Overall, emissions and associated impacts to air quality of a nuclear plant at either the Ginna site or an alternate site are considered SMALL.

- **Waste**

The waste impacts associated with operation of a nuclear power plant either at the Ginna site or at an alternate site are set forth in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B. In addition to the impacts shown in Table B-1, construction-related debris would be generated during construction activities and removed to an appropriate disposal site. Overall, waste impacts of a new nuclear plant at either the Ginna or alternate sites are considered SMALL.

- **Human Health**

Human health impacts for an operating nuclear power plant at either the Ginna site or an alternate site are set forth in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B. Overall, human health impacts of a new nuclear power plant at either the Ginna site or an alternate site are considered SMALL.

- **Socioeconomics**

The construction period and the peak workforce associated with construction of a new nuclear power plant are currently unquantified (NRC 1996). In the absence of quantified data, the staff assumed a construction period of 5 years and a peak workforce of 2500. The staff assumed that construction would take place while the existing Ginna plant continued operation and would be completed by the time Ginna permanently ceases operations. During construction, the communities surrounding the plant site would experience demands on housing, transportation, and public services that could have MODERATE to LARGE impacts. These impacts would be tempered by construction workers commuting to the site from more distant communities. In the GEIS, the staff noted that socioeconomic impacts at a rural site would be larger than at an urban site because more of the peak construction workforce would need to move to the area to work (NRC 1996). Socioeconomic impacts at a rural site could be LARGE. After construction, the communities would be impacted by the loss of the construction jobs. The replacement nuclear unit is assumed to have an operating workforce comparable to the approximately 500 workers currently working at Ginna. Transportation impacts related to commuting of plant operating personnel are considered SMALL to MODERATE. If a replacement nuclear unit was built at an alternate site, the communities around Ginna would experience the impact of Ginna operational job loss and Wayne County would experience the loss of a tax base. These losses would have SMALL to MODERATE socioeconomic impacts, given the fact that Ginna provides less than 10 percent of the total revenue in Wayne County and slightly over 10 percent of the total revenue in the town of Ontario and Wayne Central School District (Section 8.1.7). Overall, the staff considers the potential impacts of a new nuclear plant at either the Ginna or an alternate site to be MODERATE to LARGE.

- ***Aesthetics***

The containment buildings for a replacement nuclear power plant, other associated buildings, the cooling towers, and the plume from the cooling towers would be visible during daylight hours. Natural draft towers could be up to 160 m (520 ft) high. Mechanical draft towers could be up to 30 m (100 ft) high and would also have an associated noise impact and condensate plumes. Visual impacts of buildings and structures could be mitigated by landscaping and selecting a color that is consistent with the environment. Visual impact at night could be mitigated by reduced use of lighting and appropriate use of shielding. There would also be a significant aesthetic impact if a new electric power transmission line were needed. No exhaust stacks would be needed.

Noise from operation of a replacement nuclear power plant would potentially be audible offsite in calm wind conditions or when the wind is blowing in the direction of the listener. Mitigation measures, such as reduced or no use of outside loudspeakers, could be employed to reduce noise level and keep the impact SMALL to MODERATE. Overall, the staff considers the aesthetic impact of a new nuclear plant with closed-cycle cooling at the Ginna site to be MODERATE to LARGE.

The aesthetic impact of a new nuclear plant with closed-cycle cooling at an alternate site would depend on the site selected. If the alternate site is in an industrial area, visual and noise impacts would probably be SMALL; if the alternate site were a rural greenfield site, the impacts could be MODERATE to LARGE. Regardless of the alternate site location, the impact could be LARGE if a lengthy new electric power transmission line is needed to connect the plant to the power grid.

- **Historic and Archaeological Resources**

An historic and archeological resources inventory would likely be needed for any onsite property that has not been previously surveyed. Other lands, if any, that are acquired to support the plant would also likely need an inventory of field resources, identification and recording of existing historic and archaeological resources, and possible mitigation of adverse effects from subsequent ground-disturbing actions related to physical expansion of the plant site.

Before construction, studies would likely be needed to identify, evaluate, and address mitigation of the potential impacts of new plant construction on historic and archeological resources. The studies would likely be needed for all areas of potential disturbance at the proposed plant site and along associated corridors where new construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-way). Historic and archaeological resource impacts can generally be managed and mitigated to a certain extent. Therefore, the staff considers the impacts to historic and archeological resources of a new nuclear plant at either the Ginna or alternate sites to be SMALL to MODERATE.

- **Environmental Justice**

Environmental impacts on minority and low-income populations associated with a replacement nuclear plant built at an alternate site and would depend upon the site chosen and the nearby population distribution. The environmental justice impact of replacing Ginna with a new nuclear unit at the Ginna site would be SMALL. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect minority and low-income populations. Closure of Ginna would result in the loss of approximately 500 operating jobs. Resulting economic conditions could reduce employment prospects for minority or low-income populations. However, Ginna is located near a relatively urban area with many employment opportunities. Wayne County would experience a loss of property tax revenue that could affect its ability to provide services and programs. However, these losses would likely have SMALL environmental justice impacts, and would be similar to the no-action alternative (Section 8.1.10). Therefore, the staff considers the environmental justice impacts of a new nuclear plant at either the Ginna site or an alternate site to be SMALL.

- **Summary**

The staff's conclusions regarding the environmental impacts of a new nuclear plant with closed-cycle cooling are summarized in Table 8-6.

Table 8-6. Summary of Environmental Impacts of New Nuclear Generation Using Closed-Cycle Cooling at the R.E. Ginna Nuclear Power Plant Site and at an Alternate Site in New York State

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Land Use	MODERATE to LARGE	Requires approximately 200 to 400 ha (500 to 1000 ac) for the plant and 400 ha (1000 ac) for uranium mining and processing. May require acquisition of adjacent lands.	MODERATE to LARGE	Same as Ginna site, plus land for new transmission line, rail spur, and cooling water intake/discharge pipelines. Up to 259 ha (640 ac) assuming a 25-km (15 mi) transmission line.
Ecology	SMALL to MODERATE	Uses undeveloped areas at the current Ginna site. Impacts to terrestrial ecology from cooling tower drift.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and electric power transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity; impacts to terrestrial ecology from cooling tower drift.
Surface-Water Use and Quality	SMALL	Uses existing cooling water intake system. Closed-cycle system would use less water than current Ginna once-through system. Discharge of cooling tower blowdown will have impacts.	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged, the constituents in the discharge water, and the characteristics of the surface-water body. Discharges would be regulated by NYSDEC. Discharge of cooling tower blowdown will have impacts.

Table 8-6. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Groundwater Use and Quality	SMALL	No groundwater used at the Ginna site.	SMALL to MODERATE	Groundwater may be used. Impacts SMALL if only used for potable water, impacts could be SMALL to MODERATE, depending on the site or aquifer if groundwater is used as makeup cooling water.
Air Quality	SMALL	Fugitive dust emissions and emissions from vehicles and equipment during construction. Small amounts of emissions from diesel generators, vehicles, and possibly other sources during operation.	SMALL	Same as at Ginna site.
Waste	SMALL	Waste impacts for an operating nuclear power plant are set forth in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same as at Ginna site.
Human Health	SMALL	Human health impacts for an operating nuclear power plant are set forth in 10 CFR Part 51, Appendix B, Table B-1.	SMALL	Same as at Ginna site.

Table 8-6. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Socio-economics	MODERATE to LARGE	During construction, impacts would be SMALL to MODERATE. Up to 2500 workers during the peak of the 5-year construction period. Operating workforce assumed to be similar to Ginna. Tax base would be preserved. Impacts during operation would be SMALL. Transportation impacts associated with commuting construction workers could be MODERATE to LARGE. Transportation impacts during operation would be SMALL.	MODERATE to LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE. Wayne County would experience loss of tax base and employment with SMALL impacts. However, tax base and employment at alternate site would increase with SMALL to LARGE impacts, depending on the location. Transportation impacts would be similar to the Ginna site.
Aesthetics	MODERATE to LARGE	Containment buildings, cooling towers, and the plumes from cooling towers would be visible from offsite. No exhaust stacks would be needed. Daytime visual impact could be mitigated by landscaping and appropriate color selection for buildings. Visual impact at night could be mitigated by reduced use of lighting and appropriate shielding. Noise impacts would be relatively small and could be mitigated.	SMALL to LARGE	Impacts would depend on the characteristics of the alternate site. Visual and noise impacts could be mitigated as at the Ginna site. Impacts could be SMALL if the plant is located adjacent to an industrial area. Potential impacts will be greater if a new electric power transmission line is needed. Aesthetic impacts could be LARGE if a non-industrial, greenfield site is selected.

Table 8-6. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Historic and Archaeological Resources	SMALL	Impacts can generally be managed or mitigated.	SMALL to MODERATE	Same as Ginna site.
Environmental Justice	SMALL	Impacts on minority and low-income populations should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction.	SMALL	Impacts will vary depending on population distribution and makeup at the site. Wayne County would lose tax revenue and jobs, however the impacts on minority and low-income population would likely be SMALL.

8.2.3.2 Once-Through Cooling System

The environmental impacts of constructing a nuclear power plant, either at the Ginna site or at an alternate site in New York state using once-through cooling, are similar to the impacts for a nuclear power plant using closed-cycle cooling with cooling towers. However, there are some differences in the environmental impacts between the closed-cycle and once-through cooling systems. In those impact categories that are related to land area requirements such as land use, terrestrial ecology, and cultural resources, the impacts are likely to be smaller if the site uses a once-through cooling system rather than a closed-cycle cooling system. However, the impacts of a plant with a once-through cooling system are likely to be greater than a plant with a closed-cycle cooling system in the areas of water use and aquatic ecology due to the need for greater quantities of cooling water. Table 8-7 summarizes the incremental differences.

Table 8-7. Summary of Environmental Impacts of New Nuclear Generation Using Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or at an Alternate Site in New York State

	Ginna Site		Alternate Site	
Impact Category	**Impact**	**Comparison with Closed-Cycle Cooling System**	**Impact**	**Comparison with Closed-Cycle Cooling System**
Land Use	MODERATE to LARGE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.	MODERATE to LARGE	10 to 12 ha (25 to 30 ac) less land required because cooling towers and associated infrastructure are not needed.
Ecology	MODERATE	Slightly less terrestrial habitat loss, no cooling tower drift, but increase water usage with increased aquatic ecology impacts.	MODERATE to LARGE	Impact would depend on ecology at the site. No impact to terrestrial ecology from cooling tower drift. Increased water withdrawal with possible greater impact to aquatic ecology.
Surface-Water Use and Quality	SMALL	No discharge of cooling tower blowdown. Increased water withdrawal and more thermal load on receiving body of water, but similar to current Ginna plant.	SMALL to MODERATE	No discharge of cooling tower blowdown. Increased water withdrawal and more thermal load on receiving body of water.
Groundwater Use and Quality	SMALL	No change	SMALL	No change
Air Quality	SMALL	No change	SMALL	No change
Waste	SMALL	No change	SMALL	No change
Human Health	SMALL	No change	SMALL	No change
Socioeconomics	MODERATE to LARGE	No change	MODERATE to LARGE	No change
Aesthetics	SMALL	Reduced aesthetic impact because cooling towers would not be used.	SMALL to LARGE	Reduced aesthetic impact because cooling towers would not be used, but impacts could still be large if lengthy transmission line is required.

Table 8-7. (contd)

Impact Category	Ginna Site: Impact	Ginna Site: Comparison with Closed-Cycle Cooling System	Alternate Site: Impact	Alternate Site: Comparison with Closed-Cycle Cooling System
Historic and Archaeological Resources	SMALL to MODERATE	Less land impacted	SMALL to MODERATE	Less land impacted.
Environmental Justice	SMALL	No change	SMALL	No change

8.2.4 Purchased Electrical Power

If available, purchased power from other sources could potentially obviate the need to renew the Ginna OL. The New York State Energy Plan is 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 may choose among RG&E and other sources (i.e., qualified energy service companies) to supply their power, resulting in uncertainty with regard to future RG&E load obligations. In view of these conditions, RG&E assumed in the ER that adequate supplies of electricity would be available, and that purchased power would be a reasonable alternative to meet its load requirements in the event the OL for Ginna is not renewed.

During 2001, RG&E supplied 9803 GWh of electricity to its customers, 25 percent of which was purchased from other generators. The source of the purchased power that would potentially replace Ginna's 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 state noted above, natural-gas-fired, combined-cycle units, such as those described in Section 8.2, would be the most likely candidate.

RG&E does not anticipate that any additional transmission infrastructure would be needed in the event RG&E purchased power to replace the Ginna generating capacity. From a local perspective, loss of Ginna 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. The traditional strain on the New York state 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 study sponsored by the New York Independent System Operator (Sanford et al. 2001), 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.

Imported power from Canada or Mexico is unlikely to be available for replacement of the Ginna generating capacity. In Canada, 62 percent of the country's electricity capacity is derived from renewable energy sources, principally hydropower (DOE/EIA 2002). Canada has plans to continue developing hydroelectric power, but the plans generally do not include large-scale projects (DOE/EIA 2002). Canada's nuclear generation capacity is projected to increase by 2020, but its share of electric power generation in Canada is projected to decrease from 14 percent currently to 13 percent by 2020 (DOE/EIA 2002). EIA projects that total gross U.S. imports of electricity from Canada and Mexico will gradually increase from 38.5 billion kWh in year 2001 to 48.3 billion kWh in year 2005 and then gradually decrease to 24.4 billion kWh in year 2020 (DOE/EIA 2003). On balance, it appears unlikely that electricity imported from Canada or Mexico would be able to replace the Ginna generating capacity.

If power to replace Ginna generating capacity were to be purchased from sources within the United States or a foreign country, the generating technology likely would be one of those described in this SEIS and in the GEIS (probably coal, natural gas, or nuclear). The description of the environmental impacts of other technologies in Chapter 8 of the GEIS is representative of the impacts associated with the purchased electrical power alternative to renewal of the Ginna OL. Under the purchased power alternative, the environmental impacts of imported power would still occur, but would be located elsewhere within the region, nation, or another country.

The staff has assumed that any environmental impacts associated with the production of purchased power would be evaluated under separate NEPA or comparable environmental analyses, and therefore do not need to be reconsidered in relation to the Ginna OL renewal.

8.2.5 Other Alternatives

Other generation technologies are discussed in the following sections. As described in the following sections, none of these alternatives is considered feasible as a replacement for the 490 MW(e) base-load capacity of Ginna.

8.2.5.1 Oil-Fired Generation

The EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States through the year 2025 because of higher fuel costs and lower efficiencies compared to other available technologies (DOE/EIA 2003). Oil-fired operation is more expensive than coal, natural gas, or nuclear generation alternatives. In addition, future increases in oil prices are expected to make oil-fired generation increasingly more expensive than other generation alternatives. The high cost of oil has prompted a steady decline in its use for electricity generation. In Section 8.3.11 of the GEIS, the staff estimated that construction of a 1000-MW(e) oil-fired plant would require about 49 ha (120 ac) (NRC 1996). Operation of oil-fired plants would have environmental impacts (including impacts on the aquatic environment and air) that would be similar to those from a coal-fired plant (Section 8.2.1).

8.2.5.2 Wind Power

Most of western New York is in wind power Class 2 or 3 regions (average wind speeds at 9-m [30-ft] elevation of 4.4 to 5.6 m/s [9.8 to 12.5 mph]) (DOE 2002a). In general, Class 3 or higher can be used for commercial power production, but wind turbines are considered economical in wind power Classes 4 through 7 (average wind speeds of 5.6 to 9.4 m/s [12.5 to 21.1 mph]) (DOE 2002a). Wind turbines typically operate at a 25 to 35 percent capacity factor compared to 80 to 95 percent for a base-load plant (NWPPC 2000). The largest commercially available wind turbines are in the range of 1 MW to 1.5 MW, therefore at least 327 to 490 units would be required to replace the Ginna generating capacity. Given the intermittent nature of the wind resource (perhaps 30 to 35 percent availability), approximately three times this number would be required to replace the KWh generated by Ginna.

As of January 2003, there were approximately 48 MW of grid-connected wind power facilities in New York state, with an additional 410 MW of additional capacity in various stages of planning (AWEA 2003). Statewide, the New York State Energy Research and Development Authority (NYSERDA) estimates that there is a potential for approximately 17,000 MW of installed capacity, of which approximately 3200 MW would be available for the peak summer load (NYSERDA 2002). Access to many of the best wind power sites would require extensive road building, as well as clearing (for towers and blades) and leveling (for the tower bases and associated facilities) in steep terrain. Also, many of the best quality wind sites are on ridges and hilltops that could have greater archaeological sensitivity than surrounding areas. For these reasons development of large-scale, land-based wind-power facilities are likely to not only be costly, but could have MODERATE to LARGE impacts on aesthetics, archaeological resources, land use, and terrestrial ecology.

The offshore wind speeds in Lake Ontario are higher than those onshore, and could thus support greater energy production than onshore facilities. Ten offshore wind power projects are currently operating in Europe, but none have been developed in the United States. The European plants together provide approximately 250 MW, which is significantly less than the electrical output of Ginna (BWEA 2003). For the preceding reasons, the staff concludes that locating a wind-energy facility on or near the Ginna site or offshore as a replacement for Ginna generating capacity would not be economically feasible at this time given the current state of wind energy generation technology. Development of an offshore wind-power facility could impact shipping lanes, may disrupt the aquatic ecology, and would be visible for many miles, resulting in considerable aesthetic impacts. These impacts could be MODERATE to LARGE.

8.2.5.3 Solar Power

Solar technologies use the sun's energy and light to provide heat and cooling, light, hot water, and electricity for homes, businesses, and industry. Neither photovoltaic nor thermal solar power technologies currently can compete with conventional fossil-fueled electrical generation technologies in grid-connected applications due to higher capital costs per kilowatt of capacity. The average capacity factor of photovoltaic cells is about 25 percent (NRC 1996), and the capacity factor for solar thermal systems is about 25 to 40 percent (NRC 1996). Energy storage requirements limit the use of solar-energy systems as base-load electricity supply.

There are substantial impacts to natural resources (wildlife habitat, land-use, and aesthetic impacts) from construction of solar-generating facilities. As stated in the GEIS, land requirements are high. Approximately 7000 ha (27 mi^2) for photovoltaic technology (NRC 1996) and approximately 2850 ha (11 mi^2) for solar thermal systems (NRC 1996) would be required to replace the 490 MW(e) produced by Ginna. Neither type of solar electric system would fit at the Ginna site, and both would have large environmental impacts at an alternate site.

The Ginna site receives less than 2.8 kWh of direct normal solar radiation per square meter per day compared to greater than 7 kWh of solar radiation per square meter per day in areas of the western United States such as California or Arizona, which are most promising for solar technologies (DOE/EIA 2000). Because of the natural resource impacts (land and ecological), the area's relatively low rate of solar radiation, the intermittent nature of the resource in the area, and the high cost, solar power is not deemed a feasible base-load alternative to renewal of the Ginna OL. Some onsite-generated solar power (e.g., from rooftop photovoltaic applications) may substitute for a portion of the electric power from the grid. Implementation of solar generation on a scale large enough to replace the Ginna generating capacity would likely result in LARGE environmental impacts.

8.2.5.4 Hydropower

New York state has an estimated 1308 MW of undeveloped hydroelectric resource (INEEL 1998). This amount is greater than needed to replace the 490 MW(e) generating capacity of Ginna. However, as stated in Section 8.3.4 of the GEIS, hydropower's percentage of U.S. generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern about land requirements, destruction of natural habitat, and alteration of natural river courses. DOE/EIA states that potential sites for hydroelectric dams have already been largely established in the United States, and environmental concerns are expected to prevent the development of any new sites in the future (DOE/EIA 2002). In the GEIS, the staff estimated that approximately 200,000 ha (500,000 ac) of land would be required to replace the 490 MW(e) produced by Ginna using hydroelectric power (NRC 1996). Due to the relatively low amount of undeveloped hydropower resource in New York state and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to replace Ginna, the staff concludes that local hydropower is not a feasible alternative to renewal of the Ginna OL. Any development of hydroelectric facilities large enough to replace Ginna would result in LARGE environmental impacts.

8.2.5.5 Geothermal Energy

Geothermal energy has an average capacity factor of 90 percent and can be used for base-load power where available. However, geothermal technology is not widely used as baseload generation due to the limited geographical availability of the resource and immature status of the technology (NRC 1996). As illustrated by Figure 8.4 in the GEIS, geothermal plants are most likely to be sited in the western continental United States, Alaska, and Hawaii where hydrothermal reservoirs are prevalent. There is no feasible eastern location for geothermal capacity to serve as an alternative to Ginna. The staff concludes that geothermal energy is not a feasible alternative to renewal of the Ginna OL.

8.2.5.6 Wood Waste

A wood-burning facility can provide base-load power and operate with an average annual capacity factor of around 70 to 80 percent and with 20 to 25 percent energy conversion efficiency (NRC 1996). The energy conversion efficiency of a conventional fossil-fired plant is on the order of 35 percent. The fuels required are variable and site-specific. A significant barrier to the use of wood waste to generate electricity is the high delivered fuel cost and high construction cost per MW of generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size. Estimates in the GEIS suggest that the overall level of construction impact per MW of installed capacity should be approximately the same as that for a coal-fired plant, although facilities using wood waste for fuel would be built at smaller scales (NRC 1996). Like coal-fired plants, wood-waste plants require large areas for fuel storage and processing and involve the same type of combustion equipment.

Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-load generating facility, ecological impacts of large-scale timber cutting (e.g., soil erosion and loss of wildlife habitat), and relatively low energy conversion efficiency, the staff has determined that wood waste is not a feasible alternative to renewing the Ginna OL.

8.2.5.7 Municipal Solid Waste

Municipal waste combustors incinerate waste and use the resultant heat to generate steam, hot water, or electricity. The combustion process can reduce the volume of waste by up to 90 percent and the weight of the waste by up to 75 percent (EPA 2001). Municipal waste combustors use three basic types of technologies: mass burn, modular, and refuse-derived fuel (DOE/EIA 2001b). Mass burning technologies are most commonly used in the United States. This group of technologies process raw municipal solid waste "as is," with little or no sizing, shredding, or separation before combustion. The initial capital costs for municipal solid-waste plants are greater than for comparable steam-turbine technology at wood-waste facilities. This is due to the need for specialized waste-separation and -handling equipment for municipal solid waste (NRC 1996).

Growth in the municipal waste combustion industry slowed dramatically during the 1990s after rapid growth during the 1980s. The slower growth was due to three primary factors: (1) the Tax Reform Act of 1986, which made capital-intensive projects such as municipal waste combustion facilities more expensive relative to less capital-intensive waste disposal alternative such as landfills; (2) the 1994 Supreme Court decision (*C&A Carbone, Inc. v. Town of Clarkstown*), which struck down local flow control ordinances that required waste to be delivered to specific municipal waste combustion facilities rather than landfills with lower fees; and (3) increasingly stringent environmental regulations that increased the capital cost necessary to construct and maintain municipal waste combustion facilities (DOE/EIA 2001b).

Similar to the combustion of coal, municipal solid-waste combustors generate an ash residue that is buried in landfills. The ash residue is composed of bottom ash and fly ash. Bottom ash refers to that portion of the unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small particles that rise from the furnace during the combustion process. Fly ash is generally removed from flue-gases using fabric filters and/or scrubbers (DOE/EIA 2001b).

Currently, there are approximately 102 waste-to-energy plants operating in the United States. These plants generate approximately 2800 MW(e), or an average of approximately 28 MW(e) per plant (IWSA 2001). Therefore, approximately 18 typical waste-to-energy plants would be required to replace the 490 MW(e) base-load capacity of Ginna. Therefore, the staff concludes that generating electricity from municipal solid waste would not be a feasible alternative to renewal of the Ginna OL.

8.2.5.8 Other Biomass-Derived Fuels

In addition to wood and municipal solid-waste fuels, there are several other concepts for fueling electric generators, including crops, crops converted to a liquid fuel such as ethanol, and crops (including wood waste) that have been converted to a gas. In the GEIS, the staff stated that none of these technologies has progressed to the point of being competitive on a large scale or of being reliable enough to replace a base-load plant such as Ginna (NRC 1996). For these reasons, such fuels do not offer a feasible alternative to renewal of the Ginna OL.

8.2.5.9 Fuel Cells

Fuel cells work without combustion and its environmental side effects. Power is produced electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide. Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam under pressure. Natural gas is typically used as the source of hydrogen.

Phosphoric acid fuel cells are generally considered first-generation technology. These are commercially available today at a cost of approximately $4500 per kW of installed capacity (DOE 2002b). Higher-temperature second-generation fuel cells achieve higher fuel-to-electricity and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the second-generation fuel cells the capability to generate steam for cogeneration and combined-cycle operations.

DOE has a performance target that by 2003, two second-generation fuel cell technologies using molten carbonate and solid oxide technology, respectively, will be commercially available in sizes up to approximately 3 MW at a cost of $1000 to $1500 per kW of installed capacity (DOE 2002b). For comparison, the installed capacity cost for a natural-gas-fired, combined-cycle plant is approximately $456 per kW (DOE/EIA 2001a). As market acceptance and manufacturing capacity increase, natural-gas-fueled fuel cell plants in the 50- to 100-MW range are projected to become available. At the present time, however, fuel cells are not economically or technologically competitive with other alternatives for base-load electricity generation. Fuel cells are, consequently, not a feasible alternative to renewal of the Ginna OL.

8.2.5.10 Delayed Retirement

RG&E has only one other electrical generating plant designed for base-load service – the 257 MW coal-burning Russell Station. RG&E has no current plans to retire that plant, and stated in the Ginna ER (RG&E 2002) that it is not aware of opportunities for delayed retirement available to other energy suppliers in the state. For this reason, delayed retirement of existing units would not be a feasible alternative to renewal of the Ginna OL.

8.2.5.11 Utility-Sponsored Conservation

Since the 1980s, RG&E has participated in state-wide residential, commercial, and industrial programs to reduce both peak demands and daily energy consumption. These programs are commonly referred to as demand-side management (DSM). State-wide, these DSM programs through 2001 have resulted in a cumulative summer peak reduction of approximately 1600 MW between 1999 and 2000, and additional peak demand reductions on the order of 900 to 1300 MW are projected in the 2004 to 2006 time frame (RG&E 2002). These DSM-induced load reductions are acknowledged in load forecasts, therefore they cannot be used as credits to offset the power generated by Ginna. An additional 490 MW(e) of savings, or a 38- to 54-percent increase in the state-wide reduction in peak demand by 2006, would be required to offset the power generated by Ginna. Therefore, the conservation option by itself is not considered a reasonable replacement for the Ginna OL renewal alternative.

8.2.6 Combination of Alternatives

Even though individual alternatives might not be sufficient on their own to replace the Ginna generating capacity due to the small size of the resource or lack of cost-effective opportunities, it is conceivable that a combination of alternatives might be cost effective.

Ginna has an average net capacity of 490 MW(e). For the natural-gas-fired, combined-cycle alternative, RG&E assumed one 540-MW unit in its ER as a potential replacement for Ginna. The staff used this same assumption in Section 8.2.2.

There are many possible combinations of alternatives. Table 8-8 contains a summary of the environmental impacts of an assumed combination of alternatives consisting of 245 MW(e) of combined-cycle, natural-gas-fired generation (one 245-MW unit) at either the Ginna site or an alternate site in New York State using closed-cycle cooling, 175 MW(e) purchased from other generators, 40 MW(e) produced by new wind power facilities in western New York state, and 30 MW(e) gained from additional DSM measures. The impacts associated with the combined-cycle, natural-gas-fired units are based on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the reduced generating capacity. For the combination of alternatives, the staff assumed that a replacement gas-fired plant would use the existing once-through cooling system, while a gas-fired plant located at an alternative site would utilize a closed-cycle cooling system. While the DSM measures would have few environmental impacts, operation of the new natural-gas-fired plant would result in increased emissions (compared to the OL renewal alternative) and other environmental impacts. Installation of new wind power facilities would have land-use, ecology, and aesthetic impacts. The environmental impacts of power generation associated with power purchased from other generators would still occur, but would be located elsewhere within the region, nation, or another country as discussed in Section 8.2.4. The environmental impacts associated with purchased power are not shown in

Table 8-8. The staff concludes that it is very unlikely that the environmental impacts of any reasonable combination of generating and conservation options could be reduced to the level of impacts associated with renewal of the Ginna OL.

Table 8-8. Summary of Environmental Impacts for an Assumed Combination of Generating (Combined-Cycle-Natural-Gas-Fired Generation, Wind Power, and DSM) and Acquisition Alternatives

	Ginna Site		Alternate Site	
Impact Category	**Impact**	**Comment**	**Impact**	**Comment**
Land Use	SMALL to MODERATE	8 ha (20 ac) for gas-fired plant power block, offices, roads, and parking areas. Additional impact at wind power sites (at least 20 ha [50 acres]). Additional impact for construction of an underground natural gas pipeline, electric power transmission line, and cooling-water intake/discharge piping.	SMALL to MODERATE	Same as Ginna site.
Ecology	SMALL to MODERATE	Uses previously disturbed areas of Ginna site, plus gas pipeline. Habitat loss due to development of wind power sites could have a MODERATE impact. Some increase in bird mortality at wind towers. Impacts to terrestrial ecology from cooling tower drift.	SMALL to MODERATE	Impact depends on location and ecology of the sites, surface-water body used for intake and discharge, and transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity; impacts to terrestrial ecology from cooling tower drift. Some increase in bird mortality associated with wind towers.

Table 8-8. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Surface-water Use and Quality	SMALL	Uses part of the existing cooling system. Discharge of cooling tower blowdown will have impacts.	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge, the constituents in the discharge water, and the characteristics of the surface-water body. Discharge of cooling tower blowdown will have impacts.
Groundwater Use and Quality	SMALL	Use of groundwater very unlikely.	SMALL to MODERATE	Impact depends on the quantity of water withdrawn.
Air Quality	MODERATE	Sulfur oxides: 13 MT/yr (14 tons/yr) Nitrogen oxides: 43 MT/yr (47 tons/yr) Carbon monoxide: 26 MT/yr (29 tons/yr) PM_{10} particulates: 50 MT/yr (55 tons/yr) Some hazardous air pollutants. Additional emissions from producers of purchased power.	MODERATE	Same as Ginna site.
Waste	SMALL	Minimal waste generated.	SMALL	Same as Ginna site.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Same as Ginna site.
Socio-economics	SMALL to MODERATE	During construction impacts would be SMALL to MODERATE. Possibly over 200 additional workers needed during the peak construction period followed by reduction from current Ginna workforce. Impacts during operation would be SMALL.	MODERATE	Construction impacts depend on location, but could be significant if location is in a rural area. Wayne County would experience loss of tax base and employment with potentially SMALL to MODERATE impacts. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.

Table 8-8. (contd)

Impact Category	Ginna Site Impact	Ginna Site Comment	Alternate Site Impact	Alternate Site Comment
Aesthetics	MODERATE	SMALL aesthetic impact due to the impact of plant unit and stack for gas plant (similar to Ginna plant). Additional impact from wind turbine towers.	MODERATE to LARGE	MODERATE to LARGE impact from wind turbine towers as well as the gas-fired plant, stacks, and cooling towers and associated plumes. Additional impact that could be LARGE if a lengthy new electric power transmission line is needed.
Historic and Archaeological Resources	SMALL to MODERATE	Impacts can generally be managed or mitigated. Wind turbines often placed along ridge lines that may have higher likelihood of historic or archaeological significance.	SMALL to MODERATE	Same as Ginna site.
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of Ginna jobs on minority and low-income populations most likely SMALL due to the proximity of the plant to a diverse urban job market.	SMALL	Impacts vary dependent on population distribution and makeup at site. Wayne County would lose tax revenue and jobs; however, the impacts on minority and low-income populations would likely be SMALL.

8.3 Summary of Alternatives

The environmental impacts of the proposed action, renewal of the Ginna OL, are SMALL for all impact categories (except collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, for which a single significance level was not assigned). Alternative actions (i.e., no-action alternative [Section 8.1], new generation alternatives [from coal, natural gas, and nuclear discussed in Sections 8.2.1 through 8.2.3, respectively], purchased electrical power [Section 8.2.4], alternative technologies [discussed in Section 8.2.5], and the combination of alternatives [Section 8.2.6]) were considered.

The no-action alternative would result in decommissioning Ginna and would have SMALL environmental impacts for all impact categories except socioeconomics, which may have SMALL to MODERATE impacts. The no-action alternative would result in a net reduction in power production. The power not generated by Ginna during the license renewal term would likely be replaced by (1) DSM and energy conservation, (2) power purchased from other electricity providers, (3) generating alternatives other than Ginna, or (4) some combination of these options. This replacement power would produce additional environmental impacts as discussed in Section 8.2.

For each of the new generation alternatives (coal, natural gas, and nuclear), the environmental impacts would be greater than the impacts of license renewal. For example, the land-disturbance impacts resulting from construction of any new facility would be greater than the impacts of continued operation of Ginna. The impacts of purchased electrical power would still occur, but would occur elsewhere. Alternative technologies are not considered feasible at this time for replacement of the Ginna base-load power and it is very unlikely that the environmental impacts of any reasonable combination of generation and conservation options could be reduced to the level of impacts associated with renewal of the Ginna OL.

8.4 References

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10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Functions."

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

40 CFR Part 51. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

40 CFR Part 60. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 60, "Standards of Performance for New Stationary Sources."

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9.0 Summary and Conclusions

By letter dated July 30, 2002, Rochester Gas and Electric Corporation (RG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for the R.E. Ginna Nuclear Power Plant (Ginna) for an additional 20-year period (RG&E 2002a). If the Ginna OL is renewed, New York State regulatory agencies and RG&E will ultimately decide whether the plant will continue to operate based on factors such as the need for power or other matters within the state's jurisdiction or the purview of the owners. If the OL is not renewed, the plant must be shut down at or before the expiration of the current OL, which expires September 18, 2009.

Section 102 of the National Environmental Policy Act (NEPA) (42 USC 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 CFR Part 51, which identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996, 1999).[a]

Upon acceptance of the Ginna application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping (67 FR 63171 [NRC 2002a]) on October 10, 2002. The staff visited the Ginna site in November 2002 and held public scoping meetings on November 6, 2002, in Webster, New York (NRC 2002b). The staff reviewed the RG&E Environmental Report (ER) (RG&E 2002b) and compared it to the GEIS, discussed it with other agencies, and conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also considered the public comments received during the scoping process for preparation of this supplemental environmental impact statement (SEIS) for Ginna. The public comments received during the scoping process and the staff's responses to these comments are provided in Appendix A, Part 1, of this draft SEIS.

The staff will hold two public meetings near Ginna in August 2003 to describe the preliminary results of the NRC SEIS, to answer questions, and to provide members of the public with information to assist them in formulating their comments. When the comment period ends, the staff will consider and disposition all of the comments received. These comments will be addressed in Appendix A, Part 2, of the final SEIS.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

This SEIS includes the NRC staff's preliminary analysis that considers and weighs the cumulative impacts of the action, the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse effects. It also includes the staff's preliminary recommendation regarding the proposed action.

The NRC has adopted the following statement of purpose and need for license renewal from the GEIS:

> The purpose and need for the proposed action (renewal of an OL) 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) decisionmakers.

The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is to determine

> ... whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that there are factors, in addition to license renewal, that will ultimately determine whether a licensee continues to operate a nuclear power plant beyond the period of the OL.

NRC regulations (10 CFR 51.95(c)(2)) contain the following statement regarding the content of SEISs prepared at the license renewal stage:

> The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility

within the scope of the generic determination in 51.23(a) and in accordance with 51.23(b).[a]

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. In the GEIS, the NRC staff evaluated 92 environmental issues using the NRC's three-level standard of significance – SMALL, MODERATE, or LARGE – developed using the Council on Environmental Quality guidelines. The following definitions of the three significance levels are set forth in the footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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, important attributes of the resource.

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

For 69 of the 92 issues considered in the GEIS, the staff made the following findings:

(1) 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 characteristics.

(2) 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 waste and spent fuel disposal).

(3) 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.

The staff relied on conclusions as amplified by supporting information in the GEIS for all 69 issues designated as Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

(a) The title of 10 CFR 51.23 is "Temporary storage of spent fuel after cessation of reactor operations–generic determination of no significant environmental impact."

Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated on a generic basis and must also be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This SEIS documents the staff's evaluation of all 92 environmental issues considered in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the Ginna OL) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration, natural-gas and coal-fired generation appear to be the most likely power-generation alternatives if the power from Ginna is replaced. These alternatives were evaluated assuming that the replacement power generation plant is located at either the Ginna site or some other unspecified location.

9.1 Environmental Impacts of the Proposed Action – License Renewal

RG&E and the NRC staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. RG&E did not identify any information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. During the course of SEIS preparation, the staff considered mitigation measures for the continued operation of Ginna. Continued operation for an additional 20 years was considered as a whole, and all of the specific effects on the environment (whether or not "significant") were evaluated. The staff's preliminary conclusion found that the operations and facilities at Ginna provide mitigation for all impacts and no new mitigation measures are warranted. The staff relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to Ginna.

RG&E's license renewal application presents analyses of the Category 2 issues that are applicable to Ginna and, additionally, environmental justice. The staff has reviewed the RG&E analysis for each issue and has conducted an independent review of each issue and chronic effects from electromagnetic fields. Six Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at Ginna. Four Category 2 issues are not discussed in this draft SEIS because they are specifically related to refurbishment. RG&E (2002b) has stated that its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of Ginna for the license renewal period. In addition, any replacement of components or additional inspection activities are within the bounds of normal plant component replacement and, therefore, are not expected to affect the environment outside of the bounds of the plant operations evaluated in the *Final Environmental Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1, Rochester Gas and Electric Corporation* (AEC 1973).

Ten Category 2 issues related to operational impacts and one related to postulated accidents during the renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are discussed in detail in this draft SEIS. Five of the Category 2 issues and environmental justice apply to both refurbishment and to operation during the renewal term and are only discussed in this draft SEIS in relation to operation during the renewal term. All 11 Category 2 issues and environmental justice, the staff concludes that the potential environmental effects are of SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies have not reached a consensus on the existence of chronic adverse effects from electromagnetic fields. Therefore, no further evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive effort was made to identify and evaluate SAMAs. Although two of the SAMAs appeared to be cost beneficial, they do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as a part of the license renewal pursuant to 10 CFR Part 54.

Mitigation measures were considered for each Category 2 issue. Current measures to mitigate the environmental impacts of plant operation were found to be adequate, and no additional mitigation measures were deemed sufficiently beneficial to be warranted.

Cumulative impacts of past, present, and reasonably foreseeable future actions were considered, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. For purposes of this analysis, where Ginna license renewal impacts are deemed to be SMALL, the staff concluded that these impacts would not result in significant cumulative impacts on potentially affected resources.

The following sections discuss unavoidable adverse impacts, irreversible or irretrievable commitments of resources, and the relationship between local short-term use of the environment and long-term productivity.

9.1.1 Unavoidable Adverse Impacts

An environmental review conducted at the license renewal stage differs from the review conducted in support of a construction permit because the plant is in existence at the license renewal stage and has operated for a number of years. As a result, adverse impacts associated with the initial construction have been avoided, have been mitigated, or have already occurred. The environmental impacts to be evaluated for license renewal are those associated with refurbishment and continued operation during the renewal term.

The adverse impacts of continued operation identified are considered to be of SMALL significance, and none warrants implementation of additional mitigation measures. The adverse impacts of likely alternatives if Ginna ceases operation at or before the expiration of the current OL will not be smaller than those associated with continued operation of this unit, and they may be greater for some impact categories in some locations.

9.1.2 Irreversible or Irretrievable Resource Commitments

The commitment of resources related to construction and operation of Ginna during its current license period was made when the plant was built. The resource commitments to be considered in this SEIS are associated with continued operation of the plant for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage space for the spent fuel assemblies.

The most significant resource commitments related to operation during the renewal term are the fuel and the permanent storage space. Ginna regularly replaces about one-third (44) of the fuel assemblies in the reactor core at approximately 18-month intervals (RG&E 2002b).

The likely power generation alternatives if Ginna ceases operation on or before the expiration of the current OL will require a commitment of resources for construction of the replacement plants as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the Ginna site was set when the plant was approved and construction began. That balance is now well established. Renewal of the OL for Ginna and continued operation of the plant will not alter the existing balance, but may postpone the availability of the site for other uses. Denial of the application to renew the OL will lead to shutdown of the plant and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the Ginna site into a park or an industrial facility are quite different.

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the OL for Ginna. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at Ginna. Chapters 4 through 7 discuss environmental issues associated with renewal of the OL. Environmental issues associated with the no-action alternative, and alternatives involving power generation and use reduction are discussed in Chapter 8.

The significance of the environmental impacts from the proposed action (approval of the application for renewal of the OL), the no-action alternative (denial of the application), alternatives involving nuclear, or coal- or gas-fired generation of power at the Ginna site and an unspecified "greenfield site," and a combination of alternatives are compared in Table 9-1. Continued use of a once-through cooling system at Ginna is assumed for Table 9-1, but a closed-cycle cooling system is assumed at an alternate site.

Substitution of a cooling tower for the once-through cooling system in the evaluation of the nuclear and gas- and coal-fired generation alternatives would result in some greater environmental impact differences in some impact categories. For example, use of cooling towers would have a greater aesthetic impact than once-through cooling.

Table 9-1 shows that the significance of the environmental effects of the proposed action are SMALL for all impact categories (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal for which a single significance level was not assigned [Chapter 6.0]). The alternative actions, including the no-action alternative, may have environmental effects in at least some impact categories that reach MODERATE or LARGE significance.

9.3 Staff Conclusions and Recommendation

Based on (1) the analysis and findings in the GEIS (NRC 1996, 1999), (2) the Ginna ER (RG&E 2002b), (3) consultation with other Federal, State, and local agencies, (4) the staff's own independent review, and (5) the staff's consideration of public comments received during the scoping process, the preliminary recommendation of the staff is that the Commission determine that the adverse environmental impacts of license renewal for Ginna, including cumulative impacts, are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation[a]

Impact Category	Proposed Action–License Renewal	No Action Alternative–Denial of Renewal	Coal-Fired Generation: Ginna Site	Coal-Fired Generation: Greenfield Site[b]	Natural-Gas-Fired Generation: Ginna Site	Natural-Gas-Fired Generation: Greenfield Site[b]	New Nuclear Generation: Ginna Site	New Nuclear Generation: Greenfield Site[b]	Combination of Alternatives: Ginna Site	Combination of Alternatives: Greenfield Site[b]
Land Use	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	SMALL to MODERATE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE
Ecology	SMALL	SMALL	MODERATE	MODERATE to LARGE	SMALL	SMALL to MODERATE	MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE
Surface-Water Use and Quality	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Groundwater Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health[c]	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL to MODERATE	SMALL to MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE	MODERATE to LARGE	MODERATE to LARGE	SMALL to MODERATE	MODERATE
Aesthetics	SMALL	SMALL	SMALL to MODERATE	MODERATE to LARGE	SMALL to MODERATE	MODERATE to LARGE	SMALL	SMALL to LARGE	MODERATE	MODERATE to LARGE
Historic and Archaeological Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL

(a) Alternatives located at the Ginna site are assumed to utilize the existing once-through cooling system; alternatives located at an alternate site are assumed to use a closed-cycle cooling system with cooling towers.
(b) A greenfield site is assumed, for the purpose of bounding potential impacts, to be an undeveloped site with no previous construction.
(c) Excludes collective offsite radiological impacts from the fuel cycle and from high-level waste and spent-fuel disposal, for which a significance level was not assigned. See Chapter 6 for details.

9.4 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 54. Code of Federal Regulations, Title 10, *Energy,* Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

Rochester Gas and Electric Corporation (RG&E). 2002a. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License.* Rochester, New York.

Rochester Gas and Electric Corporation (RG&E). 2002b. *R.E. Ginna Nuclear Power Plant Application for Renewed Operating License, Appendix E – Environmental Report.* Rochester, New York.

National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et. seq.

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

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants Main Report.* "Section 6.3 – Transportation, Table 9.1 Summary of Findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal.* NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2002a. "Rochester Gas and Electric Corporation, R.E. Ginna Nuclear Power Plant; Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." Federal Register: Vol. 67, No. 197, pp. 63171-63173. October 10, 2002.

U.S. Nuclear Regulatory Commission (NRC). 2002b. *Summary of Public Scoping Meetings to Support Review of the R.E. Ginna Nuclear Power Plant License Renewal Application,* December 17, 2002.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I – Comments Received During Scoping

On August 1, 2002, the Nuclear Regulatory Commission (NRC) received, by letter dated July 30, 2002, an application from the Rochester Gas and Electric Corporation (RG&E), filed pursuant to Section 104b of the Atomic Energy Act of 1954, as amended, and 10 CFR Part 54, which would authorize the applicant to operate the R. E. Ginna Nuclear Power Plant (Ginna) for an additional 20-year period. The current operating license (OL) for Ginna expires on September 18, 2009. Ginna is a pressurized water reactor designed by Westinghouse Electric Company and is located in Wayne County, New York. As part of the application, RG&E submitted an Environmental Report (ER) prepared in accordance with the requirements of 10 CFR Part 51, which contains the NRC requirements for implementing the National Environmental Policy Act (NEPA) of 1969. Section 51.53 outlines requirements for preparation and submittal of ERs to the NRC.

Section 51.53(c)(3) was based upon the findings documented in NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants*, (GEIS). The GEIS, in which the staff identified and evaluated the environmental impacts associated with license renewal, was issued for public comment. The staff received input from Federal and State agencies, public organizations, and private citizens. As a result of the assessments in the GEIS, a number of impacts were determined to be generic to all nuclear power plants. These were designated as Category 1 impacts. An applicant for license renewal may adopt the conclusions contained in the GEIS for Category 1 impacts in the absence of new and significant information that may cause the conclusions to fall outside those of the GEIS. Category 2 impacts are those impacts that have been determined to be plant-specific and are required to be addressed in the applicant's ER.

The Commission determined that the NRC does not have a role in energy planning decision-making for existing plants, which should be left to State regulators and utility officials. Therefore, an applicant for license renewal need not provide an analysis of the need for power, or the economic costs and economic benefits of the proposed action. Additionally, the Commission determined that the ER should not include a discussion of any aspect of storage of spent fuel for the facility. This determination was based on the Nuclear Waste Policy Act of 1982 and the Commission's Waste Confidence Rule, 10 CFR 51.23.

On October 10, 2002, the NRC published a Notice of Intent in the *Federal Register* (67 FR 63171), to notify the public of the NRC's intent to prepare a plant-specific supplement to the GEIS to support the review of the license renewal application for the Ginna OL. The plant-specific supplement to the GEIS will be prepared in accordance with the provisions of NEPA and 10 CFR Part 51. The NRC initiated the scoping process with the issuance of a *Federal Register* Notice. The NRC invited the applicant; Federal, Tribal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting written suggestions and comments no later than December 11, 2002. The scoping process included two public scoping meetings, which were held at the Webster Public Library in Webster, New York, on November 6, 2002. The NRC announced the meetings in local newspapers (*Rochester Democrat and Chronicle, Courier Gazette, Times of Wayne County, Wayne County Star,* and *Finger Lake Times*), issued press releases, and distributed flyers locally. Approximately 120 people attended the meetings, including the NRC environmental review team, members of the public, representatives from RG&E, State and local governments, and the press. Both sessions began with NRC staff members providing a brief overview of the license renewal process and the NEPA process. Following the NRC's prepared statements, the meetings were open for public comments. Fifteen (15) commenters (two of whom spoke at both meetings) provided either oral comments or written statements that were recorded and transcribed by a certified court reporter. In addition to the comments provided during the public meetings, the NRC received four comment letters. The afternoon and evening meeting transcripts (accession numbers ML023530107 and ML023530120) and comment letters are available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm.htm (the Public Electronic Reading Room).

The scoping process provides an opportunity for public participation to identify issues to be addressed in the plant-specific supplement to the GEIS and highlight public concerns and issues. The Notice of Intent to prepare an EIS identified the following objectives of the scoping process:

- define the proposed action

- determine the scope of the supplement to the GEIS and identify significant issues to be analyzed in depth

- identify and eliminate peripheral issues

- identify any environmental assessments and other environmental impact statements being prepared that are related to the supplement to the GEIS

- identify other environmental review and consultation requirements

- indicate the schedule for preparation of the supplement to the GEIS
- identify any cooperating agencies
- describe how the supplement to the GEIS will be prepared.

At the conclusion of the scoping period, the NRC staff and its contractor reviewed the transcripts and all written material received, and identified individual comments. All comments and suggestions received orally during the scoping meetings or in writing were considered. Each set of comments from a given commenter was given a unique alpha identifier (Commenter ID letter), allowing each set of comments from a commenter to be traced back to the transcript, letter, or email in which the comments were submitted. Several commenters submitted comments through multiple sources (e.g., afternoon and evening scoping meetings). Table A-1 identifies the individuals providing comments and the Commenter ID letter associated with each person's set(s) of comments. The individuals are listed in the order in which they spoke at the public meeting, and random order for the comments received by letter or email.

Comments were consolidated and categorized according to the topic within the proposed supplement to the GEIS or according to the general topic if outside the scope of the GEIS. Comments with similar specific objectives were combined to capture the common essential issues that had been raised in the source comments. Once comments were grouped according to subject area, the staff and contractor determined the appropriate action for the comment. The staff made a determination on each comment that it was one of the following:

- A comment that was either related to support or opposition of license renewal in general (or specifically to Ginna) or that makes a general statement about the licensing renewal process. It may make only a general statement regarding Category 1 and/or Category 2 issues. In addition, it provides no new information and does not pertain to 10 CFR Part 54.

- A comment about a Category 1 issue that
  - provided new information that required evaluation during the review
  - provided no new information.

- A comment about a Category 2 issue that
  - provided information that required evaluation during the review
  - provided no such information.

- A comment that raised an environmental issue that was not addressed in the GEIS.

- A comment regarding Alternatives to the proposed action.

Table A-1. Individuals Providing Comments During Scoping Comment Period

Commenter ID	Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession Number
A	Bernadette Anderson		Afternoon Scoping Meeting[a]
B	Tim Judson	Citizens Awareness Network	Afternoon Scoping Meeting
C	John Greenbaum	Metro Justice	Afternoon Scoping Meeting
D	Andy Gutacker		Afternoon Scoping Meeting
E	Roland Micklem	Lakeshore Environmental Action	Afternoon Scoping Meeting
F	Michael Havens	Wayne Central School District	Afternoon Scoping Meeting
G	Bob Mecredy	RG&E	Afternoon Scoping Meeting
H	Susan Gateley	Lakeshore Environmental Action	Afternoon Scoping Meeting
I	Cathryn Thomas	Town of Webster	Afternoon Scoping Meeting
J	Ron Fellows	American Nuclear Society - Ginna Plant Branch	Afternoon Scoping Meeting
K	Joel Van Schaffel	Millwrights Local 1163	Afternoon Scoping Meeting
L	Ron Behan	Rochester Building and Construction Trades Council	Afternoon Scoping Meeting
M	Dr. N. R. Loomis		Afternoon Scoping Meeting
N	Charles Arnold		Evening Scoping Meeting[b]
O	Dick Clark	Town of Ontario	Evening Scoping Meeting
P	Bob Mecredy	RG&E	Evening Scoping Meeting
Q	Ron Fellows	American Nuclear Society-Ginna Plant Branch	Evening Scoping Meeting
R	Kimberly Merchant	New York State Department of Environmental Conservation	Comment Letter
S	Kathy Mitchell	Seneca Nation	Comment Letter
T	Tom Peaslee		Comment Letter
U	Frank Guelli	Town of Walworth	Comment Letter

(a) The afternoon transcript can be found under accession number ML023530107.
(b) The evening transcript can be found under accession number ML023530120.

- A comment regarding safety issues within the scope of 10 CFR Part 54, but out of the scope of 10 CFR Part 51.

- A comment outside the scope of license renewal (not related to 10 CFR Parts 51 or 54), which includes
  - a comment regarding emergency response and planning
  - a comment regarding the need for power
  - a comment regarding operational safety issues
  - a comment regarding safeguards and security.

- A comment that was actually a question and introduces no new information.

Each comment is summarized in Appendix A, Part I. For reference, the unique identifier for each comment (Commenter ID letter listed in Table A-1 plus the comment number) is provided. In those cases where no new information was provided by the commenter, no further evaluation will be performed.

The preparation of the plant-specific supplement to the GEIS (which is the SEIS) will take into account all the relevant issues raised during the scoping process. The SEIS will address both Category 1 and 2 issues, along with any new information identified as a result of scoping. The SEIS will rely on conclusions supported by information in the GEIS for Category 1 issues, and will include the analysis of Category 2 issues and any new and significant information. The draft plant-specific supplement to the GEIS will be available for public comment. The comment period will offer the next opportunity for the applicant; interested Federal, Tribal, State, and local government agencies; local organizations; and members of the public to provide input to the NRC's environmental review process. The comments received on the draft SEIS will be considered in the preparation of the final SEIS. The final SEIS, along with the staff's Safety Evaluation Report (SER), will provide much of the basis for the NRC's decision on the Ginna license renewal.

Appendix A, Part I summarizes the comments and suggestions received as part of the scoping process, and discusses their disposition. Parenthetical numbers after each comment refer to the Commenter ID letter and the comment number. Comments can be tracked to the commenter and the source document through the ID letter and comment number listed in Table A-1. Comments are grouped by category. The categories are as follows:

A.1.1 Comments Regarding License Renewal and its Processes

A.1.2 Comments in Support of License Renewal at Ginna

A.1.3 Comments in Opposition to License Renewal at Ginna

A.1.4 Comments Concerning Aquatic Ecology Issues

A.1.5 Comments Concerning Human Health

A.1.6 Comments Concerning Socioeconomic Issues

A.1.7 Comments Concerning Land Use Issues

A.1.8 Comments Concerning Uranium Fuel Cycle and Waste Management Issues

A.1.9 Comments Concerning Alternative Energy Sources

A.1.10 Comments Concerning Safety Issues Within the Scope of License Renewal

A.1 Comments and Responses

A.1.1 Comments Regarding License Renewal and its Processes

Comment: But my other question is more in terms of the relicensing issue, and whether in your understanding, or any of the NRC representatives understanding, if Ginna is relicensed, whether that creates a larger window of opportunity for RG&E, or some other owner of Ginna, to build a new reactor, without having to go through a site permitting process? Sure, it is just a follow-up to my previous question. Because, you know, this is sort of a convoluted process that I feel that we are going through with the relicensing, as well as other regulatory issues. But I guess one of the things I'm wondering is, if Ginna were not to receive a license extension, then it would have to shut down in 2009. And prior to that, you know, initiate a decommissioning and site cleanup process, you know, through preparing plans for how they were going to do that, that they would have to submit to NRC and begin preparing, you know, the reactor complex and the site for that. And would that complicate, in any way, the submission of an early site permit application to build a new reactor onsite, or to begin that kind of preparation, has that ever happened before, and what is the anticipation? (B-3)

Response: *The comment is in regard to license renewal and its processes in general. The Commission has established a process, by rule, for the environmental and safety reviews to be conducted to review a license renewal application. Any attempt to locate a new reactor on the existing site would require a new site permit as well as a new operating license completely separate from license renewal. The comment did not provide significant, new information; therefore, it will not be evaluated further.*

Comment: And my question is, there are a number of nuclear power facilities on the New York side of Lake Ontario. Canada has 12. When you do the environmental impact statements do you then also take into consideration what is the impact of this conglomerate of plants that exist in this area? (A-4)

Comment: And if Ginna were being considered, today, in this place, it might not be built under that legislation. Lake Ontario is now home to 16 nuclear plants, a tritium recovery facility, a uranium refinery, and at least two low-level radioactive waste dumps at Lewiston and Port Hope. Most of these plants were built after Ginna. Ginna is one of the oldest plants on the lake. That is a big cumulative impact on the lake. (H-3)

Comment: Also an environmental impact statement does, or should, consider what they call secondary impacts. Which are something like you build a shopping mall, and then you attract other businesses to set up alongside it, so that the initial traffic load from the mall becomes greater 20 years down the road because of other things. And that may be some of what Tim is driving at. By relicensing the plant you might encourage a future usage of that site, not necessarily another nuclear plant, but some other industrial usage of this slightly contaminated site that might not be compatible with the environment, or with the residential area. So I'm concerned about thinking about those secondary impacts, what this woman referred to, those 20 year out impacts. (H-12)

Response: *The comments are in regard to license renewal and its processes in general. The Commission has established a process, by rule, for the environmental and safety reviews to be conducted to review a license renewal application. This process includes a review of cumulative impacts. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

Comment: Another very big change since Ginna was built is deregulation. This is changing the way these plants are operated. Ginna is coming up on 40 years now. So it does need more care and monitoring. However, both the NRC and industry are trying to streamline regulation and reduce costs. Pressures to reduce costs to industry, along with possibly a little complacency, are what led to that hole in the reactor head at Davis-Besse. That could have been a very serious accident on Lake Erie. One more change since the good old days of the AEC, the regulatory Atomic Energy Commission of the 1960s. Today the NRC must function in a political environment that stresses deregulation and less government spending. The NRC has been like other agencies; it has been pressured to become more efficient. And for several years it has endured reduced funding, and a shortage of skilled technical workers. In a speech two years ago, I don't know what the situation is now, but two years ago the NRC chairman said, despite efforts to hire new engineers, we have experienced a net loss of engineers over the past five years, about 8 percent of their workforce, engineering workforce. We are losing expertise, and along with it, valuable institutional knowledge. That is a direct quote from his speech. The net effect of this, and failures to catch things like that Davis Besse hole in the head, is that there is less trust of institutions like the NRC, than there was of the AEC, 40 years ago. And I think we see a little bit of that in this room today, less trusting public. (H-8)

Response: *The comment is in regard to license renewal and its processes in general. The Commission has established a process, by rule, for the environmental and safety reviews to be conducted to review a license renewal application. This includes an appropriate number of NRC and contractor staff to sufficiently review the plant and prepare a supplemental environmental impact statement specific to the plant. The comment did not provide significant, new information; therefore, it will not be evaluated further.*

Comment: The THPO (Tribal Historic Preservation Office) would indeed be a consulting party to the renewal Ginna operating license. Under Section 106 of the NHPA (National Historic Preservation Act), the THPO has 30 days to respond to a notification of an undertaking. Unfortunately, your November 1 letter to us informed us of a public scoping meeting on November 6 - i.e., 5 days notice. Future consultation with us should occur on a government-to-government basis. The Seneca Nation, being a sovereign entity, will not be classified as the general public (see page 63172, bottom of left column of the Federal Register Notice of Intent). (S-1)

Response: *The NRC recognizes the Seneca Nation as a sovereign entity and will conduct future consultation on a government-to-government basis. The comment did not provide significant, new information; therefore, it will not be evaluated further.*

A.1.2 Comments in Support of License Renewal at Ginna

Comment: And let me say, with that, that provided that Energy East maintains the level of support for the Ginna Nuclear Power Plant, that has been demonstrated by RG&E, I am in support of relicensing the nuclear power plant. And I say that for three primary reasons. First of all, it has been an excellent corporate neighbor. Secondly, it provides a substantial tax base for the school district. And, thirdly, it provides a good standard of living for our families, and to my students. (F-1)

Comment: The power plant has provided approximately $15.8 million in revenue over the last five years. It provided $3,182,172 to the tax base just last year; 29.9 percent of the local taxes that we collect come from Ginna. Consequently the loss of Ginna would be an economic disaster for the school district, and taxpayers. (F-2)

Comment: Secondly, it has been a good corporate neighbor for us who live here in the Wayne Central School District. And I live approximately eight miles from the nuclear power plant. (F-3)

Comment: I would also say that the plant has been a good neighbor. Mr. Biendenbach and his people have allowed us to use their Manor House for training; to house some of the programs for our special needs children. When we have a need RG&E has always been there. After 9/11, when all of us were very concerned about the safety of the plant, Rick Wyatts, Joe Widay, others volunteered to come to the school and run programs for us. They have been a good corporate neighbor to us. (F-5)

Comment: So, in conclusion, Ginna has been good for the Wayne Central School District, its community, and its children. And as long as Energy East maintains the existing level of care, we are supportive of its relicensing. (F-7)

Comment: We believe it is important to retain the option to operate the plant in the extended period, thereby contributing to the overall power supply in the state and, importantly, to the energy mix in the state. (G-5) (P-5)

Comment: Long-term is it a good idea to make the licensing, but if they are making their decision, or a part of their decision is based on historically how has the facility run, and what is the impression of people about it, my impression is that the facility is run in a very excellent manner, and the people that we deal with to run it are very good, and caring, and professional people. (I-4)

Comment: And, in closing, the American Nuclear Society's Ginna Plant Branch is obviously in favor, and fully supportive of extending Ginna's license for 20 years. Thank you. (J-1) (Q-2)

Comment: They've done a very good job protecting the workers there, along with the surrounding areas. The people always seem to come home in good shape, they have learned a lot; they've been well educated while they were there. (K-1)

Comment: I'm here today to speak in favor for the renewal of the operating license for the Ginna Nuclear Power Plant. And I can only say that I hope that the NRC goes through with the licensing, it would mean a lot to this community. Thank you. (L-1)

Comment: And I think we all should realize and appreciate what a well-rounded efficient plant that RG&E has at Ginna. (L-3)

Comment: One of the concerns we talked about alternative sources of power. One of our major concerns, after RG&E bought it, was not the nuclear side of things, but were they going to put gigantic piles of coal about 600 or 800 feet behind our house. And then I found out, in some of the early stuff, that it generated more radiation than did the plant. So we were supporters at the start. And I did, for the town, a great deal of work regarding the safety of all this. (M-1)

Comment: We believe the license should be renewed because the positive factors outweigh the negative. (M-3)

Comment: In closing, I'm 41 years old; I live 11 miles south of the plant. I'm proud to be in close proximity to such facility as Ginna. (Q-1)

Comment: I am writing you in support of RG&E's application for an operating license extension. I believe its operating record is worthy of relicensing. (U-1)

Response: *The comments were supportive of license renewal at Ginna and are general in nature. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

A.1.3 Comments in Opposition to License Renewal at Ginna

Comment: And what actually, you know, what is afforded to us at this point is the fact that Ginna, you know, if it doesn't get relicensed has seven years to plan for a shutdown. And while as an anti-nuclear person it is hard for me to say, you know, keep it running for another seven years. It affords us an opportunity to plan for the phase-out, and to plan for what is going to happen in terms of jobs, and in terms of property taxes, and in terms of the economy. We would all be a lot safer; there is no doubt about that. So why not take the chance that we have now, rather than let R. E. Ginna go forward, and charge the repairs for the process of relicensing this reactor, for any retrofits that it goes through, and deal honestly with the question of whether RG&E is going to sell this plant. (B-6)

Comment: Ginna should not be relicensed. (H-11)

Comment: Nuclear power is one of the more regulated industries around. The solution is not to deregulate it, or to extend it, or relicense it, but to eliminate it, to phase it out, like they are doing in Sweden and Germany. We could do it right here, we could start right here in Wayne County. (H-14)

Comment: But with all due respect, to the NRC representatives here, I believe, and CAN believes, that the NRC's review of this question of extending Ginna's operating life for another 20 years is really inadequate to protect the public health and safety. And that is because of some of the questions that we've asked today, such as, you know, whether – it is important what the material condition of the reactor is at this point. You know, it sounds really scientific, we got a lot of really scientific answers to that, how it is going to be dealt with? But, essentially, the NRC supports relicensing of reactors as a policy. And the NRC, the Nuclear Regulatory Commission appointed by the President, has given directives to the NRC staff to facilitate the relicensing, and the construction of new reactors, and revised the rules on the relicensing process to make that more possible, to make it easier. And so what we are stuck with is this process in which it is really difficult for the public even to challenge the relicensing of a reactor at this point. It is really difficult for the public to even intervene in this process, with all the issues that are really relevant, like the questions that people have been raising today. So in that sense, you know, it doesn't seem like this is the place to have our concerns addressed. And there is a number of groups here who are going to be appealing to the Public Service Commission in New York State to be involved in this process, and to oppose the relicensing. And I know that when we are opposing the relicensing, essentially what we are saying is that the reactor should shut down. And, you know, I live in Syracuse, I work in Oswego County, I understand the terrible impact that people can conceive of when we talk about shutting down plants in this region. (B-4)

Response: *The comments are noted. The comments are opposed to license renewal at Ginna and are general in nature. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

A.1.4 Comments Concerning Aquatic Ecology Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 aquatic ecology issues include:

Category 1

- Accumulation of contaminants in sediments or biota
- Entrainment of phytoplankton and zooplankton
- Cold shock
- Thermal plume barrier to migrating fish
- Distribution of aquatic organisms
- Premature emergence of aquatic insects
- Gas supersaturation (gas bubble disease)
- Low dissolved oxygen in the discharge
- Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses
- Stimulation of nuisance organisms

Category 2

- Entrainment of fish and shellfish in early life stages
- Impingement of fish and shellfish
- Heat shock

Comment: Now, how do you determine whether or not the amount of radiation that you release into the lake, you obviously know what it is, how can you determine exactly what impact it is going to have on the ecology of the lake, given the subtleties of the changes, and is it ever considered that probably a lot of the deterioration of the lake environment – I'm talking about now only of the internal motors, I'm not talking about the air, or anything of that. The deterioration of the lake environment may be due, partially of course, to nuclear plants, but also to all the other discharges. And I don't see how you can make that kind of adequate evaluation. Okay, so we have nuclear plants, and we have a lot of other things. I don't quite see how you can get an adequate environmental impact statement on – without really taking the whole framework of the ecology there. (E-1)

Comment: I will just say one more thing, and then I will shut up. There used to be a species of snail that was very prominent on the shores of Lake Ontario. And in my more studious days I remembered the scientific name. I don't any more. All I know is that once it did exist, and now it doesn't. (E-2)

Comment: Staff have determined that the existing entrainment study (conducted in 1977) is out of date and should be updated as part of the application for NRC license extension of the Ginna facility. The initial study was conducted to meet the requirements of the 401 Water Quality Certification issued by the Department in 1974. The existing data is more than twenty years old and Lake Ontario conditions have changed considerably in this time period – including changes in populations of zebra and quagga mussels (*Dreissena* spp.), alewives, gobies, smallmouth bass, climate, etc. In addition, the 1977 study was for a very limited period of the year. More recent entrainment studies required by the Department have included studies over longer periods of time, some of which have demonstrated entrainment impacts at Lake Ontario cooling water intakes. Therefore, an updated study is recommended in order for the Department to evaluate the impacts of the facility due to entrainment. Subsequently, the Department has incorporated an entrainment study into the Draft State Pollutant Discharge Elimination System (SPDES) Permit. RG&E has commented on the draft SPDES and the Department has incorporated their comments. The draft SPDES permit is attached. The requirement to conduct an updated entrainment study will also be included as a condition of the new 401 Water Quality Certification. We recommend that the SEIS include a brief summary on the 1977 entrainment study results and the proposal to conduct an updated study of in-plant entrainment. (R-1)

Comment: We recommend that the SEIS include a brief summary on impingement report results and the commitment of RG&E to continue to replace older screens. (R-2)

Comment: Department staff identified the potential for increased fish mortality due to the return of the impinged fish to the discharge canal, which contains elevated temperatures from the cooling water effluent. RG&E included a brief discussion on this issue in the Environmental Report. Staff did not have enough information from this discussion to determine whether the elevated temperatures in the discharge canal result in additional fish mortality. On Monday, December 9, 2002, RG&E provided staff with a copy of the 316(a) Demonstration and Supplement (March 1977) to see if the report addresses the Department's concerns. Staff have not had the opportunity to review the report, however, they will be reviewing it over the next few weeks. We will continue to discuss the issue with RG&E and NRC on this issue. Depending on the information provided in the 316(a) report, we may either recommend further study, recommend an extension of the impinged fish return, or conclude that the concerns have been addressed. In the interim, we recommend that the SEIS include a discussion regarding Heat Shock. (R-3)

Response: *The comments refer to the aquatic ecology near Ginna. These specific comments as well as other aquatic ecology issues will be discussed in Chapter 2 and Chapter 4 of the DSEIS.*

A.1.5 Comments Concerning Human Health

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 human health issues include:

Category 1

- Noise
- Radiation exposures to public (license renewal)
- Occupational radiation exposures (license renewal)

Category 2

- Electromagnetic fields, acute effects (electric shock)

Comment: All of these plants, when they are operating, all of these facilities, release some radioactivity. Some of it has a very short half-life of days or weeks; some of it, like tritium, has a longer half-life of 12 years; some is very long-lived. That brings me to point number two. When the plant was new, we did not have 40 years of radiation being released. Radiation exposure has cumulative health effects. That is why most skin cancers show up later in life. As power plants operate they expose the population, and the environment, to an ongoing burden of exposure. And just as an aside to this, outside of scoping, many scientists do not accept threshold dose and hormesis as valid, no matter what the HPs (health physicist) say. So the longer these plants operate basically the more dose, cumulative, the population receives. Population around Ginna, number three, is much higher than it was when the plant was built. This is no longer a rural area; it is now a suburban area. (H-5)

***Response:** The comment is noted. Radiation exposure to the public and workers was evaluated in the GEIS and determined to be a Category 1 issue. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. The limits were based on the recommendations of standards-setting organizations. Radiation standards reflect extensive scientific study by national and international organizations (International Commission on Radiological Protection [ICRP], National Council on Radiation Protection and Measurements, and National Academy of Sciences) and are conservative to ensure that the public and workers at nuclear power plants are protected. The radiation exposure standards are presented in 10 CFR Part 20, "Standards for Protection Against Radiation," and are based on the recommendations in ICRP 26 and 30.*

Numerous scientifically designed, peer-reviewed studies of personnel exposed to occupational levels of radiation (versus life-threatening accident doses or medical therapeutic levels) have shown minimal effect on human health, and any effect was from exposures well above the exposure levels of the typical member of the public from normal operation of a nuclear power plant.

The comment provides no new information, and does not pertain to the scope of license renewal as set forth in 10 CFR Parts 51 and 54. Therefore, it will not be evaluated further.

A.1.6 Comments Concerning Socioeconomic Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 and 2 socioeconomic issues include:

Category 1

- Public services: public safety, social services, and tourism and recreation
- Public services, education (license renewal term)
- Aesthetics impacts (refurbishment)
- Aesthetics impacts (license renewal)
- Aesthetics impacts of transmission lines (license renewal term)

Category 2

- Housing Impacts
- Public services: public utilities
- Public services, education (refurbishment)
- Offsite land use (refurbishment)
- Offsite land use (license renewal term)
- Public services, transportation
- Historic and archaeological resources

Comment: Thirdly, it has to do with the standard of living for my children. Ginna provides approximately 500 RG&E jobs at its plant. In addition there are about 300 related jobs through private contractors. Now, most of those people live in my school district, and they are parents of my schoolchildren. My children live in decent homes, and have middle class values, and middle class opportunities because of Ginna. Because of this we believe we can offer the best of both worlds. We live in a pleasant rural community, but we have the benefits of a suburban type school district. (F-6)

Comment: But beyond that our employees give back to the community in a variety of ways. They serve on school boards, and town boards, as scout leaders and sports coaches, they support day care centers, and senior centers. They serve on ski patrols, and they train guide dogs. Our employees raised money to donate a defibrillator to the Ontario Volunteer

Ambulance Service. We partner with the Wayne Central School District by providing them with the space for their Eagles Ventures program, a program for those students who can benefit from an alternative educational program, and setting. We continue to participate, on an annual basis, in the science and exploration days of the St. John Fisher College, contributing to interest in science on the part of the young people in the community, and we participate in the Annual Day of Caring, among others. (G-8) (P-7)

Comment: It is used by more people every year, as a water source. I understand Newark may be expanding the water district that will now tap into Lake Ontario water. I could be wrong, but I do know that more and more municipalities are depending on Lake Ontario water. (H-4)

Comment: But a lot of things, talking about the jobs, and talking about the economic impact. I just can't imagine taking a facility with the assessed value that plant has out of a town just like Webster, and what the impact would be. I mean, we could probably sit down and even crunch numbers, but it would be significant. And it would be even more significant, would be my guess, from my – what I see as a relative relationship between what the town of Ontario is like, and what the town of Webster is like. So certainly you are going to have an impact there with that reduced assessed value should that not have a plant, or some facility there. And, of course, the job impact too. And I don't think we can really minimize it, in the economy these days. The jobs, I know a lot of people right here in Webster, and in the surrounding area, do work, rely on their jobs at the plant. So there certainly are the economic factors that are a certainty would be negative. (I-1)

Comment: The reason is very simple for us; it is jobs for our members who live in this community. Since the plant was built the Rochester Building Trades have been involved with the building of the plant, and supplementing the RG&E personnel when it comes to maintaining this plant. During shutdowns at the plant RG&E has always made sure that subcontractors have hired local craftsmen to do their work. This has provided good paying, safe jobs for the people that live in this community. (L-2)

Comment: Ginna provides jobs for our local residents. RG&E, now Energy East, is a significant contributor to the tax base in the town of Ontario. This has enabled Ontario to maintain a reasonable tax rate, and we hope this continues. RG&E has been a good neighbor. They have been sensitive to the immediate neighborhood by keeping the rural setting of orchards and acres of green space. (M-5)

Comment: In the past there has been a problem in establishing an assessed value of Ginna for local property tax purposes. Although this is a local and state issue, the relationship between Energy East and the town of Ontario is a key factor in establishing a fair assessed value. Although the ultimate assessed value of the property lies with the local assessor, it is hoped that the good relationship with the town established by RG&E will continue. Energy

East, albeit a new arrival, has yet to establish its credentials as a good neighbor, with commitment to the health and welfare of Ontario, and the surrounding area. (M-8)

Comment: This past year the plant actually paid 30 percent of the tax bill. This revenue has been very useful to the town in terms of developing the town, and also holding down the tax rate. The 15 towns in Wayne County, Ontario has the lowest tax rate. I hope that with the continued presence of the plant, it will continue to support a significant portion of our tax levy. Or in lieu of that, the negotiations, some kind of a pilot agreement between the town and RG&E, and/or the county and the school district, and RG&E. (O-6)

Comment: It is a responsive neighbor to my town and county. The plant is a substantial taxpayer in my county and provides several hundred jobs. (U-3)

Response: *The comments are noted. Socioeconomic issues specific to the plant are Category 2 issues and will be addressed in Chapter 4 of the DSEIS. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

Comment: My major beef was what I call light pollution. And on cloudy nights, particularly in the winter, the snow is orange, but it hardly has to do with the safety. (M-9)

Response: *The comment is noted. Socioeconomic issues related to aesthetic impacts of the plant during the license renewal term are Category 1 issues and were addressed in the GEIS. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

Comment: Although the State Historic Preservation Office has deemed no effect for the undertaking, the Seneca Nation THPO has concerns with the uncertainty of ground disturbing activities related to the project. The location and the history of the area surrounding Ginna are highly sensitive. The Seneca Nation THPO would like to be consulted, in the earliest planning stages, on any ground disturbing activities that may occur. (S-4)

Response: *The comment refers to Historic and Archaeological resources near Ginna. This comment will be addressed in Chapter 4 of the DSEIS.*

Comment: The following text is suggested as a replacement to the first sentence of the second paragraph of 2.12.1 on page 2-41: "The Monroe County Water Authority (MCWA), which can produce 145 million gallons of treated water per day (mgd), was created by an act of the New York State Legislature in 1950 and its legislation has been amended several times to allow it to serve areas beyond Monroe County. Today the MCWA is a metropolitan regional water purveyor, providing retail water service to most of Monroe County, several communities in Genesee County and some small portions of Livingston and Ontario Counties. It exchanges water with the Town of Ontario, Wayne County, provides wholesale water service to the Wayne County Water and Sewer Authority (WCW&SA), the Town and Village of Victor, Ontario County, three communities in Genesee County, and four adjoining communities in Orleans County." (T-1)

Response: *The comment refers to the water use near Ginna. Water use will be discussed in Chapter 4 of the DSEIS. The comment is editorial in nature and will be considered in writing this section of the DSEIS. Although the comment will be considered editorially, it provides no significant, new information to the environmental review of Ginna; therefore, the comment will not be evaluated further in that context.*

A.1.7 Comments Concerning Land Use Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 land use issues include:

- Onsite land use
- Power line right of way

Comment: Department staff requested that RG&E provide an evaluation of the ongoing coastal erosion onsite and at neighboring properties to the Environmental Report. A brief discussion was provided. Department staff have concerns about the ongoing coastal erosion on both sides of the shoreline protection. Subsequently, we have added a condition to the recent Article 34 Coastal Erosion Control Permit to RG&E, to require a survey of the existing shoreline.

We recommend that the ongoing coastal erosion issues be addressed in the SEIS. The survey should be prepared in time for inclusion into the SEIS. We recommend that the Federal NEPA process identify whether any additional shoreline protection is required to protect the facility over the renewal permit term. (R-5)
Response: *The comment refers to land use issues near Ginna. This issue will be addressed in Chapter 2 and Chapter 4 of the SEIS.*

A.1.8 Comments Concerning Uranium Fuel Cycle and Waste Management Issues

As stated in 10 CFR Part 51, Table B-1, Category 1 uranium fuel cycle and waste management issues include:

- Offsite radiological impacts (individual effects from other than the disposal of spent fuel and high level waste)
- Offsite radiological impacts (collective effects)
- Offsite radiological impacts (spent fuel and high level waste disposal)
- Nonradiological impacts of the uranium fuel cycle

- Low-level waste storage and disposal
- Mixed-waste storage and disposal
- Onsite spent fuel
- Nonradiological waste
- Transportation

Comment: If plans go as scheduled, Yucca Mountain will then open up, as a storage facility, and the waste will be trucked down 590, which is within two miles of my house, which is why I have my potassium iodide. (C-1)

Comment: We touched on transporting nuclear waste, and also the containment chamber safety requirements. What I'm trying to say here is that back in the '80s we had a way of looking, had development money to work for isotope separation. Which says we can take these rods and like a battery, make them over, and over again, maybe nine times on the contract, but actually figure we could probably get about 20 uses out of them. Which means the storage goes down, and you have to have them onsite. You can keep reusing them, and recharging them. Did that whole science fall apart, or what? It was funded by – I was working on that in Los Alamos, and also Lawrence Livermore had contracts for that. And it looked like it had great hope. Did that ever turn out to be viable? (D-1)

Comment: And I don't know a lot of statistics, I can't quote a lot of this, but my big concern is what happens to the waste from all of the thousands of nuclear power plants around the country, that we keep accumulating the waste, and keep piling it up, and keep stockpiling it with half-life of thousands of years, without any concern for what is going to happen to the people in the future that will have to deal with it. (E-3)

Comment: When the plant was built there was no spent fuel on the site. It was supposed to be removed. Politics and logistics are leading other nukes to use dry cask storage onsite. Will this plant, how long will it be there, what about security for it? (H-7)

Comment: Secondary is what happens to the waste products. We were assured, by the Federal government, I don't recall it was – I believe it was the AEC at the time that this material would be trucked away. And indeed, for a while, I believe it did go to West Valley, until its closure. (M-2)

Comment: When Ginna started this operation, in 1970, the spent nuclear waste was trucked out of this area to West Valley. This was changed several years ago, and the waste is now stored onsite. We believe that the local citizens should know when this spent fuel will be removed from the present site. The answer to this issue should be part of the permitting process. The Federal government has the responsibility for this, and has committed billions of dollars to the proper storage of spent nuclear fuel. When will this happen? (M-7)

Comment: Also, I'm very interested in whether or not the environment has been taken into account in terms of what happens to exhausted fuel. (N-1)

Comment: Although the Department does not have concerns regarding State regulated hazardous waste storage, staff recommend that the future handling of the spent-fuel inventory and containment be addressed in the SEIS. (R-4)

Comment: The environmental impact statement should analyze the ability of the plant to store its spent nuclear fuel on plant property. The environmental impact statement should analyze the risks of transporting the spent nuclear fuel to the Federal repository. This analysis should include potential truck routes and rail routes, and depending on the routes, should be coordinated with the Seneca Nation regarding the impacts to cultural resources along potential transportation corridors. (S-3)

Response: *Onsite storage and offsite disposal of spent nuclear fuel are Category 1 issues. The safety and environmental effects of long-term storage of spent fuel onsite has been evaluated by the NRC, and as set forth in the Waste Confidence Rule, the NRC generically determined that such storage could be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond the licensed operating life, which may include the term of a renewed license. At or before the end of that period, the fuel would be moved to a permanent repository. The GEIS is based upon the assumption that storage of the spent fuel onsite is not permanent. The plant-specific supplement to the GEIS regarding license renewal for Ginna will be prepared based on the same assumption. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

A.1.9 Comments Concerning Alternative Energy Sources

Comment: And I don't understand why we are taking this risk. I don't understand why we are not talking about wind generation on Lake Ontario. I just – I think we need to look at the alternatives. We are subsidizing the nuclear industry. Bush's energy plan calls for a $2.9 billion subsidy to nuclear industry, and the solar industry's subsidy would be enough to build about two miles of Federal interstate. So it seems like we need to look at the alternatives. And I'm not, myself, and the hundreds of members of Metro Justice, are not willing to take the risk involved. (C-3)

Comment: Virtually every new power plant in New York depends on natural gas as the fuel of choice. And as we have learned, in the past several years, the price of natural gas can fluctuate greatly. This means that the price of electricity from gas fired power plants, would also correspondingly fluctuate. To further complicate matters, even for those new plants receiving siting approval, plant developers are finding it difficult, to impossible, to obtain financing. The

New York state power plant siting law is scheduled to expire at the end of this year. And a number of older plants may need substantial new investment, if it is available, to meet new environmental standards. (G-7)

Comment: And today there are more efficient, cleaner, and safer ways to make electricity. (H-2)

Comment: Finally, the world of energy production has changed since 1960. We really don't need nuclear plants any more. There are cleaner, safer ways to produce power. Denmark now gets about ten percent of its power from wind. Their goal is half by 2030. California just passed a renewable energy requirement of 20 percent in 20 years. We could do this in New York. There have also been huge improvements in cogeneration technology, which is very much more efficient than the large centralized plants. I would just add, I scribbled this down during the meeting, and then it was brought up by someone else, that a good environmental impact statement does consider alternatives. I'm glad to hear that they will be considering alternative ways of producing electricity. (H-10)

Comment: And as far as that tax base concern there could be other things, perhaps even another generating facility, that would be safer and cleaner, that could pick up some of that economic and tax concern, and it could even enhance the area's economic activity. (H-15)

Comment: And you heard about, a couple of years ago, how terrible it was to live out in California, and be a resident, and try to run a business out there with the rolling blackouts, or brownouts, or whatever they were having, and we have not had any of those types of experiences, at least in this part of New York State, and not that I'm very widely aware of, throughout our state. And to think that we would have to find something to replace that. And if we were not to relicense a lot of these facilities around the state, and the country, we would have to find a whole lot of things to replace a lot of that energy that is being created, that is just another side of what is to be looked at. (I-3)

Response: *The comments are noted. The GEIS included an extensive discussion of alternative energy sources. Environmental impacts associated with various reasonable alternatives to renewal of the operating licenses for Ginna will be discussed in Chapter 8 of the DSEIS. The comments did not provide significant, new information; therefore, they will not be evaluated further.*

A.1.10 Comments Concerning Safety Issues Within the Scope of License Renewal

Comment: And I wasn't quite clear on how you are going to evaluate, as part of the renewal process, the long-term degradation issues that are very prominent in nuclear power plants across the country, Ohio being one, Virginia another one. The cracks and the various issues that have surfaced and have caused great concerns in a number of communities across the country, how do you propose to make the public aware of the process that you are going to be using in evaluating degradation? (A-1)

Comment: That is, obviously fine, because that is part of the day-to-day inspection. I'm talking about a 20 year out in the future evaluation by the NRC, how are you going to go about evaluating long-term degradation on that basis? (A-2)

Comment: There has to be, in my view, if you are extending a plant that has an age of 30 plus years, another 20 years, if you are giving approval for that, there has to be something concrete, in my view, that has to be given to the public, that estimates the degradation factors that this plant will experience, over time, and gives the public some comfort that these aging plants that many, many people feel should be shut down yesterday, are actually able to stay online safely for another 20 years. (A-3)

Comment: I'm with the Citizens Awareness Network. And just for clarity's sake, I wanted to sort of test this. It seems like the answer to this woman's question is that, no, the NRC isn't, as part of the relicensing process, going to do a systemic review of the aging and degradation of the reactor. (B-1)

Comment: I understand that. I mean, what I'm saying is, you know, it seemed like the question was whether as part of reevaluating the relicensing application, whether NRC does, you know, an actual material condition inspection review, to determine whether this reactor could safely operate for another 20 years. And didn't this used to be included as part of the relicensing process? And there were certain reactors that were preparing their applications that determined that the reactor was already too degraded, like Yankee Rowe? (B-2)

Comment: And it is instructive to talk about the reactor vessel head, in terms of inspections and replacements. In the early 1990s, based on French experience, we began to perform additional inspections, visual inspections, on our reactor vessel head. In 1999 we took the opportunity, with our extended ten-year end service inspection to do detailed, non-destructive examinations, and visual inspections, of our vessel head. In each of those cases we saw no degradation, no defects. We performed additional inspections, both non-destructive examinations, and visual inspections, in our most recent refueling outage, in 2002. And, again, saw no degradation, and no defects. Nevertheless, looking to the future, even just to 2009, we reached the conclusion to replace that reactor vessel head to provide us an economic benefit, and to give us additional margin and assurance. That vessel head will be replaced in the fall of 2003, our next refueling outage. (G-3)

Comment: Some of its components were designed to last its licensed life. There have been many other age related failures besides this one. Nine Mile core shroud, that steam generator rupture in 1982 at Ginna was not anticipated; embrittlement of the reactor vessel, these all surprised the experts. There are probably going to be more surprises as these plants age. (H-9)

Response: *The comments are noted. The NRC's environmental review is confined to environmental matters relevant to the extended period of operation requested by the applicant. To the extent that the comments pertain to safety of equipment and aging within the scope of license renewal, these issues will be addressed during the parallel safety analysis review performed under 10 CFR Part 54. Operational safety issues are outside the scope of 10 CFR Part 51 and will not be evaluated further in this SEIS. The comments provide no new information and, therefore, will not be evaluated further in the context of the environmental review. However, the comments will be forwarded to the project manager for the license renewal safety review for consideration.*

Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

The overall responsibility for the preparation of this supplement was assigned to the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC). The statement was prepared by members of the Office of Nuclear Reactor Regulation with assistance from other NRC organizations and the Pacific Northwest National Laboratory. Representatives of Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Argonne National Laboratory, Energy Research, Inc., and the Information Systems Laboratory also participated in the review.

Name	Affiliation	Function or Expertise
	NUCLEAR REGULATORY COMMISSION	
John Tappert		Section Chief
Robert Schaaf		Project Manager
Jennifer Davis		Historic and Archaeological Resources, Project Support
Barry Zalcman		Environmental Program Manager
Michael Masnik		Ecology
Gregory Suber		Project Management
James Wilson		Ecology, Alternatives
Robert Palla		Severe Accident Mitigation Alternatives
	PACIFIC NORTHWEST NATIONAL LABORATORY[a]	
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Katherine Cort		Socioeconomics, Alternatives
James Droppo		Air Quality
J. Van Ramsdell		Air Quality
Michael Sackschewsky		Terrestrial Ecology, Alternatives
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Daniel Pava	Land Use
Argonne National Laboratory[d]	
Bruce Verhaaren	Historical and Archeological Resources
Information Systems Laboratory	
Kimberly Green	Severe Accident Mitigation Alternatives
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(a) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy (DOE) by Battelle Memorial Institute.
(b) Lawrence Livermore National Laboratory is operated for DOE by the University of California.
(c) Los Alamos National Laboratory is operated for DOE by the University of California.
(d) Argonne National Laboratory is operated for the DOE by the University of Chicago.

Appendix C

Chronology of Environmental Review Correspondence Related to Rochester Gas and Electric Corporation's Application for License Renewal of R.E. Ginna Nuclear Power Plant

Appendix C

Chronology of Environmental Review Correspondence Related to Rochester Gas and Electric Corporation's Application for License Renewal of R.E. Ginna Nuclear Power Plant

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and Rochester Gas and Electric Corporation (RG&E) and other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51, of RG&E's application for renewal of the R.E. Ginna Nuclear Power Plant (Ginna) operating license (OL). All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, MD, and are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: http://www.nrc.gov/reading-rm.html. From this site, the public can gain access to the NRC's Agencywide Document Access and Management Systems (ADAMS), which provides text and image files of NRC's public documents in the Publicly Available Records (PARS) component of ADAMS. The ADAMS accession numbers for each document are included below.

July 30, 2002	Letter from Dr. Robert C. Mecredy, RG&E, to NRC, submitting the application for the renewal of the Ginna OL (Accession No. ML022210378)
July 30, 2002	Letter from Dr. Robert C. Mecredy, RG&E, to New York State Department of State Division of Coastal Resources, concerning the coastal management program consistency certification for Ginna (Accession No. ML022490337)
August 9, 2002	Letter from New York State Department of Environmental Conservation to RG&E, regarding Notice of Complete Application for Ginna (Accession No. ML022470358)
August 13, 2002	Letter from NRC to Ms. Carolyn Johnson, Rochester Public Library, concerning the maintenance of reference material for the Ginna license renewal application (Accession No. ML022260288)
August 14, 2002	Letter from NRC to Ms. Laura Viau, Ontario Public Library, regarding the maintenance of reference material for the Ginna license renewal application (Accession No. ML022260497)

August 19, 2002	Letter from NRC to Dr. Robert C. Mecredy, RG&E, regarding the receipt and availability of the license renewal application for Ginna (Accession No. ML022320189)
October 7, 2002	Letter from NRC to Dr. Robert C. Mecredy, RG&E, concerning the Notice of Intent to prepare an environmental impact statement and conduct scoping process for license renewal for Ginna (Accession No. ML022810077)
October 7, 2002	Letter from NRC to Mr. Raymond Mosely, Director, Office of the Federal Register, concerning the Notice of Intent to prepare an environmental impact statement and conduct scoping process for license renewal for Ginna (Accession No. ML022810365)
November 1, 2002	Comment letter from Mr. Frank J. Guelli, Supervisor, Town of Walworth, concerning the license renewal application for Ginna (Accession No. ML030230704)
November 1, 2002	NRC letter to Mr. Leroy Howard, Seneca-Cayuga Tribe of Oklahoma, pertaining to the license renewal application for Ginna (Accession No. ML023180609)
November 1, 2002	Letter from NRC to Mr. Irving Powles, Jr., Onondaga Nation, regarding the license renewal application for Ginna (Accession No. ML023180634)
November 1, 2002	NRC letter to Mr. Vernon Isaac, Cayuga Nation of New York, concerning the license renewal application for Ginna (Accession No. ML023180647)
November 1, 2002	NRC letter to Mr. Cyrus Schindler, Seneca Nation of New York, pertaining to the license-renewal application for Ginna (Accession No. ML023180681)
November 1, 2002	Letter from NRC to Mr. Raymond Halbritter, Oneida Indian Nation of New York, concerning license renewal application for Ginna (Accession No. ML023190078)
November 1, 2002	NRC letter to Mr. Kevin Jonathan, Tonawanda Band of Senecas, regarding license renewal application for Ginna (Accession No. ML023190126)

November 1, 2002	Letter from NRC to Mr. Leo R. Henry, Tuscarora Nation, pertaining to license renewal application for Ginna (Accession No. ML023190139)
November 1, 2002	NRC letter to Ms. Hilda Smoke, St. Regis Mohawk Tribe, concerning the license renewal application for Ginna (Accession No. ML023190147)
November 1, 2002	Letter from NRC to Mr. Gerald Danforth, Oneida Tribe of Indians of Wisconsin, relating to the license renewal application for Ginna (Accession No. ML023190171)
November 27, 2002	NRC letter to Mr. David A. Stilwell, U.S. Fish and Wildlife Service, requesting comment on the license renewal application for Ginna (Accession No. ML023330475)
December 2, 2002	Letter from NRC to Ms. Patricia A. Kurkul, National Marine Fisheries Service, seeking comment on the license renewal application for Ginna (Accession No. ML023450622)
December 11, 2002	Comment letter from NYSDEC to NRC pertaining to the license renewal application for Ginna (Accession No. ML023600074)
December 17, 2002	Summary of November 6, 2002, public scoping meetings for the RG&E license renewal application for Ginna (Accession No. ML023530096) Also includes transcripts from public meetings held November 6, 2002 (ML023530107 [afternoon session] and ML023530120 [evening session])
December 23, 2002	Letter from Dr. Robert C. Mecredy, RG&E, submitting supplemental information to support the NRC staff's environmental review of the license renewal application for Ginna (Accession No. ML030140009)
December 26, 2002	NRC letter to Dr. Robert C. Mecredy , RG&E, requesting additional information regarding severe accident mitigation alternatives for Ginna (Accession No. ML023600233)
January 6, 2003	Comment letter from U.S. Fish and Wildlife Service pertaining to Ginna's license renewal application for Ginna (Accession No. ML030150605)
January 14, 2003	NRC letter to Dr. Robert C. Mecredy, RG&E, concerning request for additional information related to the staff's review of the license renewal Environmental Report for Ginna (Accession No. ML030140526)

January 23, 2003	Letter from NYSDEC to RG&E concerning 401 Water Quality Certification – Notice of Incomplete Application (Accession No. ML030560894)
January 23, 2003	Letter from NYSDEC to RG&E concerning SPDES Permit Modification Issuance (Accession No. ML030370414)
January 31, 2003	Letter from Dr. Robert C. Mecredy, RG&E, in response to NRC letter of December 26, 2002, request for additional information regarding severe accident mitigation alternatives for Ginna (Accession No. ML030410599)
February 26, 2003	Letter from Kimberly Merchant, NYSDEC to Robert Schaaf, NRC, regarding the Master Habitat Database Report for Wayne County (Accession No. ML031220483)
February 28, 2003	Letter from Dr. Robert C. Mecredy, RG&E, providing additional information in response to NRC letter of December 26, 2002, requesting additional information regarding severe accident mitigation alternatives for Ginna (Accession No. ML030660225)
March 13, 2003	Letter from Dr. Robert C. Mecredy, RG&E, to NRC responding to the staff's request for additional information related to the environmental review for Ginna (Accession No. ML030800562)
April 16, 2003	Letter from Kimberly Merchant, NYSDEC, to J. Prill, RG&E, regarding NYSDEC-initiated addition of a thermal study associated with the license renewal for Ginna (Accession No. ML031150328)
May 8, 2003	Memo from Robert G. Schaaf, NRC, to file, regarding telecommunication with RG&E to clarify responses to NRC requests for additional information concerning severe accident mitigation alternatives (Accession No. ML031340302)

Appendix D

Organizations Contacted

Appendix D

Organizations Contacted

During the course of the staff's independent review of environmental impacts from operations during the renewal term, the following Federal, State, regional, and local agencies were contacted:

Cayuga Nation of New York, Versailles, New York

Department of Human Development, Cornell Migrant Program, Alton, New York

Genesee/Finger Lakes Regional Planning Council, Rochester, New York

Genesee Transportation Council, Rochester, New York

Monroe County Planning and Development Department, Rochester, New York

National Marine Fisheries Service, Gloucester, Massachusetts

New York State Department of State, Albany, New York

New York State Department of Environmental Conservation, Avon, New York

New York State Office of Parks, Recreation, and Historic Preservation, Waterford, New York

Oneida Indian Nation of New York, Oneida, New York

Oneida Tribe of Indians of Wisconsin, Oneida, Wisconsin

Onondaga Nation, Nedrow, New York

Salvation Army, Newark, New York

Seneca-Cayuga Tribe of Oklahoma, Miami, Oklahoma

Seneca Nation of New York, Irving, New York

St. Regis Mohawk Tribe, Hogansburg, New York

Tonawanda Band of Senecas, Basom, New York

Town of Monroe, Monroe, New York

Town of Ontario Assessor, Ontario, New York

Town of Ontario Supervisor, Ontario, New York

Tuscarora Nation, Lewiston, New York

U.S. Fish and Wildlife Service, Cortland, New York

Wayne County Economic Development Corporation, Lyons, New York

Wayne County Historian, Lisle, New York

Wayne County Emergency Management System, Lyons, New York

Wayne County Nursing Home, Lyons, New York

Wayne County Planning Department, Lyons, New York

Wayne County Real Property Tax Services, Lyons, New York

Wayne County Workforce Development, Lyons, New York

Appendix E

R.E. Ginna Nuclear Power Plant Compliance Status and Consultation Correspondence

Appendix E

R.E. Ginna Nuclear Power Plant Compliance Status and Consultation Correspondence

Correspondence received during the evaluation process of the application for renewal of the operating license for R.E. Ginna Nuclear Power Plant is identified in Table E-1. Copies of the correspondence are included at the end of this appendix.

The licenses, permits, consultations, and other approvals obtained from Federal, State, regional, and local authorities for Ginna are listed in Table E-2.

Table E-1. Consultation Correspondence

Source	Recipient	Date of Letter
New York State Department of Parks, Recreation, and Historic Preservation (R. L. Pierpont)	Rochester Gas and Electric Corporation (D. J. Mooney)	October 31, 2001
U.S. Nuclear Regulatory Commission (P. T. Kuo)	U.S. Fish and Wildlife Service (D. A. Stilwell)	November 27, 2002
U.S. Nuclear Regulatory Commission (P. T. Kuo)	National Marine Fisheries Service (P. A. Kurkul)	December 2, 2002
U.S. Fish and Wildlife Service (D. A. Stilwell)	U.S. Nuclear Regulatory Commission (P. T. Kuo)	January 6, 2003
New York State Department of Environmental Conservation (K. Merchant)	U.S. Nuclear Regulatory Commission (R. Schaaf)	February 26, 2003

Table E-2. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for the R.E. Ginna Nuclear Power Plant

Agency	Authority	Description	Number	Expiration Date	Remarks
NRC	10 CFR Part 50	Operating license, Ginna	DPR-18	09/18/2009	Authorizes operation of Plant.
FWS	Endangered Species Act, Section 7 (33 U.S.C. 1341)	Consultation			FWS letter included in Appendix E.
New York State Office of Parks, Recreation and Historic Preservation	Section 106 of the National Historic Preservation Act (16 U.S.C. 470f)	Consultation	Letter from Ruth Pierpoint, Historic Preservation Field Services Bureau to RG&E, 10/31/2001		The National Historic Preservation Act requires Federal agencies to take into account the effect of any undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. The New York State Office of Parks, Recreation and Historic Preservation, Historic Preservation Field Services Bureau determined that renewal of the Ginna OL will have No Effect upon cultural resources in or eligible for inclusion in the National Register of Historic Places.
U.S. Department of Transportation	49 CFR Part 107, Subpart G	Certificate of Registration for Transportation of Hazardous Materials	062002550003K	06/30/2008	Transportation of hazardous materials

Table E-2. (contd)

Agency	Authority	Description	Number	Expiration Date	Remarks
New York State Department of State	Federal Coastal Zone Management Act (16 USC 1451 et seq.)	Consistency Determination		Submitted on 07/30/2002	State must concur with or object to the applicant's certification.
NYSDEC	NYS ECL Article 40	Hazardous Substance Bulk Storage Registration Certificate	8-000170	07/18/2003	
NYSDEC	NYS ECL Part 675	Water Withdrawal Registration	NYGLWR-0002810	07/10/2002	Water withdrawal from Lake Ontario/Renewal submitted 6/24/02.
NYSDEC	NYS ECL 11-0515 (1), NYCRR Part 175	New York State Fish and Wildlife License	LCP01-756	12/31/2002	Collection and possession of fish and wildlife.
NYSDEC	Clean Water Act, Section 402 (33 USC 1341); NYS ECL Title 8 of Article 17	State Pollution Discharge Elimination System (SPDES) Permit	NY-0000493	02/01/2008	Documen'ts compliance with CWA standards; Discharge of wastewaters to waters of the State.
NYSDEC	Clean Water Act, Section 401 (33 USC 1341); NYS ECL Title 8 of Article 17	401 Certification	NA	Application submitted 10/07/2002	Compliance with CWA. Certification expected during 2003.

CFR - Code of Federal Regulations
FWS - U.S. Fish and Wildlife Service
SPDES - State Pollutant Discharge Elimination System
NRC - U.S. Nuclear Regulatory Commission
NYCRR - New York Code of Rules and Regulations
NYS - New York State
NYS ECL - New York State Environmental Conservation Law
NYSDEC - New York State Department of Environmental Conservation
NYSDOS - New York State Department of State
USC - United States Code

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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

Bernadette Castro
Commissioner

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

Ruth L. Pierpont
Director

RLP: cmp

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1 November 27, 2002

Mr. David A. Stilwell
Field Supervisor,
U.S. Fish and Wildlife Service
3817 Luker Road
Cortland, NY 13045

SUBJECT: R.E. GINNA NUCLEAR POWER PLANT APPLICATION FOR OPERATING LICENSE RENEWAL

Dear Mr. Stilwell:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application for the renewal of the operating license for the R.E. Ginna Nuclear Power Plant (Ginna), located in the Town of Ontario, Wayne County, New York. As part of the review of the license renewal application, the NRC is preparing a Supplemental Environmental Impact Statement (SEIS) which includes analyses of pertinent environmental issues, including endangered or threatened species and impacts to fish and wildlife.

While preparing its application, Rochester Gas and Electric, contacted your office by letter dated 23 January 2002, and your office responded on 25 February, 2002. In the Fish and Wildlife Service (FWS) response letter, it was indicated that there are no known listed or proposed threatened or endangered species, nor candidates for such listing in the vicinity of the Ginna plant, or its associated transmission right-of-way. The NRC reviewed the available information concerning threatened or endangered species that may occur in New York, inspected the Ginna site, and contacted the New York Department of Environmental Conservation concerning New York State listed species. Based on its analysis, the NRC has concluded, that consistent with your determination in your letter of 25 February 2002, that no federally-listed or proposed threatened or endangered species, any candidate for such listing, nor any designated critical habitat for threatened or endangered species are known from the site or the associated transmission corridors. Therefore, the renewal of the license will not effect any Federally protected species.

The NRC requests FWS comment on any aspects of the license renewal application that may fall under other legislation or FWS authority. Such comment is especially important during the scoping period of the environmental review. The NRC has inspected the site and has consulted the National Wetland Database, and has determined that the proposed action will not impact any wetlands. NRC staff has also met with the New York Department of Environmental Conservation concerning potential water use, water quality, fisheries, and other environmental impacts.

D. Stilwell - 2 -

Your office will receive a copy of the draft SEIS along with a request for comments when it is published. If you have any questions concerning the R.E. Ginna Nuclear Power Plant, the license renewal application, or other aspects of this project, please contact Mr. Robert Schaaf, Project Manager, at (301) 415-1312 or by email at RGS@nrc.gov.

Sincerely,

/RA/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No.: 50-244

cc: See next page

December 2, 2002

Patricia A. Kurkul, Regional Administrator
National Marine Fisheries Service
Northeast Regional Office (NERO)
One Blackburn Drive
Gloucester, MA 01930-2298

SUBJECT: APPLICATION FOR RENEWAL OF THE OPERATING LICENSE FOR THE R.E. GINNA NUCLEAR POWER PLANT

Dear Ms. Kurkul:

The U.S. Nuclear Regulatory Commission (NRC) is evaluating an application submitted by Rochester Gas and Electric Corporation for the renewal of the operating license for the R.E. Ginna Nuclear Power Plant (Ginna), located on the south shore of Lake Ontario in Wayne County, New York. The NRC is preparing a site-specific supplement to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (NUREG-1437) for this proposed license renewal, for which we are required to evaluate potential impacts to threatened and endangered species.

The proposed action would include use and continued maintenance of existing facilities and transmission lines, and would not result in new construction or disturbance. The Ginna plant and the associated transmission corridor, that is under review as part of the license renewal application, is located in Wayne County, New York. The transmission corridor is approximately 3 ½ miles long and is 500 feet in width. The plant uses once-through cooling water from Lake Ontario to remove waste heat from the facility.

To support the environmental impact statement preparation process, and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on protected, proposed, and candidate species and critical habitat that may be in the vicinity of the Ginna plant and its associated transmission lines.

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P. Kurkul - 2 -

The NRC requests NMFS comment on any aspects of the license renewal application that may fall under other legislation or NMFS authority. Such comment is especially important during the scoping period of the environmental review. If you have any questions regarding this nuclear facility or the application, please contact Mr. Robert Schaaf, Project Manager, at (301) 415-1312 or by email at RGS@nrc.gov.

Sincerely,

/RA/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No: 50-244

cc: See next page

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

January 6, 2003

Mr. Pao-Tsin Kuo
Program Director
License Renewal and Environmental Impacts Program
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Robert Schaaff

Dear Mr. Kuo:

The U.S. Fish and Wildlife Service (Service) has reviewed your letter dated November 27, 2002, regarding the relicensing of the R.E. Ginna Nuclear Power Plant. The applicant, Rochester Gas and Electric (RG&E), proposes to renew the operating license for this facility which will expire December 18, 2009. This project is located in the Town of Ontario, Wayne County, New York.

Your letter requested the Service's comments on aspects of the license renewal that may affect fish and wildlife resources. However, the letter did not indicate when the comment period terminated for this scoping effort. Mr. Robert Schaff of your office stated comments should be submitted in early January 2003. The applicant and the Nuclear Regulatory Commission (NRC) will review comments and incorporate them into a Supplemental Environmental Impact Statement (SEIS).

It is our understanding from reviewing project documents located on the NRC internet site, that no physical modifications are anticipated to the Ginna facility during the 20-year term of the next license. In addition, no operating changes are proposed at this time. The facility currently generates electricity for sale and distribution in Western New York State.

This report of the Service and the Department of the Interior is submitted for project planning purposes. Comments pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) were previously submitted in a letter dated February 25, 2002. We may provide additional comments pursuant to, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) in the future, particularly during the SEIS review period.

Fish entrainment and impingement occurring from power plant water intake systems kill millions of fish every year in New York. The Environmental Report prepared for this project indicates that fish, fish eggs, and larvae entrainment and impingement have been evaluated by the

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applicant and that the problem is not significant. However, the existing entrainment study was completed in 1977 and is too old to accurately reflect current conditions. Considerable changes may have occurred to the lake ecosystem during the 25 years since the study was completed. Additional information is required to reflect the current biological conditions of Lake Ontario. The applicant should conduct a multi-seasonal study which involves the collection of representative ichthyoplankton data from the water intake system. This study should focus on the collection of all fish life stages which are susceptible to entrainment and impingement. Details of the study should be coordinated with this office and the New York State Department of Environmental Conservation (NYSDEC).

To mitigate the effects of impingement and entrainment, the applicant should evaluate measures to reduce fish injury and mortality such as the feasibility of installing a boom which will minimize fish impingement and entrainment of fish eggs and larvae in the cooling water intake structures. A filter boom, such as the Gunderboom System, can prevent fish larvae and eggs from entering the water intake pipes. Fish larvae, eggs, and debris are removed and released downstream of the boom with small bursts of air along the length of the filter. This system is currently being used at three other major power plants in New York and has been determined to be the Best Technology Available, where its use is feasible. We recommend the applicant fully evaluate this system for this facility and document this evaluation in the SEIS.

It is our understanding that erosion is progressing at both ends of the project shoreline. Existing protection measures are not completely effective. The NYSDEC has indicated that a survey is needed to determine the extent of the problem and that remedial action may be necessary. Rochester Gas and Electric should consider the use of measures other than hard structures (i.e. riprap) to control the erosion problem. Instead of hard structures, we recommend that biotechnical erosion controls be used for this project, if feasible. We believe that biotechnical erosion controls are the most effective means to limit erosion and also provide habitat for fish, wildlife, and invertebrates. This technique uses vegetation to control erosion in a buffer between the water and upland (Fuller, 1997). The buffer should extend from the water as far inland as possible. If hard structures are necessary, we believe the applicant could use articulated concrete block or riprap in combination with planting erosion controlling vegetation. This vegetation should include native plant species which will benefit wildlife such as dwarf willow (*Salix cottetii*), grey dogwood (*Cornus racemosa*), silky dogwood (*Cornus amomum*), arrowwood viburnum (*Viburnum dentatum*), and other appropriate species. The use of vegetation will be more beneficial for wildlife and be more aesthetic than bare riprap.

The Service appreciates the opportunity to comment on this project during the scoping process. We hope these comments are useful during your project review. We will continue to work with your agency during the relicensing process and review of the SEIS.

Please contact Timothy Sullivan at 607-753-9334 if there are any questions regarding this letter.

Sincerely,

David A. Stilwell
Field Supervisor

cc: NYSDEC, Avon, NY (Environmental Permits)
EPA, Water Programs Division, New York, NY

Literature Cited:

Fuller, D.R. 1997. Understanding, Living with, & Controlling Shoreline Erosion: A Guidebook for Shoreline Property Owners. Tip of the Mitt Watershed Council, Conway, MI.

Nuclear Regulatory Commission Internet Site at www.nrc.gov

Gunderboom, Inc. Internet Site at www.gunderboom.com

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 8
6274 East Avon-Lima Road, Avon, New York 14414-9519
Phone: (585) 226-2466 • FAX: (585) 226-2830
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

February 26, 2003

Mr. Robert Schaaf
Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop o-11F1
Washington, DC 20555-0001

Re: **Master Habitat Database Report for Wayne County**
Nuclear Regulatory Commission Operating License Renewal
RG&E Ginna Nuclear Power Plant

Dear Mr. Schaaf:

Mr. Michael Sackschewsky, of the Battelle National Laboratory, requested a report of the natural resources of concern, including all the threatened, endangered, protected, and rare species, in Wayne County, from our Master Habitat Database. The purpose of this letter is to convey this information. In addition, Mr. Sackschewsky requested a mammal list for Wayne County. We provided him with a New York State mammal list from our web site, however, we do not have a mammal list by county.

I have enclosed two tables; Table 1 includes the sensitivity ranking, the scientific name, the common name, the location, the date of the most recent siting, the element type (animal vs. plant) and the New York State Listing (endangered, threatened, rare, protected, or protected); Table 2 includes the sensitivity ranking, the scientific name and the directions to the site. In addition, I have enclosed a map, generated in ArcView, which shows the Master Habitat Database theme plotted over Wayne County. I have not linked the tables and the map data.

All records which are deemed "sensitive" (a Y is listed under the sensitive column) are highly vulnerable to collection or disturbance. It is the Department's policy to release the location of sensitive sites for specific project review, however, the information on sensitive sites may not be released to other entities. Therefore, if you wish to include the attached tables in any public documents, the "name", "location" and "directions" associated with sensitive species must be removed. For example, if you wish to include the tables in the supplemental environmental impact statement, the information on the sensitive species must be redacted. It is acceptable, however, to release the name of a vulnerable species as long as the location and directions are not provided.

As we have mentioned in previous correspondence, the Natural Habitat Database does not include any "hits" for natural resources of concern at the Ginna Nuclear Power facility site.

For most sites, comprehensive field surveys have not been conducted; the information provided in the tables includes records from our databases. We cannot provide definitive statements on the presence or absence of all rare or state-listed species or natural communities. Therefore, there may be additional species of concern located in Wayne County. We typically recommend on-site surveys for specific project sites.

Please contact me directly if you have any questions regarding the enclosed report.

Sincerely,

Kimberly Merchant

Kimberly A. Merchant
Environmental Analyst 1

Enclosure: Master Habitat Database Report (Table 1, Table 2, Map)

cc with enclosure: M. Sackschewsky, Battelle National Laboratory
A. Kirsch, NYSDEC, Wildlife
J. Peek, Forestry, NYSDEC

cc: M. Calaban, Bureau of Habitat, NYSDEC, C.O.
W. Pearsall, Fisheries, NYSDEC, Region 8
L. Kuwik, Environmental Permits, NYSDEC, C.O.
J. Nasca, Environmental Permits, NYSDEC, C.O.
W. Little, Legal Division, NYSDEC, C.O.
G. Wrobel, RG&E
P. Sawyko, RG&E
V. Barr, NYSDOS
T. Sullivan, U.S. Fish and Wildlife Service
A. Peterson, NYSERDA

Appendix F

GEIS Environmental Issues Not Applicable to R.E. Ginna Nuclear Power Plant

Appendix F

GEIS Environmental Issues Not Applicable to R.E. Ginna Nuclear Power Plant

The following table lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996,1999)[a] and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are not applicable to R.E. Ginna Nuclear Power Plant (Ginna) because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Ginna

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered salinity gradients	1	4.2.1.2.2	Issue applies to a saltwater receiving water body, which Ginna does not have.
Water-use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	4.3.2.1 4.4.2.1	Ginna cooling systems do not use makeup water from a small river with low flow.
AQUATIC ECOLOGY (FOR PLANTS WITH COOLING TOWER BASED HEAT DISSIPATION SYSTEMS)			
Entrainment of fish and shellfish in early life stages	1	4.3.3	Ginna does not dissipate heat using cooling towers.
Impingement of fish and shellfish	1	4.3.3	Ginna does not dissipate heat using cooling towers.
Heat shock	1	4.3.3	Ginna does not dissipate heat using cooling towers.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

Table F-1. (cont)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
HUMAN HEALTH			
Microbiological organisms (public health) (plants using lakes or canals or cooling towers that discharge into a small river)	2	4.3.6	Issue applies only to heated effluents discharged into a small river.
Microbiological organisms (occupational health)	1	4.3.6	Ginna does not dissipate heat using cooling towers.
GROUNDWATER USE AND QUALITY			
Groundwater-use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1 4.8.2.1	Ginna uses <100 gpm of groundwater.
Groundwater-use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	4.8.1.3 4.4.2.1	Ginna does not dissipate heat using cooling towers.
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	Ginna does not have or use Ranney wells.
Groundwater quality degradation (Ranney wells)	1	4.8.2.2	Ginna does not have or use Ranney wells.
Groundwater quality degradation (saltwater intrusion)	1	4.8.2.1	Ginna is not located near saltwater.
Groundwater quality degradation (cooling ponds in salt marshes)	1	4.8.3	Ginna does not have cooling ponds in salt marshes.
Groundwater quality degradation (cooling ponds at inland sites)	2	4.8.3	Ginna does not use cooling ponds.

Table F-1. (cont)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
TERRESTRIAL RESOURCES			
Cooling tower impacts on crops and ornamental vegetation	1	4.3.4	Ginna does not dissipate heat using cooling towers.
Cooling tower impacts on native plants	1	4.3.5.1	Issue applies to a heat dissipation system feature, cooling towers, which Ginna does not have.
Bird collisions with cooling towers	1	4.3.5.2	Issue applies to a heat dissipation system feature, cooling towers, which Ginna does not have.
Cooling pond impacts on terrestrial resources	1	4.4.4	Ginna does not use cooling ponds.

F.1 References

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy,* Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report,* "Section 6.3 – Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants, Final Report." NUREG-1437, Volume 1, Addendum 1, NRC, Washington, D.C.

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives for the R.E. Ginna Nuclear Power Plant in Support of License Renewal Application

Appendix G

NRC Staff Evaluation of Severe Accident Mitigation Alternatives for the R.E. Ginna Nuclear Power Plant in Support of License Renewal Application

G.1 Introduction

Rochester Gas and Electric (RG&E) submitted an assessment of severe accident mitigation alternatives (SAMAs) for the R.E. Ginna (Ginna) Nuclear Power Plant as part of the Ginna Environmental Report (ER) (RG&E 2002). This assessment was based on the most recent Ginna probabilistic safety assessment (PSA) available at that time, a plant-specific offsite consequence analysis performed using the MELCOR Accident Consequence Code System 2 (MACCS2) code, and insights from the Ginna Individual Plant Examination for External Events (IPEEE) (RG&E 1997a, 1998a, 1998b, 1998c). In identifying and evaluating potential SAMAs, RG&E considered SAMA analyses performed for other operating plants that have submitted license renewal applications, as well as industry and U.S. Nuclear Regulatory Commission (NRC) documents that discuss potential plant improvements, such as NUREG-1560 (NRC 1997a) and NUREG-1742 (NRC 2002a). RG&E also identified SAMAs that were dominant contributors to core damage frequency (CDF) and large early release frequency (LERF) based on the plant-specific PSA. RG&E assessed the costs and benefits associated with each of the potential SAMAs and concluded that two of the candidate SAMAs evaluated are potentially cost beneficial for Ginna.

Based on a review of the SAMA assessment, the NRC issued a request for additional information (RAI) to RG&E by letter dated December 26, 2002 (NRC 2002a). Key questions concerned (1) dominant risk contributors at Ginna and the SAMAs that address these contributors, (2) the impact on dose consequences if all release categories were considered rather than just large early release categories, (3) the potential impact of uncertainties on the study results, and (4) detailed information on several specific candidate SAMAs. RG&E submitted additional information on January 31, 2003, and February 28, 2003, in response to the RAI (RG&E 2003a, 2003b). The February 28, 2003, response included a completely revised SAMA analysis (Section 4.14 and Appendix E of the ER) based on an updated version of the PSA. In these responses, RG&E provided tables containing the results of importance analyses, revised results based on the removal of scrubbing of fission product releases, and an assessment of the impacts of uncertainties. RG&E's responses addressed the staff's concerns and reaffirmed that only two SAMAs would be cost beneficial.

An assessment of SAMAs for Ginna is presented as follows.

G.2 Estimate of Risk for Ginna

RG&E's estimates of offsite risk at Ginna are summarized in Section G.2.1. The summary is followed by the staff's review of RG&E's risk estimates in Section G.2.2.

G.2.1 RG&E's Risk Estimates

Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA analysis: (1) the Ginna Level 1 and 2 PSA model, which is an updated version of the Individual Plant Examination (IPE) (RG&E 1994, 1997b, 1997c), and (2) a supplemental analysis of offsite consequences and economic impacts (essentially a Level 3 PSA model) developed specifically for the SAMA analysis. The Level 1 and 2 PSA used as the basis for the SAMA analysis is the most recent PSA model of record, and is referred to as Version 4.2. The scope of the Ginna PSA does not include full consideration of seismic events. However, the dominant fire and internal flooding sequences are included in the PSA.

The baseline CDF for the purpose of the SAMA evaluation is approximately 4×10^{-5} per year. The CDF is based on the risk assessment for internally initiated events at power and at shutdown, and the dominant external events, specifically, fire and internal flooding at power. RG&E did not include the contribution of risk from seismic events within the Ginna risk estimates. It is RG&E's position that due to the recent and extensive evaluations and modifications performed as part of IPEEE and Seismic Qualification Utility Group (SQUG) activities, seismic events have been adequately addressed and need not be explicitly treated in the SAMA analysis (additional discussion provided in Section G.2.2).

The breakdown of CDF by initiating event/accident type is provided in Table G-1. Internal events at power contribute about 33 percent of the total CDF and are composed of (1) steam generator tube ruptures (15 percent of the total), (2) loss of coolant accidents (LOCAs) less than 5 cm (2 in.) (6 percent of the total), (3) station blackout (SBO) (5 percent of the total), (4) LOCAs greater than 5 cm (2 in.) (2 percent of the total), and (5) interfacing system LOCAs and anticipated transient without scram (ATWS) (each about 1 percent of the total) (RG&E 2003b). Shutdown events represent about 17 percent of the total CDF (RG&E 2003b). External event initiators represent about 50 percent of the total CDF and are composed of fire initiators (28 percent of the total CDF) and floods (22 percent of the total CDF) (RG&E 2003b).

The Level 2 PSA model has also been updated since the IPE. As described in the RAI responses (RG&E 2003b), results from the previous detailed Level 2 analysis were converted to the simplified LERF methodology described in NUREG/CR-6595 (NRC 1999a). In the updated

Table G-1. R.E. Ginna Nuclear Power Plant Core Damage Frequency (Revision 4.2 of PSA)

Contributor	CDF (per year)	Percent of Total CDF
Internal Events – At Power		
Transients	1.0×10^{-6}	3
Station Blackout (SBO)	2.1×10^{-6}	5
Anticipated transient without scram (ATWS)	2.0×10^{-7}	1
Steam generator tube rupture (SGTR)	6.0×10^{-6}	15
Loss of coolant accidents (LOCAs) <2 inches	2.6×10^{-6}	6
LOCAs >2 inches	7.0×10^{-7}	2
Interfacing system LOCA (ISLOCA)	2.5×10^{-7}	1
Internal Events – Shutdown	6.8×10^{-6}	17
CDF from internal events	2.0×10^{-5}	**50**
External Events		
Fire	1.1×10^{-5}	28
Flood	8.8×10^{-6}	22
CDF from external events	2.0×10^{-5}	**50**
Total CDF	4.0×10^{-5}	**100**

analysis, the 25 source term categories (STCs) used in the IPE were rebinned into 11 release category bins, each of which was assigned a representative source term based on the original MAAP analyses performed for the IPE. The conditional probabilities and release characteristics associated with each release category were provided in response to an RAI (RG&E 2003b). An explanation of the binning process and a mapping of the STCs to release category bins was also provided (RG&E 2003c).

The offsite consequences and economic impact analyses use the MELCOR MACCS2 code, Version 1.12, to determine the offsite risk impacts on the surrounding environment and public. Inputs for this analysis include plant-specific and site-specific input values for core radionuclide inventory, source term and release characteristics, site meteorological data, projected population distribution (within a 80-km [50-mi] radius) for the year 2030, emergency response evacuation modeling, and economic data.

In the ER, RG&E estimated the dose to the population within 80 km (50 mi) of the Ginna site to be approximately 0.163 person-sievert (Sv) (16.300 person-rem) per year (RG&E 2003b). The breakdown of the total population dose by containment release mode is summarized in

Table G-2. Bypass events (steam generator tube rupture [SGTR] and interfacing system loss-of-coolant accident [ISLOCA]) and late containment failures dominate the population dose risk at Ginna.

Table G-2. Breakdown of Population Dose by Containment Release Mode

Containment Release Mode	Population Dose Person-Sv Per Year	Population Dose Person-Rem Per Year	Percent Contribution
SGTR[(a)]	0.063	6.3	39
ISLOCAs	0.044	4.4	27
Early containment failure	0.020	2.0	12
Late containment failure[(b)]	0.030	3.0	19
No containment failure	0.006	0.6	3
Total	0.163	16.300	100

(a) Includes thermally induced SGTR.
(b) Includes contribution from shutdown events.

G.2.2 Staff's Review of RG&E Risk Estimates

RG&E's determination of offsite risk at Ginna is based on the following three major elements of analysis:

- the Level 1 and 2 risk models that form the bases for the 1994 IPE and 1997 IPEEE submittals (RG&E 1994, 1997a, 1997b, 1997c, 1998a. 1998b, 1998c)

- the major modifications to the IPE model that have been incorporated in the Ginna PSA

- the MACCS2 analyses performed to translate fission product release frequencies from the level 2 PSA model into offsite consequence measures.

Each of these analyses was reviewed to determine the acceptability of RG&E's risk estimates for the SAMA analysis, as summarized below.

The staff's review of the Ginna IPE is described in an NRC report dated September 16, 1997 (NRC 1997b). In that review, the staff evaluated the methodology, models, data, and assumptions used to estimate the CDF and characterize containment performance and fission product releases. The staff concluded that RG&E's analyses met the intent of Generic Letter 88-20 (NRC 1988); that is, the IPE was of adequate quality to be used to look for design or operational vulnerabilities. The staff's review primarily focused on the licensee's ability to examine Ginna for severe accident vulnerabilities and not specifically on the detailed findings or quantification estimates. Overall, the staff believed that the Ginna IPE was of adequate quality to be used as a tool in searching for areas with high potential for risk reduction and to assess such risk reductions, especially when the risk models are used in conjunction with insights, such as those from risk importance, sensitivity, and uncertainty analyses.

In the IPE, RG&E identified five vulnerabilities as follows:

1. Relays for steam generator low-level actuation of auxiliary feedwater (AFW). The relays for this signal must be energized to actuate the AFW; however, they are currently powered by a non-safety bus that is unavailable upon a loss of offsite power.

2. ISLOCA through penetration 111. A LOCA outside containment through penetration 111 fails all residual heat removal (RHR) due to the low elevation of the RHR pump pits.

3. Standby AFW system out-of-service activities. Currently, both trains of this system can be taken out of service for up to 7 days; however, it is credited for providing steam generator cooling water for certain LOCAs outside containment.

4. Charging pump suction. Upon loss of dc control power or instrument air, the charging pump suction line fails to open the volume control tank, which may be empty because its supply source will have been eliminated as a result of the loss of power or air.

5. Intermediate building ventilation. The preferred AFW pumps are located in the basement of the intermediate building, which is ventilated via either building exhaust fans or natural circulation from a fire door opening; however, only one train of the exhaust fans is powered by the emergency diesel generators.

In an RAI, the staff questioned the current status of these vulnerabilities and whether any unresolved vulnerabilities were included in the SAMA evaluation. In response to the RAI, RG&E stated that items 1 and 3 had been resolved through plant modifications. Items 2 and 4, although considered by RG&E to be adequately addressed based on further review under the IPE program, are covered by SAMAs 3, 4, and 5. RG&E indicated that item 5 was originally identified as a result of overly conservative assumptions in the PSA model, and based on a more realistic assessment, it was reduced to a no-action status (RG&E 2003a). The staff inquired further about the conservative assumptions contained in the model. During a telephone conversation, RG&E explained that there are two methods of accomplishing ventilation within the intermediate building: (1) natural circulation via Fire Door F36 and (2) forced ventilation by the intermediate building exhaust fans (NRC 2003). Because only one train of the exhaust fans are diesel generator-backed, the three AFW pumps rely on the passive cooling in an SBO event in which the diesel generator is inoperable. A reanalysis of the building's ventilation determined that no active cooling is required for AFW; therefore, this item is no longer an item of concern.

The IPE also identified an issue associated with the dc electrical configuration that could result in a common mode failure of the pressurizer power-operated relief valves (PORVs). This was corrected during a subsequent outage.

A comparison of internal events risk profiles between the IPE and the PSA used in the SAMA analysis indicates a decrease of approximately 3.7×10^{-5} per year in the total CDF (about a factor of two). The reduction is attributed to plant and modeling improvements that have been implemented at Ginna since the IPE was submitted. A summary listing of those changes that resulted in the greatest impact on the total CDF was provided in response to an RAI (RG&E 2003b), and include:

- Relocated the service water (SW) piping that ran through the two battery rooms. This change eliminates the potential loss of both battery rooms due to failure to isolate SW line breaks in this area, which was the largest contributing CDF sequence.

- Modified procedures to avoid situations in which both trains of standby auxiliary feedwater (SAFW) could be taken out of service at the same time, thereby improving the ability to provide steam generator cooling in the event of a high-energy line break in the intermediate or turbine building.

- Revised the "Alternate Shutdown for Control Complex Fire" procedure to also apply to relay room floods. Previously, the procedure only addressed fire.

- Developed a new procedure to instruct plant personnel to manually close the Bus 18 breakers to prevent a SBO condition in the event of a worst-case fire.

- Updated generic data sources for initiating events, including the use of WCAP-15210 (WEC 1999) and NUREG/CR-5750 (NRC 1999b).

- Added plant-specific data for component failure rates, test and maintenance unavailabilities, and initiating event frequencies, and refined the Bayesian updating process.

- Increased frequencies for loss of offsite power to include all severe weather events, and included ISLOCAs whose frequencies previously fell below the threshold level for detailed analyses.

- Updated the human reliability analysis to provide detailed evaluations of more events in lieu of screening values.

- Removed conservatism for common cause failures that can induce initiators such as loss of service water, component cooling water, and instrument/service air.

- Added fires, internal floods, and shutdown risk models to the fault trees to enable their solution and risk ranking. Removed loss of spent fuel pool cooling and fuel-handling accidents and analyzed separately, because they do not lead to core damage.

The modeling changes from the IPE version to the current PSA are significant. Some contributors such as transients (previously a 25 percent contribution to internal events CDF) were significantly reduced. For example, the use of updated event frequencies significantly decreased the CDF from large LOCA, and plant changes such as a modification to the service water piping in battery rooms eliminated the largest contributor to CDF. Given the magnitude of the plant and model changes, the overall reduction in CDF appears to be reasonable.

The IPE CDF value for Ginna is comparable to most of the original IPE values estimated for other pressurized water reactors (PWRs) with a large dry containment. Figure 11.6 of NUREG-1560 shows that the IPE-based total internal events CDF for two-loop Westinghouse plants ranges from 5×10^{-5} to 1.2×10^{-4} per reactor-year (NRC 1997a). The internal events CDF based on the latest PSA (approximately 1.3×10^{-5} per year for events at power) is lower than the IPE values for other two-loop plants. However, it is recognized that other plants in addition to Ginna have reduced the values for CDF subsequent to the IPE submittals through modeling and hardware changes.

The staff considered the peer review performed for the Ginna PSA, and the potential impact of the peer review findings on the SAMA evaluation. In response to an RAI (RG&E 2003b), RG&E described the recent peer review of the Ginna PSA model. In preparation for a Westinghouse Owners Group peer review, an assessment of the Ginna PSA was performed by RG&E, the findings of which resulted in Revision 4.1. Revision 4.1 of the PSA model was reviewed by the Westinghouse Owners Group in May 2002. As a result of the peer review, RG&E updated the PSA to correct the most significant findings and observations. The updated model is referred to as Revision 4.2. According to RG&E, a few of the peer review comments were not incorporated into the current version of the PSA; however, those comments were evaluated and judged to have minimal impact of the plant CDF and no impact on the SAMA analysis (RG&E 2003c). Two high-level peer review items that were not addressed in the PSA but that could impact the SAMA analysis relate to the use of fission product scrubbing factors in the determination of source terms for bypass events. RG&E explicitly addressed these comments in the SAMA analysis by removing credit for scrubbing.

Ginna has two reactor coolant pumps (RCPs), each equipped with qualified high-temperature O-rings. The staff questioned RG&E regarding the model used to evaluate RCP seal LOCAs during loss-of-seal cooling events (NRC 2002a, 2003). The model used in Revision 4.2 is a composite based on (1) the original Westinghouse RCP Seal LOCA model developed in WCAP-10541 (WEC 1986), (2) the RCP Seal LOCA model employed by the NRC in NUREG-1150 (NRC 1990), (3) the Rhodes-based Brookhaven National Laboratory model, and (4) the most recent Westinghouse RCP Seal LOCA model described in WCAP-15603 (RG&E 2003c). RG&E noted that if the Rhodes model was used, the CDF would be higher by less than1 percent (RG&E 2003c). Based on RG&E's response, which supports use of the current model, the staff concludes that no new SAMA candidates would have evolved from application of the Rhodes model.

RG&E submitted an IPEEE in January 1997 (RG&E 1997c) in response to Supplement 4 of Generic Letter 88-20. This was followed by a submittal that included the fire analysis (RG&E 1998a). RG&E did not identify any vulnerabilities to severe accident risk in regard to the external events related to seismic, fire, or other external events. The Ginna hurricane, tornado, and high winds analyses show that the plant is adequately designed or procedures exist to cope with the effects of these natural events. Additionally, the Ginna IPEEE demonstrated that transportation and nearby facility accidents were not considered to be significant vulnerabilities at the plant. However, a number of areas were identified for improvement in both the seismic and fire areas as discussed below. In a letter dated December 21, 2000, the staff concluded that the submittal met the intent of Supplement 4 to Generic Letter 88-20, and that the licensee's IPEEE process is capable of identifying the most likely severe accidents and severe accident vulnerabilities (NRC 2000). A strength noted in the IPEEE submittal was that Ginna is an Systematic Evaluation Program (SEP) plant and was subjected to a detailed review for SEP, much of which is applicable to IPEEE.

The Ginna IPEEE does not provide the means to determine the numerical estimates of the CDF contributions from seismic initiators. The seismic portion of the IPEEE consisted of a reduced-scope seismic evaluation using the methodology for Seismic Margins Assessment, described in Electric Power Research Institute NP-6041 (EPRI 1988). Since initial plant licensing, Ginna has undergone a number of programs addressing seismic design issues, one of which was the SEP. Under this and other programs, RG&E conducted extensive reevaluations of, and made upgrades to, structures, systems, and equipment at Ginna, using a 0.2g Regulatory Guide 1.60 spectrum as seismic input (NRC 1973). These efforts have extended seismic capacity of Ginna beyond the original seismic design basis.

During the IPEEE seismic analysis, RG&E identified five vulnerabilities:

- The house heating boiler, which is located near the service water pumps in the screenhouse, was not anchored. It could shift and damage the attached natural gas line.

- There are several locations where block wall failures could result in the release of combustibles: an oxygen line in the auxiliary building, a hydrogen line and valve station in the intermediate building, and hydrogen cylinders in the turbine building.

- There are two fire suppression systems that could be actuated by block wall failures: (1) the manual deluge system in the relay room and (2) both a manual deluge system and a pre-action sprinkler system on elevation 253 in the intermediate building.

- Block walls are used as fire barriers throughout the plant. The walls whose failure could impact the fire protection of safety-related equipment are those separating the service building from the intermediate building (column line 3), and those separating the turbine building from intermediate building (column line F).

- The two reactor coolant pump oil collecting tanks in the containment basement were not reviewed during the seismic walkdown because the containment was inaccessible.

These issues were later resolved as a part of the Ginna's IPEEE Fire Analysis by either design evaluations or design changes (RG&E 1998a).

Additionally, seismic issues were identified for 52 items of equipment (NRC 2002b). Fourteen of these were resolved as part of the closeout of unresolved safety issue (USI) A-46 (NRC 1987). In response to an RAI, RG&E indicated that the remaining 38 items have been resolved, and outlined the resolution of all 38 items, a majority of which were resolved by plant modification (RG&E 2003c). Typical modifications included installation of restraints, hangers, anchorages, and modifications of anchorages.

RG&E noted that one item still remains open: seismically induced flooding resulting from the failure of the Reactor Makeup Water Tank (RMWT) and the Monitor Tank (RG&E 2003a). In response to a staff inquiry regarding why this vulnerability was not addressed in the SAMA analysis, RG&E indicated that a modification to address this contributor is planned for implementation in 2005 (NRC 2003). Various design options are being evaluated, including installation of leak-tight, removable curb around the RHR sub-basement entrance to a level that would neither pose a flooding danger to the safety injection pumps nor allow the RMWT and Monitor Tank contents to enter the sub-basement (RG&E 2003c). This item has been entered into the Plant Change Request (PCR) system and is being tracked in the Commitment and Action Tracking System as item 10602 (RG&E 2003a).

The Ginna IPEEE fire assessment used a PSA approach to systematically and successively evaluate fire hazards and their associated risks. The analysis was performed in three phases. The first two phases, consisting of qualitative and quantitative screening steps, used methods that are consistent with the Fire-Induced Vulnerability Evaluation methodology, which was approved for use in NUREG-1407 for screening. The third phase was a detailed fire PSA, which was performed for fire areas and fire zones that were not screened. A quantification for fire events in the IPEEE indicated that the contribution to plant CDF from fire was about 3×10^{-5} per year.

Based on the analysis, RG&E concluded that there were no fire-induced vulnerabilities. However, several plant and procedural modifications were identified as a result of the analysis. The following modification was implemented and was credited in the analysis:

- Fuses will be installed on control circuits routed in the screen house associated with the functioning of 4160 VAC circuit breakers. The fuses will be designed to open if grounding occurs during a fire, thus permitting the protective function of the circuit breakers to remain intact.

Several other modifications were identified by the licensee at the time of the IPEEE submittal, specifically:

- an operating procedure enhancement for performing local recovery of the pressurizer heaters if control of the heaters is lost from the control room (the pressurizer heaters are one means of providing long-term reactor coolant system [RCS] circulation)

- insertion of a warning in the alternate shutdown procedure ER-FIRE-1 to indicate that, in the event of a spurious opening of motor-operated valve (MOV) 857B (which fails RHR shutdown cooling), this valve can be closed locally

- installation of additional sealed containers for transient combustibles storage in the auxiliary building basement

- spurious opening of MOVs 850A and 850B due to hot shorts can lead to draining of the refueling water storage tank (RWST) volume into the containment sump

- installation of a local pressure gauge to permit RWST level measurement in the event of fire-induced damage to level instrumentation.

In response to NRC questions on the IPEEE submittal, RG&E performed a detailed update of the fire risk study that included explicitly modeling operator actions and fire suppression systems. As a result, the above modifications were no longer risk significant and were dismissed. The results of the update were documented in RG&E's response to an RAI (RG&E 1999). The staff reviewed the response and concluded that the licensee's submittals met the intent of the IPEEE process.

Since the time of the IPEEE, further changes to the fire and internal flood analyses have been made. In response to an RAI, RG&E delineated the significant changes made to these analyses since the submission of the IPEEE. The changes include:

- The installed fire suppression systems have been explicitly modeled in the fault trees.

- Several human error events have been added, and a few were deleted to reflect more detailed modeling of specific fire events.

- The model has been revised to reflect a December 2000 plant modification to the service water piping in battery rooms, which eliminated the largest contributing CDF sequence.

- Several human error events for floods have been subjected to detailed human error analysis to yield more accurate values for their probabilities.

- Several flooding initiator frequencies have been revised as well as some new ones added to model certain zone-specific floods in greater detail.

Based on the current PSA, the contribution to the total CDF from fires is comparable to the CDF contribution from internal events (approximately 1×10^{-5} per year). As such, in an RAI the staff inquired whether specific SAMAs were considered that might reduce the risk due to fire (NRC 2002a). In response, RG&E stated that six of the eight candidate SAMAs (SAMA numbers 1, 2, 3, 4, 6, and 7) address elements of internal fire (RG&E 2003a).

Because RG&E included contributions from fire and floods in its base case evaluation, and due to the extensive efforts made during the IPEEE and SQUG processes to address seismic issues, the staff finds RG&E's consideration of external events to be acceptable.

Given that RG&E incorporated all relevant and significant comments from the Westinghouse Owners Group peer review and revised the SAMA analysis accordingly, that RG&E satisfactorily addressed staff questions regarding the PSA (RG&E 2003a, 2003b, 2003c), and that the CDF falls within the range of contemporary CDFs for Westinghouse plants with large dry containments, the staff concludes that the Level 1 and 2 PSA is of sufficient quality to support the SAMA evaluation.

The staff reviewed the process used by RG&E to extend the containment performance (Level 2) portion of the PSA to an assessment of offsite consequences (essentially a Level 3 PSA). This process included consideration of the source terms used to characterize fission product releases for the applicable containment release category and the major input assumptions used in the offsite consequence analyses. The MACCS2 code was used to estimate offsite consequences. Plant-specific input to the code includes the Ginna reactor core radionuclide inventory, emergency evacuation modeling, release category source terms, site-specific meteorological data, and projected population distribution within a 80-km (50-mi) radius for the year 2030. This information is provided in Appendix E of the Ginna ER (RG&E 2002).

RG&E used source term release fractions for 11 different release classes defined for Ginna. Tables 3 and 4 of the RAI responses provide a breakout of the source terms by release category (RG&E 2003b). The frequencies of the various release classes are based on an updated version of the IPE, developed consistent with the methodology described in NUREG/CR-6595. In the updated analysis, the 25 STCs used in the IPE were rebinned into 11 release category bins, each of which was assigned a representative source term based on the original MAAP analyses performed for the IPE. The binning and assignment of source terms appears to have been performed in a consistent manner; that is, the release category bins generally contain STCs with similar release characteristics and timing and are assigned a source term consistent with these characteristics. A sensitivity study was performed for a 10 percent increase in the quantity of fission products released. (The core inventory was increased by 10 percent while maintaining the release fractions.) This resulted in a 7 percent increase in the population dose. RG&E used the 10 percent larger source term as input into MACCS2 for the base case. The staff concludes that the assignment of source terms is acceptable for use in the SAMA analysis.

The applicant used site-specific meteorological data processed from hourly measurements as input to the MACCS2 code. Annual data from 1992 through 1994 were input into the MACCS2 code for the base case. The results showed that the total dose and cost results for the most severe release category (ISLOCA) are within 12 percent of the average. The data from 1992 yielded results above the average for all release cases and, therefore, was selected and used as the input. Where data blocks were missing in the source files, supplementary information was derived from meteorological data obtained from the National Oceanic and Atmospheric Administration from the Greater Rochester International Airport, approximately 24 km (15 mi) west of Ginna. The staff notes that previous SAMA analyses results have shown little sensitivity to year-to-year differences in meteorological data and considers use of the 1992 data in the base case to be reasonable.

The population distribution the applicant used as input to the MACCS2 analysis was estimated for the year 2030, based on the NRC geographic information system for 1990 (NRC 1997c), and the population growth rates were based on the 2000 county-level census data. A sensitivity study was performed by increasing the projected population for 2030 by 10 percent. This resulted in a greater than 20 percent increase for both offsite dose and economic costs. Due to this significant increase, RG&E used the 2030 population plus 10 percent in the base case analysis. The staff considers the methods and assumptions for estimating population reasonable and acceptable for purposes of the SAMA evaluation.

The emergency evacuation model was modeled as a single evacuation zone extending 16 km (10 mi) from the plant. It was assumed that 95 percent of the population would move at an average speed of approximately 1.8 meters per second (6.0 ft per second) with a delayed start time of 2 hrs (7200 s). This assumption is conservative relative to the NUREG-1150 study (NRC 1990), which assumed evacuation of 99.5 percent of the population within the emergency planning zone. The evacuation assumptions and analysis are deemed reasonable and acceptable for the purposes of the SAMA evaluation.

Much of the site-specific economic data were provided by specifying the data for each of the 13 counties surrounding the plant, to a distance of 50 miles. The SECPOP90 site input file was manually updated to the 2000 timeframe (NRC 1997c). The agricultural economic data were updated using available data from the 1997 Census of Agriculture supplemented by other data available through other federal agencies (USDA 1999). These included per value of farm and non-farm wealth, and fraction of farm wealth from improvements (e.g., buildings).

The staff concludes that the methodology used by RG&E to estimate the offsite consequences for Ginna, which includes the frequency-weighted contribution from all release categories, provides an acceptable basis from which to proceed with an assessment of risk reduction potential for candidate SAMAs. Accordingly, the staff based its assessment of offsite risk on the CDF and offsite doses reported by RG&E.

G.3 Potential Plant Improvements

The process for identifying potential plant improvements, an evaluation of that process, and the improvements evaluated in detail by RG&E are discussed in this section.

G.3.1 Process for Identifying Potential Plant Improvements

In the Ginna ER (RG&E 2003b), only eight candidate SAMAs were identified. However, a much broader set of SAMAs was considered by RG&E to arrive at these eight SAMAs. RG&E

elaborated on its process for identifying potential SAMAs in response to RAIs (RG&E 2003a, 2003b, 2003c). The process consisted of the following elements:

- review of SAMA analyses performed for other operating plants that have submitted license renewal applications, particularly Fort Calhoun Station

- review of other NRC and industry documentation discussing potential plant improvements (e.g., NUREG-1560) (NRC 1997a)

- review of potential improvements identified in the plant-specific risk analyses (IPE, IPEEE, and subsequent PSA revisions)

- a review of the Fussel-Vesely (F-V) and risk achievement worth (RAW) importance measures, and the dominant CDF and LERF cut sets for Revision 4.2

- insights provided by RG&E plant staff.

Based on this process, 192 candidate SAMAs considered by previous applicants, plus several plant-specific SAMAs based on the Ginna PSA were identified (RG&E 2003c). RG&E performed a qualitative screening of the initial list of SAMAs and eliminated SAMAs from further consideration using the following criteria:

- The SAMA modifies features not applicable to Ginna.

- The SAMA would involve major plant design and/or structural changes that would clearly be well in excess (greater than two times) of the maximum attainable benefit (MAB).

- The SAMA would provide only minimal risk reduction based on review of F-V and RAW.

This qualitative screening process reduced the list to approximately 20 candidate SAMAs (RG&E 2003c). These SAMAs were further defined and then reviewed based on the following considerations:

- ability to implement the change at Ginna (i.e., are there any design challenges or physical limitations)

- the risk reduction that would realistically be achieved

- whether implementation of the change would increase vulnerabilities in other areas.

This culminated in eight plant-specific candidate SAMAs. These eight SAMAs were further evaluated, and two SAMAs were found to be potentially cost beneficial, as described below in Sections G.4 and G.6. RG&E considered the impact of uncertainties on the results of the SAMA analysis (RG&E 2003a). No additional SAMAs were judged to be cost beneficial (RG&E 2003b).

G.3.2 Review of RG&E's Process

The preliminary review of the Ginna ER raised concerns regarding the process used to identify potential SAMAs, and the completeness of the set of SAMAs considered. This was satisfactorily resolved though the additional information provided by the applicant, as described above. The staff also requested information regarding whether an importance analysis was used to confirm the adequacy of the SAMA identification process, and the portion of risk represented by the dominant risk contributors. In response to the RAI, RG&E provided a tabular listing of the contributors with the greatest potential for reducing risk as demonstrated by F-V and RAW assigned to the event. This approach inherently considers the top 95 percent of the CDF and LERF cut sets. RG&E also reviewed the dominant 50 CDF and LERF cut sets, which accounts for the top 45 percent of the CDF cut sets and 75 percent of the LERF cut sets (RG&E 2003b). Based on this, the staff concludes that RG&E's efforts to identify potential SAMAs included consideration of areas that presented the greatest potential for reducing risk. The list of eight SAMAs generally addressed the accident categories that are dominant CDF contributors or issues that tend to have a large impact on a number of accident sequences at Ginna.

In the original ER submittal, the estimated MAB was $992,000 (RG&E 2002). During the screening process, SAMAs whose cost exceeded two times the MAB were removed from further consideration. The SAMA analysis was subsequently revised to address peer review comments, and that portion of the ER was resubmitted. As a result, the MAB increased to $1.93 million. RG&E concluded that the increase in MAB did not result in the identification of any additional SAMAs. The staff agrees with this conclusion because the initial screening removed SAMAs that are estimated to cost $2 million or more.

The staff questioned RG&E whether it considered some of the cost beneficial SAMAs identified at previous plants, specifically, the use of a portable generator to power steam generator level instrumentation, and improvements to the reactor protection system logic to reduce the likelihood of failure of two 125 VAC instrument buses causing the spurious opening of the PORVs (NRC 2003). In a telephone conversation, RG&E stated that such vulnerabilities did not exist at Ginna due to design differences, or that sufficient battery capacity existed. Ginna is a 4-hour coping plant but has 8-hour capacity batteries (NRC 2003). Based on a review of the response, the staff agrees with this conclusion.

The staff notes that the set of SAMAs submitted is not all inclusive, since additional, possibly even less expensive, design alternatives can always be postulated. However, the staff concludes that the benefits of any additional modifications are unlikely to exceed the benefits of the modifications evaluated and that the alternative improvements would not likely cost less than the least expensive alternatives evaluated, when the subsidiary costs associated with maintenance, procedures, and training are considered.

The staff concludes that RG&E used a systematic and comprehensive process for identifying potential plant improvements for Ginna, and that the set of potential plant improvements identified by RG&E is reasonably comprehensive and, therefore, is acceptable. This search included reviewing insights from the IPE, IPEEE, and other plant-specific studies; reviewing plant improvements in previous SAMA analyses; and using the knowledge and experience of its PRA personnel.

G.4 Risk Reduction Potential of Plant Improvements

RG&E estimated the risk-reduction potential of the eight remaining SAMA candidates that were applicable to Ginna. RG&E used model requantification to determine the potential benefits. The CDF and LERF reductions were estimated using the current version of the Ginna PSA (Revision 4.2). The changes made to the PSA model to quantify the impact of each SAMA are detailed in Section E.3 of Appendix E to the Ginna ER (RG&E 2003b). Table G-3 provides a summary of the assumptions used to estimate the risk reduction, the risk reduction in terms of percent reduction in CDF and population dose, the total benefit (present value) of the averted risk, and the estimated implementation cost for each of the eight SAMAs. The determination of the benefits for the various SAMAs is discussed in Section G.6.

In response to an RAI, RG&E considered the uncertainties associated with the calculated CDF. This matter is discussed further in Section G.6.2.

The staff has reviewed the bases used by RG&E for calculating the risk reduction for the various plant improvements, and concludes that the rationale and assumptions for estimating risk reduction are reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized). Accordingly, the staff based its estimates of averted risk for the various SAMAs on risk reduction estimates provided by RG&E.

G.5 Cost Impacts of Candidate Plant Improvements

RG&E estimated the costs of implementing the eight candidate SAMAs through the application of engineering judgment and site-specific cost estimates. The cost estimates (presented in Section E.3 of Appendix E to the Ginna ER) conservatively did not include the cost of

Table G-3. SAMA Cost/Benefit Screening Analysis

SAMA	Assumptions	Percent Risk Reduction: CDF	Percent Risk Reduction: Population Dose	Total Benefit ($)	Estimated Cost ($)
1. Obtain a skid-mounted, 480-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.[a]	The addition of a skid-mounted, 480-V diesel generator with the same failure rate as the existing diesel generators and a 0.01 operator failure probability to start and align the diesel generator can supply the safeguards bus to reduce SBO and induced SBO sequences.	24.8	43.5	944,000	400,000
2. Obtain a third fire water source that is independent of the existing suction source for the motor- and diesel-driven fire pumps to be used in the event of a total loss of the screen house due to a fire or flood or loss of all service water suction due to environmental causes.	The addition of a diesel-driven pump of comparable size to the existing motor- and diesel-driven fire pumps can be connected to the existing fire system water piping and used for fire suppression or as a source of suction to the AFW pumps. The failure rate of the new pump is assumed to be the same as the existing diesel-driven fire pump. A failure rate of 0.1 is assumed for the operator action to connect the pump to the AFW system and 0.01 for the operator action to align the pump to supply the fire system during fire events.	1.8	3.3	70,000	200,000
3. Add a standby charging pump powered from a protected AC source and located in the intermediate or turbine building or SAFW pump building.	Conditions where charging pump A is out of service or directly failed, large floods that disable all three charging pumps and a charging pump room fire can be mitigated by an additional charging pump that autostarts on low flow or pressure. This pump is assumed to be powered from Bus 14.	11.2	2.5	107,000	1,100,000

Table G-3. (contd)

SAMA	Assumptions	Percent Risk Reduction: CDF	Percent Risk Reduction: Population Dose	Total Benefit ($)	Estimated Cost ($)
4. Modify procedures to allow charging pump B or C to be manually aligned 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.[a]	Manually aligning the B or C pump to Bus 14 can reduce all cut sets in which charging pump A is out of service or failed directly. A failure rate of 8.21 x 10^{-3} is used for aligning and starting the pump.	9.1	1.7	83,000	20,000
5. Add redundant check valves in the two RHR injection lines to the RCS to prevent a LOCA in the auxiliary building which could not be isolated.	The ISLOCA frequency is reduced reflecting the new configuration where failure of the additional check valve, the current check valve and the MOV, or both check valves and an inadvertent opening of the MOV, or a spurious safety injection signal would result in an ISLOCA. This was applied to the two lines through Penetration 111. It was also assumed that for this penetration LERF is a third of CDF because a third of the Penetration 111 piping that would be exposed to RCS pressure is inside containment.	0.2	7.7	45,000	1,000,000
6. Modify motor-driven AFW pump cooling system to be independent of service water (SW).	All cut sets that involve a loss of all AFW due to a failure of the SW suction source or a global failure of the screen house equipment due to fire or flooding will no longer lead to core damage due to the availability of the motor-driven pumps.	1.8	< 1	13,000	200,000

Table G-3. (contd)

SAMA	Assumptions	Percent Risk Reduction: CDF	Percent Risk Reduction: Population Dose	Total Benefit ($)	Estimated Cost ($)
7. Modify air-operated valve (AOV) 112C to fail close and AOV 112B to fail open on loss of instrument air. This change would allow the RWST to become the suction source for charging instead of the volume control tank (VCT).	All cut sets that contain the operator action to switch over the charging suction source from the VCT to the RWST can be reduced by setting this action to false (success).	2.0	< 1	14,000	50,000
8. Reconfigure the PORV so they transfer automatically from instrument air to N2 on low pressure and convert N2 supply line AOV to DC powered MOV.	The nitrogen system is available to support the power-operated relief valves with a failure probability of 4.76×10^{-3} (the failure rate of the components in the nitrogen system). Nitrogen support system failures were not included. This is conservative in that including these failures would increase the failure probability of the nitrogen system.	1.6	< 1	24,000	400,000

(a) SAMAs judged to be cost beneficial.

replacement power during extended outages required to implement the modifications, nor did they include recurring maintenance and surveillance costs or contingency costs associated with unforeseen implementation obstacles. Cost estimates typically included procedures, training, and documentation, in addition to any hardware.

The staff reviewed the bases for the applicant's cost estimates. For certain improvements, the staff also compared the cost estimates to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. Six of the eight SAMAs were screened from further consideration on the basis that the expected implementation cost would be much greater than the estimated risk reduction benefit. This is reasonable for these six SAMAs given the relatively small estimated benefit (a maximum benefit of about $107,000 among the six SAMAs), and the sizeable costs typically associated with hardware modifications. It is noted that one SAMA (SAMA 7) involves a minimal hardware modification to two valve operators. However, the estimated benefit for this SAMA ($14,000) is small in comparison to the implementation costs ($50,000), and the actual costs are likely to be higher when all cost factors are included. The staff concludes that the cost estimates are sufficient and appropriate for use in the SAMA evaluation.

G.6 Cost/Benefit Comparison

RG&E's cost/benefit analysis and the staff's review are described in the following sections.

G.6.1 RG&E Evaluation

The methodology used by RG&E was based primarily on NRC's guidance for performing cost/benefit analysis (NRC 1997d). The guidance involves determining the net value for each SAMA according to the following formula:

Net Value = (APE + AOC + AOE + AOSC) - COE

where,

APE = present value of averted public exposure ($)
AOC = present value of averted offsite property damage costs ($)
AOE = present value of averted occupational exposure costs ($)
AOSC = present value of averted onsite costs ($)
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 it is not considered cost beneficial. RG&E's derivation of each of the associated costs is summarized below.

Averted Public Exposure (APE) Costs

The APE costs were calculated using the following formula:

APE = Annual reduction in public exposure (Δperson-rem/reactor-year)
x monetary equivalent of unit dose ($2000 per person-rem)
x present value conversion factor (10.76 based on a 20-year period with a 7 percent discount rate).

As stated in NUREG/BR-0184 (NRC 1997d), it is important to note that the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk due to a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. Thus, it reflects the expected annual loss due to a single accident, the possibility that such an accident could occur at any time over the renewal period, and the effect of discounting these potential future losses to present value. For the purposes of initial screening, RG&E calculated an APE of approximately $350,000 for the 20-year license renewal period, which assumes elimination of all severe accidents.

Averted Offsite Property Damage Costs (AOC)

The AOCs were calculated using the following formula:

AOC = Annual CDF reduction
x offsite economic costs associated with a severe accident (on a per-event basis)
x present value conversion factor.

For the purposes of initial screening, which assumes all severe accidents are eliminated, RG&E calculated an annual offsite economic risk of about $87,000 based on the Level 3 risk analysis. This results in a discounted value of approximately $932,000 for the 20-year license renewal period.

Averted Occupational Exposure (AOE) Costs

The AOE costs were calculated using the following formula:

AOE = Annual CDF reduction
x occupational exposure per core damage event
x monetary equivalent of unit dose
x present value conversion factor.

RG&E derived the values for averted occupational exposure from information provided in Section 5.7.3 of the regulatory analysis handbook (NRC 1997d). Best estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in the handbook in conjunction with a monetary equivalent of unit dose of $2000 per person-rem, a real discount rate of 7 percent, and a time period of 20 years to represent the license renewal period. For the purposes of initial screening, which assumes all severe accidents are eliminated, RG&E calculated an AOE of approximately $15,000 for the 20-year license renewal period.

Averted Onsite Costs (AOSC)

Averted onsite costs (AOSC) include averted cleanup and decontamination costs and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. RG&E derived the values for AOSC based on information provided in Section 5.7.6 of the regulatory analysis handbook (NRC 1997d).

RG&E divided this cost element into two parts: (1) the onsite cleanup and decontamination Cost, also commonly referred to as averted cleanup and decontamination costs, and (2) the replacement power cost.

Averted cleanup and decontamination costs (ACC) were calculated using the following formula:

ACC = Annual CDF reduction
x present value of cleanup costs per core damage event
x present value conversion factor.

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in the regulatory analysis handbook to be $\$1.5 \times 10^9$ (undiscounted). This value was converted to present costs over a 10-year cleanup period and integrated over the term of the proposed license extension.

Long-term replacement power costs (RPC) were calculated using the following formula:

RPC = Annual CDF reduction
x present value of replacement power for a single event
x factor to account for remaining service years for which replacement power is required
x reactor power scaling factor

RG&E based its calculations on the value of 490 MWe, and scaled down from the 910 MWe reference plant in NUREG/BR-0184 (NRC 1997d). Therefore, RG&E applied a power scaling factor of 490 MWe/910 MWe to determine the replacement power costs. For the purposes of initial screening, which assumes all severe accidents are eliminated, RG&E calculated an RPC of approximately $169,000 for the 20-year license renewal period.

For the purposes of initial screening, which assumes all severe accidents are eliminated, RG&E calculated an AOSC of approximately $631,000 for the 20-year license renewal period.

Using the above equations, RG&E estimated the total present dollar value equivalent associated with completely eliminating severe accidents at Ginna to be about $1.93 million.

RG&E's Results

If the implementation costs were greater than the MAB, then the SAMA was screened from further consideration. A more refined look at the costs and benefits was performed for the remaining SAMAs. If the expected cost for those SAMAs exceeded the calculated benefit, the SAMA was considered not to be cost beneficial. The cost/benefit results for the individual analysis of the eight SAMA candidates are presented in Table G-3. As a result, two of the eight SAMAs were considered to be potentially cost beneficial:

- SAMA 1: Obtain a skid-mounted, 480-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.

- SAMA 4: Modify procedures to allow charging pump B or C to be manually aligned 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.

RG&E performed sensitivity analyses to evaluate the impact of parameter choices on the analysis results (RG&E 2002, 2003a, 2003b). As discussed in Section 5.2.2.2, sensitivity cases that assumed a 10 percent increase in the projected population and a 10 percent increase in fission product releases were adopted in the baseline analysis. In addition, RG&E considered the impact on SAMA results if (1) a 3 percent discount rate (rather than 7 percent in the base case) as recommended in NUREG/BR-0184 (NRC 1997d) was used, and (2) if the 95th percentile values of the CDF were utilized in the cost/benefit analysis instead of the mean CDF. These analyses did not result in a positive net benefit for any additional SAMAs.

RG&E stated in the Ginna ER that the two potentially cost beneficial SAMAs identified above do not relate to adequately managing the effects of aging, and therefore, are not required to be implemented pursuant to 10 CFR Part 54 (RG&E 2003b). However, RG&E stated that it will consider implementation of these SAMAs through its current plant change process.

G.6.2 Review of RG&E's Cost/Benefit Evaluation

The cost/benefit analysis performed by RG&E was based primarily on NUREG/BR-0184 (NRC 1997d) and was executed consistent with this guidance.

In response to an RAI, RG&E considered the uncertainties associated with the calculated CDF (Table G-4). If the 95th percentile values of the CDF were used in the cost/benefit analysis instead of the mean CDF value used in the baseline analysis, the estimated benefits of the SAMAs would increase by about a factor of two. Increasing the benefit by this factor would have no impact on the conclusion of the SAMA evaluation; that is, even if the non-viable SAMAs (those qualitatively screened out) were increased by a factor of two, the resulting cost benefit would remain negative (RG&E 2003b).

Table G-4. Uncertainty in the Calculated Core Damage Frequency for R.E. Ginna Nuclear Power Plant

Percentile	CDF (per year)
5th	2.05×10^{-5}
50th	3.52×10^{-5}
mean	4.00×10^{-5}
95th	9.00×10^{-5}

In addition, RG&E performed sensitivity analyses that addressed assumptions made in other parts of the cost/benefit analysis, including variations in discount rate, weather, population, and source terms. These were either adopted in the base case (e.g., population and source terms) or are bounded by the CDF uncertainty assessment.

The staff concludes that, with the exception of the two cost beneficial SAMAs, the costs of the SAMAs would be higher than the associated benefits. This conclusion is supported by uncertainty assessment and sensitivity analysis and upheld despite a number of additional uncertainties and non-quantifiable factors in the calculations, summarized as follows:

- Uncertainty in the internal events CDF was not initially included in the calculations, which employed mean values to determine the benefits. The 95th percent confidence level for internal events CDF is approximately 2.25 times the best estimate CDF. Even upon considering the benefits at the 95th percentile value, no SAMAs were judged to be cost beneficial. Therefore, consideration of CDF uncertainty is not expected to alter the conclusions of the analysis.

- Seismic events were not included in the Ginna risk profile. However, seismic vulnerabilities were addressed during the IPEEE and SQUG evaluations. Fire and flood events have been included within the scope of the SAMA evaluation. An increase in the benefits by a factor of two had no impact on the results of the evaluation.

- Risk reduction and cost estimates were generally found to be conservative. As such, uncertainty in the costs of any of the contemplated SAMAs would not likely have the effect of making them cost beneficial.

G.7 Conclusions

RG&E evaluated approximately 200 SAMA candidates using the SAMA analyses as submitted in support of licensing activities for other nuclear power plants, NRC and industry documents discussing potential plant improvements, and the plant-specific insights from the Ginna IPE, IPEEE, and current PSA model. A qualitative screening removed SAMA candidates that (1) were not applicable at Ginna due to design differences, (2) had already been implemented at Ginna, (3) were prohibitively expensive, or (4) did not provide a significant safety benefit. Upon conclusion of this screening, eight SAMA candidates were retained for further evaluation.

Using guidance in NUREG/BR-0184 (NRC 1997d), the current PSA model, and a Level 3 analysis developed specifically for SAMA evaluation, a maximum attainable benefit of about $1.93 million was calculated, representing the total present-dollar-value equivalent associated with completely eliminating severe accidents at Ginna. For the remaining eight SAMA candidates, a more detailed conceptual design and cost estimate were developed as shown in Table 5-5. The cost-benefit analyses showed that two of the eight SAMA candidates were potentially cost beneficial. Upon completion of a 3 percent discount rate sensitivity study, no additional SAMA candidates were determined to be cost beneficial. RG&E also considered the benefits at the 95th percentile CDF value, and found that no additional SAMAs were cost beneficial.

The staff reviewed the RG&E analysis and concluded that the methods used and the implementation of those methods were sound. The treatment of SAMA benefits and costs, the generally large negative net benefits, and the inherently small baseline risks support the general conclusion that the SAMA evaluations performed by RG&E are reasonable and sufficient for the license renewal submittal. The unavailability of a seismic PSA model precluded a quantitative evaluation of SAMAs specifically aimed at reducing risk of this initiator; however, significant improvements have been realized as a result of the IPEEE and SQUG processes at Ginna that would minimize the likelihood of identifying cost beneficial enhancements in this area. It is noted that one item still remains open: seismically induced flooding resulting from the failure of the RMWT and the Monitor Tank. However, RG&E is addressing this item through the PCR process and plans to implement a modification in 2005.

Although two SAMA candidates appear to be cost beneficial, they do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

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11. ABSTRACT *(200 words or less)*

This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the NRC by the Rochester Gas and Electric Corporation (RG&E) to renew the OL for R.E. Ginna Nuclear Power Plant for an additional 20 years under 10 CFR Part 54. This draft SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes the staff's preliminary recommendation regarding the proposed action.

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Ginna are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by RG&E; (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public comments received during the scoping process.

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