

# 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<sup>(a)</sup> 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

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

# Contents

Abstract .....	iii
Executive Summary .....	xv
Abbreviations/Acronyms .....	xxi
1.0 Introduction .....	1-1
1.1 Report Contents .....	1-1
1.2 Background .....	1-3
1.2.1 Generic Environmental Impact Statement .....	1-3
1.2.2 License Renewal Evaluation Process .....	1-4
1.3 The Proposed Federal Action .....	1-7
1.4 The Purpose and Need for the Proposed Action .....	1-8
1.5 Compliance and Consultations .....	1-8
1.6 References .....	1-9
2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment .....	2-1
2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term .....	2-1
2.1.1 External Appearance and Setting .....	2-4
2.1.2 Reactor Systems .....	2-5
2.1.3 Cooling and Auxiliary Water Systems .....	2-6
2.1.4 Radioactive Waste Management Systems and Effluent Control Systems .....	2-7
2.1.4.1 Liquid Waste Processing Systems and Effluent Controls .....	2-8
2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls ...	2-10
2.1.4.3 Solid-Waste Processing .....	2-12
2.1.5 Nonradioactive Waste Systems .....	2-13
2.1.6 Plant Operation and Maintenance .....	2-13
2.1.7 Power Transmission System .....	2-14

## Contents

1	2.2	Plant Interaction with the Environment	2-16
2			
3	2.2.1	Land Use	2-17
4	2.2.2	Water Use	2-18
5	2.2.3	Water Quality	2-18
6	2.2.4	Air Quality	2-19
7	2.2.5	Aquatic Resources	2-20
8	2.2.6	Terrestrial Resources	2-23
9	2.2.7	Radiological Impacts	2-27
10	2.2.8	Socioeconomic Factors	2-28
11			
12	2.2.8.1	Housing	2-28
13	2.2.8.2	Public Services	2-30
14	2.2.8.3	Offsite Land Use	2-33
15	2.2.8.4	Visual Aesthetics and Noise	2-35
16	2.2.8.5	Demography	2-36
17	2.2.8.6	Taxes	2-39
18			
19	2.2.9	Historic and Archaeological Resources	2-41
20			
21	2.2.9.1	Historic and Archaeological Background	2-41
22	2.2.9.2	Historic and Archaeological Resources at Ginna Site	2-44
23			
24	2.2.10	Related Federal Project Activities and Consultations	2-45
25			
26	2.3	References	2-46
27			
28	3.0	Environmental Impacts of Refurbishment	3-1
29			
30	3.1	References	3-4
31			
32	4.0	Environmental Impacts of Operation	4-1
33			
34	4.1	Cooling System	4-2
35			
36	4.1.1	Entrainment of Fish and Shellfish in Early Life Stages	4-9
37	4.1.2	Impingement of Fish and Shellfish	4-11
38	4.1.3	Heat Shock	4-13
39			

1	4.2	Transmission Lines . . . . .	4-14
2			
3	4.2.1	Electromagnetic Fields—Acute Effects . . . . .	4-18
4	4.2.2	Electromagnetic Fields—Chronic Effects . . . . .	4-19
5			
6	4.3	Radiological Impacts of Normal Operations . . . . .	4-19
7	4.4	Socioeconomic Impacts of Plant Operations During the License	
8		Renewal Term . . . . .	4-21
9			
10	4.4.1	Housing Impacts During Operations . . . . .	4-23
11	4.4.2	Public Services: Public Utility Impacts During Operations . . . . .	4-25
12	4.4.3	Offsite Land Use During Operations . . . . .	4-26
13	4.4.4	Public Services: Transportation Impacts During Operations . . . . .	4-28
14	4.4.5	Historic and Archaeological Resources . . . . .	4-29
15	4.4.6	Environmental Justice . . . . .	4-31
16			
17	4.5	Groundwater Use and Quality . . . . .	4-35
18	4.6	Threatened or Endangered Species . . . . .	4-36
19	4.7	Evaluation of Potential New and Significant Information on Impacts of	
20		Operations During the Renewal Term . . . . .	4-37
21			
22	4.7.1	Shoreline Erosion . . . . .	4-37
23			
24	4.8	Cumulative Impacts of Operations During the Renewal Term . . . . .	4-39
25			
26	4.8.1	Cumulative Impacts Resulting from Operation of the Plant	
27		Cooling System . . . . .	4-39
28	4.8.2	Cumulative Impacts Resulting from Continued Operation of the	
29		Transmission Lines . . . . .	4-40
30	4.8.3	Cumulative Radiological Impacts . . . . .	4-41
31	4.8.4	Cumulative Socioeconomic Impacts . . . . .	4-42
32	4.8.5	Cumulative Impacts on Groundwater Use and Quality . . . . .	4-43
33	4.8.6	Cumulative Impacts on Threatened or Endangered Species . . . . .	4-43
34			
35	4.9	Summary of Impacts of Operations During the Renewal Term . . . . .	4-44
36	4.10	References . . . . .	4-44
37			
38	5.0	Environmental Impacts of Postulated Accidents . . . . .	5-1
39			
40	5.1	Postulated Plant Accidents . . . . .	5-1
41			

## Contents

1	5.1.1	Design-Basis Accidents . . . . .	5-2
2	5.1.2	Severe Accidents . . . . .	5-3
3			
4	5.2	Severe Accident Mitigation Alternatives . . . . .	5-4
5			
6	5.2.1	Introduction . . . . .	5-5
7	5.2.2	Estimate of Risk for Ginna . . . . .	5-5
8	5.2.3	Potential Design Improvements . . . . .	5-7
9	5.2.4	Evaluation of Risk Reduction Potential and Cost of	
10		Design Improvements . . . . .	5-8
11	5.2.5	Cost/Benefit Comparison . . . . .	5-8
12	5.2.6	Conclusions . . . . .	5-9
13			
14	5.3	References . . . . .	5-9
15			
16	6.0	Environmental Impacts of the Uranium Fuel Cycle and Solid Waste Management . . . .	6-1
17			
18	6.1	The Uranium Fuel Cycle . . . . .	6-2
19	6.2	References . . . . .	6-9
20			
21	7.0	Environmental Impacts of Decommissioning . . . . .	7-1
22			
23	7.1	References . . . . .	7-4
24			
25	8.0	Environmental Impacts of Alternatives . . . . .	8-1
26			
27	8.1	No-Action Alternative . . . . .	8-1
28	8.2	Alternative Energy Sources . . . . .	8-8
29			
30	8.2.1	Coal-Fired Generation . . . . .	8-9
31			
32	8.2.1.1	Closed-Cycle Cooling System . . . . .	8-10
33	8.2.1.2	Once-Through Cooling System . . . . .	8-23
34			
35	8.2.2	Natural-Gas-Fired Generation . . . . .	8-25
36			
37	8.2.2.1	Closed-Cycle Cooling System . . . . .	8-26
38	8.2.2.2	Once-Through Cooling System . . . . .	8-34
39			
40	8.2.3	Nuclear Power Generation . . . . .	8-36

## Contents

1	8.2.3.1	Closed-Cycle Cooling System . . . . .	8-37
2	8.2.3.2	Once-Through Cooling System . . . . .	8-45
3			
4	8.2.4	Purchased Electrical Power . . . . .	8-47
5	8.2.5	Other Alternatives . . . . .	8-48
6			
7	8.2.5.1	Oil-Fired Generation . . . . .	8-49
8	8.2.5.2	Wind Power . . . . .	8-49
9	8.2.5.3	Solar Power . . . . .	8-50
10	8.2.5.4	Hydropower . . . . .	8-50
11	8.2.5.5	Geothermal Energy . . . . .	8-51
12	8.2.5.6	Wood Waste . . . . .	8-51
13	8.2.5.7	Municipal Solid Waste . . . . .	8-52
14	8.2.5.8	Other Biomass-Derived Fuels . . . . .	8-53
15	8.2.5.9	Fuel Cells . . . . .	8-53
16	8.2.5.10	Delayed Retirement . . . . .	8-53
17	8.2.5.11	Utility-Sponsored Conservation . . . . .	8-54
18			
19	8.2.6	Combination of Alternatives . . . . .	8-54
20			
21	8.3	Summary of Alternatives . . . . .	8-57
22			
23	8.4	References . . . . .	8-58
24			
25	9.0	Summary and Conclusions . . . . .	9-1
26			
27	9.1	Environmental Impacts of the Proposed Action – License Renewal . . . . .	9-4
28			
29	9.1.1	Unavoidable Adverse Impacts . . . . .	9-5
30	9.1.2	Irreversible or Irretrievable Resource Commitments . . . . .	9-6
31	9.1.3	Short-Term Use Versus Long-Term Productivity . . . . .	9-6
32			
33	9.2	Relative Significance of the Environmental Impacts of License Renewal and Alternatives . . . . .	9-7
34			
35	9.3	Staff Conclusions and Recommendations . . . . .	9-7
36	9.4	References . . . . .	9-9
37			
38		Appendix A - Comments Received on the Environmental Review . . . . .	A-1
39		Appendix B - Contributors to the Supplement . . . . .	B-1

## Contents

1	Appendix C - Chronology of Environmental Review Correspondence Related to	
2	Rochester Gas and Electric Corporation's Application for License	
3	Renewal of R.E. Ginna Nuclear Power Plant . . . . .	C-1
4	Appendix D - Organizations Contacted . . . . .	D-1
5	Appendix E - R.E. Ginna Nuclear Power Plant Compliance Status and	
6	Consultation Correspondence . . . . .	E-1
7	Appendix F - GEIS Environmental Issues Not Applicable to R.E. Ginna	
8	Nuclear Power Plant . . . . .	F-1
9		
10	Appendix G - NRC Staff Safety Evaluation of Severe Accident Mitigation	
11	Alternatives for the R.E. Ginna Nuclear Power Plant in Support of	
12	License Renewal Application . . . . .	G-1
13		



# Figures

2-1	Location of R.E. Ginna Nuclear Power Plant, 80-km (50-mi) Region . . . . .	2-2
2-2	Location of R.E. Ginna Nuclear Power Plant, 10-km (6-mi) Region . . . . .	2-3
2-3	R.E. Ginna Nuclear Power Plant Layout . . . . .	2-5
2-4	R.E. Ginna Nuclear Power Plant Transmission Lines . . . . .	2-15
4-1	Geographic Distribution of Minority Populations Within 80 km (50 mi) of the R.E. Ginna Nuclear Power Plant Site Based on Census Block Group Data . . . . .	4-33
4-2	Geographic Distribution of Low-Income Populations Within 80 km (50 mi) of the R.E. Ginna Nuclear Power Plant Site Based on Census Block Group Data . . . . .	4-34

# Tables

2-1	R.E. Ginna Nuclear Power Plant Transmission Lines Right-of-Way . . . . .	2-16
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 . . . . .	2-23
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 . . .	2-24
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. . . . .	2-26
2-5	R.E. Ginna Nuclear Power Plant Employee and Contractor Employee Residence by County in New York State . . . . .	2-29
2-6	Total Occupied and Vacant (Available) Housing Units in Wayne and Monroe Counties in New York State, 1990 and 2000 . . . . .	2-29
2-7	Population Growth in Monroe and Wayne Counties in New York State from 1970 to 2020 . . . . .	2-30
2-8	Major Public Water Supply Systems in Monroe and Wayne Counties in New York State . . . . .	2-31
2-9	Land Use in Wayne and Monroe Counties in New York State . . . . .	2-33
2-10	Major Employment Sectors in Wayne and Monroe Counties in New York State (2000) . . . . .	2-37
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 . . . . .	2-40
3-1	Category 1 Issues for Refurbishment Evaluation . . . . .	3-2
3-2	Category 2 Issues for Refurbishment Evaluation . . . . .	3-3
4-1	Category 1 Issues Applicable to the Operation of R.E. Ginna Nuclear Power Plant Cooling System During the Renewal Term . . . . .	4-3
4-2	Category 2 Issues Applicable to the Operation of R.E. Ginna Nuclear Power Plant Cooling System During the Renewal Term . . . . .	4-9
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) . . . . .	4-11
4-4	Category 1 Issues Applicable to R.E. Ginna Nuclear Power Plant Transmission Lines During the Renewal Term . . . . .	4-15
4-5	Category 2 and Uncategorized Issues Applicable to the R.E. Ginna Nuclear Power Plant Transmission Lines During the Renewal Term . . . . .	4-18

1	4-6	Category 1 Issues Applicable to Radiological Impacts of Normal Operations	
2		During the Renewal Term . . . . .	4-20
3	4-7	Category 1 Issues Applicable to Socioeconomics During the Renewal Term . . . . .	4-21
4	4-8	Environmental Justice and GEIS Category 2 Issues Applicable to	
5		Socioeconomics During the Renewal Term . . . . .	4-23
6	4-9	Category 1 Issue Applicable to Groundwater Use and Quality During the	
7		Renewal Term . . . . .	4-35
8	4-10	Category 2 Issue Applicable to Threatened or Endangered Species During the	
9		Renewal Term . . . . .	4-36
10			
11	5-1	Category 1 Issue Applicable to Postulated Accidents During the Renewal Term . . . . .	5-3
12	5-2	Category 2 Issue Applicable to Postulated Accidents During the Renewal Term . . . . .	5-4
13	5-3	Core Damage Frequency for R.E. Ginna Nuclear Power Plant . . . . .	5-6
14	5-4	Breakdown of Population Dose by Containment Release Mode . . . . .	5-7
15			
16	6-1	Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid Waste	
17		Management During the License Renewal Term . . . . .	6-2
18			
19	7-1	Category 1 Issues Applicable to Decommissioning of R.E. Ginna Nuclear Power	
20		Plant Following the Renewal Term . . . . .	7-2
21			
22	8-1	Summary of Environmental Impacts of the No-Action Alternative and	
23		Decommissioning Related to Renewal of the R.E. Ginna Nuclear Power Plant	
24		Operating License . . . . .	8-7
25	8-2	Summary of Environmental Impacts of Coal-Fired Generation Using Closed-Cycle	
26		Cooling at the R.E. Ginna Nuclear Power Plant Site and an Alternate Site in	
27		New York State . . . . .	8-20
28	8-3	Summary of Environmental Impacts of Coal-Fired Generation with	
29		Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or an	
30		Alternate Site in New York State . . . . .	8-24
31	8-4	Summary of Environmental Impacts of Natural-Gas-Fired Generation Using	
32		Closed-Cycle Cooling at an Alternate Site in New York State . . . . .	8-32
33	8-5	Summary of Environmental Impacts of Natural-Gas-Fired Generation with	
34		Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or at an	
35		Alternate Site in New York State . . . . .	8-35
36	8-6	Summary of Environmental Impacts of New Nuclear Generation Using	
37		Closed-Cycle Cooling at the R.E. Ginna Nuclear Power Plant Site and at an	
38		Alternate Site in New York State . . . . .	8-42
39	8-7	Summary of Environmental Impacts of New Nuclear Power Generation Using	
40		Once-Through Cooling at the R.E. Ginna Nuclear Power Plant Site or at an	
41		Alternate Site in New York State . . . . .	8-46

## Contents

1	8-8	Summary of Environmental Impacts for an Assumed Combination of Generating	
2		(Combined-Cycle Natural-Gas-Fired Generation, Wind Power, and DSM) and	
3		Acquisition Alternatives . . . . .	8-55
4			
5	9-1	Summary of Environmental Significance of License Renewal, the No-Action	
6		Alternative, and Alternative Methods of Generation . . . . .	9-8
7			
8	A-1	Individuals Providing Comments During Scoping Comment Period . . . . .	A-4
9			
10	E-1	Consultation Correspondence . . . . .	E-1
11			
12	E-2	Federal, State, Local, and Regional Licenses, Permits, Consultations, and	
13		Other Approvals for the R.E. Ginna Nuclear Power Plant . . . . .	E-2
14			
15	F-1	GEIS Environmental Issues Not Applicable to Ginna . . . . .	F-1
16			
17	G-1	R.E. Ginna Nuclear Power Plant Core Damage Frequency (Revision 4.2 of PSA) . . . .	G-3
18			
19	G-2	Breakdown of Population Dose by Containment Release Mode . . . . .	G-4
20			
21	G-3	SAMA Cost/Benefit Screening Analysis . . . . .	G-17
22			
23	G-4	Uncertainty in the Calculated Core Damage Frequency for R.E. Ginna	
24		Nuclear Power Plant . . . . .	G-24
25			

# 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.<sup>(a)</sup>

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.

## Executive Summary

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

5  
6 The Commission has adopted the following statement of purpose and need for license renewal  
7 from the GEIS:

8  
9 The purpose and need for the proposed action (renewal of an operating license) is to  
10 provide an option that allows for power generation capability beyond the term of a  
11 current nuclear power plant operating license to meet future system generating needs,  
12 as such needs may be determined by State, utility, and, where authorized, Federal  
13 (other than NRC) decisionmakers.

14  
15 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is  
16 to determine

17  
18 ...whether or not the adverse environmental impacts of license renewal are so great that  
19 preserving the option of license renewal for energy planning decisionmakers would be  
20 unreasonable.

21  
22 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge  
23 that, even if an OL is renewed, there are other factors that will ultimately determine whether an  
24 existing nuclear power plant continues to operate beyond the period of the current OL.

25  
26 NRC regulations (10 CFR 51.95(c)(2)) contain the following statement regarding the content of  
27 SEISs prepared at the license renewal stage:

28  
29 The supplemental environmental impact statement for license renewal is not required to  
30 include discussion of need for power or the economic costs and economic benefits of  
31 the proposed action or of alternatives to the proposed action except insofar as such  
32 benefits and costs are either essential for a determination regarding the inclusion of an  
33 alternative in the range of alternatives considered or relevant to mitigation. In addition,  
34 the supplemental environmental impact statement prepared at the license renewal stage  
35 need not discuss other issues not related to the environmental effects of the proposed  
36 action and the alternatives, or any aspect of the storage of spent fuel for the facility  
37 within the scope of the generic determination in 51.23(a) ["Temporary storage of spent  
38 fuel after cessation of reactor operation—generic determination of no significant  
39 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.

## Executive Summary

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

11  
12 RG&E and the staff have established independent processes for identifying and evaluating the  
13 significance of any new information on the environmental impacts of license renewal. RG&E  
14 and the staff did not identify information that is both new and significant related to Category 1  
15 issues that would call into question the conclusions in the GEIS. Neither the scoping process  
16 nor the staff review has identified any new issue applicable to Ginna. Therefore, the staff relies  
17 upon the conclusions of the GEIS for all of the Category 1 issues that are applicable to Ginna.

18  
19 The Ginna ER presents an analysis of the Category 2 issues that are applicable to Ginna. In  
20 addition, the staff has evaluated the two uncategorized issues, environmental justice and  
21 chronic effects from electromagnetic fields. The staff has reviewed the RG&E analysis for each  
22 issue and has conducted an independent review of each issue. Six Category 2 issues are not  
23 applicable because they are related to plant design features or site characteristics not found at  
24 Ginna. Four Category 2 issues are not discussed in this draft SEIS because they are  
25 specifically related to refurbishment. RG&E has stated that its evaluation of structures and  
26 components, as required by 10 CFR 54.21, did not identify any major plant refurbishment  
27 activities or modifications as necessary to support the continued operation of Ginna for the  
28 license renewal period. In addition, any replacement of components or additional inspection  
29 activities that are within the bounds of normal plant operation are not expected to affect the  
30 environment outside of the bounds of the plant operations evaluated in the *Final Environmental*  
31 *Statement Related to the Operation of R.E. Ginna Nuclear Power Plant Unit 1, Rochester Gas*  
32 *and Electric Corporation*, issued by the U.S. Atomic Energy Commission in 1973.

33  
34 Ten Category 2 issues related to operational impacts and one related to postulated accidents  
35 during the renewal term, as well as environmental justice and chronic effects of electromagnetic  
36 fields, are discussed in detail in this draft SEIS. Five of the Category 2 issues and  
37 environmental justice apply to both refurbishment and to operation during the renewal term and  
38 are only discussed in this draft SEIS in relation to operation during the renewal term. For all  
39 11 Category 2 issues and environmental justice, the staff preliminarily concludes that the  
40 potential environmental effects are of SMALL significance in the context of the standards set



1 forth in the GEIS. In addition, the staff determined that appropriate Federal health agencies  
2 have not reached a consensus on the existence of chronic adverse effects from  
3 electromagnetic fields. Therefore, no further evaluation of this issue is required. For severe  
4 accident mitigation alternatives (SAMAs), the staff concludes that a reasonable, comprehensive  
5 effort was made to identify and evaluate SAMAs. Based on its review of the SAMAs for Ginna  
6 and the plant improvements already made, the staff concludes that two of the candidate SAMAs  
7 are cost beneficial. However, these SAMAs do not relate to adequately managing the effects of  
8 aging during the period of extended operation. Therefore, they need not be implemented as  
9 part of license renewal pursuant to 10 CFR Part 54.

10  
11 Mitigation measures were considered for each Category 2 issue. Current measures to mitigate  
12 the environmental impacts of plant operation were found to be adequate, and no additional  
13 mitigation measures were deemed sufficiently beneficial to be warranted.

14  
15 Cumulative impacts of past, present, and reasonably foreseeable future actions were  
16 considered, regardless of what agency (Federal or non-Federal) or person undertakes such  
17 other actions. For purposes of this analysis, where Ginna license renewal impacts are deemed  
18 to be SMALL, the staff concluded that these impacts would not result in significant cumulative  
19 impacts on potentially affected resources.

20  
21 If the Ginna OL is not renewed and the plant ceases operation on or before the expiration of the  
22 current OL, then the adverse impacts of likely alternatives will not be smaller than those  
23 associated with continued operation of Ginna. The impacts may, in fact, be greater in some  
24 areas.

25  
26 The preliminary recommendation of the NRC staff is that the Commission determine that the  
27 adverse environmental impacts of license renewal for Ginna are not so great that preserving the  
28 option of license renewal for energy-planning decisionmakers would be unreasonable at the  
29 license renewal stage. This recommendation is based on (1) the analysis and findings in the  
30 GEIS; (2) the ER submitted by RG&E; (3) consultation with other Federal, State, and local  
31 agencies; (4) the staff's own independent review; and (5) the staff's consideration of public  
32 comments received during the scoping process.



## Abbreviations/Acronyms

1	$\mu\text{m}$	micrometer
2		
3	ac	acre(s)
4	AC	alternating current
5	ACC	averted cleanup and decontamination costs
6	ADAMS	Agencywide Document Access and Management System
7	AEA	Atomic Energy Act of 1954, as amended
8	AEC	U.S. Atomic Energy Commission
9	AFW	auxiliary feedwater
10	ALARA	as low as reasonably achievable
11	AOC	averted offsite property damage costs
12	AOE	averted occupational exposure
13	AOSC	averted onsite costs
14	AOV	air-operated valve
15	APE	averted public exposure
16	ATWS	anticipated transient(s) without scram
17		
18	BACT	best available control technology
19	Bq	becquerel(s)
20	Bq/mL	becquerel(s) per milliliter
21	Btu	British thermal unit(s)
22		
23	°C	degrees Celsius
24	CAA	Clean Air Act of 1970, as amended
25	CDF	core damage frequency
26	CEQ	Council on Environmental Quality
27	CFR	Code of Federal Regulations
28	Ci	curie(s)
29	cm	centimeter(s)
30	COE	cost of enhancement
31	CWA	Clean Water Act of 1977 (also known as Federal Water Pollution Control Act)
32		
33	DBA	design-basis accident
34	DC	direct current
35	DOE	U.S. Department of Energy
36	DOT	U.S. Department of Transportation
37	DSM	demand-side management
38		
39		

## Abbreviations/Acronyms

1	EIA	Energy Information Administration (of DOE)
2	EIS	environmental impact statement
3	ELF-EMF	extremely low frequency-electromagnetic field
4	EPA	U.S. Environmental Protection Agency
5	ER	Environmental Report
6	ESA	Endangered Species Act
7		
8	°F	degrees Fahrenheit
9	FAA	U.S. Federal Aviation Administration
10	FERC	Federal Energy Regulatory Commission
11	FES	Final Environmental Statement
12	FR	Federal Register
13	ft	foot/feet
14	ft <sup>3</sup>	cubic foot/feet
15	F-V	Fussel-Vessely
16	FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act of
17		1977)
18	FWS	U.S. Fish and Wildlife Service
19		
20	g	gram(s)
21	gal	gallon(s)
22	GEIS	Generic Environmental Impact Statement for License Renewal of Nuclear Plants,
23		NUREG-1437
24	Ginna	R.E. Ginna Nuclear Power Plant
25	GJ	gigajoule(s)
26	gpd	gallon(s) per day
27	gpm	gallon(s) per minute
28	GWh	gigawatt hour(s)
29		
30	ha	hectare(s)
31	hr	hour(s)
32	Hz	hertz
33		
34	IEEE	Institute of Electrical and Electronics Engineers
35	in.	inch(es)
36	IPE	individual plant examination
37	IPEEE	individual plant examination of external events
38	ISLOCA	interfacing system loss-of-coolant accident
39		
40	J	joule(s)

## Abbreviations/Acronyms

1	kg	kilogram(s)
2	kJ	kilojoule(s)
3	km	kilometer(s)
4	kV	kilovolt(s)
5	kWh	kilowatt hour(s)
6		
7	L	liter(s)
8	L/d	liter(s) per day
9	L/s	liter(s) per second
10	LAER	lowest achievable emissions rate
11	lb	pound(s)
12	LERF	large early release frequency
13	LOCA	loss-of-coolant accident
14		
15	m	meter(s)
16	mA	milliampere(s)
17	MAB	maximum attainable benefit
18	MACCS2	MELCOR Accident Consequence Code System 2
19	MBq	megabecquerel(s)
20	MCWA	Monroe County Water Authority
21	MGD	million gallons per day
22	m/s	meter(s) per second
23	m <sup>3</sup> /d	cubic meter(s) per day
24	m <sup>3</sup> /min	cubic meter(s) per minute
25	m <sup>3</sup> /s	cubic meter(s) per second
26	mi	mile(s)
27	min	minute(s)
28	MJ/m <sup>3</sup>	megajoule(s) per cubic meter
29	ml	milliliter(s)
30	MMBtu	million British thermal units of heat
31	MOV	motor-operated valve
32	mrem	millirem(s)
33	msl	mean sea level
34	mSv	millisievert(s)
35	MT	metric ton(s) (or tonne[s])
36	MTHM	metric ton(s) (or tonne[s]) heavy metal
37	MTU	metric ton(s) uranium
38	MW	megawatt(s)
39	MWd	megawatt-day(s)
40	MW(e)	megawatt(s) electric
41	MW(t)	megawatt(s) thermal

## Abbreviations/Acronyms

1	MWh	megawatt hour(s)
2		
3	NA	not applicable
4	NAS	National Academy of Sciences
5	NEI	Nuclear Energy Institute
6	NEPA	National Environmental Policy Act of 1969
7	NESC	National Electrical Safety Code
8	ng	nanograms
9	NHPA	National Historic Preservation Act of 1966
10	NIEHS	National Institute of Environmental Health Sciences
11	NMFS	National Marine Fisheries Service
12	NO <sub>x</sub>	nitrogen oxide(s)
13	NOAA	National Oceanic and Atmospheric Administration
14	NPDES	National Pollutant Discharge Elimination System
15	NRC	U.S. Nuclear Regulatory Commission
16	NRHP	National Register of Historic Places
17	NYS	New York State
18	NYSDEC	New York State Department of Environmental Conservation
19	NYSERDA	New York State Energy Research and Development Authority
20		
21	ODCM	Offsite Dose Calculation Manual
22	OL	operating license
23		
24	PARS	Publicly Available Records portion of ADAMS
25	PCB	polychlorinated biphenyl(s)
26	pCi	picocurie(s)
27	PCR	plant change request
28	PM <sub>10</sub>	particulate matter with aerodynamic diameter $\leq 10 \mu\text{m}$
29	PORV	power-operated relief valves
30	PRA	probabilistic risk assessment
31	PSA	probabilistic safety assessment
32	PSD	prevention of significant deterioration
33	psig	pounds per square inch gauge
34	PWR	pressurized water reactor
35		
36	RAI	request for additional information
37	RAW	risk achievement worth
38	RCP	reactor coolant pump
39	RCRA	Resource Conservation and Recovery Act of 1976
40	RCS	reactor coolant system

## Abbreviations/Acronyms

1	rem	special unit of dose equivalent, equal to 0.01 Sv
2	REMP	radiological environmental monitoring program
3	RG&E	Rochester Gas and Electric Corporation
4	RHR	residual heat removal
5	RMWT	reactor makeup water tank
6	ROC	Greater Rochester International Airport
7	RPC	replacement power cost
8	RWST	refueling water storage tank
9		
10	s	second(s)
11	SAFW	standby auxiliary feedwater
12	SAMA	severe accident mitigation alternative
13	SAR	safety analysis report
14	SBO	station blackout
15	SCR	selective catalytic reduction
16	SEIS	supplemental environmental impact statement
17	SEP	systematic evaluation program
18	SER	safety evaluation report
19	SGTR	steam generator tube rupture
20	SHPO	State Historic Preservation Officer
21	SO <sub>2</sub>	sulfur dioxide
22	SO <sub>x</sub>	sulfur oxides
23	SPDES	State Pollutant Discharge Elimination System
24	SQUG	Seismic Qualification Utility Group
25	STC	source term category
26	Sv	sievert, special unit of dose equivalent
27	SW	service water
28		
29	THPO	Tribal Historic Preservation Officer
30		
31	UFSAR	updated final safety analysis report
32	USC	United States Code
33	USCB	U.S. Census Bureau
34	USI	unresolved safety issue
35		
36	VAC	volt(s) alternating current
37	VCT	volume control tank
38		
39	WEC	Westinghouse Electric Company
40		