



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

0.4 p subject
NRC
Route
File

July 22, 1992

NOTE TO: Mort Fleishman
Office of Commissioner Rogers

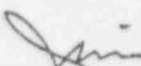
FROM: James L. Blaha
Assistant for Operations
Office of the Executive Director
for Operations

SUBJECT: SITES WITH EXCLUSION AREAS LESS THAN 0.4 MILES

The staff paper (SECY-92-215) which proposed revisions to the reactor site criteria, 10 CFR Part 100, noted that 25 of the current 75 reactor sites had exclusion area sizes that were less than 0.4 miles, but did not name the specific sites.

In your telephone call of July 16, 1992 to Len Soffer you indicated that Commissioner Rogers wished to see a listing of those reactor sites.

Enclosed is a listing of all U. S. sites where reactors are currently operating or under construction. Those sites having an exclusion area size less than 640 meters (0.4 miles) are marked. This list was included as Enclosure 3 to staff paper SECY-90-341, "Staff Study on Source Term Update and Decoupling Siting from Design."


James L. Blaha
Assistant for Operations
Office of the Executive Director
for Operations

Enclosure: As stated

cc: Technical Assistant, IS
Technical Assistant, JCV
Technical Assistant, FR
Technical Assistant, GD
SECY
J. Taylor, EDO
J. Sniezek, DEDR

9408160108 940629
PDR COMMS NRCC
CORRESPONDENCE PDR

ENCLOSURE 3

EXISTING U.S. REACTOR SITES

<u>REACTOR SITE</u>	<u>EXCLUSION AREA BOUNDARY DISTANCE (METERS)</u>	<u>LOW POPULATION ZONE (LPZ) OUTER RADIUS (METERS)</u>	<u>POP. CENTER DISTANCE (MILES)</u>
1. Arkansas	1046	4024	4
✓ 2. Beaver Valley	610	5795	5
3. Bellefonte	914	3219	4
4. Big Rock Pt	817	6439	45
✓ 5. Braidwood	457	1810	20
6. Browns Ferry	1219	3219	10
7. Brunswick	914	3219	16
✓ 8. Byron	460	4827	17
9. Callaway	1100	4023	25
10. Calvert Cliffs	1150	3219	45
11. Catawba	762	6097	5.1
12. Clinton	975	4025	22
13. Comanche Pk.	1400	6440	40
✓ 14. Cook	610	3219	8
15. Cooper	746	1609	60
16. Crystal River	1340	8047	55
✓ 17. Davis Besse	634	3219	20
18. Diablo Canyon	800	9656	12
19. Dresden	671	8000	14
✓ 20. Duane Arnold	440	9659	8

	<u>EAB</u>	<u>LPZ</u>	<u>PCD</u>
21. Farley	1260	3219	16.5
22. Fermi	915	4828	6
23. Fitzpatrick	975	5470	7
✓24. Ft. Calhoun	375	4827	10
✓25. Ft. St. Vrain	590	4827	14
✓26. Ginna	457	4827	16
27. Grand Gulf	752	3219	25
✓28. Haddam Neck	530	11,263	9.5
29. Hatch	1250	7250	48
30. Hope Creek	792	8045	18
✓31. Indian Pt.	330	1100	0.87
32. Kewaunee	1200	4827	17.5
✓33. LaSalle	515	6400	5
34. Limerick	760	2043	1.7
✓35. Maine Yankee	610	9654	26
36. McGuire	762	8850	11
✓37. Millstone	503	3700	3.2
✓38. Monticello	488	1609	22
39. Nine Mile Pt.	1555	6115	7
40. North Anna	1350	9656	24
41. Oconee	1609	9654	21
✓42. Oyster Creek	402	3219	8
43. Palisades	671	4827	20
44. Palo Verde	900	6437	34

	<u>EAB</u>	<u>LPZ</u>	<u>PCD</u>
45. Peach Bottom	820	7300	18
46. Perry	915	6437	6.3
✓47. Pilgrim	441	2414	2.5
48. Pt. Beach	1207	9012	8
49. Prairie Is.	715	2414	26
✓50. Quad Cities	380	4827	7
51. Rancho Seco	640	8000	17
52. River Bend	914	4023	24
✓53. Robinson	425	7242	25
54. St. Lucie	1554	8049	8
55. Salem	1165	8047	18
56. San Onofre	800	4827	17
57. Seabrook	914	2413	4
✓58. Sequoyah	585	4827	16
59. Shearon Harris	2133	4827	12
60. So. Texas	1430	4827	26
61. Summer	1630	4827	26
✓62. Surry	560	4827	4.5
✓63. Susquehanna	567	4800	12
✓64. Three Mile Is.	610	3219	12
65. Trojan	662	4023	6
66. Turkey Pt.	1269	8047	15
✓67. Vt. Yankee	277	8047	30
68. Vogtle	1098	3219	26

	<u>EAB</u>	<u>LPZ</u>	<u>PCD</u>
69. WPPSS1	1950	6440	8
70. WPPSS-2	1950	4827	12
71. Waterford	915	3219	13
72. Watts Bar	1200	4827	40
73. Wolf Creek	1200	4023	28
74. Yankee Rowe	945	3219	25
✓ 75. Zion	415	1600	6

V9
#6

U.9 G. S. Wong ✓

NEWMAN & HOLTZINGER, P.C.

ATTORNEYS AT LAW

1615 L STREET, N.W.

WASHINGTON, D.C. 20036-5610

TELEPHONE: (202) 955-6600

FAX: (202) 872-0581

June 1, 1993

Mr. Samuel J. Chilk
Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Docketing and Service Branch

Re: Proposed Rule on Reactor Site Criteria; Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants and Proposed Denial of Petition for Rulemaking From Free Environment, Inc. et al. (57 Fed. Reg. 47,802 (October 20, 1992))

Dear Mr. Chilk:

The law firm of Newman & Holtzinger, P.C., on behalf of clients in its International Siting Group (ISG), hereby submits the original copy, three hard copies and one electronic copy of the ISG's comments on the Nuclear Regulatory Commission's proposed rule, "Reactor Site Criteria; Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants and Proposed Denial of Petition for Rulemaking From Free Environment, Inc. et al.," (57 Fed. Reg. 47,802 (October 20, 1992)).^{2/} The ISG has the following membership:

Atomic Energy of Canada, Ltd.
Electricité de France
The Federation of Electric Power Companies
Hokkaido Electric Power Co.
Tohoku Electric Power Co.
Tokyo Electric Power Co.
Chubu Electric Power Co.
Hokuriku Electric Power Co.
The Kansai Electric Power Co.
The Chugoku Electric Power Co.
Shikoku Electric Power Co.
Kyushu Electric Power Co.
The Japan Atomic Power Co.
Taiwan Power Company.

^{2/} Messrs. William O. Doub and L. Manning Munzring and Ms. Janet E.B. Ecker, members of the firm, entered notices of appearance as counsel for members of the ISG in this rulemaking proceeding.

9306146410 100 pp

U.S. Nuclear Regulatory Commission
June 1, 1993
Page 2

The ISG was formed in response to the Commission's desire to seek the views of the international community concerning the proposed revisions to the siting criteria. ISG Members own and operate nuclear power plants in ISG Member countries. Siting of nuclear power plants in ISG Member countries is governed by national nuclear safety standards, which are consistent with the nuclear safety standards of the International Atomic Energy Agency (IAEA). These international and national siting standards were strongly influenced by the Commission's siting standards. The Commission's proposed revisions to its siting regulations in 10 CFR Part 100, if adopted, would result in fundamental changes to the process for selecting new nuclear power plant sites.

For the reasons set forth below and in the enclosed comments, International Siting Group Members urge the Commission to withdraw the proposed revisions to the siting criteria and terminate the rulemaking proceeding:

- (1) Adoption of the proposed revisions to the Commission's demographic regulations in 10 CFR Part 100 will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the International Atomic Energy Agency (IAEA) and national standards in ISG Member countries.
- (2) The existing demographic regulations in 10 CFR Part 100 have worked well. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety nor to achieve site isolation through "decoupling" of nuclear power plant siting and design. Adoption of the proposed revisions will not provide a substantial increase in protection or contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.
- (3) The technical basis for the proposed revisions to the Siting Criteria is inadequate, internally inconsistent and confusing.
- (4) The proposed revisions to the Seismic Criteria should not be adopted. Revision should await resolution of the controversy on the use of deterministic versus probabilistic methods in site selection. Any revision adopted should

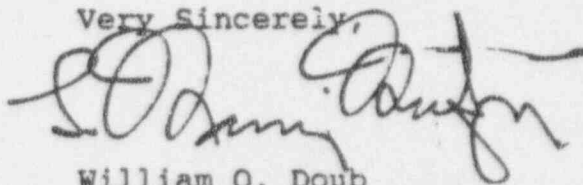
U.S. Nuclear Regulatory Commission
June 1, 1993
Page 3

meet the Commission's rulemaking objective of regulatory stability.

- (5) The Environmental Assessment prepared in conjunction with the proposed revisions is inadequate as a matter of law to support a finding of no significant environmental impact.
- (6) Finalization of the proposed revisions to the siting regulations would not be in accord with sound agency decisionmaking.

Each of the above reasons is sufficient grounds for the Commission to terminate the rulemaking proceeding. When taken together, the arguments are overwhelming that to proceed at this time with the siting rulemaking is contrary to sound public policy concerning the protection of the public health and safety and the environment from radiological hazard and disruptive of internationally accepted safety norms regarding the siting and design of nuclear power plants.

Very Sincerely,



William O. Doub
L. Manning Muntzing
J.E.B. Ecker

cc: Chairman Ivan Selin
Commissioner Kenneth C. Rogers
Commissioner James R. Curtiss
Commissioner Forrest J. Remick
Commissioner E. Gail de Planque
Mr. William C. Parler, General Counsel
Mr. James M. Taylor, Executive Director
for Operations
Dr. Eric S. Beckjord, Director
Office of Nuclear Reactor Regulation
Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
Mr. Carlton Stoiber, Director
Office of International Programs
Dr. Paul G. Shewmon, Chairman,
Advisory Committee on Reactor Safeguards

**INTERNATIONAL SITING GROUP (ISG)
COMMENTS ON PROPOSED REVISIONS
TO U.S. NUCLEAR POWER PLANT
SITING REGULATIONS**

June 1, 1993

*Newman & Holtzinger, P.C.
1615 L Street, N.W.
Suite 1000
Washington, D.C. 20036
(202) 955-6600*

TABLE OF CONTENTS

	<u>PAGE</u>
EXECUTIVE SUMMARY	iv
I. INTRODUCTION	1
A. Background	1
1. Summary of Proposed Revisions to the Nuclear Regulatory Commission's Reactor Siting Regulations ..	1
2. International Siting Group (ISG) Membership	3
3. ISG Members Have an Interest in Participating in This Rulemaking to Revise NRC's Nuclear Power Plant Site Safety Regulations in Part 100.	4
4. The Commission Has an Obligation to Consider the Implications of the Proposed Revisions to Its Siting Regulations on International Nuclear Power Plant Safety and Siting	6
B. Summary of Reasons for Requesting Termination of the Rulemaking Proceeding to Change the Commission's Siting Regulations in 10 CFR Part 100	10
II. MAJOR ARGUMENTS AGAINST PROPOSED CHANGES TO U.S. NUCLEAR POWER PLANT SITING REQUIREMENTS	12
A. Adoption of the Proposed Revisions to the Commission's Demographic Regulations in 10 CFR Part 100 Will Do Major Damage to the Evolving International Consensus on Nuclear Safety Standards and Lead to Needless Inconsistency Between U.S. Nuclear Safety Standards for the Siting of Nuclear Power Plants and Standards of the International Atomic Energy Agency (IAEA) and National Standards in ISG Member Countries. The Existing Demographic Regulations in 10 CFR Part 100 Have Worked Well. Adoption of the Proposed Revisions Is Not Needed to Ensure Adequate Protection of the Public Health and Safety Nor to Achieve Site Isolation Through "Decoupling" of Nuclear Power Plant	

Siting and Design. Adoption of the Proposed Revisions Will Not Provide a Substantial Increase in Protection or Contribute to Increased Defense-in-Depth. The Adverse Impacts of the Proposed Revisions Greatly Exceed Their Benefits	12
1. Adoption of the proposed revisions to the Commission's demographic regulations in 10 CFR Part 100 will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the International Atomic Energy Agency (IAEA) and national standards in ISG Member countries	13
2. The existing demographic regulations in 10 CFR Part 100 have worked well. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety nor to achieve site isolation through "decoupling" of nuclear power plant siting and design. Adoption of the proposed revisions will not provide a substantial increase in protection or contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.	21
a. The existing demographic regulations in 10 CFR Part 100 have worked well	21
b. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety	31
c. Adoption of the proposed revisions is not needed to achieve site isolation through "decoupling" of nuclear power plant siting and design	37
d. Adoption of the proposed revisions to the demographic regulations in Part 100 will not provide a substantial increase in protection nor contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits	42

B.	The Technical Basis for the Proposed Revisions to the Site Safety Criteria Is Inadequate, Internally Inconsistent and Confusing	57
C.	The Proposed Revisions to the Seismic Criteria Should Not Be Adopted. Revision Should Await Resolution of the Controversy on the Use of Deterministic Versus Probabilistic Methods In Site Selection. Any Revision Adopted Should Meet the Commission's Rulemaking Objective of Regulatory Stability	61
1.	The Commission should resolve the controversy between use of deterministic versus probabilistic techniques before proceeding to rulemaking	62
2.	The proposed requirements are unlikely to meet the stated objectives of greater predictability and stability.	64
3.	Any revision to the Commission's seismic regulations should provide regulatory stability	66
D.	The Environmental Assessment Prepared in Conjunction with the Proposed Revisions Is Inadequate as a Matter of Law to Support a Finding of No Significant Environmental Impact . . .	69
E.	Finalization of the Proposed Revisions to the Siting Regulations Would Not Be in Accord With Sound Agency Decisionmaking	78
III.	CONCLUSIONS	81
	APPENDIX	A1

EXECUTIVE SUMMARY

The law firm of Newman & Holtzinger, P.C., on behalf of clients in its International Siting Group (ISG), hereby submits comments on the Nuclear Regulatory Commission's proposed rule, "Reactor Site Criteria; Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants and Proposed Denial of Petition for Rulemaking From Free Environment, Inc. et al.," (57 Fed. Reg. 47,801 (October 20, 1992)). The ISG has the following membership:

Atomic Energy of Canada, Ltd.

Electricité de France

The Federation of Electric Power Companies

Hokkaido Electric Power Co.

Tohoku Electric Power Co.

Tokyo Electric Power Co.

Chubu Electric Power Co.

Hokuriku Electric Power Co.

The Kansai Electric Power Co.

The Chugoku Electric Power Co.

Shikoku Electric Power Co.

Kyushu Electric Power Co.

The Japan Atomic Power Co.

Taiwan Power Company.

ISG Members own and operate nuclear power plants in ISG Member countries. Siting of nuclear power plants in ISG Member countries is governed by national nuclear safety standards, which are consistent with the nuclear safety standards of the International Atomic Energy Agency (IAEA). These international and national siting standards were strongly influenced by the Commission's siting standards. The Commission's proposed revisions to its site safety regulations in 10 CFR Part 100, if adopted, would result in fundamental changes to the process for selecting new nuclear power plant sites. The fundamental nature of the changes likely would force reconsideration of IAEA and national nuclear safety siting standards and raise questions in ISG Members' countries concerning the adequacy of present and future nuclear power plant sites to ensure adequate protection of the public health and safety. ISG Members ask that the proposed revisions be withdrawn.

The proposed revisions are not necessary to achieve siting of nuclear power plants in areas of lower population density and away from population centers and they are inconsistent with the internationally accepted principle of establishing site safety standards which permit (and recognize the necessity to have) flexibility in balancing the various factors important to the safe siting of nuclear power plants. If adopted, the regulation could force review of the presently accepted site safety principles and raise questions about whether presently operating nuclear power plants provide adequate protection of the public and environment when the plants are located in more densely populated areas or have smaller exclusion areas than the revised criteria would permit. Moreover,

should these proposed revisions become the norm, they could preclude the siting of nuclear power plants in many areas of Western Europe and Asia and result in a dependence on energy alternatives with less favorable environmental impacts.

ISG Members believe that the NRC should consider the international implications of the proposed revisions to the Commission's siting regulations. A fundamental result of international nuclear cooperation has been an increased appreciation for safety standards that are shared by the entire international community. For the U.S. to develop and promulgate new site safety regulations without an appreciation for the international nuclear standards could imply a repudiation of current international safety standard development efforts. The proposed numerical criteria would be grossly limiting, unnecessarily so because the reviews required by the NRC and regulatory bodies in other countries using standards which are reflective of international siting norms result in adequate protection of the public health and safety and in the selection of sites which are among the best reasonably to be found after balancing the site characteristics important to adequate protection of the public and the environment. Likewise, decoupling of siting criteria from source terms and dose calculations to achieve site isolation would be entirely unsatisfactory as it would eliminate a key measure of merit of the site-plant combination, would prevent the advantageous utilization of special design provisions in siting decisions and could provide a disincentive to improvement of plant safety design features. Such a change would be extremely limiting and certainly the wrong approach in countries or regions of countries where siting options are limited. As to the seismic criteria being proposed for

codification, adoption seems premature, making them unsuitable to serve as the basis for an international safety standard. Moreover, the division within the NRC Staff and among its experts concerning the use of probabilistic versus deterministic evaluation techniques illustrates well that the criteria do not embody the consensus associated with international safety standards.

For the reasons set forth in the main text of the ISG comments, International Siting Group Members urge the Commission to withdraw the proposed revisions to the siting criteria and terminate the rulemaking proceeding. The principal reasons for this position include the following:

- (1) Adoption of the proposed revisions to the Commission's demographic regulations in 10 CFR Part 100 will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the International Atomic Energy Agency (IAEA) and national standards in ISG Member countries.
- (2) The existing demographic regulations in 10 CFR Part 100 have worked well. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety nor to achieve site isolation through "decoupling" of nuclear power plant siting and design. Adoption of the proposed revisions will not provide a substantial increase in protection or contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.
- (3) The technical basis for the proposed revisions to the Site Safety Criteria in 10 CFR Part 100 is inadequate, internally inconsistent and confusing.
- (4) The proposed revisions to the Seismic Criteria should not be adopted. Revision should await resolution of the controversy on the use of deterministic versus probabilistic methods in site selection. Any revision

adopted should meet the Commission's rulemaking objective of regulatory stability.

- (5) The Environmental Assessment prepared in conjunction with the proposed revisions is inadequate as a matter of law to support a finding of no significant environmental impact.
- (6) Finalization of the proposed revisions to the siting regulations would not be in accord with sound agency decisionmaking.

Each of the above reasons alone is sufficient grounds for the Commission to terminate the rulemaking proceeding. When taken together, the arguments are overwhelming that to proceed at this time with the siting rulemaking is contrary to sound public policy concerning the protection of the public health and safety and the environment from radiological hazard and disruptive of internationally accepted safety norms regarding the siting and design of nuclear power plants.

I. INTRODUCTION

A. Background

1. **Summary of Proposed Revisions to the Nuclear Regulatory Commission's Reactor Siting Regulations**

On October 20, 1992, the Nuclear Regulatory Commission (Commission or NRC) published in the Federal Register (57 Fed. Reg. at 47,802) a proposed rule to change the reactor site safety requirements in 10 CFR Part 100 (Part 100) to include specific numerical demographic requirements and to revise the seismic and geologic siting criteria in use since 1972.

The proposed changes to the site safety regulations in Part 100 concerning demographics would set a minimum distance for an exclusion area surrounding a nuclear power reactor at 0.4 miles (640 meters). The requirement for a low population zone surrounding the exclusion area would be deleted from the present Part 100 on the basis that the required Emergency Planning Zone (EPZ) and the proposed population density requirements obviate the need for a low population zone requirement. The proposed regulation would codify in Part 100 (the site safety regulation) the population density limits currently provided as guidance in Regulatory Guide 4.7 in connection with consideration of alternative sites. There would be a critical loss of necessary flexibility in making site safety determinations. Maximum population density at the time of initial site approval would be 500 people per square mile averaged out to 30 miles. The projected population density 40 years after initial site approval could be no more than 1000 people per square mile averaged out to 30 miles.

In addition to these numerical changes in the site safety regulations concerning demographics, a number of other revisions are proposed. Some of these proposed revisions include the deletion of meteorological factors from radiological dose calculations for siting purposes; modification of hydrological factor requirements; the addition of review of nearby industrial and transportation facilities; and the addition of periodic reporting requirements for non-related activities.

The proposed revisions to Part 100 concerning seismic and geologic siting criteria for nuclear power plants are intended to reflect advances in the earth sciences and in earthquake engineering. Under the seismic portion of the regulation, Safe Shutdown Earthquake (SSE) Ground Motion and site suitability criteria would be separated from design-related criteria, and detailed seismic guidance would be removed from the regulation. The regulation would require both probabilistic and deterministic evaluations to determine site suitability, including an explicit criterion that the probability of exceeding the SSE at a proposed site must be lower than the median annual probability of exceeding the SSE for the current generation of operating plants. In addition, the SSE calculation assumptions would be revised to decouple the Operating Basis Earthquake (OBE) from the SSE. Finally, the proposed regulation would require plant shutdown in the event of vibratory ground motion in excess of the OBE.

2. International Siting Group (ISG) Membership

The law firm of Newman & Holtzinger, P.C., on behalf of clients in its International Siting Group (ISG), hereby submits comments on the Nuclear Regulatory Commission's proposed rule, "Reactor Site Criteria; Including Seismic and Earthquake Engineering Criteria for Nuclear Power Plants and Proposed Denial of Petition for Rulemaking From Free Environment, Inc. et al.," (57 Fed. Reg. at 47,802 (October 20, 1992)).^{1/} The ISG has the following membership:

Atomic Energy of Canada, Ltd.

Electricité de France

The Federation of Electric Power Companies

Hokkaido Electric Power Co.

Tohoku Electric Power Co.

Tokyo Electric Power Co.

Chubu Electric Power Co.

Hokuriku Electric Power Co.

The Kansai Electric Power Co.

The Chugoku Electric Power Co.

Shikoku Electric Power Co.

Kyushu Electric Power Co.

The Japan Atomic Power Co.

Taiwan Power Company.

^{1/} Messrs. William O. Doub and L. Manning Muntzing and Ms. Janet E.B. Ecker, members of the firm, entered notices of appearance as counsel for members of the ISG in this rulemaking proceeding.

The ISG was formed in response to the Commission's desire to seek the views of the international community concerning the proposed revisions to the site safety criteria. See Staff Requirements Memorandum, "SECY 92-215 -- Revision of 10 CFR Part 100, Revisions to 10 CFR Part 50, New Appendix B to 10 CFR Part 100 and New Appendix S to 10 CFR Part 50" (August 18, 1992). In order to ensure that the comments of ISG Members on the proposed changes would be fully considered by the Commission in considering the disposition of the proposed changes, Newman & Holtzinger filed a request for an extension of the public comment period to June 1, 1993. On March 22, 1993, the Commission approved the extension request.

3. ISG Members Have an Interest in Participating in This Rulemaking to Revise NRC's Nuclear Power Plant Site Safety Regulations in Part 100.

ISG Members own and operate nuclear power plants in ISG Member countries. Siting of nuclear power plants in ISG Member countries is governed by national nuclear safety standards, which are consistent with the nuclear safety standards of the International Atomic Energy Agency (IAEA). These international and national siting standards were strongly influenced by the Commission's siting standards. The Commission's proposed revisions to its site safety regulations in 10 CFR Part 100, if adopted, would result in fundamental changes to the process for selecting new nuclear power plant sites. Specifically, adoption of the proposed revisions to the site safety requirements in Part 100 concerning demographics would change demographics from one of several balancing factors to be

considered in selecting a nuclear power plant site to a screening factor to be applied first before taking into account the other safety-related site characteristics to be evaluated during the site selection process. These other safety-related site characteristics would be relegated to secondary importance in the site selection process, as they would be considered only in connection with sites which first met the demographic requirements. The fundamental nature of the changes likely would force reconsideration of IAEA and national nuclear safety siting standards and raise questions in ISG Members' countries concerning the adequacy of present and future nuclear power plant sites to ensure adequate protection of the public health and safety.

As discussed below, the proposed revisions are not necessary to achieve siting of nuclear power plants in areas of lower population density and away from population centers and they are inconsistent with the internationally accepted principle of establishing site safety standards which permit (and recognize the necessity to have) flexibility in balancing the various factors important to the safe siting of nuclear power plants. If adopted, the regulation could unnecessarily force review of the presently accepted site safety principles and raise questions about whether presently operating nuclear power plants provide adequate protection of the public and environment when the plants are located in more densely populated areas or have smaller exclusion areas than the revised criteria would permit. Moreover, should these proposed revisions become the norm, they could preclude the siting of nuclear power plants in many areas of

Western Europe and Asia and result in a dependence on energy alternatives with less favorable environmental impacts.

4. The Commission Has an Obligation to Consider the Implications of the Proposed Revisions to Its Siting Regulations on International Nuclear Power Plant Safety and Siting.

The International Atomic Energy Agency Participation Act of 1957 (IAEA Act), 71 Stat. 453, provides in Section 3 that, "The participation of the United States in the International Atomic Energy Agency shall be consistent with and in furtherance of the purposes of the Agency set forth in its statute and the policy concerning the development, use and control of atomic energy set forth in the Atomic Energy Act of 1954 as amended." In conducting the instant rulemaking, the NRC thus far has failed to take into adequate account the relationship of its actions with those of the IAEA. ISG Members believe that pursuant to the IAEA Act, the NRC should consider the implications of the proposed revisions to the Commission's site safety regulations on the IAEA's guidelines and process with respect to siting. In order to assist the Commission in this consideration, the ISG is submitting comments regarding such implications.

The IAEA, an autonomous member of the United Nations family of organizations, came into being when its statute entered into force on July 29, 1957. As a member of the IAEA, the United States subscribes to the IAEA's objectives as defined in its statute. One of these objectives is "[to] encourage and assist research on, and development and practical application of, atomic energy for peaceful uses throughout the world." Among the IAEA's activities related to safety in atomic energy are development of standards, regulations, codes of

practice and recommendations concerning specific radiological rules, emergency procedures, and other matters.

The IAEA has long considered siting of nuclear installations to be an important matter. The United States participated in a symposium held in Vienna, Austria, in December 1974 under the joint sponsorship of the IAEA and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD).^{2/} Several papers were submitted on behalf of the United States concerning its practice with respect to such matters as acceptability of nuclear sites and environmental protection. Other nations also presented papers and participated in discussions, leading to a rather comprehensive discussion of the matter which was published by the IAEA in 1975. Over the years, the IAEA has published a series of standards concerning the siting of nuclear facilities. For example, the International Nuclear Safety Advisory Group (INSAG) included siting safety principles in its Safety Series No. 75-INSAG-3, "Basic Safety Principles for Nuclear Power Plants" (1988). A "Code on the Safety of Nuclear Power Plants: Siting" was prepared in 1978 and revised in 1988 (Siting Code). Thirteen titles in the Nuclear Safety Standards (NUSS) series concern siting.

The extension of the public comment period to June 1, 1993, permits the NRC to satisfy its international obligations under the IAEA Act by taking into account the implications for international siting and safety standards and the role of the United States in their development. Although not every NRC rulemaking

^{2/} Siting of Nuclear Facilities, Proceedings of the symposium held in Vienna, Austria, December 9-13, 1974, Jointly Organized by the IAEA and NEA (OECD).

need be accompanied by a detailed review of foreign policy implications, there are certain NRC rulemakings having such an obvious and direct bearing on international nuclear matters that failure to consider United States rules in the context of a global nuclear regime is contrary to the basic spirit of United States participation in the IAEA. The conduct of the instant rulemaking proceeding is one such activity.

United States interest in the IAEA received renewed attention in the Nuclear Non-Proliferation Act of 1978 (NNPA). As stated in Section 201 of the NNPA, the United States is "committed to a strengthened and more effective International Atomic Energy Agency and to a comprehensive safeguards system administered by the Agency to deter proliferation." In addition to safeguards matters, the NNPA recognizes a number of other important roles for the IAEA. In particular, Section 104 of the NNPA specifies a number of desired international undertakings to be accomplished with other nations and "groups of nations such as the IAEA." Given the primacy of the IAEA in today's nuclear society, the United States should act with a careful regard to IAEA activities. Otherwise, the United States may be perceived as undermining the effectiveness of the IAEA. The present rulemaking has not yet dealt with the subject of IAEA activities in the siting of nuclear facilities. In considering whether to adopt the proposed revisions, the NRC should give appropriate consideration to the role of the IAEA.

The NRC has been directed by Congress in the NNPA and other acts to give suitable consideration to the vitally important matter of nuclear non-proliferation. In this rulemaking, the NRC should consider the two subjects of

siting of nuclear facilities and international impacts of NRC rules, which are obviously related to nuclear non-proliferation.

United States foreign policy recognizes the place of nuclear energy in the economies of both the developed and the developing countries of the world. The safety standards and regulations developed by the NRC for the U.S. civilian nuclear industry continue to serve as models for the development of international nuclear safety standards. The proposed revisions to the site safety criteria threaten to have an adverse effect on international nuclear cooperation and to disrupt the evolving international consensus on nuclear safety standards.

A fundamental result of international nuclear cooperation has been an increased appreciation for safety standards that are shared by the entire international community. For the U.S. to develop and promulgate new site safety regulations without an appreciation for the international nuclear standards could imply a repudiation of current international safety standard development efforts. The proposed numerical criteria would be grossly limiting, unnecessarily so because the reviews required by the NRC and regulatory bodies in other countries using standards which are reflective of international siting norms result in adequate protection of the public health and safety and in the selection of sites which are among the best reasonably to be found after balancing the site characteristics important to adequate protection of the public and the environment. Likewise, decoupling of siting criteria from source terms and dose calculations to achieve site isolation would be entirely unsatisfactory as it would eliminate a key measure of merit of the site-plant combination, would prevent the advantageous utilization of

special design provisions in siting decisions and could provide a disincentive to improvement of plant safety design features. Such a change would be extremely limiting and certainly the wrong approach in countries or regions of countries where siting options are limited.

As to the seismic criteria being proposed for codification, adoption seems premature, making them unsuitable to serve as the basis for an international safety standard. Moreover, the division within the NRC Staff and among its experts concerning the use of probabilistic versus deterministic evaluation techniques illustrates well that the criteria do not embody the consensus associated with international safety standards.

B. Summary of Reasons for Requesting Termination of the Rulemaking Proceeding to Change the Commission's Siting Regulations in 10 CFR Part 100

Based on the foregoing discussion and for the reasons set forth below in Section II, International Siting Group Members urge the Commission to withdraw the proposed revisions to the siting criteria and terminate the rulemaking proceeding. The principal reasons for this position include the following:

- (1) Adoption of the proposed revisions to the Commission's demographic regulations in 10 CFR Part 100 will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the International Atomic Energy Agency (IAEA) and national standards in ISG Member countries.
- (2) The existing demographic regulations in 10 CFR Part 100 have worked well. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety nor to achieve site isolation

through "decoupling" of nuclear power plant siting and design. Adoption of the proposed revisions will not provide a substantial increase in protection or contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.

- (3) The technical basis for the proposed revisions to the Site Safety Criteria in 10 CFR Part 100 is inadequate, internally inconsistent and confusing.
- (4) The proposed revisions to the Seismic Criteria should not be adopted. Revision should await resolution of the controversy on the use of deterministic versus probabilistic methods in site selection. Any revision adopted should meet the Commission's rulemaking objective of regulatory stability.
- (5) The Environmental Assessment prepared in conjunction with the proposed revisions is inadequate as a matter of law to support a finding of no significant environmental impact.
- (6) Finalization of the proposed revisions to the siting regulations would not be in accord with sound agency decisionmaking.

Each of the above reasons alone is sufficient grounds for the Commission to terminate the rulemaking proceeding. When taken together, the arguments are overwhelming that to proceed at this time with the siting rulemaking is contrary to sound public policy concerning the protection of the public health and safety and the environment from radiological hazard and disruptive of internationally accepted safety norms regarding the siting and design of nuclear power plants.

II. MAJOR ARGUMENTS AGAINST PROPOSED CHANGES TO U.S. NUCLEAR POWER PLANT SITING REQUIREMENTS

The International Siting Group Members urge the Commission to withdraw the proposed revisions to the siting criteria and terminate the rulemaking proceeding.^{3/} In the sections which follow, the basis for the ISG's request is set forth in detail. The arguments focus on the impact of the proposed revisions on internationally accepted standards for nuclear safety; how well the present regulatory framework has worked in achieving the goal of remote siting; how well the proposed revisions would contribute to reduction in nuclear power plant risk and increased defense-in-depth; and how well the proposed revisions would meet the Commission's stated objectives in the October 20, 1992 Federal Register notice (FRN) proposing the revisions.

- A. Adoption of the Proposed Revisions to the Commission's Demographic Regulations in 10 CFR Part 100 Will Do Major Damage to the Evolving International Consensus on Nuclear Safety Standards and Lead to Needless Inconsistency Between U.S. Nuclear Safety Standards for the Siting of Nuclear Power Plants and Standards of the International Atomic Energy Agency (IAEA) and National Standards in ISG Member Countries. The Existing Demographic Regulations in 10 CFR Part 100 Have Worked Well. Adoption of the Proposed Revisions Is Not Needed to Ensure Adequate Protection of the Public Health and Safety Nor to Achieve Site Isolation Through "Decoupling" of Nuclear Power Plant Siting and Design. Adoption of the Proposed Revisions Will Not Provide a Substantial Increase in Protection or Contribute to Increased Defense-in-Depth. The Adverse Impacts of the Proposed Revisions Greatly Exceed Their Benefits.

^{3/} The associated draft regulatory guides, in particular Draft Regulatory Guide DG-4003 (Proposed Revision 2 to Regulatory Guide 4.7), should also be withdrawn.

1. Adoption of the proposed revisions to the Commission's demographic regulations in 10 CFR Part 100 will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the International Atomic Energy Agency (IAEA) and national standards in ISG Member countries.

The United States has had and will continue to have a major influence on nuclear power plant siting practices elsewhere in the world. The IAEA has established a wide-ranging program to provide its Member States with guidance on many aspects of safety associated with thermal neutron nuclear power reactors. The program has involved the preparation of many publications in the form of Codes of Practice and Safety Guides, many of which concern safe siting of nuclear facilities. Review of the siting documents reveals both the extensive participation by the United States in their development and the influence the United States has had on the substantive positions set forth in the documents.

The INSAG of the IAEA in its Safety Series No. 75-INSAG-3, "Basic Safety Principles for Nuclear Power Plants," (1988), sets forth basic safety principles for nuclear power plant siting:

- The choice of sites takes into account the results of investigations of local factors which could adversely affect the safety of the plant.
- Sites are investigated from the radiological impact of the plant in normal operations and in accident conditions. Site characteristics which can influence the air, food-chain and water supply pathways are to be investigated, including physical characteristics, environmental characteristics, the use of land and water resources and the population distribution around the site.

- The site selected for a nuclear power plant is compatible with the off-site countermeasures that may be necessary to limit the effects of accidental releases of radioactive substances, and is expected to remain compatible with such measures.
- The site selected for a nuclear power plant has a reliable long term heat sink that can remove energy generated in the plant after shutdown, both immediately after shutdown and over the longer term. 75-INSAG-3 at 23, 26.

An IAEA Code of Practice and a series of thirteen Safety Guides implement these safety principles for the siting of nuclear power plants.^{4/} The Siting Code, which was revised in 1988, establishes the objectives and basic requirements that must be met to ensure adequate safety in the operation of nuclear power plants. The

^{4/} The thirteen titles in the Nuclear Safety Standards series concerning siting are:

1. 50-SG-S1 (Rev. 1) -- Earthquakes and Associated Topics in Relation to Nuclear Power Plant Siting (1991);
2. 50-SG-S2 -- Seismic Analysis and Testing of Nuclear Power Plants (1979);
3. 50-SG-S3 -- Atmospheric Dispersion in Nuclear Power Plant Siting (1980);
4. 50-SG-S4 -- Site Selection and Evaluation for Nuclear Power Plants with Respect to Population Distribution (1980);
5. 50-SG-S5 -- External Man-Induced Events in Relation to Nuclear Power Plant Siting (1981);
6. 50-SG-S6 -- Hydrological Dispersion of Radioactive Material in Relation to Nuclear Power Plant Siting (1985);
7. 50-SG-S7 -- Nuclear Power Plant Siting: Hydrogeological Aspects (1984);
8. 50-SG-S8 -- Safety Aspects of the Foundations of Nuclear Power Plants (1986);
9. 50-SG-S9 -- Site Survey for Nuclear Power Plants (1984);
10. 50-SG-S10A -- Design Basis Flood for Nuclear Power Plants on River Sites (1983);
11. 50-SG-S10B -- Design Basis Flood for Nuclear Power Plants on Coastal Sites (1983);
12. 50-SG-S11A -- Extreme Meteorological Events in Nuclear Power Plant Siting, Excluding Tropical Cyclones (1981); and
13. 50-SG-S11B -- Design Basis Tropical Cyclone for Nuclear Power Plants (1984).

Siting experts from the NRC participated in the development of these documents, the contents of which strongly reflect U.S. siting practices.

Siting Code at page 9 describes the main objective in siting nuclear power plants from the viewpoint of nuclear safety as:

protection of the public and the environment against the radiological impact of accidental releases of radioactivity; normal radioactive releases from nuclear power plants have also to be considered. In the evaluation of the suitability of a site for a nuclear power plant the following aspects shall be considered:

- (a) Effects of external events occurring in the region of the particular site (these events could be of natural or man induced origin);
- (b) Characteristics of the site and its environment which could influence the transfer of released radioactive material to man;
- (c) Population density and distribution and other characteristics of the external zone in relation to the possibility of implementing emergency measures and the need to evaluate the risk to individuals and the population.

Methods and solutions set out in the siting guides provide assurance that plants can be sited without undue risk to the health and safety of the general public. Together the Siting Code and guides establish an essential basis for safety in the siting of nuclear power plants, including the desirability of keeping reactors away from densely populated centers.^{5/} The Siting Code and siting guides

^{5/} Safety Guide No.50-SG-S4, "Site Selection and Evaluation for Nuclear Power Plants with Respect to Population Distribution," states at 2 (1980):

Countries which have developed their own nuclear power programmes from the beginning have, as far as has been practicable, begun by selecting sites in regions away from population centres and with low population densities. As experience was acquired and with technological progress, some of these countries were able to justify the choice of sites away from

(continued...)

emphasize that "it is essential to ensure that all site-related characteristics have been taken into account" during the selection of the preferred candidates. See IAEA Safety Guide No. 50-SG-S9, "Site Survey for Nuclear Power Plants," at 10 (1984). That guide identifies fourteen (14) safety-related site characteristics to be evaluated during the site selection process, of which population distribution is but one.^{8/} The guide recognizes the difficulty in comparing sites based on population and suggests that "[i]t may be appropriate to compare all other site characteristics, and then to evaluate the sites independently from the point of view of population distribution." Id. at 32.

During the original development of these publications and during the revision process, care has been taken to ensure that all Member States of the

^{8/}(...continued)

population centres but with higher population densities. Member States embarking on a nuclear power programme may consider it prudent to give the greatest preference to sites with a low population density in the region.

^{9/} The other thirteen are:

- Surface faulting
- Seismicity
- Suitability of subsurface material
- Vulcanism
- Flooding
- Extreme meteorological phenomena
- Man-induced events
- Dispersion in air
- Dispersion in water
- Emergency Planning
- Land use
- Availability of cooling water
- Other site characteristics as appropriate, such as avalanche, landslide, surface collapse.

IAEA Safety Guide No. 50-SG-S9 at 10-13.

IAEA, in particular those with active nuclear power programs such as the United States, provide their input and that the resulting standards embody an international consensus. Indeed, the United States, in particular Commission representatives, have played an important role in the development of these guidance documents. Each significantly reflects regulatory practices in the United States, as the foregoing discussion demonstrates. One of the IAEA's hopes for the revised Siting Code is that it will be used, accepted and respected by Member States as a basis for the regulation of the safety of power reactors within the respective national legal and regulatory frameworks. See Siting Code at Foreword.

Siting, along with emergency planning and design, is viewed as an important element of defense-in-depth, a fundamental safety principle underlying the use of nuclear power. The INSAG of the IAEA describes defense-in-depth as follows:

'Defense in depth' is singled out amongst the fundamental principles since it underlies the safety technology of nuclear power. All safety activities, whether organizational, behavioral or equipment related, are subject to layers of overlapping provisions, so that if a failure should occur it would be compensated for or corrected without causing harm to individuals or the public at large. This idea of multiple levels of protection is the central feature of defence in depth, and it is repeatedly used in the specific safety principles that follow.

Two corollary principles of defence in depth are defined, namely, accident prevention and accident mitigation. These corollary principles follow the general statement of defence in depth. Safety Series Report No. 75-INSAG-3 (1988) at 13. See also Appendix to the report, which provides an expanded discussion of defense-in-depth.

The NRC, in discussing comments received on its 1980 Notice Of Intent to prepare an Environmental Impact Statement (EIS) in connection with revision of the demographic regulations in Part 100 (45 Fed. Reg. 79,820 (December 2, 1980)), stated:

Siting, design, and emergency planning are three factors which each in its own way goes as far as is reasonable toward protecting the public health and safety. This is the 'defense-in-depth' concept. . . . [A rulemaking on any one] must consider the premises of the other two. NUREG-0833, 'Environmental Impact Statement on the Siting of Nuclear Power Plants Scoping Summary Report,' at 13 (December 1981).

The foregoing is not meant to imply that the United States is bound to implement the codes and guides of the IAEA's Nuclear Safety Standards (NUSS) program and may not change its regulations. However, it is meant to suggest that, in the spirit of acceptance of and respect for the NUSS program, account should be taken of the implications for change upon the international consensus standards encompassed by the NUSS program, when changes to national safety standards, such as 10 CFR Part 100, are being considered.

It is in this spirit that ISG Members are offering comments on the proposed revisions to the demographic regulations in Part 100. As discussed in the sections which follow, the proposed revisions will do major damage to the evolving international consensus on nuclear safety standards and lead to needless inconsistency between U.S. nuclear safety standards for the siting of nuclear power plants and standards of the IAEA and national standards in ISG Member countries. Specifically, adoption of the revisions by the United States would likely

force fundamental reconsideration of international site safety standards and the adequacy of sites selected in accordance with present standards. However, the changes being considered by the NRC are not necessary to ensure adequate protection of the public health and safety; they will not result in improved safety; and they have the potential for destabilizing an international safety framework that has worked well in the selection of suitable nuclear power plant sites in both the U.S. and elsewhere in the world.

For example, the guidelines used by the Japan Atomic Energy Commission in reactor site evaluation closely resemble the current U.S. siting framework. An exclusion area surrounds each site, which is, in turn, surrounded by a low population zone. The reactor must also be sited away from densely populated areas. The size of the exclusion zone and population distances are chosen to limit radiation effects in the unlikely event of an accident. Fixed demographic limits are not imposed.

In Canada, the suitability of a site is based on the risk to the population (doses under normal operation and potential doses in accidents). The risk is based on a conservative prediction of actual plant performance and site characteristics and is evaluated using all the exposure pathways, including land contamination, and such site characteristics as meteorology. Societal judgment about the acceptability of the risk is also a key factor in determining site suitability. As in Japan, fixed demographic limits are not imposed.

In France, the current practice of the safety authorities is to pay special attention to demographics while assessing the suitability of potential sites

for nuclear power plants. French safety authorities rely on a site-by-site analysis, which encompasses both the safety features of the plant design and the suitability of the local background with respect to population distribution around the site, existing thoroughfares and the ability to take emergency action. Fixed demographic limits are not imposed.

Taiwan, Belgium and Korea^{2/} base their siting practices on U.S. siting standards. Taiwan establishes exclusion area distances in accordance with the evaluated potential radiological consequences and limited available site area, making use, in particular, of multi-reactor sites. Korea's approach is similar. Instead of detailed Belgian-specific rules (apart from a licensing procedure, an inspection system and ICRP-type rules), Belgium safety authorities apply NRC rules in so far as practicable using a transposition process.

The proposed changes to the U.S. siting standards, if adopted, will force reconsideration of siting practices elsewhere in the world. For the additional reasons set forth in the sections which follow, the members of the International Siting Group urge the Commission to withdraw the proposed revisions to the Commission's siting regulations, along with the associated draft Regulatory Guide DG-4003 (Proposed Revision 2 to Regulatory Guide 4.7).

^{2/} We have been able to obtain information about Belgian and Korean standards and, hence, are including it here, even though no Belgian or Korean organization is an ISG Member.

2. The existing demographic regulations in 10 CFR Part 100 have worked well. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety nor to achieve site isolation through "decoupling" of nuclear power plant siting and design. Adoption of the proposed revisions will not provide a substantial increase in protection or contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.
 - a. The existing demographic regulations in 10 CFR Part 100 have worked well.

A basic assumption underlying the proposed changes to the demographic regulations in 10 CFR Part 100 (Part 100) is that plant design features have improved as a result of applying Part 100, but that site isolation has been de-emphasized. This crucial assumption -- that site isolation has been de-emphasized -- drives the proposed revisions, but has no basis in fact. As such, it does not provide a valid basis for the demographic criteria in the proposed rule.

Contrary to this assumption, under the existing NRC regulatory framework for nuclear power plant siting, based on 10 CFR Parts 50, 51 and 100 and on the philosophy and guidelines published in Regulatory Guide 4.7 (Rev. 1), U.S. nuclear power plants have been sited away from highly populated areas and the Commission's remote siting objective has been achieved. Very recently, NRC Staff representatives underscored this fact when meeting with members of the international community in January 1993, attending a meeting of the Committee on Nuclear Regulatory Activities (CNRA) of the OECD in Paris. The Staff's briefing charts stated:

Use of Reg. Guide 4.7 [Rev. 1] in conjunction with Part 100 provides effective means to keep reactors away from densely populated centers. NRC Staff Trip Report

Concerning CNRA Meeting, enclosure at 8 (February 5, 1993).

i. Summary of existing NRC framework for siting nuclear power plants.

The demographic regulations in Part 100 were promulgated in 1962. The Supplementary Information for these safety regulations identified as a basic objective of the regulations assurance that "the cumulative exposure dose to large numbers of people as a consequence of any nuclear accident should be low in comparison with what might be considered reasonable for total population dose. . . . [Another objective is to] provide for protection against excessive exposure doses to people in large centers, where effective protective measures might not be feasible." 27 Fed. Reg. 3,509 (April 12, 1962). The regulations identified site evaluation factors, which included population density and "use characteristics" (i.e., characteristic human activities) of the site environs; and provided guidance for determining the suitability of the proposed site on the basis of a dose assessment which took into account:

- the characteristics of the reactor design;
- population density and use characteristics, including the exclusion area, low population zone and population zone distance; and
- physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

Flexibility of application was an important aspect of implementation to make certain that the concept of environmental isolation did not receive undue emphasis

and to recognize the importance of engineered safeguards in meeting the regulation's objective. See id.

Appendix A to 10 CFR Part 50 establishes the minimum requirements for the principal design criteria for nuclear power plants. A number of these criteria are directly related to site characteristics, as well as to events and conditions outside the nuclear power unit. Part 50 also specifies emergency planning and preparedness requirements.

Compliance with the National Environmental Policy Act of 1969 (NEPA)^{8/} is also a factor in nuclear power plant siting. NEPA requires that a cost benefit analysis be completed before any major federal action significantly affecting the human environment is undertaken. Nuclear power plant siting, being the initial step of a major federal action to license a plant for operation, is necessarily encompassed by the provisions of NEPA.^{9/} NRC requires preparation of alternative site studies which balance environmental costs and benefits of several preselected sites. Population characteristics are among the site characteristics entering into the cost-benefit balancing. The site selected by the applicant is to be among the best reasonably to be found for which no obviously superior alternative has been identified.^{10/}

^{8/} 42 U.S.C. § 4332(2)(c) (1988).

^{9/} Calvert Cliffs Coordinating Committee v. AEC, 449 F.2d 1109, 1112 (D.C. Cir. 1971).

^{10/} See 10 CFR Part 51 and Regulatory Guide 4.2, Rev. 2, "Preparation of Environmental Reports for Nuclear Power Stations" (1976).

Regulatory Guide 4.7 (Rev. 1), "General Site Suitability Criteria for Nuclear Power Stations," was issued in November 1975.^{11/} The guide is intended to assist applicants in the initial stage of selecting potential sites for nuclear power stations. Regulatory Guide 4.7 provides guidance related to both the site's safety and its environmental qualities.

Regulatory Guide 4.7 implements the safety criteria in 10 CFR § 100.11 pertaining to demographics as follows. Each nuclear power plant applicant must determine the following:

1. An exclusion area of such size that an individual located at any point on its boundary for two hours immediately following onset of the postulated fission product release would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.
2. A low population zone of such size that an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose to the whole body in excess of 25 rem or a total radiation dose in excess of 300 rem to the thyroid from iodine exposure.
3. A population center distance of at least one and one-third times the distance from the reactor to the outer boundary of the low population zone. In applying this guide, the boundary of the population center shall be determined upon consideration of population distribution. Political boundaries are not controlling in the application of this guide. Where very large cities are

^{11/} In November 1992, the NRC issued for public comment Draft Regulatory Guide DG-4003 (Proposed Revision 2 to Regulatory Guide 4.7). Relevant differences between Rev. 1 and Proposed Rev. 2 are noted where appropriate. The changes in Proposed Revision 2 conform to the proposed changes to 10 CFR Part 100.

involved a greater distance may be necessary because of total integrated population dose consideration.^{12/}

Regulatory Guide 4.7 (Rev. 1) also provides guidance concerning consideration of alternative sites when numerical demographic criteria given in the guide are exceeded. The guide states:

If the population density, including weighted transient population, projected at the time of initial operation of the nuclear power station exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by an area at that distance), or the projected population density over the lifetime of the facility exceeds 1000 persons per square mile averaged over any radial distance out to 30 miles, special attention should be given to the consideration of alternative sites with lower population densities (emphasis added).^{13/}

In sum, Regulatory Guide 4.7 (Rev. 1) makes clear that "[t]he decision that a station may be built on a specific candidate site is based on a detailed evaluation of the proposed site-plant combination and a cost-benefit analysis

^{12/} 10 CFR § 100.11 (1993).

^{13/} Regulatory Guide 4.7 (Rev. 1) at 16. Draft Regulatory Guide DG-4003 states substantially the same at 9:

As set forth in 10 CFR Part 100, nuclear power station sites should be located in areas with low population density. If the population density of a proposed site (1) exceeds 500 people per square mile averaged over any radial distance out to 30 miles or (2) is projected to exceed 1000 people per square mile averaged over any radial distance out to 30 miles (50 kilometers) 40 years after the time of site approval, the applicants should give special attention to alternative sites.

comparing it with alternative site-plant combinations . . ." (emphasis added).^{14/}

As discussed above, the analysis includes consideration of site safety issues and environmental issues. The site safety issues include geologic/seismic, hydrologic and atmospheric characteristics of proposed sites; potential effects on the station from accidents associated with nearby industrial, transportation, and military facilities; and population densities in the site environs as they relate to protecting the general public from the potential radiation hazards of postulated serious accidents.^{15/} When an applicant's preferred site does not meet the numerical population density guidelines in Regulatory Guide 4.7 (Rev. 1), consideration is given to alternative sites.

Like the international site safety standards described above, implementation of the Commission's current site safety regulations requires a balanced account of all factors contributing to safety and to reduced risk of

^{14/} Regulatory Guide 4.7 (Rev. 1) at 1. While Draft Guide DG-4003 replaces "site-plant combination" with "site," it makes clear at 3 that "[s]ite selection involves considerations of public health and safety, engineering and design, economics, institutional requirements, environmental impacts, and other factors." (Emphasis added.)

^{15/} Id. at 1-2. Draft Guide DG-4003 states at 4:

Generally, the most restrictive safety-related site characteristics considered in determining the suitability of a site are surface faulting, potential ground motion and foundation conditions (including liquefaction, subsidence, and landslide potential), and seismically induced floods.

Of atmospheric extremes, the Draft Guide states at 5:

[T]he atmospheric extremes that may occur at a site are not normally critical in determining the suitability of a site because safety-related structures, systems, and components can be designed to withstand most atmospheric extremes. (Emphasis added.)

accident consequences. The emphasis on dose calculations to determine exclusion areas, low population zones and population center distances places significant importance on engineered safety features found at plants that reduce and contain potential accidental releases of radioactivity from the plant. Additionally, emphasis is placed on emergency preparedness in that the exclusion areas surrounding the plant must be totally controlled by the reactor licensee and the low population zone immediately surrounding the exclusion area must be such that the population number and distribution provide a reasonable probability that appropriate measures could be taken in the event of a serious accident. The guidance on Regulatory Guide 4.7 also emphasizes that when a site is surrounded by more than 500 persons per square mile over a radial distance 30 miles from the plant, consideration should be given to better alternative sites.

ii. Existing siting regulations have achieved site isolation.

In its publication, "Demographic Statistics Pertaining to Nuclear Power Reactor Sites" (NUREG-0348), issued in October 1979, the NRC examined in detail the demographic characteristics surrounding plant sites. NUREG-0348 discussed the results of a trend analysis and provided a variety of data on population densities and distances from population centers. The purpose of the NUREG-0348 analysis was to determine if a trend existed toward greater site isolation. The analysis performed indicated that nuclear power plants were being sited away from high population areas.^{16/}

^{16/} NUREG-0348, Fig. 17.

Even more significant than this result is what the data indicate about site isolation. The data demonstrate conclusively that the goal of remote siting was achieved in the 1970s. Of the 58 new sites docketed at the NRC from 1971 to 1979, Perryman was the only new site proposed that did not meet the population density requirements at 30 miles. See id. at Table 1. When the staff received the application for an early site review for Perryman, it concluded that an obviously superior alternate site was preferable. The application for the Perryman site was subsequently withdrawn.^{17/} In addition, only about seven of the sites in the United States today (approximately 10%) have population densities in excess of the Regulatory Guide 4.7 (Rev. 1) guidelines. In each case, the sites comprising the seven were given construction permits prior to the adoption of the Regulatory Guide 4.7 (Rev. 1) parameters in November 1975.^{18/} Thus, the Commission's framework for nuclear power plant siting developed in the 1970s has achieved site isolation.

The basic assumption underlying the proposed changes to the demographic regulations in 10 CFR Part 100 -- namely, that as a result of applying Part 100, site isolation had been de-emphasized -- is taken from the August 1979 NRC "Report of the Siting Policy Task Force" (NUREG-0625).^{19/} As the

^{17/} Id. at 20.

^{18/} NRC Staff Trip Report Concerning CNRA Meeting, enclosure at 7 (February 5, 1993).

^{19/} NUREG-0625 was the result of several years study of possible revisions to the Commission's siting regulations. The purpose of the report was to obtain an overview of the siting policy and practice that resulted from 25 years of licensing of civilian nuclear power plants. Another purpose was to determine whether current siting policy and
(continued...)

foregoing discussion of the NUREG-0348 data demonstrates, this critical assumption that site isolation has been de-emphasized has no basis in fact. As such, it cannot provide a valid basis for the proposed demographic regulation.

The lack of factual basis was recognized at the time NUREG-0625 was undergoing internal NRC review prior to its release. Robert B. Minogue, the Director of NRC's Office of Standards Development, after reviewing NUREG-0625, stated in a letter to Daniel R. Muller, Chairman of the Siting Policy Task Force, dated August 15, 1979:

The implication in the discussion of past practices that the demographic features of population and distances have been getting progressively worse at licensed sites is not true. Indian Point, San Onofre, and Zion sites were reviewed and approved more than 10 years ago. Demographic features of current licensed sites have actually been improving somewhat since the above listed sites were approved.^{20/}

Mr. Minogue stated further, "... we are concerned about the prospect that the report may be forced to be used as a basis for immediate rulemaking and is inadequate for that purpose."^{21/}

^{18/}(...continued)

practice should be changed. The report made nine recommendations, the most important of which were to divorce from the siting framework the use of plant design features to compensate for unfavorable site characteristics and to develop population density and distribution limits beyond the exclusion area which would be functions of the average population in different regions of the United States. Dependence on the average population of a region meant that areas of the United States having lower average population densities might be subject to higher population density and distribution limits than more densely populated regions of the country, such as the Northeast.

^{20/} NUREG-0625 at 78.

^{21/} Id. at 77.

Another NRC official also discussed limitations in the use of the NURFG-0625 recommendations. In a letter to Mr. Muller, dated August 14, 1979, Norman M. Haller, then NRC's Director of the Office of Management and Program Analysis, recommended publication of a definitive value-impact analysis of all Task Force recommendations contained in NUREG-0625 before any recommendations were released for public comment. Mr. Haller stated:

. . . the net or true cost cannot be estimated unless the next best alternative (namely, allowing trade-offs between distance and unique design features to be made) is also analyzed.

* * *

In general, adoption of the distance-related recommendations in this report would appear to undermine the philosophy that reactors can operate safely primarily because their designs satisfy NRC regulations. And, we believe that adoption of these recommendations would leave the Commission open to the charge that some existing reactors aren't safe enough (since they rely on design features).^{22/}

In sum, no basis exists for the statement in NUREG-0625 that nuclear power plant site isolation in the United States has been de-emphasized. To the contrary, under the existing siting regulations in 10 CFR Parts 50, 51 and 100 and implementing guidance, the objective of remote siting has been achieved.

^{22/} Id. at 75.

- b. Adoption of the proposed revisions is not needed to ensure adequate protection of the public health and safety.

The Supplementary Information for the proposed revisions to Part 100 indicates that since promulgation of the reactor site regulations in 1962, the Commission has approved more than 75 sites for nuclear power reactors. 57 Fed. Reg. at 47,803. These approvals required an affirmative finding of adequate protection of the public health and safety. We may conclude, therefore, that adoption of the proposed revisions is not necessary to ensure adequate protection of the public health and safety.

Other considerations buttress this conclusion. As recently as December 1988, the NRC denied a petition for rulemaking (PRM) to amend Part 100 to specify demographic criteria to be met for all new nuclear power plant sites. 53 Fed. Reg. 50,232 (December 14, 1988). The NRC denied the petition for the following reasons:

(1) it would unnecessarily restrict NRC's regulatory siting policies and procedures by elevating population density criteria above other siting criteria such as environmental and ecological factors, and (2) it would not result in a substantial increase in overall protection of the public health and safety, as compared to the current siting criteria when combined with calculations of potential health effects. The NRC has carefully considered the issues raised in the petition, and has taken them into account in reaching a decision on the areas which fall within its jurisdiction. Id.

The petitioners had requested that the Commission amend its regulations in 10 CFR Part 100 to set numerical limits on allowable population density around nuclear power reactor sites. The amendments to 10 CFR §

100.11(a) proposed by the petitioners would set 0.4 miles and 3 miles as the minimum distances for the outer boundaries of the exclusion area and the low population zone, respectively. A new section of 10 CFR § 100.12 proposed by the petitioners would set a maximum population density of 400 persons per square mile averaged over any radial distance out to a distance of 40 miles. The petitioners proposed that the Commission also deny Construction Permit applications where, during the effective period of the plant's license, the maximum projected population density would exceed 800 persons per square mile averaged over any radial distance out to a distance of 40 miles. Additionally, the petitioners proposed that all population figures and projections include transit populations.

The Commission amplified its reasons for denial as follows:

At first glance, it might appear that the NRC's population density siting parameters and the population density siting parameters indicated by the petitioner are similar -- 500 vs. 400 per square miles averaged over any radial distance of 40 vs. 30 miles for the initial operation of the nuclear power plants. However, the real difference between the NRC's and the petitioner's population density siting requirements is regulatory flexibility. The NRC's siting requirements allow for the consideration of alternative sites with superior environmental parameters, e.g., suitable meteorological, natural resources and water temperature conditions or superior geophysical conditions, e.g., suitable geologic, hydrologic, and tectonic conditions if the population density parameters cannot be met. However, on the other hand, the petitioner's siting requirements would automatically eliminate any site from further consideration if specific population density criteria are not met regardless of any mitigating factors.

The NRC believes that Regulatory Guide 4.7 [Rev. 1] adequately addresses population density siting considerations and that no new rulemaking as proposed

by the petitioners is justified at this time. Also, the petitioner offers no basis for the specific numerical population density limits indicated in the petition. Therefore, the petition would not result in a substantial increase in the overall protection of the public health and safety, as compared to the current NRC siting criteria when combined with calculations of potential health effects. *Id.* at 50,233 (emphasis added).

Consideration of Commission findings concerning the residual risk from severe accidents and compliance with the Commission's safety goals also testifies to the adequacy of the present siting regulations in ensuring adequate protection of the public health and safety. In 1985, the Commission issued its "Policy Statement on Severe Reactor Accidents Regarding Future Designs and Existing Plants." 50 Fed. Reg. 32,138 (August 8, 1985). The Commission emphasized that "[o]n the basis of currently available information, the Commission concludes that existing plants pose no undue risk to public health and safety and sees no present basis for immediate action on generic rulemaking or other regulatory changes for those plants because of severe accident risk." *Id.* The Commission stated that its "severe accident policy is that the Commission intends to take all reasonable steps to reduce the chances of occurrence of a severe accident involving substantial damage to the reactor core and to mitigate the consequences of such an accident should one occur." *Id.* at 32,139. In promulgating the Safety Goal Policy Statement, the Commission stated its belief that "Current regulatory practices are believed to ensure that the basic statutory requirement, adequate protection of the public is met." 51 Fed. Reg. 30,028, at 30,029 (August 21, 1986). The Safety Goal Policy Statement "expresses the

Commission's views on the level of risks to public health and safety that the industry should strive for in its nuclear power plants" and provides a framework "for testing the adequacy of and need for current and proposed regulatory requirements" in order to "lead to a more coherent and consistent regulation of nuclear power plants, a more predictable regulatory process, a public understanding of the regulatory criteria that the NRC applies, and public confidence in the safety of operating plants." Id.

In 1990, NUREG-1150, "Severe Accident Risk Assessment for Five U.S. Nuclear Power Plants," was published; and in 1992, NUREG-1465, "Accident Source Terms for Light Water Nuclear Power Plants," was issued for public comment. Using state-of-the-art risk assessment techniques, NUREG-1150 studied the risks from severe accidents in five nuclear power plants representative of plants presently in operation today in the United States. Draft NUREG-1465, using updated knowledge about severe LWR accidents, and the resulting behavior of the released fission products, developed over a 30-year period, provides a postulated fission product source term released into containment.

The issuance of the Severe Accident and Safety Goal Policy statements and the enhanced capability to evaluate severe accident risk and understand severe accident source terms, as demonstrated by NUREG-1150 and NUREG-1465 results, allow the Commission to evaluate the risk significance of any revisions to the Part 100 regulations that might be proposed. Indeed, the purpose of the Commission's earlier suspension of the siting rulemaking was, first, to develop such a capability and, then, to utilize that capability in evaluating the

safety significance of alternative proposals to revise the regulatory framework for siting nuclear power plants.^{23/}

In the 1992 Supplementary Information for the proposed changes to the siting regulations, the Commission relied on NUREG-1150 as one of:

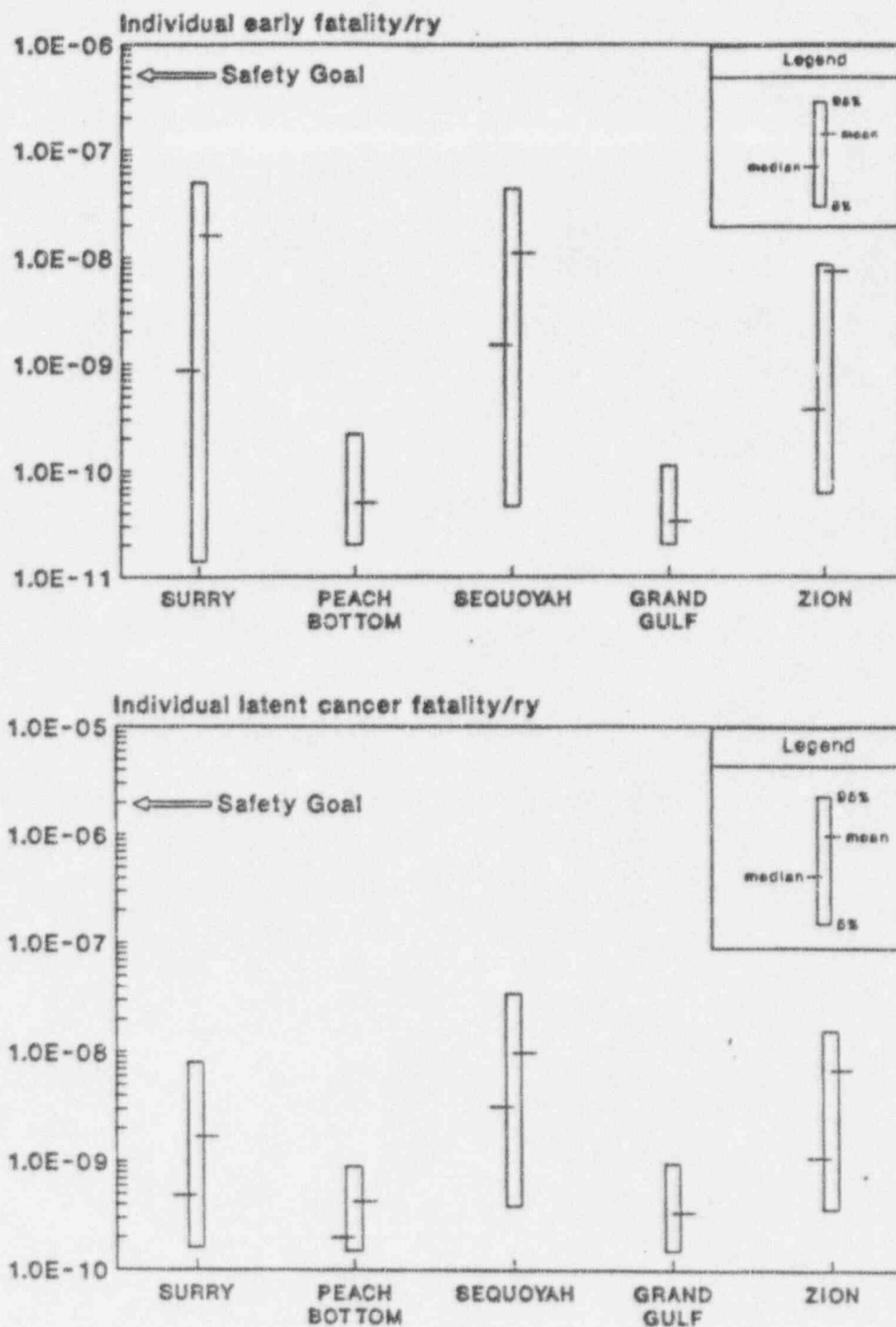
[N]umerous risk studies on radioactive material releases to the environment under severe accident conditions [which] have all confirmed that the present siting practice is expected to effectively limit risk to the public. 57 Fed. Reg. at 47,803.

Figure 13.2 of NUREG-1150, reproduced on the next page, demonstrates that the quantitative health effects objectives specified in the Safety Goal Policy Statement

^{23/} In the Summer of 1980, the Commission began an effort to revise the siting criteria in 10 CFR Part 100. On July 29, 1980, the NRC issued an Advance Notice of Proposed Rulemaking (ANPR) (45 Fed. Reg. 50,350), in which the Commission announced its intention to revise the reactor siting criteria and requested comments on seven of the nine recommendations of the Siting Policy Task Force, as well as certain alternative approaches.

In conjunction with the rulemaking effort, the Commission also issued a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) (45 Fed. Reg. 79,280 (December 2, 1980)). The NOI, among other things, identified the technical approach to detailed analyses that would be followed in developing the bases for any proposed revisions. See id. at 79,822-23. In December 1981, the NRC published the Scoping Summary Report for the EIS (NUREG-0833). The report addressed comments received on both the ANPR and the NOI and provided further discussion of the efforts which would be undertaken to develop an adequate technical basis for any revisions. The report recognized that the siting rulemaking must take into account premises concerning reactor design and emergency planning. See NUREG-0833 at 13. It also restated that "a systematic evaluation of accident consequences for a full range of reactor accidents would be a fundamental part of the technical basis for the siting rulemaking. . . ." Id. at 20. See also id. at 14 regarding consideration of a full range of accidents in establishing siting criteria.

Shortly thereafter, the Commission directed the NRC Staff to suspend work on revision of the siting (demographic) criteria until safety goals were developed and a reassessment of source terms was completed. See NUREG-0885, "U.S. Nuclear Regulatory Commission Policy and Planning Guidance" (January 1982).



Note: As discussed in Reference 13.23, estimated risks at or below $1\text{E-}7$ per reactor year should be viewed with caution because of the potential impact of events not studied in the risk analyses.

Figure 13.2 Comparison of individual early and latent cancer fatality risks at all plants (internal initiators).

have been met^{24/} and, consequently, that the basic statutory requirement of adequate protection has been met under present (site-plant combination) siting practice.

Of particular interest are the results from one of these five plants, the Zion plant.^{25/} The Zion population density figure is close to the 500 people/square mile value in the proposed rule. As Figure 13.2 shows, the Zion

^{24/} The prompt fatality health effects objective, a measure of whether the individual safety goal has been met, states:

The risk to an average individual in the vicinity of a nuclear power plant of prompt fatalities that might result from reactor accidents should not exceed one-tenth of one percent (0.1 percent) of the sum of prompt fatality risks resulting from other accidents to which members of the U.S. population are generally exposed. 51 Fed. Reg. at 30,030.

The latent cancer mortality health objective, a measure of whether the societal safety goal has been met, states:

The risk to the population in the area of a nuclear power plant of cancer fatalities that might result from nuclear power plant operation should not exceed one-tenth of one percent (0.1 percent) of the sum of cancer fatality risks resulting from all causes. *Id.*

^{25/} The average population density around the Zion plant was 457 people/square mile in the early 1980s, when calculated over an area with a 30 mile radius originating at the plant site. NUREG/CR-2239, "Technical Guidance for Siting Criteria Development," (November 1982).

early and latent fatality risks are quite low and well below the Safety Goals, thus supporting the conclusion that present siting practice has worked well in limiting public risk from nuclear power plant operation. Future plants, with even greater safety capabilities, would show even greater margins. The Severe Accident Policy Statement requires, in effect, that all new plant designs meet certain "fundamental criteria" to reduce severe accident risk and that cost-effective features of a preventive or mitigative nature be included in the design. The Safety Goal Policy Statement provides guidance in determining cost-effectiveness. Taken together, these two policy statements ensure adequate protection of the public health and safety and a very low level of residual risk.

In sum, adoption of the proposed revisions is not necessary to ensure adequate protection of the public health and safety.

- c. **Adoption of the proposed revisions is not needed to achieve site isolation through "decoupling" of nuclear power plant siting and design.**

In addition to specifying fixed, numerical requirements in Part 100, the proposed revisions relocate certain design requirements pertaining to plant design to 10 CFR Part 50, "thereby effectively decoupling siting from plant design." See Supplementary Information for the proposed revisions at 57 Fed. Reg. 47,803. The proposed decoupling is directed at ensuring that engineering safeguards or advanced safety features are not used as a substitute for site isolation. The proposed decoupling is intended to implement the Siting Policy Task Force goal:

To strengthen siting as a factor in defense in depth by establishing requirements for site approval that are independent of plant design consideration. The present policy of permitting plant design features to compensate for unfavorable site characteristics has resulted in improved designs but has tended to deemphasize site isolation. NUREG-0625 at iii (emphasis added).

As discussed in the preceding sections, the Commission's present siting requirements in Parts 50, 51 and 100, and implementing guidance in Regulatory Guide 4.7, have achieved site isolation. In particular, consideration of alternative sites when numerical demographic criteria in Regulatory Guide 4.7 have been exceeded ensures site isolation. Thus, decoupling is not needed to achieve site isolation.

The fact that the proposed revisions to the Commission's demographic regulations in Part 100 are unnecessary to achieve isolation in nuclear power plant siting by decoupling siting and design is buttressed by consideration of the provisions of 10 CFR Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants," adopted by the Commission in 1989. With the adoption of Part 52, it is not necessary to revise Part 100 to accomplish such "decoupling." Part 52 promotes the use of pre-approved standardized designs which are certified (approved) by the Commission in a design certification rulemaking proceeding, conducted pursuant to Subpart B of Part 52.^{26/} Certification does not involve consideration of specific sites so

^{26/} Subpart B to Part 52, "Standard Design Certifications," sets forth the requirements and procedures for "certification," or pre-approval through a hybrid rulemaking process, of new standardized nuclear power plant designs to ensure that all safety-related design issues are resolved prior to the purchase or construction of a new standard plant.

(continued...)

there is no tailoring of a design to compensate for site deficiencies. Certified designs incorporated by reference into a nuclear power plant application would not be subject to further review or challenge in a licensing proceeding unless the applicant proposed to make changes to the certified design. In particular, Subpart C of Part 52 provides for issuance of a combined construction permit/operating license and permits applicants for such to incorporate by reference certified designs into the application. These limitations on review and challenge in a nuclear power plant licensing proceeding implicitly encourage the selection of sites falling within the siting envelope specified in the design certification and discourage the selection of sites which would require changes to the certified design.

Additionally, Part 52 provides for early approval of sites in a licensing proceeding conducted in accordance with Subpart A of Part 52.^{27/} While general

^{26/}(...continued)

Specifically, an applicant for design certification must provide, among other things, all technical information which is required of applicants for construction permits and operating licenses by 10 CFR Parts 20, 50 and its appendices, 73 and 100, which is technically relevant to the design and not site-specific. Subpart B further requires the design certification applicant to prepare a design-specific probabilistic risk assessment (10 CFR § 52.47(a)(1)(v)), and include proposed inspections, test, analyses and acceptance criteria which are necessary and sufficient to provide reasonable assurance that if the tests, inspections and analyses are performed and the acceptance criteria met, a plant which references the design is built and will operate in accordance with the design certification. See 10 CFR § 52.47(a)(1)(vi) (1993).

^{27/} Subpart A of Part 52, "Early Site Permits," allows for early resolution of site-related safety and environmental issues and authorizes pre-approval of sites for new nuclear power plants -- separate and apart from design approval. Subpart A will allow utilities to "bank" sites for new nuclear power plant facilities before the need for them has materialized and independent of design details for a nuclear power plant tailored to the site. In particular, an applicant for an early site permit must provide, among other things, a description of: (1) the number, type, and thermal power level of the facilities for which the site may be used; (2) the anticipated maximum levels of radiological and thermal effluents each facility will produce; (3) the type of cooling systems that may be associated with each facility; (4)
(continued...)

design information must be specified in an early site approval application, Part 52, when viewed in its entirety, creates incentives to choose sites suitable for use as the location of a plant of certified design.

ISG Members believe that there are significant disadvantages to decoupling siting and plant design so that siting does not take into account plant design features. First, decoupling siting and plant design in the manner proposed is not necessary to achieve site isolation. Second, decoupling eliminates an accepted measure of the overall merit of the site-plant combination with respect to safety without providing for a substitute. Third, some of the major advances in design have come because designers wished to ensure greater safety for a

²²(...continued)

the seismic, meteorological, hydrologic, and geologic characteristics of the proposed site (as set forth in existing Appendix A to 10 CFR Part 100); and (5) the existing and projected future population profile of the area surrounding the site. See 10 CFR § 52.17(a)(1)(i)-(viii) (1993).

Emergency planning must also be considered at the early site permit stage. Three options are available to the applicant ranging from identification of significant impediments to a complete integrated plan. At a minimum, an early site permit applicant must identify any significant impediments to emergency planning and list the contacts and arrangements made with state, local and federal agencies with emergency planning responsibilities. Such impediments, if any, will be assessed in determining whether any alternative site is obviously superior. See 10 CFR § 52.17(b) (1993). In addition, an applicant may either request NRC approval for major features of an emergency plan, or approval of a complete integrated emergency plan. See 10 CFR § 52.17(b)(2) (1993).

Moreover, an early site permit applicant must provide a complete environmental report as required under Part 51, which includes an evaluation of alternative sites to determine whether any "obviously superior alternative" to the proposed site exists. See 10 CFR § 52.17(a)(2) (1993). The Part 52 early site permit process does, however, require certain limited consideration of design features. Specifically, an applicant must provide a description and safety assessment of the proposed site, "with appropriate attention to features affecting facility design." 10 CFR § 50.34(a)(1) (1993); see also 10 CFR § 52.17(a)(1) (1993). Such an assessment must "contain an analysis and evaluation of the major structures, systems and components of the facility which bear significantly on the acceptability of the site under the site evaluation factors identified in Part 100. . . ." Id.

specific site. For example, the multi-unit vacuum containment for plants of CANDU design originated as a means to ensure additional safety for the Pickering plant because of its location. The same containment concept was later used for multi-unit stations at remote sites, even though the additional safety was not needed to ensure adequate protection of the public health and safety. More generally, in countries which have very few acceptable sites due to basic land availability or cooling water supply or public acceptance, the regulatory structure should encourage designers to innovate to reduce public risk in making use of the available sites. The restrictions on siting contemplated by the proposed revisions to the demographic requirements in Part 100 will have to be ignored by such countries (with consequent justification as to why imposition of NRC-like requirements is not necessary) or will pose real and unnecessary restrictions to the growth of nuclear power in places where it is most needed.

In sum, adoption of the proposed revisions to the Commission's site safety regulations in Part 100 is not necessary to ensure site isolation through decoupling of nuclear power plant siting and design. As discussed above, the regulatory position stated in Regulatory Guide 4.7 to consider alternative sites when numerical population density criteria are exceeded provides an appropriate context for ensuring site isolation.

- d. **Adoption of the proposed revisions to the demographic regulations in Part 100 will not provide a substantial increase in protection nor contribute to increased defense-in-depth. The adverse impacts of the proposed revisions greatly exceed their benefits.**

- i. **NRC decisional framework when action is not necessary to ensure adequate protection.**

Discussion The previous sections established that no change to the Commission's present demographic regulations in Part 100 is necessary to ensure adequate protection of the public health and safety. As discussed above, one of the primary reasons the Commission adopted the Safety Goals was to establish a coherent and consistent set of safety regulations and provide a means to determine whether future safety regulations were necessary. Consistent with the Atomic Energy Act, safety requirements must be imposed when they are necessary to provide adequate protection of the public health and safety. Safety requirements may be imposed when they are not needed for adequate protection, if they are cost-effective and afford a substantial increase in protection. When it can be shown that the Safety Goals are met, the Commission has indicated that an increase in protection cannot be substantial and that no additional safety requirements need or should be imposed. By setting limits on population density in Part 100, adoption of the proposed rule would establish additional safety requirements beyond the Safety Goals which are not needed and of little benefit, thus creating an inconsistency in the Commission's regulatory philosophy.

Consistent with the decisional framework for implementation of the Safety Goal Policy Statement, the Commission, in deciding whether to adopt the

proposed changes to the demographic regulations in Part 100, should consider (1) whether they will provide a substantial increase in protection of the public health and safety and (2) whether the benefits from the changes will outweigh the impacts. Absent an affirmative finding on both of these questions, the Commission should not adopt the proposed changes. As discussed below, ISG Members believe that adoption will not provide a substantial increase in protection and that the impacts will far outweigh the benefits.

In its safety regulation of nuclear power plants, the Commission distinguishes between changes necessary to ensure adequate protection of the public health and safety and changes imposed to effect safety improvements beyond the minimum needed for adequate protection. This principle was clarified as a result of litigation about the initial formulation of the so-called "backfit rule" (10 CFR § 50.109), which distinguishes between the two kinds of changes.^{28/} When establishing safety requirements which are not necessary for adequate protection of the public health and safety:

[T]he Commission shall require the backfitting of a facility only when it determines . . . that there is a substantial increase in the overall protection of the public health and safety or the common defense and security to be derived from the backfit and that the direct and indirect costs of implementation for that facility are justified in view of this increased protection. 10 CFR § 50.109(a)(3) (1993) (emphasis added).

^{28/} ISG Members believe that the direction the Commission has provided on the application of the Safety Goal Policy to backfit decisions is relevant and should guide Commission decisionmaking concerning adoption of the proposed revisions to Part 100 to ensure regulatory coherence and consistency in establishing Commission requirements.

In adopting the present version of the backfit rule, the Commission stated:

In this rulemaking the Commission has adhered to the following safety principle for all of its backfitting decisions. The Atomic Energy Act commands the Commission to ensure that nuclear power plant operation provides adequate protection to the health and safety of the public. In defining, redefining or enforcing this statutory standard of adequate protection, the Commission will not consider economic costs. However, adequate protection is not absolute protection or zero risk. Hence safety improvements beyond the minimum needed for adequate protection are possible. The Commission is empowered under section 161 of the Act to impose additional safety requirements not needed for adequate protection and to consider economic costs in doing so. 53 Fed. Reg. 20,603, at 20,604 (June 6, 1988).

In a Staff Requirements Memorandum, "SECY-89-102 - Implementation of the Safety Goals," dated June 15, 1990, the Commission addressed the meaning of "substantial increase in protection as an application of the Safety Goals." The Commission indicated that once it could be established that the Safety Goals have been met, any further increase in protection would not be substantial. This development allows the Commission to make decisions about proposed regulatory actions based on their safety significance.

In sum, when examined against the backdrop of these developments, it is clear that the Commission may take into account the adverse impacts (costs) of adopting a new safety regulation, when adoption of the regulation is not necessary to provide adequate protection. Moreover, ISG Members believe that the Commission's decisional framework for Safety Goal implementation should be used when considering whether a proposed change in safety requirements will

contribute reasonably to increased defense-in-depth. Since imposition of fixed, numerical demographic criteria through changes to the present demographic regulations in Part 100 clearly is not necessary for adequate protection, as discussed above, it is equally clear that the adverse impacts (costs) that result from such imposition may be weighed against the benefits of their imposition.

When such an approach is taken to evaluate the proposed revisions to the demographic regulations in Part 100, two conclusions inexorably follow. First, adoption of the proposed revisions will not result in a substantial increase in protection nor contribute to increased defense-in-depth. Second, the adverse impacts from their adoption will far outweigh the benefits. Based on such conclusions, the ISG Members urge the Commission to withdraw the proposed revisions and terminate the present rulemaking proceeding.

ii. No substantial increase in protection or defense-in-depth is afforded by the proposed revisions.

Concerning the first point, in 1988 the NRC denied a 1976 petition for rulemaking (PRM-100-2) to set more restrictive siting distances and population densities than in Regulatory Guide 4.7 (Rev. 1), partly on the grounds that granting of the petition would not result in a substantial increase in the overall protection of the public health and safety. (See supra Section II.A.2.b.) Clearly then, the less restrictive numerical criteria of Regulatory Guide 4.7 (Rev. 1) being proposed for inclusion in the demographic regulations could not provide a substantial increase in protection through the mere act of codification.

Similarly, the mere act of codification: will not contribute to increased defense-in-depth. The Commission and Staff have made it abundantly clear that the proposed changes will have an insignificant impact on risk. Specifically, the Supplementary Information for the proposed rule makes clear that present practice has effectively limited risk to the public. (See supra Section II.A.2.b, concerning the discussion of NUREG-1150 results.) In discussions before the Commission's Advisory Committee on Reactor Safeguards (ACRS) in January 1992, the NRC Staff tried to explain the basis for the proposed revisions, as well as provide some background on the thinking of the 1979 Siting Policy Task Force. Mr. Soffer, a member of the NRC Staff who had been a member of the task force, explained:

The major recommendations of this task force were to establish requirements for site approval that were independent of plant design, to try to take into consideration the risk of accidents beyond the design basis by establishing population and density distribution criteria and that selected sites should be among the best available in the region, that siting requirements should be stringent enough in the view of the Siting Policy Task Force to reduce residual risk but not so stringent as to eliminate siting from large regions of the country. Transcript of ACRS Meeting at 45 (January 7, 1992).

Mr. Soffer then explained that due to the "low frequency of core damage that is associated with the plants themselves, [b]asically, the safety goal and the ability of the plants themselves is such that they could be sited almost anywhere and meet the safety goal." Id. at 47 (emphasis added). In other words, contrary to the Siting Policy Task Force's assumptions, putting the numerical demographic criteria presently in Regulatory Guide 4.7 (Rev. 1) into Part 100 would have no or very little effect on reducing the residual health risk to the population (i.e., prompt

fatalities, genetic effects or excess cancers) over what has been achieved under the current regulatory framework for siting nuclear power plants.

Within the Commission's Safety Goal decisional framework, substantial increase in protection is based upon consideration of risk; namely, health effects upon the individual and population (see supra note 24 regarding health effects objectives). That is, the measure of whether there has been a substantial increase in protection (i.e., reduction in risk) takes into account both the probability of an accident and the consequences of an accident should one occur. Contrary to the Commission's Safety Goal decisional framework, the justification for the proposed changes to the demographic regulations rests, in large part, on consideration of consequences alone independent of their probability of occurrence. In particular, the proposed changes are justified on the basis that control of population density out to 30 miles would obviate the need to condemn a large population center (as opposed to less intensively used land) should a very low probability severe accident occur and release cesium or strontium to the environment. See Transcript of ACRS Meeting at 70-81 (January 7, 1992).^{29/} Thus, the basis for the proposed numerical demographic criteria is not so much protection of the public health and safety through avoidance of health

^{29/} As ISG Members understand the land condemnation rationale presented by the NRC Staff, the issue is not so much protection of the population within a condemned population center from health effects, but avoidance of condemnation (and the attendant property losses) of land that is the site of a large population center. This is because the NUREG-1150 analysis assumes that effective emergency action has been taken. NUREG-1150 at 2-20. Thus, the residual issue is condemnation of land and loss of economic productivity of that land. By requiring population centers to be located 30 or more miles from a nuclear power plant, any land condemnation would not include a population center, but, at most, land having less intensive use.

consequences (and, hence, defense-in-depth), but avoidance of the need to condemn land on which is situated a major population center for which the emergency actions to protect the population have already been taken.

From the Commission's statements to the effect that plants with a smaller exclusion area boundary than 0.4 miles would cause a "very low level of risk" (57 Fed. Reg. at 47,804) and that "nuclear power plants meeting current safety standards could be located at sites significantly more dense than" (*Id.* at 47,805) the population density levels proposed, placing such stringent demographic limits in the Commission's regulations is not necessary to satisfy the Commission's Safety Goals. Moreover, even if consequences alone are relied upon as the basis for justification, such codification would not result in a substantial increase in protection. This conclusion is even more compelling when codification carries with it the potential to decrease the benefits accrued from the present flexible application of the demographic guidelines in Regulatory Guide 4.7 (Rev. 1).

iii. The adverse impacts of the proposed revisions greatly exceed their benefits.

In addition to being unnecessary to provide adequate protection of the public health and safety or a substantial increase in such protection, the proposed revisions to the demographic regulations in Part 100, if adopted, would impose significant adverse impacts (costs), without commensurate benefit. Therefore, in accordance with the Commission's Safety Goal decisional framework, the proposed revisions, along with draft Regulatory Guide DG-4003 (Proposed Revision

2 to Regulatory Guide 4.7), should be withdrawn and the current framework left intact.

The proposed revisions, if adopted, would impose a hierarchy of site characteristics, which elevates demographics over other physical characteristics of the site and other safety-related aspects of nuclear power plant siting which may have greater potential for reducing risk. This, in turn, would create the possibility that sites with a better balance overall of favorable safety-related characteristics might be eliminated from further consideration on the basis of demographics alone. Thus, adoption of the proposed revisions would upset fundamental, internationally accepted siting principles directed at selecting sites based on a careful weighing of site characteristics, including demographic characteristics. Such an outcome would be contrary to the public interest, sound regulation, and the fundamental safety principles governing the siting of nuclear power plants in the United States and elsewhere in the world.

In order to avoid this undesirable outcome, it is necessary that any site safety requirements be flexible enough to take into account demographics, while simultaneously recognizing that demographics alone do not define the risk reduction potential of a site. The present regulations have the necessary inherent flexibility. In 1988, as discussed above, the NRC denied a 1976 petition for rulemaking (PRM-100-2) dealing with siting distances and population densities that would have eliminated flexibility in making site-safety determinations. The Commission found that adoption of PRM-100-2 would have unnecessarily

restricted NRC's regulatory siting policies and would not have resulted in a substantial increase in the overall protection of the public's health and safety.

Another adverse consequence of the proposed regulations is that if the proposed 500 people/square mile population density limit, applied out to 30 miles, is adopted, otherwise superior sites would be judged to be unacceptable under the proposed rule. The impact of the proposed change can be seen in Figure F9.14 found in NUREG/CR-2239, "Technical Guidance for Siting Criteria Development" (November 1982), replicated on the next page. The shaded areas in this figure display locations where the 500 people/square mile limit out to 30 miles in the proposed rule would not be met as of November 1982. More recent census data would likely show the elimination of larger areas and a greater number of areas. Furthermore, the burden of the proposed rule would not fall evenly across the United States. The Mid-Atlantic and New England areas would be most heavily affected. Therefore, the proposed rule would be more restrictive from what is acceptable today. Like PRM-100-2, it could lead to elimination of superior sites. In particular, it would lead to the elimination of sites already approved as superior sites for nuclear power plants.

The risk reduction benefit from codification in Part 100 of the demographic limits in Regulatory Guide 4.7 (Rev. 1) would not outweigh the potential for elimination of superior sites. Risks (the product of the probability of an event times the consequences from the event should it occur) are already very low, as discussed above. This inherently precludes further risk reductions that are substantial. However, the proposed rule discusses consequences as well as risks.

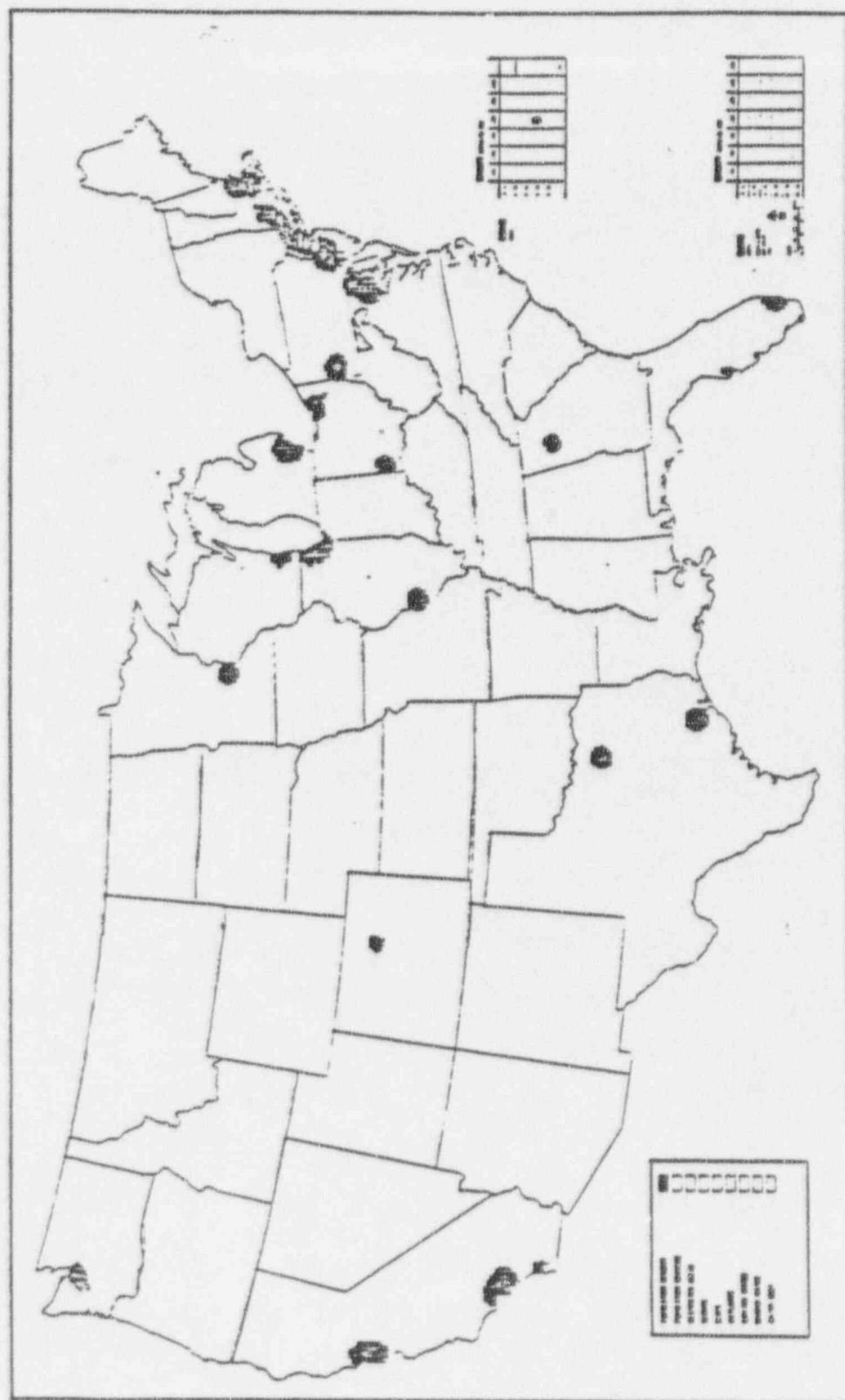


FIGURE F9.14

Even if probability is not taken into account -- an inherent regulatory deficiency -- the proposed rule would not provide any significant reduction in early injury or early fatality consequences. Additionally, the proposed rule, if adopted, would result in only a very limited potential decrease in latent fatality consequences.

Based on the foregoing, it is clear that the loss of necessary flexibility to ensure selection of sites with the most favorable overall characteristics for protection of the public health and safety may compromise fundamental safety principles with no or little enhancement of safety. Thus, the adoption of the proposed revisions cannot be justified on grounds of substantial safety enhancements. When other significant factors are incorporated into the decision-making process, including the adequacy of present U.S. sites, impact on sites in ISG Member countries and elsewhere, and economic impacts, it is clear that the adverse impacts overwhelm any benefit that might result from adoption of the proposed revisions to the demographic regulations in Part 100.

Imposition of the proposed numerical exclusion area and demographic requirements could lead to questions concerning the safety of current nuclear power sites. Although the Federal Register notice on the proposed rule states, "[a]n exclusion area of this size [0.4 miles] or larger is fairly common for most power reactors in the U.S.," (57 Fed. Reg. at 47,804), it does not acknowledge that 33% of the present U.S. nuclear power plant sites have an exclusion area smaller than the proposed numerical standard. Similarly, 10% of the present U.S. nuclear power plant sites exceed the proposed numerical criteria for population density surrounding the plant site. SECY-92-215 at 6. The situation is similar

elsewhere in the world. In France for example, roughly half of the plants in operation do not meet the proposed exclusion area of 0.4 miles and 5 of the plants do not comply with the proposed population density requirement of 500 persons per square mile. In Belgium, Holland, the Rhineland or Luxembourg, the proposed population density and distance requirements, if applied, could exclude all or nearly all nuclear power stations. In these areas, the average population density is over 300 persons/sq. km. (750 persons/sq. mi.) -- versus 500 persons/sq. mi. in the proposed revisions -- and the average distance between major population centers (> than 100,000 persons) is about 50 km. (31 miles). Also, the proposed revisions, if imposed, would not only preclude most siting possibilities in these countries, but also raise questions about the location of French power plants on French territory near the relevant borders. In this respect, two of the French sites now in operation, which do not meet the proposed population density criterion, are located near the French border with Germany or Luxembourg. A similar situation pertains to Taiwan, where there is also a need to use existing sites for new plants, as well as in Korea.

The comments of Atomic Energy Council of Taiwan to the NRC (February 17, 1993) summarize the likely impact of the proposed revisions on the nuclear power plant siting in other countries:

Reactor Siting Criteria (Nonseismic) -- An Exclusion Area Distance of 0.4 miles (640 meters):

The distance of the exclusion area boundary for nuclear power plants in Taiwan are 800, 600, 1000, and 350 meters for Chinshan, Kuosheng, Maanshan, and Yenliao sites, respectively. Once the minimum distance of

exclusion area is specified explicitly as 640 meter, two sites are already not complied with the revised regulation. It is believed that, although the revision only applies to the new sites as stated, we are still going to face the challenge from the general public on the related safety issue and spend a great deal of effort in communication and explanation. More than that, due to the limitation of location arrangement, compliance with this requirement is impossible if adding new units to the existing sites is considered. In other words, the proposed rule change will impose a very big impact, which we think is not absolutely necessary from the safety point of view, on the development of our nuclear applications. We would therefore suggest that, instead of requiring a minimum exclusion area distance, NRC place this distance as a recommended value in the Regulatory Guide.

Reactor Siting Criteria (Nonseismic) - Population Density Criteria:

The population density of 1990, with the unit of person per square mile, within 30 miles of domestic nuclear power plants are as follows:

<u>Chinshan</u>	<u>Kuosheng</u>	<u>Maashan</u>	<u>Yenliao</u>
7257	6339	209	6453

It is evident that only Maanshan site can meet this requirement as proposed in the revision of regulation. Again, even though the proposed rule change will not affect the operation of the existing plants as stated, this population density requirement will definitely serve as a strong argument to against the domestic nuclear development.

The Korea Electric Power Corporation's comments to the NRC (December 22, 1992) similarly highlighted the difficulties:

- A. The application of the proposed population density requirement of 500 persons per square mile in Korea will greatly aggravate our ability to acquire suitable sites, which has been a major problem for nuclear power construction due to a public acceptance problem.

- (1) The average national population density as of 1992 is 1126 persons per square mile, which far exceeds the proposed NRC requirement.
 - (2) Coastal areas, where the siting of nuclear power plants is most practical and possible is more densely populated than other parts of Korea due to the fact that these areas are also suitable for other industrial activities.
 - (3) Since Korea is an actively industrializing country, the projected population density will be even greater in coastal areas.
- B. Major Asian countries possessing nuclear power plants such as Korea, Japan, and Taiwan are all densely populated, and the proposed regulation will undermine the execution of future projects in these countries as well as other Asian countries.

Country	Population Density (persons/sq. mile)	Remarks
Korea	1,126	as of '92
Japan	838	as of '90
Taiwan	1,450	as of '90

- C. The numerical demographic criteria will lead to questions concerning the safety of current nuclear power sites which do not meet the proposed population density criteria, not only in the United States but in other countries as well.
- D. There is no current need for codifying demographic criteria because the present Regulatory Guide 4.7 works sufficiently for regulatory purposes.

Although the applicability of the proposed revisions is explicitly limited to future plants, the fact that large numbers of present U.S. sites would not meet limits purportedly relating to site safety and having the force of law raises troubling public acceptance problems about the adequacy of present sites, at the least, and quite possibly could provide an arguable basis for petitions and other actions to shut down currently operating reactors.

The proposed codification of numerical exclusion area and demographic criteria in Part 100 could adversely impact the siting of future nuclear power plants by unnecessarily limiting the number of potential future sites. Such unnecessary limitation is especially troubling because of the availability of additional design features to improve, when necessary, plant safety. Within the United States, geographical regions such as the Northeast, which have higher relative population densities and less available open land area, may well be precluded from consideration for future nuclear power plant sites if the proposed numerical demographic regulations are adopted. Furthermore, the regulations would preclude siting additional nuclear power plant units at approximately one-third of the presently operating reactor sites in the U.S., even though these sites possess acceptable physical characteristics, important to safe siting. The situation is worse in Western Europe and Asia where size alone limits the availability of acceptable sites. Outside the U.S., particularly in countries with higher population densities and less available land, the public pressure to adopt safety standards similar to the proposed U.S. siting regulations may well make siting additional nuclear plants extremely difficult, if not impossible. ISG Members believe that

existing sites which are otherwise acceptable should be able to receive new plants with enhanced built-in safety characteristics and margins.

If the rule results in acceptable sites being located far from metropolitan areas, there will be a need for longer transmission lines. In general, longer transmission lines will result in a higher cost for the facility as well as certain disadvantages from power losses which occur over long transmission routes. In some cases, a state or states may find that few, if any, acceptable sites are available after the new rule is promulgated. If such states must purchase power from utilities located in adjoining states having more favorable sites, there will be obvious economic impacts on the consumer and the unfavored state. While some favorable economic impacts are also possible, since remote sites may be less expensive to acquire, this possible benefit seems highly theoretical since utilities already strive to obtain the best sites at the lowest possible cost. The foregoing list does not purport to be a comprehensive list of economic impacts. Indeed, through careful review, NRC would doubtless discover many other varieties of economic impacts.^{30/}

^{30/}

The siting rule may operate to favor certain utilities in that their competitive advantage is greatly enhanced. At the same time, the rule could deprive some utilities of any acceptable sites for nuclear facilities. In some states or regions, the siting rule could operate to render nuclear power uneconomic (or of marginal economic benefit) and thus raise the cost of power in a region or force it to rely on an energy source which has adverse impacts. This may be especially severe in densely populated areas of the country where nuclear power presents a logical answer to high base load demand and where the contamination or pollution from coal or other methods of power generation would be an unacceptable added burden on air standards.

B. The Technical Basis for the Proposed Revisions to the Site Safety Criteria Is Inadequate, Internally Inconsistent and Confusing.

The Commission fails to provide an adequate or internally consistent technical basis for including numerical exclusion area boundary and demographic limits in its site safety regulations in Part 100. The proposed regulations would arbitrarily codify the 0.4 mile exclusion area boundary on the basis of design considerations, but reject the use of dose calculations by fixing the population density limits (500 people per square mile out to 30 miles at the time of initial site approval and 1000 people per square mile 40 years later). The Commission indicates that codification of the exclusion boundary limit in Part 100 would "assure a very low level of risk to individuals, even for those located close to the plant," 57 Fed. Reg. at 47,804 (emphasis added), and that the population density limits would "meet the Commission's Safety Goals." *Id.* at 47,805. However, as discussed in the foregoing sections, codification of these numerical standards in Part 100 would be inconsistent with the Commission's stated policies on regulatory decision-making, in particular, those associated with Safety Goal implementation. Moreover, codification in Part 100 is not necessary to meet the Commission's remote siting goal. Consideration of alternative sites when numerical demographic criteria in Regulatory Guide 4.7 have been exceeded is sufficient to accomplish this goal, as discussed above.

The proposed changes are intended to achieve site isolation through decoupling siting and design, but the rationale for the proposed changes is fundamentally linked to the contributions of design to the reduction of the residual

risk from a severe nuclear power plant accident. For example, reference is made to numerous risk studies, such as WASH-1400 and NUREG-1150, which estimate risk considering both siting and design characteristics. Further, the justification for an exclusion area distance of 0.4 miles is based on "typical engineered safety features." Id. at 47,804. Thus, the proposed revisions rely on past success in design improvements as a basis for achieving site isolation by decoupling siting from design, but refuse to allow credit for future safety improvements to the design in siting new plants. Specifically, "the proposed regulation would eliminate the use of a postulated source term, [and] assumptions regarding mitigating systems . . ." in order to achieve site isolation through decoupling. 57 Fed. Reg. at 47,804.

In sum, the proposed rule is inconsistent because it precludes the use of design and risk as a basis for selecting sites, but relies on design and risk as the basis for such preclusion. Additionally, in contravention of the Safety Goal decisional framework for imposing safety requirements which are not necessary for adequate protection, it uses the consequences of a very low probability severe accident, as opposed to risk, as the basis for imposing the requirements.

Further exacerbating the inconsistent technical basis is the Commission's invitation to comment on the size of the exclusion area for plants whose power levels are significantly lower than 3800 MW (thermal). Power level is a determinant of the source term, which the Commission would eliminate as a basis for determining exclusion area size. Thus, the proposed rule sends conflicting messages on the importance of source term issues.

As presently constructed, the proposed rule would have site issues affect the determination of the design, but not have design characteristics widen the choice of sites. Design and risk arguments are used to support certain of the proposed revisions, but, largely based on consequences, revisions would exclude the application of design and risk considerations in site selection. Even in this narrower and more inappropriate measure of acceptability, no numerical evaluation of the benefits is offered. When analyses are made of the proposed rule on the basis of consequences, the benefits from codification are shown to be either zero or very small. No counterbalancing analysis is provided for the economic and health benefits of alternative formulations of regulations which would be consistent with accepted safety principles for siting nuclear power plants.

The inconsistency between the basis for the rule and the requirements the rule would impose is made all the more striking when the implications of the proposed rule for the use of existing sites for additional power units or replacement power units are considered. All existing sites are acceptable on the basis of safety considerations. Without grandfathering, however, some existing sites, which would not meet the proposed demographic criteria, would have to be discarded as sites for additional or replacement units, even though they are superior sites from an overall safety perspective. Prohibition of grandfathering would needlessly result in loss of investment and loss of use of safe sites. Grandfathering, however, would likely lead to endless disputes regarding the safety of the existing units. This example illustrates the flaw inherent in establishing a dual regulatory structure in Part 100 where there is no compelling safety rationale for its existence.

The first of three objectives of the proposed rule is to "[s]tate the criteria for future sites that, based upon experience and importance to risk, have been shown as key to protecting public health and safety." 57 Fed. Reg. at 47,803 (emphasis added). However, the proposed rule would impose arbitrary prescriptive criteria without any attempt to determine the significance of or necessity for the criteria, such as specified exclusion area distances and specified population densities. In this regard, the Supplementary Information published with the proposed changes reflects a misunderstanding of the fundamental purpose of the Safety Goal decisional framework. One of the stated purposes of the Safety Goal decisional framework is to provide a better means for testing the adequacy of and need for current and proposed safety requirements. See 51 Fed. Reg. at 28,044. In contravention of this stated purpose, the Safety Goal decisional framework is cited as the basis for an unjustifiable ratchet.

Given the progress the nuclear industry has made since 1980 in understanding severe accident source terms and the increased application of probabilistic risk assessment techniques to severe accident analysis, the radiological risk to the public is now understood to be considerably different from and less than it was previously thought to be. When coupled with the incorporation of severe accident risk reduction features into new reactor designs, the magnitude of the residual severe accident risk has become small enough that further reductions in the residual risk from siting on the basis of demographics will be very small. To be judged adequate and credible, particularly in light of the

Commission's rulemaking objective quoted above, the technical basis must reflect such facts.

C. The Proposed Revisions to the Seismic Criteria Should Not Be Adopted. Revision Should Await Resolution of the Controversy on the Use of Deterministic Versus Probabilistic Methods In Site Selection. Any Revision Adopted Should Meet the Commission's Rulemaking Objective of Regulatory Stability.

The Commission issued seismic and geologic siting criteria in 1973 in the form of Appendix A to Part 100 (38 Fed. Reg. 31,279 (November 13, 1973)). At the time of their issuance, the seismic criteria reflected state-of-the-art understandings in the conduct of seismic and geologic investigations and were developed with the cooperation of the U.S. Geological Survey and the National Oceanic and Atmospheric Administration. Id. at 31,280.

The primary reasons given in the Federal Register notice for the proposed changes to the seismic and geologic criteria are (1) to benefit from experience gained in the application of the procedures and methods set forth in the present regulations; (2) to incorporate the rapid advances in the earth sciences and earthquake engineering that have been made since the criteria were first published in 1972; and (3) to reduce the difficulty encountered by nuclear power plant applicants and the NRC Staff in exercising needed judgment in applying the criteria and using evolving methods of analyses within the context of the licensing process, thereby leading to a more stable and predictable licensing process than in the past. See 57 Fed. Reg. at 47,803. The ISG does not believe that the proposed revisions to the present criteria in Part 100 will accomplish these objectives. To the contrary, the proposed revisions could lead to greater instability

and less predictability in the licensing process than under the present regulatory regime. In view of the potential attractiveness of other alternatives and the lack of a resolution methodology should deterministic and probabilistic methods give divergent results, the prudent course is for the Commission to withdraw the proposed revisions.

1. **The Commission should resolve the controversy between use of deterministic versus probabilistic techniques before proceeding to rulemaking.**

The Supplementary Information published with the proposed changes makes clear that the present, deterministic approach "has worked reasonably well for the past two decades, in the sense that SSEs [Safe Shutdown Earthquakes] for plants sited with this approach are judged to be suitably conservative, [even though] the approach has not explicitly recognized uncertainty in the geoscience parameter." *Id.* at 47,807. Because the NRC wants to require use of probabilistic methods, which allow treatment of this uncertainty, the revisions are being proposed. The proposal to use a dual scheme by adding probabilistic methodology to the existing deterministic methodology for seismic design criteria will unnecessarily complicate and destabilize decisions concerning selection of design basis ground motion and, consequently, site selection. Controversy over the appropriate probabilistic methodology for seismic analysis has led to the development of two distinctly different approaches in the U.S. As the NRC acknowledges, "[b]ecause so little is known about earthquake phenomena (especially in the United States) . . . [e]xperts often delineate very different estimates of the largest earthquakes to be considered and different ground-motion

models." Id. Application to seismic analyses of a probabilistic methodology that has not yet been fully evaluated and tested through actual use in the licensing process results in even greater controversy. In particular, the bottom-line results from probabilistic seismic hazard analyses tend to be dominated by the extremes rather than the central tendencies of the distributions of knowledge and expert opinions. Id. This controversy among seismic experts, coupled with the divergent views within the NRC Staff as to the role probabilistic seismic hazard analysis should play in the licensing arena, will undoubtedly have a destabilizing, rather than a stabilizing, effect on the siting process.

Given the controversy surrounding the appropriateness of using such analyses in the licensing process, the lack of experience on the part of both the NRC Staff and nuclear power plant applicants in such use in the licensing process, and the availability to the Commission of other, more suitable means to gain experience with the application of probabilistic methodology to seismic analyses (such as the use of pilot programs or issuance of a policy statement), there is no valid reason for proceeding with these revisions.

At a minimum, if the Commission insists upon codifying a methodology requiring that both deterministic and probabilistic methods be used in nuclear power plant siting, it should identify a resolution methodology to be applied whenever the two kinds of studies produce divergent results. Without such a methodology, the revisions requiring use of both deterministic and probabilistic studies will destabilize the licensing process and introduce greater unpredictability into it.

2. The proposed requirements are unlikely to meet the stated objectives of greater predictability and stability.

There is not consensus within the NRC Staff as to whether or how probabilistic analyses should be used in making siting decisions. 47 Fed. Reg. at 47,812. Moreover, the application in the licensing process of such analyses to nuclear power plant siting has not yet been tested. Lack of consensus and lack of a body of licensing practice are destabilizing forces in the licensing process. Under these circumstances, it cannot be expected that adoption of the proposed revisions to the seismic criteria will lead to greater predictability and stability.

Imposition at this time of seismic criteria in the form proposed is especially inappropriate. In the seismic-hazard area, the Commission has stated that the bottom-line results from probabilistic analyses tend to be dominated by the extremes rather than the central tendencies of the distributions of knowledge and expert opinions. Also, "[b]ecause so little is known about earthquake phenomena (especially in the eastern United States), . . . [e]xperts often delineate very different estimates of the largest earthquakes to be considered and different ground-motion models." *id.* at 47,807. Additionally, there are divergent views within the NRC Staff as to the role probabilistic seismic hazard analysis should play in the licensing arena. In particular, "views range from an advocacy of a predominantly probabilistic analysis to the probabilistic/deterministic analysis [being] proposed [in the revisions] to a predominantly deterministic approach as used currently." *id.* at 47,812.

Due to the divergence of views among the NRC Staff, the Commission is requesting comments on specific questions. The Commission has asked whether deterministic and probabilistic evaluations should be combined or weighted, whether the procedure specified in one of the draft Regulatory Guides to determine controlling earthquakes from the probabilistic analysis is adequate, whether median values of the seismic hazard analysis should be used to the exclusion of other statistical measures, whether the exceedance criterion for the Safe Shutdown Earthquake Ground Motion is properly specified, and how many earthquakes should be generated to cover the frequency bands of concern for nuclear power plants. See id. at 47,812-13. As discussed above, the controversy should be resolved before adopting new requirements, due to the fundamental problems remaining in the criteria as proposed. For example, further effort should be expended in developing the earthquake database, improved techniques for weighting the seismic zone area, and improved expressions for the attenuation equation. At a minimum, no rule should be proposed which does not resolve all issues which could lead to instability in the licensing process. Even though the present criteria are not perfect, their operation is understood by both applicants and the NRC. The proposed revisions are fraught with regulatory uncertainty of a fundamental nature and should not be finalized until further evaluation is completed.

3. Any revision to the Commission's seismic regulations should provide regulatory stability.

As discussed above, there is not agreement among the NRC Staff as to how probabilistic analyses should be used in siting nuclear power plants. This is because neither the NRC Staff nor the nuclear industry has developed a body of practice in the licensing context. As the Federal Register notice implicitly acknowledges, the nuclear regulatory experience is limited to those who participated in either the NRC-Lawrence Livermore National Laboratory or the Electric Power Research Institute seismic hazard research projects over the last decade. See id. Additionally, under the sponsorship of the Nuclear Management and Resources Council (NUMARC) an alternative has been developed.

Therefore, it is both appropriate and prudent for the Commission to proceed cautiously with codification of requirements in the absence of licensing experience with implementation of the requirements. In similar instances in the past, the Commission has employed a trial approach in order to develop the necessary body of practice within the regulatory context. Such an approach is especially appropriate where, as is the case here, the proposed revisions have limitations and there is significant controversy among experts as to whether and how the probabilistic criteria should be applied. For example, in implementation of the Policy Statement on Safety Goals, the Commission proceeded cautiously and, in the area of severe accident regulation, it is only now embarking on a rulemaking based on years of safety research. 57 Fed. Reg. at 44,513 (September 27, 1992). Also, NUMARC's proposal appears to merit evaluation by the

Commission before the Commission makes a final decision on the structure and content of revised siting criteria.

The Federal Register notice for the proposed revision to the seismic criteria asserts without elaboration that "the NRC believes that this approach is the best way to accomplish the objective, . . . and arrive, through analysis, at a site-specific ground motion that appropriately captures what is known about the seismic regime"; and that the approach "should lead to a more stable and predictable licensing process than in the past." 57 Fed. Reg. at 47,807 (emphasis added). Two aspects of this assertion need to be addressed. First, rulemaking does not have to be used to achieve the desired result. Second, the approach taken in the proposed rule has not been shown to be the best approach.

As to the first point, the Commission does not have to modify the existing Part 100 seismic and geologic criteria in Appendix A to Part 100 in order to obtain the submittal of probabilistic analyses in addition to deterministic analyses as part of the assessment of the seismic and geologic properties of a site. Applicants who wish to conduct probabilistic analyses and submit them to the NRC in conjunction with their deterministic analyses are certainly not prohibited from doing so and the NRC Staff can indicate to applicants its interest in such analyses.

If the Commission wishes to require such probabilistic analyses, it could issue a policy statement requiring the submittal of probabilistic analyses. This would be similar to the approach taken in the Commission's Severe Accident Policy Statement (50 Fed. Reg. 32,138), which requires that a Probabilistic Risk

Assessment (PRA) be completed for all new plants and included with the application. This PRA must be used to expose the severe accident vulnerabilities initiated by both internal and external events that are associated with a plant of new design. For the Severe Accident Policy Statement, the NRC Staff must complete a review of a PRA as part of its licensing review of a design for a new nuclear power plant. Although a policy statement does not establish a requirement as a legal matter, it has the practical effect of a requirement. In conjunction with issuing such a Policy Statement on probabilistic seismic analyses, the NRC Staff might issue guidance as to how the Policy Statement would be implemented for both the Staff itself and applicants.

As to the second point, the Commission has not provided any justification that the proposed revisions to the seismic criteria are the best. To the contrary, the Supplementary Information for the proposed revisions demonstrates that there is controversy concerning their formulation. Additionally, in its comments on the proposed revisions to Part 100, NUMARC has proposed an alternative which appears to warrant evaluation. At a minimum, the Commission should evaluate the NUMARC proposal (and any other attractive alternatives) and resolve the present controversy before finalizing any changes. Such an evaluation would also permit the Commission to make further progress in such areas as development of an earthquake database, improved techniques for weighting the seismic zone area, and improved expressions for the attenuation equation. In view of the infirmities in the rule as a whole, the ISG urges the Commission to withdraw the rule in its entirety until these issues are adequately addressed.

D. The Environmental Assessment Prepared in Conjunction with the Proposed Revisions Is Inadequate as a Matter of Law to Support a Finding of No Significant Environmental Impact.

The Commission's regulations in 10 CFR Part 51 specify the procedures necessary for compliance with NEPA. At a minimum, Part 51 requires that an Environmental Assessment (EA) be prepared examining the environmental impacts of the proposed action and reasonable alternatives to the proposed action. The purpose of an EA is to determine whether a comprehensive Environmental Impact Statement (EIS) must be prepared. Section 51.30 requires that an EA identify the proposed action and include:

- (1) A brief discussion of:
 - (i) The need for the proposed action;
 - (ii) Alternatives as required by section 102(2)(E) of NEPA;
 - (iii) The environmental impacts of the proposed action and alternatives as appropriate; and
- (2) A list of agencies and persons consulted, and identification of sources used.

The EA prepared in conjunction with revision of the Commission's siting criteria fails to meet the Commission's NEPA requirements in Part 51 and is otherwise not in accordance with law.

The proposed revisions to the 10 CFR Part 100 siting regulations will result in substantive and significant changes to the Commission's regulatory framework for siting new nuclear power plants, if adopted. Specifically, the demographic criteria as formulated in the proposed rule do not ensure that the sites chosen will be among the best reasonably to be found. Given the importance of the U.S. siting regulations and guidance to the formulation of international site

safety standards, adoption would force reconsideration of present international safety standards and raise questions about the adequacy of present siting practices. Adoption could have the practical effect of making it difficult, if not impossible, to site nuclear power plants in any portion of the United States which did not meet the numerical demographic criteria specified in the regulation, as well as elsewhere in the world. Adoption also has the potential to create confusion among members of the public as to the adequacy of existing nuclear power plant sites and the adequacy of existing emergency planning requirements. The EA fails to address the issue of multi-unit sites and the economic impacts of the regulation on siting decisions. These are the kinds of environmental impacts which NEPA requires be addressed and taken into account as part of the process to decide whether to make the proposed revisions final.

The inadequacy of the current EA is corroborated by the fact that in 1980, the Commission determined that it would prepare an Environmental Impact Statement (EIS) in connection with revision of its siting criteria to incorporate numerical demographic criteria into a revised 10 CFR Part 100.^{31/} In support of

^{31/} On July 29, 1980, the NRC issued an Advance Notice of Proposed Rulemaking (ANPR) (45 Fed. Reg. 50,350), in which the Commission announced its intention to revise the reactor siting criteria and requested comments on seven of the nine recommendations of the Siting Policy Task Force, as well as certain alternative approaches. In conjunction with the rulemaking effort, the Commission also issued a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS). 45 Fed. Reg. 79,280 (December 2, 1980). The NOI, among other things, identified the technical approach to detailed analyses that would be followed in developing the bases for any proposed revisions. See id. at 79,822-23. In December 1981, the NRC published the Scoping Summary Report for the EIS (NUREG-0833). The report addressed comments received on both the ANPR and the NOI and provided further discussion of the efforts which would be undertaken to develop an adequate technical basis for any revisions. The report recognized that the siting rulemaking must take into account premises concerning reactor design and emergency planning. See (continued...)

the development of the EIS, the NRC identified major studies to be undertaken to understand the impacts. Significant changes have occurred since issuance of the Notice of Intent and Scoping Summary Report in Commission policy, practice and capability to determine how it will proceed in establishing requirements, such as the proposed changes to the siting regulations, when such changes are not necessary to ensure adequate protection of the public health and safety. However, the kinds of studies identified remain as valid in 1993 as they were in 1980 for assessing the impacts of the proposed regulation and serving as the basis for an EA. For example, the following studies were identified in the 1980 Notice of Intent (see 45 Fed. Reg. at 79,822-23):

(1) Radiological Consequences of Accidents: Proposed criteria will be compared with realistic alternatives on the basis of impacts on public health and safety. For demographic criteria this means that variation in doses to the maximally exposed individual and the population from a full range of accident releases must be examined for alternative ways of specifying constraints on population density and distribution. Existing sites and a hypothetical site will be evaluated. Consequences considered will include early fatalities, injuries, latent fatalities, and property damage. Both individual and societal risk will be evaluated but may differ in relative importance for establishing different criteria.

(2) Feasibility of Protective Actions: The topics under consideration for rulemaking with respect to demographic criteria and external hazards will be examined to determine whether the capability to take protective action in the vicinity of a site under

²¹(...continued)

NUREG-0833 at 13. It also restated that "a systematic evaluation of accident consequences for a full range of reactor accidents would be a fundamental part of the technical basis for the siting rulemaking. . . ." Id. at 20. See also id. at 14, regarding consideration of a full range of accidents in establishing siting criteria.

accident conditions might be impaired or enhanced by various choices of alternative criteria.

(3) **Definition of Region:** Alternative schemes of regionalization will be examined to determine a proper basis for establishing regional criteria. Socioeconomic and physiographic units will be examined to establish potential regional breakdowns. Effects of uniformity of population distribution, water resource restrictions and any other appropriate regional concerns will be considered when deciding on the proper regionalization scheme.

(4) **Site Availability:** Consistent with the intent of the NRC FY-80 Authorization Act^{22/}, the new

^{22/} In June 1980, the U.S. Congress passed the NRC Authorization Act for Fiscal Year 1980 (FY-80), Pub. L. No. 96-295, 94 Stat. 780 (1980). Section 108 of the Act provided in pertinent part that:

(a) . . . [T]he Nuclear Regulatory Commission is authorized and directed . . . to develop and promulgate regulations establishing demographic requirements for the siting of utilization facilities . . .

(c) The regulations . . . shall specify demographic criteria, including maximum density and population distribution for zones surrounding the facility without regard to any design, engineering, or other differences among such facilities.

The Conference Report (H.R. Conf. Rep. No. 96-1070, 96th Cong., 2nd Sess. 24 (1980)), linked the legislation to the Siting Policy Task Force recommendation to strengthen siting as a factor in defense-in-depth, but without eliminating further siting of nuclear reactors in any region of the United States. See H.R. Conf. Rep. No. 96-1070 at 25-26. Like the Siting Policy Task Force Report upon which it relied, the FY-80 NRC Authorization Act reflected understandings of the time that codification of remote siting requirements in the Commission's regulations would contribute significantly to reducing the residual risk from a severe nuclear power plant accident and, hence would contribute to increased defense-in-depth.

Section 108 of the Fiscal Year 1980 Authorization Act has long since expired, as evidenced by its not having been codified in the U.S. Code and its having no language indicating permanency. In Massachusetts v. NRC, the Court referred to the FY 80 NRC Authorization Act as "an expired fiscal appropriations law, [that] was not in effect when CLI-90-2 was decided and therefore did not limit the licensing discretion otherwise conferred on the Commission by Congress." Massachusetts v. NRC, 924 F.2d 311, 324 (D.C. Cir. 1991). However, the assessment identified in the 1980 Notice of Intent to ensure that new demographic regulations do not preclude further siting of nuclear power plants in any region of the United States is still needed, the more so because changes to the demographic regulations in Part 100 are not needed to ensure adequate protection of the public health and safety.

demographic criteria should not preclude further siting of nuclear power plants in any region of the United States. An assessment will be made for each region that identifies the variation in availability of sites for nuclear power plants as a function of the structure of the criteria and the variation in numerical values as well as realistic constraints on siting such as water availability and violation of safety criteria. The benefits of regionally based criteria versus nationwide criteria will be examined. Basic information will be developed from existing siting studies which, taken together, cover large portions of the country. (Emphasis added.)

(4) Socioeconomic Impacts: The socioeconomic impacts of varying degrees of remoteness will be investigated. Economic impact of increased transmission distances, impacts on land use and other factors will be addressed along with sociological penalties and inequities in distribution of cost and benefits of such siting.

(5) Severity of External Hazards: A literature review will be performed to establish the potential level of hazard associated with the external hazards listed in the [ANPR] and any other appropriate topics. Staff practice for dealing with these hazards will be assessed. Available models for characterizing the effect of a hazardous external event will be evaluated. The feasibility of establishing a meaningful protective distance will be examined. The availability of sites associated with the demographic criteria proposed by the staff will be reexamined to determine whether the standoff criteria will significantly alter site availability.

(6) Engineering Alternatives to Standoff Distances: The feasibility of design performance requirements as opposed to specific standoff distances will be evaluated.

(7) Precluding Siting of Nuclear Reactors in Any Region of the United States: Energy generation from any source has its associated risk and risks from some energy sources may be greater than that of the nuclear option. Therefore, it has been suggested that the siting criteria should not be so stringent as to preclude the use of nuclear power from any region of the United States.

The implications of not precluding nuclear power from any region of the United States will be examined.

(8) Effect of Groundwater Interdiction Criteria on Site Availability: The effect of site availability of alternative siting criteria that assure the capability for groundwater interdiction would be examined.

(9) Use of Existing Sites: The existing sites would be examined for various levels of criteria to determine which sites were acceptable under each proposal. The feasibility of adding additional units to each of these sites would then be examined and an estimate made by region of remaining siting capacity. Using the characteristics of the selected site, an estimate would be prepared of the availability of multi-unit sites as a modification of the availability information for the various demographic criteria and standoff distances.

(10) Use of Unusual or Unproven Engineering Design to Compensate for Site Deficiencies: An estimate would be made of the effect on site availability of instituting such a requirement, particularly where large areas might have a common deficiency which might preclude siting from a large region.

The economic aspects of reactor siting have long been a fundamental part of the NRC's NEPA review. In numerous cases the Commission's tribunals have considered the economic aspects, among other factors, of alternative facility sites.^{33/} Since the NRC has consistently interpreted NEPA as requiring it to assess cost-benefit matters, including economic factors, in individual adjudications concerning construction permits and operating licenses, the NRC is plainly under a duty to inquire into the cost-benefit aspects of its proposed siting rule. The need for a comprehensive and accurate inquiry into economic impacts cannot be

^{33/} See Union of Concerned Scientists v. AEC, 499 F.2d 1069, 1084-85 (D.C. Cir. 1974).

overstated. Since acceptable sites for nuclear power plants are difficult to find and costly to acquire, a siting rule is certain to have significant impacts on the costs of constructing a nuclear facility. An irony concerning the cost of nuclear facilities is that costs have risen sharply in response to tightened NRC engineering safety requirements. Yet through this proposed rulemaking, the NRC would ignore many of the engineered safety features which have been required for plants at considerable cost. Some of the more obvious economic impacts of such a siting rule are discussed above in Section II.A.2.c.iv.

An agency's Finding of No Significant Environmental Impact, and hence the adequacy of the EA which provides the basis for the finding, is judged against a standard of reasonableness. See Natural Resources Defense Council v. Duvall, 777 F.Supp. 1533, 1537 (E.D. Cal. 1991). In determining adequacy, courts have considered, among other things, the following questions:

- Has the agency accurately identified the relevant environmental concern?
- Once the agency has identified the problem, has it taken a "hard look" at the problem in preparing the EA?
- If a finding of no significant impact is made, will the agency be able to make a convincing case for its finding?

See Sierra Club v. DOT, 753 F.2d 120, 127 (D.C. Cir. 1985) (citations omitted).

The draft EA prepared in connection with the proposed revisions to the siting regulations would not be found adequate under this test. In its 1980 ANPR, the Commission sought public comment on substantially the same revisions

to the Commission's demographic regulations in Part 100. The Commission received a number of comments on the ANPR. Commenters emphasized that current siting practices were effective in achieving isolation, with the trend being toward the siting of nuclear power plants away from highly populated areas. Commenters expressed concern about the inadequacy of the technical basis for the changes under consideration and requested that the Commission develop safety goals, quantify residual risk and establish an overall risk criterion before proceeding. Several commenters thought that an EIS should be prepared, which would consider among other things, the disadvantages of remote siting and the elimination of new nuclear power plants from certain regions of the country should the contemplated revisions be adopted. The potential impact on worldwide siting was also called to the Commission's attention.

The Commission's Advisory Committee on Reactor Safeguards (ACRS) also commented on the issues presented in 1980 when the Commission issued the ANPR. While the ACRS agreed that siting, as a factor in the defense-in-depth philosophy should be strengthened, the ACRS stated:

[T]he ACRS believes that any minimum requirements for parameters such as the exclusion zone radius, surrounding population density, or distance from population centers should be established, if possible, within the framework of an overall Nuclear Regulatory Commission safety philosophy for future reactors.

Such a philosophy should be based on preestablished Commission objectives for acceptable risk to both individuals and society. This will, of necessity, include consideration of matters such as the potential effects of a broad spectrum of reactor accidents, the identification of ALARA (As Low As Reasonably Achievable) criterion

for the reduction of risk from accidents, and a general statement of policy concerning the objectives to be sought in reactor design with regard to the prevention and mitigation of accidents.

The establishment of demographic-related site criteria will inevitably require a considerable amount of judgment. However, the choice will be less arbitrary if made within the framework of an overall NRC safety policy. 45 Fed. Reg. at 50,352.

An Errata Sheet to the 1981 Scoping Summary Report, which addressed comments received on both the ANPR and Notice of Intent, indicated that the Commission would re-examine its decision to prepare an EIS when it resumed the rulemaking to revise the siting regulations. ISG members do not believe issuance of the draft EA without explanation of why the Commission apparently changed its mind about preparing an EIS is consistent with case law. An agency's decision not to proceed with an EIS is unreasonable if the agency "fails to supply a convincing statement of reasons why potential effects are insignificant." Seattle Community Council Federation v. FAA, 961 F.2d 829, 832 (9th Cir. 1992) (citation omitted). An agency's decision is also unreasonable if substantial questions are raised regarding "whether the proposed action may have a significant impact upon the human environment." Id. See also Blue Ocean Preservation Society v. Watkins, 767 F. Supp. 1518, 1526 (D. Haw. 1991). The Commission's seeming failure, in preparing the EA for the 1992 proposed revisions, to take into account the comments generated in response to the 1980 ANPR and Notice of Intent cannot be considered reasonable, given their continuing

relevance to the changes proposed. Ignoring those earlier comments is not a "convincing statement."

In sum, the Environmental Assessment prepared in conjunction with the proposed revisions to the Commission's siting regulations is inadequate as a matter of law to support a finding of no significant environmental impact.

E. Finalization of the Proposed Revisions to the Siting Regulations Would Not Be in Accord With Sound Agency Decisionmaking.

As the Supreme Court held in Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519 (1978), administrative agencies have reasonable latitude in the rulemaking process, and the courts will not impose their own notion of what procedures are best or most likely to further the public good. Still standing, however, is the requirement that an agency avoid conduct which is arbitrary or capricious, and that it provide a reasonable statement of the basis and purpose of its rules. Moreover, an agency must obey its own regulations. On many occasions the courts have struck down agency rules which were adopted without adequate agency review of major matters related to the rulemaking. The NRC's present course is perilously close to the type of conduct which courts frequently strike down.

The siting rule, if promulgated, may well be vulnerable to legal challenge on the grounds that the Commission's analyses and decisionmaking have omitted consideration of critical information in the formulation of the proposed revisions, even though such information was available to the Commission as a result of the earlier issuance of the ANPR and Notice of Intent. Furthermore, the

proposed rule lacks an adequate technical basis, and the Environmental Assessment required by NEPA is patently inadequate. Additionally, the analytic process prescribed by the Commission's Safety Goal Policy Statement and implementing guidance has not been followed in formulating the technical basis. Given the importance of the siting rule, it is critical that the Commission closely observe prudent administrative practices. Too much is at stake here for the Commission to proceed further when important aspects of the siting rule are not yet developed.

Following publication in the Federal Register of the Advance Notice of Proposed Rulemaking in July 1980, the NRC supplemented the notice in December 1980 with its Notice of Intent to Prepare an Environmental Impact Statement. The following year, in December of 1981, the Commission "deferred" its rulemaking process concerning siting criteria to await development of Safety Goals and improved research on accident source terms. Finally, on October 20, 1992, the NRC issued a proposed rule concerning reactor siting criteria.

The NRC's decision to publish the ANPR began the rulemaking process regarding siting criteria. Indeed, the NRC's October 20, 1992, Federal Register notice states that the rulemaking process began over twelve years ago. 57 Fed. Reg. 47,802. Although the 1986 Regulatory Agenda and 1988 denial of PRM-100-2 indicate that the NRC's Executive Director for Operations had concluded the 1980 rulemaking should be terminated, the Commission, by its own admission in the 1992 Federal Register notice, clearly regards the rulemaking as ongoing since 1980. Consequently, the NRC, in formulating the proposed

revisions to the demographic regulations, should have considered the comments submitted in response to the ANPR issued on July 29, 1980, as well as the December 2, 1980 Notice of Intent to prepare an EIS and the responses thereto by the NRC Staff in the December 1981 Scoping Summary Report.

Under Section 553 of the Administrative Procedure Act (5 U.S.C. § 552 et seq. (1988)), an agency must "incorporate in the rules adopted a precise general statement of their basis and purpose." 5 U.S.C. § 553(c) (1988). A failure to address substantive comments or concerns raised during the rulemaking renders that process invalid. Marsh v. Oregon Resources Council, 490 U.S. 360, 378 (1989); Bethesda Hosp. v. Heckler, 609 F. Supp. 1360, 1371 (S.D. Ohio 1985). If, upon review, a court cannot discern that an agency made a reasoned decision after consideration of relevant factors, the agency action is arbitrary and capricious. Id. As discussed above, the Commission's failure thus far to address relevant comments in proceeding from one stage of the rulemaking to the next, in the process of revising its siting regulations, has the potential to render any rule which may be adopted vulnerable to invalidation.

Also, an agency is also bound by its own regulations. Robert E. Dereckter of Rhode Island, Inc. v. Goldschmidt, 506 F. Supp. 1059, 1063 (D.R.I. 1980). The NRC's NEPA regulations in Part 51, described above, require the NRC to explain the basis for its actions. To the extent that the Commission has ignored its earlier ANPR and NOI actions, the NRC is out of compliance with its own regulations. Similarly, the technical basis for the proposed revisions to the demographic regulations is inconsistent with the Commission's Safety Goal

decisional framework. The problems with the proposed revisions to the siting regulations and the rulemaking process leading up to their proposal are so great that withdrawal of the proposed revisions and termination of the proceeding seems the most prudent course.

III. CONCLUSIONS

For the reasons set forth above, ISG Members believe that:

- The existing demographic regulations in 10 CFR Part 100 have worked well;
- The proposed revisions to the demographic regulations are unnecessary;
- Contrary to the Supplementary Information published with the proposed rule, the proposed revisions to the demographic regulations do not codify present siting practice, but change practice in a fundamental way such that there no longer can be assurance that a site proposed for a nuclear power plant will be among the best reasonably to be found;
- The proposed revisions to the demographic regulations are unduly restrictive and without commensurate benefit; and
- Adoption of the proposed revisions to the demographic regulations will have adverse consequences on the internationally accepted consensus standards of the IAEA on the siting of nuclear power plants and on national standards in ISG Member countries.

Consequently, ISG Members urge the Commission to withdraw the proposed revisions, along with draft Regulatory Guide DG-4003 (Proposed Revision 2 to Regulatory Guide 4.7), to the demographic regulations in 10 CFR Part 100.

Likewise, ISG Members request the Commission to withdraw the proposed changes to the seismic criteria in Part 100. Withdrawal would allow resolution of present controversies concerning the proposed changes and evaluation of alternatives. Withdrawal and evaluation of alternatives would provide a better basis for the development of international consensus standards reflecting the principles embodied in the NRC regulations.

APPENDIX

In addition to soliciting comments on all aspects of this rulemaking, the Commission, in Section XI of the Federal Register notice requested comments on a number of questions. The International Siting Group's responses to these questions are found in this Appendix.

A. REACTOR SITING CRITERIA (NONSEISMIC)

1. Should the Commission grandfather existing reactor sites having an exclusion area distance less than 0.4 miles (640 meters) for the possible placement of additional units, if those sites are found suitable from safety consideration?

ISG Response: This question presupposes that the Commission will revise the existing reactor siting regulations to include a numerical size requirement, in terms of distance, for the exclusion area. The International Siting Group (ISG) does not believe that it is either necessary or desirable to change the existing siting regulations. As discussed in Section II(A)(1) of the ISG Comments on the proposed revisions to the siting regulations, it is essential for siting standards to be sufficiently flexible to "ensure that all site-related characteristics have been taken into account" during the selection of the preferred candidate sites. See IAEA Safety Guide No. 50-SG-S9, Site Survey for Nuclear Power Plants (1984) at 10. That guide identifies fourteen (14) safety-related site characteristics to be evaluated during the site selection process, of which population

distribution is but one.^{2/} The guide recognizes the difficulty in comparing sites based on population and suggests that "[i]t may be appropriate to compare all other site characteristics, and then to evaluate the sites independently from the point of population distribution." Id. at 32. Contrary to what is essential in the selection of preferred sites, the proposed revisions, if adopted, would impose a hierarchy of site characteristics, which elevates demographics over other physical characteristics of the site and other safety-related aspects of nuclear power plant siting which may have greater potential for reducing risk. This, in turn, creates the possibility that sites with a better balance overall of favorable safety-related characteristics may be eliminated from further consideration on the basis of demographics alone. Such an outcome would be contrary to the public interest and sound regulation and the fundamental safety

^{2/} The other thirteen are:

- Surface faulting
- Seismicity
- Suitability of subsurface material
- Vulcanism
- Flooding
- Extreme meteorological phenomena
- Man-induced events
- Dispersion in air
- Dispersion in water
- Emergency Planning
- Land use
- Availability of cooling water
- Other site characteristics as appropriate, such as avalanche, landslide, surface collapse.

Id. at 10-13.

principles governing the siting of nuclear power plants everywhere in the world.

Regulations which grandfather are always problematic. They establish a dual system of seemingly conflicting standards and are confusing to the public. Grandfathering conveys to the public the message that what is grandfathered is less safe than what is not grandfathered. Once this occurs, it is very difficult to convince the public otherwise. In the case of the proposed revisions to the demographic requirements in the Commission's siting regulations, there is no need to introduce grandfathering clauses into the Commission's demographic requirements because there is no need to change the requirements at all. As discussed in Section II(A)(2)(a) of the ISG Comments on the proposed revisions to the siting regulations, the existing siting regulations have achieved site isolation. As discussed in Section II(A)(2)(b), adoption of the proposed revisions is not needed to ensure "decoupling" of nuclear power plant siting and design. As discussed in Section II(A)(2)(c), adoption of the proposed revisions to the demographic regulations in Part 100 will not provide a substantial increase in protection nor contribute to increased defense-in-depth. Further, the adverse impacts of the proposed revisions greatly exceed their benefits. And,

as discussed in Section II(B), the technical basis for the proposed revisions to the siting criteria is inadequate, internally inconsistent and confusing.

2. Should the exclusion area distance be smaller than 0.4 mile (640 meters) for plants having reactor power levels significantly less than 3800 Megawatts (thermal) and should the exclusion area distance be allowed to vary according to power level with a minimum value (for example, 0.25 miles or 400 meters)?

ISG Response: See ISG Response to Question 1 above. The exclusion area should be allowed to vary according to power level, as is the case with the current regulations. In this regard, power level is a determinant of the source term which is used in setting exclusion area size.

The question illustrates a basic inconsistency in the technical basis for the proposed rule. The proposed rule, if adopted, would eliminate source term as a basis for determining exclusion area size. Question 2, however, implicitly suggests that consideration of the source term is an appropriate way to determine exclusion area size.

3. The Commission proposes to codify the population density guidelines in Regulatory Guide 4.7 which states that the population density should not exceed 500 people per square mile out to a distance of 30 miles at the time of site approval and 1000 people per square mile 40 years thereafter. Comments are specifically requested on questions 3(a), 3(b), and 3(c) given below.

- (a) Should numerical values of population density appear in the regulation or should the regulation provide merely general guidance, with numerical values provided in a regulatory guide?

ISG Response: See ISG Response to Question 1 above.

Numerical values should not be codified in the siting regulations. Any numerical values should be placed in regulatory guides, as is the case under present requirements.

- (b) Assuming numerical values are to be codified, are the values of 500 persons per square mile at the time of site approval and 1000 persons per square mile 40 years thereafter appropriate? If not, what other numerical values should be codified and what is the basis for these values?

ISG Response: No changes should be made to the present siting regulations. See ISG Response to Question 1. As discussed in the ISG Response to Question 1 and the referenced sections of the ISG Comments, the proposed changes to the siting requirements lack an adequate technical basis. Any changes to the regulations must have an adequate technical basis. At this time, no adequate technical basis to support any numerical values has been identified.

Additionally, the requirement to project population densities out to 40 years is problematic. Would there be safety significance if the projections were exceeded? If not, why should the projections be made in the first place? If exceeding the projections has safety significance, what regulatory measures would NRC take?

- (c) Should population density be specified out to a distance other than 30 miles (50 km), for example, 20 miles (32 km)? If a different distance is recommended, what is its basis?

ISG Response: No changes should be made to the present siting regulations. See ISG Response to Question 1. As discussed in the ISG Response to Question 1 and the referenced sections of the ISG Comments, the proposed changes to the siting requirements lack an adequate technical basis. Any changes to the regulations must have an adequate technical basis.

4. Should the Commission approve sites that exceed the proposed population values of 10 CFR 100.21, and if so, under what conditions?

ISG Response: Yes, the Commission should approve sites that exceed the proposed population values of 10 CFR 100.21 if the results of an evaluation of the best available sites, considering all relevant factors, lead to selection of such a site. The Commission makes clear in the Statement of Considerations that "numerous risk studies on radioactive material releases to the environment under severe accident conditions have all confirmed that the present siting practice is expected to effectively limit risk to the public." 57 Fed. Reg. 47,803. Moreover, as discussed in Section II(A)(2)(b), population densities far in excess of 500 persons/square mile would not cause risks to exceed the safety goals. More importantly, as discussed in Section II(A)(1), population is but one factor to be evaluated during the site selection process. Selection of sites among the best reasonably to be found requires consideration of additional factors, such as surface faulting, seismicity, suitability of subsurface material, vulcanism, flooding, extreme meteorological phenomena, man-induced events, dispersion in air, dispersion in water, emergency planning, land use, availability of cooling water, and other site characteristics as appropriate, such as avalanche, landslide and surface collapse. It is essential to ensure that all site-related

characteristics have been taken into account during the selection of the preferred candidates. As discussed in Section II(A)(2)(c)(iii) of the ISG Comments, the adverse impacts of the proposed revisions greatly exceed their benefits. The proposed revisions, if adopted, would impose a hierarchy of site characteristics, which elevates demographics over other physical characteristics of the site and other safety-related aspects of nuclear power plant siting which may have greater potential for reducing risk. This, in turn, would create the possibility that sites with a better balance overall of favorable safety-related characteristics might be eliminated from further consideration on the basis of demographics alone.

5. Should holders of early site permits, construction permits, and operating license permits be required to periodically report changes in potential offsite hazards (for example, every 5 years within 5 miles)? If so, what regulatory purpose would such reporting requirements serve?

ISG Response: ISG Members question why existing reporting requirements are not sufficient for the reporting of significant changes. If a change presents no significant hazard, why would the NRC wish to impose new reporting requirements? Wouldn't this result in increased costs without a commensurate increase in protection of public health and safety? If a change would potentially present a significant hazard, wouldn't the current U.S. regulations

require analysis of its significance and a report of the change to the NRC if the change was found to present a significant hazard?

6. What continuing regulatory significance should the safety requirements in 10 CFP part 100 have after granting the initial operating license or combined operating license under 10 CFR part 52?

ISG Response: See ISG Response to Question 1 above. The ISG does not believe it is necessary to modify Part 100 and, hence, change the regulatory significance of Part 100 from what it is today.

7. Are there certain site meteorological conditions that should preclude the siting of a nuclear power plant? If so, what are the conditions that can not be adequately compensated for by design features?

ISG Response: Unfavorable meteorological conditions alone are not sufficient to reject candidate sites.

8. In the description of the disposition of the recommendations of the Siting Policy Task Force report (NUREG-0625), it was noted that the Commission was not adopting every element of each recommendation. Are there compelling reasons to reconsider any recommendation not adopted and, if so, what are the bases for reconsideration?

ISG Response: As discussed in Section II(A)(2)(a)(ii) of the ISG Comments, the Siting Policy Task Force Report (NUREG-0625) should not be used as the basis for making changes to the regulations. The Siting Policy Task Force report was issued in 1979. Since that time,

new information regarding severe accident phenomena, probability and consequences has been developed and new regulations established which invalidate assumptions underlying the report's recommendations. The limitations in the use of NUREG-0625 were recognized as early as 1979 by the Director of NRC's Office of Standards Development and the Director of NRC's Office of Management and Program Analysis. Given regulatory developments since then, there are no compelling reasons to reconsider any additional recommendations of the Siting Policy Task Force Report.

B. REACTOR SITING CRITERIA (SEISMIC)

1. In making use of both deterministic and probabilistic evaluations, how should they be combined or weighted; that is, should one dominate the other?

ISG Response: As discussed in the main text of our comments (see Section II(C)(1)), ISG Members are not in favor of requiring the use, by regulation, of both deterministic and probabilistic methods to determine the Safe Shutdown Earthquake. By the Commission's own admission, the present regulation has worked reasonably well for two decades. Also, experts differ on estimates of the largest earthquakes and choice of ground-motion models. The Supplementary Information published with the proposed rule makes clear there is controversy over the kind of probabilistic methods to use and the

balance to be struck between probabilistic and deterministic methods. All of this underscores the prematurity of codifying the proposed regulations at this time where there are so many unanswered questions. The need for further evaluation by the Commission is reinforced by the alternative to the proposed changes to the seismic criteria submitted by the Nuclear Management and Resources Council (NUMARC) as part of its comments.

ISG Members believe that a more prudent course is to continue evaluation until consensus is reached on an appropriate approach. Absent such consensus, it is highly unlikely that the proposed revisions, if adopted, will lead to anything other than regulatory instability. In no circumstances should the Commission codify a requirement to use both deterministic and probabilistic analyses without prescribing a way to reconcile differences in the analyses. Without a reconciliation method, it is certain that closure of seismic issues in the licensing process would be vastly more difficult.

2. In making use of the probabilistic and deterministic evaluations as proposed in Draft Regulatory Guide DG-1015, is [sic] the proposed procedures in appendix C to DG-1015, adequate to determine controlling earthquakes from the probabilistic analyses?

ISG Response: As part of its comments on the proposed revisions to the seismic criteria in Part 100, the Nuclear Management and

Resources Council (NUMARC) submitted comments on DG-1015, which included a major markup of appendix C. In responding to this question, NUMARC requested that the Commission carefully evaluate NUMARC's alternative before adopting any revisions to the seismic criteria and implementing regulatory guides. ISG Members believe that further evaluation of the proposed revisions and alternatives thereto is highly desirable before the Commission adopts any changes to the seismic criteria presently in Part 100.

3. The proposed Appendix B to 10 CFR part 100 has included in Paragraph V(c) a criterion that states: "The annual probability of exceeding the Safe Shutdown Earthquake Ground Motion is considered acceptably low if it is less than the median annual probability computed from the current [EFFECTIVE DATE OF THE FINAL RULE] population of nuclear power plants." This is a relative criterion without any specific numerical value of the annual probability of exceedance because of the current status of the probabilistic seismic hazard analysis. However, this requirement assures that the design levels at new sites will be comparable to those at many existing sites, particularly more recently licensed sites. Method dependent annual probabilities or target levels (e.g., $1E-4$ for LLNL or $3E-5$ for EPRI) are identified in the proposed regulatory guide. Sensitivity studies addressing the effects of different target probabilities are discussed in the Bernreuter to Murphy letter report. Comments are solicited as to: (a) whether the above criterion, as stated, needs to be included in the regulation? and, (b) If not, should it be included in the regulation in a different form (e.g., a specific numerical value, a level other than the median annual probability computed for the current plants)?

ISG Response: As discussed in Section II(C) of our comments, ISG Members do not believe the proposed revisions to the Commission's seismic regulations in Part 100 should be adopted.

4. In determining the controlling earthquakes, should be [sic] median values of the seismic hazard analysis, as described in appendix C to Draft Regulatory Guide DG-1015, be used to the exclusion of other statistical measures, such as mean or 85th percentile? (The staff has selected probability of exceedance values associated with the median hazard analysis estimates as they provide more stable estimates of controlling earthquakes.)

ISG Response: There is no scientific or regulatory justification for choosing the median, particularly because each existing plant has been judged to be acceptable in seismic terms. Hence, every seismic spectrum for existing plants should be acceptable. However, if the Commission decides to require the use of probabilistic criteria, then it would be appropriate for the choice of controlling earthquakes to employ the Safety Goal decisional framework. That is, for very severe, very rare natural events, a useful criterion might be that for such events, the incremental harm due to the presence of the nuclear plant be small compared to that due to the event itself.

5. For the probabilistic analysis, how many controlling earthquakes should be generated to cover the frequency band of concern for nuclear power plants? (For the four trial plants used to develop the criteria presented in Draft Regulatory Guide DG-1015, the average of results for the 5 Hz and 10 Hz spectral velocities was used to establish the probability of exceedance level. Controlling earthquakes were evaluated for this frequency band, for the average of 1 and 2.5 Hz spectral responses, and for peak ground acceleration.)

ISG Response: See above response to Question 2 (seismic).

✓ 10
✗ 1