A. Murphy

AD93-1
PDR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
Office of Public Affairs
Washington, D.C. 20555

No. 92-152
Tel. 301-504-2240

FOR IMMEDIATE RELEASE
(Tuesday, October 20, 1992)

NRC PROPOSES REVISIONS TO REACTOR SITING REGULATIONS

The Nuclear Regulatory Commission is proposing to amend its requirements governing the siting of nuclear power plants to decouple siting issues from those associated with reactor design and to take into account advancements in the earth sciences and earthquake engineering as they apply to the siting of nuclear power plants.

As proposed, the revisions would:

(a) for future nuclear power plants, eliminate the requirements to postulate accident source terms (calculations on the amount of radioactivity that would be available for release to the environment in the event of an accident) and for the use of dose calculations (potential radiation exposures to members of the public); these requirements would be retained for existing nuclear power plants and non-power reactors;

(b) require a minimum exclusion area (the area surrounding a nuclear power plant where the licensee has complete control over any and all activities and usually there are no residents) of 0.4 miles;

(c) establish population density criteria for use in assessing the suitability of future nuclear power plant sites; as proposed, the population density at the time of initial site approval should not exceed 500 people per square mile averaged over any radial distance out to 30 miles and 40 years after initial site approval should not exceed 1000 people per square mile out to a radial distance of 30 miles; if these population densities were exceeded, consideration of alternative sites would be required, but they would not constitute upper limits of acceptability because severe accident risk considerations show that low risk can be achieved for sites having significantly higher population densities.

(d) require that reviews of applications for early site approvals take into account important factors such as population distribution, topography and transportation routes in order to determine where there are any site characteristics that could pose a significant impediment to the development of an offsite

emergency plan such as limitations of access or egress in the immediate vicinity of the proposed site; and

(e) update the seismic siting and engineering criteria for new nuclear power plants to benefit from the rapid advancement in the state of the art of earth sciences and the experience gained in the application of the procedures and methods used in the current regulation.

The criteria which govern the siting of existing nuclear power plants were issued in 1962 and require an exclusion area, a low-population zone where protective actions can be taken and that the size of the exclusion area be determined by postulating the accidental release into the reactor containment of a large amount of radioactive materials and that the resulting doses to hypothetical individuals--one at the closest point to the nuclear power plant of the exclusion area boundary and the other at the outer radius of the low population zone--be within specified limits.

In 1976, the Public Interest Research Group (PIRG) filed a petition for rulemaking asking the Commission to establish minimum exclusion area and low population zone distances and population density limits. The following year, Free Environment, Inc., and others filed a petition for rulemaking requesting, among other things, that the Commission require that the central Iowa nuclear project and other reactors be sited at least 40 miles from major population centers.

In response, the Commission, in 1978, directed its staff to develop a policy statement on nuclear power plant siting and a resulting report "Report of the Siting Policy Task Force" was issued in 1979 and provided the staff's recommendations. In July 1980, the Commission issued an Advanced Notice of Proposed Rulemaking regarding the staff's recommendations and seeking public comments on the matter. The proposed rulemaking was deferred the following year, however, to await development of the Safety Goal and improved research on accident source term.

Public comments on these proposed amendments to Parts 50, 52 and 100 of the Commission's regulations should be received by February 18, 1993. They should be addressed to the Secretary of the Commission, Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

US NRC-RES
DIV OF ENGINEERING
NL-007
WASHINGTON DC 20555

Letter 91-08, "Removal of Component Lists from Technical Specifications."

Date of issuance: October 29, 1992

Effective date: October 29, 1992

Amendment No. 44

Facility Operating License No. NPF-58. This amendment revised the Technical Specifications.

Date of initial notice in Federal Register: August 19, 1992 (57 FR 37560) The Commission's related evaluation of the amendment is contained in a Safety Evaluation dated October 28, 1992. No significant hazards consideration comments received: No

Local Public Document Room location: Perry Public Library, 3753 Main Street, Perry, Ohio 44081

Wisconsin Electric Power Company, Docket Nos. 50-266 and 50-301, Point Beach Nuclear Plant, Unit Nos. 1 and 2, Town of Two Creeks, Manitowoc County, Wisconsin

Date of application for amendments: September 10, 1992

Brief description of amendments: The amendments revised Technical Specification Section 15.4.6, "Emergency Power System Periodic Tests." Specification A.3 requires that each diesel generator be given an inspection, at least annually. For the current inspection only, this amendment authorized 18-month interval since the last inspection of diesel generator GO2.

Date of issuance: November 3, 1992

Effective date: November 3, 1992

Amendment Nos.: 135 and 139

Facility Operating License Nos. DPR-24 and DPR-27. Amendments revised the Technical Specifications.

Date of initial notice in Federal Register: September 30, 1992 (57 FR 45091)The Commissio..'s related evaluation of the amendments is contained in a Safety Evaluation dated November 3, 1992.No significant hazards consideration comments received: No.

Local Public Document Room location: Joseph P. Mann Library, 1516 Sixteenth Street, Two Rivers, Wisconsin.

Yankee Atomic Electric Company, Docket No. 50-029, Yankee Nuclear PowerStation, Franklin County, Massachusetts

Date of application for amendment: August 27, 1992

Brief description of amendment: Permits the licensee to move the Radiological Technical Specifications (TS) from the Facility TS to the Offsite Dose Calculation Manual or the Process Control Program. In addition, programmatic controls will be added to the Administretive Controls section of the TS in order to implement these changes.

Date of issuance: November 5, 1992

Effective date: November 5, 1992

Amendment No.: 146Possession Only License No. DPR-3: Amendment revised the Technical Specifications.

Date of initial notice in Federal Register: September 16, 1992, (57 FR 42780). The Commission's related evaluation of the amendment is contained in a Safety Evaluation dated November 5, 1992. No significant hazards consideration comments received: No

Local Public Document Room location: Greenfield Community College, 1 College Drive, Greenfield, Massachusetts 01301.

Dated at Rockville, Maryland, this 18th day of November 1992.

For the Nuclear Regulatory Commission

Jack W. Roe,

Director, Division of Reactor Projects - III/IV/V, Office of Nuclear Reactor Regulation

[Doc. 92-28456 Filed 11-24-92; 8:45 am]

BILLING CODE 7590-01-F

Draft Regulatory Guides and Standard Review Plan; Issuance, Availability

The Nuclear Regulatory Commission has issued for public comment drafts of five regulatory guides for its Regulatory Guide Series and a related section of the standard review plan (SRP). The Regulatory Guide Series has been developed to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits and licenses.

These draft regulatory guides are being developed to provide guidance on meeting proposed regulations that deal with nuclear power reactor siting, including geologic, seismic, and earthquake engineering considerations for future nuclear power plants. These proposed regulations include amendments to 10 CFR Part 100, "Reactor Site Criteria," and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"; a proposed new appendix to 10 CFR Part 50, Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants"; and a proposed new appendix to 10 CFR Part 100, Appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or after [Effective Date of this Regulation]" (see 57 FR 47802).

Draft Regulatory Guide DG-1015, "Identification and Characterization of Seismic Sources, Deterministic Source Earthquakes, and Ground Motion," is being developed to provide guidance acceptable to the NRC staff on procedures to identify and characterize seismic sources, to determine deterministic source earthquakes and controlling earthquakes, and to compare the seismic hazard level to that at operating plants.

Draft Regulatory Guide DG-1016, the second Proposed Revision 2 to Regulatory Guide 1.12, "Nuclear Power Plant Instrumentation for Earthquakes," is being developed to describe seismic instrumentation acceptable to the NRC staff.

Draft Regulatory Guide DG-1017, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake Actions," is being developed to provide guidance acceptable to the NRC staff for a timely evaluation after an earthquake of the recorded instrumentation data and for determining whether plant shutdown would be required.

Draft Regulatory Guide DG-1018, "Restart of a Nuclear Power Plant Shut Down by a Seismic Event," is being developed to provide guidance acceptable to the NRC staff for performing inspections and tests of nuclear power plant equipment and structures prior to restart of a plant that has been shut down by a seismic event.

Draft Regulatory Guide DG-4003, the Proposed Revision 2 to Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations," is being developed to provide guidance on the major site characteristics related to public health and safety and environmental issues that the NRC staff considers in determining the suitability of sites for light-water-cooled nuclear power stations.

The draft standard review plan section is section 2.5.2, "Vibratory Ground Motion." The draft describes procedures for assessing the ground motion potential of seismic sources at a nuclear power plant site and for assessing the adequacy of the safe shutdown earthquake.

These draft guides and the draft SRP section are being issued to involve the public in the early stages of the development of regulatory positions in these areas. They have not received complete staff review and do not represent official NRC staff positions.

Public comments are being solicited on the guides and SRP section, and comments should be accompanied by supporting data. Comments on the draft guides and SRP section may be combined and integrated with comments

on the proposed regulations. Written comments may be submitted to the Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Comments will be most helpful if received by March 24, 1993.

Although a time limit is given for comments on these drafts, comments and suggestions in connection with (1) items for inclusion in guides currently being developed or (2) improvements in all published guides are encouraged at any time.

Regulatory guides and SRPs are available for inspection at the Commission's Public Document Room, 2120 L Street NW., Washington, DC. Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Distribution and Mail Services Section. Telephone requests cannot be accommodated. Regulatory guides are not copyrighted, and Commission approval is not required to reproduce them.

Dated at Rockville, Maryland, this 6th day of November 1992.

For the Nuclear Regulatory Commission.

Lawrence C. Shao,

Director, Division of Engineering, Office of Nuclear Regulatory Research.

Warren Minners,

Director, Division of Safety Issue Resolution, Office of Nuclear Regulatory Research.

[FR Doc. 92-28641 Filed 11-24-92; 8:45 am]

BILLING CODE 7590-01-M

New Standard Technical Specifications (Revision 0); Availability

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of availability.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) previously noticed the availability of five sets of improved Standard Technical Specifications (STS) that were issued for proof and review in July 31, 1992 [57 FR 33979]. Subsequently the NRC revised the improved STS to incorporate additional comments, received from the Nuclear Steam Supply System (NSSS) owners groups, and editorial corrections. The NRC issued improved STS, Revision 0 for implementation by the volunteering lead-plant licensees and placed copies in the NRC public document room.

The STS for each NSSS vendor are as follows:

NUREG-1430, "Standard Technical Specifications, Babcock and Wilcox Plants"

NUREG-1431, "Standard Technical Specifications, Westinghouse Plants"

NUREG-1432, "Standard Technical Specifications, Combustion Engineering Plants"

NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4"

NUREG-1434, "Standard Technical Specifications, General Electric Plants, BWR/6"

The NRC staff has established an electronic bulletin board system (BBS) as a public service for anyone who wishes to obtain copies of electronic files of the STS. The NRC developed the STS with WordPerfect, version 5.1, software and placed the Revision 0 of the improved STS on the BBS in compressed form using "ZIP" data compression software to reduce the time required to download the files. The NRC BBS may be reached by telephone at (301) 504-1778. Access to the BBS is available using a personal computer and modem with any standard communication software package. The BBS operates 24 hours a day at up to 9600 baud with communication parameters set at 8 bits, no parity, and 1 stop bit (8-N-1). The system operators are Tom Dunning and Chris Hoxie. They can be reached by telephone (voice) at (301) 504-1189 and 504-3138, respectively, if assistance is needed.

Copies of the STS Revision 0 are also available for inspection or copying for a fee in the NRC Public Document Room, the Gelman Building—room LL6 (Lower Level), 2120 L Street NW., Washington DC, 20555. Requests for copies may be made by writing to the NRC Public Document Room or by facsimile at (202)-634-3343, or by telephone (202)-634-3273. Those requesting copies should identify the STS by NUREG number and title as noted above.

FOR FURTHER INFORMATION CONTACT: Mark Reinhart, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Telephone (301) 504-1185.

Dated at Rockville, Maryland, this 19th day of November 1992.

For the Nuclear Regulatory Commission.

Christopher I. Grimes,

Chief, Technical Specifications Branch, Division of Operating Reactor Support, Office of Nuclear Reactor Regulation.

[FR Doc. 92-28639 Filed 11-24-92; 8:45 am]

BILLING CODE 7590-01-M

POSTAL SERVICE

Privacy Act of 1974; System of Records

AGENCY: Postal Service.

ACTION: Notice of altered system of records.

SUMMARY: The purpose of this document is to publish notice of alterations to existing system of records USPS 170.010, Statistical (Cost) Systems—Workload Reporting Records, herein renamed USPS 170.010, Operations Data Collection Systems—Workload/Productivity Management Records. Some of the workload reporting systems that prompted establishment of USPS 170.010 have been integrated or replaced with enhanced systems that provide management with additional tools to ensure maximum productivity performance and use of postal resources. The changes to the system description reflect those enhancements.

DATES: This proposal will become effective without further notice 60 days from the date of this publication (January 25, 1993) unless comments are received on or before that date which result in a contrary determination.

ADDRESSES: Comments may be mailed to the RECORDS OFFICE, U.S. POSTAL SERVICE, 475 L'ENFANT PLAZA SW., RM 8141, WASHINGTON DC 20260-5010, or delivered to room 8141 at the above address between 8:15 a.m. and 4:45 p.m. where they will be available for inspection during those hours.

FOR FURTHER INFORMATION CONTACT: Betty Sheriff, Records Office (202) 268-5158.

SUPPLEMENTARY INFORMATION: Existing USPS 170.010 was established to cover automated and manual data collected to schedule workloads and staffing, and to track time spent by an employee to complete a particular project so that management could determine project costs for billing customers for services. With improved technology and the passage of time, some systems collecting that data have been replaced, combined, or expanded. While these new developments have not significantly changed the general character of USPS 170.010, the categories of records have been expanded to include additional employee data and the purpose has been expanded albeit along the same lines. More specifically, the revised system collects leave, lunch time, and overtime data about employees as well as mail volume, equipment availability, and other non-personal data about operations. This data is integrated and used for various production control

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ALL STATE LIAISON OFFICERS
ALL NO SIGNIFICANT HAZARDS CONTACTS
ALL STATE PUBLIC UTILITY COMMISSIONERS

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 (SP-92-153)

Enclosed for your information is a copy of the subject Federal Register Notice dated October 20, 1992. The proposed rule would allow the U.S. Nuclear Regulatory Commission (NRC) to benefit from experience gained in the application of the procedures and methods set forth in the current regulation and to incorporate the rapid advancements in the earth sciences and earthquake engineering. The proposed rule primarily consists of two separate changes, namely, the source term and dose considerations, and the seismic and earthquake engineering considerations of reactor siting. The NRC is also proposing to deny the remaining issue in the petition filed by Free Environment, Inc. et al (PRM-50-20).

Note that the comment period expires February 17, 1993. For further information you may contact Dr. Andrew J. Murphy, Office of Nuclear Regulatory Research at 301/492-3860 concerning the seismic and earthquake engineering aspects and Mr. Leonard Soffer, Office of Nuclear Regulatory Research at 301/492-3916 concerning other siting aspects.

original signed by Carlton Kammerer

Carlton Kammerer, Director
Office of State Programs

Enclosure:
As stated

Distribution:

DIR RF	CKammerer
SLO File	Rulemaking File
SASchwartz	RVirgilio
VMiller	SLIR Staff (4)
RSLOs (5)	DZannoni
AJMurphy, RES	LSoffer, RES
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OFC	SP:SLIR	SP:SLIR:AD	SP:D				
NME	RVirgilio:gd	SSchwartz	CKammerer				
DTE	10/22/92	10/22/92	10/23/92				

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Proposed Rules

Federal Register
Vol. 57, No. 203
Tuesday, October 20, 1992

This section of the FEDERAL REGISTER contains notices to the public of the proposed issuance of rules and regulations. The purpose of these notices is to give interested persons an opportunity to participate in the rule making prior to the adoption of the final rules.

NUCLEAR REGULATORY COMMISSION

10 CFR Parts 50, 52, and 100

RIN 3150-AD93

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.

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule and proposed denial of petition for rulemaking from Free Environment, Inc. et al.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to update the criteria used in decisions regarding power reactor siting, including geologic, seismic, and earthquake engineering considerations for future nuclear power plants. The proposed rule would allow NRC to benefit from experience gained in the application of the procedures and methods set forth in the current regulation and to incorporate the rapid advancements in the earth sciences and earthquake engineering. The proposed rule primarily consists of two separate changes, namely, the source term and dose considerations, and the seismic and earthquake engineering considerations of reactor siting. The Commission is also proposing to deny the remaining issue in petition (PRM-50-20) filed by Free Environment, Inc. et al.

DATES: Comment period expires February 17, 1993. Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

ADDRESSES: Mail written comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Service Branch.

Deliver comments to 11555 Rockville Pike, Rockville, Maryland, between 7:45 a.m. and 4:15 p.m., Federal workdays.

Copies of the regulatory analysis, the environmental assessment and finding of no significant impact, and comments received may be examined at the NRC Public Document Room at 2120 L Street NW. (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Dr. Andrew J. Murphy, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492-3860, concerning the seismic and earthquake engineering aspects and Mr. Leonard Soffer, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492-3916, concerning other siting aspects.

SUPPLEMENTARY INFORMATION:

I. Background

The present regulation regarding reactor site criteria (10 CFR part 100) was promulgated April 12, 1962 (27 FR 3509). Staff guidance on exclusion area and low population zone sizes as well as population density was issued in Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations," published for comment in September 1974. Revision 1 to this guide was issued in November 1975. On June 1, 1976, the Public Interest Research Group (PIRG) filed a petition for rulemaking (PRM-100-2) requesting that the NRC incorporate minimum exclusion area and low population zone distances and population density limits into the regulations. On April 28, 1977, Free Environment, Inc. et al., filed a petition for rulemaking (PRM-50-20). The remaining issue of this petition requests that the central Iowa nuclear project and other reactors be sited at least 40 miles from major population centers. In August 1978, the Commission directed the NRC staff to develop a general policy statement on nuclear power reactor siting. The "Report of the Siting Policy Task Force" (NUREG-0625) was issued in August 1979 and provided recommendations regarding siting of future nuclear power reactors. In the 1980 Authorization Act for the NRC, the Congress directed the NRC to decouple siting from design and to specify demographic criteria for siting. On July 29, 1980 (45 FR 50350), the NRC issued an Advance Notice of Proposed Rulemaking (ANPRM) regarding revision of the reactor site criteria, which discussed the recommendations of the Siting Policy Task Force and sought public comments. The proposed rulemaking was deferred by the Commission in December 1981 to await development of a Safety Goal and improved research on accident source terms. On August 4, 1986 (51 FR 23044), the NRC issued its Policy Statement on Safety Goals that stated quantitative health objectives with regard to both prompt and latent cancer fatality risks. On December 14, 1988 (53 FR 50232), the NRC denied PRM-100-2 on the basis that it would unnecessarily restrict NRC's regulatory siting policies and would not result in a substantial increase in the overall protection of the public health and safety. Because of possible renewed interest in power reactor siting, the NRC is proceeding with a rulemaking in this area. Because the proposed regulations would include population density criteria for future nuclear power reactor sites, the Commission concludes that the remaining issue in PRM-50-20 is being addressed as part of this rulemaking action.

Appendix A to 10 CFR part 100, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," was originally issued as a proposed regulation on November 25, 1971 (36 FR 22601), published as a final regulation on November 13, 1973 (38 FR 31279), and

became effective on December 13, 1973. There have been two amendments to 10 CFR part 100, appendix A. The first amendment, issued November 27, 1973 (38 FR 32575), corrected the final regulation by adding the legend under the diagram. The second amendment resulted from a petition for rulemaking (PRM 100–1) requesting that an opinion be issued that would interpret and clarify appendix A with respect to the determination of the Safe Shutdown Earthquake. A notice of filing of the petition was published on May 14, 1975 (40 FR 20983). The substance of the petitioner's proposal was accepted and published as an immediately effective final regulation on January 10, 1977 (42 FR 2052).

II. Objectives

The objectives of this proposed regulatory action are to—

1. State the criteria for future sites that, based upon experience and importance to risk, have been shown as key to protecting public health and safety;

2. Provide a stable regulatory basis for seismic and geologic siting and applicable earthquake engineering design of future nuclear powerplants that will update and clarify regulatory requirements and provide a flexible structure to permit consideration of new technical understandings; and

3. Relocate the requirements that apply to plant design into 10 CFR part 50 thereby effectively decoupling siting from plant design.

III. Genesis

The proposed regulatory action reflects changes that are intended to: (1) Benefit from the experience gained in applying the existing regulation and from research; (2) resolve interpretive questions; (3) provide needed regulatory flexibility to incorporate state-of-the-art improvements in the geosciences and earthquake engineering; and (4) simplify the language to a more "plain English" text.

The proposed regulatory action would apply to applicants who apply for a construction permit, operating license, preliminary design approval, final design approval, manufacturing license, early site permit, design certification, or combined license on or after the effective date of the final regulations.

Criteria not associated with the selection of the site or establishment of the Safe Shutdown Earthquake Ground Motion (SSE) have been placed into 10 CFR part 50. This action is consistent with the location of other design requirements in 10 CFR part 50.

Because the revised criteria presented in the proposed regulation would not be applied to existing plants, the licensing bases for existing nuclear power plants must remain part of the regulations. Therefore, the proposed revised reactor siting criteria would be added as subpart B in 10 CFR part 100 and would apply to site applications received on or after the effective date of the final regulations. The criteria on seismic and geologic siting would be added as a new appendix B to 10 CFR part 100. The dose calculations and the earthquake engineering criteria will be located in 10 CFR part 50 (§ 50.34(a) and appendix S, respectively). Because appendix S is not self executing, applicable sections of part 50 (§ 50.34 and § 50.54) are revised to reference appendix S. The proposed regulation would also make conforming amendments to 10 CFR parts 52 and 100. Sections 52.17(a)(1)(vi), and 100.20(c)(1) would be amended to note appendix B to part 100.

IV. Alternatives

The first alternative considered by the Commission was to continue using current regulations for site suitability determinations. This is not considered an acceptable alternative. Accident source terms and dose calculations currently influence plant design requirements rather than siting. It is desirable to state directly those siting criteria which, through importance to risk, have been shown to be key to assuring public health and safety. Further, significant advances in the earth sciences and in earthquake engineering have taken place since the promulgation of the present regulation and deserve to be reflected in the regulations.

The second alternative considered was replacement of the existing regulation with an entirely new regulation. This is not an acceptable alternative because the provisions of the existing regulations form part of the licensing bases for many of the operating nuclear power plants and others that are in various stages of obtaining operating licenses. Therefore, these provisions must remain in force and effect.

The approach of establishing the revised requirements in new sections and an appendix to 10 CFR part 100 and relocating plant design requirements to 10 CFR part 50 while retaining the existing regulation was chosen as the best alternative. The public will benefit from a clearer, more uniform, and more consistent licensing process that incorporates updated information and is subject to fewer interpretations. The NRC staff will benefit from improved regulatory implementation (both technical and legal), fewer interpretive debates, and increased regulatory flexibility. Applicants will derive the same benefits in addition to avoiding licensing delays caused by unclear regulatory requirements.

V. Major Changes

A. Reactor Siting Criteria (Nonseismic)

Since promulgation of the reactor site criteria in 1962, the Commission has approved more than 75 sites for nuclear power reactors and has had an opportunity to review a number of others. As a result of these reviews, a great deal of experience has been gained regarding the site factors that influence risk and their range of acceptability. Much of the experience gained by the NRC staff in these reviews has been reflected in the issuance of Regulatory Guide 4.7, "General Site Suitability Criteria for Nuclear Power Stations," which was issued for comment in 1974, and revised in 1975. It also reflects the Commission's policy of keeping reactors away from densely populated centers. A review of the Regulatory Guidelines implementation has shown that its application is expected to result in low risk to the public while allowing a good selection of potential reactor sites in all regions of the nation.

The site criteria presented in the proposed regulation are based on those contained primarily in Regulatory Guide 4.7, and represent current NRC practice. In addition, 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. These studies include the early "Reactor Safety Study" (WASH–1400), published in 1975, many Probabilistic Risk Assessment (PRA) studies conducted on individual plants as well as several specialized studies, and the recent "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," (NUREG–1150), issued in 1990.

The proposed criteria basically decouple siting from accident source term and dose calculations. Experience has shown that these factors have tended to influence plant design aspects rather than siting. Accident source term and dose considerations are proposed to be applied to plant design aspects and would be relocated to part 50. The Commission considers it appropriate, based on the extensive experience and confirmatory studies noted above, to state directly those site criteria that

have been shown to be key to protecting public health and safety. These reactor site criteria are expected to be independent of plant design and, as such, are independent of the plant type to be built at the site. The Commission considers this appropriate because it expects that future reactors licensed under part 50 or part 52 will reflect, through their design, construction, and operation, risk characteristics that are equal to or better than existing plants. Therefore, there would be an extremely low probability for accidents that could result in release of significant quantities of radioactive fission products. In addition, the recommendations of the Siting Policy Task Force were considered in making these changes as discussed in Section XII of this proposed rule.

Rationale for Individual Criteria

1. Exclusion Area

An exclusion area surrounding the immediate vicinity of the plant has been a requirement for siting power reactors from the very beginning. This area provides a high degree of protection to the public from a variety of potential plant accidents and also affords protection to the plant from potential man-related hazards.

The present regulation has no numerical size requirement, in terms of distance, for the exclusion area. The present regulations assesses the consequences of a postulated radioactive fission product release within containment, coupled with assumptions regarding containment leakage, performance of certain fission product mitigation systems, and atmospheric dispersion factors for a hypothetical individual located at any point on the exclusion area boundary. The plant and site combination is considered to be acceptable if the calculated consequences do not exceed the dose values given in the present regulation. Regulatory Guide 4.7 suggests an exclusion area distance of 0.4 miles (640 meters). This distance has been found, in conjunction with typical engineered safety features, to meet the dose values in the existing regulation. Future reactors would be expected to be as good or better in meeting the dose criteria at this distance.

The Commission considers an exclusion area to be an essential feature of a reactor site and is retaining this requirement for future reactors. However, in keeping with the recommendation of the Siting Policy Task Force to decouple site requirements from reactor design, the proposed regulation would eliminate the use of a postulated source term, assumptions regarding mitigation systems and dispersion factors, and the calculation of radiological consequences to determine the sizes of the exclusion area and low population zone. It would instead require a minimum exclusion area distance of 0.4 miles (640 meters) for power reactors.

This distance, together with typical engineered safety features previously reviewed by the staff, has been found to satisfy the dose guidelines in the present regulation. An exclusion area of this size or larger is fairly common for most power reactors in the U.S. It has not been unduly difficult for most prospective applicants to find and obtain a suitable site.

Finally, this distance has also been found to readily satisfy the prompt fatality quantitative health objective of the Commission's Safety Boards Policy, when coupled with plant designs as reflected by those in NUREG–1150, and for a reactor power level of 3800 Megawatts (thermal). Therefore, the minimum exclusion area distance proposed would assure a very low level of risk to individuals, even for those located very close to the plant.

Although an exclusion area size of about 0.4 miles is considered appropriate for reactor power levels of current design, the Commission is also considering whether or not this size unduly penalizes potential reactors that have significantly lower power levels and is therefore requesting comments on this subject.

2. Low Population Zone

The present regulation requires that a low population zone (LPZ) be defined immediately beyond the exclusion area. Residents are permitted in this area, but the number and density must be such that there is a reasonable probability that appropriate protective measures could be taken in their belief in the event of a serious accident. In addition, the nearest densely populated center containing more than about 25,000 residents must be located no closer than one and one-third times the outer radius of the LPZ. Finally, the dose to a hypothetical individual located at the outer radius of the LPZ over the entire course of the accident must not be in excess of the dose values given in the regulation. Regulatory Guide 4.7 suggests that an outer radius of about 3 miles (4.8 km) for the LPZ has been found to satisfy the dose values in the present regulation.

Several practical problems have arisen in connection with the LPZ. Before 1980, the LPZ generally defined the distance over which public protective actions were contemplated in the event of a serious accident. The regulations in 10 CFR 50.47 now requires plume exposure Emergency Planning Zones (EPZ) of about 10 miles for each plant.

The LPZ also places restrictions on the proximity of the nearest densely populated center of 25,000 or more residents. However, without numerical requirements for the outer radius of the LPZ, this requirement has little practical effect. Typical LPZs for existing power reactors have several thousand residents. If Regulatory Guide 4.7 were followed and a distance of 3 miles were selected as the LPZ outer radius, a maximum population within the LPZ at the time of site approval would be about 14,000 residents. Finally, the staff has sometimes experienced difficulty in defining a "densely populated center."

The Commission considers that the functions intended for the LPZ, namely, a low density of residents and the feasibility of taking protective actions, have been accomplished by other regulations or can be accomplished by other means. Protective action requirements are defined via the use of the EPZ, while restrictions on population close to the plant can be assured via proposed population density criteria. For these reasons, the Commission is proposing to eliminate the requirement of an LPZ for future power reactor sites for purposes of determining site suitability.

3. Population Density Criteria

The present regulation contains no population density requirements other than the requirement, noted above, that the distance to the nearest population center containing more than about 25,000 residents must be no closer than one and one-third times the outer radius of the LPZ. This was recognized as a potential concern when the present regulation was promulgated. As the Commission noted in its Statement of Considerations on April 12, 1962 (27 FR 3509), accompanying the issuance of the regulation, "* * * in some cases where very large cities are involved, the population center distance may have to be greater than those suggested by these guides."

As a result of the significant experience gained in the siting of power reactors, the staff issued Regulatory Guide 4.7 in 1974. With respect to population density this guide states as follows:

"Areas of low population density are preferred for nuclear power station sites. High population densities projected for any time during the lifetime of a station are

considered during both the NRC staff review and the public hearing phases of the licensing process. If the population density at the proposed site is not acceptably low, then the applicant will be required to give special attention to alternative sites with lower population densities.

If the population density, including weighted transient population, projected at the time of initial operation of a 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 the 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."

The basis for this guide was that it provided for reasonable separation of reactor sites from large population centers while also assuring an adequate selection of sites in all regions of the nation. However, no comparisons with explicit risk criteria were provided at that time.

On April 28, 1977, Free Environment, Inc. et. al., filed a petition for rulemaking (PRM-50-20) requesting, among other things, that "the central Iowa nuclear project and other reactors be sited at least 40 miles from major population centers." The petitioner also stated that "locating reactors in sparsely-populated areas * * * has been endorsed in non-binding NRC guidelines for reactor siting." However, the petitioner did not specify what constituted a major population center. The only NRC guidelines concerning population density in regard to reactor siting are in Regulatory Guide 4.7, issued in 1974, and revised in 1975, prior to the date of the petition. This guide provides population density criteria out of a distance of 30 miles from the reactor, not 40 miles.

An illustration of the degree of separation distance provided for in this guide from population centers of various sizes may be useful. Under this guide, a population center of about 25,000 or more residents should be no closer than 4 miles (6.4 km) from a reactor because a density of 500 persons per square mile within this distance would yield a total population of about 25,000 persons. Similarly, a city of 100,000 or more residents should be no closer than about 10 miles (16 km); a city of 500,000 or more persons should be no closer than about 20 miles (32 km), and a city of 1,000,000 or more persons should be no closer than about 30 miles (50 km) from the reactor.

The Commission has examined these guidelines with regard to the Safety Goal. The Safety Goal quantitative health objective in regard to latent cancer fatality states that, within a distance of ten miles (16 km) from the reactor, the risk to the population of latent cancer fatality from nuclear power plant operation, including accidents, should not exceed one-tenth of one percent of the likelihood of latent cancer fatalities from all other causes. In addition to the risks of latent cancer fatalities, the Commission has also investigated the likelihood and extent of land contamination arising from the release of long-lived radioactive species, such as cesium-137, in the event of a severe reactor accident.

The results of these analyses indicate that the latent cancer fatality quantitative health objective noted above is met for current plant designs. From analysis done in support of this proposed change in regulation, the likelihood of land contamination from a severe accident sufficient to require long term condemnation of land beyond 30 miles (50 km) is very low. Other analyses indicate that population density restrictions out to 40 miles could make it difficult to obtain suitable reactor sites in some regions of the nation.

Because the population density values of Regulatory Guide 4.7 have been in use since 1975, and these values afford an adequate supply of potential reactor sites in every region of the nation while providing assurance of low risk of latent cancer fatality as well as land contamination, the Commission considers it prudent to maintain these population density values for future power reactor sites. The Commission wishes to emphasize, however, that nuclear power plants meeting current safety standards could be safely located at sites significantly more dense than 500 people per square mile.

For these reasons, the Commission is proposing that, at the time of initial site approval or early site permit renewal, population density values of no more than 500 people per square mile averaged over any radial distance out to 30 miles be used for judging the acceptability of future nuclear power plant sites. Similarly, in keeping with Regulatory Guide 4.7, the projected population density 40 years after initial site approval should not exceed 1000 people per square mile.

With regard to the petition by Free Environment, Inc. (PRM-50-20), the Commission concludes that the criteria in Regulatory Guide 4.7 provide a reasonable degree of separation for a range of population centers, including "major" population centers, depending upon their size. Further, codifying the population density criteria of this guide is expected to ensure a low level of risk, including the risk of latent cancer fatality as well as long-term land contamination. Finally, the Commission concludes that granting of the petitioner's request to specify population criteria out to 40 miles rather than 30 miles would not substantially reduce the risks to the public, but could significantly increase the difficulty of obtaining suitable reactor sites in some regions of the nation. For these reasons, the Commission is proposing not to adopt the proposal by Free Environment, Incorporated.

An important point regarding population projections and their application should be made. Because the validity and reliability of population projections, particularly for relatively small regions, decreases markedly as the projection time period increases, population projections for the purpose of assessing site suitability are to be limited to 40 years. Population projections beyond this time period become unreliable and speculative. The 40 year period for population projections is to be distinguished from the 60 year or more plant lifetime.

Because analyses have shown that current plan designs can meet the Commission's Safety Goals and that other risks can be kept at a very low level at sites that have significantly higher population densities than those being proposed, the Commission wishes to emphasize that these population density levels do not indicate the upper limits of acceptability. These levels represent preferred values, that, if exceeded, require that an applicant provide justification or not locating a reactor at an alternative site having a lower population density. Therefore, the population density limits proposed in the regulation are intended to be used only in the siting decision process to be applied at the time of initial site approval or early site permit renewal to determine whether alternative sites that have lower population densities should be considered. The Commission does not intend to consider license conditions or operating restrictions upon an operating reactor solely upon the basis that the population density around it may reach or exceed the proposed siting decision values given above during the plant lifetime. Because of the possibility for confusion resulting from numerical values being cited in the regulation, the Commission is also requesting comments on whether numerical population density values should be cited in the regulation or whether these should be stated in a regulatory guide only. The Commission is also requesting

comments on whether the values of 500 and 1000 persons per square mile are appropriate, and whether population density criteria need be specified out to 30 miles, or whether another distance is more appropriate.

4. Meteorological Factors

Radiological doses that incorporate site meteorological data need no longer be calculated for the purpose of determining site suitability. Meteorological data will still be needed for safety analysis and for assessing the adequacy of certain plant features, as well as to determine plant adequacy in regard to meteorological extremes, such as tornados and maximum probable precipitation. Therefore, the proposed regulation maintains the requirement to collect and characterize meteorological data representative of the site.

The Commission has examined the variations in site meteorology that have influenced dose calculations in past licensing reviews. Individual site meteorology characteristics have been used primarily to determine atmospheric dispersion or dilution factors in order to evaluate does to hypothetical individuals at the exclusion area and LPZ outer radius. The degree of dilution increases with increasing distance between the release point and any hypothetically exposed individual, but it also is affected by other factors, including the time of day. In this regard, the dispersion factor could vary significantly at a given site and show a pronounced diurnal variation. However, when the time-averaged dispersion factor of a given site is compare with that of other sites, the variation between one site and another is much less. Analyses reported in NUREG/CR-2239, "Technical Guidance for Siting Criteria Development," dated December 1982, for example, show that calculated average individual consequences for an identical postulated release of radioactivity to the environment using data from weather stations throughout the United States yielded results that varied only by about a factor of two. Based upon these considerations, the Commission has determined that the average meteorological characteristics between one site and another are sufficiently similar that characterization of individual site meteorology is not a significant discriminator in determining site suitability when compared to the uncertainties in other areas of the determination of risk to the health and safety to the public. However, site meteorological characteristics are needed in safety analysis and for assessing the adequacy of certain plant design features.

5. Hydrological Factors

These factors are important in establishing the magnitude of external hazards from ground-water contamination, such as by containment basemat melt through, which could contaminate aquifers and thereby affect large populations. The proposed regulation adds or modifies existing requirements for obtaining information to characterize hydrological factors at a site important to risk. This information will be reviewed by the staff and used as interface criteria in matching a proposed design to the site.

6. Nearby Industrial and Transportation Facilities

This area of review would be incorporated into the regulations for determining site suitability. This area of review has, in fact, been a part of the NRC review for many years. The proposed regulation involves no substantive changes in this area and merely codifies what has been NRC practice for a number of years.

7. Feasibility of Carrying out Protective Actions

The proposed regulation would require that important site factors such as population distribution, topography, and transportation routes be considered and examined in order to determine whether there are any site characteristics that could pose a significant impediment to the development of an emergency plan.

Planning for emergencies is part of the Commission's defense-in-depth approach. The Commission has concluded that site characteristics that may represent an impediment to the development of adequate emergency plans, such as limitations of access or egress in the immediate vicinity of a nuclear power plant, should be identified at the site approval phase. This is consistent with the approach the Commission has taken in early site reviews under 10 CFR part 52.

8. Periodic Reporting of Man-Related Activities

Conditions around a site may change and significant changes in the nature of the industrial, military, and transportation facilities may occur. Early identification of activities or facilities that are potentially hazardous could permit timely changes in the procedures or plant features to minimize the change in the risk to the health and safety of the public. Man-related activities potentially hazardous to a plant are typically major industrial or transport facilities such as major highways, large pipelines, major airports, etc. Relatively minor changes in industrial activity have been shown to be of little concern.

The Commission is considering whether periodic reporting of significant offsite activities should be required and is requesting comments on whether significant offsite facilities within five miles of the reactor should be periodically updated every five years.

Interim Change to 10 CFR Part 50

The proposed change to 10 CFR part 50 would simply relocate from 10 CFR part 100 the requirements for each applicant to calculate a whole body and a thyroid dose at specified distances. Because these requirements affect reactor design rather then siting, they are more appropriately located in 10 CFR part 50. For this proposed revision, the source term and methodology for performing the dose calculations would remain unchanged from the current requirements.

These requirements would continue to apply to future applicants for a construction permit, design certification, or an operating license, but are intended to be interim requirements until such time as more specific requirements are developed regarding revised accident source terms and severe accident insights.

B. Seismic and Earthquake Engineering Criteria

The following major changes in the proposed revision to appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," to part 100, are associated with the proposed seismic and earthquake engineering criteria rulemaking:

1. Separate Siting from Design

Criteria not associated with site suitability or establishment of the Safe Shutdown Earthquake Ground Motion (SSE) have been placed into 10 CFR part 50. This action is consistent with the location of other design requirements in 10 CFR part 50. Because the revised criteria presented in the proposed regulation will not be applied to existing plants, the licensing basis for existing nuclear power plants must remain part of the regulations. The criteria on seismic and geologic siting would be designated as a new appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or After [Effective Date of this Regulation]," to 10 CFR part 100. Criteria on earthquake engineering would be designated as a new appendix S,

"Earthquake Engineering Criteria for Nuclear Power Plants," to CFR part 50.

2. Remove Detailed Guidance from the Regulation

The current regulation contains both requirements and guidance on how to satisfy the requirements. For example, section IV, "Required Investigations," of appendix A, states that investigations are required for vibratory ground motion, surface faulting, and seismically induced floods and water waves. Appendix A then provides detailed guidance on what constitutes an acceptable investigation. A similar situation exists in Section V, "Seismic and Geologic Design Bases," of appendix A.

Geoscience assessments require considerable latitude in judgment. This latitude in judgment is needed because of limitations in data and the state-of-the-art of geologic and seismic analyses and because of the rapid evolution taking place in the geosciences in terms of accumulating knowledge and in modifying concepts. This need appears to have been recognized when the existing regulation was developed. The existing regulation states that it is based on limited geophysical and geological information and will be revised as necessary when more complete information becomes available.

However, having geoscience assessments detailed and cast in a regulation has created difficulty for applicants and the staff in terms of inhibiting the use of needed latitude in judgment. Also, it has inhibited flexibility in applying basic principles to new situations and the use of evolving methods of analyses (for instance, probabilistic) in the licensing process.

The level of detail presented in the proposed regulation would be reduced considerably. The proposed regulation would identify and establish basic requirements. Detailed guidance, that is, the procedures acceptable to the NRC for meeting the requirements, would be contained in a draft regulatory guide to be issued for public comment as Draft Regulatory Guide, DG-1015, "Identification and Characterization of Seismic Sources, Deterministic Source Earthquakes, and Ground Motion."

3. Use of Both Deterministic and Probabilistic Evaluations

The proposed regulation would require the use of both probabilistic and deterministic evaluations. The existing approach for determining a Safe Shutdown Earthquake Ground Motion (SSE) for a nuclear reactor site, embodied in appendix A to 10 CFR part 100, relies on a "deterministic" approach. Using this deterministic approach, an applicant develops a single set of earthquake sources, develops for each source a postulated earthquake to be used as the source of ground motion that can affect the site, locates the postulated earthquake according to prescribed rules, and then calculates ground motions at the site. Although this approach has worked reasonably well for the past two decades, in the sense that SSEs for plants sited with this approach are judged to be suitably conservative, the approach has not explicitly recognized uncertainty in geoscience parameter. Because so little is known about earthquake phenomena (especially in the eastern United States), there have always been differences of opinion among experts as to how the prescribed process in Appendix A is to be carried out. Experts often delineate very different estimates of the largest earthquakes to be considered and different ground-motion models.

Over the past decade, analysis methods for encompassing these differences have been developed and used. These "probabilistic" methods have been designed to allow explicit incorporation of different models for zonation, earthquake size, ground motion, and other parameters. The advantage of using these probabilistic methods is their ability to not only incorporate different models and different data sets, but also to weight them using judgments as to the validity of the different models and data sets, and thereby to provide an explicit expression for the overall uncertainty in the ground motion estimates and a means of assessing sensitivity to various input parameters.

Probabilistic methods have been used by many groups, not only in the seismic-hazard area but in many other areas. In the seismic-hazard area, many of the practitioners participated in either the NRC-Lawrence Livermore National Laboratory (LLNL) or the Electric Power Research Institute (EPRI) seismic-hazard projects over the past decade.

The advantages of these probabilistic methods are manifest. However, their limitations are important too. In the seismic-hazard area, the most important limitation is that the "bottom-line" results from these analyses tend to be dominated by the tails rather than the central tendencies of the distributions of knowledge and expert opinion.

For these reasons, the proposed revision of appendix A to 10 CFR part 100 has adopted an approach using both probabilistic and deterministic evaluations. The staff proposes to use both the deterministic (currently being used) and the probabilistic evaluations together and compare the results of each to provide insights unavailable if either method were used alone. The principal limitations of the deterministic evaluation—its ability to incorporate only one model and one data set at a time and its inability to allow weighted incorporation of numerous models—can be assessed by comparing its results with the results of a probabilistic evaluation accomplished in parallel. Similarly, the principal limitation of the probabilistic evaluation—its tendency to allow its results to be dominated by the tails rather than the central tendency of distributions of uncertain knowledge or expert opinion—can be assessed by comparing its results with the results of one or more deterministic evaluations.

The NRC believes that taken together, this approach can allow more informed judgments as to what the appropriate Safe Shutdown Earthquake Ground Motion should be for a given site. Both the applicant's judgments and those of the NRC will be improved. Therefore, the NRC believes that this approach is the best way to accomplish the objective of this aspect of the revised regulation and arrive, through analysis, at a site-specific ground motion that appropriately captures what is known about the seismic regime. Using both probabilistic and deterministic evaluations to complement each other should lead to a more stable and predictable licensing process than in the past.

In order to implement this approach, the NRC has proposed a requirement that the annual probability of exceeding the Safe Shutdown Earthquake Ground Motion at a site be lower than the median annual probability of exceedance computed for the current population of the operating plants. This requirement assures that the design levels at new sites will be comparable to those at many existing sites, particularly more recently licensed sites. This criterion is also used to identify significant seismic sources, in terms of magnitude and distance, affecting the estimates of ground motions at a site.

The Commission is specifically requesting comments on the questions contained in section XI.B pertaining to the use of probabilistic seismic hazard analysis and the balance between the deterministic and probabilistic evaluations. The position(s) stated in the final regulation, supporting regulatory guide and Standard Review Plan Section will be based on Commission consideration of responses to these questions and comments on all aspects of this rulemaking.

4. Safe Shutdown Earthquake

The existing regulation (10 CFR part 100, appendix A, section V(a)(1)(iv)) states "The maximum vibratory accelerations of the Safe Shutdown Earthquake at each of the various foundation locations of the nuclear power plant structures at a given site shall be determined * * *". The location of the seismic input motion control point as stated in the existing regulation has led to confrontations with many applicants that believe this stipulation is inconsistent with good engineering fundamentals.

The proposed regulation would move the location of the seismic input motion control point from the foundation-level to free-field, at the free ground surface or hypothetical rock outcrop, as appropriate. The 1975 version of the Standard Review Plan placed the control motion in the free-field. The proposed regulation is also consistent with the resolution of Unresolved Safety Issue (USI) A-40, "Seismic Design Criteria" (August 1989), that resulted in the revision of Standard Review Plan sections 2.5.2, 3.7.1, 3.7.2, and 3.7.3. However, the proposed regulation requires that at a minimum, the horizontal Safe Shutdown Earthquake Ground Motion at the foundation level of the structures must be an appropriate response spectrum with a peak ground acceleration of at least 0.1g.

5. Value of the Operating Basis Earthquake Ground Motion (OBE) and Required OBE Analyses

The existing regulation (10 CFR, appendix A, section V(a)(2)) states that the maximum vibratory ground motion of the OBE is one-half the maximum vibratory ground motion of the Safe Shutdown Earthquake ground motion. Also, the existing regulation (10 CFR, appendix A, section VI(a)(2)) states that the engineering method used to insure that structures, systems, and components are capable of withstanding the effects of the OBE shall involve the use of either a suitable dynamic analysis or a suitable qualification test. In some cases, for instance piping, these multi-facets of the OBE in the existing regulation made it possible for the OBE to have more design significance than the SSE. A decoupling of the OBE and SSE has been suggested in several documents. For instance, the NRC staff, SECY-79-300, suggested that design for a single limiting event and inspection and evaluation for earthquakes in excess of some specified limit may be the most sound regulatory approach. NUREG-1061, "Report of the U.S. Nuclear Regulatory Commission Piping Review Committee," Vol. 5, April 1985, (Table 10.1) ranked a decoupling of the OBE and SSE as third out of six high priority changes. In SECY-90-016, "Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements," the NRC staff states that it agrees that the OBE should not control the design of safety systems. For the evolutionary reactors, the NRC will consider requests to decouple the OBE from the SSE on a design-specific basis.

Activities equivalent to OBE-SSE decoupling are also being done in foreign countries. For instance, in Germany their new design standard requires only one design basis earthquake (equivalent to the SSE). They require an inspection-level earthquake (for shutdown) of 0.4 SSE. This level was set so that the vibratory ground motion should not induce stresses exceeding the allowable stress limits originally required for the OBE design.

The proposed regulation would allow the value of the OBE to be set at: (i) One-third or less of the SSE, where OBE requirements are satisfied without an explicit response or design analyses being performed, or (ii) a value greater than one-third of the SSE, where analysis and design are required. There are two issues the applicant should consider in selecting the value of the OBE: first, plant shutdown is required if vibratory ground motion exceeding that of the OBE occurs (discussed below in Item 6, Required Plant Shutdown), and second, the amount of analyses associated with the OBE. An applicant may determine that at one-third of the SSE level, the probability of exceeding the OBE vibratory ground motion is too high, and the cost associated with plant shutdown for inspections and testing of equipment and structures prior to restarting the plant is unacceptable. Therefore, the applicant may voluntarily select an OBE value at some higher fraction of the SSE to avoid plant shutdowns. However, if an applicant selects an OBE value at a fraction of the SSE higher than one-third, a suitable analysis shall be performed to demonstrate that the requirements associated with the OBE are satisfied. The design shall take into account soil-structure interaction effects and the expected duration of the vibratory ground motion. The requirement associated with the OBE is that all structures, systems, and components of the nuclear power plant necessary for continued operation without undue risk to the health and safety of the public shall remain functional and within applicable stress and deformation limits when subjected to the effects of the OBE in combination with normal operating loads.

As stated above, subject to further confirmation, it is determined that if an OBE of one-third of the SSE is used, the requirements of the OBE can be satisfied without the applicant performing any explicit response analyses (some minimal design checks and the applicability of this position to seismic base isolation of buildings are discussed below). There is high confidence that, at this ground-motion level with other postulated concurrent loads, most critical structures, systems, and components will not exceed currently used design limits. In this case, the OBE serves the function of an inspection and shutdown earthquake. There are situations associated with current analyses where only OBE is associated with the design requirements, for example, the ultimate heat sink (see Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants"). In these situations, a value expressed as a fraction of the SSE response would be used in the analyses. Section VIII of this Proposed rule identifies existing guides that would be revised technically to maintain the existing design philosophy. With regard to piping analyses, positions on fatigue ratcheting and seismic anchor motion are being developed and will be issued for public comment in a draft regulatory guide separate from this rulemaking. More than one earthquake response analysis for a seismic base isolated nuclear power plant design may be necessary to ensure adequate performance at all earthquake levels. Decisions pertaining to the response analyses associated with base isolated facilities will be handled on a case by case basis.

6. Required Plant Shutdown

The current regulation (Section V(a)(2)) states that if vibratory ground motion exceeding that of the OBE occurs, shutdown of the nuclear power plant is required. The supplementary information to the final regulation (published November 13, 1973, 38 FR 31279, Item 6e) includes the following statement: "A footnote has been added to § 50.36(c)(2) of 10 CFR part 50 to assure that each power plant is aware of the limiting condition of operation which is imposed under section V(2) of appendix A to 10 CFR part 100. This limitation requires that if vibratory ground motion exceeding that of the OBE occurs, shutdown of the nuclear power plant will be required. Prior to resuming operations, the licensee will be

required to demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public." At that time, it was the intention of the Commission to treat the Operating Basis Earthquake as a limiting condition of operation. From the statement in the Supplementary Information, the Commission directed applicants to specifically review 10 CFR part 100 to be aware of this intention in complying with the requirements of 10 CFR 50.36. Thus, the requirement to shut down if an OBE occurs was expected to be implemented by being included among the technical specifications submitted by applicants after the adoption of appendix A. In fact, applicants did not include OBE shutdown requirements in their technical specifications.

The proposed regulation would treat plant shutdown associated with vibratory ground motion exceeding the OBE or significant plant damage as a condition in every operating license. The shutdown requirement would be a condition of the license (10 CFR 50.54) rather than a limiting condition of operation (10 CFR 50.36), because the necessary judgments associated with exceedance of the vibratory ground motion or significant plant damage can not be adequately characterized in a technical specification. A new paragraph § 50.54(ee) would be added to the regulations to require plant shutdown for licensees of nuclear power plants that comply with the earthquake engineering criteria in paragraph IV(a)(3) of Proposed Appendix S, "Earthquake Engineering Criteria for Nuclear Power Plants," to 10 CFR part 50.

Draft Regulatory Guide DG–1017, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions," is being developed to provide guidance acceptable to the NRC staff for determining whether or not vibratory ground motion exceeding the OBE ground motion or significant plant damage had occurred and nuclear power plant shutdown is required. The guidance is based on criteria developed by the Electric Power Research Institute (EPRI). The decision to shut down the plant should be made within eight hours after the earthquake. The data from the seismic instrumentation, coupled with information obtained from a plant walkdown, are used to make the determination of whether the plant should be shut down, if it has not already been shut down by operational perturbations resulting from the seismic event. The guidance being developed in Draft Regulatory Guide DG–1017 is based on two assumptions, first, that the nuclear power plant has operable seismic instrumentation, including the equipment and software required to process the data within four hours after an earthquake, and second, that the operator walkdown inspections can be performed in approximately four to eight hours depending on the number of personnel conducting the inspection. If vibratory ground motion exceeding that of the Operating Basis Earthquake Ground Motion or if significant plant damage occurs, the licensee must shut down the nuclear power plant. If the licensee determines that plant shutdown is required by the Commission's regulations, but the licensee does not think it prudent to do so, the licensee may ask for an emergency exemption from the requirements of the regulation pursuant to § 50.12 to 10 CFR part 50 so that the plant need not shut down if the exemption is granted.

Draft Regulatory Guide DG–1018, "Restart of a Nuclear Power Plant Shut Down by a Seismic Event," is being developed to provide guidelines that are acceptable to the NRC staff for performing inspections and tests of nuclear power plant equipment and structures prior to plant restart. This guidance is also based on EPRI reports. Prior to resuming operations, the licensee must demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public. The results of post-shutdown inspections, operability checks, and surveillance tests shall be documented in written reports and submitted to the Director, Office of Nuclear Reactor Regulation. The licensee shall not resume operation until authorized to do so by the Director, Office of Nuclear Reactor Regulation.

7. Clarify Interpretations

In appendix B to 10 CFR part 100, changes have been made to resolve questions of interpretation. As an example, definitions and required investigations stated in the proposed regulation would be significantly changed to eliminate or modify phrases that were more applicable to only the western part of the United States.

VI. Siting Policy Task Force Recommendations

The Siting Policy Task Force made nine recommendations with regard to revision of the reactor siting criteria in NUREG–0625, "Report of the Siting Policy Task Force," August 1979. The individual recommendations and the proposed disposition and actions being taken in regard to each of these are discussed below.

Recommendation 1

Revise part 100 to change the way protection is provided for accidents by incorporating a fixed exclusion area and protection action distance and population density and distribution criteria.

1. Specify a fixed minimum exclusion distance based on limiting the individual risk from design basis accidents. Furthermore, the regulations should clarify the required control by the utility over activities taking place in land and water portions of the exclusion area.

2. Specify a fixed minimum emergency planning distance of 10 miles. The physical characteristics of the emergency planning zone should provide reasonable assurance that evacuation of persons, including transients, would be feasible if needed to mitigate the consequences of accidents.

3. Incorporate specific population density and distribution limits outside the exclusion area that are dependent on the average population of the region.

4. Remove the requirement to calculate radiation doses as a means of establishing minimum exclusion distances and low population zones.

Disposition and Action

Recommendation 1 has been or is largely proposed to be adopted by the Commission. With regard to item 1, a fixed minimum exclusion area distance of 0.4 mile, commensurate with past NRC experience in the review of design basis accidents, is being proposed. The Commission believes that the existing requirements regarding control over any land portion of the exclusion area together with current emergency planning requirements make any new requirements on exclusion area control unnecessary. The recommendations in item 2 were adopted by the Commission shortly after the Three Mile Island accident and are contained in 10 CFR 50.47. The recommendations in item 3 are proposed to be adopted except that the population density and distribution limits are proposed to be applicable nationwide. The recommendation of Item 4 is proposed to be adopted.

Recommendation 2

Revise 10 CFR part 100 to require consideration of the potential hazards posed by man-made activities and natural characteristics of sites by

establishing minimum standoff distances for:

1. Major or commercial airports,
2. Liquid Natural Gas (LNG) terminals,
3. Large propane pipelines,
4. Large natural gas pipelines,
5. Large quantities of explosive or toxic materials,
6. Major dams, and
7. Capable faults.

Disposition and Action

Recommendation 2 is proposed to be adopted in part and rejected in part. 10 CFR part 100 is to be revised to include consideration of man-related hazards. However, establishing minimum standoff distances by regulation for the hazards cited is not feasible. NRC review has found that acceptable separation distances are not readily quantified and can depend upon many other factors such as the topography, size, and operational aspects of the facilities, in addition to the distance from the reactor. Accordingly, the proposed regulation will require that the hazards be identified and evaluated so that they can be adequately considered in the design of the reactor to be located on the site. Present NRC review criteria, as given in the Standard Review Plan (SRP), Section 2.2.3, are considered adequate.

Recommendation 3

Revise 10 CFR part 100 by requiring a reasonable assurance that interdictive measures are possible to limit groundwater contamination resulting from Class 9 accidents within the immediate vicinity of the site.

Disposition and Action

The Commission is not proposing to adopt this recommendation. However, requirements on future reactor designs will address the need to consider and minimize containment failure under severe accident conditions. Future reactor designs will need to address the potential for ground water contamination as part of their environmental review under 10 CFR part 51.

Recommendation 4

Revise appendix A to 10 CFR part 100 to better reflect the evolving technology in assessing seismic hazards.

Disposition and Action

The Commission is proposing to adopt this recommendation in this rulemaking.

Recommendation 5

Revise 10 CFR part 100 to include consideration of post-licensing changes in offsite activities.

1. The NRC staff shall inform local authorities (planning commission, country commissions, etc.) that control activities within the emergency planning zone (EPZ) of the basis for determining the acceptability of a site.

2. The NRC staff shall notify those Federal agencies as in item 1 above that may reasonably initiate a future Federal action that may influence the nuclear power plant.

3. The NRC staff shall require applicants to monitor and report potentially adverse offsite developments.

4. If, in spite of the actions described in items 1 through 3, there are offsite developments that have the potential for significantly increasing the risk to the public, the NRC staff will consider restrictions on a case-by-case basis.

Disposition and Action

This recommendation is already in effect or is proposed to be adopted. Item 1 is already covered by existing emergency planning requirements. Item 2 is being accomplished by issuance of a Significant Hazard Consideration statement by the NRC staff. The Commission is requesting comments on Item 3. With regard to item 4, the Commission retains the right to order restrictions on a case-by-case basis.

Recommendation 6

Continue the current approach relative to site selection from a safety viewpoint, but select sites so that there are no unfavorable characteristics requiring unique or unusual design to compensate for site inadequacies.

Disposition and Action

The Commission is not proposing to adopt this recommendation. In the current and proposed part 100 regulations, applicants may provide specific plant design features to compensate for site inadequacies. As long as these design features adequately account for the conditions at the site, public health and safety will be protected. These specific design features may involve added costs. However, the Commission has concluded that any economic consideration should be left to the applicant.

Recommendation 7

Revise part 100 to specify that site approval be established at the earliest decision point in the review and to provide criteria that would have to be satisfied for this approach to be subsequently reopened in the licensing process.

Disposition and Action

The Commission considers that the early site permit provisions of 10 CFR part 52 accomplish this recommendation.

Recommendation 8

Revise 10 CFR part 51 to provide that a final decision disapproving a proposed site by a state agency whose approval is fundamental to the project would be a sufficient basis for NRC to terminate review. The termination of a review would then be reviewed by the Commission.

Disposition and Action

The Commission is not proposing to adopt this recommendation because it is considered inappropriate. This recommendation would give a State the authority to grant issuance of a construction permit for a nuclear facility. Only the Federal Government has this authority. States do have an independent right to deny site approval as long as it is not a radiological health and safety, common defense, or security concern.

Recommendation 9

Develop common bases for comparing the risks for all external events.

Disposition and Action

The Siting Policy Task Force's primary recommendation in this area was that an interdisciplinary effort should be undertaken with the objective of developing quantitative risk comparisons of all external events and natural phenomena. The Commission considers this to be a desirable objective but notes that the Siting Policy Task Force made no specific recommendations with regard to siting criteria or rulemaking. The Commission therefore considers this recommendation inapplicable in the present context of examination of siting criteria, but notes that recent developments in probabilistic risk analysis (PRA) have considered examination of the risk from external events in detail.

VII. Related Regulatory Guides and Standard Review Plan Section

The NRC is developing the following draft regulatory guides and standard review plan section to provide prospective licensees with the necessary guidance for implementing the proposed regulation. The notice of availability for these materials is published elsewhere in this issue of the Federal Register.

1. DG–1015, "Identification and Characterization of Seismic Sources,

Deterministic Source Earthquakes, and Ground Motion." The draft guide provides general guidance and recommendations, describes acceptable procedures and provides a list of references that present acceptable methodologies to identify and characterize capable tectonic sources and seismogenic sources.

2. DG–1016, Second Proposed Revision 2 to Regulatory Guide 1.12, "Nuclear Power Plant Instrumentation for Earthquakes." The draft guide describes seismic instrumentation type and location, operability, characteristics, installation, actuation, and maintenance that are acceptable to the NRC staff.

3. DG–1017, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions." The draft guide provides guidelines that are acceptable to the NRC staff for a timely evaluation of the recorded seismic instrumentation data and to determine whether or not plant shutdown is required.

4. DG–1018, "Restart of a Nuclear Power Plant Shut Down by a Seismic Event." The draft guide provides guidelines that are acceptable to the NRC staff for performing inspections and tests of nuclear power plant equipment and structures prior to restart of a plant that has been shut down because of a seismic event.

5. Draft Standard Review Plan Section 2.5.2, Proposed Revision 3 "Vibratory Ground Motion." The draft describes procedures to assess the ground motion potential of seismic sources at the site and to assess the adequacy of the SSE.

6. Draft Regulatory Guide 4.7, Revision 2, dated December 1991, "General Site Suitability Criteria for Nuclear Power Plants." This guide discusses the major site characteristics related to public health and safety and environmental issues that the NRC staff considers in determining the suitability of sites.

VIII. Future Regulatory Action

Several existing regulatory guides will be revised to incorporate editorial changes or maintain the existing design or analysis philosophy. These guides will be issued to coincide with the publication of the final regulations that would implement this proposed action.

The following regulatory guides will be revised to incorporate editorial changes, for example to reference new paragraphs in appendix B to part 100 or appendix S to part 50. No technical changes will be made in these regulatory guides.

1. 1.57, "Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components."
2. 1.59, "Design Basis Floods for Nuclear Power Plants."
3. 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants."
4. 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes."
5. 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis."
6. 1.102, "Flood Protection for Nuclear Power Plants."
7. 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes."
8. 1.122, "Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components."

The following regulatory guides will be revised to update the design or analysis philosophy, for example, to change OBE to a fraction of the SSE:

1. 1.27, "Ultimate Heat Sink for Nuclear Power Plants."
2. 1.100, "Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants."
3. 1.124, "Service Limits and Loading Combinations for Class 1 Linear-Type Component Supports."
4. 1.130, "Service Limits and Loading Combinations for Class 1 Plate-and-Shell-Type Component Supports."
5. 1.132, "Site Investigations for Foundations of Nuclear Power Plants."
6. 1.138, "Laboratory Investigations of Soils for Engineering Analysis and Design of Nuclear Power Plants."
7. 1.142, "Safety-Related Concrete Structures for Nuclear Power Plants (Other than Reactor Vessels and Containments)."
8. 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

Minor and conforming changes to other Regulatory Guides and standard review plan sections as a result of proposed changes in the nonseismic criteria are also planned. If substantive changes are made during the revisions, the applicable guides will be issued for public comment as draft guides.

IX. Referenced Documents

An interested person may examine or obtain copies for the documents referenced in this proposed rule as set out below.

Copies of NUREG–0625, NUREG–1150, and NUREG/CR–2239 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013–7082. Copies are also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. A copy is also available for inspection and copying for a fee in the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC.

Copies of issued regulatory guides may be purchased from the Government Printing Office (GPO) at the current GPO price. Information on current GPO prices may be obtained by contacting the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013–2171. Issued guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161.

SECY 79–300, SECY 90–016, and WASH–1400 are available for inspection and copying for a fee at the Commission's Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC.

X. Submission of Comments in Electronic Format

The comment process will be improved if each comment is identified with the document title, section heading, and paragraph number addressed. Commenters are encouraged to submit, in addition to the original paper copy, a copy of the letter in electronic format on 5.25 or 3.5 inch computer diskette: IBM PC/DOC or MS/DOS format. Data files should be provided in one of the following formats: WordPerfect, IBM Document Content Architecture/Revisable-Form-Text (DCA/RFT), or unformatted ASCII code. The format and version should be identified on the diskette's external label.

XI. Questions

In addition to soliciting comments on all aspects of this rulemaking, the Commission specifically requests comments on the following questions.

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?

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)?

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 3A, 3B, and 3C 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?

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?

C. Should population density criteria 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?

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

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?

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

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?

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?

B. Seismic and Earthquake Engineering Criteria

The proposed guide, DG–1015, outlines concepts and procedures to be used in conjunction with the probabilistic/deterministic seismic hazard evaluations. Rationale for the approach is discussed in section V.B(3) of this Proposed Rule.

The staff is currently performing confirmatory studies to evaluate and refine these proposed procedures. A limited study has been completed demonstrating the feasibility of procedures and the validity of the concepts. However, the staff would like to solicit comments on the concepts outlined in the proposed guide at this time. To facilitate the review, results of the application of the proposed procedure to four test sites are published separately (Letter report from D. Bernreuter of LLNL to A. Murphy of NRC dated September 24, 1992, available in the NRC Public Document Room at 2120 L Street NW., (Lower Level), Washington, DC.).

There are divergent views on the role probabilistic seismic hazard analysis should play in the licensing arena. There is a general consensus within the NRC staff that the revised seismic and geological siting criteria should allow consideration for a probabilistic hazard analysis. There is also a general belief that the outcome of a probabilistic analysis should be compared with the results of past practices for siting and licensing the current generation of nuclear power plants. There is a general consensus that ground motions should be calculated using deterministic methods once the controlling earthquakes are determined. With regard to the role of the probabilistic analysis, views range from an advocacy of a predominantly probabilistic analysis to the probabilistic/deterministic proposed here to a predominantly deterministic approach as used currently. Given these divergent views, the NRC staff would like to invite comments regarding the use of probabilistic seismic hazard analysis and the balance between the deterministic and probabilistic evaluations. This and other associated issues are itemized below. (As the detailed technical studies are completed some of the staff positions may be confirmed, but specific comments would be helpful at this time.)

1. In making use of both deterministic and probabilistic evaluations, how should they be combined or weighted, that is, should one dominate over the other? (The NRC staff feels strongly that deterministic investigations and their use in the development and evaluation of the Safe Shutdown Earthquake Ground Motion should remain an important aspect of the siting regulations for nuclear power plants for the foreseeable future. The NRC staff also feels that probabilistic seismic hazard assessment methodologies have reached a level of maturity to warrant a specific role in siting regulations.)

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

3. In determining the controlling earthquakes, should be 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 levels associated with the median hazard analysis estimates as they provide more stable estimates of controlling earthquakes.)

4. 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)?

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.)

XII. Finding of No Significant Environmental Impact: Availability

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in subpart A of 10 CFR part 51, that this proposed regulation, if adopted, would not be a major Federal action significantly affecting the quality of the human environment and therefore an environmental impact statement is not required.

The provisions associated with the [illegible]ing criteria in 10 CFR part 100 and [illegible]location of the plant design requirements from 10 CFR part 100 to 10 CFR part 50 have been evaluated against the current requirements. The Commission has concluded that relocating the requirement for a dose calculation to part 50 and adding more specific site criteria to part 100 does not decrease the protection of the public health and safety over the current regulations. The proposed amendments do not affect nonradiological plant effluents and have no other environmental impact.

The addition of appendix B to 10 CFR part 100, and the addition of appendix S to 10 CFR part 50, will not change the radiological environmental impact offsite. Onsite occupational radiation exposure associated with inspection and maintenance will not change. These activities are principally associated with base line inspections of structures, equipment, and piping, and with maintenance of seismic instrumentation. Base line inspections are needed to differentiate between pre-existing conditions at the nuclear power plant and earthquake related damage. The structures, equipment and piping selected for these inspections are those routinely examined by plant operators during normal plant walkdowns and inspections. Routine maintenance of seismic instrumentation ensures its operability during earthquakes. The location of the seismic instrumentation is similar to that in the existing nuclear power plants. The proposed amendments do not affect nonradiological plant effluents and have no other environmental impact.

The environmental assessment and finding of no significant impact on which this determination is based are available for inspection at the NRC Public Document Room 2120 L Street NW. (Lower Level), Washington, DC. Single copies of the environmental assessment and finding of no significant impact are available from Mr. Leonard Soffer, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492–3916, or Dr. Andrew Murphy, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492–3860.

XIII. Paperwork Reduction Act Statement

This proposed regulation amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). This proposed regulation has been submitted to the Office of Management and Budget for review and approval of the paperwork requirements.

There is no public reporting burden related to the nonseismic siting criteria. Public reporting burden for the collection of information related to the seismic and earthquake engineering criteria is estimated to average 800,000 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch (MNBB 7714), U.S. Nuclear Regulatory Commission, Washington, DC 20555; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB–3019, (3150–0011 and 3150–0093), Office of Management and Budget, Washington, DC 20503.

XIV. Regulatory Analysis

The Commission has prepared a draft regulatory analysis on this proposed regulation. The analysis examines the costs and benefits of the alternatives considered by the Commission. The draft analysis is available for inspection in the NRC Public Document Room, 2120 L Street NW. (Lower Level), Washington, DC. Single copies of the analysis are available from Mr. Leonard Soffer, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492–3916, or Dr. Andrew J. Murphy, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492–3860.

The Commission requests public comment on the draft regulatory analysis. Comments on the draft analysis may be submitted to the NRC as indicated under the "ADDRESSES" heading.

XV. Regulatory Flexibility Certification

In accordance with the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)), the Commission certifies that this proposed regulation will not, if promulgated, have a significant economic impact on a substantial number of small entities. This proposed regulation affects only the licensing and operation of nuclear power plants. Nuclear power plant site applicants do not fall within the definition of small businesses as defined in Section 3 of the Small Business Act (15 U.S.C. 632), the Small Business Size Standards of the Small Business Administrator (13 CFR part 121), or the Commission's Size Standards (56 FR 56671; November 6, 1991).

XVI. Backfit Analysis

The NRC has determined that the backfit rule, 10 CFR 50.109, does not apply to this proposed regulation, and therefore, a backfit analysis is not required for this proposed regulation because these amendments do not involve any provisions that would impose backfits as defined in 10 CFR 50.109(a)(1). The proposed regulation would apply only to applicants for future nuclear power plant construction permits, preliminary design approval, final design approval, manufacturing licenses, early site reviews, operating licenses, and combined operating licenses.

List of Subjects

10 CFR Part 50

Antitrust, Classified information, Criminal penalty, Fire protection, Incorporation by reference, Intergovernmental relations, Nuclear power plants and reactors, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements.

10 CFR Part 52

Administrative practice and procedure, Antitrust, Backfitting, Combined license, Early site permit, Emergency planning, Fees, Inspection, Limited work authorization, Nuclear power plants and reactors, Probabilistic risk assessment, Prototype, Reactor

siting criteria, Redress of site, Reporting and recordkeeping requirements, Standard design, Standard design certification.

10 CFR Part 100

Nuclear power plants and reactors, Reactor siting criteria.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C. 553, the NRC is proposing to adopt the following amendments to 10 CFR parts 50, 52 and 100.

PART 50—DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation for part 50 continues to read as follows:

Authority: Secs. 102, 103, 104, 105, 161, 182, 183, 186, 189, 68 Stat. 936, 937, 938, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 1244, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2201, 2232, 2233, 2236, 2239, 2282); secs. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246, (42 U.S.C. 5841, 5842, 5846).

Section 50.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5851). Section 50.10 also issued under secs. 101, 185, 68 Stat. 936, 955, as amended (42 U.S.C. 2131, 2235); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.13, 50.54(dd) and 50.103 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138). Sections 50.23, 50.35, 50.55, and 50.56 also issued under sec. 185, 68 Stat. 955 (42 U.S.C. 2235). Sections 50.33a, 50.55a and Appendix Q also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332). Sections 50.34 and 50.54 also issued under sec. 204, 88 Stat. 1245 (42 U.S.C. 5844). Sections 50.58, 50.91 and 50.92 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239).

Section 50.78 also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Sections 50.80-50.81 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Appendix F also issued under sec. 187, 68 Stat. 955 (42 U.S.C. 2237).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), §§ 50.5, 50.46 (a) and (b), and 50.54(c) are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); §§ 50.5, 50.7(a), 50.10(a)-(c), 50.34 (a) and (e), 50.44(a)-(c), 50.46 (a) and (b), 50.47(b), 50.48(a), (c), (d), and (e), 50.49(a), 50.54(a)(i), (i)(1), (1)-(n), (p) (q), (t), (v), and (y), 50.55(f), 50.55a(a), (c)-(e), (g), and (h), 50.59(c), 50.60(a), 50.62(b), 50.64(b), 50.65 and 50.80 (a) and (b) are issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201(i)); and §§ 50.49(d), (h), and (j), 50.54(w), (z), (bb), (cc), and (dd), 50.55(e), 50.59(b), 50.61(b), 50.62(b), 50.70(a), 50.71(a)-(c) and (e), 50.72(a), 50.73 (a) and (b), 50.74, 50.78, and 50.90 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

2. In § 50.2, add in alphabetical order the definitions for exclusion area, low population zone, and population center distance to read to read as follows:

§ 50.2 Definitions.

As used in this part,

* * * * *

Exclusion area means that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety. Residence within the exclusion area shall normally be prohibited. In any event, residents shall be subject to ready removal in case of necessity. Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

* * * * *

Low population zone means the area immediately surrounding the exclusion area which contain residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident. These guides do not specify a permissible population density of total population within this zone because the situation may vary from case to case. Whether a specific number of people can, for example, be evacuated from a specific area, or instructed to take shelter, on a timely basis will depend on many factors such as location, number and size of highways, scope and extent of advance planning, and actual distribution of residents within the area.

* * * * *

Population center distance means the distance from the reactor to the nearest boundary of a densely populated center containing more then 25,000 residents.

* * * * *

3. In § 50.8, paragraph (b) is revised to read as follows:

§ 50.8 Information collection requirements: OMB approval.

* * * * *

(b) The approved information collection requirements contained in this part appear in §§ 50.30, 50.33, 50.33a, 50.34, 50.34a, 50.35, 50.36, 50.36a, 50.48, 50.49, 50.54, 50.55, 50.55a, 50.59, 50.60, 50.61, 50.63, 50.64, 50.65, 50.71, 50.72, 50.80, 50.82, 50.90, 50.91, and Appendices A, B, E, G, H, I, J, K, M, N, O, Q, R, and S.

* * * * *

4. In § 50.34, footnotes 6, 7, and 8 are redesignated as footnotes 8, 9 and 10, paragraph (a)(1) is revised and paragraphs (a)(12) and (b)(10) are added to read as follows:

§ 50.34 Contents of applications; technical information.

(a) * * *

(1) A description and safety assessment of the site and a safety assessment of the facility. Site characteristics must comply with part 100 of this chapter. Special attention must be directed to plant design features intended to mitigate the radiological consequences of accidents. In performing this assessment, an applicant shall assume a fission product release [6] from the core into the containment assuming that the facility is operated at the ultimate power level contemplated. The applicant shall perform an evaluation and analysis of the postulated fission product release, using the expected demonstrable containment leak rate and any fission product cleanup systems intended to mitigate the consequences of the accidents, together with applicable site characteristics, including site meteorology, to evaluate the offsite radiological consequences. The evaluation must determine that:

(i) An individual located at any point on the boundary of the exclusion area for two hours immediately following the onset of the postulated fission product release would not receive a total radiation dose to the whole body in excess of 25 rem [7] or a total radiation

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[6] The fission product release assumed for this evaluation should be based upon a major accident, hypothesized or determined from considerations of possible accidental events, that would result in potential hazards not exceeded by those from any accident considered credible. Such accidents have generally been assumed to result in substantial meltdown of the core with subsequent release into the containment of appreciable quantities of fission products.

[7] The whole body dose of 24 rem referred to above has been stated to correspond numerically to the once in a lifetime accidental or emergency dose for radiation workers which, according to NCRP recommendations may be disregarded in the determination of their radiation exposure status (see NBS handbook 69 dated June 5, 1959). More recently, this whole body dose value has also been provided as guidance for radiation workers performing emergency services involving life saving activities or protection of large populations where lower doses are not practicable (see EPA, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, Draft, September 1990). However, neither its use nor that of the 300 rem value for

Continued

dose in excess of 300 rem to the thyroid from iodine exposure.

(ii) An individual located at any point on the outer radius of a low population zone 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. For purposes of this evaluation, a low population zone boundary of 3.0 miles (measured from the reactor center point) is assumed.

(iii) With respect to operation at the projected initial power level, the applicant is required to submit information prescribed in paragraphs (a)(2) through (a)(8) of this section, as well as the information required by this paragraph, in support of the application for a construction permit.

Note: Reference is made to Technical Information Document (TID) 14844, dated March 23, 1962, which contains a fission product release into containment which has been used in past evaluations. The fission product release given in TID–14844 may be used as a point of departure upon consideration of severe accident research insights available since its issuance, upon consideration of plant design features intended to mitigate the consequences of accidents, or upon characteristics of a particular reactor. Copies of Technical Information Document 14844 may be obtained from the Commission's Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC., or by writing the Director of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

* * * * *

(12) On or after [EFFECTIVE DATE OF THE FINAL RULE], applicants who apply for a construction permit pursuant to this part, or a design certification or combined license pursuant to part 52 of this chapter, as partial conformance to General Design Criterion 2 of Appendix A to this part, shall comply with the earthquake engineering criteria in Appendix S of this part.

(b) * * *

(10) On or after [EFFECTIVE DATE OF THE FINAL RULE], applicants who apply for an operating license pursuant to this part, or a design certification or combined license pursuant to part 52 of this chapter, as partial conformance to General Design Criterion 2 of appendix A to this part, shall comply with the earthquake engineering criteria of appendix S to this part. However, if the construction permit was issued prior to [EFFECTIVE DATE OF THE FINAL RULE], the applicant shall comply with the earthquake engineering criteria in Section VI of Appendix A to part 100 of this chapter.

* * * * *

5. In § 50.54, paragraph (ee) is added to read as follows:

§ 50.54 Conditions of licenses.

* * * * *

(ee) For licensees of nuclear power plants that have implemented the earthquake engineering criteria in Appendix S of this part, plant shutdown is required if the criteria in Paragraph IV(a)(3) of Appendix S are exceeded. Prior to resuming operations, the licensee shall demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public.

6. Appendix S to part 50 is added to read as follows:

Appendix S to Part 50—Earthquake Engineering Criteria for Nuclear Power Plants

General Information

This appendix applies to applicants who apply for a design certification or combined license pursuant to part 52 of this chapter or a construction permit or operating license pursuant to part 50 of this chapter on or after [EFFECTIVE DATE OF THE FINAL RULE]. However, if the construction permit was issued prior to [EFFECTIVE DATE OF THE FINAL RULE], the operating license applicant shall comply with the earthquake engineering criteria in Section VI of Appendix A to 10 CFR part 100.

I. Introduction

Each applicant for a construction permit, operating license, design certification, or combined license is required by § 50.34(a)(12), § 50.34(b)(10), and General Design Criterion 2 of Appendix A to this part to design nuclear power plant structures, systems, and components important to safety to withstand the effects of natural phenomena, such as earthquakes, without loss of capability to perform their safety functions. Also, a condition of all operating licenses for nuclear power plants, as specified in § 50.54(ee), is plant shutdown if the criteria in Paragraph IV(a)(3) of this appendix are exceeded.

These criteria implement General Design Criterion 2 insofar as it requires structures, systems, and components important to safety to withstand the effects of earthquakes.

II. Scope

The evaluations described in this appendix are within the scope of investigations permitted by § 50.10(c)(1) of this chapter.

III. Definitions

As used in these criteria:

Combined license means a combined construction permit and operating license with conditions for a nuclear power facility issued pursuant to subpart C of part 52 of this chapter.

Design Certification means a Commission approval, issued pursuant to subpart B of part 52 of this chapter, of a standard design for a nuclear power facility. A design so approved may be referred to as a "certified standards design."

The *Operating Basis Earthquake Ground Motion (OBE)* is the vibratory ground motion for which those features of the nuclear power plant necessary for continued operation without undue risk to the health and safety of the public will remain functional. The Operating Basis Earthquake Ground Motion is only associated with plant shutdown and inspection unless specifically selected by the applicant as a design input.

A *response spectrum* is a plot of the maximum responses (acceleration, velocity, or displacement) of a family of idealized single-degree-of-freedom oscillators as a function of the natural frequencies of the oscillators for a given damping value. The response spectrum is calculated for a specified vibratory motion input at the oscillators' supports.

The *Safe Shutdown Earthquake Ground Motion* (SSE) is the vibratory ground motion for which certain structures, systems, and components must be designed to remain functional.

The *structures, systems, and components required to withstand the effects of the Safe Shutdown Earthquake Ground Motion or surface deformation* are those necessary to assure:

(1) The integrity of the reactor coolant pressure boundary,

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or

(3) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of § 50.34(a)(1) of this chapter.

Surface deformation is distortion of soils or rocks at or near the ground surface by the processes of folding, faulting, compression, or extension as a result of various earth forces. Tectonic surface deformation is associated with earthquake processes.

IV. Application To Engineering Design

The following are pursuant to the seismic and geologic design basis requirements of paragraphs V (a) through (f) of appendix B to part 100 of this chapter:

(a) Vibratory Ground Motion.

(1) Safe Shutdown Earthquake Ground Motion. The Safe Shutdown Earthquake Ground Motion must be characterized by free-field ground motion response spectra at the free ground surface or hypothetical rock

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thyroid exposure as set forth in this section are intended to imply that these numbers constitute acceptable limits for emergency doses to the public under accident conditions. Rather, this 25 rem whole body value and the 300 rem thyroid value have been set forth in this section as reference values, which can be used in the evaluation of plant design features with respect to postulated reactor accidents, in order to assure that such designs provide assurance of low risk of public exposure to radiation, in the event of such accidents.

outcrop, as appropriate. In view of the limited data available on vibratory ground motions of strong earthquakes, it usually will be appropriate that the design response spectra be smoothed spectra developed from an ensemble of response spectra related to the vibratory motions caused by more than one earthquake. At a minimum, the horizontal Safe Shutdown Earthquake Ground Motion at the foundation level of the structures must be an appropriate response spectrum with a peak ground acceleration of at least 0.1g.

The nuclear power plant must be designed so that, if the Safe Shutdown Earthquake Ground Motion occurs, certain structures, systems, and components will remain functional and within applicable stress and deformation limits. In addition to seismic loads, applicable concurrent normal operating, functional, and accident-induced loads must be taken into account in the design of these safety-related structures, systems, and components. The design of the nuclear power plant must also take into account the possible effects of the Safe Shutdown Earthquake Ground Motion on the facility foundations by ground disruption, such as fissuring, lateral spreads, differential settlement, liquefaction, and landsliding, as required in paragraph V(f) of appendix B to part 100 of this chapter.

The required safety functions of structures, systems, and components must be assured during and after the vibratory ground motion associated with the Safe Shutdown Earthquake Ground Motion through design, testing, or qualification methods.

The evaluation must take into account soil-structure interaction effects and the expected duration of vibratory motion. It is permissible to design for strain limits in excess of yield strain in some of these safety-related structures, systems, and components during the Safe Shutdown Earthquake Ground Motion and under the postulated concurrent loads, provided the necessary safety functions are maintained.

(2) Operating Basis Earthquake Ground Motion.

(i) The Operating Basis Earthquake Ground Motion must be characterized by response spectra. The value of the Operating Basis Earthquake Ground Motion must be set to one of the following choices:

(A) One-third or less of the Safe Shutdown Earthquake Ground Motion. The requirements associated with this Operating Basis Earthquake Ground Motion in paragraph (a)(2)(i)(B)(*1*) can be satisfied without the applicant performing explicit response or design analyses, or

(B) A value greater than one-third of the Safe Shutdown Earthquake Ground Motion. Analysis and design must be performed to demonstrate that the requirements associated with this Operating Basis Earthquake Ground Motion in Paragraph (a)(2)(i)(B)(*1*) are satisfied. The design must take into account soil-structure interaction effects and the expected duration of vibratory ground motion.

(*1*) When subjected to the effects of the Operating Basis Earthquake Ground Motion in combination with normal operating loads, all structures, systems, and components of the nuclear power plant necessary for continued operation without undue risk to the health and safety of the public must remain functional and within applicable stress and deformation limits.

(3) Required Plant Shutdown.[1] If vibratory ground motion exceeding that of the Operating Basis Earthquake Ground Motion or if significant plant damage occurs, the licensee must shut down the nuclear power plant. Prior to resuming operations, the licensee must demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public.

(4) Required Seismic Instrumentation. Suitable instrumentation must be provided so that the seismic response of nuclear power plant features important to safety can be evaluated promptly after an earthquake.

(b) Surface Deformation. The potential for surface deformation must be taken into account in the design of the nuclear power plant by providing reasonable assurance that in the event of deformation, certain structures, systems, and components will remain functional. In addition to surface deformation induced loads, the design of safety features must take into account seismic loads, including aftershocks, and applicable concurrent functional and accident-induced loads. The design provisions for surface deformation must be based on its postulated occurrence in any direction and azimuth and under any part of the nuclear power plant, unless evidence indicates this assumption is not appropriate, and must take into account the estimated rate at which the surface deformation may occur.

(c) Seismically Induced Floods and Water Waves and Other Design Conditions. Seismically induced floods and water waves from either locally or distantly generated seismic activity and other design conditions determined pursuant to paragraphs V (e) and (f) of appendix B to Part 100 of this chapter must be taken into account in the design of the nuclear power plant so as to prevent undue risk to the health and safety of the public.

PART 52—EARLY SITE PERMITS; STANDARD DESIGN CERTIFICATIONS; AND COMBINED LICENSES FOR NUCLEAR POWER PLANTS

7. The authority citation for part 52 continues to read as follows:

Authority: Secs. 103, 104, 161, 182, 183, 186, 189, 68 Stat. 936, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 1244, as amended (42 U.S.C. 2133, 2201, 2232, 2233, 2236, 2238, 2282); secs. 201, 202, 206, 88 Stat. 1242, 1244, 1246, as amended (42 U.S.C. 5841, 5842, 5846).

8. In § 52.17, the introductory text of paragraph (a)(1) and paragraph (a)(1)(vi) are revised to read as follows:

[1] Guidance is being developed in Draft Regulatory Guide DG-1017, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions."

§ 52.17 Contents of applications.

(a)(1) The application must contain the information required by 50.33(a)–(d), the information required by § 50.34 (a)(12) and (b)(10), and, to the extent approval of emergency plans is sought under paragraph (b)(2)(ii) of this section, the information required by § 50.33 (g) and (j), and § 50.34(b)(6)(v). The application must also contain a description and safety assessment of the site on which the facility is to be located, with appropriate attention to features affecting facility design. The assessment must contain an analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in § 50.34(a)(1) of this chapter. Site characteristics must comply with part 100 of this chapter. In addition, the application should describe the following:

* * * * *

(vi) The seismic, meteorological, hydrologic, and geologic characteristics of the proposed site;

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9. In 10 CFR part 52, appendix Q, paragraph 8 is added to read as follows:

Appendix Q to Part 52—Pre-Application Early Review of Site Suitability Issues

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8. Notwithstanding paragraph 7, any application for renewal of an early site permit is subject to a full early site permit review.

PART 100—REACTOR SITE CRITERIA

10. The authority citation for part 100 continues to read as follows:

Authority: Secs. 103, 104, 161, 182, 68 Stat. 936, 397, 948, 953, as amended (42 U.S.C. 2133, 2134, 2201, 2232); sec. 201, as amended, 202, 88 Stat. 1242, as amended, 1244 (42 U.S.C. 5841, 5842).

11. The table of contents for Part 100 is revised to read as follows:

PART 100—REACTOR SITE CRITERIA

Sec.

12. Section 100.1 is revised to read as follows:

§ 100.1 Purpose.

(a) This part sets forth standards for evaluation of the suitability of proposed sites for stationary power and testing reactors subject to part 50 or part 52 of this chapter.

(b) This part identifies the factors considered by the Commission in the evaluation of reactor sites and the standards used in approving or disapproving proposed sites.

13. Section 100.2 is revised to read as follows:

§ 100.2 Scope.

(a) This part applies to applications filed under part 50 or part 52 of this chapter for early site permit, construction permit, operating license, or combined license (construction permit and operating license) for power and testing reactors.

(b) The site criteria contained in this part apply primarily to reactors for which there is significant operating experience. These site criteria can also be applied to other reactor types, such as for reactors that are novel in design and unproven as prototypes or pilot plants. For plants without significant operating experience, it is expected that these basic criteria will be applied in a manner that takes into account the lack of experience. In the application of these criteria which are deliberately flexible, the safeguards provided, either site isolation or engineered features, should reflect the lack of certainty that only experience can provide.

14. Section 100.3 is revised to read as follows:

§ 100.3 Definitions.

As used in this part:

Exclusion area means that area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety. Residence within the exclusion area shall normally be prohibited. In any event, residents shall be subject to ready removal in case of necessity. Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

Low population zone means the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken in their behalf in the event of a serious accident. These guides do not specify a permissible population density or total population within this zone because the situation may vary from case to case. Whether a specific number of people can, for example, be evacuated from a specific area, or instructed to take shelter, on a timely basis will depend on many factors such as location, number and size of highways, scope and extent of advance planning, and actual distribution of residents within the area.

Population center distance means the distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents.

Power reactor means a nuclear reactor of a type described in § 50.21(b) or § 50.22 of this chapter designed to produce electrical or heat energy.

Testing reactor means a *testing facility* as defined in § 50.2 of this chapter.

15. Section 100.4 is added to read as follows:

§ 100.4 Communications.

Except where otherwise specified in this part, all correspondence, reports, applications, and other written communications submitted pursuant to 10 CFR 100 should be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, and copies sent to the appropriate Regional Office and Resident Inspector. Communications and reports may be delivered in person at the Commission's offices at 2120 L Street, NW., Washington, DC, or at 11555 Rockville Pike, Rockville, Maryland.

16. Section 100.8 is revised to read as follows:

§ 100.8 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). OMB has approved the information collection requirements contained in this part under control number 3150-0093.

(b) The approved information collection requirements contained in this part appear in appendix A and appendix B.

17. A heading for subpart A is added directly before § 100.10 to read as follows:

Subpart A—Evaluation Factors for Stationary Power Reactor Site Applications Before [Effective Date of the Final Rule] and for Test Reactors.

18. Section 100.10 is revised to read as follows:

§ 100.10 Factors to be considered when evaluating sites.

Factors considered in the evaluation of sites include those relating both to the proposed reactor design and the characteristics peculiar to the site. It is expected that reactors will reflect through their design, construction and operation an extremely low probability for accidents that could result in release of significant quantities of radioactive fission products. In addition, the site location and the engineered features included as safeguards against the hazardous consequences of an accident, should one occur, should insure a low risk of public exposure. In particular, the Commission will take the following factors into consideration in determining the acceptability of a site for a power or testing reactor:

(a) Characteristics of reactor design and proposed operation including—

(1) Intended use of the reactor including the proposed maximum power level and the nature and inventory of contained radioactive materials;

(2) The extent to which generally accepted engineering standards are applied to the design of the reactor;

(3) The extent to which the reactor incorporates unique or unusual features having a significant bearing on the probability or consequences of

accidental release of radioactive materials;

(4) The safety features that are to be engineered into the facility and those barriers that must be breached as a result of an accident before a release of radioactive material to the environment can occur.

(b) Population density and use characteristics of the site environs, including the exclusion area, low population zone, and the population center distance.

(c) Physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

(1) Appendix A to part 100, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," describes the nature of investigations required to obtain the geologic and seismic data necessary to determine site suitability and to provide reasonable assurance that a nuclear power plant can be constructed and operated at a proposed site without undue risk to the health and safety of the public. It describes procedures for determining the quantitative vibratory ground motion design basis at a site due to earthquakes and describes information needed to determine whether and to what extent a nuclear power plant need be designed to withstand the effects of surface faulting.

(2) Meteorological conditions at the site and in the surrounding area should be considered.

(3) Geological and hydrological characteristics of the proposed site may have a bearing on the consequences of an escape of radioactive material from the facility. Special precautions should be planned if a reactor is to be located at a site where a significant quantity of radioactive effluent might accidentally flow into nearby streams or rivers or might find ready access to underground water tables.

(d) Where unfavorable physical characteristics of the site exist, the proposed site may nevertheless be found to be acceptable if the design of the facility includes appropriate and adequate compensating engineering safeguards.

19. Section 100.11 is revised to read as follows:

§ 100.11 Determination of exclusion area, low population zone, and population center distance.

(a) As an aid in evaluating a proposed site, an applicant should assume a fission product release [1] from the core, the expected demonstrable leak rate from the containment and the meteorological conditions pertinent to his site to derive an exclusion area, a low population zone and population center distance. For the purpose of this analysis, which shall set forth the basis for the numerical values used, the applicant should 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 [2] 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 involved, a greater distance may be necessary because of total integrated population dose consideration.

(b) For sites for multiple reactor facilities consideration should be given to the following:

(1) If the reactors are independent to the extent that an accident in one reactor would not initiate an accident in another, the size of the exclusion area, low population zone and population center distance shall be fulfilled with respect to each reactor individually. The envelopes of the plan overlay of the areas so calculated shall then be taken as their respective boundaries.

(2) If the reactors are interconnected to the extent that an accident in one reactor could affect the safety of operation of any other, the size of the exclusion area, low population zone and population center distance shall be based upon the assumption that all interconnected reactors emit their postulated fission product releases simultaneously. This requirement may be reduced in relation to the degree of coupling between reactors, the probability of concomitant accidents and the probability that an individual would not be exposed to the radiation effects from simultaneous releases. The applicant would be expected to justify to the satisfaction of the Commission the basis for such a reduction in the source term.

(3) The applicant is expected to show that the simultaneous operation of multiple reactors at a site will not result in total radioactive effluent releases beyond the allowable limits of applicable regulations.

Note: For further guidance in developing the exclusion area, the low population zone, and the population center distance, reference is made to Technical Information Document 14844, dated March 23, 1962, which contains a procedural method and a sample calculation that result in distances roughly reflecting current siting practices of the Commission. The calculations described in Technical Information Document 14844 may be used as a point of departure for consideration of particular site requirements which may result from evaluation of the characteristics of a particular reactor, its purpose and method of operation. Copies of Technical Information Document 14844 may be obtained from the Commission's Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC. or by writing the Director of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC. 20555.

20. Subpart B (§§ 100.20–100.22) is added to read as follows:

Subpart B—Evaluation Factors for Stationary Power Reactor Site Applications On or After [Effective Date of the Final Rule]

§ 100.20 Factors to be considered when evaluating sites.

The Commission will take the following factors into consideration in determining the acceptability of a site for a stationary power reactor:

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[1] The fission product release assumed for these calculations should be based upon a major accident, hypothesized for purposes of site analysis or postulated from considerations of possible accidental events, that would result in potential hazards not exceeded by those from any accident considered credible. Such accidents have generally been assumed to result in substantial meltdown of the core with subsequent release of appreciable quantities of fission products.

[2] The whole body dose of 25 rem referred to above corresponds numerically to the once in a lifetime accidental or emergency dose for radiation workers which, according to NCRP recommendations may be disregarded in the determination of their radiation exposure status (see NBS Handbook 69 dated June 5, 1959). However, neither its use nor that of the 300 rem value for thyroid exposure as set forth in these site criteria guides are intended to imply that these numbers constitute acceptable limits for emergency doses to the public under accident conditions. Rather, this 25 rem whole body value and the 300 rem thyroid value have been set forth in these guides as reference values, which can be used in the evaluation of reactor sites with respect to potential reactor accidents of exceedingly low probability of occurrence, and low risk of public exposure to radiation.

(a) Population density and use characteristics of the site environs, including the exclusion area, the population distribution, and site-related characteristics must be evaluated to determine whether individual as well as societal risk of potential plant accidents is low, and that site-related characteristics would not prevent the development of a plan to carry out suitable protective actions for members of the public in the event of emergency.

(b) The nature and proximity of man-related hazards (e.g., airports, dams, transportation routes, military and chemical facilities) must be evaluated to determine whether the plant design can accommodate commonly occurring hazards, and whether the risk of other hazards is very low.

(c) Physical characteristics of the site, including seismology, meteorology, geology, and hydrology.

(1) Appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or After [EFFECTIVE DATE OF THE FINAL RULE]," describes the criteria and nature of investigations required to obtain the geologic and seismic data necessary to determine site suitability.

(2) Meteorological characteristics of the site that are necessary for safety analysis or that may have an impact upon plant design (such as maximum probable wind speed and precipitation) must be identified and characterized.

(3) Factors important to hydrological radionuclide transport (such as soil, sediment, and rock characteristics, adsorption and retention coefficients, ground water velocity, and distances to the nearest surface body of water) must be obtained from on-site measurements. The maximum probable flood along with the potential for seismic induced floods discussed in Appendix B must be estimated using historical data.

§ 100.21 Determination of exclusion area and population distribution.

(a) Each reactor facility must have an exclusion area, as defined in § 100.3(a) of this part.

(1) For sites with a single reactor facility, the distance to the exclusion area boundary at any point (as measured from the reactor center point) shall be at least 0.4 miles (640 meters).

(2) For sites with multiple reactor facilities, consideration must be given to the following: If the reactors are independent to the extent that an accident in one reactor would not initiate an accident in another, the size of each exclusion area must be determined with respect to each reactor individually. The exclusion area for the site must then be taken as the plan overlay of the sum of the exclusion areas for each reactor. If the reactors are interconnected to the extent that an accident in one reactor would initiate an accident in another, the size of the exclusion area for each reactor must be determined on a case by case basis.

(b)(1) If the offsite population density at the proposed site exceeds the values given in paragraph (b)(2) of this section, the site will not be approved by the Commission unless the applicant demonstrates either:

(i) That there are no reasonably available alternative sites with significantly lower population densities, or

(ii) That the proposed site is preferred over an alternative site with significantly lower population density on the basis of other considerations.

(2) The population density, including weighted transient population, projected at the time of initial site approval or early site permit renewal should not exceed 500 people per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the total circular area at that distance). The projected population density, including weighted transient population, 40 years after the time of initial site approval or early site permit renewal should not exceed 1000 people per square mile averaged over any radial distance out to 30 miles.

(3) Transient population must be included for those sites where a significant number of people (other than those just passing through the area) work, reside part-time, or engage in recreational activities and are not permanent residents of the area. The transient population should be considered for siting purposes by weighting the transient population according to the fraction of the time the transients are in the area.

(c) Physical characteristics of the proposed site, such as egress limitations from the area surrounding the site, that could pose a significant impediment to the development of emergency plans, must be identified.

§ 100.22 Evaluation of potential man-related hazards.

(a) Potential hazards to the plant from man-related activities associated with nearby transportation routes, military, and industrial facilities must be identified and their potential effects evaluated. Potential hazards to the plant include such effects as explosions, fires, toxic and/or flammable chemical releases, dams (both upstream and downstream), pipeline accidents, and aircraft crashes and impacts.

(b) The effects of offsite hazards must have a very low probability of affecting the safety of the plant. The likelihood and consequences of offsite hazards must be estimated using data and assumptions that are as realistic and representative of the site as is practical. The design bases for which the plant is designed must be specified.

21. Appendix B to part 100 is added to read as follows:

Appendix B to Part 100—Criteria for the Seismic and Geologic Siting of Nuclear Power Plants On or After [Effective Date of the Final Rule]

General Information

This appendix applies to applicants who apply for an early site permit or combined license pursuant to part 52 of this chapter, or a construction permit or operating license pursuant to part 50 of this chapter on or after [EFFECTIVE DATE OF THE FINAL RULE]. However, if the construction permit was issued prior to [EFFECTIVE DATE OF THE FINAL RULE], the operating license applicant shall comply with the seismic and geologic siting criteria in Appendix A to Part 100 of this chapter.

I. Purpose

General Design Criterion 2 of appendix A to part 50 of this chapter requires that nuclear power plant structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. It is the purpose of these criteria to set forth the principal seismic and geologic considerations that guide the Commission in its evaluation of the suitability of proposed sites for nuclear power plants and the suitability of the plant design bases established in consideration of the seismic and geologic characteristics of the proposed sites.[1]

These criteria are based on the current geophysical, geological, and seismological information concerning faults and earthquake occurrences and effects. They will be revised as necessary when more complete information becomes available.

II. Scope

These criteria, which apply to nuclear power plants, describe the nature of the investigations required to obtain the geologic and seismic data necessary to determine site suitability and provide reasonable assurance that a nuclear power plant can be constructed and operated at a proposed site without undue risk to the health and safety of the public. Geologic and seismic factors required to be taken into account in the siting and design of nuclear power plants are identified.

[1] Considerations presented in this regulation are general. Acceptable methods and additional discussion are provided in regulatory guides and standard review plan sections.

The investigations described in this appendix are within the scope of investigations permitted by § 50.10(c)(1) of this chapter.

Each applicant for a construction permit, operating license, early site permit, or combined license shall investigate all seismic and geologic factors that may affect the design and operation of the proposed nuclear power plant irrespective of whether such factors are explicitly included in these criteria. Both deterministic and probabilistic evaluations must be conducted to determine site suitability and seismic design requirements for the site. Additional investigations or more conservative determinations than those included in these criteria may be required for sites located in areas with complex geology, recent tectonic deformation, or in areas of high seismicity. If an applicant believes that the particular seismic and geologic characteristics of a site indicate that some of these criteria, or portions thereof, need not be satisfied, the applicant shall identify the specific sections of these criteria in the license application and present supporting data to clearly justify such departures. The Director, Office of Nuclear Reactor Regulation approves any deviations.

III. Definitions

As used in these criteria:

A *capable tectonic source* is a tectonic structure that can generate both earthquakes and tectonic surface deformation such as faulting or folding at or near the surface in the present seismotectonic regime. It is characterized by at least one of the following characteristics:

(1) The presence of surface or near-surface deformation of landforms or geologic deposits of recurring nature within the last approximately 500,000 years or at least once in the last approximately 50,000 years.

(2) A reasonable association with one or more large earthquakes or sustained earthquake activity that is usually accompanied by significant surface deformation.

(3) A structural association with a capable tectonic source having characteristics in paragraph III (1) of this definition so that movement on one could be reasonably expected to be accompanied by movement on the other.

In some cases, the geologic evidence of past activity at or near the ground surface along a particular capable tectonic source may be obscured at a particular site. This might occur, for example, at a site having a deep overburden. For these cases, evidence may exist elsewhere along the structure from which an evaluation of its characteristics in the vicinity of the site can be reasonably based. This evidence must be used in determining whether the structure is a capable tectonic source within this definition.

Notwithstanding paragraph (1), (2) and (3) of this definition, structural association of a structure with geologic structural features that are geologically old (at least pre-Quaternary) such as many of those found in the Eastern region of the United States must, in the absence of conflicting evidence, demonstrate that the structure is not a capable tectonic source within this definition.

Combined license means a combined construction permit and operating license with conditions for a nuclear power facility issued pursuant to subpart C of part 52 of this chapter.

A *deterministic source earthquake (DSE)* is the largest earthquake that can reasonably be expected to occur in a given seismic source in the current tectonic regime, and is to be used in a deterministic analysis. It is generally based on the maximum historical earthquake associated with that seismic source, unless recent geological evidence warrants a larger earthquake, or where the rate of occurrence of earthquakes indicates the likelihood of larger than the largest historical event.

Early Site Permit means a Commission approval, issued pursuant to subpart A of part 52 of this chapter, for a site or sites for one or more nuclear power facilities.

A *fault* is a tectonic structure along which differential slippage of the adjacent earth materials has occurred parallel to the fracture plane. A fault may have gouge or breccia between its two walls and includes any associated monoclinal flexure or other similar geologic structural feature.

The *magnitude* of an earthquake is a measure of the size of an earthquake and is related to the energy released in the form of seismic waves. Magnitude means the numerical value on a standardized scale such as, but not limited to, Moment Magnitude, Surface Wave Magnitude, Body Wave Magnitude, or Richter Magnitude scales.

A *response spectrum* is a plot of the maximum responses (acceleration, velocity, or displacement) of a family of idealized single-degree-of-freedom oscillators as a function of the natural frequencies of the oscillators for a given damping value. The response spectrum is calculated for a specified vibratory motion input at the oscillators' supports.

The *Safe Shutdown Earthquake Ground Motion (SSE)* is the vibratory ground motion for which certain structures, systems, and components must be designed to remain functional.

A *seismic source* is a general term referring to both seismogenic sources and capable tectonic sources.

A *seismogenic source* is a portion of the earth that has uniform earthquake potential (same deterministic source earthquake and frequency of recurrence) distinct from the surrounding area. A seismogenic source will not cause surface displacements. Seismogenic sources cover a wide range of possibilities from a well-defined tectonic structure to simply a large region of diffuse seismicity (seismotectonic province) thought to be characterized by the same earthquake recurrence model. A seismogenic source is also characterized by its involvement in the current tectonic regime as reflected in the Quaternary (approximately the last 2 million years) geologic history.

Surface deformation is distortion of soils or rocks at or near the ground surface by the processes of folding, faulting, compression, or extension as a result of various earth forces. Tectonic surface deformation is associated with earthquake processes.

Surface faulting is differential ground displacement at or near the surface caused directly by fault movement and is distinct from nontectonic types of ground disruptions, such as landslides, fissures, and craters.

IV. Required Investigations

The geological, seismological, and engineering characteristics of a site and its environs must be investigated in sufficient scope and detail to permit an adequate evaluation of the proposed site, to provide sufficient information to support both probabilistic and deterministic evaluations required by these criteria, and to permit adequate engineering solutions to actual or potential geologic and seismic effects at the proposed site. The size of the region to be investigated and the type of data pertinent to the investigations must be determined by the nature of the region surrounding the proposed site. The investigations must be carried out by a review of the pertinent literature and field investigations as identified in paragraph IV (a) through (e) of this appendix.

(a) Vibratory Ground Motion.

The purpose of these investigations is to obtain information needed to assess the Safe Shutdown Earthquake ground motion. The seismic sources (capable tectonic sources and seismogenic sources) in the site region must be identified and evaluated. The deterministic source earthquakes must be evaluated for each seismic source.

(b) Tectonic Surface Deformation.

The purpose of these investigations is to assess the potential for tectonic surface deformation near the site and, if any, to what extent the nuclear power plant needs to be designed for these occurrences.

(c) Nontectonic Deformation.

The purpose of these investigations is to assess the potential for surface deformations not directly attributable to tectonics, such as those associated with subsidence or collapse as in karst terrain, glacially induced offsets, and growth faulting. Paragraph IV(b) concerns investigations required for tectonic surface deformation that can occur coseismically. Nontectonic phenomena can represent significant surface displacement hazards to a site, but can in many cases be monitored, controlled, or mitigated by engineering, or it can be demonstrated that conditions that were the cause of the displacements no longer exist. Geological and geophysical investigations must be carried out to identify and define nontectonic deformation features and, where possible, distinguish them from tectonic surface displacements. If such distinction is not possible, the questionable features must be treated as tectonic deformation.

(d) Seismically Induced Floods and Water Waves.

The purpose of these investigations is to assess the potential for nearby and distant tsunamis and other waves that could affect coastal sites. Included in this assessment is the determination of the potential for slides of earth material that could generate waves. Information regarding distant and locally generated waves or tsunamis that have affected the site, and available evidence of runup and drawdown associated with these events, shall be analyzed. Local features of coastal or underwater topography which could

modify wave runup or drawdown must be considered. For sites located near lakes or rivers, analyses must include the potential for seismically induced floods or water waves, as, for example, from the failure during an earthquake of a dam upstream or from slides of earth or debris into a nearby lake.

(e) Volcanic Activity.

The purpose of these investigations is to assess the potential volcanic hazards that would adversely affect the site.

V. Seismic and Geologic Design Bases

(a) Determination of Deterministic Source Earthquakes.

For each seismogenic and capable tectonic source identified in paragraph IV(a), the deterministic source earthquake must be evaluated. At a minimum, the deterministic source earthquake must be the largest historical earthquake in each source. The uncertainty in determining the deterministic source earthquakes must be accounted for in the probabilistic analysis.

(b) Determination of the Ground Motion at the Site.

The ground motion at the site must be estimated from all earthquakes, including the deterministic source earthquake associated with each source, which could potentially affect the site using both probabilistic and deterministic approaches. In the deterministic approach, the deterministic source earthquake associated with each source must be assumed to occur at the part of the source which is closest to the site. Appropriate models, including local site conditions, must be used to account for uncertainty in estimating the ground motion for the site. The ground motion is defined by both horizontal and vertical free-field ground motion response spectra the free ground surface or hypothetical rock outcrop, as appropriate.

(c) Determination of Safe Shutdown Earthquake Ground Motion.

The Safe Shutdown Earthquake Ground Motion is characterized by free-field ground motion response spectra at the free ground surface or hypothetical rock outcrop, as appropriate. These spectra are developed from or compared to the ground motions determined in paragraph V(b). Deterministic and probabilistic seismic hazard evaluations must be used to assess the adequacy of the Safe Shutdown Earthquake Ground Motion. 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.

At a minimum, the horizontal Safe Shutdown Earthquake Ground Motion at the foundation level of the structures must be an appropriate response spectrum with a peak ground acceleration of at least 0.1g.

(d) Determination of Need To Design for Surface Tectonic and Nontectonic Deformations.

Sufficient geological, seismological, and geophysical data must be provided to clearly establish that surface deformation need not be taken into account in the design of a nuclear power plant. When surface deformation is likely, an assessment of the extent and nature of surface deformations must be characterized.

(e) Determination of Design Bases for Seismically Induced Floods and Water Waves.

The size of seismically induced floods and water waves that could affect a site from either locally or distantly generated seismic activity must be determined, taking into consideration that results of the investigation required by paragraph IV (d) of this appendix.

(f) Determination of Other Design Conditions.

(1) Soil Stability. Vibratory ground motions determined in paragraph V(b) can cause soil instability from ground disruption such as fissuring, lateral spreads, differential settlement, and liquefaction, which is not directly related to surface faulting. Geological features that could affect the foundations of the proposed nuclear power plant structures must be evaluated, taking into account the information concerning the physical properties of materials underlying the site and the effects of the vibratory ground motion determined in paragraph V(b).

(2) Slope stability. Stability of all slopes, both natural and artificial, must be considered, the failure of which could adversely affect the nuclear power plant. An assessment must be made of the potential effects of erosion or deposition and of combinations of erosion or deposition with seismic activity, taking into account information concerning the physical properties of the materials underlying the site and the effects of the vibratory ground motion determined in paragraph V(b).

(3) Cooling water supply. Assurance of an adequate cooling water supply for emergency and long-term shutdown decay heat removal shall be considered in the design of the nuclear power plant, taking into account information concerning the physical properties of the materials underlying the site, the effects of the Safe Shutdown Earthquake Ground Motion, and the design basis for tectonic and nontectonic surface deformation. Consideration of river blockage or diversion or other failures that may block the flow of cooling water, coastal uplift or subsidence, tsunami runup and drawdown, and the failure of dams and intake structures must be included in the evaluation where appropriate.

(4) Distant structures. Those structures that are not located in the immediate vicinity of the site but are safety-related must be designed to withstand the effect of the Safe Shutdown Earthquake Ground Motion. The design basis for surface faulting must be determined on a basis comparable to that of the nuclear power plant, taking into account the material underlying the structures and the different location with respect to that of the site.

VI. Application To Engineering Design

Pursuant to the seismic and geologic design basis requirements of paragraphs V(a) through (f), applications to engineering design are contained in Appendix S to part 50 of this chapter for the following areas:

(a) Vibratory ground motion.

(1) Safe Shutdown Earthquake Ground Motion (SSE).

(2) Operating Basis Earthquake Ground Motion (OBE).

(3) Required Plant Shutdown.

(4) Required Seismic Instrumentation.

(b) Surface Deformation

(c) Seismically Induced Floods and Water Waves and Other Design Conditions.

Dated at Rockville, Maryland, this 13th day of October 1992.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

[FR Doc. 92-25240 Filed 10-19-92; 8:45 am]

BILLING CODE 7590-01-M

COMMODITY FUTURES TRADING COMMISSION

17 CFR Part 4

Commodity Pool Operators; Exclusion for Certain Otherwise Regulated Persons From the Definition of the Term "Commodity Pool Operator"

AGENCY: Commodity Futures Trading Commission.

ACTION: Proposed Rulemaking.

SUMMARY: The Commodity Futures Trading Commission ("Commission" or "CFTC") is proposing to amend Regulation 4.5 which excludes certain otherwise regulated persons from the definition of the term "commodity pool operator" ("CPO"). The rule currently permits such persons to maintain this exclusion to the extent that, *inter alia*, (1) the commodity futures or option positions which they assume are either bona fide hedging positions or long positions which are "incidental to a qualifying entity's activities in the underlying cash market" and (2) the aggregate initial margins and premiums for all such positions does not exceed five percent of the fair market value of the entity's assets. The Commission proposes to permit the assumption of commodity futures and option positions that are neither hedging nor "incidental" to the extent that the market exposure attained through such positions does not predominate a qualifying entity's overall market exposure. The Commission also proposes to (1) remove the current restriction that permits assumption of only *long* non-hedging positions and (2) modify the five percent margin/premium limitation to exclude margins on bona fide hedging positions from computation of the five percent.

DATES: Comments must be received by December 4, 1992.

ADDRESSES: Comments should be sent to the Commodity Futures Trading Commission, 2033 K Street, NW.,

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REGULATORY RESEARCH

DRAFT REGULATORY GUIDE

November 1992
Division 1
Draft DG-4003

Contact: L. Soffer (301)492-3916

DRAFT REGULATORY GUIDE DG-4003

(Proposed Revision 2 to Regulatory Guide 4.7)

GENERAL SITE SUITABILITY CRITERIA FOR NUCLEAR POWER STATIONS

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received complete staff review and does not represent an official NRC staff position.

Public comments are being solicited on the draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Regulatory Publications Branch, DFIPS, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Comments will be most helpful if received by March 24, 1993.

Requests for single copies of draft guides (which may be reproduced) or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Office of Administration, Distribution and Mail Services Section.

TABLE OF CONTENTS

A. INTRODUCTION

The Energy Reorganization Act of 1974 places on the Nuclear Regulatory Commission (NRC) the responsibility for the licensing and regulation of private nuclear facilities from the standpoint of public health and safety. Title 10, Part 100, "Reactor Site Criteria," of the Code of Federal Regulations requires that the population density; use of the site environs, including proximity to man-made hazards; and the physical characteristics of the site, including seismology, meteorology, geology, and hydrology, be taken into account in determining the acceptability of a site for a nuclear power reactor. Seismic and geologic site criteria for nuclear power plants are provided in Appendix A and Appendix B to 10 CFR Part 100. Appendix A to 10 CFR Part 50 establishes the minimum requirements for the principal design criteria for water-cooled 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.

The National Environmental Policy Act of 1969 (NEPA) (83 Stat. 852), implemented by Executive Order 11514 and the Council on Environmental Quality's Guidelines of August 1, 1973 (38 FR 20550), requires that all agencies of the Federal Government prepare detailed environmental statements on proposed major Federal actions that can significantly affect the quality of the human environment. A principal objective of NEPA is to require the Federal agency to consider, in its decision-making process, the environmental impacts of each proposed major action and the available alternative actions, including alternative sites.

Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," of Title 10, Code of Federal Regulations, sets forth the Nuclear Regulatory Commission's policy and procedures for the preparation and processing of environmental impact statements and related documents pursuant to Section 102(2)(C) of the NEPA.

The limitations on the Commission's authority and responsibility pursuant to the NEPA imposed by the Federal Water Pollution Control Act (86 Stat. 916) are addressed in an Interim Policy Statement published in the Federal Register on January 29, 1973 (38 FR 2679).

This guide discusses the major site characteristics related to public [illegible] safety and environmental issues that the NRC staff considers in determining the suitability of sites for light-water-cooled (LWR) nuclear

power stations.* The guidelines may be used by applicants in identifying suitable candidate sites for nuclear power stations. The decision that a station may be built on a specific candidate site is based on a detailed evaluation of the proposed site and a cost-benefit analysis comparing it with alternative sites as discussed in Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations."

Chapter 9 of Regulatory Guide 4.2 discusses the selection of a site from among alternative sites. Although it is recognized that planning methods** will differ among applicants, Chapter 9 states that the applicant should present its site selection process as the consequence of an analysis of alternatives whose environmental costs and benefits were evaluated and compared and then weighed against those of the proposed site.

This guide is intended to assist applicants in the initial stage of selecting potential sites for a nuclear power station. Each site that appears to be compatible with the general criteria discussed in this guide will have to be examined in greater detail before it can be considered to be a "candidate" site, i.e., one of the group of sites that are to be considered in selecting a "proposed" or "preferred" site.***

This guide should be used only in the initial stage of site selection because it does not provide detailed guidance on the various relevant factors and format for ranking the relative suitability or desirability of possible sites. This guide provides a general set of safety and environmental criteria which the NRC staff has found to be valuable in assessing candidate site identification in specific licensing cases.

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*For the purposes of this guide, nuclear power station refers to the nuclear reactor unit(s), nuclear steam supply, electric generating units, auxiliary systems, including the cooling system and structures such as docks that are located on a given site, and any new electrical transmission towers and lines erected in connection with the facilities.

**Site selection methodologies that have been used by the nuclear power industry are described in "Nuclear Power Plant Siting, A Generalized Process," Atomic Industrial Forum, August 1974, National Environmental Studies Project, R-1578.

***See Chapter 9 of Regulatory Guide 4.2 for a discussion of site selection procedures. The "proposed" site submitted by an applicant for a construction permit is that site chosen from a number of "candidate" sites that the applicant prefers and on which the applicant proposes to construct a nuclear power station.

The information needed to evaluate potential sites at this initial stage of site selection is assumed to be limited to that information which may be obtained from published reports, public records, public and private agencies, and individuals knowledgeable about the locality of a potential site. Although in some cases the applicants may have conducted on-the-spot investigations, it is assumed here that these investigations would be limited to reconnaissance-type surveys at this stage in the site selection process.

The safety issues discussed include geologic/seismic, hydrologic, and meteorological characteristics of proposed sites; potential effects on a 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. The environmental issues discussed concern potential impacts from the construction and operation of nuclear power stations on ecological systems, water use, land use, the atmosphere, aesthetics, and socioeconomics.

This guide does not discuss details of the engineering designs required to ensure the compatibility of the nuclear station and the site or the detailed information required for the preparation of the safety analysis and environmental reports. In addition, nuclear power reactor site suitability as it may be affected by the Commission's materials safeguards and plant protection requirements for nuclear power plants is not addressed in this guide.

Guidance concerning the siting of offshore nuclear stations, high temperature gas-cooled (HTGR), liquid metal fast breeder reactors (LMFBR), test reactors, and advanced siting concepts such as underground sites and nuclear energy centers is not included in this guide.

A significant commitment of time and resources may be required to select a suitable site for a nuclear power station, including safety and environmental considerations. Site selection involves considerations of public health and safety, engineering and design, economics, institutional requirements, environmental impacts, and other factors. The potential impacts of the construction and operation of nuclear power stations on the physical and

biological environment and on social, cultural, and economic features* are usually similar to the potential impacts of any major industrial facility. The safety requirements are primary determinants of the suitability of a site for nuclear power stations, but considerations of environmental impacts and public acceptance of nuclear power stations are also important and need to be evaluated.

In the site selection process, coordination between applicants for nuclear power stations and various Federal, State, and local agencies will be useful in identifying potential problem areas.

Appendices A and B of this guide summarize the important safety-related and environmental considerations for assessing the site suitability of nuclear power stations.

B. DISCUSSION

1. GEOLOGY/SEISMOLOGY

Nuclear power stations must be designed to prevent the loss of safety-related functions. 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. Criteria that describe the nature of the investigations required to obtain the geologic and seismic data necessary to determine site suitability are provided by Appendix B, "Criteria for the Seismic and Geological Siting of Nuclear Power Plants on or after [EFFECTIVE DATE OF THIS REGULATION]" to 10 CFR Part 100. Safety-related site characteristics are identified in Section 2.5 of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)," and Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants." In addition to geologic and

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*Biological and physical environment includes geology, geomorphology, surface and ground-water hydrology, climatology, air quality, limnology, water quality, fisheries, wildlife, and vegetation. Social and cultural features include scenic resources, recreation resources, archeological/historical resources, and community resources including land use patterns. From "Development and the Environment: Legal Reforms to Facilitate Industrial Site Selection," final report by the Committee on Environmental Law, American Bar Association, February 1974.

seismic evaluation for assessing seismically induced flooding potential, Section 2.4 of Regulatory Guide 1.70 and Regulatory Guide 1.59 describe hydrologic criteria, including coincident flood events that should be considered.

2. ATMOSPHERIC EXTREMES AND DISPERSION

The potential effect of natural atmospheric extremes (e.g., tornadoes* and exceptional icing conditions**) on the safety-related structures of a nuclear station must be considered. However, the 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.

The atmospheric characteristics at a site are an important consideration in evaluating the dispersion of radioactive effluents both from postulated

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*Refer to Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants."

**Refer to Section 2.4.7 of Regulatory Guide 1.70.

accidents and from routine releases in gaseous effluents.* In addition to meeting the NRC requirements for the dispersion of airborne radioactive material, the station must meet State and Federal requirements of the Clean Air Amendments of 1970 (PL 91-604). This is unlikely to be an important consideration for nuclear power station siting unless (1) a site is in an area where existing air quality is near or exceeds the limits set under the Clean Air Amendments, (2) there is a potential for interaction of the cooling system plume with a plume containing noxious or toxic substances from a nearby facility, or (3) the auxiliary generators are operating.

The atmospheric data necessary for adequate assessment of the potential dispersion of radioactive material from design basis accidents are described in Regulatory Guide 1.23, "Onsite Meteorological Programs." Models and assumptions used for evaluating the potential radiological consequences of certain postulated accidents are provided in Regulatory Guides 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors"; 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors"; 1.5, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for

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*Routine releases of airborne radioactive material must be kept "as low as is reasonably achievable." [See 10 CFR 20.1101.]

The proposed Section 50.34a of 10 CFR Part 50 would set forth the requirements for design objectives for equipment to control releases of radioactive material in effluents from nuclear power reactors.

Section 50.36a further provides that, in order to keep power reactor effluent releases as low as practicable, each license authorizing operation of such a facility will include technical specifications regarding the establishment of effluent control equipment and reporting of actual releases.

Appendix I to 10 CFR Part 50, promulgated May 5, 1975 (40 FR 19439), provides numerical guidance for design objectives and technical specification requirements for limiting conditions of operation for light-water-cooled nuclear power plants.

The following regulatory guides were prepared to assist in application of the numerical guidance in Appendix I:

1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I";

1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors";

1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors";

1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I."

Boiling Water Reactors"; 1.24, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure"; and 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors." However, the atmospheric assumptions in the guides may not be appropriate for sites with unusual atmospheric conditions.

In the evaluation of potential sites, onsite atmospheric reconnaissance can determine if the atmospheric conditions at a site are adequately represented by the available atmospheric data for the area. Canyons or deep valleys frequently have atmospheric variables that are substantially different from those variables measured for the general region. Other topographical features such as hills, mountain ranges, and lake or ocean shorelines can affect the local atmospheric conditions at a site and may cause the dispersion characteristics at the site to be less favorable than those in the general area or region. More stringent design or effluent objectives may be required in such cases.

While it is the concentration of radioactivity in the atmosphere at any distance from the point of release, $\chi(Ci/m^3)$, that must be controlled, the ratio χ/Q, where Q(Ci/sec) is the rate of release of radioactivity from the source, has become a commonly evaluated term because it depends only on atmospheric variables and distance from the source.

If under assumed unfavorable atmospheric conditions (see Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants") the dispersion of radioactivity released following a design basis accident is insufficient at the boundary of the exclusion area (see the following section, "Population Considerations") and the outer boundary of the low population zone, the plant design would not satisfy the requirements of 10 CFR Part 50.34(a)(1). Thus, the design of the station would be required to include appropriate and adequate compensating engineered safety features. In addition, meteorological conditions are to be determined for use in the environmental report required in 10 CFR Part 51 and for comparison to the meteorology assumed in the Probabilistic Risk Assessment (PRA) for a certified plant design (if such a design is to located at the site) or used in the site-specific PRA for a custom plant at the site.

Local fogging and icing can result from plumes discharged into the atmosphere from cooling towers, lakes, canals, or spray ponds, but can generally be acceptably mitigated by station design and operational practices. However, some sites have the potential for severe fogging or icing because of local atmospheric conditions. For example, areas of unusually high moisture content that are protected from large-scale airflow patterns are most likely to experience these conditions. The impacts are generally of greatest potential importance relative to transportation or electrical transmission corridors in the vicinity of a site.

A cooling system designed with special consideration for reducing drift may be required because of the sensitivity of the natural vegetation or the crops in the vicinity of the site to damage from airborne salt particles. The vulnerability of existing industries or other facilities in the vicinity of the site to corrosion by drift from cooling tower or spray system drift should be considered. Not only are the amount, direction, and distance of the drift from the cooling system important, but the salt concentration above the natural background salt deposition at the site is also important in assessing drift effects. None of these considerations are critical in evaluating the suitability of a site, but they could result in special cooling system design requirements or in the need for a larger site to confine the effects of drift within the site boundary. The environmental effects of salt drift are most severe where saline water or water with high mineral content is used for condenser cooling.

Cooling towers produce cloudlike plumes that vary in size and altitude depending on the atmospheric conditions. The plumes are often a few miles in length before becoming dissipated, but the plumes themselves or their shadows could have aesthetic impacts. Visible plumes emitted from cooling towers in the vicinity of airports could cause a hazard to aviation.

3. POPULATION CONSIDERATIONS

A reactor licensee is required by 10 CFR Part 100 to designate an exclusion area and to have authority to determine all activities within that area, including removal of personnel and property. In selecting a site for a nuclear power station, it is necessary to provide for an exclusion area in which the applicant has such authority. Transportation corridors such as highways, railroads, and waterways are permitted to traverse the exclusion

area provided (1) these are not so close to the facility as to interfere with normal operation of the facility and (2) appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway in the case of emergency to protect the public health and safety.

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 applicant should give special attention to alternative sites.

4. HYDROLOGY

4.1 Flooding

Criteria for evaluation of seismically induced floods are provided in Appendix B to 10 CFR Part 100. Regulatory Guide 1.59 describes an acceptable method of determining the design basis floods for sites along streams or rivers and discusses the phenomena producing comparable design basis floods for coastal, estuary, and Great Lakes sites. The effects of a probable maximum flood (as defined in Regulatory Guide 1.59), seiche, surge, or seismically induced flood such as might be caused by dam failures or tsunami on station safety functions can generally be controlled by engineering design or protection of the safety-related structures, systems, and components that are identified in Regulatory Guide 1.29, "Seismic Design Classification." For some river valleys, flood plains, or areas along coastlines, there may not be sufficient information to make the evaluations needed to satisfy the criteria for seismically induced flooding. In such cases, study of the potential for dam failure, river blockage, or diversion in the river system or distantly and locally generated sea waves may be needed to determine the suitability of a site. In lieu of detailed investigations, Regulatory Guide 1.59 and Section 2.4 of Regulatory Guide 1.70 present acceptable analytical techniques for evaluating seismically induced flooding.

4.2 Water Availability

Nuclear power stations require reliable sources of water for steam condensation, service water, emergency core cooling system, and other functions. In regions where water is in short supply, the recirculation of the hot cooling water through cooling towers, artificial ponds, or impoundments has been practiced.

Essential water requirements for nuclear power plants are that sufficient water be available for cooling during plant operation and normal shutdown, for the ultimate heat sink,* and for fire protection. The limitations imposed by existing laws or allocation policies govern the use and consumption of cooling water at potential sites** for normal operation. Regulatory Guide 1.27 discusses the safety requirements. Consumptive use of water may necessitate an evaluation of existing and future water uses in the area to ensure adequate water supply during droughts both for station operation and other water users (i.e., nuclear power station requirements versus public water supply). Regulatory agencies should be consulted to avoid potential conflicts.

Where required by applicable law, demonstration of a request for certification of the rights to withdraw or consume water and an indication that the request is consistent with appropriate State and regional programs and policies should be provided as part of the application for a construction permit or operating license.

The availability of essential water during periods of low flow or low water level is an important initial consideration for identifying potential sites on rivers, small shallow lakes, or along coastlines. Both the frequency and duration of low flow or low-level periods should be determined from the historical record and, if the cooling water is to be drawn from impoundments, from projected operating practices.

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*Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants," provides guidance on water supply for the ultimate heat sink.

**To the extent that site selection is dependent on water diversions for consumptive use, allocation of water supply is a function of State statutory and administrative procedures.

4.3 Water Quality

Thermal and chemical effluents discharged to navigable streams are governed by the Federal Water Pollution Control Act (FWPCA, PL 92-500), 40 CFR Part 122, 40 CFR Part 423, and State water quality standards. The applicant should also determine other regulations that are current at the time sites are under consideration. Section 401(a)(1) of the FWPCA requires, in part, that any applicant for an NRC construction permit or combined license (combined construction permit and operating license) for a nuclear power station provide to the NRC certification from the State that any discharge will comply with applicable effluent limitations and other water pollution control requirements. In the absence of such certification, no construction permit or combined license can be issued by NRC unless the requirement is waived by the State or the State fails to act within a reasonable period of time. A National Pollution Discharge Elimination System (NPDES) permit to discharge effluents to navigable streams pursuant to Section 402 of the FWPCA may be required for a nuclear power station to operate in compliance with the Act, but is not a prerequisite to an NRC construction permit or operating license.

Evaluations of the dispersion and dilution capabilities and potential contamination pathways of the ground-water environment under operating and accident conditions with respect to present and future users are required. Potential radiological and nonradiological contaminants of ground water should be evaluated. The suitability of sites for a specific plant design in areas with a complex ground-water hydrology or of sites located over aquifers that are or may be used by large populations for domestic or industrial water supplies or for irrigation water can only be determined after reliable assessments have been made of the potential impacts of the reactor plants on the ground water. Accordingly, in 10 CFR Part 100, Subpart B requires that site environmental characteristics, which include hydrological and meteorological characteristics, be characterized and used in or compared to those characteristics used in the plant PRA and environmental analysis.

Although management of the quality of surface waters is important, water quality per se is not a determining factor in assessing the suitability of a site since adequate design alternatives can generally be developed to meet the requirements of the Federal Water Pollution Control Act and the Commission's regulations implementing NEPA. However, the environmental characteristics or the complexity of the environment at a site and its vicinity may be such that

it would be difficult to obtain or develop sufficient information to establish, in a timely manner, that the potential environmental impacts on water quality would be acceptable. Examples of situations that could pose unusual impact assessment or design problems are areas of existing marginal water quality, small bays, estuaries, stratified waters, and sites that would require intake from and discharge to waters of markedly different quality, such as intake of marine water and discharge to an estuary.

The following are examples of potential environmental effects of station construction and operation that must be assessed: physical and chemical environmental alterations in habitats of important species, including plant-induced rapid changes in environmental conditions; changes in normal current direction or velocity of the cooling water source and receiving water; scouring and siltation resulting from construction and cooling water intake and discharge; alterations resulting from dredging and spoil disposal; and interference with shoreline processes.

5. ECOLOGICAL SYSTEMS AND BIOTA

Areas of great importance to the local aquatic ecosystem may present major difficulties in assessing potential impacts on populations of important species or ecological systems. Such areas include those used for breeding (e.g., nesting and spawning), wintering, and feeding, as well as areas where there may be seasonally high concentrations of individuals of important

species.* Where the ecological sensitivity of a site under consideration cannot be established from existing information, more detailed studies, as discussed in Regulatory Guide 4.2, may be necessary. Impacts of station construction and operation on the biota and ecological systems may be mitigated by design and operational practices if justifiable relative to costs and benefits. In general, the important considerations in the balancing of costs and benefits are (1) the uniqueness of a habitat or ecological system within the region under consideration and (2) the amount of habitat or ecological system that would be destroyed or disrupted relative to the total amount of the habitat or ecological system present in the region or the vulnerability of the reproductive capacity of important species populations to the effects of construction and operation of the plant and ancillary facilities.

The alteration of one or more of the existing environmental conditions may render a habitat unsuitable as a breeding or nursery area. In some cases, organisms use identical breeding and nursery areas each year; if the characteristics of the areas are changed, breeding success may be substantially reduced or enhanced. Destruction of part or all of a breeding or nursery area may cause population shifts that result in increased competition for the remaining suitable areas. Such population shifts cannot compensate for the reduced size of the breeding or nursery areas if the remaining suitable area is already occupied by the species. Some species will desert a breeding area

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*A species, whether animal or plant, is important (for the purpose of this guide) if a specific causal link can be identified between the nuclear power station and the species and if one or more of the following criteria applies:
(1) If the species in commercially or recreationally valuable,
(2) If the species is endangered or threatened,
(3) If the species affects the well-being of some important species within criteria (1) or (2) or if it is critical to the structure and function of a valuable ecological system or is a biological indicator of radionuclides in the environment.

Endangered and threatened species are defined by PL 93-205, the Endangered Species Act of 1973, as follows: "The term 'endangered species' means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man." "The term 'threatened species' means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Lists of endangered and threatened species are published periodically in the Federal Register by the Secretary of the Interior.

because of man's activities in the proximity to the area, even in the absence of physical disturbance of the actual breeding area.

Of special concern relative to site selection are those unique or especially rich feeding areas that might be destroyed, degraded, or made inaccessible to important species by station construction or operation. Evaluation of feeding areas in relation to potential construction or operation impacts includes the following considerations: size of the feeding area onsite in relation to the total feeding area offsite, food density, time of use, location in relation to other habitats, topography relative to access routes, and other factors (including human activities). Site modification may reduce the quality of feeding areas by destruction of a portion of the food base, destruction of cover, or both.

Construction and operation of nuclear power stations can create barriers to migration, occurring mainly in the aquatic environment. Narrow zones of passage for migratory animals in some rivers and estuaries may be restricted or blocked by station operation. Partial or complete blockage of a zone of passage may result from the discharge of heat or chemicals to receiving water bodies or the construction and placement of power station structures in the water body. Strong-swimming aquatic animals often avoid waters of adverse quality, but larval and immature forms are usually moved and dispersed by water currents. It is therefore important in site selection that the routes and times of movement of the immature stages be considered in relation to potential effects.

A detailed assessment of potential impact on the species population would be required for sites where placement of intake or discharge structures would markedly disrupt normal current patterns in migration paths of important species. The potentials for impingement of organisms on cooling water intake structures and entrainment of organisms through the cooling system are determined by a number of variables, including site characteristics, intake structure design, and placement of the structures at the site.

Site characteristics should be considered relative to design and placement of cooling system features and the potential of the cooling system to hold fish in an area longer than the normal period of migration or to entrap resident populations in areas where they would be adversely affected, either directly or indirectly, by limited food supply or adverse temperatures. Canals or areas where cooling waters are discharged may induce fish to remain in an unnaturally warmed habitat. The cessation of station operation during

winter can be lethal to these fish because of an abrupt drop in water temperature.

6. LAND USE AND AESTHETICS

Many impacts on land use at the site and in the site neighborhood from construction and operation of the plant, transmission lines, and transportation corridors can be mitigated by appropriate designs and practices. Aesthetic impacts can be reduced by selecting sites where existing topography and forests can be utilized for screening station structures from nearby scenic, historical, or recreational resources. Restoration of natural vegetation, creative landscaping,* and the integration of structures with the environment can mitigate adverse visual impacts.

Preconstruction archeological excavations can usually reduce losses. Short-term salvage archeology may not be sufficient if extensive or valuable archeological sites are found on the potential site for a nuclear station. For areas of archeological concern, the Chief Archeologist of the National Park Service is an information source, as are the State Archeologist and the State Liaison Officer responsible for the National Historic Preservation Act activities for a particular state.

Proposed alternative land use may render a site unsuitable for a nuclear power station. For example, lands specified by a community (1) as planned for other uses or (2) as restricted to compatible uses vis-a-vis other lands may be unsuitable. Therefore, official land use plans developed by governments at any level and by regional agencies should be consulted for possible conflicts with power station siting.

Another class of impacts involves the preempting of existing land use at the site itself. For example, nuclear power station siting in areas uniquely suited for growing specialty crops may be considered a type of land conversion involving unacceptable economic dislocation.

Sites adjacent to lands devoted to public use may be considered unsuitable. In particular, the use of some sites or the use of transmission line or transportation corridors close to special areas administered by Federal, State, or local agencies for scenic or recreational use may cause unacceptable

*Station protection requirements for nuclear safeguards may influence landscape design and clearing of vegetation.

impacts regardless of design parameters. Such cases are most apt to arise in areas adjacent to natural resource oriented areas (e.g., Yellowstone National Park) as opposed to recreation-oriented areas (e.g., Lake Mead National Recreation Area). Some historical and archeological sites may also fail into this category. The acceptability of sites near special areas of public use should be determined by consulting cognizant government agencies.

The following Federal agencies should be consulted for the special areas listed:

6.1 National Park Service (U.S. Department of the Interior)

National Parks; International Parks; National Memorial Parks; National Battlefields, Battlefield Parks and Battlefield Sites; National Military Parks; Historic Areas and National Historic Sites; National Capital Parks; National Monuments and Cemeteries; National Seashores and Lakeshores; National Rivers and Scenic Riverways; National Recreation Areas; National Scenic Trails and Scientific Reserves; National Parkways

6.2 National Park Service Preservation Program

National Landmarks Program; Historic American Buildings Survey; National Register of Historic Places; National Historical Landmarks Program; National Park Service Archeological Program

6.3 Bureau of Sport Fisheries and Wildlife (U.S. Department of Interior)

National Wildlife Refuges

6.4 Forest Service (U.S. Department of Agriculture)

National Forest Wilderness, Primitive Areas, National Forests.

Individual States and local governments administer parks, recreation areas, and other public use and benefit areas. Information on these areas should be obtained from cognizant State agencies such as State departments of natural resources. The Advisory Council on Historic Preservation or the

appropriate State historical society should be contacted for information on historic areas.

It should be recognized that some areas, as yet undesignated, may be unsuitable for siting because of public interest in future dedication to public scenic, recreational, or cultural use. Relatively rare land types such as sand dunes and wetlands are prime candidates for such future designation. However, the acceptability of sites for nuclear power stations at some future time in these areas will depend on the existing impacts from industrial, commercial, and other developments.

7. INDUSTRIAL, MILITARY, AND TRANSPORTATION FACILITIES

Potential accidents at present or projected nearby industrial, military, and transportation facilities may affect the safety of a nuclear power station.* A site should not be selected if, in the event of such an accident, it is not possible to safely shut down a plant at that site or if it is not possible to have nearby facilities alter their mode of operation or incorporate features to reduce to an acceptable level the likelihood and severity of such potential accidents.

In the event of an accident at a nearby industrial facility such as a chemical plant, refinery, mining and quarrying operation, oil or gas well, or gas and petroleum product storage installation, it is possible that missiles, shock waves, flammable vapor clouds, toxic chemicals, or incendiary fragments may result. These may affect the station itself or the station operators in a way that jeopardizes the safety of the station.

Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," describes assumptions acceptable to the NRC staff for use in assessing the habitability of the control room during and after a postulated external release of hazardous chemicals and describes criteria that are generally acceptable to the staff for the protection of the control room operators.

Nearby military facilities, such as munitions storage areas and ordnance test ranges, may threaten station safety. Regulatory Guide 1.91, "Evaluations of Explosions Postulated To Occur on Transportation Routes Near Nuclear Power Plants," describes assumptions acceptable to the NRC staff for use in

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*Section 2.2 of Regulatory Guide 1.70 lists these safety considerations.

assessing potential explosions on nearby transportation routes. The acceptability of a site depends on establishing, among other things, that the nuclear power station can be designed so its safety will not be affected by an accident at the military installation. Alternatively, an otherwise unacceptable site may become acceptable if the cognizant military organization agrees to change the installation or mode of operation to reduce the likelihood or severity of potential accidents involving the nuclear station to an acceptable level.

An accident during the transport of hazardous materials (e.g., by air, waterway, railroad, highway, or pipeline) near a nuclear power plant may generate shock waves, missiles, and toxic or corrosive gases that can affect the safe operation of the station. The consequences of the accident will depend on the proximity of the transportation facility to the site, the nature and maximum quantity of the hazardous material per shipment, and the layout of the nuclear station. Unless a station can be designed to operate safely in the event of a postulated accident or an enforceable agreement can be reached to limit the transport of hazardous materials or the transportation link can be relocated, the proposed site may not be acceptable.

Airports are transportation facilities that pose specialized hazards to nearby nuclear power stations. Potential threats to stations from aircraft result from the aircraft itself as a missile and from the secondary effects of a crash, e.g., fire.

8. SOCIOECONOMICS

Social and economic issues are important determinants of siting policy. It is difficult both to assess the nature of the impacts involved and to determine value schemes for predicting the level or the acceptability of potential impacts.

The siting, construction, and operation of a nuclear power station may have significant impacts on the socioeconomic structure of a community and may place severe stresses on the local labor supply, transportation facilities, and community services in general. There may be changes in the tax basis and in community expenditures, and problems may occur in determining equitable levels of compensation for persons relocated as a result of the station siting. It is usually possible to resolve such difficulties by proper coordination with impacted communities; however, some impacts may be locally

unacceptable and too costly to avoid by any reasonable program for their mitigation. Evaluation of the suitability of a site should therefore include consideration of purpose and probable adequacy of socioeconomic impact mitigation plans for such economic impacts on any community where local acceptance problems can be reasonably foreseen.

Certain communities near the site may be subject to unusual impacts that would be excessively costly to mitigate. Among such communities are towns that possess notably distinctive cultural character, i.e., towns that have preserved or restored numerous places of historic interest, have specialized in an unusual industry or avocational activity, or have otherwise markedly distinguished themselves from other communities.

9. NOISE

High noise levels at nuclear stations occur during both the construction and operation phases and could have unacceptable impacts. Cooling towers, turbines, and transformers contribute to the noise levels during station operation.

C. REGULATORY POSITION

1. GEOLOGY/SEISMOLOGY

Preferred sites are those where there is a minimum likelihood of surface or near surface deformation, or the occurrence of earthquakes on faults in the site vicinity (within a radius of 8 kilometers (5 miles)). Because of the uncertainties and difficulties in mitigating the effects of permanent ground displacement phenomena such as surface faulting or folding, fault creep, subsidence or collapse, the NRC staff considers it prudent to select an alternative site when the potential for permanent ground displacement exists at the site.

Sites located near geologic structures for which there is an inadequate data base at the time of application to determine their potential for causing surface deformation are likely to be subject to a longer licensing process in view of the need for extensive and detailed geologic and seismic investigations of the site and surrounding region and for the rigorous analyses of the site-plant combination.

Sites with competent bedrock for foundations generally have suitable foundation conditions. In regions where there are few or no such sites, it is prudent to select sites in areas with competent and stable solid soils, such as dense sands and glacial tills. Other materials may also provide satisfactory foundation conditions, but in any case, a detailed geologic and geotechnical investigation will be required to determine static and dynamic engineering properties of the material underlying the site in accordance with Appendix B to 10 CFR Part 100.

2. ATMOSPHERIC EXTREMES AND DISPERSION

As noted in the Discussion of this guide, site atmospheric conditions are site characteristics principally with respect to the calculation of radiation doses resulting from the release of fission products as a consequence of a postulated accident. Accordingly, each applicant for site approval must collect meteorological and hydrological information for at least 1 year that is representative of the site conditions, including wind speed, wind direction, precipitation, and atmospheric stability.

Nonradiological atmospheric considerations such as local fogging and icing, cooling tower drift, cooling tower plume lengths, plume interactions between cooling tower plumes, and plumes from nearby industrial facilities should be considered in evaluating the suitability of potential sites.

3. POPULATION CONSIDERATIONS

Areas of low population density are preferred for nuclear power station sites. High population densities projected for any time during the lifetime of a station are considered during both the NRC staff review and the public hearing phases of the licensing process. If the population density at the proposed site is not acceptably low, the applicant will be required to give special attention to alternative sites with lower population densities.

If the population density, including weighted transient population, projected at the time of site approval exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (50 kilometers) (cumulative population at a distance divided by the area at that distance), or the projected population density for 40 years after site approval exceeds 1,000 persons per square mile averaged over any radial distance out to 30 miles

(50 km), special attention should be given to the consideration of alternative sites with lower population densities.

Transient population should be included for those sites where a significant number of people (other than those just passing through the area) work, reside part-time, or engage in recreational activities and are not permanent residents of the area. The transient population should be taken into account by weighting the transient population according to the fraction of time the transients are in the area.

Based on past experience, the NRC staff has found that a minimum exclusion distance of 0.4 mile (640 meters), even with unfavorable design basis atmospheric dispersion characteristics, usually provides assurance that engineered safety features can be designed to bring the calculated dose from a postulated accident within the guidelines of 10 CFR 50.34(a)(1). Also, based on past experience, the NRC staff has found that a distance of 3 miles (5 km) to the outer boundary of the low population zone is usually adequate. Subpart B of 10 CFR Part 100 specifies the exclusion area distance. Section 50.34 specifies an LPZ for stationary power reactor applications.

4. HYDROLOGY

4.1 Flooding

To evaluate sites located in river valleys, on flood plains, or along coastlines where there is a potential for flooding, the site suitability studies described in Regulatory 1.59, "Design Basis Floods for Nuclear Power Plants," should be made.

4.2 Water Availability

A highly dependable system of water supply sources must be shown to be available under postulated occurrences of natural and site-related accidental phenomena or combinations of such phenomena as discussed in Regulatory Guide 1.59.

To evaluate the suitability of sites, there should be reasonable assurance that permits for consumptive use of water in the quantities needed for a nuclear power plant of the stated approximate capacity and type of

cooling system can be obtained by the applicant from the appropriate State, local, or regional bodies.

4.3 Water Quality

The potential impacts of nuclear power stations on water quality are likely to be acceptable if effluent limitations, water quality criteria for receiving waters, and other requirements promulgated pursuant to the Federal Water Pollution Control Act are applicable and satisfied.

The criteria provided in 10 CFR Parts 20 and 50 will be used by the NRC staff for determining permissible concentrations of radioactive materials discharged to surface water or to ground water.*

4.4 Fission Product Retention and Transport

To be able to assess fission product retention and transportation via ground water, the following information should be determined for the site:

- Soil, sediment, and rock characteristics (e.g., volcanic ash, fractured limestone),
- Absorption and retention coefficients for fission product materials,
- Ground-water velocity, and
- Distance to nearest body of surface water.

This information should be used in the environmental report required in 10 CFR Part 51 and compared to the hydrological information used in the PRA for a certified design (if such a design is to be located at the site) or used in the site specific PRA for a custom plant located at the site.

Aquifers that are or may be used by large populations for domestic, municipal, industrial, or irrigation water supplies provide potential pathways

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*Appendix I to 10 CFR Part 50 provides numerical guidance for design objectives and technical specification requirements for limiting conditions of operation for light-water-cooled nuclear power stations.

for the transport of radioactive material to humans in the event of an accident. To evaluate the suitability of proposed sites located over such aquifers, detailed studies of factors identified in Section 2.4.13 of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," should be completed.

5. ECOLOGICAL SYSTEMS AND BIOTA

The ecological systems and biota at potential sites and their environs should be sufficiently well known to allow reasonably certain predictions that there would be no unacceptable or unnecessary deleterious impacts on populations of important species or on ecological systems with which they are associated from the construction or operation of a nuclear power station at the site.

When early site inspections and evaluations indicate that critical or exceptionally complex ecological systems will have to be studied in detail to determine the appropriate plant designs, proposals to use such sites should be deferred unless sites with less complex characteristics are not available.

It should be determined whether any important species (as defined in Section B.5 of this guide) inhabit or use the proposed site or its environs; and the relative abundance and distribution of their populations should be considered. Potential adverse impacts on important species should be identified and assessed. The relative abundance of individuals of an important species inhabiting a potential site should be compared to available information in the literature concerning the total estimated local population. Any predicted impacts on the species should be evaluated relative to effects on the local population and the total population of the species. The destruction of, or sublethal effects on, a number of individuals that would not adversely affect the reproductive capacity and vitality of a population or the crop of an economically important harvestable population or recreationally important population should generally be acceptable, except in the case of certain endangered species. If there are endangered or threatened species at a site, the potential effects should be evaluated relative to the impact on the local population and the total estimated population over the entire range of the species as noted in the literature.

It should be determined whether there are any important ecological systems at a site or in its environs. If so, determination should be made as

to whether the ecological systems are especially vulnerable to change or if they contain important species habitats, such as breeding areas (e.g., nesting and spawning areas), nursery, feeding, resting, and wintering areas, or other areas of seasonally high concentrations of individuals of important species.

The important considerations in the balancing of costs and benefits include the uniqueness of a habitat or ecological system within the region under consideration, the amount of the habitat or ecological system destroyed or disrupted relative to the total amount in the region, and the vulnerability of the reproductive capacity of important species populations to the effects of construction and operation of the station and ancillary facilities.

If sites contain, are adjacent to, or may impact on important ecological systems or habitats that are unique, limited in extent, or necessary to the productivity of populations of important species (e.g., wetlands and estuaries), they cannot be evaluated as to suitability for a nuclear power station until adequate assessments for the reliable prediction of impacts have been completed and the facility design characteristics that would satisfactorily mitigate the potential ecological impacts have been defined. In areas where reliable and sufficient data are not available, the collection and evaluation of appropriate seasonal data may be required.

Migrations of important species and migration routes that pass through the site or its environs should be identified. Generally, the most critical migratory routes relative to nuclear power station siting are those of aquatic species in water bodies associated with the cooling systems. Site conditions that should be identified and evaluated in assessing potential impacts on important aquatic migratory species include (1) narrow zones of passage, (2) migration periods that are coincident with maximum ambient temperatures, (3) potential for major modification of currents by station structures, (4) potential for increased turbidity during construction, and (5) potential for entrapment, entrainment, or impingement by or in the cooling water system, or blocking of migration by facility structures of effluents.

The potential blockage of movements of important terrestrial animal populations from the use of the site for a nuclear power station and the availability of alternative routes that would provide for maintenance of the species' breeding population should be assessed.

If justifiable relative to costs and benefits, potential impacts of plant construction and operation on the biota and ecological systems can generally be mitigated by adequate engineering design and site planning and by proper

construction and operation practice when there is adequate information about the vulnerability of the important species and ecological systems.

A summary of environmental considerations, parameters, and regulatory positions for use in evaluating the suitability of sites for nuclear power stations is provided in Appendix B to this guide. A discussion of ecological systems and habitats, the level of detail that should be addressed in the site selection process, and the survey, monitoring, and analytical techniques for assessing impacts on important species and ecological systems will be summarized in subsequent appendices to this guide.

6. LAND USE AND AESTHETICS

Land use plans adopted by Federal, State, regional, or local governmental entities should be examined, and any conflict between these plans and use of a potential site should be resolved by consultation with the appropriate governmental entity.

For a potential site on land devoted to specialty crop production where changes in land use might result in market dislocations, a detailed investigation should be provided to demonstrate that potential problems have been identified and resolved.

The potential aesthetic impact of nuclear power stations at sites near natural resource oriented public use areas is of particular concern, and evaluation of the suitability of such sites is dependent on consideration of specific station design layout. However, existing aesthetic impacts at potential sites should be taken into account as mitigating any requirements for further special design.

7. INDUSTRIAL, MILITARY, AND TRANSPORTATION FACILITIES

Potentially hazardous facilities and activities within 5 miles of a proposed site should be identified. If a preliminary evaluation of potential accidents at these facilities indicates that the potential hazards from shock waves and missiles approach or exceed those of the design basis tornado for the region* or if potential hazards such as flammable vapor clouds, toxic

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*The design basis tornado is described in Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants."

chemicals, or incendiary fragments exist, the suitability of the site should be determined by detailed evaluation of the degree of risk imposed by the potential hazard.

The identification of design basis events resulting from the presence of hazardous materials or activities in the vicinity of a nuclear power station is acceptable if the design basis events include each postulated type of accident for which a realistic estimate of the probability of occurrence of potential exposures in excess of the proposed Section 50.34(a)(1) guidelines exceeds approximately 10^{-7} per year. Because of the difficulty of assigning precise numerical values to the probability of occurrence of the types of potential hazards generally considered in determining the acceptability of sites for nuclear stations, judgment must be used as to the acceptability of the overall risk presented by an event.

In view of the low probability events under consideration, the probability of occurrence of the initiating events leading to potential consequences in excess of the proposed Section 50.34(a)(1) exposure guidelines should be based on assumptions that are as realistic as is practicable. In addition, because of the low probability of events under consideration, valid statistical data are often not available to permit accurate quantitative calculation of probabilities. Accordingly, a conservative calculation showing that the probability of occurrence of potential exposures in excess of the proposed Section 50.34(a)(1) guidelines is approximately 10^{-6} per year is acceptable if, when combined with reasonable qualitative arguments, the realistic probability can be shown to be lower.

The effects of design basis events have been appropriately considered if analyses of the effects of those accidents on the safety-related features of a proposed nuclear station have been performed and appropriate measures (e.g., hardening fire protection) to mitigate the consequences of such events have been taken.

To evaluate in detail the suitability of sites for potential accidents involving hazardous materials and activities at nearby industrial, military, and transportation facilities, the studies described in Section 2.2 of Regulatory Guide 1.70 should be made.

8. SOCIOECONOMICS

The NRC staff considers that an evaluation of the suitability of nuclear power station sites near distinctive communities should demonstrate that the construction and operation of the nuclear station, including transmission and transportation corridors, and potential problems relating to community services such as schools, police and fire protection, water and sewage, and health facilities, will not adversely affect the distinctive character of the community. A preliminary investigation should be made to identify and analyze problems that may arise from the proximity of a distinctive community to a proposed site.

9. NOISE

Noise levels at proposed sites must comply with applicable Federal, State, and local noise regulations.

10. EMERGENCY PLANNING

As a minimum, each applicant for site approval should provide a description of the area within a 10-mile (16 km) radius of the plant emergency planning zone, including:

- population distribution (current and projected for the next 40 years),
- residential, industrial, public, and commercial facilities and structures,
- transportation routes, including any egress limitations, and
- topography.

In addition, the applicant should provide a description of any contacts, evaluations by, and assessments with local, State, and Federal government agencies with emergency planning responsibilities. An evaluation of the above information with respect to its impact on the development of an emergency plan

that can assure adequate protective measures for the populace should be provided.

D. IMPLEMENTATION

The purpose of this section is to provide guidance to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

This proposed revision has been released to encourage public participation in its development. Except in those cases in which the applicant proposes an acceptable alternative method for complying with the specified portions of the Commission's regulations, the method to be described in the active guide reflecting public comments will be used in the evaluation of applications for construction permits, operating licenses, combined licenses, or design certification submitted after the implementation date to be specified in the active guide. This guide would not be used in the evaluation of an application for an operating license submitted after the implementation date to be specified in the active guide if the construction permit was issued prior to that date.

APPENDIX A

SAFETY-RELATED SITE CONSIDERATIONS FOR ASSESSING SITE SUITABILITY FOR NUCLEAR POWER STATIONS

This appendix provides a checklist of safety-related site characteristics, relevant regulations and regulatory guides, and regulatory experience and positions for assessing site suitability for nuclear power stations.

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
A.1 Geology/ Seismology		
Geologic and seismic characteristics of a site, such as surface faulting, ground motion, and foundation conditions (including liquefaction, subsidence, and landslide potential), may affect the safety of a nuclear power station.	10 CFR Part 100, Appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or after [Effective Date of this Regulation]." Regulatory Guide 1.70, Chapter 2 (identifies safety-related site characteristics). Regulatory Guide 1.29 (discusses plant safety features which should be controlled by engineering design).	Where the potential for permanent ground deformation such as faulting, folding, subsidence or collapse exists at a site, the NRC staff considers it prudent to select an alternative site. Sites should be selected in areas for which an adequate geologic data base exists to determine "capability." Delay in licensing can result from a need for extensive geologic and seismic investigations. Conservative design of safety-related structures will be required when geologic, seismic, and foundation information is questionable. Sites with competent bedrock generally have suitable foundation conditions. If bedrock sites are not available, it is prudent to select sites in areas known to have a low subsidence and liquefaction potential. Investigations will be required to determine the static and dynamic engineering properties of the material underlying the site as stated in 10 CFR Part 100, Appendix A and Appendix B.

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
A.2 Atmospheric Dispersion		
The atmospheric conditions at a site should provide sufficient dispersion of radioactive materials released during a postulated accident to reduce the radiation exposures of individuals at the exclusion area and low population zone boundaries to the values prescribed in the proposed 10 CFR 50.34.	10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Regulatory Guide 1.23, "Onsite Meteorological Programs." Regulatory Guide 1.5, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors." Regulatory Guide 1.24, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure." Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors." Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants"	Unfavorable safety-related design basis atmospheric dispersion characteristics can be compensated for by engineered safety features. Accordingly, the regulatory position on atmospheric dispersion of radiological effluents is incorporated into the section "Population Considerations" (see A.3 of this appendix).

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
A.3 Population Considerations In the event of a serious accident at a nuclear power station, effective action must be taken to minimize exposure of individuals outside the station to any radioactive materials which may be released during the accident. To ensure that exposure to populations will be minimized in the event of an accident, the nuclear power station should not be located in a densely populated area.	10 CFR Part 100, "Reactor Site Criteria," requires the following: • An "exclusion area" surrounding the reactor in which the reactor licensee has the authority to determine all activities, including exclusion or removal of personnel and property; • 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." • A "low population zone" (LPZ) which immediately surrounds the exclusion area, • At any point on the exclusion area boundary and on the outer boundary of the LPZ the exposure of individuals to a postulated release of fission products (as a consequence of an accident) be less than certain prescribed values, Regulatory Guides 1.5, 1.24, 1.25, and 1.145 give calculational methods (see A.2 of this appendix).	If the population density, including weighted transient population, projected at the time of initial site approval exceeds 500 persons per square mile averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area at that distance), or the projected population density for 40 years after site approval exceeds 1,000 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. Transient population should be included for those sites where a significant number of people (other than those just passing through the area) work, reside part-time, or engage in recreational activities, and are not permanent residents of the area. The transient population should be taken into account by weighting the transient population according to the fraction of time the transients are in the area. Based on past experience, the NRC staff has found that a minimum exclusion distance of 0.4 mile (640 meters), even with the most unfavorable design basis atmospheric dispersion characteristics, provides

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
		assurance that engineered safety features can be added that will bring the calculated doses from a postulated accident within the guidelines of 10 CFR 50.34. Also based on past experience, the NRC staff has found that a distance of 3 miles (5 km) to the outer boundary of the LPZ is usually adequate.
A.4 Hydrology		
A.4.1 Flooding		
Precipitation, wind, or seismically induced flooding (e.g., resulting from dam failure, from river blockage or diversion, or from distantly and locally generated sea waves) can affect the safety of a nuclear power station.	10 CFR Part 100, Proposed Appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or after [Effective Date of this Regulation]." Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants." Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants (LWR Edition)" (Section 2.4). 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants;" Criterion 2, "Design Bases for Protection Against Natural Phenomena."	To evaluate sites located in river valleys, on flood plains, or along coastlines where there is a potential for flooding, the studies described in Regulatory Guide 1.59 should be made.

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
A.4.2 Water Supply		
A safety-related water supply is required for normal or emergency shutdown and cooldown.	10 CFR Part 100, Proposed Appendix B, "Criteria for the Seismic and Geologic Siting of Nuclear Power Plants on or after [Effective Date of this Regulation]."	A highly dependable system of water supply sources should be shown to be available under postulated occurrences of natural phenomena and site-related accidental phenomena or combinations of such phenomena as discussed in Regulatory Guide 1.59.
	Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants."	
	Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants."	To evaluate the suitability of a site, there must a reasonable assurance that permits for water use and for water consumption in the quantities needed for a nuclear power plant of the stated approximate capacity and type of cooling system can be obtained by the applicant from the appropriate State, local, or regional bodies.
A.4.3 Water Quality		
Contamination of ground water and surface water by radioactive materials discharged from nuclear stations could cause public health hazards.	10 CFR Part 20, "Standards For Protection Against Radiation."	The criteria provided in 10 CFR Parts 20 and 50 will be used by the NRC staff for determining permissible concentrations of radionuclides discharged to surface water and ground water.
	10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."	

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
A.5 Industrial, Military, and Transportation Facilities Near the Site.		
Accidents at present or projected nearby industrial, military, and transportation facilities may affect the safety of the nuclear power station.	10 CFR Part 100, "Reactor Site Criteria," Subpart B, Proposed Section 100.22. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 4, "Environmental and Dynamic Effects Design Bases." Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports (LWR Edition)," Section 2.2 (lists types of facilities and potential accidents). Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."	Potentially hazardous facilities and activities within 5 miles (8 km) of a proposed site must be identified. If a preliminary evaluation of potential accidents of these facilities indicates that the potential hazards from shock waves and missiles approach or exceed those of the design basis tornado for the region (the design basis tornado is described in Regulatory Guide 1.76), or potential hazards such as flammable vapor clouds, toxic chemicals, or incendiary fragments exist, the suitability of the site should be determined by detailed evaluation of the potential hazard. The identification of design basis events resulting from the presence of nearby hazardous materials or activities in the vicinity of a nuclear power station is acceptable if the design basis events include each postulated type of accident for which a realistic estimate of the probability of occurrence of potential exposures in excess of 10 CFR 50.34 guidelines exceeds approximately 10^{-7} per year. To evaluate the suitability of sites in detail for potential accident situations involving

Considerations	Relevant Regulations and Regulatory Guides	Regulatory Experience and Position
		hazardous materials and activities from nearby industrial, military, and transportation facilities, the studies described in Section 2.2 of Regulatory Guide 1.70 should be made.

APPENDIX B

ENVIRONMENTAL CONSIDERATIONS FOR ASSESSING SITE SUITABILITY FOR NUCLEAR POWER STATIONS

This appendix summarizes environmental considerations related to site characteristics that should be addressed in the early site selection process. The relative importance of the different factors to be considered varies with the region or State in which the potential sites are located.

Site selection processes can be facilitated by establishing limits for various parameters based on the best judgment of specialists knowledgeable of the region under consideration. For example, limits can be chosen for the fraction of water that can be diverted in certain situations without adversely affecting the local populations of important species. Although simplistic because important factors such as the distribution of important species in the water body are not taken into account, such limits can be useful in a screening process for site selection.

Considerations	Parameters	Regulatory Position
B.1 Preservation of Important Habitats		
Important habitats are those that are essential to maintaining the reproductive capacity and vitality of important species populations* or the harvestable crop of economically or recreationally important species. Such habitats include breeding areas (e.g., nesting and spawning areas), nursery, feeding, resting, and wintering areas or other areas of seasonally high concentrations of individuals of important species.	The proportion of an important habitat that would be destroyed or significantly altered in relation to the total habitat within the region in which the proposed site is to be located is a useful parameter for estimating potential impacts of the construction or operation of a nuclear power station. The value of the proportion varies among species and among habitats. The region considered in determining proportions is the normal geographic range of the specific population in question.	In general, a detailed justification should be provided when the destruction or significant alteration of more than a few percent of important habitat types is proposed. The reproductive capacity of populations of important species and the harvestable crop of economically or recreationally important populations must be maintained unless justification for proposed or probable changes can be provided.
The construction and operation of nuclear power stations (including new transmission lines and access corridors constructed in conjunction with the station) can result in the destruction or alteration of habitats of important species leading to changes in the abundance of a species or in the species composition of a community.	If endangered or threatened species occur at a site, the potential effects of the construction and operation of a nuclear power station should be evaluated relative to the potential impact on the local population and the total estimated population over the entire range of species. See also Chapter 2 of Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations."	

*As defined for this guide in Section B.5.

Considerations	Parameters	Regulatory Position
B.2 Migratory Routes of Important Species		
Seasonal or daily migrations are essential to maintaining the reproductive capacity of some important species populations. Disruption of migratory patterns can result from partial or complete blockage of migratory routes by structures, discharge plumes, environmental alterations, or human activities (e.g., transportation or transmission corridor clearing and site preparation).	The width or cross-sectional area of a water body at a proposed site relative to the general width or cross-sectional area in the portion of the water used by migrating species should be estimated. Suggested minimum zones of passage range from 1/3 to 3/4 of the width or cross-sectional areas of narrow water bodies.*,** Some species migrate in central, deeper areas while others use marginal, shallow areas. Rivers, streams, and estuaries are seldom homogeneous in their lateral dimension with respect to depth, current velocity, and habitat type. Thus, the use of width or cross-sectional area criteria for determining adequate zones of passage should be combined with a knowledge of important species and their migratory requirements.	Narrow reaches of water bodies should be avoided as sites for locating intake or discharge structures. A zone of passage that will permit normal movement of important species populations and maintenance of the harvestable crop of economically important populations should be provided.

*Water Quality Criteria, 1972, National Academy of Sciences - National Academy of Engineering, Washington, DC, 1972.

**Handbook of Environmental Control, Volume III: Water Supply and Treatment, R.G. Bond and C.P. Straub (Editors), CRS Press, Cleveland, Ohio, 1973.

Considerations	Parameters	Regulatory Position
B.3 Entrainment and Impingement of Aquatic Organisms		
Plankton, including eggs, larvae, and juvenile fish, can be killed or injured by entrainment through power station cooling systems or in discharge plumes. The reproductive capacity of important species populations may be impaired by lethal stresses or by sublethal stresses that affect reproduction of individuals or result in increased predation on the affected species population. Fish and other aquatic organisms can be killed or injured by impingement on cooling water intake screens* or by entrainment in discharge plumes.	The depth of the water body at the point of intake relative to the general depth of the water body in the vicinity of the site. The proportion of water withdrawn relative to the net new available water at the site is an indirect measure of the destruction of plankton, which in turn is indicative of possible effects on populations of important species. It has been suggested that the fraction of available new water that can be diverted is in the range of 10% to 20% of flow.** The simplistic parameter (proportion of water withdrawal) is suitable for use in a screening process or site selection. However, other factors such as distribution of important species should be considered and in all cases the advice of experts on the local fisheries should be consulted to ensure that proposed withdrawals will not be excessive.	The site should have characteristics that allow placement of intake structures where the relative abundance of important species is small and where low approach velocities can be attained. (Deep regions are generally less productive than shallow areas. It is not implied that benthic intakes are necessary.) Important habitats (see B.1) should be avoided as locations for intake structures.

*Approach velocity and screen-face velocity are design criteria that may affect the impingement of larger organisms, principally fish, on intake screens. Acceptable approach and screen-face velocities are based on fish swim speeds that will vary with the species, site, and season.

**The Water's Edge: Critical Problems of the Coastal Zone, B.H. Ketchum (Editor), MIT Press, Cambridge, Mass., 1972; and Engineering for Resolution of the Energy-Environment Dilemma, National Academy of Engineering, Washington, DC, 1972.

Considerations	Parameters	Regulatory Position
B.4 Entrapment of Aquatic Organisms		
Cooling water intake and discharge system features, such as canals and thermal plumes, can attract and entrap organisms, principally fish The resulting concentration of important fish species near the station site can result in higher mortalities from station-related causes, such as impingement, cold shock, or gas bubble disease, than would otherwise occur. Entrapment can also interrupt normal migratory patterns.	Site characteristics that will accommodate design features that mitigate or prevent entrapment.	Sites where the construction of intake or discharge canals would be necessary should be avoided unless the site and important species characteristics are such that entry of important species to the canal can be prevented or limited by screening.

Considerations	Parameters	Regulatory Position
B.5 Water Quality		
Effluents discharged from nuclear power plants are governed under the authority of the Federal Water Pollution Control Act (FWPCA)--(PL 92-500).	Applicable EPA-approved State water quality standards. For states without EPA-approved water quality standards, the water quality criteria listed in Water Quality Criteria, 1972,* will be used for evaluation.	Pursuant to Section 401(a)(1) of the FWPCA, certification from the State that any discharge will comply with applicable effluent limitations and other water pollution control requirements is necessary before the NRC can issue a construction permit unless the requirement is waived by the State or the State fails to act within a reasonable length of time. Issuance of a permit pursuant to Section 402 of the Act is not a prerequisite to an NRC license or permit. Where station construction or operation has the potential to degrade water quality to the possible detriment of other users, more detailed analyses and evaluation of water quality may be necessary.

*Water Quality Criteria, 1972, National Academy of Sciences--National Academy of Engineering, Washington, DC, 1972.

Considerations	Parameters	Regulatory Position
B.6 Water Availability		
The consumptive use of water for cooling may be restricted by statute, may be inconsistent with water use planning, or may lead to an unacceptable impact to the water resource.	Applicable Federal, State, and local statutory requirements. Compatability with water use plan of cognizant water resource planning agency. In the absence of a water use plan, the effect on other water users is evaluated considering flow or volume reduction and the resultant ability of all users to obtain adequate supply and to meet applicable water quality standards (see B.5, Water Quality).	Water use and consumption must comply with statutory requirements and be compatible with water use plans of cognizant water resources planning agencies. Consumptive use should be restricted such that the supply of other users is not impaired and that applicable surface water quality standards could be met, assuming normal station operational discharges and extreme low flow conditions defined by generally accepted engineering practices. For multipurpose impounded lakes and reservoirs, consumptive use should be restricted such that the magnitude and frequency of drawdown will not result in unacceptable damage to important habitats (see B.1, Preservation of Important Habitats) or be inconsistent with the management goals for the water body.

Considerations	Parameters	Regulatory Position
B.7 Established Public Amenity Areas		
Areas dedicated by Federal, State, or local governments to scenic, recreational, or cultural purposes are generally prohibited areas for siting power stations. Siting nuclear power stations in the vicinity of established public amenity areas could result in the loss or deterioration of important public amenities.	Proximity to public amenity area. Viewability (see B.10, Visual Amenities).	Siting in the vicinity of designated public amenity areas will generally require extensive evaluation and justification. The evaluation of the suitability of sites in the vicinity of public amenity areas is dependent on consideration of a specific plant design and station layout in relation to potential impacts on the public amenity area.
B.8 Prospective Designated Amenity Areas		
Areas containing important resources for scenic, recreational, or cultural use may not currently be designated as such by public agencies but may involve a net loss to the public if converted to power generation. These areas may include locally rare land types, such as sand dunes, wetlands, or coastal cliffs.	Comparison of possible amenity areas in number and extent with other similar areas available on a local, regional, or national basis, as appropriate.	Public amenity areas that are distinctive, unique, or rare in a region should be avoided as sites for nuclear power stations.
B.9 Public Planning		
Land use for a nuclear power station should be compatible with established land use or zoning plans of governmental entities.	Officially adopted land use plans.	Land use plans adopted by Federal, State, regional, or local government entities must be examined, and any conflict between these plans and use of a proposed site must be resolved by consultation with the appropriate governmental entity.

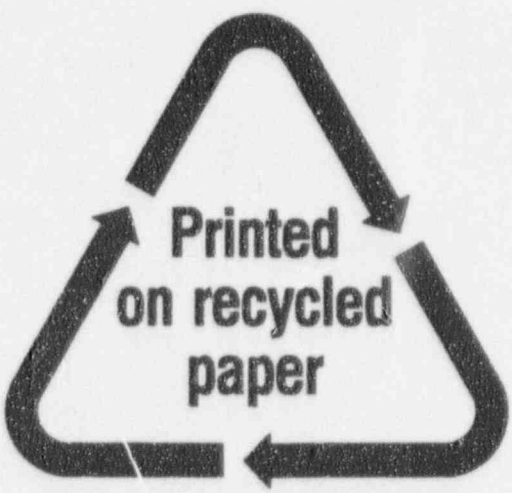
Considerations	Parameters	Regulatory Position
B.10 Visual Amenities		
The presence of power station structures may introduce adverse visual impacts to residential, recreational, scenic, or cultural areas or other areas with significant dependence on desirable viewing characteristics.	The solid angle subtended by station structures at critical viewing points.	The visual intrusion of nuclear power station structures as viewed from nearby residential, recreational, scenic, or cultural areas should be controlled by selecting sites where existing topography and forests can be utilized for screening station structures from those areas in which visual impacts would otherwise be unacceptable.
B.11 Local Fogging and Icing		
Water and water vapor released to the atmosphere from recirculating cooling systems can lead to ground fog and ice resulting in transportation hazards and damage to electric transmission systems.	Increase in number of hours of fogging or icing caused by operation of the station.	The hazards on transportation routes from fog or ice that result from station operation should be evaluated. The evaluation should include estimates of frequency of occurrence of station-induced fogging and icing and their impact on transportation, electrical transmission, and other activities and functions.
B.12 Cooling Tower Drift		
Concentrations of chemicals, dissolved solids, and suspended solids in cooling tower drift could affect terrestrial biota and result in unacceptable damage to vegetation and other resources.	The percent drift loss from recirculating condenser cooling water, particle size distribution, salt deposition rate, local atmospheric conditions, and loss of sensitive terrestrial biota affected by salt deposition from cooling tower drift.	The potential loss of important terrestrial species and other resources should be considered.

Considerations	Parameters	Regulatory Position
B.13 Cooling Tower Plume Lengths		
Natural draft cooling towers produce cloud-like plumes that vary in size and altitude depending on the atmospheric conditions. The plumes are usually a few miles in length before becoming dissipated, although plume lengths of 20 to 30 miles have been reported from cooling towers. Visible plumes emitted from cooling towers could cause a hazard to commercial and military aviation in the vicinity of commercial and military airports. The plumes themselves or their shadows could have aesthetic impacts.	The number of hours per year the plume is visible as a function of direction and distance from the cooling towers.	The visibility of cooling tower plumes as a function of direction and distance from cooling towers should be considered. The evaluation should include estimates of frequency of occurrence for plumes as well as potential hazards to aviation in the vicinity of commercial and military airports.
B.14 Plume Interaction		
Water vapor from cooling tower plumes may interact with industrial emissions from nearby facilities to form noxious or toxic substances which could cause adverse public health impacts, or result in unacceptable levels of damage to biota, structures, an other resources.	The degree to which impacts may occur will vary depending on the distance between the nuclear and fossil-fueled sites, the hours per year of plume interaction, the type and concentration of chemical reaction products, the area of chemical fallout, and the local atmospheric conditions.	The hazards to public health, structures, and other resources from potential plume interaction between cooling tower plumes and plumes from fossil-fueled sites and industrial emissions from nearby facilities should be considered.

Considerations	Parameters	Regulatory Position
B.15 Noise		
Undesirable noise levels at nuclear power stations could occur during both the construction and operation phases and have unacceptable impacts near the plant.	Applicable Federal, State, and local noise regulations.	Noise levels at proposed sites must comply with statutory requirements.
B.16 Economic Impact of Preemptive Land Use		
Nuclear power stations can preempt large areas, especially when large cooling lakes are constructed. The land requirement is likely to be an important issue when a proposed site is on productive land (e.g., agricultural land) that is locally limited in availability and is important to the local economy, or which may be needed to meet foreseeable national demands for agricultural products.	The level of local economic dislocation, such as loss of income, jobs, and production, caused by preemptive use of productive land and its effect on meeting foreseeable national demands for agriculture products.	If a preliminary evaluation of net local economic impact of the use of productive land for a nuclear power station indicates a potential for large economic dislocation, the NRC staff will require a detailed evaluation of the potential impact and justification for the use of the site based on a cost-effectiveness comparison of alternative station designs and site-station combinations. To complete its evaluation, the staff will also need information on whether and to what extent the land use affects national requirements for agricultural products.

REGULATORY ANALYSIS

A separate analysis was not prepared for this regulatory guide. The draft regulatory analysis, "Proposed Revisions of 10 CFR Part 100 and 10 CFR Part 50," provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of the draft regulatory analysis is available for inspection and copying for a fee at the NRC Public Document Room, 2121 L Street NW. (Lower Level), Washington, DC, as Enclosure 2 to Secy 92-215.



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