

1000 Siting

August 30, 1979

SECY-79-493A

COMMISSIONER ACTION

For: The Commissioners

From: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Thru: Executive Director for Operations *ll plus*

Subject: APPROVAL OF A LETTER TO SENATOR ALAN K. SIMPSON

Purpose: To express Commission views on an amendment to S.562, the NRC Authorization Bill that would require the Commission to include demographic requirements in its siting regulations.

Category: This paper covers a major policy matter. *

Issue: What demographic requirements are needed relating to siting of nuclear power plants, and in what time frame should the Commission be required to promulgate these requirements.

Decision Criteria:

1. Consistency of the adopted alternative with desirable changes in siting policy.
2. Feasibility of implementation of the alternative.
3. Need to be responsive to congressional and public concerns over adequacy of present reactor siting policy and regulation.

Options:

- A. The Commission accept the language of the proposed amendment on all the specific provisions as presently formulated.
- B. The Commission provide modified language for the proposed amendment, including provisions consistent with the recommendations of the Siting Policy Task Force Report at about the same level of specificity as the original amendment. A point-by-point explanation of all deviations from the presently formulated amendment would accompany the modified language.

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*SECY NOTE: This paper relates to SECY-79-493, "Report of the Siting Policy Task Force," dated August 16, 1979, which is currently scheduled for a Commission briefing on September 5, 1979. Since early conference action on the NRC Authorization Bill is contemplated, Senator Simpson has requested NRC comments by September 5. OCA will advise the Committee of the fact that a Commission briefing is scheduled and that comments will be provided as soon as possible thereafter.

- C. The Commission provide modified language for the proposed amendment including provisions of general nature consistent with the goals of the Siting Policy Task Force Report. A point-by-point explanation of all deviations from the presently formulated amendment would accompany the modified language.

Discussion:

By a letter of July 26, 1979, Senator Alan K. Simpson gave the Commission an opportunity to comment on an amendment sponsored by him and Senator Hart to S.562, the NRC Authorization Bill. The amendment appears as Section 108 of the Bill, dated July 17, 1979 (see Enclosure 1). The amendment contains several rather specific provisions relating to demography in siting of nuclear power plants.

The staff has analyzed the proposed amendment and has concluded that (a) present regulations would have to be changed substantially in order to accommodate the provisions of the Bill, (b) the proposed provisions are in conflict in one major area with the recommendations of the Siting Policy Task Force Report, NUREG 0625, which was submitted to the Commission on August 16, 1979. *

Three major options are presented for Commission consideration:

Option A

The Commission accept the language of the proposed amendment and all the specific provisions as presently formulated.

The following is a brief point-by-point discussion of the major provisions of the proposed amendment (Enclosure 1) and how it compares with current regulations.

1. Time Limitation - Section 108(a) of the Bill prescribes a time limit of 180 days for promulgation of the required rule, "after notice and opportunity for a hearing". With a hearing on this subject being almost a certainty, the six-month limit for having a rule in place is not realistic. A more realistic approach would be to either (a) extend the time limit to two years for having a final rule in place, or (b) modify and extend the time limit to 270 days for having an interim rule in place pending subsequent public comment and a rulemaking hearing.
2. Low Population Zone, Permissible Radiation Exposure and Minimum Fission Product Release - Section 108(a)(1) requires that the size and maximum population density be specifically defined for a "low population zone immediately surrounding the site including consideration of permissible radiation exposure."

In addition Section 108(a)(4) requires establishing of "the minimum fission-product release into the containment structure assumed for dose calculations."

The "low population zone" concept is presently used in NRC regulations which state that a low population zone should be determined for every power reactor. It is a zone immediately surrounding the exclusion area (10 CFR § 100.3, § 100.11). The area need not be under the control of the applicant and may 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." A limit on permissible number and density of persons in this zone is not specified because "the situation may vary from case-to-case." Appropriate protective actions, such as evacuation or taking shelter, "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" (10 CFR § 100.3 (b)).

The main difference between the proposed amendment and present regulations is that the amendment requires a fixed size of the low population zone (LPZ) having a fixed maximum population density while our regulations provide a flexible size of the LPZ (which is a function of the site characteristics and of the design features of the plant) and the number and density of population is evaluated on a case-by-case basis.

The concept of fission product release into the containment structure and radiation exposure also exists presently in the siting regulations (10 CFR Part 100), however, Part 100 doses have been used as reference values to determine sizes of LPZs and allowable distances to population centers in combination with the engineered safety features of plants, rather than as an expression of permissible levels of radiation exposure.

3. Controlling Offsite Activities - Section 108(a)(2) requires NRC to establish "acceptable means of assuring such maximum population density is not exceeded during the useful life of the facility."

Present regulations do not clearly require consideration of off-site activities projected beyond the time at which the license would be granted, however, the Statement of Consideration for Part 100 states that "AEC review of land use surrounding a proposed site includes considerations of potential residential growth" (27 FR 3509). Both the regulations and the Statement of Consideration are silent concerning changes in land use following issuance of a CP or OL. Staff practice has been to monitor changes in offsite activities and to take action on an ad hoc basis, should it be warranted.

The Siting Policy Task Force Report discusses this issue in greater detail in Sections 2.1.2.10 and 3.2.5. The Task Force has concluded that short of legislation, there is no absolute way for the NRC to control land use in an area surrounding the site.

It should be pointed out, however, that when one considers changes in offsite activities which may result in increased risk, the increases in population represent marginal incremental increases in risk, as opposed to step function increases in risk resulting from construction and operation of potentially hazardous facilities such as LNG terminals.

4. Distance to Densely Populated Area - Section 108(a)(3) of the Bill requires establishing of "the minimum distance from the site to the nearest boundary of any densely populated area."

Present regulations require identification of the nearest densely populated center containing more than about 25,000 residents. The population center distance must be at least one and one-third times the LPZ outer boundary, but "where very large cities are involved, a greater distance may be necessary because of total integrated population dose consideration" (10 CFR § 100.11(a)(3)).

The main difference between the proposed amendment and our present regulations is that while the amendment requires a fixed standoff distance to the "densely populated area" our regulations rely on flexible approach by determining the distance as a function of site characteristics in combination with the design features of the plant.

5. Multiple Siting and Feasibility of Evacuation - Section 108(a)(5) requires the Commission to "specifically consider the possibility of multiple unit siting and the feasibility of evacuation in case of an extraordinary nuclear occurrence, or an event or sequence of events which significantly increase the likelihood thereof."

Present Part 100.11(b) addresses the issue of multiple units on a site for accident conditions and distinguishes between reactors that are independent of one another and those for which there may be a degree of coupling. It prescribes the manner in which the exclusion area, low population zones, and population center distances should be determined in such cases. It also prescribes that the total radioactive effluent releases from the simultaneous operation of multiple reactors at a site should not exceed the

allowable limits of applicable regulations. In addition, General Design Criterion 5 (Part 50, Appendix A) generally prohibits the sharing of structures, systems, and components among nuclear power units unless the applicant can show that such sharing cannot significantly impair items important to the safe shutdown of the remaining units in the event of an accident in one of them. The regulations regarding routine effluent releases (Part 50, Appendix A) generally prohibits the sharing of structures, systems, and components among nuclear power units unless the applicant can show that such sharing cannot significantly impair items important to the safe shutdown of the remaining units in the event of an accident in one of them. The regulations regarding routine effluent releases (Part 20 and Appendix I to Part 50) do not limit the number of reactors on a single site.

In addition, the EPA has issued the Uranium Fuel Cycle Standard (40 CFR 190) that becomes effective for uranium fuel cycle facilities including light water reactors on December 1, 1979. This standard will limit the doses resulting from releases from LWR sites and supporting facilities. For reactor sites, there will therefore be a practical upper limit of about four reactors assuming that each operates within the Appendix I design objectives.

The staff is presently developing an implementation scheme for 40 CFR Part 190. Currently, routine releases are evaluated for individual reactors using Appendix I criteria for sites using 10 CFR Part 20. The technical specifications issued for implementing ALARA reflect the same evaluation.

NRC policy relating to elements of emergency planning is included in the definitions of exclusion area and low population zone (LPZ) (10 CFR § 100.3). The definition of the LPZ calls for "a reasonable probability that appropriate protective measures could be taken" on behalf of persons within an LPZ" in the event of a serious accident." Specific reference is made to evacuation or taking shelter as potential protective measures. Additional policy on aspects of emergency planning not related to siting policy is contained in 10 CFR Part 50, Appendix E.

The staff evaluates the physical characteristics of the low population zone to determine whether there is a reasonable probability that protective measures could be taken. The potential for entrapment is an essential consideration.

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Although not reviewed in the context of site suitability, emergency planning within the LPZ and beyond is reviewed in the licensing process.

6. Option A - Pros and Cons

- Pros:
- a. Amendment contains some features similar to the recommendations of the Siting Policy Task Force.
 - b. Does not require the Commission to take a position prior to a complete review of the Siting Policy Task Force recommendations.
- Cons:
- a. Would make future implementation of the Siting Policy Task Force recommendations more difficult because certain features of the amendment run counter to the Siting Policy Task Force recommendations for separating siting requirements from design requirements.

Option B

The Commission provide modified language for the proposed amendment, including provisions consistent with the recommendations of the Siting Policy Task Force Report, at about the same level of specificity as the original amendment.

Enclosure 2 provides recommended new language of the amendment. The following is an analysis of the differences (deletions and additions) between the original and revised versions.

1. The prescribed time limitation was changed from 180 days for having a rule to 270 days for having an interim rule after enactment of the Bill. Given suitable priority, it would possible to have a proposed regulation published for public comment within 270 days after enactment. This proposed regulation could serve as an interim rule until an effective rule could be promulgated.

It is most unlikely, however, that an effective rule could be put in place within the time frame specified in the amendment as written now. This is because major proposed rules must have a minimum comment period of 60 days. For controversial rules such as this one, it is likely that the comment period would be extended for an additional 30 to 45 days as a result of a request for such extension. Further it is likely that there would be extensive public comment on the proposed rule, much of it technically

complex. All public comments received would have to be examined carefully as part of the process by which the effective rule is formulated. Lastly, in such a controversial rulemaking as this, it is likely that a hearing on the proposed rule would be requested. This would greatly extend the rulemaking period.

2. The word "future" was added in front of "utilization facilities" to provide the Commission some flexibility to determine the point at which CP applications would be subject to the revised rule. The implementation schedule and the impact of revised siting requirements on past siting decisions are important questions that will have to be addressed by the Commission in its consideration of future siting rules. The Siting Policy Task Force correctly skirted the issue by operating under a premise that existing licensed sites would be exempt from the changes to siting requirements brought about by its study. Nevertheless, the Task Force clearly recognized that siting policy changes brought about as a result of its recommendations would be based on, but not necessarily constrained by, the past experience of the Commission in siting nuclear plants. Further, we recognize the changes in siting policy and practice, even if specified as prospective, inevitably will have to be compared to past practice and any important differences evaluated.
3. In Sections 108(a)(1) and (4) of the Bill, the considerations of maximum permissible radiation exposure and minimum fission product release into the containment were deleted since in its experience the staff found that a calculation of radiation exposure to off-site individuals as a consequence of an hypothesized accident involving release of fission products into the containment has not been as useful as originally envisioned as a means of making a siting decision. This is primarily because a large number of assumptions must be made in order to do the calculation. They include (a) the nature of the accident, (b) the degree to which accident preventing safety features function, (c) the resultant fission product release from the core to the containment, (d) the efficacy of the engineered safety feature that remove the fission products, (e) the leakage characteristics of the containment and other systems that contain radioactive material, (f) the meteorological characteristics that disperse the fission product, (g) the characteristics of the pathway to the human receptor, (h) the characteristics of the human receptor, and (i) the efficacy of interdiction or other protective measure. Most of these assumptions are subject to at least an order of magnitude uncertainty depending upon the degree of conservatism assumed and thus the collective uncertainty would be many orders of magnitude. Such

an uncertainty is of marginal value for making a siting decision. For this reason, the dependency of siting decisions on dose calculations was changed to reliance on site characteristics which include population density and distribution limits and other set stand-off distances. Distances and population densities that would eventually be adopted would consider generic studies of individual and societal risk from a broad spectrum of potential accidents.

4. Section 108(a)(2) of the Bill was deleted for two reasons. First, there is no way under the NRC mandate in the Atomic Energy Act or NEPA that NRC could assure that maximum population density is not exceeded. The only manner in which such limits could be assured would be to limit growth in regions surrounding nuclear plants by Federal law. Other alternatives, such as requiring states or local jurisdictions to establish regulation that would limit growth would also be subject to local vagaries. In addition, it may be unreasonable to limit population growth to that allowable at the construction stage since population growth results in marginal increase in risk.
5. Section 108(a)(3) of the Bill was deleted since the concept of densely populated centers is included in new Section 108(a)(A) of our proposed revision of the amendment and is discussed in item 6, below.
6. In Section 108(a)(A) of the proposed revision the consideration of the average population density of the region where the site is located was added. This is an important concept since it is a statement of Commission policy that nuclear plants should be allowed in any region of the United States, provided they meet siting criteria related to stand-off distances and population density and distribution. The allowable population limits, however, would be tied to the average population density of the region. The concept of coupling the permissible population density with the population characteristics of the region provides uniform incentive across the country for locating nuclear power plants on relatively remote sites. Rigid population density limits, on the other hand, provide lesser incentive for remote siting in less populous regions of the country. Flexible limits tied to the average population density of the region are also more equitable in that the social, ecological, and health and safety costs of nuclear-generated electric power would be borne by the same portion of our society that is deriving the benefits from such generation.
7. In Section 108(a)(B) of the proposed revision, a reference to an allowable minimum exclusion distance was added because the staff believes that it has sufficient insight into siting to permit establishing a fixed minimum exclusion distance that no longer would be dependent upon difficult to justify dose calculations. Staff experience indicates that such distance could be in the range of 1/2 mile based upon risk from design basis accidents to individuals in the vicinity of the plant.

8. In Section 108(a)(C) of the proposed revision, a reference to an allowable minimum emergency planning distance was added. For the reasons discussed in 6 above, the staff believes that this distance can be fixed for all plants and would be in the range of 10 miles.
9. Section 108(a)(D) was added which would establish fixed stand-off distances from hazardous activities and severe natural phenomena. Such fixed distances would improve the licensing process by enhancing licensing predictability and ending unproductive prolonged technical negotiations involved in demonstration of engineering adequacy. The staff believes that requiring such fixed stand-off distances would not significantly limit the number of otherwise viable nuclear plant sites.
10. The concept of selecting sites that will limit the overall risk from energy generation was added since it fosters the idea that availability of nuclear power should not be limited only to those regions of the country in which population density is low; but rather that nuclear power be available to all regions of the country even though the societal risk in more densely populated regions would be proportionately greater. This is because energy generation from any source has its associated risks, with risks from some energy sources being greater than that of the nuclear option.
11. Option B - Pros and Cons
 - Pros:
 - a. Makes the amendment consistent with the Siting Policy Task Force recommendations.
 - b. Provides an amendment at the same level of specificity as intended by the framers of the original amendment.
 - Cons:
 - a. Requires the Commission to make a quick assessment of most of the Siting Policy Task Force recommendations and reach general conclusions prior to a detailed review of the recommendations.

Option C

The Commission provide modified language for the proposed amendment, including provisions of general nature consistent with the goals of the Siting Policy Task Force Report.

Enclosure 3 provides recommended new language of the amendment. This option is similar to Option B in all respects with exception of the level of specificity of the proposed requirements. For this reason, the discussions of the time requirement and of the elements deleted from the original proposed amendment presented under Option B apply also to this option and therefore will not be repeated. In this

option the specific language of the requirements which appear in Option B is replaced by much more general language.

These general requirements are consistent, however, with the three goals that the Siting Policy Task Force had in mind when making the specific implementing recommendations in its Report (NUREG 0625).

1. Section 108(a)(A) would require the Commission to strengthen siting as a factor in defense in depth by establishing requirements for site approval that are independent of plant design consideration.

The present policy of permitting plant design features to compensate for unfavorable site characteristics has resulted in improved designs but has tended to deemphasize site isolation.

2. Section 108(a)(B) would require the Commission to take into consideration in siting the risk associated with accidents beyond the design basis by establishing population density and distribution criteria.

Plant design improvements have reduced the probability and consequences of design basis accidents, but there remains the residual risk from accidents not considered in the design basis. Although this risk cannot be completely reduced to zero, it can be significantly reduced by selective siting.

3. Section 108(a)(C) would require the Commission to require that sites selected will minimize the risk from energy generation.

The selected sites should be among the best available in the region where new generation capacity is needed. Siting requirements should be stringent enough to limit the residual risk of reactor operation but not so stringent as to eliminate the nuclear option from large regions of the country. This is because energy generation from any source has its associated risk, with risks from some energy source being greater than that of the nuclear option.

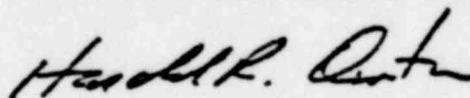
The above three concepts have been discussed in much greater detail in Section 3 of the Siting Policy Task Force Report (NUREG 0625).

4. Option C - Pros and Cons

- Pros:
- a. Provides maximum flexibility to NRC.
 - b. Permits the Commission to avoid taking specific positions on siting policy prior to a thorough review of the Siting Policy Task Force recommendations.
- Cons:
- a. Results in a less specific amendment than originally intended by Congress.
 - b. Could be interpreted as a lack of openness with Congress in that we appear unwilling to discuss our future plans with regard to siting policy.

Recommendations: The staff recommends that the Commission approve Option B; although Option C would also be acceptable. The Commission provide modified language for the proposed amendment, including provisions consistent with the recommendations of the Siting Policy Task Force Report at about the same level of specificity as the original amendment. A point-by-point explanation of all deviations from the presently formulated amendment would accompany the modified language.

Coordination: The Office of Standards Development has reviewed this paper and concludes that it provides an adequate range of options and covers all important considerations; but favors acceptance of Option C. A memo from Standards which addresses this as well as some other issues raised by this paper is included as Enclosure 6.



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures: -4-

1. Section 108 of S.562 as passed by the Senate
2. Proposed Language for Option B
3. Proposed Language for Option C
4. Proposed Letter to Senator Alan K. Simpson
5. Letter from Senator Alan K. Simpson to J. M. Hendrie dtd 7/26/79
6. Memo to H. R. Denton from R. B. Minogue dtd 8/22/79

Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. Friday, September 7, 1979.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT September 5, 1979, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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