

RESPONSES TO REQUESTS FOR INFORMATION IN THE SRM DATED AUGUST 12, 1993

1. The extent to which the source term can be decoupled from the siting criteria in view of technological advancements

It should be noted that the staff proposal did not represent a complete decoupling of reactor design from siting, but rather established prescriptively an exclusion area size independent of plant-specific source term and dose calculations. The proposed rule was based upon an exclusion area size consistent with the source term and dose calculation results for current and evolutionary reactor designs, employing the TID-14844 source term and a conservative evaluation of fission product removal systems.

Setting a minimum exclusion area distance in the rule independently of individual plant source term and dose calculations would have the benefit of assuring predictability in a licensing hearing context.

On the other hand, setting the exclusion area size prescriptively may serve as a disincentive to the implementation of potentially significant technological advancements in reactor design or fuel factors that could affect radiological consequences, such as improved fission product mitigation systems, or improved retention of fission products within the fuel itself.

2. The technical and safety-related basis for siting criteria as opposed to what the U.S. can accommodate

Some aspects of the technical and safety-related basis for non-seismic aspects of reactor siting criteria are discussed in Enclosure 4, "Revised Source Term, Safety Goal and Severe Accident Insights." As noted in that enclosure, use of revised accident source terms together with a more realistic evaluation of fission product removal systems indicates that an exclusion area distance of 0.25 miles, or less, would satisfy the dose criteria of Part 100. The prompt fatality QHO of the Safety Goal would be met for very small exclusion area distances.

As also noted in Enclosure 4, severe accident risk insights indicate that future reactors could be located virtually anywhere solely from a Safety Goal perspective, even within densely populated cities, and pose very low risk to the population. In the United States, and particularly outside of the northeastern region, it is evident that more stringent siting criteria could be considered and there still would be a reasonable number of potential reactor sites.

3. The extent to which proposed reactor site criteria reflect concerns of potential users in other countries

In order to reflect concerns of potential users outside the U.S., proposed reactor site criteria would need to consider the differing geographic and demographic conditions of other countries. Since these conditions are likely to differ considerably from those in the U.S., as well from country to

country, such criteria would need to be as flexible as possible. Hence, such criteria should be stated in general terms or objectives, and should not include numerical criteria for distances or population densities in the rule itself, but these should be relegated to regulatory guidance. While such a rule would reflect concerns of users in other countries, it may be more difficult to implement in the U.S. (i.e., differing interpretations and reliance on regulatory guides rather than a rule).

Another concept to state reactor siting criteria would be to express them in terms similar to ALARA conditions; i.e., select sites from among the best that are available within the region. This approach is consistent with the NRC review under the National Environmental Policy Act (NEPA) for alternative site considerations and should not cloud safety considerations.

4. The pros and cons of less prescriptive revisions to Part 100 than those issued for public comment

Less prescriptive revisions to Part 100 have a clear advantage of maintaining flexibility in that reactors with different design features or of varying power levels (radioactive material inventory) can be accommodated by use of a suitable methodology. In addition, less prescriptive revisions are more likely to be compatible with potential criteria of users in other countries.

On the other hand, less prescriptive criteria have the disadvantage of the likelihood of increased litigation during licensing hearings with a concomitant increase in uncertainty.

5. The extent to which the reactor siting criteria conform to stated risk objectives, such as the Safety Goals, and the extent to which emphasis should be given to less quantifiable objectives such as defense-in-depth or prudence

As noted in Enclosure 4, based strictly upon stated risk objectives, such as the Safety Goals, the quantitative health objectives (QHOs) of the Safety Goals could be satisfied with a very small exclusion area distance (0.1 miles or less). Since the QHOs impose a limitation of individual risk only, the Safety Goals alone provides no guidance with regard to setting population limits beyond the exclusion area.

Based upon revised accident source terms, a more realistic treatment of fission product removal systems, and maintaining the dose limits currently in Part 100, the staff concludes that significantly smaller exclusion area distances (0.25 miles or less) would satisfy the dose limits.

Based upon severe accident insights, including the risks associated with core-melt and early bypass of or containment failure, the staff concludes that future reactors are expected to pose very low risks to large population centers, even if they were located within such centers. The staff continues to believe, however, that future reactors should continue to be located "away from" densely populated centers as an additional measure of defense-in-depth. Any criteria defining "away from" should provide an additional degree of mitigation, but should not be so stringent as to impact upon the availability

of a suitable supply of potential sites. Implementation of any criteria in this regard is likely to vary significantly from one nation to another, depending upon geographical and population distribution considerations.

6. The appropriate balance between deterministic and probabilistic seismic evaluations

The staff believes that it has achieved an appropriate balance between deterministic and probabilistic seismic hazard evaluations to be used in the revision of the Seismic and Geologic Siting Criteria for Nuclear Power Plants. The key elements of this balanced approach, as presented at the August 3, 1993 Commission briefing, are repeated below (the staff has been referring to it informally as the hybrid approach).

PROPOSED HYBRID APPROACH - KEY ELEMENTS

- TARGET EXCEEDANCE PROBABILITY SET BY EXAMINING CURRENT NUCLEAR POWER PLANTS
- CONDUCT PROBABILISTIC SEISMIC HAZARD ANALYSIS
- CONDUCT SITE SPECIFIC AND REGION SPECIFIC GEOSCIENCE INVESTIGATIONS
- CHECK TO DETERMINE IF GEOSCIENCE INVESTIGATIONS CHANGE PROBABILISTIC RESULTS
- CALCULATE SITE SPECIFIC GROUND MOTION FOR PLANT
- INDEPENDENT STAFF CHECK OF PROBABILISTIC RESULTS AGAINST SIMPLIFIED DETERMINISTIC ANALYSIS
- UPDATE OF DATA BASE AND PROBABILISTIC METHODOLOGY EVERY TEN YEARS

The proposed balance is a probabilistic rule, anchored by the Commission Severe Accident Policy Statement, with a series of thorough site-specific geoscience investigations and a deterministic check by the NRC staff reviewer. The U.S. utility industry through its designated representative, NUMARC, and about a dozen individual utilities has endorsed revised siting criteria that follow a philosophy similar to the philosophy behind the NRC staff's hybrid approach. The U.S. Geological Survey provided a series of comments and recommendations that led to and can be met by the hybrid approach. Therefore, two of the principal domestic protagonists in this revision, NUMARC and U.S. Geological Survey, are, in general, on board with the philosophy of this approach. However, there are still important details on the implementation of that philosophy that must be worked in the comment resolution. One example of these important details is that while the NRC proposed using Standard Review Plan Sec. 2.5.2 to obtain the site-specific ground motion from the controlling earthquakes, NUMARC is proposing a probabilistic scaling technique.

The principal concerns of the foreign commenters are understood by the staff and will be fully addressed in the "Comment Resolution Memorandum". (They are very broadly addressed in Enclosure 2.) Thus, the staff believes that there are no "show stoppers" among the commenters and the staff recommendation is to proceed with the seismic portion of the rulemaking. Additional material concerning the public comments on the seismic portion of the rulemaking are included in Enclosure 2.

7. The extent to which timing of proposed revisions are being driven by the prospects of an early site permit

The schedule for the proposed rule was driven, in part, by the expectation that a utility would apply for an early site permit (ESP) in conjunction with the Department of Energy (DOE) ESP demonstration program. A prospective ESP candidate has not been identified to test the ESP regulations and is no longer likely to be identified in the near term. Hence, the urgency for any proposed revisions of the reactor site criteria has diminished. The staff still believes that a revision to siting criteria is best accomplished absent an application to review an early site permit to avoid any appearance of special favor.

8. The extent to which proposed revisions support the Commission policy of consistent and predictable practice (e.g., the issue of assurance versus flexibility afforded by the proposed revisions)

The proposed revisions to Part 100 support the Commission's policy of predictable practice. Specification of a minimum exclusion area distance and numerical values for population density in the rule would provide assurance of a highly predictable mechanism to resolve site safety issues. However, fixed numerical criteria specified in a rule imply an accuracy that may not be warranted in assessing sites and do not allow flexibility in the event of reactor and plant design differences.

9. Plans to ensure that there is feedback between the source term development effort and the severe accident rulemaking process

The staff plans to ensure that there will be feedback between the development and implementation of an updated source term and any severe accident rulemaking. The staff is currently preparing a paper regarding source term related policy, technical, and licensing issues pertaining to evolutionary and advanced light-water reactor designs. In this paper the staff will propose positions regarding the implementation of updated source terms in licensing of evolutionary and advanced reactors. Approved positions will be used in preparing the staff's Safety Evaluation Reports (SER) for these plants.

In staff paper SECY-93-226, "Public Comments on 57 FR 44513 - Proposed Rule on ALWR Severe Accident Performance," the staff recommended that a decision on the need for generic rulemaking to address severe accidents be delayed at least until after the Final Safety Evaluation Reports (FSER) are issued for the ABWR and the System 80+. In an SRM dated September 14, 1993, the Commission approved this recommendation.