UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

September 16, 1981

Honorable Nunzio J. Palladino
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: REPORT ON PROPOSED RULE ON REACTOR SITE CRITERIA

Dear Dr. Palladino:

During its 257th meeting, September 10-12, 1981, the Advisory Committee on Reactor Safeguards met with the NRC Staff to discuss the status of the proposed rule on Reactor Site Criteria, 10 CFR Part 100. This was also the subject of a meeting of our Subcommittee on Site Evaluation on May 1, 1981. We previously commented to the NRC Chairman on this subject in a letter on February 14, 1980. Our comments on the matter are based on material presented by the NRC Staff during the recent Subcommittee meeting and modified at the full Committee meeting.

1. The supplementary information concerning the proposed rule states that minimum siting criteria can be established independently of an overall safety goal or philosophy and without benefit of any definition of minimum engineered safety features or the basic approach to be taken in resolving the issues raised by the severe accident rulemaking. The Committee does not agree with this approach. We believe that the decision on reactor site criteria should not be made in the absence of either some guiding safety philosophy or sufficiently specific design requirements for nuclear power plants.

2. The proposed rule would eliminate consideration of the possible contamination of ground water due to a serious reactor accident. Unless there is a clear commitment to address this issue as a function of site characteristics for future plants in the severe accident rulemaking, the ACRS believes that hydrologic considerations should not be dropped from the siting rule. In any event, there should be a requirement to examine a proposed site in terms of such considerations, even if related requirements are not specified in the siting rule.

3. The proposed rule has not included possible consideration of major societal resources, other than water resources, the use of which could be seriously impaired or lost for an extended period of time in the unlikely event of a major release of the less volatile fission products. The ACRS suggests that studies be made of this matter, possibly in a manner similar to that used in examining riverine and estuarine sites for the Floating Nuclear Power Plant.

4. The NRC Staff proposal does not differentiate among sites in the eastern portion of the U.S. in terms of the delayed cancer effects that might result from a major accident in a nuclear power plant. The basis for this approach is that the bulk of the estimated collective dose is accumulated in very small increments over large distances from the reactor. The Committee believes that this point of view must be carefully justified if it is to remain an important aspect of the Staff rationale in developing a proposed new approach to siting criteria. The assumptions and bases for judgment concerning these matters should be carefully evaluated for their validity.

5. The Staff described five alternative approaches to specifying demographic criteria. These covered a range of numerical values. The ACRS has the following comments in this regard:

   a) If the rule were to place limits only on the average population density as a function of distance from the reactor, with no limitations on density within an angular sector, the rule would permit a large densely populated city to be located near a plant. For example, for a density limit of 750 people/square mile, a city of approximately 200,000 people could be located between 5 and 10 miles from a plant. This might lead to some problems with implementation of the Emergency Planning Rule which specifies a plume exposure emergency planning zone of 10 miles. Also, the siting of a large nuclear power plant that close to a fairly large city is contrary to the philosophy expressed in the draft Staff document that loss of use of an important metropolitan area should not occur. Furthermore, siting of a large plant so close to a large city would increase the likelihood of an accident involving a considerable number of early fatalities.

   b) The proposed alternatives would allow utilities to use sites having substantial surrounding population densities and these would not necessarily include those sites in the region having the better combination of demographic, hydrologic, and meteorologic characteristics. If this approach is to be taken in the siting rule, it should be with the clear expectation that there will be an as-low-as reasonably achievable, cost-effectiveness criterion imposed in design, over and above the severe accident rulemaking requirements, to provide both an incentive to use better sites and to more nearly equalize the residual societal risks from plants having differing surrounding population densities and nearby natural resources.

   c) One of the proposed alternatives allows inclusion of meteorologic and topologic characteristics in the evaluation of a site. The ACRS suggests that this aspect receive sufficient study to determine the validity of the tentative conclusion by the Staff that meteorological differences among sites are relatively unimportant.

d) On the basis of the studies reported by the Staff, it is not clear whether a population density of 750 people/square mile or a somewhat lower number would be required so as not to rule out the nuclear option (a requirement imposed on the NRC Staff by the Congress). If a limit less than 750 people/square mile is practical, then ALARA considerations would suggest that it receive serious evaluation. This would be consistent with the conservative approach normally followed with respect to reactor safety matters.

e) The Committee is pleased to see several alternatives receiving serious evaluation and recommends that such a broad approach be continued, at least until a firmer basis for decision making exists.

6. The ACRS has several other comments relating to the methodology and analysis discussed by the NRC Staff.

a) The safety goals used in the NRC draft report were based on data developed from a review and assessment of the impact of a wide range of different types of disasters that have occurred in the past and the assumption that the public is willing to accept these levels of risk. Although we understand the purpose of the NRC Staff in evaluating nuclear power plant risks as a function of various assumed population densities, we recommend that they take care to document and explain all of the considerations and assumptions used in making these evaluations.

b) The NRC Staff is using postulated radioactive source terms in evaluating various site parameters. This is a useful technique. It is important, however, that the Staff clearly describe the accident situations which are represented by the postulated source terms. If a weighted combination of these postulated accidents is used as part of any rationale, the basis for the choice of weighting factors should be specified.

c) In assessing the risks of accidents, the only protective action evaluated was evacuation. Even here, a rather simplistic model was used as contrasted to the more sophisticated models that have been developed. We recommend that evaluations of protective actions be made covering a range of times after the accident in which it is assumed that the public is alerted, as well as the application of a variety of countermeasures, including sheltering and the use of radioprotective prophylaxis as well as evacuation.

d) The comparison in the draft document of the estimated early fatalities of reactor accidents with statistically known effects for aircraft crashes, fires, etc. is questionable, partly because of the difference in our knowledge of the uncertainty in the magnitude and frequency of such accidents, and more importantly because aircraft crashes, shipwrecks, and fires do not have associated with them the other large economic, psychologic and health risks associated with a serious accident in a large nuclear power plant.

7. By way of closing remarks, the Committee offers the following:

a) It is important to keep in mind the fact that there is no obvious near term necessity for revising and confirming new siting criteria, independent of other important, ongoing rulemaking activities. For example, a matter warranting more immediate attention is the development of criteria for assessing the addition of new units at existing sites, particularly as this may be affected by the outcome of the severe accident rulemaking. It appears that there may be time for the siting rulemaking to wait for the development of an overall safety policy or goal by the NRC. This action could then be followed by the development of siting criteria that are compatible with the goals.

b) The rule, as finally formulated, must keep in perspective the fact that the safety of a nuclear power plant involves not only the features of the site on which it is located, but also the people who design, construct, and operate it, the engineered safety features which it incorporates, and the emergency preparedness system developed for coping with accidents. Although the Committee encourages the development of minimum acceptable criteria for each of these aspects, we encourage the NRC Staff to keep in mind the close interrelationships involved, and we urge that they assure that any criteria developed will, to the best possible extent, incorporate incentives for the continued upgrading of plant safety.

Sincerely,

J. Carson Mark
Chairman

References - Office Copies Only
1. Report of the Siting Policy Task Force, NUREG-0625, 8/79
2. Advance Notice of Rulemaking: Revision of Reactor Siting Criteria USNRC Modification of the Policy & Regulatory Practice Governing Siting of Nuclear Power Reactors signed by S. Chilk, 7/23/80
3. Notice of Intent to Prepare an Environmental Impact Statement for Revision of the Regulations Governing the Siting of Nuclear Power Plants signed by R. G. Smith, OSD, NRC, 11/17/80