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AMERICAN ELECTRIC POWER Service Corporation

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PHILIP SPORN
President

June 8, 1961

Mr. Harold L. Price
Acting Director of Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Price:

I have reviewed the material prepared by AEC and published in the Federal Register on February 11, 1961, entitled, "Notice of Proposed Guides -- Reactor Site Criteria," 10 CFR, Part 100. In accordance with the invitation included in that publication, I enclose, as an attachment to this letter, my comments and suggested changes in the proposed criteria.

The proposed guides represent in one respect a desirable improvement over the proposal published by the AEC two years ago and on which I commented in my letter to you of August 21, 1959. They establish upper limits on the radiation dosages to which members of the public should be exposed in the event of an unlikely but still credible nuclear incident. This feature of the proposed guides will, I believe, prove helpful to the industry. But I continue to find the proposed guides disappointing in their emphasis on isolation and population factors, and particularly in their failure adequately to stress the relationship between these factors and the engineering design and safeguards of the particular reactor facility.

Much of my difficulty with the proposed criteria stems from Appendix "A". It is not clear to what extent Appendix "A" is intended to freeze into future hazards analyses the assumption that a significant fraction of fission products will be released by accident from the reactor core or the further assumptions and calculations as to the radiation exposures resulting from such an accident. Whatever the intent, however, such may well be the practical effect of its adoption by the AEC. The result is largely to negate commendable efforts elsewhere in the proposed criteria to stress the importance of the individual reactor type and the engineering characteristics of the facility. A further result may be the premature codification of technical standards and data as to which we do not yet have sufficient knowledge and experience. I have therefore urged in the attachment to this letter that Appendix "A" be deleted from the proposed guides. If this is not done, the

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proposed guides should at a minimum make unequivocably clear that Appendix "A" is intended only to be illustrative of the type of hazards analysis which applicants are expected to provide in support of license applications.

While there would be some advantages to the nuclear power industry in having a set of reactor site criteria which could be applied as a rule of thumb to all reactor concepts, this cannot be the case as long as reactor concepts are in different stages of development, have different accident potentials, and may have altogether different engineering safeguards. We need to bear constantly in mind that engineering safeguards can often compensate for unfavorable site characteristics. We must be extremely cautious that in our zeal to assure the safety of the public we do not penalize those reactor concepts for which the technology is well-known and those facility designs which are conservatively engineered by establishing site criteria which meet the requirements of less well-known concepts of less conservative designs. We must be careful also in establishing site criteria not to freeze site requirements on the basis of today's knowledge and technology. Until we have more knowledge and experience with nuclear plants, we must necessarily be conservative in evaluating the likelihood of serious accidents and in our calculations of radiation exposures that might result. At the same time site criteria need to be flexible enough to allow for growth in our knowledge and experience. Assumptions about accidents and their consequences which prudence requires us to make today are likely in time to prove either unrealistic or too conservative.

Sincerely,

Philip Sporn

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Comments and Suggestions on Proposed Site Criteria to Accompany Mr. Philip Sporn's Letter of June 8, 1961

Statement of Considerations. Subparagraph (b) of this statement should, in my opinion, be deleted. It implies that even after all credible accidents have been considered, some further factor of conservatism of undefined proportions needs to be applied to site evaluations against the contingency that a "more serious incident not normally considered credible" might occur. It requires that reactors be so located in such event that "the number of people killed should not be catastrophic."

The wording of subparagraph (b) is unfortunate and may give rise to unjustified public apprehensions. But the main difficulty with the subparagraph as a statement of objectives is that it is so lacking in definition as to be unworkable. I see no alternative in evaluating reactors and their location than for experts to come to conservative conclusions as to the types of accident which might occur, including the maximum nuclear incident which is plausible enough to warrant consideration, and to base their safety determination on this judgment. The proposed guides will in practice provide very little guidance if licensing officials are expected to apply some further undefined margin of safety in order to take care of unidentified contingencies which technical experts do not consider credible.

I suggest deletion also of the last sentence of subparagraph (c). The preceding sentence states that the Commission is considering establishing, for large population centers, lower limits on maximum dosages than those contained in Section 100.11; if so, it is entirely appropriate to advise potential licensees of this fact. It does not follow, however, as stated in the last sentence, that this will necessarily result in greater population center distances than suggested by the proposed guides. Engineering safeguards and other considerations may more than offset distance factors. In any event, the potential dosages to which population centers might be subjected, and not arbitrary distances, should be the determining consideration.

Section 100.2 -- Scope. The second paragraph of Section 100.2 states that the proposed site criteria should be applied with "additional conservatism" to reactors which are "novel in design, unproven as prototypes, and do not have adequate theoretical and experimental or pilot plant experience." Conservatism in this instance is equated by the proposed guides to additional isolation.

I certainly do not argue with the principle that we ought to be conservative about unproven reactor types. The conservatism should be applied, however, to the safeguards which need to be incorporated in the reactor facility and to the analysis of the probability and consequences of an accident, and not in some unrelated manner to the determination of site distances. If the reactor is unproven, and

compensating safeguards are not provided, it may well be necessary to take into account types of accidents which can be ruled out for other concepts. Similarly, if an unproven reactor is thought much more likely to produce a serious incident than other concepts, it would not be unreasonable for AEC to cut back the radiation limits to which the public might be exposed simply on the grounds of greater probability of exposure. The important thing is that the hazards potential of the facility be carefully explored by competent technical personnel before coming to a judgment about the site.

The net result of applying "conservatism" to the reactor hazards evaluation may, in a given case, produce the same net result as an effort to apply such conservatism directly to site distances. But the difference in approach is important. The first approach assures that site requirements will in the end be controlled by technical considerations and will reflect the discipline of a careful examination of the potential hazards of the reactor facility in question. The danger in the second approach is that site requirements will be established on the basis of arbitrary rules not tied to specific technical considerations or safety analysis.

I suggest therefore deletion of the second paragraph of Section 100.2. Instead, I would incorporate elsewhere in the proposed guides the concept that conservative assumptions may have to be made about potential accidents and releases of radioactive material for unproven reactor types. The converse of this principle should also be stated, i.e., that as we come to have more knowledge and experience with established reactor concepts, we can reasonably expect that assumptions about the probability and consequences of accidents need be less conservative than at present.

I also suggest that the first paragraph of Section 100.2 be revised to refer to applications for "facility licenses" instead of applications for "construction permits and operating license". Those familiar with AEC licensing procedures will realize that an applicant files simultaneously, at the beginning of his project, for both a construction permit and an operating license, and that AEC's formal site review takes place at this time. Those not familiar with AEC licensing practice may assume that AEC intends two site reviews -- one at the construction permit and one at the operating license stage of licensing proceedings. AEC should not, of course, be precluded from taking a second look at the reactor and its site at the time of the operating license if technical knowledge or other circumstances have altered markedly since the issuance of a construction permit. But AEC's intention should be to settle the matter of site approval at the construction permit proceedings.

Section 100.10 -- Factors to be Considered When Evaluating Sites. Greater emphasis needs to be placed in this section on the relationship between engineering design, including special safety precautions, and the suitability of the reactor site. A particular site is safe or unsafe only in relation to the facility proposed to be located on the site and to the potential release of radioactive materials from that facility. Recognition of this principle is, of course, already reflected in the Statement of Considerations and, to some extent, elsewhere in the proposed guides. The point could be further emphasized, however, through other changes in the wording and arrangement of Section 100.10. The order of the "factors to be considered" might well be reversed, so that paragraph (c) would appear first, in the interest of giving added emphasis to the importance of engineering design. The last sentence of paragraph (b), which points out that unfavorable meteorological, geographical, and hydrological site characteristics can be compensated for by engineering safeguards, could equally be made applicable to paragraph (a) relating to population densities and distance from population centers. The last sentence of subparagraph (b) (3) could be revised to read: "If reactors are located at sites where radioactive liquid effluents might flow readily into nearby streams or rivers or might find ready access to underground water tables, special engineering precautions must be taken." This wording better reflects the fact that a reactor designer can through conservative design compensate for site characteristics which are less than those most desirable.

Section 100.11 -- Determination of Exclusion Area, Low Population Zone, and Population Center Distance. While the intent of this section is not entirely clear, it appears, when taken with Appendix "A", to require that all applicants must assume in their hazards analyses a core melt-down and release of a significant fraction of the fission product inventory to the interior of the containment structure, such as might occur in the case of water-type reactors from a loss of coolant following rupture of the primary system.

I do not quarrel with the necessity for this assumption in the present state of technological development. Even with reactors which use water as a coolant, and despite the excellent record of the utility industry with pressurized water systems in conventional plants, the possibility of a primary system rupture cannot be entirely discounted in view of the limited experience with some of the materials used in the reactor system, particularly under radiation conditions. But surely there should be room in the proposed guides for the possibility that from accumulated experience and technical progress we will learn that a severe rupture of the primary cooling

system is not a credible accident or that protective measures, such as a safety injection system, can be counted on to prevent destruction of the core.

It is also not clear to what extent other assumptions and numerical values contained in Appendix "A" are intended to control the applicant's hazards analysis. Whatever the intent, however, the inclusion of Appendix "A" with the proposed guides seems bound to have, to a considerable degree, the practical effect of freezing stated assumptions and numerical values. At best, Appendix "A" will shift to the applicant the burden of justifying the use of other assumptions and values. At worst, it may impose on the applicant assumptions and values which are not applicable to his reactor concept or which fail to reflect current technical judgments.

I urge therefore that Appendix "A" and all references to it be deleted from the proposed guides. Instead, the Commission would perform a more useful service for the nuclear industry by publishing from time to time in technical journals and papers sample hazards analyses for a variety of reactor plants.

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