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LOS ANGELES
WASHINGTON, D. C.
HONOLULU, T. H.

June 28, 1959

Mr. Harold L. Price, Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Price:

Enclosed are my comments covering the notice of the proposed rule on reactor site evaluation. It is fully appreciated that the AEC in attempting to set forth guide lines in any part of reactor safety is undertaking an ambitious assignment which regardless of the outcome can never hope to be favorably received by all people in the nuclear fraternity.

The decision to ask for comments from industry is encouraging. It is hoped that the attached statements will be of interest.

Very truly yours,

HOLMES AND NARVER, INC.

B John Garrick

B. John Garrick
Chief Nuclear Scientist

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General.

Much has been said or written about what constitutes a reactor hazards evaluation, including site selection. There have emerged different philosophies of approach to the problem. The more popular approach and the one which the subject AEC criteria implies is the concept of multiple defenses. This is the concept whereby an infinitesimally small probability of risk is achieved by compounding the already small probabilities associated with the failure of any one of several lines of protection. If the reactor system in order to achieve an acceptable risk factor has to rely on site properties as a final line of protection, the site and its ability to restrain or transmit radiation becomes an important issue.

The adoption of the multiple defenses concept is a sound approach, particularly at the beginning of a new industry such as nuclear. On the otherhand, if allowed to become too strongly established it can lend itself to resisting the streamlining of the art. Segregating site requirements from reactor safety requirements has a tendency to encourage the assumption that all test and power reactors are going to impose their radioactivity to the site in sufficient quantities as to become a possible hazard. This may be true, but the concern is that the door might be closed to the possible fact that by the design and within the limits of credibility a reactor facility can be independent of certain site safety criteria. The criteria presented deals with the size of the pan catching the water from the leaky roof but does not allow for elimination of the pan by fixing the roof.

Specific.

With respect to the criteria I have the following specific comments:

Exclusion Distance Around Power and Test Reactors. It is quite understandable why the AEC gave some numbers for typical exclusion distances. The advantage of such information is appreciated for it quickly gives an indication of the order of magnitude of land required to support the operation of a reactor. However, the information which would be of equal value would be the basis used by the AEC to arrive at the suggested exclusion distances. It is suspected that this basis derived from the direct radiation accompanying a maximum credible type contained accident with a possible contribution from the radioactive cloud resulting from containment leakage. The availability of the assumption used by the AEC would greatly assist the hazard analyst in selecting, for example, the emergency dose value to be used and the general

type of release considered to be credible. Furthermore, the availability of such information would promote the possibility of reducing or increasing the exclusion distance as more research information becomes available. In any event, there is some apprehension about the use of numbers in the context of rules and regulations where traditionally they have been found to become fixed and long before they are revised obsolete.

Should the above guesses on the basis of the exclusion distance numbers be true at least one concept can be cited where such basis could be argued. For example, although not now a common practice in this country, it might be that both the direct radiation and leakage criteria for all practical purposes could be eliminated by going to an underground concept of containment. Criteria vulnerable to restricting the imagination of the reactor designer should be discouraged.

Finally, the statement that test reactors may require more exclusion distance than power reactors of equal power lends itself to being misinterpreted. It certainly may be a fact, but to earmark the test reactor as especially dangerous, when it is so dependent on existing circumstances, seems to be without basis.

Population Density in Surrounding Areas. It is agreed that absolute control should be maintained out to distances where under any condition deemed credible there could be detectable biological effects inflicted. Beyond that, however, it is difficult to appreciate the need for a certain distribution of people. In my mind, it is hard to justify jepordizing the health of ten people but not a hundred, or a hundred but not a thousand, etc. Admittedly, reactor safety is non-exact, but I contend that we can start getting bold in certain areas and population distribution appears way overdue.

Meteorological Considerations. It has for some time been my opinion that meteorological information contained in most hazards reports was nothing more than window dressing. It is difficult to see the need for anything other than average, adverse and peculiar (e.g., hurricanes, tornadoes, etc.) meteorological conditions associated with a given site. As a matter of fact it appears that the only real concern is the definition of adverse conditions. Considering test reactors, for example, there appears to be general agreement among engineering experts that the low pressures (1-6 psig) in containment vessels associated with maximum credible type accidents would require only a few hours before reaching equilibrium with the outside air. Under these circumstances, i.e., a day or so of fission product driving force, it would be unsound to assume anything other than adverse meteorology. The

dividends come from having to consider a pressure gradiant only over a short period of time -- a more meaningful and simpler assumption than assuming a constant overpressure over a long period of time involving average meteorological conditions. In the case of some power reactors where large amounts of stored energy are available, it is conceivable, but not probable, that an overpressure would persist for several days. In such cases the use of meteorological data accounting for the daytime-nighttime cycle is in order.

Seismological Considerations. I am in full agreement with the general statements made since earthquakes unlike the other criteria presented have the capability of being an accident initiating mechanism.

Hydrology and Geology. Somehow I can't help but believe that the problem of designing a reactor system capable of confining its radioactive liquids in any disposition is no more difficult than designing a fast reactor core to melt in a safe geometry. I have confidence that the later is possible. Whatever criteria are presented covering hydrology and geology, the tendency should be to encourage the practice of complete accountability of all radioactive liquid effluents -- a practice already claimed by certain existing reactor facilities. It is interesting to note the mentioning of the desirability of impermeable soils over ground water, etc. Again I think this is too restricting to the imagination. It is conceivable that a site near a very large body of water, such as an ocean, would have ground water movement, away from domestic water users and towards the ocean offering an infinite dilution capability. In such a case, the preference would be no protective soil. A gross discharge of radioactive liquids into a sink of the type mentioned could be of little or no consequence while a similar discharge into impermeable soil could lead to confiscation of the immediate site.

Conclusion.

The above comments, which pertain only to test and power reactors, are my initial reaction to the proposed criteria. What I am saying may not be evident but I think I'm saying that the AEC could help most by making available to the nuclear industry its methods of review rather than its approval requirements (whether they be specific or general). There is a difference -- the former in my opinion leaves the field wide open to imaginative analysis while the latter tends to be restrictive.

So far as site selection is concerned at the risk of showing my naivity, I believe the most satisfactory solution would

be regulations requiring some sort of site approval or blessing by the AEC prior to the construction permit stage. This would force the AEC and industry together during the most crucial period of the overall reactor safety studies. I think the availability of site criteria would be nice but somehow I can't help but feel we are starting with the last line of defense when we should be starting with the first.

B. John Garrick