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General Manager

MAR 27 1961

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Original signed by
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COMMENTS ON PROPOSED REACTOR SITE CRITERIA

HS:JRH

The following comments on the reactor site criteria, Staff Paper AEC-R 2/19, are based on NRTS operational experience and field studies on uncontained research and test reactors.

The techniques of thyroid dose calculation and parameters used are realistic in light of present knowledge. No mention is made of ingestion dose in dairy farm areas, techniques of whole-body dose calculation, and bone dose from the long half-lived bone seekers. Re-erosion of deposited Strontium and Cesium could increase the problem. For areas with a high incidence of precipitation, rainout should be considered an even more hazardous diffusion case.

We believe that the proposed regulation overemphasizes the dose due to Iodine. ORNL studies have shown that as the operating time of a reactor increases, the dose to the bone and lung will be greater than the thyroid dose. Specifically, if the operating time of the reactor exceeds 45 days, the dose to the bone from inhaling one microcurie of the isotopic mixture expected from an accident will exceed the dose to the thyroid. Similarly, after 85 days of operating time, the lung dose will exceed the thyroid dose. In view of this, the bone exposure becomes the criteria controlling the hazard. Therefore, since power reactors are being designed for very long operational life, emphasis should be placed on the bone and lung doses and not on the thyroid dose.

Although the methods of estimating maximum credible accidents and the computation of diffusion in the atmosphere are far from an exact science, these techniques have not changed appreciably in the past 10 years. Hazard reports are, for the most part, extremely similar in their approach. There is little likelihood of significant changes in methodology in the foreseeable future, so that an interim set of criteria for reactor siting seems feasible until such changes are justified. The belief that a set of reactor siting criteria will stifle imaginative thought and progress is of questionable validity.

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The city center distance is defined as the "boundary of a large population center." There is the problem of population shifts due to normal city expansion and the tendency for workers to move near the place of their employment. Therefore, it may not be practical to talk about a population center distance that is subject to major change during the lifetime of the reactor plant.

Circular exclusion and evacuation areas of certain radii can be questioned based upon observed and computed air concentration and deposition patterns. This is particularly true for regions where winds usually blow along certain directions, such as valley-mountain winds confined along the valley axis, or channelled winds along river valleys. This is even more striking if winds of one direction are associated primarily with temperature lapse conditions, and winds of the opposite direction are associated with inversions. Long period integrated air concentration or deposition isopleths, as well as computed mean diffusion isopleths of relative concentration, are more elliptically shaped along the prevailing wind direction. Therefore, elliptically shaped exclusion or evacuation areas are preferable to circular areas. Enclosed is a sample isopleth for the southern part of the BRTR to demonstrate this approach.

The criteria specify dose limits of 25 rem to the whole body and 300 rem to the adult thyroid. Neither dose limit has been endorsed by the Federal Radiation Council or the AEC. This working approach should receive RMC consideration at an early date to prevent possible embarrassment at a later time.

One of your basic concepts on site evaluation is that a catastrophic accident will not occur. The term "catastrophe" needs definition since the meaning changes with different professional groups. To the safety engineer, it means five or more fatalities. The frequent publishing of technical papers by the Hazard Evaluation Branch would be of considerable help in understanding the working approach used in making judgments on the adequacy of proposed reactor sites.

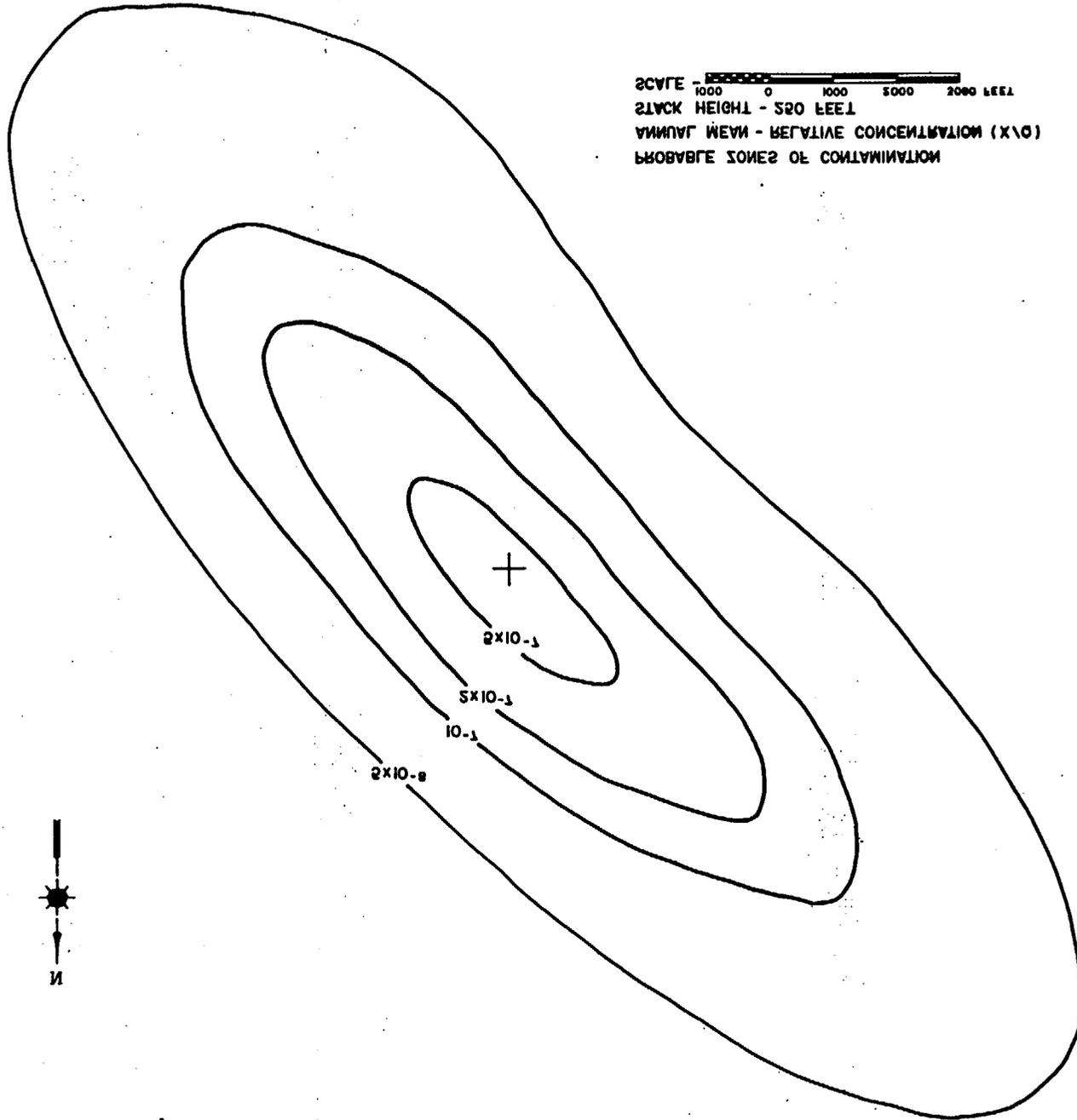
The adoption of the criteria will be a very useful technical contribution to the understanding of reactor safeguard considerations by industry and government.

Enclosure:
Sample isopleth

cc: Dr. F. K. Pittman, Director, BRD (w/o encl.)



SCALE 
STACK HEIGHT - 520 FEET
ANNUAL MEAN - NEGATIVE CONCENTRATION (%V)
POTENTIAL ZONES OF CONTAMINATION



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