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50-247

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1821 Jefferson Place, N. W.
Washington, D. C. 20036

In the Matter of Consolidated Edison Company of New York, Inc.
Indian Point Nuclear Generating Unit No. 2
Docket No. 50-247

Dear Mr. Trosten:

Pursuant to an agreement between counsel for the applicant, Citizen's Committee for the Protection of the Environment, and the AEC regulatory staff (transcript pages 4591-4592 of subject proceeding) there is forwarded herewith a statement by the regulatory staff on organic iodides. This statement has been prepared as a result of previous answers by the staff to specific inquiries from Mr. Richard Cruger, which we feel were not intended to summarize the staff's position on the entire subject of organic iodides. The attached statement outlines the reasoning which has led the staff to conclude that the numerical value for the fraction of organic iodides stated in Safety Guide 4 represents an extreme upper limit value, and is adequately conservative for site evaluation purposes.

Sincerely,

Myron Karman

Myron Karman
Counsel for AEC Regulatory Staff

Enclosure:
As stated

cc: Anthony Z. Roisman, Esq.
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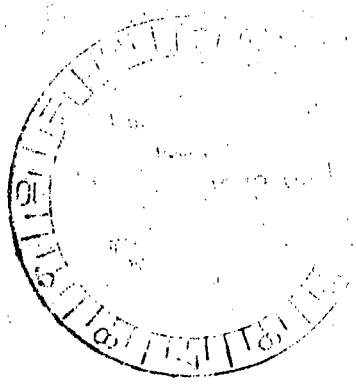
hearing

Organic Iodides

The release of iodine from the core, and the fractional conversion to organic iodides, can both be discussed in terms of the entire equilibrium core iodine inventory for specific lengths of operation at known power levels, or alternatively related to specified fractions of this inventory. In analyses by the AEC regulatory staff the model given in TID-14844, which specifies that "the maximum credible accident will release into the reactor . . .50 percent of the halogens" and "fifty percent of the iodines in the containment vessel is assumed to remain available for release to the atmosphere" has been applied for siting evaluations. The fraction of the iodine assumed available for release is therefore 25% of the entire core inventory. All data for iodine release used by the regulatory staff are normalized to the above release fraction.

Experimental data on organic iodide formation analyzed by the regulatory staff have all been normalized in terms of the entire gas phase inventory of elemental iodine (e.g. Table II of the attachment to the Oct. 4, 1971 letter to Mr. Cruger). Since TID-14844 refers to a total amount of airborne iodine, with no subsequent plateout, the two are directly comparable. On the basis of an extensive literature review and theoretical analysis, the regulatory staff has concluded that, following a hypothetical loss-of-coolant accident, a maximum of 10% of the gas phase iodine should be considered to be in the form of organic iodides and other difficult to remove species for the putpose of siting evaluations. This numerical value is equivalent to 2.5% of the entire core iodine in terms of mass of iodine converted. In terms of the initial release to the containment specified in TID-14844 of half (50%) of the iodine inventory, this would be equivalent to 5% of that fraction.

In previous testimony during the ASLB hearings on the operating license for Indian Point 2 the staff has also made reference to a time dependent model, where 50% of the core inventory iodine reaches the containment and is subject to rapid plateout. Since this mechanism leads to rapid depletion of the entire airborne iodine, which constitutes the principal source term for organic iodide formation, such an assumption would be expected to result in a greatly decreased organic iodide production. In effect, a model which is based on a time-dependent plateout mechanism leads to a significantly smaller organic iodide fraction than a model which allows 25% of the entire iodine inventory to remain airborne indefinitely. The operation of an iodine removal system , such as sprays or filters, would further diminish the available quantity of airborne iodine and reduce the quantity converted to organic iodides.



As noted in the attachment to the letter of October 4, 1971, as well as in BNWL-319 and elsewhere in the literature, the fractional conversion of elemental iodine to organic iodides is dependent on a number of variables, including the total iodine concentration, presence of organic contaminants or carbon oxides, temperature, radiation, and type of containment surfaces. Literature references must therefore be evaluated in the context of the total situation and its approximation to the very severe conditions imposed by the criteria of TID-14844 and the predicted post-LOCA environment. Low gas phase concentrations of elemental iodine can be predicted to lead to relatively large fractional conversion to organic iodides, but the total resultant concentration of organic iodides would be far below that obtained for the case of a smaller fractional conversion of a much larger initial elemental iodine inventory. This general relationship has been observed in all experimental results, where larger percentages of organic iodides are invariably associated with very small total iodine concentrations. Therefore, numerical values for percentage conversion to organic iodide are meaningless by themselves without reference to the total concentration of iodine as well as to the associated environmental conditions.

The conclusions of the regulatory staff with respect to the subject of organic iodine formation may therefore be summarized as follows:

1. The fraction of airborne organic iodides is conservatively taken as 10% of 25% of the entire core iodine inventory (2.5 of the entire core iodine inventory).

2. The above fraction is only applicable to a situation where 25% of the entire core iodine inventory remains airborne indefinitely.

3. Taking the hypothetical case of a 50% release of the entire core iodine inventory, followed by rapid plateout, the organic iodide fraction would be much lower than for the current regulatory staff model because of source term depletion. Nonetheless, normalization of 2.5% of the entire core iodine inventory to this 50% release would yield 5% equivalent organic iodides.

4. Sprays and other iodine removal mechanisms would reduce the conversion to organic iodides by virtue of rapid source term depletion and removal of available iodine.

5. Literature values for organic iodide conversion must be analyzed in the concept of total iodine concentration and similarity of environmental conditions. High fractional conversion of very low elemental iodine concentrations are expected, with decreasing fractional conversion as the elemental iodine concentration increases. For iodine concentrations in the range of those stated in TID-14844, both the predicted and observed fractional conversion to organic iodides becomes very small and would seldom be expected to exceed 1% of the total gas phase iodine. The regulatory staff is convinced that its proposed value for organic iodide conversion is conservative and has not been exceeded in any experimental determination carried out under simulated loss-of-coolant conditions.