POOR ORIGINAL

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METROPOLITAN EDISON - THREE MILE ISLAND - RESPONSE TO REQUEST OF JULY 10, 1967 - ITEM 2.4

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Insufficient experimental information is available at present to give a definitive answer on the effectiveness of thiosulfate spray system as a fission product iodine removal mechanism. Only a speculative answer to the question can be given at this time.

Most of the information suggesting that iodine removal by sprays may be feasible is based on theoretical papers by V. Griffiths (AHSB(s) R 45- 1963) and by A. E. J. Eggleton (AERE - R 4887 - 1967), both of the United Kingdom Atomic Energy Authority. No experimental work under simulated accident conditions has been performed to date to verify the theory. A number of laboratory scale experiments using both sodium thiosulfate and hydrazine have indicated, however, that this may be a feasible method of removing inorganic molecular iodine from the vapor phase. The removal of iodine associated with particulate matter or of organic iodides, which may constitute a large fraction of the total iodine inventory release, has not yet been shown to be very effective by this technique. Westinghouse, on July 12, 1967, presented to DRL a summary of their results on the chemcial and thermal stability of sodium thiosulfate solutions as well as their analysis of corrosion tests. In the presence of oxygen a pH of 9 or higher, obtained by the addition of 0.15 molar sodium hydroxide, is required to prevent rapid loss of iodine reduction capability. An independent corroberation of their findings by a disinterested laboratory would appear to be highly desirable. Several weeks previous to this, ORNL presented to DRL their proposal for a major experimental effort to determine the removal capability of containment spray additives for halogen removal. This project is just now in its initial stages and no really definitive answers can be expected for perhaps one year. The work at other laboratories, especially BNWL, is at a similar stage.

The conclusion one necessarily comes to at this stage is that sodium thiosulfate as an additive to containment sprays holds promise as a mechanism for removing the molecular iodine from the gas phase following a design basis accident. Steam condensation on the drop surface, incomplete mixing, etc., may considerably diminish the theoretical efficiency. The removal capability for organic iodides and particulates-associated molecular iodine remains to be demonstrated.

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