



Mr. James Wilson
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Proj 669

April 14, 1994

Dear Mr. Wilson:

In an attachment to a July 30, 1993 EPRI/ALWR letter to NRC, the ALWR Program and General Electric provided information to the staff which supported the position that, for BWRs, the organic iodide fraction is considerably lower than the 0.25% specified in the draft Source Term SECY. This lower organic iodide fraction is due to the relatively large water volume in the BWR containment which retains greater quantities of dissolved I_2 and reduces the dose rate for radiolysis, and the lower fraction is considered to be consistent with NUREG/CR 5732. The July 30 letter proposed 0.05% as a conservative value for BWR organic iodide fraction. The BWR organic iodide issue was also noted in the March 17, 1994 ALWR Program letter to NRC's W.T. Russell.

At the March 9, 1994 meeting between the ALWR Program and the NRC on source term issues, the staff commented that Section 2.5 of NUREG/CR 5732 included a BWR sequence (Peach Bottom TC2) with 3.1% HI from revaporization of CsI deposited on RCS surfaces and stated therefore that it may not be appropriate to reduce the BWR organic iodide fraction since the HI would be a source of organic iodide. The purpose of this letter is to provide additional information to the staff on this comment. The ALWR Program notes the following:

- We are unaware of any evidence that HI is a significant source of organic iodide. To the contrary, work since the early 1970s strongly suggests that elemental iodine (along with organic material) is necessary to produce significant amounts of organic iodide. This work includes the following:
 - The 1972 Postma and Zavadoski report (BNWL-B-213) which evaluated 69 experiments to determine the degree to which organic iodide could form within the containment. The only significant organic iodide formation was from elemental iodine.

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- NUREG 0772, published in 1981, which indicates in Sections 5.3.9 and C.7 that I_2 is the principal source of organic iodide.
- NUREG/CR-2493, a 1982 report by G. Bell, which indicates that iodine as an iodide does not form organic iodides.
- NUREG 0956, published in 1986, which reported on samples from the LOFT FP-2 test which indicated that I-131 as I_2 was being converted to CH_3I .
- The 1987 Nuclear Safety paper, "Organic Iodide Formation During Severe Accident in Light Water Reactor Accidents," by Ed Beahm et al, which states that three factors are important in forming CH_3I : radiation, organic material, and iodine as I_2 . The paper also stated that the conversion to CH_3I as a function of pH indicates that I_2 is the species that is reacting to form CH_3I .

(2) Only a fraction of the CsI released from the damaged core will deposit in the RCS (otherwise there would be no source term in containment to leak out - NUREG 1150 estimated ~50% retention in the RCS) and only a fraction of this deposited amount will be revaporized (NUREG 1150 estimated the iodine revaporization as ~5 to 10% - no reactor vessel head failure is assumed for the ALWR DBA source term because of eventual reflood of the reactor vessel). Assuming ~75% iodine release from the damaged core, 50% deposition in the RCS, and 10% revaporization, the HI fraction for an ALWR would be $(.031)(.75)(.5)(.1) = \sim 0.1\%$. Thus even if HI could produce some organic iodide, the contribution would be negligible.

For these reasons, the ALWR Program considers that the NUREG/CR 5732 evaluation of CsI revaporization for the Peach Bottom TC2 sequence will not change the industry conclusion regarding the BWR organic iodide fraction.

Please contact Dave Leaver (415 948 8242) or General Electric's Bill Usry (408 925 3460) if you have further comments or need of additional information on this matter.

Very truly yours,



John D. Trotter
ALWR Regulatory Interface

cc: R. P. McDonald
J. Santucci