TO: A. J. Miller

SUBJECT: Tritium Injection into a Flowing Sodium Fluoroborate Salt Thermal Convection Loop

Quite a bit of effort has been expended to investigate the possible disposition of tritium which would be produced in a molten salt reactor. Since tritium exchanges with the normal hydrogen in hydrogenous compounds, the exchange of tritium with the hydrogen in hydroxyfluoroboric acid or in some other unidentified compound in the fluoroborate salt would prevent excessive amounts of tritium from reaching the steam system. This exchange has not been shown in a flowing system.

I am proposing the injection of 2 curies of tritium (an amount agreed upon by Westbrook of Health Physics to be reasonable with the available facilities and agreed upon by Analytical Chemistry as an amount which can be counted in the salt) into the loop. The tritium comes in a glass ampule (~0.75 cm³, 2.59 curies/cm³) which will be enclosed in a bulged portion of a copper tube which will be in the standpipe and which will extend through the ball valves into the flowing salt system. Enclosed is a schematic drawing of the loop system. Prior to releasing the tritium, a flow of He and BF₃ will be established through the tube, over the ampule, and into the salt. At a given time the ampule will be broken and the tritium will be carried into the salt. An infra-red sniffer and perhaps a tritium counter will be available to get some idea of how much T₂ diffuses through the walls. By virtue of the hood area over the loop, no problem would be anticipated from a safety point of view if all 2 curies were released into this area. Salt samples will be taken periodically and analyzed by Analytical Chemistry to determine how much tritium remains in the salt.

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