UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

December 11, 2020

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Request for license amendment and adjustment of tritium effluent values for new D_2 cold source under 10 CFR 20.1302(2)(c)

Ref: Docket 50-184, TR-5 Facility License

Sirs/Madams:

The NIST Center for Neutron Research (NCNR) Test Reactor (NBSR) is in the process of designing and building a liquid deuterium cold source to replace the current liquid hydrogen source. NRC reviewed the original liquid hydrogen cold source and concluded in a letter of May 17, 1993, that no unreviewed safety question existed and that it could be implemented under 10 CFR 50.59. Analyses of the proposed liquid deuterium cold source show that, similar to the original liquid hydrogen cold source, there is no credible scenario that could affect the reactor. However, pursuant to 10 CFR 50.59(c)(2)(viii), a license amendment is requested for a new method of evaluation to adequately evaluate the tritium dose from a hypothetical release of gaseous deuterium.

In 10 CFR 20, Appendix B, a licensee is instructed to treat effluent concentrations of HT or T_2 (and, by inference, DT) gas as equivalent to tritiated water. Appendix B incorrectly states that "... HT and T_2 oxidizes in air and in the body to HTO." The International Committee on Radiation Protection, in ICRP-66 states that only about 0.01% of the HT is absorbed and converted to HTO. Thus, in accordance with 10 CFR 20.1302(2)(c), the NCNR is requesting the commission approve the use of actual chemical characteristics of gaseous DT in using the ICRP-66 gaseous tritium dose conversion factor in lieu of the 10 CFR 20 Appendix B instruction to treat as tritiated water. As the attached analysis shows, proper use of ICRP values for gaseous DT will result in public doses well below 10 CFR 20 limits and is easily bounded by the maximum hypothetical accident calculated doses. However, as this is a change in analysis methodology as defined by 10 CFR 50.59(c)(2)(viii), the NCNR is also requesting a license amendment to use this analysis in Chapter 11 of the UFSAR.

NIST

As is the case for the current cold source, there appear to be no potential adverse effects on the reactor, so no technical specifications need to be changed.

Respectfully,

Robert Dimeo
Director

I declare under penalty of perjury that the foregoing is true and correct.

Executed on December 11, 2020

Attachments: Tritium evaluation memo
Statement of No Significant Hazards