

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

January 3, 2020

TO: Christopher J. Roscetti, Technical Director
FROM: Timothy L. Hunt, Cognizant Engineer
SUBJECT: Idaho National Laboratory (INL) Report for December 2019

DNFSB Staff Activity: No Board's staff members were on site during December 2019.

Potential Inadequacy in the Safety Analysis (PISA) – Incorrect Dose Conversion Factor Used. During the contractor readiness assessment for EBR-II fuel movements, a PISA was declared against safety basis document PLN-5207, *Transport Plan for the Transfer of EBR-II Driver Fuel in the HFEF-14 Cask Between INTEC and RSWF*. Per the PISA screen, the Pu-239 equivalent curie (PEC) conversion factors used to calculate the material at risk (MAR) and estimate source terms and unmitigated doses to the public for design basis accidents were taken from International Commission on Radiological Protection (ICRP)-68, which is specific to workers. The correct PEC conversion factors for members of the public should have been obtained from ICRP-72. Thus, estimated unmitigated doses to the public in PLN-5207 were incorrect. The cask MAR values using the conversion factors from ICRP-68 are 2.13E+01 PEC, while using ICRP-72 yields values of 2.34E+01 PEC; an increase of about six percent. The unreviewed safety question (USQ) determination found that an inadequacy in the safety analysis did not exist since there is no increase in the consequences of an analyzed accident or reduction in margin of safety.

PISA – Integrated Waste Treatment Unit (IWTU) Equipment Contained More Residual Material Than Expected. Following personnel access to the upper packaging cell after plant shutdown in June for Outage J, more than expected residual material was found in product receiver cooler 0 (PRC0). An IWTU technical safety requirement (TSR) requires that the cooler(s) be “drained of material to the vessel heels” prior to accessing the packaging cell. The TSR specifies that draining continues “until the transfer activity no longer produces a measurable indication of transfer.” While Fluor Idaho personnel completed the draining, residual material apparently remained in PRC0 due to complete clogging of the PRC0 drain path. Having excess residual material in PRC0 could lead to a carbon powder deflagration if the material was released due to a breach of the system or personnel inadvertently opened the PRC0 drain valve coincident with having no canister present in the drain path. The USQ determination, however, concluded that there is no increase in the consequences or probability of a previously evaluated accident, therefore, no new controls were developed. All residual material has been removed.

Evaluation of the Safety of the Situation (ESS-140) for Unanalyzed Pathways for Oxygen Introduction into the IWTU Process Off-Gas. Fluor Idaho personnel identified existing pathways for which oxygen (from room air or instrument air) can be introduced to process off-gas downstream of the off-gas cooler. ESS-140 identifies two revised and two new hazardous events. The revised events deal with a hydrogen deflagration *in* the carbon reduction reformer (CRR) vessel during heatup or cool down and also during operations. The new events relate to a deflagration *downstream* of the CRR vessel during heatup or cooldown as well as during operations. There are no new TSRs or safety significant (SS) structures, systems, and components required for the revised or new hazardous events (the existing SS hydrogen deflagration protection system is credited). On December 5, 2019, DOE-ID approved ESS-140.