SAFETY EVALUATION REPORT FOR THE FINAL HAZARD CATEGORIZATION FOR SURVEILLANCE AND MAINTENANCE OF 100 AREA REACTOR BUILDINGS
Executive Summary

This Safety Evaluation Report (SER) documents the U.S. Department of Energy Richland Operations Office (RL) review of the Final Hazard Categorization (FHC) for Surveillance and Maintenance (S&M) of the 100 Area Reactor Buildings. The FHC, submitted by Mission Support Alliance (MSA), is documented in MSC-56872, Revision 0, Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Buildings.

The submitted FHC provides the safety basis for S&M activities for the 105-B, 105-C, 105-D, 105-DR, 105-F, 105-H, and 105-N/109-N Reactor Buildings until interim or final disposition. It is the incorporation of the information and requirements from WCH-19, Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Facilities, Revision 1, and WCH-26, Final Hazard Categorization for the 105-N/109-N Facility Interim Safe Storage Project, Revision 1. The incorporated submittal adds the 105-N/109-N Reactor Building, removes the 105 K East (KE) and 105 K West (KW) Reactor Buildings, and updates the inventory and status of the 105-B Fuel Storage Basin (FSB). The submittal of the FHC by MSA marks transition of the 100 Area Reactor Buildings, with the exception of the 105 KE and 105 KW Reactor Buildings, from Washington Closure Hanford LLC to MSA for long term S&M of the facilities.

The RL Review Team included Nuclear Safety Division (NSD), Operations Oversight Division (OOD), and Assistant Manager for River and Plateau (AMRP) personnel who were provided opportunities to review and comment on the submitted FHC. Review of the submittal resulted in no significant issues being identified. The RL Review Team recommends approval of the submitted FHC for the S&M of the 100 Area Reactor Buildings.
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1.0 Scope of Review

The MSA submittal, MSA-1402426, dated July 7, 2014, RL Approve Final Hazard Categorization for Surveillance and Maintenance of 100 Area Reactor Buildings, was the subject of this review. Staff from RL NSD, OOD, and AMRP constituted the RL Review Team. This review was performed under the applicable portions of the RL Integrated Management System Authorization Basis review procedure and was consistent with DOE-STD-1104-96.

2.0 Summary of Review

The submitted FHC, MSC-56872, Revision 0, provides the safety basis for S&M activities for the 105-B, 105-C, 105-D, 105-DR, 105-F, 105-H, and 105-N/109-N Reactor Buildings. The scope of work authorized through the submittal includes periodic entries into the facility for walkdown surveillances and basic maintenance as needed. In addition, the 105-B Area has requirements for routine fire extinguisher inspections and emergency lighting inspections/tests. The objective of routine surveillance is to ensure that any unfavorable conditions or trends are recognized and evaluated such that appropriate corrective actions can be initiated. Maintenance consists primarily of the correction of deficiencies identified during the surveillances. The RL Review Team concludes the S&M activities are non-intrusive in nature and will not affect the safe configuration of the facilities.

In the seismic scenario the inventory of radioactive material associated with the reactor blocks is well protected from forces related to structural failure of the reactor buildings. The reactor blocks are massive structures consisting of a graphite moderator stack, a thermal shield, and a biological shield. The 105-N Reactor structures and systems were originally designed for a 0.20 g ground acceleration. Subsequent analysis verified that the structures would maintain their functional capabilities after being subjected to a safe shutdown earthquake of 0.25 g. Consistent with the seismic event accident scenario evaluation methodology presented by CHPRC for the 105 KE Reactor, the material at risk (MAR) was assumed to involve 10 percent of the reactor block’s graphite radiological inventory. Consistent with DOE-STD-3010-94, the scenario was modeled as a vibration-shock impact of bulk powder on an unyielding surface. The appropriate Airborne Release Fraction (ARF) and Respirable Fraction (RF) from the DOE-STD-3010-94 model were used in the calculation. The resulting 105-N Sum of Fractions (SOF) for the seismic scenario is 5.40E-01.
For the fire scenario a fire was postulated to occur in the 105-B FSB. The above grade portion of the 105-B FSB structure is constructed of concrete block walls and a precast concrete panel roof. The below grade portion is constructed of reinforced concrete. Although the FSB is constructed of noncombustible materials, wood planking is present and used on the FSB walls and floor is combustible. It is postulated that the wood planking ignites, burns, and falls into the FSB, providing sufficient energy to burn the asphalt fixative and disperse the underlying contamination. Recently, two-thirds of the sediment from the FSB transfer pits were removed and one to three feet of grout was placed on top of the remaining sediment and debris. Therefore, the MAR for the scenario was assumed to be the inventory of the FSB walls, floor, and stem walls. The analysis assumed the activity of the selected MAR is present as a layer of chemically non-reactive powder. The appropriate ARF and RF from DOE-STD-3010-94 were used in the calculation. The resulting SOF for the fire scenario is 2.89E-02.

The FHC resulted in a categorization of less than Hazard Category (HC) 3. Key assumptions include the robust and protective nature of the reactor blocks and limited availability of FSB sediment to dispersive energy. Based on their review, the Review Team agrees with the assumptions and the final hazard category of less than HC 3. The Review Team recommends approval of the 100 Area Reactors, 105-B, 105-C, 105-D, 105-DR, 105-F, 105-H, and 105-N/109-N, as less than HC 3 nuclear facilities.

3.0 Conditions of Approval

No Conditions of Approval are required for recommending approval of the MSA submittal.

4.0 Conclusion

In summary, the Review Team reviewed the FHC for S&M of 100 Area Reactor Buildings in detail and concludes that the proposed S&M activities at the 100 Area Reactors will not result in a release of radiological material in excess of HC 3 quantities. Therefore, the Review Team recommends that the designated approval authority for these facilities approve the less than HC 3 designation for S&M of these facilities.