

Exemption of Packaged Fissile Exempt Material from U-235 Possession Limit

Introduction

This document provides justification for NRC approval of a revised license possession limit for License Number SNM-928 to facilitate timely and cost-effective decommissioning operations. The proposed limit includes specific conditions for the possession and storage of materials that meet the requirements for exemption from classification as fissile material as per 10 CFR 71.15. This change is focused on safety and control of materials containing low concentration of special nuclear material generated during decommissioning operations involving treatment of groundwater. This change will allow an acceptable means to store packaged “fissile exempt” materials prior to transport to an off-site facility for disposal. This change is necessary to facilitate efficient and timely decommissioning operations by allowing greater flexibility for removal of low concentration special nuclear material (SNM) and more efficient transportation.

The proposed license amendment is compatible with NRC’s goals for the decommissioning program. As stated in the NRC’s *Program Evaluation of Changes to the Decommissioning Program* (September 2003), “Because of the persistent challenges facing the Decommissioning Program as well as the high cost to licensees for decommissioning, the staff believes that its near-term goal should be to continue improving the efficiency and timeliness of decommissioning activities at all decommissioning sites without impacting safety or public confidence.” The proposed change will allow the licensee to perform decommissioning more efficiently. In addition, this approach reduces unnecessary regulatory burden associated with decommissioning at the Cimarron Site and has no adverse impact on public safety.

The primary basis for the requested changes is to facilitate handling, transportation and disposal of large volumes of materials containing low concentrations of SNM. NRC regulations pertaining to SNM, particularly 10 CFR Part 70 and 73, were established primarily for the safe handling and control of various quantities of stock material for the fuel cycle. Low concentration residues being stored prior to transportation and disposal as waste do not pose the same hazards and concerns as stock material and therefore should not require the same level of regulatory control to maintain comparable safety. The NRC has previously approved similar activities as discussed in this Appendix.

Due to the limited number of active SNM-licensed sites undergoing decommissioning, the NRC has deferred changes in the regulations and the current practice is to address decommissioning regulatory issues through the amendment and exemption process.

Authorization for Possession and Specific Conditions of Use of Fissile Exempt Materials

The efficient and effective decommissioning of the Cimarron Site will require the treatment of groundwater. The treatment process generates ion-exchange resins and biomass containing low concentrations of uranium. The current license contains mass possession limits for enriched uranium. Although appropriate for higher concentration SNM, these limits place significant constraints on the decommissioning process when material contains low concentrations of low enriched uranium.

The proposed license amendment requested in this application incorporates a new possession limits based on the limitations of “fissile exempt” material. NRC and Department of Transportation (DOT) regulations for the transportation of radioactive material provide for the safety of packaged materials that are stored on site pending transport for either recycling or disposal. 10 CFR 71.15 exempts from classification as fissile material any material which meets a specified ratio of fissile to nonfissile material mass.

Section 6.2 of the December 2015 Decommissioning Plan proposes the addition of Item D to the possession limit table. Item D would enable the licensee to accumulate and store containers of waste meeting the transportation requirements for fissile exempt materials, independent of the U-235 mass possession limit. This would enable the licensee to store containers of low level radioactive waste until a full load is accumulated for transportation to an off-site disposal facility.

In addition to evaluations related to criticality safety to transportation, similar studies have been performed for disposal of similar materials. In November 1994 NRC issued NUREG/CR-6284, *Criticality Safety Criteria for License Review of Low-Level Waste Facilities*. This study provided nuclear criticality safety levels for disposal of materials in terms of areal density (grams per square foot). Later the NRC issued NUREG/CR-6505, *The Potential for Criticality Following Disposal of Uranium at Low-Level Waste Facilities* in June 1997. This study provided nuclear criticality safety levels for disposal of materials in terms of concentration limits. NUREG/CR-6505 is the technical basis for the current waste acceptance criteria (WAC) for disposal of SNM. WAC for enriched uranium (comparable to transportation requirements) include a limit of 1,900 pCi/g U-235 for enrichments less than 10% or a limit of 1,190 pCi/g U-235 for enrichments of 10% or greater.

Given that there are different criteria for transportation (mass ratio) and disposal of low concentration enriched uranium (radionuclide concentration), a comparison will be useful. Conversion of the of transportation requirements from mass ratio (2,000 grams nonfissile for every gram fissile) to radionuclide concentration results in 1,080 pCi/g U-235. Since this is less than the WAC for enriched uranium, the fissile exempt concentration for transportation is the most conservative and limiting value. Furthermore, materials that meet the transportation requirements for fissile exempt will also be acceptable for disposal since U-235 concentrations will be less than WAC limits.

In addition, shipments of spent resins must adhere to the definition of “Fissile Exempt”. The definition of “fissile exempt” is based on the assumption that the fissile material is pure U-235 (i.e. 100% enrichment), therefore the applicable regulations for the transport of the waste from the nuclear criticality safety standpoint are conservative for any material that may be encountered during decommissioning at the Cimarron Site where the enrichment of the uranium is limited to approximately 4% U-235.

Another potential concern regarding fissile exempt materials is security. In NRC Regulatory Guide 5.59, *Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance* states that the quantity of concern for gross theft is estimated as 75 kg of U-235. At the fissile exempt

concentration (1,080 pCi/g U-235) this converts to approximately 165 tons of waste material. Moreover, as part of the evaluation for WAC and an Order exempting the disposal facility from requirements relative to possession of SNM published in 68FR74986-74988, the NRC stated, *“Safeguarding SNM against diversion or sabotage is not considered a significant issue because of the diffuse form of the SNM in waste meeting the conditions specified.”*

Since the fissile exempt criteria for transportation is less than the WAC, material meeting fissile exempt should not be considered a significant security issue, since diversion or sabotage of low concentration material is not a practical threat. Therefore, once material has been demonstrated to meet fissile exempt criteria, no additional physical protection measures under 10 CFR Part 73 for SNM should be required. This concept of a specific exemption from the regulations in 10 CFR 70 for a waste disposal site was given to both the Clive, UT and Andrews, TX disposal sites. A license provision to exempt packaged materials from the license possession limit was issued to ABB for the Windsor Site by License Amendment #66 dated October 29, 2009 (License # 060-00217-06, Docket # 030-03754).

Resin and biomass which accumulates uranium will be mixed with sufficient non-fissile material to comply with both fissile exempt criteria and disposal site WAC. The mixed LLRW will be transferred into appropriate transport containers meeting transportation requirements for fissile exempt materials. Samples of each batch of the LLRW mixture will be collected, and the concentration and mass of SNM for each container will be calculated. This mass will be added to the SNM inventory, but will not count against the mass possession limit for U-235.

This process will maintain sufficient documentation and control of the material to ensure nuclear criticality safety during decommissioning operations, as well as accountability of the material while it remains at the Site. Reporting of SNM transactions and inventory to Nuclear Materials Management & Safeguards System (NMMSS) will be in accordance with NRC regulations.

Summary

Fissile exempt materials have been evaluated by the NRC and shown not to pose any nuclear criticality safety or SNM physical security concerns. These changes will reduce unnecessary regulatory burden associated with decommissioning. In addition, it will allow more effective transportation of waste to the disposal site, reducing the risk of accidents. NRC has approved or allowed similar activities for such materials at other licensed facilities. This change will allow EPM to complete decommissioning in a timely and efficient manner and achieve license termination for unrestricted use, with no adverse consequences to safety.