

## REGULATORY AUTHORIZATIONS FOR HANDLING SPECIAL NUCLEAR MATERIALS

Waste Control Specialists LLC (WCS) is preparing procedures that rely on the regulatory requirements used for transporting fissile-material packaging as the safety basis for transporting and emplacement of waste containing Special Nuclear Materials<sup>1</sup> (SNM) in the Disposal Unit of the Texas Compact Waste Disposal Facility (CWF) and the Federal Waste Disposal Facility (FWF). Stringent regulations have been established by both the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Transportation (DOT) to ensure the safe transport SNM across the U.S. The transportation regulations for using fissile-exempt and fissile-packaging are based on Nuclear Criticality Safety Evaluations (NCSE) to ensure that a conveyance of SNM remains subcritical during normal conditions and for postulated transportation accidents. Licensees that intend to transport SNM using fissile-exempt and fissile-material packages must comply with the transportation package Certificate of Compliance (COC) and any safety limits, such as limits on the mass of <sup>235</sup>U or total number of packages allowed on the conveyance, are identified in the NCSE.

For example purposes, we will assume a shipment by rail of 20 drums, each containing 350 grams of U235. Under our current authorization, the drums would be offloaded one at a time to stay within the SNM limits of our license. That would mean 20 trips from the rail to the landfill. Under our proposed authorization discussed below, all 20 drums would be offloaded and transported from the rail to the landfill. At that point, each drum would be individually placed in the MCC. Additionally, we may limit the number of drums allowed in each MCC by procedure to ensure no criticality concerns arise.

### Regulatory Basis

WCS believes that the Texas Commission on Environmental Quality (TCEQ), as an Agreement State, is authorized to approve procedures that would be used by WCS to transport SNM-bearing waste received at the site into the Disposal Unit and emplace such waste into its final disposal configuration inside of a Modular Concrete Canister (MCC).

Agreement States are authorized to regulate facilities that possess Special Nuclear Materials (SNM) in quantities not sufficient to form a critical mass, as specified in 10 CFR Part 150, *Exemptions and Continued Regulatory Authority in Agreement States and in Offshore Waters under Section 274*. Quantities sufficient to form a critical mass are defined in 10 CFR 150.11 as more than 350 grams of <sup>235</sup>U, 200 grams of <sup>233</sup>U, or 200 grams of plutonium, or any combination thereof. Licensees in both Agreement States and non-Agreement States that possess SNM in quantities sufficient to form a critical mass are regulated by the U.S. Nuclear Regulatory Commission (NRC) under Title 10 of the Code of Federal Regulations Part 70 (10 CFR 70), *Domestic Licensing of Special Nuclear Materials*. The NRC has applied the critical mass threshold to SNM that is above ground—once the SNM has been disposed the Commission has determined that SNM no longer is subject to the limits specified in 10 CFR 150.11.

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<sup>1</sup> Special Materials are defined as: (1) plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Commission, pursuant to the provisions of section 51 of the Act, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material.

The TCEQ established above ground possession limits of SNM as set forth in 10 CFR 150.11 in License Condition 5.F (LC-5.F) of Radioactive Material License No. R04100 (RML R04100). These above ground possession limits for SNM apply to waste received at the Low-Level Radioactive Waste (LLRW) disposal facilities operated by Waste Control Specialists LLC (WCS) in Andrews County, Texas.

However, once waste containing SNM is placed inside of a Modular Concrete Canister (MCC) in a Disposal Unit at either the CWF or the FWF then it no longer is subject to the above ground possession limits specified in LC-5F.

### **Commissioners' Directive to Staff**

The NRC required licensee's to submit procedures in a license application that describe the methods that will be used to prevent a nuclear criticality accident resulting from SNM in storage or during waste emplacement at LLRW Facilities pursuant to 10 CFR 61.16, *Other Information*. The requirements specified in 10 CFR 61.16(b) is as follows:

*(b) Safety information concerning criticality, if appropriate. (1) Any application to receive and possess special nuclear material in quantities that would be subject to the requirements of § 70.24, "Criticality accident requirements" of part 70 of this chapter shall demonstrate how the requirements of that section will be met, unless the applicant requests an exemption pursuant to § 70.24(d). In determining whether receipt and possession would be subject to the requirements of § 70.24, the applicant shall not consider the quantity of special nuclear material that has been disposed of.*

The NRC did not issue strict compatibility requirements for Agreement States to adopt similar regulations. Therefore, Agreement States hosting a disposal facility were allowed to choose whether or not that wanted to establish a 10 CFR 61.16(B)-like regulation that would require their licensees to have approved procedures that addressed criticality safety controls for waste emplacement activities. At present, Texas and Utah did not promulgate a 10 CFR 61.16(b)-like regulation.

On February 24, 1999, the NRC staff prepared a paper titled, *Agreement State Compatibility for Criticality Requirements Applicable to Low-Level Waste Disposal Facilities*, in response to a Petition by Envirocare of Utah (renamed and referred to henceforth as EnergySolutions Inc. (ESol)) to possess SNM in excess of current regulatory limits<sup>2</sup>. The NRC Staff acknowledges that the SNM limits set forth in 10 CFR 150.11 applied only to the above ground possession of SNM (i.e., receipt and storage), but did not apply to waste emplacement. Furthermore, the NRC staff recognized that not restricting the quantities of SNM during waste emplacement would allow for the accumulations of more than a critical mass of SNM during waste emplacement. Therefore, the NRC staff concluded that without requiring additional controls (such waste placement, enrichment, concentration, mass etc.) an inadvertent criticality could occur at a LLRW Facility. As such, the NRC Staff recommended approval to develop guidance that could be used by Agreement States to review and approve procedures submitted by their licensees regarding criticalities controls for waste emplacement activities.

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<sup>2</sup> See SECY-99-059 and SECY-98-010, *Petition for Envirocare of Utah to Possess Special Nuclear Material in Excess of Current Regulatory Limits*, published on January 20, 1998.

On April 29, 1998, the Commissioners approved the staff's recommendation<sup>3</sup> to develop guidance which could be used by Agreement States for existing and proposed Low-Level Radioactive Waste Disposal Facilities. The Oak Ridge National Laboratory (ORNL) developed nuclear criticality safety guidance that could be used by Agreement States for evaluating waste emplacement activities at LLRW facilities. The regulatory guidance prepared by ORNL was based, not only for existing LLRW facilities, but also for future facilities that were being planned at the time, such as the Sierra Blanca facility in southwestern Texas.

### **Transportation Regulations**

Waste generators have shipped radioactive and mixed waste across the U.S. on a conveyance in excess of the SNM limits specified in 10 CFR 150.11 for decades. The safety basis and requirements for transporting fissile materials in commerce are provided in the COC for both fissile-exempted and fissile-materials packages established by the NRC under 10 CFR Part 71, *Packaging and Transportation of Radioactive Material*. The NRC relies on the NCSE to ensure transport of fissile materials remain subcritical under both normal and accident conditions, as the basis for issuing a fissile-exempt and fissile-material package COC. These regulations have ensured that shipping fissile materials by rail or truck in approved packages is safe for several decades.

Pursuant to LC-11.Q of RML R04100, radioactive and mixed waste containing SNM received within the controlled area or any rail spurs controlled by WCS conveyed by truck or rail is considered "in transport" and not "possessed" as long as the containers remain on the delivery conveyance in compliance with all regulations established by the DOT. As such, WCS is authorized to receive shipments by rail or truck containing fissile materials in excess of the regulatory limits specified in 10 CFR 150.11 provided that the waste packages remain on the delivery conveyance in compliance with all DOT regulations. The TCEQ approved the definition of "In Transport" based on regulator precedent established by the NRC and the Utah Division of Radiation Control (URDC) regarding an exception issued to ESOL transport and possess greater amounts of SNM that authorized under 10 CFR 150.11.

WCS will use regulatory guidance to develop procedures to transport waste packages by truck or rail into the Disposal Unit for waste emplacement. The safety basis supporting the procedures rely on ensuring that the transport of SNM-bearing waste is compliant with the fissile packaging requirements used to place such materials in commerce and regulated by the NRC and DOT. Using these procedures, WCS will transfer SNM-bearing waste from the delivery conveyance to subsequent transport to the Disposal Unit. Furthermore, SNM-bearing waste will remain in the fissile exempt or fissile-materials package in compliance with all requirements specified in the COC—the number of packages authorized for transport to the Disposal Unit will be determined by the requirements contained in the COC. This process provides the same margin of safety relied on to transport the waste across the country as it will during transport a hundred meters to the Disposal Unit.

### **Waste Emplacement Guidance**

Radioactive and mixed waste that is transferred from the delivery conveyance for transport to the Disposal Unit will continue to be defined as "in transport" and not "possessed" pursuant to

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<sup>3</sup> See Staff Requirements Memorandum, Petition for Envirocare of Utah to Possess Special Nuclear Material in Excess of Current Limit, SECY-98-010, April29, 1998.

LC-11.Q of RML R04100. Individual packages will only be removed after transfer in the Disposal Unit for emplacement directly into MCCs if the mass of SNM in the package is less than the limits specified in LC-5 (10 CFR 150.11). The waste is considered disposed of at the time of placement into a MCC and no longer counted against the above ground possession limits for SNM.

The ORNL prepared guidance that addressed emplacement of waste in concrete canisters similar to those used by WCS. This guidance titled, *Emplacement Guidance for Criticality Safety in Low-Level-Waste Disposal* (NUREG/CR-6626, Vol. 2, June 1999) provides the safety basis that will be used to develop procedures to ensure that the disposal practices and canister arrays remain subcritical. The guidance includes operational limits to restrict the concentrations of SNM present in an MCC. It can also be used to assess the use of multiple MCCs that are stacked vertically by limiting the areal density of multiple packages placed inside an MCC. The calculation for areal density is bounding insofar as it assumes that no single waste package would exceed the above ground possession limits specified in LC-5 of RML R04100.

### **Path Forward**

Following existing procedures, WCS is authorized to remove a package(s) from a delivery conveyance provided that the above ground possession limit is not exceeded. This package (or packages) may be transported to the Disposal Unit for emplacement in an MCC provided that the above ground possession limits for SNM are not exceeded. Once the SNM-bearing waste is emplaced in the MCC it is considered disposed of and no further nuclear criticality safety restrictions apply pursuant to 10 CFR 61.16(b).

At present, the only limits that apply to the receipt, possession and disposal of SNM are the above ground possession limits specified in LC-5. These limits only apply when SNM-bearing waste is removed from the delivery conveyance, transported a few hundred meters to the Disposal Unit, and placed in an MCC. WCS proposes changes to LC-11.Q that would extend the definition of "in transport" to allow for the transfer of fissile-exempted and fissile-material packages to the Disposal Unit. The transfer of fissile-exempted fissile-material packages would remain in compliance with all requirements specified in the COC and DOT regulations—the exact same configuration that was required when they were originally transported across the country to WCS.

The offloading and emplacement of waste into a MCC will be conducted in a manner that ensure that the mass of SNM present in any package is less than the SNM limits for above ground possession specified in LC-5. Additionally, SNM-bearing waste that was transferred to the Disposal Unit would have to be placed in a MCC within 24 hours or placed back on the delivery conveyance.

WCS recognizes that mass of SNM may need to be further restricted procedurally to ensure that the waste emplaced in the Disposal Unit remains subcritical. As such, WCS will develop procedures that address the transfer of SNM to the Disposal Unit and emplacement of waste into a MCC. These procedures will be prepared following regulatory guidance developed specifically to ensure that waste emplacement operations remain subcritical. Additionally, such procedures will be submitted for review and approval by the TCEQ consistent with the direction set forth by the NRC Commissioners as described in Staff Requirements Memorandum SECY-98-010 published in April 29, 1998.

## Definition of In Transport (LC-11.Q)

WCS proposes the following revision to the definition of “in transport” to authorize the transfer to SNM-bearing waste into the Disposal Unit provided that the transfer is in compliance with all DOT regulations:

*LC-11.Q. In transport - Radioactive and mixed wastes containing special nuclear material (SNM) received by the Licensee within the controlled area or any rail spurs controlled by the Licensee and conveyed to the facility by truck or rail is “in transport” and not possessed as long as the waste containers remain on the delivery conveyance or is transported to the disposal unit in compliance with all U.S. Department of Transportation (DOT) regulations for transport of that waste. Furthermore, waste that is transported to the disposal unit must be placed in a safe disposal configuration as specified in written procedures that have been approved by the TCEQ and disposed of within 24 hours from receipt. Waste received by the Licensee may be in transport for up to 14 days. If weather or another unexpected event prevents the disposal of such waste on the day it is removed from the conveyance, that waste shipment may be placed again “in transport” for up to two days if placed onto the delivery conveyance in a manner that satisfies all DOT regulations for transport.*

## Conclusions

The NRC recognized that the limits for receiving and possession of SNM do not apply to waste once it has been disposed of pursuant to 10 CFR 61.16(b). However, they also recognized that Agreement States that regulate Low-Level Radioactive Waste Disposal Facilities should be provided with the necessary guidance to review procedures developed by their licensees to prevent an inadvertent nuclear criticality accident from occurring as part of waste emplacement.

WCS proposes to prepare procedures for the transfer and emplacement of SNM-bearing waste in a manner that addresses requirements for nuclear criticality safety. Revisions to LC-11.Q are needed to authorize the transfer of fissile-excepted and fissile-material packages to the Disposal Unit. Proposed changes to LC-11.Q ensure that same DOT regulatory requirements used to transport the packages across the country are used during the transfer of the packages to the Disposal Unit.