

U.S. NUCLEAR REGULATORY COMMISSION  
DOCKET 70-7005  
WASTE CONTROL SPECIALISTS LLC  
SAFETY EVALUATION REPORT REGARDING THE PROPOSED EXEMPTION FROM  
REQUIREMENTS OF 10 CFR PART 70  
October 2004

## 1. INTRODUCTION

By letter dated August 6, 2003, as modified by letter dated March 15, 2004, Waste Control Specialists, LLC (WCS) requested an amendment to its exemption from certain U.S. Nuclear Regulatory Commission (NRC) regulations relative to the possession of special nuclear material (SNM). WCS is seeking NRC approval for additional reagents that may be used for the chemical stabilization of mixed waste containing SNM.

Section 274 of the Atomic Energy Act of 1954, as amended, permits Agreement States to license SNM in quantities not sufficient to form a critical mass. The quantities are set forth in NRC regulations at 10 CFR 150.11. For SNM quantities greater than the 10 CFR 150.11 limits, a 10 CFR Part 70 license issued by NRC is required. By NRC Order dated October 30, 2001, WCS is exempt from licensing under Part 70 for possession of greater than the Part 150 SNM limits (66 FR 57489; November 15, 2001).

The conditions of the 2001 Order are:

- SNM isotope concentration limits (Condition 1);
- bulk chemical limits (Condition 2);
- unusual moderator limits (Condition 3);
- soluble uranium limits (Condition 4);
- mixed waste processing limits (Condition 5);
- waste characterization and certification requirements (Condition 6);
- waste receipt sampling condition (Condition 7); and
- notification requirements (Conditions 8 and 9).

Conditions 1 through 4 specify four sets of technical criticality safety limits. Condition 6, waste characterization and certification requirements, assures that these limits will not be exceeded. The waste sampling plan of Condition 7 provides for detection of erroneous shipment of waste not complying with the concentration limits. Condition 5 limits the chemical reagents WCS may use in stabilizing any mixed waste that contains SNM.

WCS operates a low level waste (LLW) and mixed waste (MW) treatment and storage facility in Andrews County, Texas. This facility is licensed by the State of Texas Department of Health (TDH), an NRC Agreement State, under a 10 CFR Part 30 equivalent radioactive materials license (RML). The facility also is licensed by the Texas Commission on Environmental Quality (TCEQ) to treat and dispose of hazardous waste. In 1997, WCS began accepting Resource

Conservation and Recovery Act (RCRA) and Toxic Substance Control Act (TSCA) wastes for treatment, storage, and disposal. Later that year, WCS received a license from TDH for treatment and storage of MW and LLW. The MW and LLW streams may contain quantities of SNM.

WCS receives wastes by rail and truck. All of the waste received by truck and some of the waste received by rail are in containers. The containers vary in size from 55-gallon drums to 70 cubic yard intermodal containers. Bulk waste received by rail is placed in large (90 cubic yard) roll-off containers. Separate storage and treatment facilities exist for the RCRA and TSCA waste and for the MW and LLW. Storage of the MW and LLW occurs in two buildings and an adjacent outside area. WCS treats mixed waste using several technologies including (1) chemical stabilization, (2) shredding, (3) deactivation, (4) neutralization, and (5) macro encapsulation with cement. WCS also is permitted by TDH to perform compaction using a Ramflat compactor. The applicable hazardous waste regulations require bench scale treatability studies prior to treating the bulk of the waste.

## **2. PROPOSED ACTION**

By letters dated August 6, 2003, and March 15, 2004, WCS requested that the list of reagents identified in Condition 5 of the 2001 Order be modified to include an additional 22 reagents. Condition 5 currently specifies 14 chemicals that WCS is permitted to use in chemically stabilizing mixed waste containing SNM.

Based on its review of WCS's requests and with WCS's agreement (see discussion in the "Evaluations" section), the NRC staff proposes to amend Condition 5 by removing the names of specific reagents and instead requiring that WCS, in treating each container of mixed waste containing SNM, meet a mass limit for stabilization. Currently, Condition 1 of the Order sets concentration limits for SNM in individual containers and/or during processing. The amended Condition 5 would set the mass limit for batches of greater than 600 kilograms (kg) of waste at the concentration limits in Condition 1 times 600 kg of waste. Condition 1 concentration limits would continue to apply to batches of 600 kg of waste or less.

This modification would allow WCS to use the chemical reagents identified in its submittals, as well as other reagents, so long as the applicable mass limit for stabilization was met. WCS would continue to be restricted from using magnesium oxide in the treatment, per Condition 2 of the 2001 Order.

In addition, the amended Condition 5 would continue to allow WCS to use reagents as part of its currently approved stabilization process, which includes oxidation-reduction, pH adjustment, and bulking. This understanding was clarified in a series of emails dated August 3, 10, and 13, 2004, between the NRC staff and WCS.

Other conditions of the Order would remain unchanged. Currently, WCS is permitted to possess SNM without regard for mass. Instead, to insure criticality safety, a concentration limit is applied, such that accumulations of SNM at or below this concentration limit would not pose a criticality safety concern. This concentration limit is specified in Condition 1 of the Order.

## **3. EVALUATIONS**

In evaluating the safety of the proposed action, the NRC staff is relying on the State of Texas safety evaluations relative to SNM for safety other than criticality safety. These evaluations are

documented in a Technical Evaluation Report prepared by the Texas Department of Health, Bureau of Radiation Control, dated May 1997. Moreover, WCS's exemption is limited to the concentration of SNM in the MW and LLW and does not address any solely hazardous waste issues.

By letter dated August 6, 2003, WCS requested that 18 reagents be added to those reagents identified in Condition 5 of the 2001 Order. In reviewing WCS's request, the NRC staff identified five of the requested reagents (potassium permanganate, sulfuric acid, nitric acid, phosphoric acid, and hydrochloric acid) that could change the solubility of the SNM in the mixed waste being treated, and thus potentially changing its concentration. The principal emphasis of 10 CFR Part 70 is criticality safety and safeguarding SNM against diversion or sabotage. The addition of reagents that could increase the concentration of SNM poses a criticality concern. In a letter dated September 30, 2003, the NRC staff identified this concern to WCS in a request for additional information.

WCS responded by letter dated March 15, 2004. WCS stated that the purpose of the requested reagents was for pH adjustments and/or use as catalysts to aid in the oxidation-reduction of organic constituents that require treatment to meet RCRA requirements for disposal. In WCS's process, the waste is mixed frequently during the oxidation-reduction reaction, and bulking reagents and other reagents are added to immobilize the metals in the waste and to stabilize/neutralize the waste mixture.

In responding, WCS also modified its requested list of additional reagents. This revised list of 22 reagents included four of the five chemicals with which the NRC staff had concerns; only nitric acid was not on the revised list.

In an electronic mail (email) message sent to WCS on April 26, 2004, the NRC staff documented discussions from a phone call with WCS concerning the exemption request. In the phone call, the NRC staff offered to remove specific chemical names from Condition 5 and to modify the condition to include a mass limit for stabilization not to exceed the concentration limits in Condition 1 times 600 kg of waste. Modifying Condition 5 in this way would allow WCS to use the chemical reagents it wished in treatment so long as the mass limit was met. WCS still would be restricted from using magnesium oxide, per Condition 2, in treating the mixed waste. By email dated April 27, 2004, WCS agreed to this modification.

## CRITICALITY SAFETY

Currently, WCS is permitted to possess SNM without regard for mass. Instead, to insure criticality safety, a concentration limit is applied, such that accumulations of SNM at or below this concentration limit would not pose a criticality safety concern. The NRC staff's evaluation of this limit is documented in the Safety Evaluation Report (SER) supporting the 2001 Order. The concentration limit is identified in Condition 1 of the Order.

With WCS's agreement, the revised Condition 5 of the Order will include a mass limit for stabilization not to exceed the SNM concentration limits in Condition 1 times 600 kg of waste. Condition 1 currently requires that, if the SNM is not homogeneously distributed throughout the waste, then the limiting concentrations in Condition 1 must not be exceeded on average in any contiguous mass of 600 kg of waste. Therefore, for a contiguous mass of 600 kg of waste, Condition 1 specifies a mass limit for each SNM isotope. The revised Condition 5 will employ this mass limit for contiguous masses of waste of greater than 600 kg.

Although the NRC staff had reconcentration and criticality concerns with four of the chemical reagents that WCS proposed, use of the mass limit in Condition 1 for contiguous masses of waste of greater than 600 kg reduces these concerns since accumulations of SNM at this concentration limit would not pose a criticality safety concern.

#### PROCESSING OF WASTE CONTAINING SNM

WCS's principal activity associated with radioactive material is treatment of mixed waste. WCS currently uses in-drum stabilization, shredding, deactivation, neutralization, and macro encapsulation with cement. WCS also is permitted by TDH to perform compaction using a Ramflat compactor.

Chemical stabilization is accomplished by mixing various chemical reagents with the waste. As discussed previously, WCS currently uses a limited number of chemicals in its stabilization process, and with this request, will be able to use the chemicals identified in their August 6, 2003, and March 15, 2004, submittals. These chemicals may be mixed singularly or in combination and in varying amounts. The end result is to immobilize hazardous constituents in the MW. In order to verify the effectiveness of the treatment process, bench scale testing is conducted in accordance with EPA procedures. Following a successful treatability study, the subject waste is treated either in using an in-drum mixer or in a large mixing pan with a hydraulic arm.

#### 4. SUMMARY AND CONCLUSION OF SAFETY EVALUATION

Based on its analysis of the operations and waste forms at the WCS's facility, the NRC staff concludes that waste processing and storage operations can be conducted with an acceptably low risk of nuclear criticality. The NRC staff developed maximum concentration limits to ensure criticality safety and a set of conditions that will ensure that the concentration limits are not exceeded. These conditions would be included in an Order to WCS. The Order would become effective if the conditions are incorporated by the State of Texas into WCS's RML.

#### 5. EXEMPTION CONDITIONS

Condition 5 of the Order is amended to read:

Processing of mixed waste containing SNM will be limited to chemical stabilization (i.e., mixing waste with reagents). For batches with more than 600 kilograms of waste, the mass of SNM shall not exceed the concentration limits in Condition 1 times 600 kilograms of waste.

## 6. REFERENCES

The ADAMS accession numbers for the documents related to this notice are:

<b>Document Description</b>	<b>Accession Number</b>
August 6, 2003, WCS initial request	ML032590937
September 30, 2003, NRC request for additional information	ML032731010
March 15, 2004, WCS modified request	ML041350224
April 26 and 27, 2004, NRC and WCS email messages	ML042450534
August 3, 10 and 13, 2004, NRC and WCS email messages	ML042450511
November 21, 2001, NRC EA, SER, and Order	ML030130085

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August 6, 2003, WCS initial request	ML032590937
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**ML042250362**

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\* see previous concurrence

\*\* No Legal Objection (Neil Jensen for STreby)

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