



CD06-0382

September 29, 2006

Mr. Scott C. Flanders, Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Mail Stop T7-J8
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: NRC Order Exempting EnergySolutions from Licensing Requirements of 10 CFR
70

Dear Mr. Flanders:

EnergySolutions, LLC (EnergySolutions) hereby requests authorization from the U.S. Nuclear Regulatory Commission (NRC) in accordance with EnergySolutions' Utah Radioactive Material License UT2300249, License Condition 13.I, which states "EnergySolutions shall obtain NRC approval prior to changing any activities associated with the above conditions." The reference to the "above conditions" is the Special Nuclear Material (SNM) requirements for EnergySolutions' Clive Disposal Facility (Clive) Order, Docket No. 40-8989, dated May 30, 2006 (attached). EnergySolutions requests that this project-specific authorization be provided by letter instead of a revision to the Clive SNM Order due to project schedule constraints.

Currently, there is a major effort undertaken by the U.S. Department of Energy (DOE) and its' contractors for cleanup of the former gaseous diffusion facility located in Oak Ridge, TN. This project will require the disposal of tons of steel pipes and other process gas equipment (PGE) that is internally contaminated with various constituents, including uranium enriched up to 20 percent in the chemical form of uranyl fluoride. Uranyl fluoride is a soluble form of uranium. In order to receive the waste for disposal at Clive, it must comply with the SNM criteria specified in the Clive Radioactive Material License upon receipt.

As part of EnergySolutions waste receipt process, the generator must complete a waste profile that describes all of the physical, chemical and radiological characteristics of the waste. This profile is reviewed and approved by the Director of Operations, the Environmental Engineer and the Corporate Radiation Safety Officer for compliance with EnergySolutions' licenses and permits. In addition, the generator must sign an SNM

Certification describing the SNM characteristics, concentrations and chemical forms of the waste.

The piping and PGE will meet all of the SNM receipt requirements delineated in the Clive Radioactive Material License with the exception of License Condition 13.D. License Condition 13.D reads as follows:

“Waste packages must not contain highly water soluble forms of uranium greater than 350 grams of uranium-235 or 200 grams of uranium-233. The sum of the fractions rule will apply for mixtures of U-233 and U-235. Highly soluble forms of uranium include, but are not limited to: uranium sulfate, uranyl acetate, uranium chloride, uranyl formate, uranyl fluoride, uranyl nitrate, uranyl potassium carbonate, and uranyl sulfate. The presence of the above materials will be determined by the generator, based on process knowledge or testing.”

As part of the NRC’s criticality safety review, they examined mechanisms that could increase the concentration of the SNM in the waste sent to the Clive facility for disposal. One of these mechanisms involves the leaching of highly soluble uranium with water and subsequently increasing the SNM concentration within the waste. The NRC considered that leaching or washing of soluble uranium from waste in containers could occur and collect in a corner of the container. The NRC assumed a large intermodal container (70 yd³).

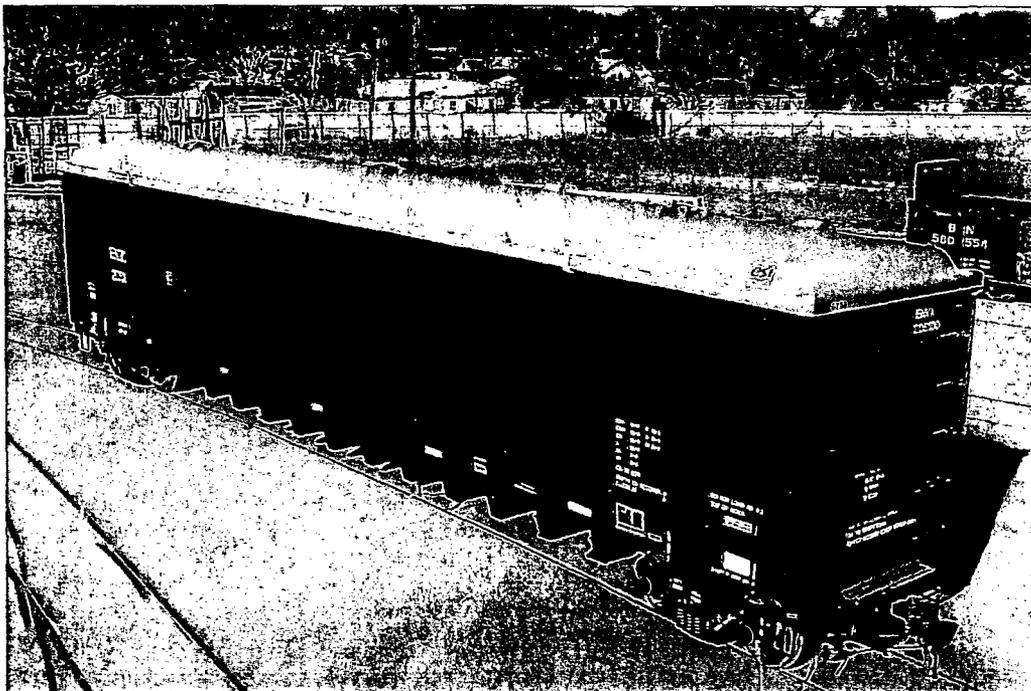
In concert with DOE and its Contractors, *EnergySolutions* is proposing to prepare the waste, for handling and receipt at Clive, in a manner that would prevent water from coming in contact with the uranyl fluoride. Therefore, the uranyl fluoride would not leach from the waste and concentrate. Since the uranyl fluoride is on the interior surfaces of the piping and PGE, two methods will be employed to render the internal void spaces inaccessible. First, expandable polyurethane foam will be introduced into the internals of the piping and PGE thereby preventing contact with water. Second, the waste will be loaded in DOT qualified shipping packages that are designed and constructed to prevent water from entering the waste package.

This approach would use industrial grade, impervious polyurethane foam and inject it into the piping/PGE voids that contain the uranyl fluoride. This foam will serve two purposes, (1) seal the uranium contamination to the piping/PGE walls; therefore, maintaining homogeneity of the uranium concentration, and most importantly, (2) prevent the introduction of water into the interior of the piping/PGE where the uranium is located. The foam void-filling process will be controlled by detailed, approved operating procedures that will specify how the foam is to be injected, verification of void filling and appropriate Quality Control (QC) oversight.

Polyurethane (PU), which is a type of plastic, has been widely used for almost half a century in the health, automotive and industrial fields. The unique chemical and physical properties of PU give it a range of characteristics and a wide range of versatility in these fields. Many types of PUs are an important class of polymers with diverse end use in the forms of coatings, adhesives, constructional materials, fibers, elastomers, padding, paints, and medical implants. PUs could also be used in the environmental field, in the form of foams, for many remediation applications as an isolation material to prevent the release of hazardous materials into the environment. Hence, this class of materials has received wide attention for their synthesis, morphology, chemical and mechanical properties.

A study was performed by one of the DOE contractors' to evaluate the long-term performance of polyurethane foam, specifically in a landfill environment. The results were favorable. The environmental conditions in a landfill will be considerably harsher than the static conditions in a waste package.

In addition to the use of PU, EnergySolutions will package and transport the waste in specially designed IP-1, 6,275 cubic foot gondola railcars with hard lids as illustrated below. Each gondola railcar will comply with the requirements in 49 CFR, Transportation.



Since this waste will be disposed at the Clive Bulk Waste Facility (BWF), there is no possession limit for the quantity of SNM, as long as it is received within the constraints and concentration stipulated in the Clive Radioactive Material License. There are also no SNM disposal license requirements with respect to concentration limitations or spatial distribution within the disposal cell embankment.

In conclusion, EnergySolutions believes that the process described above will provide a safe, compliant waste form and meet the NRC's intent with respect to criticality safety.

Please call me at (801) 649-2114 with any questions or concerns.

Sincerely,



Tye Rogers
Vice President of Compliance and Permitting

Cc: Mr. James Park, NRC
Mr. Dane L. Finerfrock, Director, Utah Division of Radiation Control

Attachment

NUCLEAR REGULATORY COMMISSION
Docket No. 40-8989
In the Matter of EnergySolutions, LLC (formerly Envirocare of Utah, LLC)
Order Modifying Exemption from 10 CFR Part 70

AGENCY: Nuclear Regulatory Commission

ACTION: Issuance of Order Modifying Exemption from Requirements of 10 CFR Part 70

FOR FURTHER INFORMATION CONTACT: James Park, Environmental and Performance Assessment Directorate, Division of Waste Management and Environmental Protection, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Telephone: (301) 415-5835, fax number: (301) 415-5397, e-mail: JRP@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Introduction

The Nuclear Regulatory Commission (NRC) is issuing an Order pursuant to section 274f of the Atomic Energy Act to EnergySolutions, LLC (formerly Envirocare of Utah, LLC) concerning EnergySolutions' exemption from certain NRC licensing requirements for special nuclear material. This Order reflects the change in company name from Envirocare of Utah, LLC to EnergySolutions, LLC.

Enclosure

II. Further Information

EnergySolutions, LLC (EnergySolutions) operates a low-level waste (LLW) disposal facility in Clive, Utah. This facility is licensed by the State of Utah, an Agreement State. EnergySolutions also is licensed by Utah to dispose of mixed waste, hazardous waste, and 11e.(2) byproduct material (as defined under Section 11e.(2) of the Atomic Energy Act of 1954, as amended). By letter dated March 3, 2006, EnergySolutions notified the NRC that the company had changed its name from Envirocare of Utah, LLC and requested that the NRC reflect this name change in identified NRC staff documents.

Section 70.3 of 10 CFR Part 70 requires persons who own, acquire, deliver, receive, possess, use, or transfer special nuclear material (SNM) to obtain a license pursuant to the requirements in 10 CFR Part 70. The licensing requirements in 10 CFR Part 70 apply to persons in Agreement States possessing greater than critical mass quantities as defined in 10 CFR 150.11.

Pursuant to 10 CFR 70.17(a), "the Commission may...grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest."

By previous Orders, Envirocare of Utah, LLC was exempted from certain NRC regulations and was permitted, under specified conditions, to possess waste containing SNM in greater quantities than specified in 10 CFR Part 150, at its LLW disposal facility located in Clive, Utah, without obtaining an NRC license pursuant to 10 CFR Part 70. The first such Order was published in the *Federal Register* on May 21, 1999 (64 FR 27826). The most recent revision to this Order was published in the *Federal Register* on August 1, 2005 (70 FR 44123).

The modified Order set forth below reflects the change in company name from Envirocare of Utah, LLC to EnergySolutions, LLC. No other substantive changes to the August 1, 2005 Order have been made. The exemption conditions would be revised as follows.

III. Modified Order

1. For waste with no more than 20 weight percent of materials listed in Condition 2, concentrations of SNM in individual waste containers must not exceed the following values at time of receipt:

Table A.

SNM Nuclide	Maximum SNM concentration in waste containing the described materials (g SNM/g waste)	
	No materials listed in Condition 2	Maximum of 20 weight percent of materials listed in Condition 2 and no more than 1 weight percent of beryllium
U-235 (>50%) ^a	6.2E-4	5.4E-4
U-235 (=50%)	6.9E-4	6.1E-4
U-235 (=20%)	8.3E-4	7.4E-4
U-235 (=10%)	9.9E-4	8.8E-4
U-235 (=5%)	1.0E-3	9.6E-4
U-235 (=3%)	1.3E-3	1.1E-3
U-235 (=2%)	1.7E-3	1.5E-3
U-235 (=1.5%)	2.3E-3	2.1E-3
U-235 (=1.35%)	2.8E-3	2.5E-3
U-235 (=1.2%)	3.5E-3	3.2E-3
U-235 (=1.1%)	4.5E-3	4.2E-3
U-235 (=1.05%)	5.0E-3	4.8E-3
U-233	4.7E-4	4.3E-4
Pu-239	2.8E-4	2.6E-4
Pu-241	2.2E-4	1.9E-4

- a - Percentage value refers to weight percent enrichment in U-235. For enrichments that fall between identified values in the table, the higher value is the applicable value (e.g., for an enrichment of 14 weight percent U-235, the applicable concentration limit is that for 20 weight percent U-235).

For waste with more than 20 weight percent of materials listed in Condition 2, concentrations of SNM in individual waste containers must not exceed the following values at time of receipt:

Table B.

Radionuclide	Maximum SNM concentration in waste containing the described materials (g SNM/g waste)	
	Unlimited quantities of materials listed in Condition 2	Unlimited quantities of materials listed in Conditions 2 and 3
U-235 (>50%)	3.4E-4	1.2E-5
U-235	N/A	3.1E-4 ^a
U-233	2.9E-4	1.1E-5
Pu-239	1.7E-4	7.5E-6
Pu-241	1.3E-4	5.3E-6

- a - for uranium at any enrichment with sum of materials listed in Condition 2 and beryllium not exceeding 45 percent of the weight of the waste

Plutonium isotopes other than Pu-239 and Pu-241 do not need to be considered in demonstrating compliance with this condition. When mixtures of these SNM isotopes are present in the waste, the sum-of-the-fractions rule, as illustrated below, should be used.

$$\frac{\text{U-233 conc}}{\text{U-233 limit}} + \frac{100\text{wt}\% \text{U-235 conc}}{100\text{wt}\% \text{U-235 limit}} + \frac{10\text{wt}\% \text{U-235 conc}}{10\text{wt}\% \text{U-235 limit}} + \frac{\text{Pu-239 conc}}{\text{Pu-239 limit}} + \frac{\text{Pu-241 conc}}{\text{Pu-241 limit}} \leq 1$$

The concentration values in Condition 1 are operational values to ensure criticality safety. Where the values in Condition 1 exceed concentration values in the corresponding conditions of the State of Utah Radioactive Material License (RML), the concentration values in the RML, which are averaged over the container, may not be exceeded. Higher concentration values are included in Condition 1 to be used in establishing the maximum mass of SNM for non-homogeneous solid waste and liquid waste.

The measurement uncertainty values should be no more than 15 percent of the concentration limit, and represent the maximum one-sigma uncertainty associated with the measurement of the concentration of the particular radionuclide. When determining the applicable U-235 concentration limit for a specific enrichment percentage, the analytical uncertainty shall be added to the result (e.g., for a measurement value of U-235 enrichment percentage of 1.1 +/- 0.2, the U-235 concentration limit corresponding to an enrichment percent of 1.35 shall be used). This shall be applied to analytical methods employed by the generator prior to receipt and by EnergySolutions upon receipt.

The SNM must be homogeneously distributed throughout the waste. If the SNM is not homogeneously distributed, then the limiting concentrations must not be exceeded on average in any contiguous mass of 600 kilograms of waste.

Liquid waste may be stabilized provided the SNM concentration does not exceed the SNM concentration limits in Condition 1. For containers of liquid waste with more than

600 kilograms of waste, the total mass of SNM shall not exceed the SNM concentration in Condition 1 times 600 kilograms of waste. Waste containing free liquids and solids shall be mixed prior to treatment. Any solids shall be maintained in a suspended state during transfer and treatment.

2. Except as allowed by Tables A and B in Condition 1, waste must not contain "pure forms" of chemicals containing carbon, fluorine, magnesium, or bismuth in bulk quantities (e.g., a pallet of drums, a B-25 box). By "pure forms," it is meant that mixtures of the above elements, such as magnesium oxide, magnesium carbonate, magnesium fluoride, bismuth oxide, etc., do not contain other elements. These chemicals would be added to the waste stream during processing, such as at fuel facilities or treatment such as at mixed waste treatment facilities. The presence of the above materials will be determined by the generator, based on process knowledge or testing.
3. Except as allowed by Tables A and B in Condition 1, waste accepted must not contain total quantities of beryllium, hydrogenous material enriched in deuterium, or graphite above one tenth of one percent of the total weight of the waste. The presence of the above materials will be determined by the generator, based on process knowledge, physical observations, or testing.
4. Waste packages must not contain highly water soluble forms of uranium greater than 350 grams of uranium-235 or 200 grams of uranium-233. The sum of the fractions rule will apply for mixtures of U-233 and U-235. Highly soluble forms of uranium include, but are not limited to: uranium sulfate, uranyl acetate, uranyl chloride, uranyl formate,

uranyl fluoride, uranyl nitrate, uranyl potassium carbonate, and uranyl sulfate. The presence of the above materials will be determined by the generator, based on process knowledge or testing.

5. Waste processing of waste containing SNM will be limited to stabilization (mixing waste with reagents), micro-encapsulation and macro-encapsulation using low-density and high-density polyethylene, macro-encapsulation with cement grout, spray-washing, organic destruction (CerOx process and Solvent Electron Technology process), and thermal desorption.

EnergySolutions shall confirm that the SNM concentration in the rinse water does not exceed the limits in Condition 1 following spray-washing, prior to further treatment. If the rinse water is evaporated, the evaporated product shall comply with the requirements in Condition 1. EnergySolutions shall perform sampling and analysis of the liquid effluent collection system at a frequency of one sample per 300 gallons or when the system reaches capacity, whichever is less.

EnergySolutions shall track the SNM mass of waste treated using the CerOx process. When the total concentration of SNM is 85 percent of the sum of the fraction rule in Condition 1, EnergySolutions shall confirm the SNM concentration in the phase reactor tank and replace the solutions. The 10 percent enriched limit shall be used for uranium-235. The contents of the phase reactor tank should be solidified prior to disposal.

When waste is processed using the thermal desorption process and the Solvent Electron Technology process, EnergySolutions shall confirm the SNM concentration following processing and prior to returning the waste to temporary storage.

6. EnergySolutions shall require generators to provide the following information for each waste stream:

Pre-shipment

Waste Description. The description must detail how the waste was generated, list the physical forms in the waste, and identify uranium chemical composition.

Waste Characterization Summary. The data must include a general description of how the waste was characterized (including the volumetric extent of the waste, and the number, location, type, and results of any analytical testing), the range of SNM concentrations, and the analytical results with error values used to develop the concentration ranges.

Uniformity Description. A description of the process by which the waste was generated showing that the spatial distribution of SNM must be uniform, or other information supporting spatial distribution.

Manifest Concentration. The generator must describe the methods to be used to determine the concentrations on the manifests. These methods could include direct measurement and the use of scaling factors. The generator must describe the

uncertainty associated with sampling and testing used to obtain the manifest concentrations.

EnergySolutions shall review the above information and, if adequate, approve in writing this pre-shipment waste characterization and assurance plan before permitting the shipment of a waste stream. This will include statements that EnergySolutions has a written copy of all the information required above, that the characterization information is adequate and consistent with the waste description, and that the information is sufficient to demonstrate compliance with Conditions 1 through 4. Where generator process knowledge is used to demonstrate compliance with Conditions 1, 2, 3, or 4, EnergySolutions shall review this information and determine when testing is required to provide additional information in assuring compliance with the Conditions. EnergySolutions shall retain this information as required by the State of Utah to permit independent review.

At receipt

EnergySolutions shall require generators of SNM waste to provide a written certification with each waste manifest that states that the SNM concentrations reported on the manifest do not exceed the limits in Condition 1, that the measurement uncertainty does not exceed the uncertainty value in Condition 1, and that the waste meets Conditions 2 through 4.

7. Sampling and radiological testing of waste containing SNM must be performed in accordance with the following: one sample for each of the first ten shipments of a waste

stream; or one sample for each of the first 100 cubic yards of waste up to 1,000 cubic yards of a waste stream, and one sample for each additional 500 cubic yards of waste following the first ten shipments or following the first 1,000 cubic yards of a waste stream. Sampling and radiological testing of debris waste containing SNM (that is exempted from sampling by the State of Utah) can be eliminated if the SNM concentration is lower than one tenth of the limits in Condition 1. EnergySolutions shall verify the percent enrichment by appropriate analytical methods. The percent enrichment determination shall be made by taking into account the most conservative values based on the measurement uncertainties for the analytical methods chosen.

8. EnergySolutions shall notify the NRC, Region IV office within 24 hours if any of the above conditions are not met, including if a batch during a treatment process exceeds the SNM concentrations of Condition 1. A written notification of the event must be provided within 7 days.
9. EnergySolutions shall obtain NRC approval prior to changing any activities associated with the above conditions.

Based on the staff's evaluation, the Commission has determined, pursuant to 10 CFR 70.17(a), that the exemption of above activities at the EnergySolutions disposal facility is authorized by law, and will not endanger life or property or the common defense and security and is otherwise in the public interest. Accordingly, by this Order, the Commission grants an exemption subject to the stated conditions. The exemption will become effective after the State of Utah has incorporated the above conditions into EnergySolutions' radioactive materials

license. In addition, at that time, the Order published on August 1, 2005 will no longer be effective.

Pursuant to the requirements in 10 CFR Part 51, the Commission has determined that an Environmental Assessment is not required as the proposed action (change in company name) is administrative and therefore falls within the categorical exclusion provisions of 10 CFR 51.22(c)(11).

IV. Availability of Documents

Documents related to this action, including the application for amendment and supporting documentation, will be available electronically at the NRC's Electronic Reading Room at <<http://www.NRC.gov/reading-rm/adams.html>>. From this site, you can access the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the document related to this notice is: EnergySolutions' March 3, 2006 request (**ML060740549**).

If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by email to pdr@nrc.gov.