



January 12, 2015

CD15-0009

Annette Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attn: Rulemakings and Adjudications Staff

Subject: Comments on the Petition for Rulemaking re Part 37, Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material

Reference: Docket No. PRM-37-1; NRC-2014-0172

Dear Ms. Vietti-Cook:

EnergySolutions hereby provides comments in response to the petition for rulemaking regarding the Physical Protection of Byproduct Material. Our comments on the petition for rulemaking are summarized below and described in greater detail in the attachment.

In general, EnergySolutions is in agreement with the Nuclear Energy Institute's (NEI) request that the U.S. Nuclear Regulatory Commission (NRC) amend their regulations on the Physical Protection of Byproduct Material, 10 CFR 37 *et al.*, to "remove unnecessary and burdensome requirements on licensees with established physical security programs." More specifically, we agree that the rule should be amended to clarify and expand the exemptions in 10 CFR 37.11 to include the addition of a new exemption, §37.11(d), to exclude large components and material stored in robust structures.

In addition to the changes to Part 37 proposed by NEI, EnergySolutions proposes that the NRC revise the applicability of Part 37 as it pertains to low-level radioactive waste (LLRW). We propose that the applicability of Part 37 be limited to disused discrete radioactive sources, as initially intended in the base IAEA protection model and as implemented by other national authorities. If the NRC continues to subject Part 37 controls to LLRW, maximum realistically accessible dose rates should be a primary factor in determining if these controls are applicable. EnergySolutions recommends an item must exhibit accessible dose rates in excess of 0.1 Gy/h (10 rads/h) at a measured or calculated distance of 1 meter from the material.

Furthermore, the aggregation requirements of 10 CFR 37.11(c) create a new level of security for LLRW that is not justified by the actual radiological risk associated with LLRW. These requirements will be costly and provide little or no reduction to public radiological risks. If the NRC continues to subject LLRW to these controls, we recommend that an aggregated dose rate be defined to reduce the breadth of unnecessary and costly controls. EnergySolutions recommends that the dose rate be measured or calculated at a distance of 1 meter from the material, and individual or aggregated packages of $\geq 1 \text{ m}^3$ of volume, or $\geq 500 \text{ kg}$ of mass be excluded from Part 37 controls.

EnergySolutions also proposes that LLRW that has been disposed in bulk or engineered disposal vaults be explicitly excluded from Part 37 *et al.* As is the case with major radioactive



components, and the subject of this petition for rulemaking, such material is not readily accessible because of the need for special equipment to extract and move waste entombed in a burial site. This includes disused sources that have been encapsulated or otherwise properly processed and disposed.

Finally, we believe the 2,000 kg exemption threshold for exempting activated components is excessively conservative. Based on our experience, we have found that practical considerations render material handling problematic when packages or component mass exceeds approximately 500 kg. Mechanical equipment is required to handle such items, which provides a significant barrier to theft or diversion.

Thank you again for this opportunity to comment. Questions regarding these comments may be directed to me at (801) 649-2109 or dshrum@energysolutions.com.

Sincerely,

Daniel B. Shrum
Senior Vice President
Regulatory Affairs



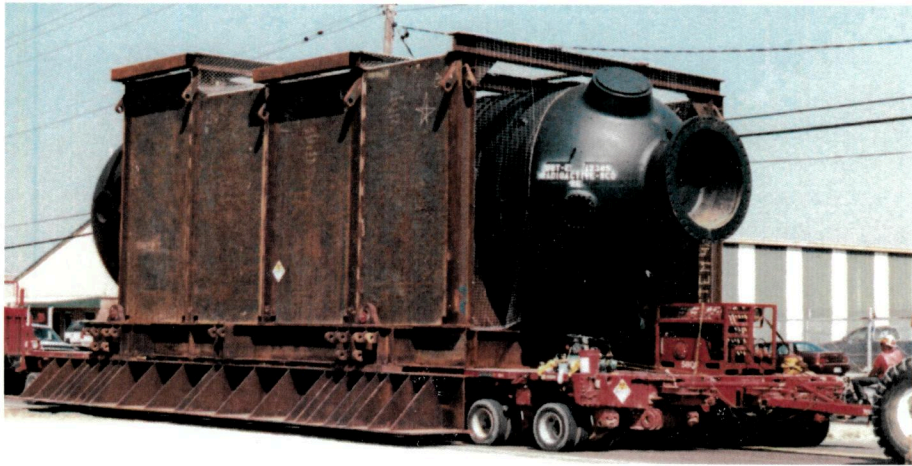
COMMENTS ON THE PHYSICAL PROTECTION OF CATEGORY 1 AND CATEGORY 2 QUANTITIES OF RADIOACTIVE MATERIAL

This attachment provides additional detail to support our proposed changes to NRC rules for the Physical Protection of Byproduct Material, 10 CFR 37 *et al.* We are in support of the petitioner's proposal that changes should be made to "remove unnecessary and burdensome requirements on licensees with established physical security programs." We also believe that changes beyond those proposed by the petitioner are merited to reduce unduly burdensome requirements on licensees, while still meeting the needs of an enhanced security for radioactive material quantities of concern.

1. EnergySolutions supports the proposal that 10 CFR 37.11 should be revised to exempt major radioactive components and material in robust structures

In section B1 of the NEI petition, NEI references Enforcement Guidance Memorandum EGM-14-001 in which NRC staff recognizes the size and weight of large components as significant impediments to theft and diversion. We fully agree that major radioactive components (e.g., steam generators, pressurizers, reactor pressure vessel closures) are inherently low risk items for theft or diversion and believe that these considerations apply irrespective of the presence of a Part 73 Security program. We further propose that they are equally applicable at LLRW processor and disposal locations.

Take for example a processed mid-sized steam generator (pictured below). The activity distribution of the steam generator was minimally dispersible and had dose rates from accessible surfaces much less than 0.1 Gy/h (10 rads/h) at a distance of one-meter. EnergySolutions believes that an explicit exemption from Part 37 *et al.* is appropriate for these components. We further believe that, as proposed by the petitioner, this exemption should extend beyond the limitations in the current enforcement discretion, which allows for reactor site storage in "robust structures." These components cannot be moved without special equipment and the design of the components renders any substantial dispersal of the contained radioactivity extremely unlikely. This is an inherent feature of major radioactive components and is not dependent upon storage in a robust structure.



330 ton (490 tons with shielding & dunnage) being moved from barge slip to processing facility

At the time of shipment, the steam generator pictured above contained approximately 5.6 TBq (150 Ci) of ^{60}Co , equal to approximately 18 times the category 2 quantity threshold, but exhibited external dose rates of only 0.5 mSv/h to 0.6 mSv/h (50 to 60 mrad/h), or less than 1% of the most limiting dose rate associated with IAEA category 2 threshold effects. The steam generator shell is 3.75 inches of carbon steel in the region of the tube bundle, and the nominal 5,000 m² of internal Inconel tube surface contains most of the radioactivity as a thin layer of relatively fixed, insoluble surface contamination. Surreptitious movement or theft of such components is not possible, and substantial damage resulting in dispersal of the radioactivity is not a credible threat. For these reasons, EnergySolutions recommends that items that can be categorized as major radioactive components should not be required to adhere to Part 37 controls.

As mentioned in Section B2 of the petition, if major radioactive components are not exempt from these requirements, licensees will need to change their NRC-approved Part 73 security plans in order to meet the regulations set forth by Physical Protection of Byproduct Material regulations. This alteration of NRC-approved security plans will have an associated financial burden, which will ultimately be passed along to the consumer and not provide enhancements to public radiological safety. This reinforces the recommended request to exempt major radioactive components.

EnergySolutions supports the recommendation to amend the rule and expand the exemptions in 37.11 to include §37.11(d), which notes the exemption of large components and robust structures containing category 1 or category 2 quantities of radioactive material.

EnergySolutions does not support the creation of a new definition for “large component.” We believe the objective of the petitioner can be accomplished by referring to “major radioactive component” as currently defined in 10 CFR 50.2.

2. Spent ion exchange resins (IERS) should be added as a specific exemption in Part 37.11(c)

As noted in IAEA *Categorization of Radioactive Sources*, derived deterministic dose limits (threshold) define a "dangerous source" and are used to normalize and categorize sealed sources of differing radionuclide composition and activity. The guidance was issued specifically for small sealed sources. The IAEA ERP Method 2003 (IAEA-TECDOC-953) states the following examples of the potential exposure scenarios of a dangerous source:

- a small source removed from a shield and carried in a pocket for 10 hours
- a small source inadvertently left in a bedroom for an extended time frame
- a sealed container is breached and the individual consumes some of the material (and assuming the ingestion is "...10x the largest fraction of the material ever known to have been accidentally eaten").

These examples clearly demonstrate that the need for controls is intended for application to high specific activity and physically small sources. Due to the fact that these derivations are based upon physically small sealed sources, exposure scenarios involving dispersed low specific activity material, such as an ion exchange resin (IER), require alternative metrics and less stringent criteria because the activity is being distributed over a much larger volume of inert material and the significant self-absorption in the resin media.

To further demonstrate the lack of applicability to IERs, a sample calculation is provided below comparing the dose rates for a typical industrial radiography source (2 cm in length) and a large IER package (100 ft³).

Radiography source:	100 Gy/h at 2.54 cm (10,000 rads/h at 2.54 cm)	1 Gy/h at 30 cm (100 rads/h at 30 cm)	0.10 Gy/h at 1 m (10 rads/h at 1 m)
Resin liner:	0.04 Gy/h at 2.54 cm (4 rads/h at 2.54 cm)	0.03 Gy/h at 30 cm (3 rads/h at 30 cm)	<0.01 Gy/h at 1 m (<1 rads/h at 1 m)

As demonstrated above, the radiography source emits a significantly higher dose rate than the resin liner. Based on the IAEA guidance and the dosimetric analyses, we believe that applying these physical controls to IERs is unwarranted. Therefore, EnergySolutions recommends that the scope of applicability for the Physical Protection of Byproduct Material be limited to disused discrete radioactive sources, as initially intended in the base IAEA protection model and as implemented by other national authorities (e.g., Canada), and not apply to IERs.

3. Implement a dose rate criteria to provide clarity on the applicability of the regulation on all radioactive material

In the petition, NEI notes in Section B3, that the scope and requirements in 10 CFR 37.11(c) are ambiguous. EnergySolutions agrees and believes some of the ambiguity can be relieved if an additional criterion, such as dose rate, is provided to the applicable radioactive material.

The exposure potential from activated materials and items are highly variable and external dose rates depend upon the actual physical distribution of activity and the self-absorption characteristics of the item. Two simple calculations are provided below to represent possible irradiated items in which ^{60}Co is a significant contributor to the external dose rates.

Scenario 1: A 30 cm diameter iron right cylinder with a length of 350 cm, containing 8.1 Ci of ^{60}Co has a calculated photon dose rate of approximately 0.9 rads/h at a distance of 1 meter to the midpoint of its length.

Scenario 2: A 300 cm diameter iron disk with a height of 3.7 cm, containing 8.1 Ci of ^{60}Co has a calculated photon dose rate of 3.5 rads/h at a distance of 1 meter from its center.

As demonstrated above, the potential for exposure greatly depends upon the geometry of the object, even two objects of similar volume containing the same activity. Accordingly, EnergySolutions recommends that maximum realistically accessible dose rates be a primary factor in determining if Part 37 controls are applicable. To marry this criterion to the lowest threshold value for category 2 source deterministic effects, it is recommended that the item exhibit accessible dose rates in excess of 0.1 Gy/h (10 rads/h). Additionally, EnergySolutions recommends accessible dose rate be defined as the dose rate measured or calculated at a distance of one-meter from the material.

4. Remove the requirement of additional physical controls for aggregated exempted waste

In addition to the relief of ambiguity through dose rates, EnergySolutions believes that some of the ambiguity referenced in Section B3 of the petition is due to the fact that 10 CFR 37.11 contains a partial exemption (Parts B, C and D of the rule) for aggregated category 1 and category 2 quantities of radioactive materials in waste, yet specifies additional physical controls in paragraph (c). By requiring these additional controls, this effectively creates a new category of materials security. In many cases, the large numbers of packages, high mass and large volumes of waste render these additional controls expensive and unnecessary. This is impractical, particularly where hundreds or thousands of low activity packages are co-located within a single security barrier for purposes of operational efficiency. These new security provisions are contrary to the actual radiological risk associated with LLRW and will be costly to implement, while providing little or no improvement to public radiological risks.

Therefore, if LLRW continues to be subject to these controls, then realistic considerations should be included to avoid wasting resources on otherwise low-risk materials. These include volume and mass limits when aggregating materials relative to the category 1 and 2 quantity threshold values. EnergySolutions recommends individual or aggregated packages of $> 1 \text{ m}^3$ of volume or $\geq 500 \text{ kg}$ of mass be excluded from Part 37 controls, including the new 10 CFR 37(c) security requirements.

5. Physical protection of byproduct material should not be required for waste that has been permanently disposed

The same logic applicable to major radioactive components (i.e., the need for special equipment to extract and move items) is applicable to radioactive wastes once permanently disposed in bulk or in engineered disposal vaults in a licensed disposal facility. This includes disused sources that have been encapsulated or otherwise properly processed and disposed. For this reason, EnergySolutions recommends all LLRW be categorically excluded from Part 37 once disposed. This change should be identified as Agreement State Compatibility Category B in order to ensure that it is effectively and consistently adopted at the disposal sites, all of which are regulated by Agreement States.

6. Reduce the mass-based exemption for activated components

EnergySolutions supports a specific exclusion for activated components, 37.11(c), but believes the 2,000 kg exemption threshold is extremely conservative. This position is based on our operational experience, which typically involves handling in excess of 15,000 tons of LLRW annually. EnergySolutions has found that practical considerations render material handling problematic when the mass of packages or components exceeds approximately 500 kg. Mechanical equipment (e.g., fork trucks, cranes, chain hoists) is required to handle such items. The required use of such equipment essentially forms a practical barrier to theft or diversion. Furthermore, a specific basis is not provided for the 2,000 kg threshold; therefore, EnergySolutions recommends that the mass threshold be revised to be 500 kg.

In order to implement comments 2 through 6, EnergySolutions proposes that Part §37.11(c) be revised to read as follows (new language shown in **bold type** and deletions in ~~striketrough~~):

“A licensee that possesses radioactive waste that **contains an aggregated or individual package of category 1 or category 2 quantities of radioactive material in excess of 1 m³ of volume or \geq 500 kg of mass** is exempt from the requirements of subparts B, C, and D of this part. Except that any radioactive waste that contains discrete sources, ~~ion exchange resins,~~ or activated material that weighs less than 500 kg (1,103 lbs) ~~2,000 kg (4,409 lbs)~~ **and has an accessible dose rate in excess of 0.1 Gy/h (10 rads/h) measured or calculated at a distance of one-meter from the material** is not exempt from the requirements of this part. **All radioactive waste that has been disposed as defined in part 61 of this chapter is exempt from the requirements of subparts B, C, and D of this part.** The licensee shall implement the following requirements to secure the radioactive waste...”

7. Metrication alignment of radioactive waste regulations

To better align radioactive waste security regulations, Part 20 and Part 37 *et al.*, EnergySolutions recommends that 10 CFR 37 *et al.* regulations note quantities on records (and calculations) in traditional units as the standard. This would follow the already used and implemented regulation specified in 20.2101(a), with quantities in SI units following in parentheses for information purposes as specified in 20.2101(b).