

# NEUTRON PRODUCTS inc

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8 April 2010

Via FAX (301) 492-3348

Ms. Vonna Ordaz  
Director  
Division of Spent Fuel Storage and Transportation  
Office of Nuclear Material Safety and Safeguards  
United States Nuclear Regulatory Commission  
11555 Rockville Pike  
Mail Stop EBB-3-D-2M  
Rockville, MD 20852-2738

Re: Certificate No. 9215, Rev. 9  
Docket No. 71-9215  
Package ID No. USA/9215/B(U)

Dear Ms. Ordaz,

I am writing regarding our request of 12 March 2010 to add special form cesium-137 sources to the list of authorized contents to be transported in our USA/9215/B(U) package.

## **Outstanding Commitments to NRC**

As you may recall from the meeting between NRC and Neutron on November 10, 2009, we have undertaken a comprehensive review of our Quality Assurance Program for the Transportation of Radioactive Materials, a significant undertaking which is scheduled for completion by the end of this month.

In addition, we have an outstanding financial obligation to NRC stemming from its review of our request to bring the package including overpack OP-10 back from Brazil. The package was returned without adverse incident in early January, and we are making payments to NRC in accordance with an installment plan to satisfy the invoice arising from that NRC review.

## **Future Plans**

At some time after the successful completion of our QAP review, we are hoping to schedule a meeting with NRC to discuss our USA/9215/B(U) packages, and possible modifications to the certificate. In addition to including Cs-137 special form sources as an authorized content, we are

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considering other modifications, such as increasing the activity limit on the square drawer configuration from its current level of 6,300 Ci.

### **Withdrawal of Current Request**

During the past month or so, I have spoken with both Michele Sampson and Christopher Staab regarding our March 12 request to modify the CoC, both of whom have been very informative. Based upon the discussions following our submittal, we now understand that, while our letter of March 12 may contain adequate technical information to evaluate our request, it - as a stand alone document - is insufficient to allow NRC to begin the process of modifying the CoC. Based upon discussions within our own organization, we have concluded that the submittal of a request which would satisfy NRC's evaluation criteria for CoC amendments would require us to divert human resources away from the on-going QAP review which is nearing completion. Thus, we have decided that our efforts need be focused on satisfying the requirements of our current authorizations before requesting a CoC amendment.

In addition, we believe that it would be a more efficient use of NRC review time and of our financial resources to discuss the cesium-137 modification at the same time as we are discussing other modifications currently being contemplated. As a result, we hereby withdraw our request of March 12, 2010 for the modification of our CoC.

### **IAEA Project in Uruguay**

The initial impetus for our cesium request was the IAEA project in Uruguay to repatriate several radioactive sources currently in storage in Montevideo. The sources to be removed comprise eight cobalt-60 research irradiator sources to be shipped to India, twelve cobalt-60 teletherapy sources to be shipped to Southwest Research Institute, and one cesium-137 teletherapy source to be shipped to SwRI. There is limited information available about the sources and at least some of the sources do not have current special form certificates. Thus, in order to facilitate shipment, another licensee will make new special form sources out of the existing sources using a portable hot cell. In the process of making the new sources, many of the existing sources will be consolidated. The total activity of cobalt-60 to be shipped to India is estimated to be approximately 30 Ci. The total activity of the cobalt-60 to be shipped to SwRI is estimated to be less than 3,000 Ci. The activity of the cesium-137 source is estimated to be approximately 500 Ci.

In order to ship the cobalt-60 sources, we are currently planning to ship our packages to Uruguay on April 14, 2010 and intend to have them loaded and ready to ship to India and SwRI by May 21, 2010. We hereby request a one-time authorization to use one of our USA/9215/B(U) packages for the shipment of one special form cesium-137 source, with a total activity not to exceed 600 Ci. The cesium source would be the only source in the entire package, which is

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currently licensed for 15,000 Ci of cobalt-60.

### **Safety Analysis Report**

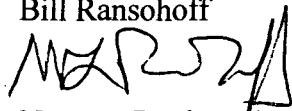
For the reasons discussed above, we are not now in a position to submit a complete application for amendment of the CoC. In lieu of modified pages of the SAR, we have attached to this letter an SAR addendum to demonstrate that the 600 Ci special form cesium-137 source is within the bounds of the current thermal and shielding capabilities of the package.

### **Conclusion**

In considering this request, we hope that NRC will consider the fact that there is a significant backlog of this repatriation work to be performed, and limited (primarily US taxpayer) funding with which to do it, so that economic efficiency is at a premium. We recognize that efficiency should not come at the expense of safety, and we submit that the thermal and shielding calculations support our request and we will do our best to assure that the granting of this request will provide the same wide margin of safety that has characterized the prior use of these packages for the shipment of more than three thousand sources containing more than ten million curies of cobalt-60.

Thank you for your consideration in this matter. If you have any questions, or require additional information, please advise.

Bill Ransohoff



Neutron Products inc  
Director of Operations

cc: Christopher Staab, USNRC

**NEUTRON PRODUCTS inc**

**Addendum to Safety Analysis Report for Certificate of Compliance No. USA/9215/B(U)  
Concerning the One-Time Authorization to Transport a Special Form Cesium-137 Source  
with an Activity not to Exceed 22.2 Tbq (600 Curies)**

**Thermal Evaluation**

*Summary*

The heat generation design basis of the package is 240 watts, which corresponds to the decay heat of approximately 15,000 Ci of cobalt-60. The decay heat of a 600 Ci cesium-137 source is approximately 3.1 watts, or 1.3% of the design basis.

*Supporting Calculations*

Cobalt-60 decays by beta decay to a stable isotope of nickel. With each disintegration, there are two photons released. The energies are as follows:

$$\beta_{\text{avg}} = 0.094 \text{ MeV}$$

$$\gamma_1 = 1.173 \text{ MeV}$$

$$\gamma_2 = 1.332 \text{ MeV}$$

$$\text{TOTAL} = 2.6 \text{ MeV / Co-60 disintegration}$$

It follows that:

$$\begin{aligned} 1 \text{ Ci Co-60} &= (3.7 \times 10^{10} \text{ dps}) \times (2.6 \text{ MeV/d}) = 9.6 \times 10^{10} \text{ MeV/s} \\ &= (9.6 \times 10^{10} \text{ MeV/s}) \times (1.6 \times 10^{-13} \text{ J/MeV}) \\ &= 0.0154 \text{ J/s} \\ &= 0.0154 \text{ W} \end{aligned}$$

Maximum heat load for the current authorization of 15,000 Ci of cobalt-60:

$$(0.0154 \text{ W/Ci}) \times (15,000 \text{ Ci}) = \mathbf{231 \text{ W}}$$

Cesium-137 beta decays to barium-137, yielding a 0.662 MeV photon and a  $\beta$  particle with an average energy of 0.195 MeV, for a total of 0.86 MeV / disintegration. This is equivalent to 0.0051 W/Ci Cs-137.

$$\text{Heat load for 600 Ci of cesium-137} = (0.0051 \text{ W/Ci}) \times (600 \text{ Ci}) = \mathbf{3.1 \text{ W}}$$

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*Conclusion*

The decay heat from 600 Ci of cesium-137 is significantly less than the thermal loading for which the package is currently authorized.

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**Shielding Evaluation**

The shielding in the package is adequate for 15,000 Ci of cobalt-60. The design is governed by the requirement to shield the 1.17 MeV and 1.33 MeV gamma rays resulting from each cobalt-60 disintegration. The decay of cesium-137 results in a single 0.662 MeV gamma ray. The shielding requirements for a 600 Ci source emitting a 0.662 MeV photon are significantly less than those for a 15,000 Ci source emitting photons with a combined energy of 2.5 MeV.

For a point source, the dose rate at one meter from one Ci of cobalt-60 is 1.32 R/hr., while one Ci of Cs-137 gives a dose rate of 0.33 R/hr. at one meter, or approximately one quarter of the Co-60 dose rate.

The package is currently used for sources of various geometries, with various source holder configurations based upon the manufacturer of the source and its intended use. As necessary, shield plugs and spacers made of lead, steel or tungsten are utilized to restrict movement of the source and to ensure that regulatory dose rate limits are not exceeded. Adequate shield plugs will be required for the use of this package for the transport of the 600 Ci cesium-137 source, just as they are for the transport of cobalt-60 sources.

*Conclusion*

The shielding requirements for 600 Ci of Cs-137 are significantly less than that for which the package is currently authorized.