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27 August 2018

Mr. John McKirgan, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Neutron Products, Inc. – Requests for Additional Information for Renewal of Certificate of Compliance No. 9215, Model No. NPI-20WC-6 MkII

Docket No. 71-9215

Dear Mr. McKirgan,

I am writing in response to your letter of August 6, 2018, which was received here on August 9, and which transmitted the NRC's Requests for Additional Information. That additional information is provided below.

Request 5-1 states, in part "Please provide complete footnote information for Table 5.4.1 of your application."

Reply to 5-1

Regarding the footnotes in Table 5.4.1, there seems to have been a formatting problem. All of the footnotes were included in the table, but the numbering was not correct. We have revised Table 5.4.1 accordingly. At this point, I have included it in this response as a draft. If it is acceptable as modified, we will submit it as Revision 7, page 5-8, of the SAR.

Request 5-2 states in part: "Please specify an activity limit below which axial shielding plugs are not necessary."

Reply to 5-2

The intent of our request was for operational flexibility. Let me provide an example:

The source we were trying to ship was a very long cesium-137 assembly. The source capsule itself was 15.94" long. It was pinned to a tungsten rod which was 3.61" long. On the end of the tungsten rod was a threaded stud used to pick up the assembly. The threaded stud was 3/8" long. Add them all up, and the complete assembly was 19.925" long. As the through-hole of

NMSS01

our package is only 21.625", the difference was only 1.70". So, on one side of the source, the axial shielding was more than 3.5" of tungsten, so we were in compliance on that side. However, on the other side of the source, we could get no more than 1.7" of axial shielding.

The requirement does not actually say that we need 2" of tungsten axial shielding **on each side of the source**, but that is the most conservative way to interpret it, and that is how we have interpreted it. If the intent is to have at least 2" of axial shielding **total**, then we would have been able to ship the source assembly as it was, because we would have had more than 5" of tungsten alloy shielding. As it was, the unit was being decommissioned, so the need to manipulate the source in the future was quite limited, so we chose to grind off the 3/8" threaded stud. This shortened the total length of the assembly to 19.55", thereby giving us more than 2" of room for the tungsten shield plug.

The activity of this source was approximately 2,350 Ci. But it was such a large source dimensionally, so that the specific activity of the cesium was quite low, and it was cesium as opposed to cobalt-60. We would not have been able to make the shipment had it been cobalt-60 of the same activity and geometry. The TI of the package was only 0.5, so it shipped as Yellow II.

The task of grinding off the threaded stud was manageable, but it was not insignificant and it was being done for what we felt were artificial reasons. It was not necessary for shielding purposes for this particular source. Had we used a 1.7" tungsten plug instead of a 2" tungsten plug, the TI still would have been very low. Perhaps the shipment would have been Yellow III instead of Yellow II, but still a very low TI.

From time to time, there are sources which could be safely shipped in our package from a shielding standpoint, but which we cannot ship due to the 2" requirement. As a result, the source needs to be shipped using an alternate package at additional expense to the customer. Or, a portable hot cell has to be brought onto the job site, and the source assembly needs to be taken apart (the source capsule needs to be unpinned from the tungsten rod). Again, this adds considerable licensed work to the job and considerable expense for the customer with no significant off-setting shielding benefit. I don't want to overstate the frequency of this, but it happens once or twice every year or two that we know of, and it may happen more often than that in the event that our customers have shipping requirements that they do not contact us about because they are aware of the source length restrictions.

As such, our request to the NRC is essentially to remove the relatively new axial shielding length requirement entirely. The packages were used for many years without such a requirement, and we believe that we were adequately regulated during that period due to the dose rate limits on all shipments. If we could not shield the source in a manner adequate to meet the dose rate limits for shipping, then our package would not be used to transport the source in question.

So, this request is really a request for operational flexibility. We submit that the axial shielding requirement is superfluous as we are already bound by established dose rate regulations to adequately shield the source(s) being shipped. Accordingly, we request that the NRC reconsider the necessity of its inclusion in the certificate.

Request 5-3 states in part: "Please clarify the orientation of the package with respect to the dose locations in Table 5.4.1."

Reply to 5-3

From Table 5.4.1, the "forward" and "back" designations refer to the areas around the end caps. On drawing 240122, Rev H, at half section A-A, item 23 is a small piece of angle iron. This side of the cask is the working end of the cask, where the source handler operates, and is referred to as the "back" of the cask, whereas the opposite side is the side which mates to the teletherapy unit, and is referred to as the "front".

The "left" and "right" designations are as viewed from the back of the cask.

In submitting this consolidated SAR, we only made changes to items such as Table 5.4.1 to the extent we felt necessary due to additional information gathered since the previous consolidated SAR had been submitted. As such, the first six examples in the table are the same as the previous. The vast majority of them were for AECL/Theratronics teletherapy sources shipped in the "-4 Drum Assembly" shown on Sheet 2 of Drawing 240122. This type of source was shipped with the thin window pointing down, which explains why the highest dose rate readings were at the bottom of the package.

One exception was the third example in Table 5.4.1. It was a Picker source in an international capsule, similar to that shown in the drawing 5.3.1. This type of source was shipped with the thin window pointing toward the back of the cask, which is why the back dose rate is so much higher than the forward one. Also, as can be seen from the "-4 Drum Assembly" drawing, there are three through holes in this drum, so the source must have been in the through hole on the bottom right side of the cask, which is why the right side dose rate is higher than the left, and why the "below" dose rate is higher than the "above".

The two additional examples provided both only show the maximum dose rates recorded for those shipments. The first one was included to demonstrate the improved shielding characteristics of the newer drum design, which is shown on Sheet 1 of Drawing 240122. Despite the fact that more activity was being shipped, the maximum package dose rate was considerably lower. The second one was included to provide one example of dose rates resulting from the shipment of pencil type sources. This is the same type of configuration described in the paragraph above with the Picker source in the international capsule, to the extent that the source is shipped in a horizontal configuration. Although it was not clearly stated in the SAR, it was for sources in this configuration that the statement was made that "the areas of highest contact dose rate with the package itself can generally be found on the overpack in the areas extending outward from the End Cover flanges."

Regarding the drawing 5.3.1, the point we were trying to make was that the area of highest dose rate for sources in the horizontal configuration was through the steel flanges. As such, we used the drawing from the previous consolidated application with the source in the horizontal configuration. As the source length increases, the distance to the steel flanges (and therefore the amount of shielding) would be reduced accordingly. It is for this reason that the pencil source example given, wherein the total

activity was less than that in some of the other examples, resulted in a higher contact dose rate and a higher dose at 1 meter.

Request 5-4 states in part: "Please complete the table information or provide more explanation regarding the inclusion of only two dose rate locations for the last two examples in Table 5.4.1"

Reply to 5-4

As discussed above, these two examples were taken from shipping papers associated with their respective shipments and, as such, provide only the maximum dose rates identified for the configurations, based on the surveys conducted at the time of shipment.

Conclusion

We believe this response to be fully responsive to your requests for additional information, and the associated telephone conversation. If you believe otherwise, or require additional information, please let us know. Thank you again for your consideration of these matters.

Sincerely,

Bill Ransohoff
Neutron Products, Inc.
President

TABLE 5.4.1

DOSE RATES FOR SHIPMENTS

Source Strength Curies	Distance From Package	Maximum Dose Rate, mR/Hr. FWD	Back	Left[1]	Right[1]	Above	Below
8,050	Surface	2	5	7	5	0.2	70E[2]
	1 meter	0.3E	0.6	0.5	0.5	0.1	12E
8,700[4]	Surface	10	14	20	13	0.6	60
	1 meter	2	3	3	2	0.4	8E
4, 100	Surface	5	15	5	15	GB[3]	4.0
	I meter	.2	1	.5	1	GB[3]	1.5
9,500[4]	Surface	4	5	18	30	0.8	70E
	I meter	1.5	2	5	5	0.6	9E
7,950	Surf ace	9	11	25	25	0.1	70
	1 meter	1.5	1.5	8	5	0.3	9
7,300	Surface	4	9	20	18	0.7	46
	1 meter	0.9	1.5	3	3	0.4	8
13,500	Surface	25 max					
	1 meter	5					
6,500[5]	Surface		85 max				
	1 meter		9				

[1] Facing Forward
[2] E indicates estimate
[3] At gamma background
[4] Two source total
[5] Pencil source

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