



National Institutes of Health  
Bethesda, Maryland 20892  
www.nih.gov

January 19, 2017

License: 19-00296-10

U.S. Nuclear Regulatory Commission  
Division of Radiation Safety and Safeguards  
2100 Renaissance Blvd  
King of Prussia, PA 19406

*Br. 1*  
*03001786*

Dear Sir or Madam:

This is a request to amend conditions 8D, 8E, 8F, and 8G of NIH Broad Scope License 19-00296-10. The NIH Cyclotron Facility has recently received targetry upgrades for both of its GE PETtrace units. The main purpose of the upgrades is to be able to produce PET radionuclides at a higher specific activity. However, it will also be possible to produce a larger quantity than has been previously possible. Although there is no immediate demand to receive more activity overall, it would be prudent to have the license limits be commensurate with what is possible. The requested amounts are as follows:

- 8D – Carbon-11: 30 Ci total
- 8E – Nitrogen-13: 20 Ci total
- 8F – Oxygen-15: 20 Ci total
- 8G – Fluorine-18: 40 Ci total

Attached is an updated hot cell shielding evaluation for the nuclide with the highest hot cell delivery amount, C-11 which is typically 3 Ci. The evaluation is under the same conditions as was set in the original license renewal application. Activity amounts were evaluated up to 6 Ci for 2-inch hot cells and 40 Ci for 3-inch hot cells, respectively. The results show that 2-inch hot cells are adequate for up to 6 Ci if this amount were ever needed to be delivered. The Division of Radiation Safety will re-evaluate on a case-by-case basis the 2-inch hot cells should more than 6 Ci ever be requested. The 3-inch hot cells are adequate for any amount up to the license limit.

If you have any questions or need additional clarification on this amendment request, please contact me at 301-594-1303 or via e-mail at [cribaudo@nih.gov](mailto:cribaudo@nih.gov).

Catherine A. Ribaud

cc: Dr. Bradford Wood, Chair, NIH Radiation Safety Committee

**REC'D IN LAT** *01/19/2017*

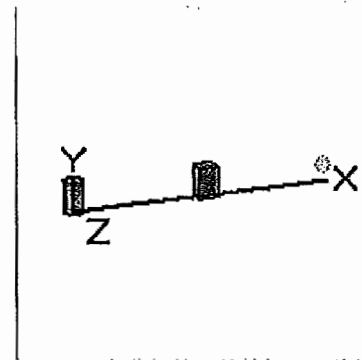
*592835*  
NMSS/RONI MATERIALS-002

**MicroShield 8.02  
NIH/ORS (8.02-0000)**

Date	By	Checked
<b>Filename</b> Case2	<b>Run Date</b> December 1, 2016	<b>Run Time</b> 7:10:04 AM
<b>Duration</b> 00:00:01		
Project Info		
<b>Case Title</b>	50 mm Pb Hot Cell	
<b>Description</b>	6 Ci C-11 in stainless steel coil	
<b>Geometry</b>	12 - Annular Cylinder - External Dose Point	

Source Dimensions	
Height	8.0 cm (3.1 in)
Inner Cyl Radius	2.0 cm (0.8 in)
Inner Cyl Thickness	0.079 cm (0.0 in)
Outer Cyl Thickness	0.079 cm (0.0 in)
Source	0.159 cm (0.1 in)

Dose Points			
A	X	Y	Z
#1	66.0 cm (2 ft 2.0 in)	4.0 cm (1.6 in)	0.0 cm (0 in)



Shields			
Shield N	Dimension	Material	Density
Cyl. Radius	2.0 cm	Air	0.00122
Shield 1	.079 cm	Iron	7.86
Source	17.251 cm <sup>3</sup>	Air	0.00122
Shield 3	.079 cm	Iron	7.86
Transition	30.0 cm	Air	0.00122
Shield 6	5.0 cm	Lead	11.34
Air Gap		Air	0.00122

Source Input: Grouping Method - Actual Photon Energies				
Nuclide	Ci	Bq	μCi/cm <sup>3</sup>	Bq/cm <sup>3</sup>
C-11	6.0000e+000	2.2200e+011	3.4780e+005	1.2869e+010

Buildup: The material reference is Shield 6	
Integration Parameters	
Radial	10
Circumferential	20
Y Direction (axial)	20

Results					
Energy (MeV)	Activity (Photons/sec)	Fluence Rate	Fluence Rate	Exposure Rate	Exposure Rate
		MeV/cm <sup>2</sup> /sec No Buildup	MeV/cm <sup>2</sup> /sec With Buildup	mR/hr No Buildup	mR/hr With Buildup
0.0002	4.928e+05	0.000e+00	1.443e-29	0.000e+00	2.415e-28

0.511	4.430e+11	8.426e+02	1.701e+03	1.654e+00	3.338e+00
<b>Totals</b>	<b>4.430e+11</b>	<b>8.426e+02</b>	<b>1.701e+03</b>	<b>1.654e+00</b>	<b>3.338e+00</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(1 of 3)</b>	<b>(66 cm)</b>
0.0002	4.928e+05	0.000e+00	1.443e-29	0.000e+00	2.415e-28
0.511	4.430e+11	8.426e+02	1.701e+03	1.654e+00	3.338e+00
<b>Totals</b>	<b>4.430e+11</b>	<b>8.426e+02</b>	<b>1.701e+03</b>	<b>1.654e+00</b>	<b>3.338e+00</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(2 of 3)</b>	<b>(56 cm)</b>
0.0002	4.928e+05	0.000e+00	2.004e-29	0.000e+00	3.355e-28
0.511	4.430e+11	1.170e+03	2.362e+03	2.296e+00	4.636e+00
<b>Totals</b>	<b>4.430e+11</b>	<b>1.170e+03</b>	<b>2.362e+03</b>	<b>2.296e+00</b>	<b>4.636e+00</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(3 of 3)</b>	<b>(46 cm)</b>
0.0002	4.928e+05	0.000e+00	2.969e-29	0.000e+00	4.971e-28
0.511	4.430e+11	1.730e+03	3.493e+03	3.396e+00	6.856e+00
<b>Totals</b>	<b>4.430e+11</b>	<b>1.730e+03</b>	<b>3.493e+03</b>	<b>3.396e+00</b>	<b>6.856e+00</b>

**Sensitivity Analysis Summary - X Dose Point 1**

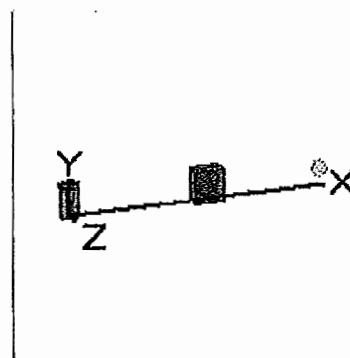
Dose Point #	Sensitivity	Sensitivity Dimension	Fluence Rate	Fluence Rate	Exposure Rate	Exposure Rate
			MeV/cm <sup>2</sup> /sec No Buildup	MeV/cm <sup>2</sup> /sec With Buildup	mR/hr No Buildup	mR/hr With Buildup
1	(1 of 3)	(66 cm)	8.426e+02	1.701e+03	1.654e+00	3.338e+00
1	(2 of 3)	(56 cm)	1.170e+03	2.362e+03	2.296e+00	4.636e+00
1	(3 of 3)	(46 cm)	1.730e+03	3.493e+03	3.396e+00	6.856e+00

MicroShield 8.02  
NIH/ORS (8.02-0000)

Date	By	Checked
Filename Case2	Run Date December 1, 2016	Run Time 7:03:12 AM
		Duration 00:00:01
Project Info		
Case Title	75 mm Pb Hot Cell	
Description	40 Ci C-11 in stainless steel coil	
Geometry	12 - Annular Cylinder - External Dose Point	

Source Dimensions	
Height	8.0 cm (3.1 in)
Inner Cyl Radius	2.0 cm (0.8 in)
Inner Cyl Thickness	0.079 cm (0.0 in)
Outer Cyl Thickness	0.079 cm (0.0 in)
Source	0.159 cm (0.1 in)

Dose Points			
A	X	Y	Z
#1	66.0 cm (2 ft 2.0 in)	4.0 cm (1.6 in)	0.0 cm (0 in)



Shields			
Shield N	Dimension	Material	Density
Cyl. Radius	2.0 cm	Air	0.00122
Shield 1	.079 cm	Iron	7.86
Source	17.251 cm <sup>3</sup>	Air	0.00122
Shield 3	.079 cm	Iron	7.86
Transition	30.0 cm	Air	0.00122
Shield 6	7.5 cm	Lead	11.34
Air Gap		Air	0.00122

Source Input: Grouping Method - Actual Photon Energies				
Nuclide	Ci	Bq	μCi/cm <sup>3</sup>	Bq/cm <sup>3</sup>
C-11	4.0000e+001	1.4800e+012	2.3187e+006	8.5791e+010

Buildup: The material reference is Shield 6	
Integration Parameters	
Radial	10
Circumferential	20
Y Direction (axial)	20

Results					
Energy (MeV)	Activity (Photons/sec)	Fluence Rate	Fluence Rate	Exposure Rate	Exposure Rate
		MeV/cm <sup>2</sup> /sec No Buildup	MeV/cm <sup>2</sup> /sec With Buildup	mR/hr No Buildup	mR/hr With Buildup
0.0002	3.286e+06	0.000e+00	9.617e-29	0.000e+00	1.610e-27

0.511	2.953e+12	8.762e+01	2.018e+02	1.720e-01	3.961e-01
<b>Totals</b>	<b>2.953e+12</b>	<b>8.762e+01</b>	<b>2.018e+02</b>	<b>1.720e-01</b>	<b>3.961e-01</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(1 of 3)</b>	<b>(66 cm)</b>
0.0002	3.286e+06	0.000e+00	9.617e-29	0.000e+00	1.610e-27
0.511	2.953e+12	8.762e+01	2.018e+02	1.720e-01	3.961e-01
<b>Totals</b>	<b>2.953e+12</b>	<b>8.762e+01</b>	<b>2.018e+02</b>	<b>1.720e-01</b>	<b>3.961e-01</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(2 of 3)</b>	<b>(56 cm)</b>
0.0002	3.286e+06	0.000e+00	1.336e-28	0.000e+00	2.236e-27
0.511	2.953e+12	1.215e+02	2.799e+02	2.385e-01	5.493e-01
<b>Totals</b>	<b>2.953e+12</b>	<b>1.215e+02</b>	<b>2.799e+02</b>	<b>2.385e-01</b>	<b>5.493e-01</b>
	<b>Sensitivity</b>	<b>Variable</b>	<b>X Dose Point 1</b>	<b>(3 of 3)</b>	<b>(46 cm)</b>
0.0002	3.286e+06	0.000e+00	1.979e-28	0.000e+00	3.314e-27
0.511	2.953e+12	1.792e+02	4.129e+02	3.518e-01	8.105e-01
<b>Totals</b>	<b>2.953e+12</b>	<b>1.792e+02</b>	<b>4.129e+02</b>	<b>3.518e-01</b>	<b>8.105e-01</b>

## Sensitivity Analysis Summary - X Dose Point 1

Dose Point #	Sensitivity	Sensitivity Dimension	Fluence Rate	Fluence Rate	Exposure Rate	Exposure Rate
			MeV/cm <sup>2</sup> /sec No Buildup	MeV/cm <sup>2</sup> /sec With Buildup	mR/hr No Buildup	mR/hr With Buildup
1	(1 of 3)	(66 cm)	8.762e+01	2.018e+02	1.720e-01	3.961e-01
1	(2 of 3)	(56 cm)	1.215e+02	2.799e+02	2.385e-01	5.493e-01
1	(3 of 3)	(46 cm)	1.792e+02	4.129e+02	3.518e-01	8.105e-01



**ACKNOWLEDGEMENT - RECEIPT OF CORRESPONDENCE**

**Name and Address of Applicant and/or Licensee**

Department of Health & Human Services  
ATTN: Catherine Ribaldo, Radiation Safety  
Officer  
21 Wilson Drive, MSC 6780  
Bethesda, MD 20892-6780

**Date**

January 24, 2017

**License Number(s)**

19-00296-10

**Mail Control Number(s)**

592835

**Licensing and/or Technical Reviewer or Branch**

Medical Branch (Branch 1)

This is to acknowledge receipt of your:  Letter and/or  Application Dated: 01/19/2017

The initial processing, which included an administrative review, has been performed.

Amendment  Termination  New License  Renewal

There were no administrative omissions identified during our initial review.

This is to acknowledge receipt of your application for renewal of the material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Your application for a new NRC license did not include your taxpayer identification number. Please complete and submit NRC Form 531, Request for Taxpayer Identification Number, located at the following link: <http://www.nrc.gov/reading-rm/doc-collections/forms/nrc531.pdf>  
Follow the instructions on the form for submission.

The following administrative omissions have been identified:

[Empty box for listing administrative omissions]

Your application has been assigned the above listed MAIL CONTROL NUMBER. When calling to inquire about this action, please refer to this control number. Your application has been forwarded to a technical reviewer. Please note that the technical review, which is normally completed within 180 days for a renewal application (90 days for all other requests), may identify additional omissions or require additional information. If you have any questions concerning the processing of your application, our contact information is listed below:

**Region I**  
**U. S. Nuclear Regulatory Commission**  
**Division of Nuclear Materials Safety**  
**2100 Renaissance Boulevard, Suite 100**  
**King of Prussia, PA 19406-2713**  
**(610) 337-5260, (610) 337-5313,**  
**(610) 337-5398, or (610) 337-5239**