

From: [Bose, Satya R.](#)
To: [Ullrich, Elizabeth](#)
Cc: [Wutoh, Anthony K.](#); [MAHAN, ALICE A](#); [Nekhai, Sergei](#)
Subject: [External_Sender] RE: RE: license amendment request dated May 8, 2019
Date: Wednesday, July 10, 2019 9:34:16 AM
Attachments: [List of byproduct materials requested by Dr Wang \(002\).pdf](#)

Good Morning Ms. Ullrich,

Thank you again for your kind email regarding the amendment request of our "Broad Scope" license. We would like to select option 2 (two) per your suggestion shown below:

2. Request that the individual line items for these AND the other short-lived radionuclides currently listed on your license, be replaced by the following authorization: **"Any byproduct material with atomic numbers 3 through 83 with half-lives less than or equal to 120 days, "Any" form, not to exceed 500 millicuries per radionuclide and 4 curies total."**

I would like to make a correction to the authorization limits for Ge 168 and Na-22. The authorization limits for G-168 and Na-22 are 1.0 mCi and 1.5 mCi, respectively. The updated list is attached. Kind Regards – Satya Bose

From: Ullrich, Elizabeth <Elizabeth.Ullrich@nrc.gov>
Sent: Wednesday, July 10, 2019 8:17 AM
To: Bose, Satya R. <satya.bose@Howard.edu>
Cc: Wutoh, Anthony K. <awutoh@Howard.edu>; MAHAN, ALICE A <alice.a.mahan@Howard.edu>; Nekhai, Sergei <snekhai@Howard.edu>
Subject: RE: RE: license amendment request dated May 8, 2019

External Email Warning

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Dr. Bose,

Thank you for providing this information. Please clarify the request for the authorized limits, because the new requested limit of 500 millicuries for germanium-168 and sodium-22 [is in the form of a solid epoxy matrix, containing less than 5 nanocuries each] seems unrealistic. Also, it is not clear to me if you intended to request a broad authorization as was suggested as an option, or if you meant only to raise the limits for each radionuclide from the amounts proposed in the May 8 letter. You need to choose one of two ways to have these and the other short-lived radionuclides to be listed on your license.

Please choose **either**

1. To have each radionuclide listed as individual line in the amounts and forms stated in the letter dated May 8, 2019 (that is, F-18, 200 mCi; Cu-64., 200 mCi; Ga-67, 200 mC; Ge-68, 1 mCi; Ga-68. 200 mCi; Zr-89, 200 mCi; Na-22, 1.5 mCi; In-111, 200 mCi; Lu-177 200 mCi; I-124, 200 mCi; I-125, 500 mCi);

OR

2. Request that the individual line items for these AND the other short-lived radionuclides currently listed on your license, be replaced by the following authorization: **"Any byproduct material with atomic numbers 3 through 83 with half-lives less than or equal to 120 days, "Any" form, not to exceed 500 millicuries per radionuclide and 4 curies total."**

Please note that I suggested the 4 curie maximum based on you already have listed on the license the following line items that would be replaced by this authorization

- P-32 500 mCi
- S-35 250 mCi
- Fe-59 100 mCi
- I-125 500 mCi
- I-131 500 mCi.

And the requested amounts in the May 8 letter

- F-18, 200 mCi
- Cu-64, 200 mCi
- Ga-67, 200 mCi
- Ge-68, 1 mCi
- Ga-68, 200 mCi
- Zr-89, 200 mCi
- Na-22, 1.5 mCi
- In-111, 200 mCi
- Lu-177, 200 mCi
- I-124, 200 mCi
- I-125, 500 mCi

So, by assuming you possessed all of these maximum quantities at the same time, a total limit of 3452.5 millicuries would be needed if the duplication of the I-125 limit is not required. Therefore a total limit of 4 curies in the 3-83 authorization seems reasonable.

Thanks,
Betsy

Betsy Ullrich, Senior Health Physicist
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From: Bose, Satya R. [<mailto:satya.bose@Howard.edu>]

Sent: Tuesday, July 09, 2019 4:54 PM

To: Ullrich, Elizabeth <Elizabeth.Ullrich@nrc.gov>

Cc: Wutoh, Anthony K. <awutoh@Howard.edu>; MAHAN, ALICE A <alice.a.mahan@Howard.edu>; Nekhai, Sergei <snekhai@Howard.edu>; Bose, Satya R. <satya.bose@Howard.edu>

Subject: [External_Sender] RE: license amendment request dated May 8, 2019

Good Afternoon Ms. Ullrich,

Please see the attached documents, in response to your email requesting additional information. Kind Regards - Satya Bose

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List of Byproduct materials for conducting research

Byproduct material	Physical and chemical form	Requested Annual Limit use (mCi)	Authorized use
Fluorine-18	Organic liquid, aqueous liquid or solid & free $^{18}\text{F}^-$ or fluorinated compounds.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Copper- 64	Aqueous liquid & free $^{64}\text{Cu}^{2+}$ or its compounds.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Gallium- 67	Aqueous liquid & free $^{67}\text{Ga}^{3+}$ or its compounds.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Germanium- 68	Epoxy matrix, solid, leak test <5 nCi.	1	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Gallium- 68	Aqueous liquid & $^{68}\text{Ga}^{3+}$ or its complexes.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Zirconium-89	Aqueous liquid & $^{89}\text{Zr}^{4+}$ or its complexes.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Sodium -22	Epoxy matrix, solid, leak test <5 nCi.	1.5	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Indium-111	Aqueous liquid & $^{111}\text{In}^{3+}$ or its complexes.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Lutetium-177	Aqueous liquid & $^{177}\text{Lu}^{3+}$ or its complexes.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Iodine-124	Organic liquid or aqueous liquid & free $^{124}\text{I}^-$ or its complex.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Iodine- 125	Organic liquid or aqueous liquid & free $^{125}\text{I}^-$ or its complex.	500	For research and development as defined in 10 CFR 30.4 including animal studies; invitro studies; teaching and training of students
Cs-137	Sealed Sources – Rod Type or as available per manufacturer’s specifications	10	For calibrating well type chamber, consistency checks of survey meters etc.