



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

JAN 10 2014

Susan T. Masih
Radiation Safety Officer
The Curators of the University of Missouri
The Chancellor
University of Missouri – Kansas City
Administrative Center
5115 Oak Street
Kansas City, MO 64110

Dear Ms. Masih:

We have reviewed your letter dated October 21, 2013, requesting authorization for a neutron generator and find that we will need the additional information requested below. As we are unable to issue an amendment to your license at this time we are voiding your request. "Void" means that we are removing your request from our active casework database until such time as you submit an appropriate response. It is only an administrative procedure that has no effect on your license.

In preparing your written response, please address it to my attention at the above address as "additional information to control number 582378." We will then continue our review.

Please note that my colleague, Peter Lee, Ph.D., is assisting with this review. For technical questions, you may contact him at (630) 829-9870.

Please resubmit your request in entirety to address the following:

1. Please confirm that you are not conducting any testing with the generator and that you are not performing any high voltage conditioning.
2. Please confirm that you will not commence any kind of activation analysis with the neutron generator until your license has been amended to authorize these activities.
3. Please explain what the anticipated scope of your use of the neutron generator will be, i.e., what specifically will you be using it for? Please describe in simple terms what a typical use of the neutron generator will consist of and outline and assess the radiological results of this use.
4. Please describe the setup of the neutron generator shielding housing/sample irradiated chamber. Please confirm that there will be a low residual emission, including 2.2 MeV gamma, from neutron capture on hydrogen, on the outside of the shielding

housing/sample irradiated chamber, based on the Monte Carlo N-particle model calculation.

5. Please confirm that the Monte Carlo N-particle model (MCNP) will be used to determine the neutron flux inside and outside of the room where the generator will be located.
6. Please submit the results of your Monte Carlo N-particle evaluation. The table in 10 CFR 20.1004(b)(2) can be used to determine the neutron doses based on the neutron energy and flux.
7. Please describe the interlock system you will employ for the safe operation of the neutron generator to prevent entry into the neutron generator room while it is activated.
8. Please confirm that an emergency "off" button will be installed to permit the device to shut off immediately. Also describe the location of the emergency off button in relation to the generator and the nearest exit in the room.
9. Please provide a description of the airborne control of N-16 with a 6 MeV gamma from neutron interaction with air during operation of neutron generator.
10. Please provide your normal operation and emergency procedures for the generator.
11. Please confirm that a copy of these procedures will be posted and readily available at the console/controls for the generator.
12. Please confirm that all persons participating in the activation/use of the generator will be trained in these procedures prior to initiating participation; whenever the procedures change; and at least once each calendar year for refresher training.
13. Please describe who will conduct this training and what the minimal qualifications of the instructor(s) will be. Please confirm that appropriate records of this training will be maintained for three years from the date of the training.
14. Item 1 in your letter dated October 21, 2013, stated that you wished to have the neutron generator included in your authorization in Subitem Nos. 6 through 9 B of your license. Please note that we will be unable to authorize it in this manner. Instead, we may authorize it as a separate line item. This item only needs your acknowledgment in response.
15. Item 2 in your letter requests the addition of depleted uranium and naturally-occurring uranium source material up to a total of 100 millicuries or 130 kilogram, in non-dispersible form as aluminum clad plates.

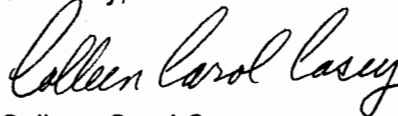
Please separate your requests for each type of uranium and specify a possession limit for each in units of millicuries and in units of kilograms. Please include your calculations to convert from one type of unit to the other.

16. As use of this generator constitutes a special use, please provide the address of the building and room identifier in which the neutron generator will be used and stored.
17. Please describe the minimum education, training and experience qualifications that your Radiation Safety Committee will use to evaluate prospective authorized users for the neutron generator.
18. Please describe what you mean in Attachment IV of your letter dated October 21, 2013, when you state "We have already requested permission add rooms and building without requesting amendment to the license in our license renewal."
19. Please describe which activation products you anticipate the neutron generator will produce and the anticipated typical and maximum quantities for each.
20. Please clarify what the elevation is for the proposed room where the neutron generator will be used.
21. Please describe the thicknesses and composition of all barriers in the adjacent rooms and spaces surrounding the proposed room where the neutron generator will be used.
22. Please submit diagrams for the proposed room where the neutron generator will be used, and all adjacent rooms and spaces surrounding it, that are not blueprints or copies of blueprints; show the direction of north; identify the room dimensions or scale drawn to; and clearly show the placement of relevant equipment and shielding. Please show which areas will be restricted and which will be unrestricted and please show where persons may be located relative to this room and the device.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any further questions concerning this amendment please contact me at (630) 829-9841 and my fax number is (630) 515-1078. My email address is colleen.casey@nrc.gov.

Sincerely,



Colleen Carol Casey
Materials Licensing Branch