

Null, Kevin

From: Null, Kevin
Sent: Wednesday, July 23, 2014 11:15 AM
To: 'maddock@niowaveinc.com'
Attachments: NIOWAVEemailATTACHMENT.docx

Hi Mr. Maddock,

I received your call this morning and have attached a list of items and topics addressing deficiencies that we have consistently identified in the cyclotron applications that we receive. You will note that the document throughout refers to cyclotrons. I realize that Niowave will be using a linear accelerator, but the issues I believe will most likely be the same.

The bulk if the issues pertain to facilities and equipment. Hopefully this will help you in preparing your application.

Please confirm receipt of this e-mail and feel free to call if you want to discuss.

Kevin Null
Sr Health Physicist
USNRC, Region III
630-829-9854

Radioactive Material

If you will need to possess any sealed sources to calibrate instrumentation, for example, dose calibrators, survey meters, effluent monitoring systems, etc., you will need to provide the make and model number for each source.

Decommissioning Financial Assurance

The use of an accelerator generally results in the production of incidentally produced activated products with half-lives greater than 120 days. An assessment will need to be performed to determine if financial assurance is required.

Qualifications of Authorized Users, Cyclotron Engineers, and Staff who will handle targets and perform maintenance

- A. Authorized users should have training and experience commensurate with the scope of proposed activities. Confirm that individuals have had training in topics specific to radiation safety and radiation protection principles as described on pages 8-16 and 8-17 of Volume 21, as well as a minimum of 6 months of experience with similar types, forms, quantities, and uses of radioactive material that will be authorized on the license.
- B. Identify who will perform servicing, maintenance, and repair of accelerator components or any equipment associated with radioactive material production. If these activities will be performed by your staff, please describe their training and experience in servicing the cyclotron.

Training Program

- A. Submit an outline of the training which illustrates the topics covered and time spent on each topic. Describe the method that will be used to evaluate the effectiveness of the training that is provided, and submit the qualifications of the instructor(s).
- B. Commit to providing refresher training for ancillary staff, or confirm that they will only do work under the direct supervision of an individual named on the license.
- C. Confirm that retraining will be performed whenever there is a change in duties or the work environment and at a frequency sufficient to ensure that all staff are adequately trained (at least annually).

Facilities and Equipment

- A. With regard to transfer lines from the cyclotron, describe your program for periodically checking the transfer lines for functionality to verify that the lines are not leaking. Also, describe your program for changing out the transfer lines on a periodic basis.
- B. Submit a diagram that illustrates where routing to hot cells or synthesis units occur.
- C. Describe any hot cells of chemical synthesis units that will be used to process radionuclides or radiochemicals produced by the cyclotron.

- D. Submit diagrams illustrating air exhaust flow and filtration for any hot cells, synthesis units, cyclotron room, and exhaust systems.
- E. Describe procedures that will be used to check effluent filters for saturation, and your criteria for replacing old filters with new ones. Also, describe radiation safety procedures that staff will follow when handling saturated filters. Additionally, provide the procedure for checking filters for saturation and state the frequency for replacement.
- F. To assure worker breathing zone safety, describe how the cyclotron and hot cell rooms will be maintained at negative pressure, how the system will be tested to assure it is functioning and actions that will be taken if it fails. If it fails, commit to shutting operations down (both cyclotron and hot cells) until the system is repaired.
- G. Describe how you will control access to the cyclotron room when it is in operation. Describe the room monitor/detector that will be used to measure radiation levels, and how the detector is calibrated and the frequency of calibration. Also state what the alarm trigger level will be and describe actions that will be taken, including procedures that will be implemented, if the alarm activates.
- H. Submit a separate diagram of the ventilation system(s) that include locations of both air supply and exhaust points. The diagram should show all ventilation systems associated with radioactive material operations that include the cyclotron, and hot cells, synthesis cells, (if applicable) and the location of filtration systems and effluent monitoring instrumentation.
- I. Describe radiation safety procedures and equipment, e.g., remote handling tools, etc., that will be used to handle targets. Describe the location(s) where spent targets and filters will be stored and shielding provided for these items. Submit results of surveys for radiation levels in areas adjacent to these storage location(s).
- J. Describe radiation safety procedures that will be followed for conducting routine and periodic maintenance of delivery lines that exit the cyclotron. Include a description of your program and radiation safety procedures for inspecting and replacing parts that become worn or brittle from repeated radiation exposure. Describe who will perform these inspections and equipment/parts replacement, and the training that they have received, or will receive, in performing these activities, the procedures that they will follow, and the dosimetry that they will wear.
- K. Submit a facility diagram that includes the type and thickness of material in the walls and ceiling used to shield the cyclotron unit. Also submit results of area surveys of all areas adjacent to, above, and below the cyclotron room when the unit is in its peak period of operation and radioactive materials are being transferred through delivery lines.
- L. Describe provisions for shielding filter banks that trap effluents released from the operation of the cyclotron.
- M. Submit the procedure that will be implemented to calibrate the effluent monitoring system.

Air Effluent Release and Monitoring & use of COMPLY Code

- A. Submit COMPLY code results to demonstrate compliance with the constraint on air emissions described in 10 CFR 20.1101(d).
- B. Describe the stack monitoring system for effluent release and the filtration that will be used, including the frequency for change out of the filters. Also, include the provisions for decay-in-storage for the filters.

Waste Management

Submit diagrams that show the location and security of the storage area for radioactive waste relative to the location where workers will be located.

Occupational Exposure

Describe how you will detect an accidental airborne release into worker breathing zones resulting from, for example, a defective valve in the transfer tubing between the cyclotron room and hot cells. Also, in the event of a release, describe how you will evaluate internal dose to workers in a timely fashion.

Emergency Procedures

Describe emergency procedures for shutting down the cyclotron if necessary.