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2 November 1981



Mr. James R. Miller, Chief
Standardization and Special Projects Branch
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

License No. R-125
Docket 50-223

Dear Sir:

The University of Lowell is writing this letter in support of it's previous application, dated October 19, 1981, requesting an amendment to the Facility Operating License which would authorize the receipt, possession and use of by-product materials, activated in reactors other than the University of Lowell Reactor.

For the purposes described in our previous submittal, it is requested that paragraph 2, B(3) of the license be amended to read

> "Persuant to the Act and 10CFR 30 and 70, to possess, but not seperate, such by-product and special nuclear materials as may be produced by the operations of the reactor and to receive, possess, use and transfer by-product materials activated in reactors other than the University of Lowell Reactor, in the form of Cobalt-60 in quantities not to exceed 1,500,000 curies at any time."

To insure the safe handling of the by-product material and to insure safe operation of the reactor, the following changes to the facility technical specifications are proposed.

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S/O

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Section 3 - Limiting conditions for Operation Section 3.6.4 of Specification be amended to read:

3.6.4 "Explosive materials, in any quantity, shall not be allowed in the reactor building without rigorous safety evaluation, and special authorization from the USNRC."

add section 3.6.9 to read

3.6.9 "The Reactor shall not be operated whenever the reactor core is in the same end of the reactor pool as any portion of the Cobalt-60 Source."

Section 4 - Surveillance Requirements

Section 4.5.2 Specification be amended to read

4.5.2 "The radioactivity of the pool water shall be analyzed weekly (at intervals not to exceed 10 days). The pool water shall be analyzed for gross activity and for Cobalt-60. Analysis shall be capable of detecting levels of $1x10^{-7}$ microcuries per millileter. If a sample analysis reveals a significant increase of activity in the water, with respect to previous samples or a contamination level greater than $1x10^{-6}$ microcuries of Cobalt-60 per millileter of water, prompt action shall be taken to prevent further contamination of pool water. If the gross activity of the sample is less than $1x10^{-7}$ microcuries

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per millileter, specific analysis for Cobalt-60 need not be performed. If remedial action is required by this section, notification will be made to the USNRC within 10 days as required by section 6.6 b(1) of these Technical Specifications."

Amendment to Facility Operating License & Technical Specifications.

The purpose of requested amendment is to broaden Facility Operating License R-125 so that the University of Lowell may accept a Cobalt-60 source from the Dept. of the Army, U. S. Army Natick Laboratories, Natick, Mass. This source, licensed under USNRC license number BML 20-315-03, is presently being used for the irradiation of food and other non-explosive materials. The proposed amendment would allow us to accept and use this source in the University of Lowell reactor pool.

The proposed changes to the Technical Specifications are designed to insure safe storage and use of the source and to prevent the source from having any effect on the operation of the reactor. Technical Specification 3.6.4 previously limited the irradiation of $< 25$ mg. by requiring prior USNRC approval. This new specification will limit the irradiation of any sample containing any explosive material in the reactor or in the gamma facilities using the Cobalt-60 source and will require prior USNRC approval of all such experiments.

It is anticipated that the only real potential impact on reactor operation caused by the cobalt source would be

the effect of such a large gamma field on the nuclear instrumentation. The chambers could be sensitive to a very large gamma source if the source were brought into close proximity to the reactor core. To forestall this possibility, the source will not be used or stored near the reactor while the reactor is in operation. By requiring that the source be located in the opposite end of the pool, a minimum of 12 feet of water will separate the source and the normal operating position of the reactor core.

By increasing the frequency of radioactivity analysis of the pool water and adding the requirement for specific analysis for Cobalt-60, early detection of a leaking cobalt strip or fuel element will be possible. The previous frequency of once per month has been increased to once per week. This frequency is consistent with the frequency required at the Natick facility. Analysis sensitivity of $1x10^{-7}$ microcuries per milliliters is the lower limit of sensitivity for Cobalt-60 with the instrumentation available at the University of Lowell and is the same as is required for the Natick facility. By requiring prompt action in finding the leaking strip when the activity exceeds $1x10^{-6}$ microcuries of Cobalt-60 per millileter of water, the activity of the water in the pool will be maintained at a high purity level and will minimize exposure levels to personnel and contamination levels of reactor system component. This action level is lower, by a factor of one thousand, than the action level required at the Natick facility.

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The University of Lowell Reactor Technical Specifications already require weekly conductivity measurements of the reactor pool water. The radioactivity analysis requirement, in conjunction with the conductivity requirement, will insure the maintenance of reactor pool purity.

General Operation of the Facility as it applies to the Cobalt Source

The Cobalt-60 source is in the form of 616 encapsulated strips. One hundred fifty-four of these strips are of the high specific activity type, originally having a content of up to 22,000 curies in 1972. All of this type are less than 10,000 curies at the present time. The remaining strips had original activities of approximately 3000 curies (1968) and are presently approximately 600 curies each. This source is presently licensed under license number BML 20-315-03. Drawings for the encapsulation of the strips were previously submitted with above license application.

The Cobalt-60 source will be stored in the "bulk" end of the reactor pool when not in use. (Page 4-16, Figure 4.10 of Final Safety Analysis Report). This pool is approximately 16' x 12' x 31' deep. The pool wall is approximately 5'-5" of concrete at its minimum thickness. This pool was designed for 5 megawatt operation of the reactor and is therefore more than adequate for the proper shielding of this source. The source will be stored on the floor of the pool and therefore will not be uncovered during the Maximum Credible Accident (MCA) analyzed for this facility. If the pool drains to the point analyzed, the core becomes uncovered; however, six feet of water remains in the pool.

It is anticipated that the source will be used on the Gamma Cave window. This is a dry room adjacent to the reactor pool designed for the irradiation of materials by use of fuel elements mounted in the pool. It is anticipated that the Cobalt-60 source will be used instead of the fuel elements. Irradiations have been performed in this room with dose rates up to 5 megarad/hr without exceeding the limits of 10 CFR 20 for the areas adjacent to the room. In addition, some portion of the source may be used in the hot cell as the situations requiring such facilities may arise. Both the Gamma Cave and the Hot Cell are described in the FSAR.

The source will be used for the irradiation of food stuff, the sterilization of medical products, the irradiation of electronic components used in the space industry, irradiation of components used in power plants to assure minimum IEEE standards, etc. In addition, there will be work associated with the development of the irradiation facility itself, such as the study of various source arrangements and the study of dosimetry methodology as it applies to high gamma fields.

Procedures

Written procedures, reviewed and approved by the Reactor Safety Sub-committee, shall be in effect and followed for the following items. The procedures shall be adequate to assure the safe use of the source and to prevent any effect on reactor operation.

1. Handling and receipt of the source material in shipping casks and transferring the source from the casks into storage racks in the reactor pool.
2. Movement of the source material within the reactor pool.
3. Gamma cell and hot cell use and access.
4. Source material inventory and activity records.
5. Initial and routine radiation and contamination surveys.
6. Emergency procedures for loss of power, fire, etc. (the reactor procedures now in place will be updated to reflect the presence of the source).

Training

Only those persons certified to be qualified by the Radiation Safety Officer and the Reactor Supervisor will be allowed to manipulate the source or have access to the Gamma cave or hot cell. It is expected that the use of the source will be incorporated into the licensed reactor operator training program. Only those individuals having completed that portion of the training will be certified to operate the cobalt facility. In addition, the operating and emergency procedures dealing with the cobalt source will be incorporated into the licensed reactor operator requalification program to insure maintenance of qualifications.

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This letter summarized the procedures, training, and facilities to be used in conjunction with this proposed source. It is fully expected that the use of this source will complement the reactor in the research and development activities at the University. Your prompt attention to this matter will be appreciated. If you need further information please contact Mr. Thomas Wallace at 617-452-5000, extension 2232.

Sincerely,

Leon E Beghian.

LEON E. BEGHIAN
Vice President for
Academic Services and
Technical Research