



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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NRC P
FOR

Docket No. 50-142

MEMORANDUM FOR: Samuel E. Bryan, Assistant Director, Division of Reactor
Operations Inspection, OIE

FROM: Robert W. Reid, Chief, Operating Reactors Branch #4, Division
of Operating Reactors, NRR

SUBJECT: NRR INPUT FOR RESPONSE TO PETITION FROM THE COMMITTEE TO
BRIDGE THE GAP (CBG) CONCERNING THE UCLA RESEARCH REACTOR

Enclosed is a discussion of CBG charges contained in its October 3, 1979, petition concerning the UCLA research reactor. The specific CBG charges discussed are those which allege deficiencies in our review procedures used to support Amendment 10 to the UCLA operating license.

It is expected that further NRR input will be necessary to assure that all issues raised by the CBG have been properly covered. Please contact Mr. Hal Bernard (X27435) for assistance.

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosure:
Discussion of CBG Charges

cc w/enclosure:
DEisenhut
WGammill
DGarner
HBernard
SBlock
RBachmann, OELD
JBuchanan, I&E
GKlinger, I&E
GKnighton

DISCUSSION OF CBG CHARGES RELATED TO REVIEW PROCEDURES
USED IN SUPPORT OF AMENDMENT 10 TO THE UCLA OPERATING LICENSE

Limits on discharges of radioactive effluents to unrestricted areas around nuclear facilities are contained in Appendix B, Table II, of 10 CFR Part 20. However, Section 20.106(b) allows an applicant for a license to propose limits higher than the values in Table II, and the Commission will approve such proposed limits provided that the applicant demonstrates:

- "(1) That the applicant has made a reasonable effort to minimize the radioactivity contained in effluents to unrestricted areas; and
- (2) That it is not likely that radioactive material discharged in the effluent would result in the exposure of an individual to concentrations of radioactive limits specified in Appendix B, Table II of this part."

Section 20.106(a) also states that:

"For purpose of this section concentrations may be averaged over a period not greater than one year."

In a letter dated May 22, 1975, UCLA applied for an amendment to its facility operating license for the purpose of rectifying the discrepancy between its actual reactor building ventilation system and the system as described in its Technical Specifications (TSs). A review of the proposed amendment against the provisions of the regulations cited above was undertaken by members of the NRC's Office of Nuclear Reactor Regulation. A request for additional information regarding the proposed amendment was forwarded by the NRC in a letter dated August 14, 1975. UCLA responded to this request by letter dated August 26, 1975. Another supplement to the proposed amendment dated November 5, 1975, was submitted by UCLA in response to questions raised by the NRC staff in a telephone call on September 22, 1975. On February 5, 1976, the NRC issued Amendment 10 to the UCLA operating license incorporating the proposed changes to the TSs.

In its submittal of October 3, 1979, the CBG charged that conditions which existed before the amendment was issued are essentially unchanged today. These charges are addressed as follows:

1. Reactor building stack emissions still exceed the normally permitted concentrations of Argon-41.

Response: It is acknowledged that instantaneous emissions from the UCLA reactor building stack may have exceeded the maximum permissible concentration (MPC) values given in Table II of Appendix B to 10 CFR Part 20. However, as previously discussed, effluent concentrations may be allowed to exceed MPC values as long as certain conditions are fulfilled. It is also permitted by the regulations to average effluent concentrations over a period of one year. (It should be noted

that the application of these provisions of the regulations does not constitute the granting of an "exemption" as claimed by the CBG.) In the licensee's submittals referenced previously, UCLA provided the NRC with sufficient information to conclude that: a) the licensee made a reasonable effort to minimize radioactive effluents to unrestricted areas, and b) there is reasonable assurance that no individual will be exposed to average concentrations of Argon-41 in excess of the MPC values. We have rereviewed the Safety Evaluation Report (SER) used to support our issuance of Amendment 10 to the UCLA operating license, and we conclude that our findings are still valid.

2. The reactor building stack is still below the level of the surrounding buildings.

Response: The dispersion of the plume from the reactor building stack was calculated using the height of the stack that exists today. The fact that the stack height is below that of surrounding buildings does not alter the fact that the dose consequences of the plume are acceptable since they are within allowable limits.

3. The accelerator nozzle (previously required by TSs) has been removed from the stack.

Response: In our review of the licensee's submittals in support of the amendment to the TSs, we did not assume that the nozzle would be present. Therefore, it is expected that the nozzle, although previously required should not be used today.

4. The roof area in the vicinity of the reactor building stack is widely used and openly accessible to the public.

Response: The occupancy of the roof area was accounted for in the SEK supporting Amendment 10. The occupancy factor used in the calculational support of the amendment remains correct, and there is no reason to restrict access to the roof area surrounding the reactor building.

5. The emissions from the reactor building are taken into the Math Science building via its air conditioning system intake. Further, the NRC did not take into account the inside of the Math Science building in granting UCLA its amendment.

Response: As noted in the licensee's response of November 5, 1975, the NRC considered the air intakes of all buildings that might draw air from the reactor building stack plume. Although not explicitly discussed in the SER for Amendment 10, the inside of the Math Science building cannot accumulate larger concentrations of the Argon-41 than those that occur on its roof. Therefore, the doses to individuals inside the building are bounded by the doses to individuals on the roof, which were found to be within allowable limits. As a verification of this conclusion, a calculation has been performed to determine the maximum dose inside the Math Science building assuming that an individual is present at all times the reactor is operating. This calculation is shown in the attachment. The maximum hypothetical dose in this calculation is well below the limits allowed by 10 CFR Part 20.

6. The NRC inadequately examined the efforts made by UCLA to minimize radioactive effluents.

Response: As discussed in Response 1 above, the NRC was satisfied with efforts made by UCLA in its attempt to minimize the Argon-41 emissions. This is documented in our SER for Amendment 10. However, in our continuing effort to minimize radioactive effluents whenever reasonably achievable, we will examine this area further during the review of the UCLA license renewal application.

In summary, the charges made by the CBG in its submittal of October 3, 1979, with respect to the NRC's application of its regulations in granting Amendment 10 to the UCLA operating license are without basis. We have reviewed Amendment 10 and its corresponding SER and have reached no conclusions different from those stated in the SER.

In NRC's continuing program to minimize radiation exposure to the public whenever reasonably obtainable, all avenues for achieving this goal are continually investigated. The potential for further decrease in emissions from UCLA's training reactor will be evaluated in our review of its current application for license renewal.

Attachment

Calculations have been made for estimating the dose that could be received by a "maximum individual" occupying a room in the math-science building. We will define a "maximum individual" as one who occupies this room for the entire year during which time the reactor is at power (i.e., 8.4 hrs/week), and is subjected to the same ^{41}Ar concentration as is on the roof of the math-science building (e.g. We assume the same concentration in the room as is at the intake to the ventilation system supplying air to the room).

From Regulatory Guide 1.109 "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I", table B-1 provides the total body gamma dose factor for exposure to a continuous semi-infinite cloud of ^{41}Ar as $8.84 \times 10^{-3} \frac{\text{mrem/yr}}{\text{pci/m}^3}$. Using this dose factor, the parameters of the UCLA reactor effluent, and a geometry correction factor, we get the following:

$$^{41}\text{Ar dose factor} = \frac{8.8 \times 10^{-3} \text{ mrem/yr}}{\text{pci/m}^3} \times \frac{10^6 \text{ pci}}{\text{uci}} \times \frac{10^6 \text{ cc}}{\text{m}^3} = 8.8 \times 10^9 \frac{\text{mrem/yr}}{\text{uci/cc}}$$

UCLA parameters:

$$\begin{aligned} ^{41}\text{Ar emission concentration} &= 1.6 \times 10^{-5} \text{ uci/cc} \\ \text{Dilution factor at Math-Science ventilation intake} &= 0.115 \\ \text{Reactor utilization factor} &= \frac{8.4 \text{ hrs/week} \times 52 \text{ weeks/yr}}{8760 \text{ hrs/yr}} = 0.05 \end{aligned}$$

Since the ^{41}Ar dose factor is based on a semi-infinite hemisphere, a correction factor must be used for a finite room volume. From the report "The Atmospheric Diffusion of Gases Discharged from the Chimney of the Harwell Pile (BEPO)", N.G. Stewart, et. al., AERE HP/R 1452, a correction factor for a room of 9 meter radius is about 0.03.

Collecting terms we get:

$$\frac{\text{mrem}}{\text{yr}} = 8.8 \times 10^9 \frac{\text{mrem/yr}}{\text{uci/cc}} \times 1.6 \times 10^{-5} \frac{\text{uci}}{\text{cc}} \times 0.115 \times 0.05 \times 0.03 = 0.0024 \times 10^4 = 24 \text{ mrem/yr}$$

This value is in reasonable agreement with the approximate 40 mrem/yr dose measured by an independent contractor on the roof. It would be expected to be smaller since the roof dosimeters would be "seeing" a larger plume of ^{41}Ar .