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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

OFFICE OF SECRETARY  
GENERAL SERVICE  
BRANCH

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of  
  
ARMED FORCES RADIOBIOLOGY  
RESEARCH INSTITUTE  
  
(TRIGA-Type Research Reactor)

Docket No. 50-170  
  
(Renewal of Facility  
License No. R-84)

LICENSEE'S FIRST SUPPLEMENTARY  
ANSWERS TO INTERVENOR'S INTERROGATORIES

Licensee submits these First Supplementary Answers to Intervenor's Interrogatories under the provisions of 10 C.F.R. 2.740(b) and pursuant to the Atomic Safety and Licensing Board's direction given at a prehearing conference on October 15, 1982. This supplementary response relates to Intervenor's Interrogatories numbered 20 through 24. Although interrogatories 21 and 22 were answered on October 30, 1981, those answers are reprinted here for convenience. Interrogatories 20, 23, and 24 are answered in the same format and by the same people who answered the basic interrogatories. In addition, the matters set forth on page 2 of Licensee's response of October 30, 1981, are incorporated herein by reference.

20. Describe the accident that occurred in your cobalt facility between April 22 and May 16, 1981, including a statement of the class of emergency it began as and

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escalated to, the precipitating event(s), the mitigating steps taken, the extent to which the emergency plan operated as planned, who the decision-makers were (including the person(s) who acted in the Director's absence), the individuals who were exposed to radiation as a result of the accident, their levels of exposure and whether the same exceeded Federal limits, the concentration levels of radiation in the cobalt storage room, AFRRRI building, and outside the building (in restricted and non-restricted areas), and whether these exceeded Federal levels, final resolution of the accident, steps you have taken to preclude its recurrence, citations and notices of violation from the NRC, and correspondence between AFRRRI and other agencies pertaining to the accident.

Answer to Question 20:

Answered by: Smoker

A. At 1158 hours on 22 April 1981, the AFRRRI Cobalt-60 source lift mechanism became jammed above the storage pool water surface while lowering the source rack. Note: Normal storage of the Cobalt-60 is at the bottom of the storage pool; irradiations are performed with the cobalt source rack (containing the required number of Cobalt-60 elements) raised above the storage pool surface (i.e., in air) within the heavily shielded cobalt exposure room.

Jamming occurred because a support frame member of the experimental stand (on which the sample to be irradiated was placed) became caught under the cobalt source rack and prevented return of the source rack to its normal storage position at the bottom of the storage pool. Immediate efforts to remotely free the jammed source rack were attempted without success. At the time of the event, the source rack was loaded with four cassettes each containing six Cobalt-60 elements (1000 Ci each) for a total of 24,000 Ci. Since the AFRRRI Cobalt Facility was originally designed to safely accommodate 500,000 Ci and normal experimental operations often utilize much more than 24,000 Ci (the amount in use at the time of the incident), there was absolutely no danger to the AFRRRI staff or the general public. The AFRRRI Cobalt-60 exposure room was initially designed to be flooded from within for just such an occurrence and this capability was checked and verified as being operational.

No emergency was declared during the event (since no emergency existed) and AFRRRI continued its normal functions during the entire time that the source rack was jammed except, of course, for the actual operational use of the AFRRRI Cobalt Irradiation Facility in support of normal experiments. Dose rate measurements made in and around the Institute registered only background levels of radiation

and permitted a methodical and professional approach to recovery. This event, therefore, constituted a non-standard condition (not an emergency) for which adequate time was available to plan, analyze, and choose alternatives for ultimate facility recovery. The plan that was developed and implemented involved using a mobile manipulator (robot) to restore the cobalt to its place in the storage pool. The cobalt was successfully lowered into the pool on 16 May 1981.

The AFRRRI Director, CAPT Paul E. Tyler, and/or the Deputy Director, COL Bobby R. Adcock, directed and made decisions during the events from incident occurrence through the planning and restoration activities.

There was about 24,000 Ci of Cobalt-60 exposed in air in the exposure facility. This is less than 5% of the amount the facility was designed to accommodate. Inside and outside of AFRRRI, exposure rates with the exposure room door closed did not exceed background levels; therefore, no Federal limits were exceeded. It was necessary to open the exposure room door twice: once to verify the exposure rates we had calculated would be present with the door opened and once again to permit entry of the robot into the storage facility. With the exposure room door open and the specially constructed shield in place, the levels outside AFRRRI were still background. Inside

AFRRI the only exposure rates measurable above background in accessible areas during the door openings were next to the shield built to allow the robot access to the room. These exposure rates were less than 0.5 mr/hr everywhere except:

(1) directly in front of the robot cable access port: 15 mr/hr with lead shot in the port and 100 mr/hr with no lead shot in the port;

(2) the top of the shield (reached with an extended probe survey meter): 5 mr/hr (but this was not an accessible area);

(3) at a crack between the shield and the cobalt room wall: 60 mr/hr.

Access to this general area was restricted to the six people required to provide direct support to the recovery operation and these people received no dose based on extensive personnel dosimetry. No individual, including the six people directly supporting the recovery operation, received any exposure. The final resolution of the incident was complete restoration of the facility.

Several steps were taken to preclude the reoccurrence of a similar incident. First, bumpers were installed on the source dolly such that a minimum distance is held from the experiment to the source elevator. Second, the

dolly brake was modified to prevent any movement (drift) once the dolly is in place.

There were no citations or violation notices issued to AFRRRI by the USNRC and correspondence between AFRRRI and other agencies consisted of notification (as per 10 C.F.R. 20.403) and communication concerning the use of "HERMAN" the robot with Oak Ridge National Laboratory and DoE and short items requesting information on possible use of equipment at other Government agencies. It should be noted that a representative of Region I, USNRC, monitored the progress of the recovery operation including personal observation at appropriate times.

B. Report of inquiry concerning the operation incident on 22 April 1981 at the AFRRRI Cobalt-60 Gamma Radiation Facility.

C. See general statement.

D. See general statement.

E. See general statement.

21. Describe how this accident affected the operation of your reactor.

Answer to Question 21:

Answered by: Smoker, Sholtis, Alt

A. There was no effect on reactor operation.

B. No references used.

C. See general statement.

D. See general statement.

E. See general statement.



22. Describe how, in a "worst-case scenario" of the cobalt accident, the operation of your reactor would have been affected.

Answer to Question 22:

Answered by: Smoker, Sholtis, Moore, Alt

- A. There would be no effect on reactor operations from a "worst-case" cobalt accident.
- B. No references used.
- C. See general statement.
- D. See general statement.
- E. See general statement.

23. Describe the evacuation and other emergency plans, both within the AFRRRI facility and in conjunction with other agencies and the public, that were put into a state of readiness and/or were actually carried out in the course of the cobalt restoration.

Answer to Question 23:

Answered by: Moore, Smoker

- A. There were no evacuation or other emergency plans put in a state of readiness or actually carried out in the course of the cobalt operation other than normal SOPs in effect for cobalt operation. The basis for this is that no emergency existed or could be postulated.

- B. No references used.
- C. See general statement.
- D. See general statement.
- E. See general statement.

24. Describe the instructions AFRRRI personnel were given during the cobalt accident regarding protective and mitigative measures they should take, evacuation, and the possibility that they could not return to work if the emergency situation escalated or continued unabated.

Answer to Question 24:


Answered by: Moore, Smoker

A. This event did not constitute an "accident" or an "emergency situation." Moreover, there was never a concern that the situation would escalate into an "emergency" which would necessitate evacuation of AFRRRI. Nevertheless, the staff was briefed early on about the situation and its impact on their activities. They were assured no danger existed and were told to continue performing their normal routine except for use of the Cobalt facility. Thus, no special or unusual instructions were given to AFRRRI personnel regarding protective and mitigative measures, evacuation or the possibility of not being able to return to work since none were required. Once the recovery plan was developed and approved, the staff was again briefed,




this time on the plan. The staff was instructed to not be in the Institute during the course of actual recovery, so as not to interrupt operations. Obviously, those members of the staff directly involved in recovery operations received additional briefings to detail specific tasks in support of recovery. Recovery was successfully accomplished without any personnel exposures at about 1:40p.m. on May 16, 1981.

- B. None.
- C. See general statement.
- D. See general statement.
- E. See general statement.

  
DAVID C. RICKARD  
Counsel for Licensee

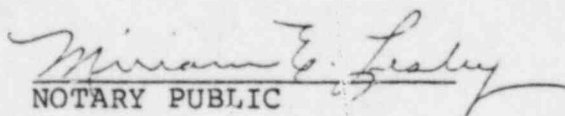
AFFIDAVIT

Ronald R. Smoker, being duly sworn according to law, deposes and says that he is the Chief, Radiation Sources Division, Armed Forces Radiobiology Research Institute, and as such is responsible for the operation of AFRI's TRIGA reactor and that he supervised the preparation of the answers to these Interrogatories and that those answers are true and correct to the best of his knowledge, information and belief.

  
Ronald R. Smoker

State of Virginia ) ss:  
County of Fairfax )

Sworn to and subscribed before me this 22<sup>nd</sup> day of  
October, 1982.

  
NOTARY PUBLIC

My commission expires April 8, 1984.

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CERTIFICATE OF SERVICE OF DUPLICATE SIGNED  
COPIES OF 22 OCTOBER 1982 FILING

I hereby certify that true and correct copies of the foregoing "LICENSEE'S FIRST SUPPLEMENTARY ANSWERS TO INTERVENOR'S INTERROGATORIES" were mailed this 22nd day of October, 1982, by United States Mail, First Class, to the following:

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