

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-186/90002(DRSS)

Docket No. 50-186

License No. R-103

Licensee: University of Missouri
Research Reactor Facility
Research Park
Columbia, MO 65201

Facility Name: Research Reactor Facility

Inspection At: University of Missouri, Columbia, Missouri

Inspection Conducted: December 18-21, 1990

Inspectors: *DM Barss for*
T. Ploski

1/7/91
Date

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1/7/91
Date

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1/7/91
Date

Inspection Summary

Inspection on December 18-21, 1990 (Report No. 50-186/90002(DRSS))

Areas Inspected: Routine, announced inspection of the licensee's emergency preparedness (IP 82745) and environmental protection (IP 80745) programs. The inspection involved two NRC inspectors.

Results: No violations or deviations were identified. Several improvement items were suggested regarding the Emergency Preparedness program. The Plan and relevant procedures should be updated to list the current whole body emergency worker exposure limit for lifesaving actions. Several inconsistencies were noted between the Plan and procedures regarding notification of NRC and State officials following an Unusual Event or higher emergency declaration. The next Plan revision should accurately reflect the implementing procedures on these notification provisions. The licensee should also contact State officials regarding their initial information needs. The Plan and appropriate procedures should indicate the regulatory time limit for initially notifying State officials after an emergency declaration. Radiological effluents were found to have been maintained ALARA and well below regulatory limits.

DETAILS

1. Persons Contacted

J. Sheridan, Vice Provost for Research
J. Rhyne, Missouri University Research Reactor (MURR) Director
C. McKibben, MURR Associate Director
W. Meyer, Reactor Manager
S. Langhorst, Health Physics Manager
T. Schoone, Operations Engineer
L. Pitchford, Radiation Safety Officer-University of Missouri
T. Young, Assistant, Radiation Safety Officer-University of Missouri

The persons listed above attended the December 21, 1990 exit interview. The inspectors contacted other licensee representatives during the inspection.

2. Emergency Preparedness Program (IP 82745)

a. Organization

The Facility Emergency Organization's (FEO's) structure has remained unchanged and as described in the Emergency Plan and related procedures. Dr. James Rhyne will become the Director of the Research Reactor Facility in January 1991. The Interim Director, Dr. J. Steven Morris, will become the Director of the Neutron Activation Program and will probably retain a role in the FEO. Dr. Rhyne's role in the FEO had not yet been determined.

Adequate numbers of personnel were qualified to hold the key positions of Emergency Director, Emergency Coordinator, and Health Physics Manager in the FEO. The Reactor Manager indicated that non-proceduralized provisions have been in place to ensure that at least one Emergency Director and one Health Physics Manager would be available onsite within about one hour at all times. All Shift Supervisors, who are in charge of Control Room operations, were also qualified as Emergency Directors.

No violations or deviations were identified.

b. Emergency Plan and Procedures

The Emergency Plan was reviewed during 1989 and 1990. The Reactor Manager described the acceptable method for revising Site Emergency Procedures (SEPs) and Facility Emergency Procedures (FEPs) as follows. He or the Operations Engineer would draft a revision and route it to all four Control Room crews for review and comment. The Reactor Manager would then be responsible for resolving comments, and ensuring that a revised procedure was issued and distributed to all holders of controlled copies of these procedures.

The inspector determined that FEP-3, Fire Procedure, had been revised several times during 1990. The first revision incorporated several lessons learned from a February 1990 exercise, which involved the participation of offsite support organizations. The second revision addressed the Control Room crew's response in the event of a fire in the Alpha Laboratory.

The Reactor Manager was also responsible for ensuring that any revision to the Plan did not decrease its effectiveness, in accordance with 10 CFR 50.54(q), and for informing the NRC of the results of his evaluation of a Plan revision. The current Plan revision included a statement that the Emergency Director's first responsibility was to identify and classify an emergency, as was recommended as a task prioritization change in previous NRC Inspection Report No. 50-186/89002(DRSS).

The inspector determined that controlled copies of the Emergency Plan, SEPs, and FEPs were available in the Control Room.

Section 5.0 of the Plan and SEPs 2, 3, and 11 listed the emergency worker whole body exposure limit to be 100 rem for lifesaving activities. The licensee was advised that the generally accepted value in the current EPA Protective Action Guides (PAGs) was 75 rem, and that the EPA PAGs were again under revision.

The Plan included a letter of agreement with the City of Columbia for firefighting and "other emergency situations." The licensee indicated that fire department personnel would, for example, enter the MURR to rescue injured personnel and bring them to the location(s) where ambulance personnel would assume responsibility for their care. The current letter of agreement with the City of Columbia was dated February 1990.

No violations or deviations were identified; however, the following item should be considered for improvement:

- ° The generally accepted value for the emergency worker whole body exposure limit should be listed in the Emergency Plan and in relevant SEPs.

c. Notification and Communications

The licensee has not had an activation of the Emergency Plan for an actual situation which would have warranted the declaration of an Unusual Event or a higher emergency classification.

Site Emergency Procedures (SEP) -2, -3, and -4 included the licensee's response actions associated with an Unusual Event, Alert, or a Site Area Emergency declaration, respectively. Review of these procedures and corresponding portions of Section 5.0 of the Emergency Plan revealed several inconsistencies and unclear points. These three (3) procedures indicated that the NRC Region III office, the State Emergency Management Agency (SEMA), and American Nuclear Insurers (ANI) would be notified after the declaration of any of the aforementioned emergency classes.

However, while these procedures indicated that NRC's initial notification would be within one (1) hour of the declaration, neither the plan nor the procedures clearly indicate a time limit for initially notifying SEMA. In accordance with 10 CFR 50.54(r) and 10 CFR 50, Appendix E Paragraph IV.D.3, the licensee shall have the capability of initially notifying offsite officials within 15 minutes of declaring an emergency. The Plan did not contain statements reflecting the procedural requirement to notify NRC within one hour of a declaration, or that NRC, SEMA, and ANI would be notified after any Unusual Event.

Worksheet C was a form developed by the licensee for formulating verbal notification messages to the NRC Region III office following any Unusual Event, Alert, or Site Area Emergency declaration. No analogous form had been developed for formulating an initial notification message to SEMA, although Worksheet C appeared readily adaptable for that purpose. The licensee indicated that notification message content had probably last been discussed with SEMA staff prior to 1985. Worksheet C included provisions for satisfying many of the NRC's initial information needs. The following refinements to Worksheet C were suggested by the inspector to better ensure that a licensee communicator utilizing a completed Worksheet C would satisfy NRC's initial information needs. The worksheet should also indicate: the reactor's operational status; whether SEMA had yet been notified; the status of any onsite protective actions; and the status of any offsite support organizations' responses to the facility.

The Reactor Manager correctly indicated that a licensee communicator would contact the NRC Region III Regional Duty Officer (RDO). The inspector provided information to the Reactor Manager on how the licensee could contact the NRC Headquarters Operations Officer (HOO) during off hours, and generally described the interface between the RDO and HOO, and how these individuals would inform NRC decision-makers following receipt of an initial notification message.

Records review indicated that the Facility Emergency Organization (FEO) Call List has been updated approximately semiannually. The Reactor Manager indicated that any minor changes to the call list that might occur between these updates were accomplished by annotating the current lists, which was acceptable. The inspector verified that current call lists were available at the predesignated locations indicated in SEP-1. Telephone numbers found in various SEPs and FEPs have been updated on an as needed basis.

No violations or deviations were identified; however, the following items should be considered for improvement:

- ° The licensee should contact SEMA to determine SEMA's information needs following an initial notification of any Unusual Event, Alert, or Site Area Emergency declaration.
- ° The next revision of the Emergency Plan should consistently reflect regulatory and procedural timeliness requirements for notifying SEMA and NRC.

- ° Worksheet C should be revised to better address the NRC's initial information needs.

d. Emergency Preparedness Training

The licensee's annual emergency preparedness training cycle has been the fiscal year from July 1 through June 30. Records associated with this annual training effort were reviewed and discussed with the Operations Engineer, who was largely responsible for ensuring that the training was conducted.

FEO members have received annual emergency preparedness training in several ways. Annual requalification training was essentially the same for all FEO members, and involved the required reading of the Emergency Plan, SEPs, and FEPs. Records review indicated that all but two (2) or three (3) FEO members had already completed the training requirement for the July 1990 - June 1991 training cycle. Licensed personnel would be trained on any Plan or procedure revisions occurring between complete reviews of these documents by required reading of a "Crew Review" book maintained in the Control Room. This book also included critiques of the periodic emergency drills.

The Operations Engineer also indicated that the four Control Room crews participated in an annual tabletop discussion of an emergency scenario. The next round of tabletops were tentatively scheduled for the Spring of 1991.

In accordance with SEP-9, members of the Missouri University Research Reactor (MURR) staff who were not FEO members receive initial and annual requalification training on their responses to a Facility Emergency, Unusual Event, Alert, or a Site Area Emergency declaration. Such responses could include a containment or an entire MURR evacuation. Initial and periodic training of non-FEO members can be accomplished by seminar, lecture, or video tape sessions. Records review and discussions with the Operations Engineer indicated that periodic training for the July 1990 - June 1991 cycle had been completed by most of the non-FEO members by their having attended one of several lectures conducted in November 1990. Another lecture session was planned, but had not yet been scheduled. Non-FEO personnel who failed to attend any of these lectures would then be required to take the complete MURR indoctrination program, which included relevant information on their emergency response actions. The lecture session largely consisted of excerpts of the Emergency Plan, SEPs, and FEPs, and included sufficient information relevant to non-FEO members.

The licensee has conducted and critiqued annual onsite emergency drills to test the training of FEO members and, to some extent, non-FEO members. Participation of some offsite support groups in these drills has occurred biannually. Records review indicated that the most recent drill involving offsite support groups occurred in February 1990, while the annual drill involving only MURR staff was conducted in early December 1990.

The February 1990 drill involved the participation of fire department, ambulance, and hospital staffs to a simulated fire in several MURR laboratories which resulted in simulated contamination and injuries to several MURR staff. Performances of ambulance and hospital staffs were evaluated by FEMA as part of a larger test of the regional Hospital Radiation Disaster Plan. The licensee critiqued the performances of FEO and non-FEO staff. Critique items resulting in corrective action included a revision to a FEP and discussions with several participants regarding their responses. The February 1990 drill included an evacuation of non-FEO MURR staff, which was also largely the scope of the December 1990 drill.

The licensee has been responsible for providing periodic training to some non-MURR staff. Records review indicated that Fire Department personnel received training, which included facility tours, in November 1989 and August 1990. Some house-keeping and campus facility maintenance personnel received orientation training on the facility in the first quarter of 1990. The University's Health Physics Services Group was responsible for periodic training of ambulance crews regarding the potential radiological aspects of a response to the MURR. Records of such training were not reviewed.

No violations or deviations were identified.

e. Emergency Facilities, Equipment, and Supplies

The emergency response facilities remained unchanged and as described in the Plan and relevant procedures. Records review indicated that quarterly inventories of emergency equipment and supplies have been performed since the previous inspection in accordance with SEP-8, Emergency Equipment Maintenance Procedure. The inspector made a cursory verification of the items in one emergency equipment location and found them to be satisfactory.

No violations or deviations were identified.

3. Radiological Effluents (IP 80745)

a. Liquid Effluents

The licensee's annual report of radiological effluents released to the sanitary sewer were reviewed. The licensee's records indicated that releases conducted from July 1, 1989 through June 30, 1990 were in compliance with and well below limits established by 10 CFR 20.303 "Disposal by release to Sanitary Sewage Systems".

A representative sample of "Waste Tank Sample Reports" were reviewed and found to be accurately completed in accordance with the licensee's established procedures. Computational values and maximum permissible concentration (MPC) limits were verified to be correct and in accordance with limits specified in 10 CFR 20 Appendix B, Table 1, Column 2.

In an effort to maintain all radiological liquid effluent releases as low as reasonably achievable (ALARA), the licensee has adminis-

tratively established activity limits in procedures used for preparing and reviewing documentation in preparation for batch disposal of liquid effluents. When administrative limits are exceeded, additional reviews and approval is required prior to conducting a release. When waste tank samples identify abnormal activity levels or nuclides, the licensee evaluates the source of the abnormality prior to release authorization. This review and evaluation ensures that consideration is given to additional processing (such as additional filtering processes using more restrictive filters, chemical treatments to improve filtration efficiency or storage for decay), to reduce activity levels and maintain radioactive liquid effluents ALARA.

No violation or deviations were identified.

b. Airborne Effluents

The licensee's annual report of radiological effluents released to unrestricted areas through the common vent stack was reviewed. The licensee's records indicated that releases conducted from July 1, 1989 through June 30, 1990 were in compliance with, and well below, limits established by 10 CFR 20.106 "Radioactivity in effluents to unrestricted areas" and Technical Specification Number 3.7 "Facility Gaseous and Particulate Radioactivity Release".

Calibration records for the stack monitoring system were reviewed and found to have been completed within established time limits and in accordance with approved procedures. The licensee uses secondary calibration standards which are traceable to the National Institute of Standards and Technology (NIST) for these periodic calibrations. Concurrent with stack monitor system calibration, alarm setpoints are also verified and adjusted if necessary.

The licensee has installed additional exhaust monitoring equipment when necessary to meet the needs of monitoring special research projects. For example, an alpha air monitor has been installed to monitor exhaust flow from the laboratory specially built for the transuranic management by the pyropartitioning separation (TRUMP-S) research project.

Facility airborne effluents are filtered using high efficiency particulate (HEPA) filters to maintain airborne releases ALARA. Additional HEPA filters are utilized on the exhaust ventilation from areas of known or suspected elevated contamination, such as the hot cell, to further ensure airborne effluents are maintained ALARA.

No violations or deviations were identified.

c. Experiments

Each experiment or production process to be conducted by the licensee is formally reviewed in accordance with requirements of Technical Specification 3.6.C "Experiments". This review is

documented utilizing a Reactor Utilization Request (RUR) form. As part of this review each experiment or process is analyzed to evaluate the potential for release of radioactive gases or aerosols to the reactor bay or atmosphere. The amount of material authorized for use in experiments or processes is limited to ensure that limits established by Technical Specifications are not exceeded.

Selected RUR packages were reviewed and found to have appropriate analyses conducted and handling precautions established to ensure that safe practices were maintained and release limits would not be exceeded.

Experiments and production processes also receive a reactor chemistry safety analysis to ensure reactor chemistry can detect water soluble radionuclides to at least one tenth of the maximum permissible concentration (MPC) levels in the event of a failure of the experiment or process apparatus and a subsequent release to reactor systems or effluent streams.

No violations or deviations were identified.

d. Facility Tour

The inspector was escorted on two tours of the facility. The first tour was for a general familiarization with the facility and ongoing research and production projects. The second tour was to specifically inspect effluent streams, filter locations and monitoring points. The inspector made a third independent tour of the facility.

During each facility tour general house-keeping was observed to be well maintained. Radiological postings were clearly and conspicuously posted. Current survey results are posted at the entrance to radiological areas to provide additional information, which was helpful in aiding individuals to minimize exposure to radiation and radioactive material.

No unmonitored or unauthorized release path was identified during facility tours. The licensee has taken efforts to ensure potential release paths are appropriately directed and monitored.

No violation or deviations were identified.

4. Exit Interview

On December 21, 1990, the inspectors met with those licensee representatives identified in Section 1 to present and discuss the preliminary inspection findings. The licensee indicated that none of the matters discussed were proprietary.

The licensee was informed that no violations or open items requiring corrective action had been identified. Several improvement items for the licensee's consideration were identified regarding the Emergency Preparedness program. The Plan and relevant procedures should be revised to indicate EPA's currently accepted emergency worker whole body exposure

limit of 75 rem for lifesaving actions. Several inconsistencies were identified between State and NRC notification requirements stated in the procedures versus the language in the Emergency Plan. The Plan's next revision should be consistent with the procedures. The worksheet which would be utilized when informing the NRC of an Unusual Event or higher emergency classification should be revised to better address the NRC's initial information needs. The licensee should contact SEMA officials to determine their initial information needs if an Unusual Event or higher category of an emergency would be declared. The 15 minute regulatory time limit for initially notifying offsite officials should be stated in the Plan and appropriate procedures. The licensee was informed that radiological effluents were considered to have been maintained ALARA and well below regulatory limits.