

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-186/85-002(DRSS)

Docket No. 50-186

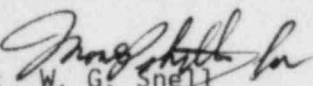
License No. R-103

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

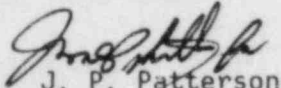
Facility Name: Research Reactor Facility

Inspection At: University of Missouri, Columbia, MO

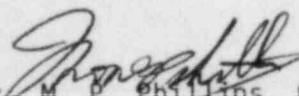
Inspection Conducted: February 5-7, 1985

Inspectors: 
W. G. Snell
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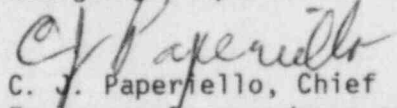
2/27/85
Date


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Approved By: 
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2/28/85
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Inspection Summary

Inspection on February 5-7, 1985 (Report No. 50-186/85-002(DRSS))

Areas Inspected: Special, announced appraisal of the onsite emergency preparedness program at the Research Reactor Facility involving three general areas: Emergency Organization, Emergency Response, and Maintaining Emergency Preparedness. The inspection involved 70 inspector-hours onsite by two NRC inspectors and two consultants.

Results: No items of noncompliance or deviations were identified; however, several items related to incorporation of additional Emergency Actions Levels, clarification in the areas of evacuation and accountability, provisions for personnel monitoring equipment, and required training must be corrected to ensure that there is reasonable assurance that the licensee's emergency response organization can and will protect the health and safety of the public and employees during a radiological emergency. These items are delineated in Appendix A of the transmittal letter.

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CONTENTS

	<u>Page No.</u>
1.0 Emergency Organization	1
1.1 Onsite Organization	1
1.2 Offsite Support	2
2.0 Emergency Response	2
2.1 Notification and Activation of Emergency Organization	2
2.2 Classification and Assessment	4
2.2.1 Identification and Classification	4
2.2.2 Assessment Actions	6
2.3 Protective/Corrective Actions	6
2.3.1 Facilities and Equipment	6
2.3.2 Evacuation and Accountability	8
2.3.3 Personnel Exposure Control	9
2.3.4 First Aid and Rescue	11
3.0 Maintaining Emergency Preparedness	11
3.1 Emergency Training	11
3.2 Drills	12
3.3 Maintenance of Emergency Plan and Procedures	12
4.0 Persons Contacted	12
5.0 Exit Interview	12

Attachment: Emergency Organization Chart

DETAILS

1.0 Emergency Organization

1.1 Onsite Organization

The Facility Director serves as the Emergency Director (ED) with the ultimate authority to oversee and direct all emergency onsite activities. He is responsible for terminating an emergency and initiating recovery actions. He also maintains responsibility for authorizing exposures to emergency workers in excess of normal occupational limits. If the Facility Director is absent, the line of succession for the ED positions is: Associate Director; Reactor Manager; and the Duty Shift Supervisor.

The ED initially has responsibility for relating information to the public and news media about the emergency situation. This responsibility will be delegated to the University of Missouri Office of University Relations when they become available, or to any other individual who has the knowledge and experience to handle the responsibility.

The ED also has initial responsibility for onsite and offsite radiological assessment and for recovery operations. The responsibility for radiological assessment will be delegated to the Health Physics Manager and recovery operations to the Reactor Manager when these individuals arrive. Each of these responsibilities could be delegated to other available personnel with knowledge and experience to handle the responsibility if the Health Physics Manager or Reactor Manager are not available.

The onsite emergency organization is referred to as the Facility Emergency Organization. The Facility Emergency Organization consists of staff members of the Missouri University Research Reactor (MURR) Directors Office, Operations group, Health Physics group, and Reactor Chemistry group who are onsite at the time of an emergency. Additional personnel from these MURR groups will be called to respond as required. The Facility Emergency Organization has the capability to function 24 hours a day for a protracted period of time.

Authorization to permit volunteer workers to incur radiation exposures in excess of 10 CFR Part 20 limits is made by the Emergency Director. The Emergency Plan specifies exposure limits of 100 rem dose equivalent per individual for life saving and 25 rem dose equivalent per individual for corrective actions to save vital reactor equipment to mitigate the consequences of the emergency.

Walkthroughs and interviews were conducted with most licensee personnel who could potentially be responsible for the position of Emergency Director. All personnel interviewed demonstrated a good knowledge of the responsibilities and duties of the Emergency Director.

Based on the above findings, this portion of the licensee's program is acceptable.

1.2 Offsite Support

Offsite Support Organizations include the City of Columbia Fire Department, the University of Missouri (UMC) Health Physics Services, UMC Police, UMC Hospital and Clinics, and the Office of University Relations. Attachment 1 contains a diagram of the emergency organization for both onsite and offsite support.

The UMC Health Physics Services will assist with radiological assessment, the UMC Police will control access to the site area, the UMC Hospitals and Clinics (and ambulance service) will handle medical emergencies, and the Office of University Relations will provide information to the public and news media.

The licensee has identified and made agreements with the Columbia Fire Department for support in the event of a facility fire. This is the only non-university support organization the licensee expects to rely upon during an emergency.

Through discussions with the above groups, it was determined that they were capable of performing the tasks agreed upon with the MURR facility.

Based on the above findings, this portion of the licensee's program is acceptable.

2.0 Emergency Response

2.1 Notification and Activation of Emergency Organization

Procedures and communication systems related to notification and activation were examined. In addition, walkthroughs and interviews were conducted with most key emergency personnel.

The Duty Shift Supervisor or any other individual who could assume the position of Emergency Director is authorized to activate the Facility Emergency Organization (FEO). Emergency Procedure SEP-1 specifies that the FEO will be activated for a Reactor Isolation, Facility Evacuation, fire, medical or security event, Unusual Event, Alert or Site Area Emergency. The licensee's procedures refer to the Reactor Isolation, Facility Evacuation, fire, medical and security events as General Emergency Classifications, which is the terminology used in their original (pre 10 CFR Part 50.54(r) requirement) emergency procedures. Because of the conflict with the NRC General Emergency class, the licensee already has identified this terminology as a problem that will be corrected during the next revision to the procedures.

Upon activation of the FEO, Emergency Procedures SEP-1 through SEP-7 provide most of the necessary information to assess and respond to an Unusual Event or higher classification. However, Facility Evacuation, Reactor Isolation, fire, medical and security events are covered separately in the original emergency procedures. These will be appended to the new emergency procedures, but having separate procedures appears to produce unnecessary redundancy and confusion. The Unusual Event, Alert and Site Area Emergency classifications would more than likely include a Facility Evacuation and Reactor Isolation. In addition, having fire and security events covered in separate procedures from radiological events is inconsistent since both fire and security events could lead to a radiological event. Since the same emergency organization will be activated to handle any emergency (radiological or otherwise), the NRC believes a single set of procedures which would lead to successively increased emergency response activities as the emergency events escalated would be more appropriate than separate procedures.

For emergencies that occur during normal working hours, notification of activation of the FEO is accomplished by a facility public address announcement. During non-normal hours, a call-list is included in the emergency procedures with the home phone numbers of the emergency organization personnel. Also included in the call-list are the phone numbers of all emergency support organizations, including the State Emergency Management Agency (SEMA), NRC and American Nuclear Insurers.

In addition to the University telephone system which is available throughout the facility, a public telephone line is available in the Control Room. The public address system can be activated in either the Control Room or the MURR Lobby. Additional communications include an alarm system that activates at the UMC Police Department, two ring-down phones in the Control Room that go to the UMC Police, two licensed walkie-talkies in the Control Room, and two more walkie-talkies in the electronic shop.

Worksheet C attached to the emergency procedures contains provisions for providing initial and followup emergency messages to the NRC in Region III. SEP-7, Public Information Procedure, contains a worksheet for University Public Relations to obtain information from the ED so that it can be provided to the public and news media.

Walkthroughs and interviews demonstrated that FEO personnel were knowledgeable of the activation and notification procedures.

Based on the above findings, this portion of the licensee's program is acceptable; however, the following item should be considered for improvement:

- . The original facility emergency procedures should be integrated into the new radiological emergency procedures to provide a single set of procedures for all emergencies.

2.2 Classification and Assessment

2.2.1 Identification and Classification

The licensee has written emergency procedures SEP-1, SEP-2, SEP-3, and SEP-4 which describe Emergency Action Levels (EALs) leading to emergency classifications. These procedures include a list of predetermined immediate actions for each classification, a list of corrective actions to be considered, and a list of subsequent actions.

EALs are based upon observable and definable information such as instrument readings and/or equipment status. The primary means of classification is based upon readings taken from the gas, particulate, and Iodine stack monitors using overlays over the readouts. The overlays allow a determination of MPCs at the EPZ and a determination of the existing emergency classification.

However, almost all EALs addressed in the procedures are the result of a radiological release. The Emergency Plan provides the bases for classifying an emergency as an Unusual Event or greater based on nonradiological events. For example, there are no EALs in the procedures that consider the following: Unusual Event, (1) threats to or breaches of facility security, (2) prolonged fire or minor explosion within the facility but nonspecific to the reactor or its control system, (3) other plant conditions exist that warrant assuring emergency personnel are available to respond and assuring information will be provided to offsite authorities; Alert, (1) fire or explosion which might adversely affect the reactor or its safety systems, (2) loss of physical control of the facility, (3) other plant conditions exist that warrant notification of the emergency staff and activation of the Facility Emergency Organization; Site Area Emergency, (1) fire compromising the functions of safety systems, (2) other plant conditions exist that warrant activation of the Facility Emergency Organization and assistance from offsite support organizations. To assure the adequate implementation of the Emergency Plan, the above EALs need to be added to the procedures.

Procedures are provided for sampling and radiological monitoring under accident conditions. Health Physics procedures include air sampling, contamination monitoring, and dose rate monitoring. Although routine procedures exist for obtaining and analyzing a stack sample, none currently exist for performing these tasks under accident conditions.

In relating stack emissions to air concentration at the EPZ boundary, detector efficiencies were considered. Detection and assessment equipment was observed to be maintained on a routine schedule. Technical specifications call for these devices to be calibrated on a semiannual frequency and the operation checked monthly. Defective monitors are replaced or repaired promptly, or the reactor is shut down as per technical specifications.

The licensee maintains several analytical labs for analyzing samples. This equipment consists of several spectrum analyzers in both the reactor facility and the campus health physics office. The analytical capability of the licensee was observed to be adequate.

Based on the above findings, the following emergency planning deficiencies must be addressed to ensure the adequate implementation of your emergency preparedness program:

- . The following EALs need to be added to the Emergency Procedures:

Unusual Event - threats to or breaches of facility security.

- prolonged fire or minor explosion within the facility but nonspecific to the reactor or its control system.
- other plant conditions exist that warrant assuring emergency personnel are available to respond and assuring information will be provided to offsite authorities.

Alert - fire or explosion which might adversely affect the reactor or its safety systems.

- loss of physical control of the facility.
- other plant conditions exist that warrant notification of the emergency staff and activation of the Facility Emergency Organization.

Site Area Emergency - fire compromising the functions of safety systems.

- other plant conditions exist that warrant activation of the Facility Emergency Organization and assistance from offsite support organizations.

- . Provide procedures for obtaining and analyzing stack samples under accident conditions.

2.2.2 Assessment Actions

Procedures exist for monitoring radiological conditions at the site boundary. However, in taking a grab air sample, a GM is used for determining plume location. An ion chamber should be used in place of the GM for locating the plume for two reasons. The first is that an open-closed window reading on the ion chamber allows better definition of plume location than a GM. The second is that personnel can better determine dose rates to themselves with an ion chamber, and thus take protective actions if necessary.

Personnel designated as ED or an alternate were given a postulated emergency scenario to respond to. The scenario was designed to determine their capability to detect, assess, and classify an event and to determine the adequacy of emergency preparedness training.

The initial EDs (Duty Shift Supervisors) did a good job of assessing, classifying, and mitigating the postulated event. Two weaknesses were observed, however. Training in emergency response was apparently minimal which resulted in these EDs being not totally familiar with how to use the plan and procedures. In addition, a hesitation to classify an event based on imminent conditions was observed.

Other personnel designated as EDs (Management) also performed well. The only observed weakness was in classifying events based on stack monitor readings. The overlays, charts, and instructions were at times confusing. This could probably be eliminated with better and more frequent training.

Based on the above findings, this portion of the licensee's program is acceptable; however, the following item should be considered for improvement:

- . Increase or improve the training to personnel responsible for directing emergency response activities.

2.3 Protective/Corrective Actions

2.3.1 Facilities and Equipment

The inspector observed the location and layout of the Emergency Control Center (ECC) in the reactor control room and the backup location in the reactor building lobby. Both locations included access to the public address system and the telephone system. The Manager of Health Physics is responsible for establishing the habitability

of the ECC (EP-I.1 Facility Evacuation Plan). In the event the entire reactor building needs to be evacuated the ECC would be moved to the Research Park Development Building.

An emergency supply locker adjacent to the ECC in the Reactor Building lobby was inspected and determined to be adequate. The locker contained personnel protection equipment such as respirators and cartridges, protective clothing, first aid kit, warning signs, and radiological supplies. One other emergency kit is maintained at the Research Park Development Building. Procedure SEP-8 "Emergency Equipment Maintenance Procedure" states that the contents of the kits are to be inventoried quarterly. The inventory list attached to the door of the cabinet listed three SCBAs but only two were present. A review of the August 13, 1984 inventory record revealed a note to the effect that one SCBA was out for maintenance. However, health physics personnel had no record of exactly when the respirator was removed. The current inventory list on display in the emergency cabinet should accurately reflect its contents, and equipment which is missing should be noted when removed and logged back in when returned. A review of documentation failed to locate the most recent inventory sheet for the emergency kit locker adjacent to the ECC. A discussion with the HP technician who had performed the inventory revealed that the sheet had been filled out.

The facilities and equipment used for personnel decontamination during an emergency were observed. Hot sinks draining to the rad waste system are available as well as emergency showers and standard showers. For persistent skin contamination or internal contamination the university hospital is prepared to assist with treatment. However the location of decontamination facilities and supplies was not indicated in the Emergency Plan.

The maintenance program for radiological measurement equipment was inspected. Installed instrumentation such as the stack monitor and ARM system are calibrated semi-annually in accordance with technical specifications and the records maintained by reactor operations personnel. Health Physics equipment is calibrated annually, with certain equipment calibrated by the manufacturer and other equipment calibrated by the health physics staff. A review of the documentation maintained by health physics confirmed this. Check sources are provided to operationally check instruments before use and a procedure exists for tagging inoperable equipment for repair or replacement.

Self Contained Breathing Apparatus was determined to be available. However, discussions with licensee representative found it questionable whether personnel were maintaining adequate training in their use.

Based on the above findings, this portion of the licensee's program is acceptable; however, the following items should be considered for improvement:

- . Institute methods to ensure that emergency kit check lists accurately reflect its contents and that any shortages are noted.
- . Document control procedure should be instituted to ensure the proper maintenance of inventory records.
- . The locations and descriptions of decontamination control facilities should be specified in the Emergency Plan.
- . Provide periodic training in the use of self contained breathing apparatus for members of the facility emergency response organization who might be called upon to use them.

2.3.2 Evacuation and Accountability

Evacuation will be implemented under three different levels: Reactor Isolation, Facility Evacuation, and Partial Site Area Evacuation. Reactor Isolation is automatically initiated when specified radiation monitors exceed setpoints or can be manually initiated. Both Facility Evacuation and a Partial Site Area Evacuation are initiated by the ED. A Reactor Isolation calls for evacuation of the reactor containment building. Facility Evacuation calls for a Reactor Isolation in addition to evacuation of selected facility labs or the entire facility. A partial Site Area Evacuation is an evacuation of the facilities and grounds surrounding the MURR facility by the UMC police.

During a Reactor Isolation an Emergency Coordinator (EC) is assigned the task of verifying the containment building has been vacated. During a Facility Evacuation, the EC is assigned the task of verifying both the containment building and facility labs have been vacated and secured. However SEP-1 states that an individual "may" be assigned to fill the EC position by the ED. Since the EC has defined responsibilities, the procedures should ensure this position will be filled. In addition, the procedures and plan refer to the Duty Operator and a surveillance team as having responsibility for verifying evacuation. These inconsistencies in the procedures need to be clarified.

Signs have been posted throughout the MURR showing the routes for evacuation. Upon exiting the facility all personnel are to go to one of two parking lots adjacent to the building depending on wind direction. A wind vane is visible on top of the facility to determine wind direction, and all personnel have been trained to proceed to the upwind parking lot to be surveyed for contamination. If a Partial Site Area Evacuation is necessary, personnel will proceed to the Research Park Development Building. Accountability is accomplished by verifying the containment and/or facility and/or site have been vacated. However, the procedures are inconsistent as to who is responsible for accountability. Provisions for monitoring individuals evacuated from the facility are contained in procedure SEP-1 "Activation of Emergency Organization". However, procedure EP-1 "Facility Evacuation Plan" contains no provisions for monitoring evacuated personnel for contamination prior to their release. Discussions with licensee personnel have not made it clear which of these two procedures would be initiated in all cases. The procedures need to be revised to accurately reflect what will be implemented.

Based on the above findings, the following emergency planning deficiencies must be addressed to ensure the adequate implementation of the emergency preparedness program:

- . Inconsistencies in the procedures in regards to the Emergency Coordinator, Duty Operator and surveillance team having responsibility and assigned tasks for evacuation activities should be corrected.
- . The procedures need to be revised to accurately reflect how accountability will be carried out and that people will be required to be surveyed for contamination before being allowed to leave the area.

2.3.3 Personnel Exposure Control

The lifesaving and corrective action maximum exposures discussed in the plan are consistent with EPA recommendations.

High range personnel dosimetry which could be used during an emergency appeared to be available. However, no description of available equipment, its location, or conditions under which it would be used were located in the Emergency Plan or procedures. No procedures were located which addressed record keeping of personnel dose during an emergency, with the exception of Worksheet D "Emergency Exposure Authorization and Record" used for

authorizing exposures in excess of 10 CFR Part 20 limits. No provisions were made for recording doses received during emergency operations which were not in excess of 10 CFR Part 20 limits.

No provisions have been made to supply offsite response personnel (i.e., ambulance, fire department, police) with personnel dosimetry upon arrival at the facility. Discussions with licensee personnel and support personnel indicate that ambulance and fire response vehicles carry pencil dosimeters supplied by SEMA. However this dosimetry is not under the direct control and supervision of the licensee and does not fulfill the requirement to supply appropriate personnel monitoring equipment as specified in 10 CFR Part 20.202 "Personnel Monitoring". Further, this form of dosimetry does not provide a legal and permanent record of dose.

Campus Police in accordance with facility Security Procedures provide the means to isolate and control access to the facility. Appropriate means exist to isolate and control access to radiologically contaminated areas of the facility.

Based on the above findings, the following emergency planning deficiency must be addressed to ensure adequate implementation of your emergency preparedness program:

- . In accordance with 10 CFR Part 20.202, supply appropriate personnel monitoring equipment to personnel entering the facility under circumstances in which it is possible for them to receive a significant dose. Provisions need to be established either in the Emergency Plan or Emergency Procedures to supply the appropriate personnel dosimetry to offsite emergency response personnel.

In addition, the following items should be considered for improvement:

- . Personnel dosimetry provided for offsite response personnel should result in a permanent legal record of dose received while responding to the emergency situation.
- . Include in the Emergency Plan a discussion of dosimetry available for use during an emergency, where it is located, and some guidance concerning the conditions under which it should be used and the proper type for each condition.

. Provide a means for recording and logging personnel exposure received during emergency response other than just authorized exposures beyond 10 CFR Part 20 limits.

2.3.4 First Aid and Rescue

A first aid kit is contained within the emergency locker and stretchers are accessible within the facility. The facility is within one mile of the University Medical School and Hospital. The hospital has ambulance and helicopter service and has the trained staff and facilities to handle severe contamination or contaminated injuries.

Based on the above findings, this portion of the licensee's program is acceptable.

3.0 Maintaining Emergency Preparedness

3.1 Emergency Training

Members of the FEO are trained initially and annually thereafter. Training consists of reading and reviewing the Emergency Plan and procedures by each FEO member so they can carry out their assigned duties and responsibilities. Any questions that arise are to be discussed with an individual's supervisor. When the reading and review is completed, the FEO members sign and date that they have completed the training and understand their role in the emergency organization. When the plan or procedures are revised, the revisions are routed to all FEO personnel for review. Records were examined and it was verified that training was being carried out for the FEO as required by the plan and procedures.

All non-FEO MURR facility staff personnel will also be trained annually. This training is conducted by videotape, lecture or seminar. Training of non-FEO facility personnel was determined to be up-to-date.

Offsite support organizations are trained biennially. The licensee has provided training for these support groups and it is current for all except the medical support personnel from the hospital and clinics. The training for these individuals has not been provided for over two years. Historically the training for the medical support personnel has been conducted by the UMC Health Physics Services. MURR should maintain verification from UMC Health Physics Services to ensure this training is conducted.

Based on the above findings, the following emergency planning deficiency must be addressed to ensure the adequate implementation of your emergency preparedness program:

. Provide the required biennial training to the medical support staff in handling contaminated injured persons.

In addition, the following item should be considered for improvement:

- Maintain records of training conducted by the UMC Health Physics Services to ensure MURR training commitments are being carried out.

3.2 Drills

An emergency drill is required to be conducted annually by Section 8.3 of the Emergency Plan. At least every two years the drill should test at a minimum the notification procedures and communication links with emergency support organizations. All drills will be observed, critiqued, and identified deficiencies corrected. A drill was conducted on February 1, 1985. The inspector reviewed the critique of and planned corrective actions as a result of this drill and found them acceptable.

Based on the above findings, this portion of the licensee's program is acceptable.

3.3 Maintenance of Emergency Plan and Procedures

The Emergency Plan and Emergency Procedures shall be reviewed annually and revised as necessary in accordance with MURR Technical Specification 6.1. The Reactor Manager is responsible for the annual review and maintenance of the Plan and Procedures, as well as any necessary retraining as a result of revisions.

Based on the above findings, this portion of the licensee's program is acceptable.

4.0 Persons Contacted

- *R. Brugger, Director
- *D. Alger, Associate Director
- *C. McKibben, Reactor Manager
- *W. Meyer, Reactor Operations Engineer
- *O. Olson, Manager Reactor Health Physics
 - C. Anderson, Duty Shift Supervisor
 - N. Tritschler, Duty Shift Supervisor
 - R. Mussman, Associate Director University Relations

*Denotes those present at the exit interview.

5.0 Exit Interview

The appraisal team met with the licensee representatives denoted in Section 4.0 of this report at the conclusion of the appraisal on February 7, 1985. The NRC team leader summarized the scope and findings of the appraisal. The Director, University of Missouri Research Reactor Facility agreed to address concerns identified as a result of the appraisal.

EMERGENCY ORGANIZATION CHART

NON-UNIVERSITY EMERGENCY
SUPPORT ORGANIZATION

UNIVERSITY OF MISSOURI
EMERGENCY SUPPORT
ORGANIZATIONS

MURR

