



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20545

SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING REVISIONS TO

THE REED COLLEGE REACTOR FACILITY

EMERGENCY PLAN

DOCKET NO. 50-288

1.0 INTRODUCTION

By letter of May 7, 1992, and supplemented by letters on May 15, and June 3, 1992, the licensee requested changes to Emergency Action Levels (EALs) specifications in their Emergency Plan. The changes were precipitated by two events that required the declaration of a Notification of Unusual Event (NOUE) as described in the following two paragraphs.

On November 23, 1991, Reed College declared a NOUE while operating at about 96 percent power. The operators received a gaseous stack monitor alarm, a reactor room ventilation isolation signal, and an alarm from the reactor building bay continuous air monitor (CAM). Based upon these initiating conditions, the licensee declared a NOUE due to indications of a leaking fuel element. The NRC staff estimated that approximately 120 millicuries of noble gases were released during the course of the event and the resultant dose was estimated to be about 0.07 millirem for a person standing at the edge of the exclusion boundary for 20 hours.

On May 11, 1992, the licensee declared a NOUE based upon a fire in a chemistry lab in the Chemistry Building. The fire was minor (it was put out by the student experimenter and was estimated to last less than a minute), but the declaration of the NOUE was required because of the current wording of the event classification criteria associated with the licensee's Emergency Plan (Emergency Action Levels).

These two incidents demonstrated the reasons that the licensee proposed revisions to their Emergency Action Levels (EALs). The licensee's request removes unnecessary conservatism from their EALs and brings the Emergency Plan into a form consistent with standard regulatory guidance.

2.0 EVALUATION

The proposed revisions were evaluated against the current regulations and guidance in NUREG-0849, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors," and Regulatory Guide 2.6, which essentially endorsed the NUREG-0849 document.

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The first change involved the EAL covering fire and explosions. The current plan had two EALs under the NOUE emergency class covering the subject. The original wording is as follows:

Fire or explosion in the basement of the Chemistry building (radiochemistry laboratory, counting rooms, pneumatic tube terminal, or reactor storeroom), reactor bay, or control room.

and

Major fire, explosion, or any event requiring evacuation of any part of the Chemistry building.

The licensee proposed to replace these two EALs with the following:

An explosion, or a fire in the Chemistry Building lasting more than 10 minutes.

The proposed EAL is consistent with the words in the NRC emergency preparedness guidance document used for other nuclear facilities. It defines the size of the fire by adding the 10-minute criteria and eliminates the vagueness of the adjective "major."

As previously discussed, on May 11, 1992, the licensee declared a NOUE based upon a fire in a chemistry lab in the Chemistry Building. The fire was estimated to have lasted less than a minute, but because of the current wording of the EAL the declaration of the NOUE was required. Under the proposed version to the EAL, no declaration would be required for a similar minor incident.

The second EAL involves the release of radioactivity or the occurrence of radiation levels. The original wording of the EAL is as follows:

Failure of an experiment or fuel cladding as indicated by alarms on one or more of the facility monitors:

Air Particulate Monitor
Continuous Air Monitor
Gaseous Stack Monitor
Radiation Area Monitor

The licensee proposes to delete this EAL because, as written, it is too conservative based upon the radiological risks involved at the alarm set points. The licensee plans to maintain relatively low alarm setting for internal operational purposes (i.e., the licensee plans to continue to receive early warnings of developing problems to enable him to prevent any major releases and deal with the underlying problems). Under these alarm settings and the physical situation at the reactor, very low levels of radioactivity

can trigger the alarms and require the declaration of an NOUE under the current EALs. This was the reason that a NOUE was declared on November 23, 1992, as discussed above.

The licensee proposes to replace the above EAL with an EAL listed in NUREG-0849. It will read as follows:

Actual or projected radiological effluents at the site boundary exceeding 10 MPC when averaged over 24 hours or 15 mRem whole body accumulated in 24 hours. Written procedures shall be in effect for estimating these doses based on measurements from the stack monitors.

An accompanying footnote would also be added to read as follows:

Long before the MPC is reached, the stack monitor will have alarmed initiating the reactor room ventilation system "isolation operating cycle," as described in the Safety Analysis Report. Under this cycle, the stack monitor will continue to operate, monitoring the small amount of air which is vented from the facility and these readings would be used to project radiological effluent releases and direct radiation levels at the site boundary. Direct measurements with portable survey meters would also be used to evaluate radiation levels at the site boundary.

The proposed EAL is based upon one meter reading (the stack monitor) instead of the previously used four instruments, and the proposed EAL requires some subjective interpretation and calculation. Although this method is less conservative than the original EAL, it meets the requirements and guidance in NUREG-0849. However, for this new EAL to be effective, an implementing procedure is needed to document the methodology and applicable licensee staff must be trained in the use of the implementing procedure. The licensee has committed to its radiation safety committee, and has also committed to the NRC by the June 3, 1992, letter to complete these actions prior to implementation of the changes.

The next set of proposed EALs fall under the Alert Classification. The licensee proposes to delete the following EALs:

Severe fuel damage or experiment failure resulting in significant releases of radioactivity as determined by observing the following radiation levels on the facility air monitors:

Air Particulate Monitor: 100 x Alarm Level
Gaseous Stack Monitor: 100 x Alarm Level
Continuous Air Monitor: 100 x Alarm Level
and
Radiation Area Monitor: An alarm lasting 1 hour from an unexplained source

The licensee proposes to substitute the following action levels:

Actual or projected radiological effluent at the site boundary exceeding 50 MPC when averaged over 24 hours, or 75 mRem whole body accumulated in 24 hours.

Actual or projected radiation levels at the site boundary of 20 mRem/hr. for 1 hour whole body or 100 mRem thyroid dose.

The proposed EALs are also identical to the guidance in NUREG-0849. The same evaluation and comments apply to these EALS as expressed in above for the EALS for NOUEs.

CONCLUSION

The staff has concluded that the revised emergency plan as submitted in the May 7, 1992, letter and supplemented by letters of May 15, and June 3, 1992, is acceptable and in accord with NRC guidance, with the commitment that the licensee will assure that the implementing procedures are in place and applicable staff trained in these procedures.

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Date: June 9, 1992