BACKGROUND

On November 21, 2008, the United States Enrichment Corporation (USEC) submitted a certificate amendment request to modify several technical safety requirements (TSRs) to (1) allow exclusion from the criticality accident alarm system (CAAS) requirements of Title 10, Section 76.89(a), of the Code of Federal Regulations (10 CFR 76.89(a)) during temporary activities that produce localized areas of inaudibility by allowing use of a "buddy system" to alert personnel of criticality, and (2) extend the surveillance period for CAAS and building horns from quarterly to annually. The changes would broaden the CAAS exclusion for TSRs 2.1.4.5b, 2.2.4.3b, 2.3.4.7b, and 2.4.4.2b and would also increase the surveillance period for those TSRs and for TSR 2.6.4.1b.

The regulation in 10 CFR 76.89(a) requires that USEC maintain and operate a CAAS in all areas of its facility, but allows USEC to describe areas to be excluded with NRC approval. The submittal must describe the measures used to ensure against criticality, including the kinds and quantities of material to be permitted and measures used to control those kinds and quantities of material.

TSR 2.6.4.1b currently has such an exclusion for permit-confined spaces and localized areas of inaudibility. The basis statement for this TSR clarifies that "localized areas of inaudibility" are "localized areas of inaudibility resulting from temporary activities that generate high noise levels." In such areas, a "buddy system" will be used, in which one person will remain outside the affected area (i.e., where the alarm is audible) and will maintain communication with personnel in the area, to ensure evacuation in the unlikely event of criticality. In its previous approval, the NRC determined that these provisions are adequate to ensure worker safety.

The NRC noted that ANSI/ANS-8.3-1997 states, "In areas with very high audio background or mandatory hearing protection, visual signals or other alarm means should be considered." The NRC noted that USEC has extensive experience employing the buddy system for confined spaces and that the delay associated with use of the buddy system (on the order of seconds) would be similar to that for confined spaces. In the approval of a similar amendment request made by USEC dated July 27, 2006, (ML062060454) the staff concluded that the use of a buddy system to notify personnel in lieu of a CAAS alarm would not increase the risk to personnel. Accordingly, the U.S. Nuclear Regulatory Commission (NRC) approved such a CAAS exclusion for the non-cascade facilities, as covered by TSR 2.6.4.1b.

The NRC had approved a more limited CAAS exclusion for TSRs 2.1.4.5b, 2.2.4.3b, 2.3.4.7b, and 2.4.4.2b, for "permit-required confined spaces" (ML062060454). This amendment request extends the CAAS exclusion to cover "localized areas of inaudibility resulting from temporary activities that produce localized areas of inaudibility by allowing use of a "buddy system" to alert personnel of criticality."
activities that generate high noise levels” in the Toll Transfer and Sampling Facility, the UF₆ Feed Facilities, the Product and Tails Withdrawal Facilities, and Enrichment Cascade Facilities.

This amendment request also increases the surveillance period for all the affected TSRs to be consistent with Section 6.4 of the American National Standards Institute/American Nuclear Society standard ANSI/ANS -8.3-1997, “Criticality Accident Alarm System”. This compliance evaluation report documents the staff’s review of this request.

DISCUSSION

On November 21, 2008, the United States Enrichment Corporation (USEC) submitted a certificate amendment request to modify several technical safety requirements (TSRs) to (1) allow exclusion from the criticality accident alarm system (CAAS) requirements of Title 10, Section 76.89(a), of the Code of Federal Regulations (10 CFR 76.89(a)) during temporary activities that produce localized areas of inaudibility by allowing use of a “buddy system” to alert personnel of criticality, and (2) extend the surveillance period for CAAS and building horns from quarterly to annually. The changes would broaden the CAAS exclusion for TSRs 2.1.4.5b, 2.2.4.3b, 2.3.4.7b, and 2.4.4.2b and would also increase the surveillance period for those TSRs and for TSR 2.6.4.1b.

The request to extend the CAAS exclusion to cover “localized areas of inaudibility resulting from temporary activities that generate high noise levels” applies to the Toll Transfer and Sampling Facility, the UF₆ Feed Facilities, the Product and Tails Withdrawal Facilities, and Enrichment Cascade Facilities. USEC asserts that the same technical justification supporting the 2006 action applies here. The amendment request also increases the surveillance period for all the affected TSRs to be consistent with Section 6.4 of the American National Standards Institute/American Nuclear Society standard ANSI/ANS -8.3-1997, “Criticality Accident Alarm System”.³

In this case, the NRC staff noted that the likelihood of an inadvertent criticality is small and is not affected by this amendment. Although there is additional risk posed to personnel working in an area of localized inaudibility, the use the Buddy-System will provide reasonable assurance that during temporary circumstances where a worker may not be able to hear the CAAS alarm, the worker will be notified, and, thus adequate measures will have been taken to ensure the worker’s safety. The NRC staff notes that this amendment is similar to the previously approved amendment request submitted on July 27, 2006. In addition, by letter dated January 14, 2009, USEC clarified the meaning of the term “temporary”.⁴ “Temporary Activities” include such activities as construction, maintenance, and repair that use equipment that produces ambient noise. USEC provided the examples of concrete repairs using jackhammers, demolition work on buildings, and drilling associated with environmental remediation. While USEC did not define an explicit time limit associated with such work, it stated that because use of the buddy system requires additional resources, use of the CAAS is the preferred method of protecting


workers and that use of the buddy system would, therefore, be “limited to the time duration necessary to complete a particular task.” In addition to determining that no unique considerations invalidate the previous justification, the staff concluded that the duration of such work would be short compared to the timeframe associated with normal operations, during which the criticality controls in the surrounding processes would be maintained. Therefore, use of a buddy system over such a relatively short timeframe does not result in any undue increase in risk to workers.

Based on the preceding discussion, the staff concludes that extension of the CAAS exclusion to cover the Toll Transfer and Sampling Facility, the UF₆ Feed Facilities, the Product and Tails Withdrawal Facilities, and Enrichment Cascade Facilities, is acceptable.

With regard to the increase in the surveillance period for both the CAAS and building horns, USEC stated, within its November 21, 2008, application that current industry standards require only annual surveillance testing. The staff has verified those standards and notes that Section 6.4 of ANSI/ANS-8.3-1997 states, “The entire alarm system should be tested periodically and that each signal generator should be tested at least annually.” USEC further stated that annual testing is justified based on their operating experience. The staff reviewed events related to CAAS failure from 2000 to October 2008 and found only three instances in which individual CAAS monitors inoperability was identified during surveillance testing (meaning the alarm may not have functioned). The first such event occurred more than 8 years ago, the second more than 7 years ago, and the third approximately 3 years ago and, in each case, the system was modified to enhance its reliability. These enhancements are expected to result in a lower frequency of system failure. All other events related to CAAS failure were self-revealing. Thus, considering the large number of detectors (100’s), only three non-self revealing failures in 8 years is a very low failure rate. Finally, the failure of 3 detectors, even if they were simultaneously lost (which was not the case) would not degrade the overall ability of the system to annunciate an evacuation alarm.

Other component failures have occurred, but, because of design redundancy, these did not result in inoperability. Therefore, the use of an annual surveillance frequency, as allowed by ANSI/ANS-8.3-1997, is justified.

The staff also noted that Section 6.3 of ANSI/ANS-8.3-1997 states, “System response to radiation shall be measured periodically to confirm continuing instrument performance. The test interval should be determined on the basis of experience. In the absence of experience, tests should be performed at least monthly.” USEC clarified, in its RAI response, that the annual surveillance is for the entire CAAS system, including calibration of the radiation detectors⁵. While testing will not be done monthly, the staff concludes that the operating history of the facility justifies the alternate testing period. USEC has confirmed that the annual testing will include calibration of its radiation detectors, in accordance with procedure CP4-GP-IM6128, “Criticality Accident Alarm System Calibration and Shop Test,” using a cesium-137 source.

Based on operating history, the staff finds this surveillance frequency acceptable to meet the intent of both Section 6.3 and Section 6.4 of ANSI/ANS-8.3-1997.

CONCLUSION

Based on similar risk from activities covered by previous approvals, the adequacy of the buddy system to provide timely notification to workers, and the limited duration of temporary activities, the staff finds that extension of the CAAS exclusion as described in the changed TSRs provides reasonable assurance of adequate protection against the consequences of accidental criticality. Based on industry practice as codified by ANSI/ANS-8.3-1997 and operating history, the staff considers the extension to annual surveillance of the CAAS adequate to ensure continued reliability.

Technical Reviewer

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