SummerRAIsPEm Resource

From: KALLAN, PAUL B
Sent: Monday, June 27, 2016 2:33 PM
To: GLEAVES, Bill C
Subject: Summer LAR 13-09 follow-up RAIs on R1 S1 (Paul 6-27-16).doc
Attachments: Summer LAR 13-09 follow-up RAIs on R1 S1 (Paul 6-27-16).doc

Importance: High

Hi Billy,

Enclosed are the Draft RAI questions for LAR 13-09 R1 S1.

Thank you for putting it in the system and providing me with a ML number. I will then send it to Jennifer and to Jordan.

Paul

Hearing Identifier: Summer_COL_eRAIs
Email Number: 145

Mail Envelope Properties (392321c5a6424d088fbca34916800e94)

Subject: Summer LAR 13-09 follow-up RAIs on R1 S1 (Paul 6-27-16).doc
Sent Date: 6/27/2016 2:32:53 PM
Received Date: 6/27/2016 2:32:54 PM
From: KALLAN, PAUL B

Created By: Paul.Kallan@nrc.gov

Recipients:
"GLEAVES, Bill C" <Bill.Gleaves@nrc.gov>
Tracking Status: None

Post Office: HQPWMSMRS07.nrc.gov

Files	**Size**	**Date & Time**	
MESSAGE	204	6/27/2016 2:32:54 PM	
Summer LAR 13-09 follow-up RAIs on R1 S1 (Paul 6-27-16).doc			48002

Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

DRAFT RAIs

Summer LAR 13-09 follow-up RAIs on Sup. I to Rev. 1 (dated June 1, 2016)

Question 9

Section 20.1101 (b) of 10 CFR Part 20 states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses that are as low as is reasonably achievable (ALARA).

As a follow-up to a public meeting with the licensee held on February 3, 2016, the staff submitted three Clarification Questions to the licensee relating to shielding of the three proposed bunkers in the Waste Accumulation Room.

The licensee provided their response to the staff Clarification Questions in Supplement 1 to Revision 1 to LAR 13-09 (June 1, 2016). In this response, the licensee stated that the back and side concrete shield walls surrounding the three bunkers in the Waste Accumulation Room

> "provide adequate shielding to maintain the radiation levels for the worker occupied areas in the radwaste building, and in the adjacent plant yard areas, as Zone I to Zone IV as defined in the proposed revision to UFSAR Figure 12.3-1 (Sheet 14), without the additional vertical shielding from the removable steel shield bunker roof plates and horizontal shielding from the removable steel shield bunker door plates."

The licensee's response goes on to state that

> "Therefore, for normally occupied areas, the removable steel shield bunker roof plates and removable steel shield bunker door plates are provided for ALARA considerations only and for maximum operational flexibility."

The licensee also states that, if access to the normally unoccupied radwaste building roof is required during storage of moderate or high activity waste in the bunkers, the use of a single 6" thick removable steel shield bunker roof plate above each bunker is adequate to maintain Zone II to Zone III radiation levels or less on the radwaste building roof.

- Although the licensee's response to each of Clarification Questions states that the removable steel shield bunker door plates in front of each bunker are not required to maintain the specified radiation zones in worker occupied areas of the radwaste building when moderate and high activity wastes are stored in the bunkers, this description of the function of the removable steel shield bunker door plates is not sufficiently addressed in Supplement 1 to Revision 1 to LAR 13-09 and is not addressed in the UFSAR. In order to address this issue, the staff requests that the licensee amend LAR 13-09 and the UFSAR to describe the functions of the removable steel shield bunker door plates and state that these removable shield plates are not relied upon to

maintain the specified radiation zones in the adjacent worker occupied areas of the radwaste building when moderate and high activity wastes are stored in the bunkers.

Question 10

Section 20.1301(e) of 10 CFR Part 20 states that, in addition to complying with the requirements of this part, each licensee shall comply with the radiation standards in 40 CFR Part 190. 40 CFR Part 190 states that the annual dose equivalent to a member of the public as the result of exposures to planned discharges of radioactive materials (radon and its daughters excepted) to the general environment from uranium fuel cycle operations and to radiation from these operations does not exceed 25 millirems (mrem) to the whole body.

The potential exposure pathways that should be considered when determining the maximally exposed individual dose for comparison with the 40 CFR Part 190 dose limits are the doses from liquid effluents, the doses from gaseous effluents, and the direct doses from radionuclides in plant equipment and systems and doses from sources stored on site (such as the direct doses from spent fuel stored in the ISFSI and irradiated components such as steam generators and reactor vessel heads that are stored onsite).

V. C. Summer UFSAR Table 11.3-206, "Comparison of Maximally Exposed Individual Doses with 40 CFR Part 190 Criteria," shows that the estimated total body dose from liquid and gaseous effluents from both of the V. C. Summer units is estimated to be 2.2 mrem/yr. Supplement 1 to LAR 13-09 (dated July 9, 2014) stated that the radiation levels on the radwaste building roof do not exceed radiation Zone II (less than or equal to 2.5 mrem/hr). The most recent version of this LAR, Supplement 1 to Revision 1 to LAR 13-09 (dated June 1, 2016), states that the radiation levels on the radwaste building roof could conceivably be as high as Zone IV (less than or equal to 100 mrem/hr) during storage of moderate and high activity waste in the bunkers.

On the basis of this apparent large increase in in the estimated dose rate on the radwaste building roof, describe and show how this increase in the direct dose from the radwaste building roof effects your compliance with Section 20.1301(e) of 10 CFR Part 20.

Question 11

10 CFR Part 50, Appendix A, GDC 61 requires, in part, that systems that may contain radioactivity be designed to assure adequate safety under normal and postulated accident conditions and shall be designed with appropriate containment, confinement, and filter systems.

10 CFR Part 50, Appendix A, GDC 3 requires that SSCs important to safety shall be designed and located to minimize the probability and effects of fires and explosions.

RG 1.189 indicates that the design should minimize fires and explosions, including those that could be associated with the release of radioactive material and exposure to workers. RG 1.189

also indicates that the fire hazard analysis should include explosion-prevention measures in areas subject to potentially explosive environments from flammable gases or other potentially energetic sources, including ion exchange columns.

In addition, SRP 11.4A, SECY-94-198, Generic Letter 81-38, Information Notice 90-50, and NUREG/CR-4601 also discuss preventing flammable/explosive conditions from spent resin.

1. LAR 13-09 includes the addition of three bunkers to the radwaste building. Staff's initial RAI, Question 6, requested that the licensee to evaluate the LAR against the criteria in NUREG-0800, Section 11.4A. Section 11.4A includes discussion of gas generation and the potential for flammable/explosive conditions from radioactive waste. The licensee's initial response to the staff indicated that the source term was not increasing, therefore, there was no need to evaluate against the criteria in Section 11.4A. However, this response does not address the potential for flammable/explosive gas buildup inside the bunkers.

   In a 2014 teleconference, the staff asked the licensee about the potential for flammable/explosive gas buildup inside the bunkers and the licensee indicated that no resin would be stored in the radwaste building (or in the bunkers). Therefore, the licensee stated that there was no risk of flammable/explosive gas buildup inside the bunkers.

   However, instead of indicating that no resin will be stored in the bunkers, in an August 2015 submittal (S3 to LAR 13-09) and again in a December 2015 submittal (R1 to LAR 13-09), the licensee indicated that explosive/flammable conditions were not a concern because it was not a concern in the AP1000 design. This is not an acceptable response because the AP1000 DCD did not include bunkers. The inclusion of bunkers is a departure from the AP1000 design and provides an enclosed location where explosive gases from stored radioactive material could achieve explosive concentrations.

   Therefore, as a result of a February 2016 teleconference, staff asked the licensee to revise the response to either indicate that resin wouldn't be stored in the bunkers, to provide information indicating the bunkers were ventilated, so gas buildup would not be a concern, or to provide an analysis indicating why the design is acceptable.

   In LAR 13-09, Revision 1, Supplement 1 (June 2016), the licensee indicated that the highest activity resins expected to be stored in the bunkers were condensate polishing system resin and steam generator blowdown system electrodeionization module resin. In addition, the licensee indicated that if the maximum amount of condensate polishing system and steam generator blowdown system electrodeionization unit resin that could be generated over one year of operation, assuming 0.25% failed fuel and design basis primary to secondary leakage, is stored in a radwaste bunker for a period of six months, hydrogen gas concentrations will not exceed 5 volume percent (in the response, the licensee indicates that the calculated hydrogen concentration during these conditions after 6 months is 4.7 volume percent). The licensee also added information to UFSAR Chapter 11 specifying that a new evaluation would be needed to confirm the risk of hydrogen gas generation if the total volume, activity, or storage period was larger than

the quantities assumed. The licensee specified that the new evaluation would need to demonstrate that the hydrogen concentration in the bunker air space will not exceed 5 percent hydrogen in air, per NUREG/CR-6673. Based on this response, staff requests the following:

a. The above guidance specifies the possibility of other flammable/explosive gasses being generated besides only hydrogen (such as methane). Please explain how potentially flammable/explosive conditions are being limited from these other gasses. In addition, please ensure that the UFSAR markups are sufficient to limit flammable/explosive conditions from all waste forms and types of explosive gasses that can be generated within the bunkers.

b. The use of 5% hydrogen in NUREG/CR-6673 is for transportation packages in transport. The 5% concentration limit in NUREG/CR-6673 is based on hydrogen flammability limits inside a transportation package. NUREG/CR-6673 indicates that the hydrogen flammability limit is higher under these conditions, than in other more open conditions, where the flammability limit is near 4%. In addition, for safety-related systems, Branch Technical Position (BTP) CMEB-9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," specifies controls to maintain hydrogen concentration less than 2 percent for SSCs evaluated using the BTP as guidance. Please specify why the hydrogen concentration limit of 5% is appropriate for the hydrogen concentration limit in the bunkers or modify the limit to a value below the flammability limit, with sufficient conservatism to ensure the flammability limit is not reached.

c. The information provided by the licensee only considered the generation of radiolytic generation of hydrogen gas as a source of potentially explosive gases. Information Notice 90-050, “Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers - ML08261039,” discusses an event where methane gas accumulated in radioactive waste containers due to microbial activity. Other NRC documents, such as RIS 2008-12 “Considerations For Extended Interim Storage Of low-Level Radioactive Waste By Fuel Cycle And Materials Licensees,” and industry documents such as EPRI report 1018644 “Guidelines for Operating an Interim On Site Low Level Radioactive Waste Storage Facility – Revision 1,” note that waste material interactions, including decomposition of organic resins can lead to gas generation. Please ensure that these different types of gas generation are considered.

d. It is unclear if the procedures discussed in the LAR will be covered under part of the radiation protection program or if this is part of a separate program. Please specify what program will include these procedures and update the UFSAR as appropriate.

e. In addition to the above, the staff requests to review the licensee's completed calculations, when the above issues have been addressed.

f. As an alternative to items a through e above, the licensee may add ventilation lines to each of the bunkers and provide information on the ventilation capabilities and requirements for each of the bunkers, demonstrating that the ventilation is adequate to prevent the buildup of flammable/explosive conditions from the waste being stored in the bunkers.

2. SRP 11.4A specifies that "Facility design and operation should assure that radiological consequences of design basis events (e.g., fire, tornado, seismic occurrence, and flood) do not exceed a small fraction (10 percent) of 10 CFR Part 100 dose limits (i.e., no more than a few sieverts whole body dose)." In previous versions of LAR 13-09, the licensee indicated that the total source term within the Radwaste Building was not increasing due to the LAR and therefore, there was no need to evaluate against this criteria. The licensee removed this information from the current revision of the LAR. In addition, the current version of the LAR indicates the possibility for higher dose rates than were specified in previous versions. For example, the licensee now indicates that 4.5 inches of steel shielding, plus credit for the roof thicknesses and distance between the waste storage location and the roof elevation is need to maintain the dose rate at Zone III on the roof. The waste accumulation room was Zone IV prior to the LAR. This amount of shielding would not be necessary to shield a Zone IV radiation area to a Zone III area. In addition, the licensee also indicates that, in reality, the steel shield bunker roof plate is 6 inches and that two 6 inch plates may be used, if necessary. Therefore, it strongly appears, based on the most recent version of LAR 13-09, that the source term in the Radwaste Building is larger than the source term that was initially approved in the UFSAR. As a result, the licensee is requested to demonstrate how the design and operation will assure that the radiological consequences of design basis events (e.g., fire, tornado, seismic occurrence, and flood) do not exceed a small fraction (10 percent) of the 10 CFR Part 100 dose limits.