

From: Edward Helvenston
Sent: Monday, December 11, 2023 1:54 PM
To: Rusty Towell; Lester Towell; Benjamin Beasley; Tim Head; Jordan Robison; Alexander Adams; Brazos Fitch
Cc: Richard Rivera; Mohsin Ghazali; Michael Wentzel; Andrew Prinaris; Ian Tseng
Subject: ACU MSRR PSAR Chapter 3 Audit Question
Attachments: Question 3.2-2.pdf

Dear Dr. Towell,

Attached is a question the NRC staff has prepared for Abilene Christian University (ACU) related to the ACU Preliminary Safety Analysis Report, primarily Chapter 3, "Design of Structures, Systems, and Components." The NRC staff would like to discuss this question within the scope of the ACU construction permit (CP) application review Audit Plan for Chapters 2 and 3 (see audit plan dated 3/2/2023, ML23065A048), and I am providing in advance to facilitate discussion during an audit meeting. We will add this email, with the question, to public ADAMS. If you have any questions, please let Richard, Mohsin, or I know.

Thank you,

Ed Helvenston, U.S. NRC

Non-Power Production and Utilization Facility Licensing Branch (UNPL)
Division of Advanced Reactors and Non-Power Production and Utilization Facilities (DANU)
Office of Nuclear Reactor Regulation (NRR)
O-6B22
(301) 415-4067

Hearing Identifier: NRR_DRMA
Email Number: 2334

Mail Envelope Properties (BY5PR09MB5956C4F464C020A1C9A501CEE08FA)

Subject: ACU MSRR PSAR Chapter 3 Audit Question
Sent Date: 12/11/2023 1:54:15 PM
Received Date: 12/11/2023 1:54:00 PM
From: Edward Helvenston

Created By: Edward.Helvenston@nrc.gov

Recipients:

"Richard Rivera" <richard.rivera@nrc.gov>
Tracking Status: None
"Mohsin Ghazali" <Mohsin.Ghazali@nrc.gov>
Tracking Status: None
"Michael Wentzel" <Michael.Wentzel@nrc.gov>
Tracking Status: None
"Andrew Prinaris" <Andrew.Prinaris@nrc.gov>
Tracking Status: None
"Ian Tseng" <Ian.Tseng@nrc.gov>
Tracking Status: None
"Rusty Towell" <rxt01a@acu.edu>
Tracking Status: None
"Lester Towell" <ldt20a@acu.edu>
Tracking Status: None
"Benjamin Beasley" <bgb23b@acu.edu>
Tracking Status: None
"Tim Head" <tlh07b@acu.edu>
Tracking Status: None
"Jordan Robison" <jcr20b@acu.edu>
Tracking Status: None
"Alexander Adams" <axa20j@acu.edu>
Tracking Status: None
"Brazos Fitch" <bjf15a@acu.edu>
Tracking Status: None

Post Office: BY5PR09MB5956.namprd09.prod.outlook.com

Files	Size	Date & Time
MESSAGE	921	12/11/2023 1:54:00 PM
Question 3.2-2.pdf	90560	

Options

Priority: Normal
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:

ACU Chapter 3, Structural Engineering Question

Question 3.2-2

The regulation 10 CFR 50.34(a)(1)(i) requires, in part, that the PSAR include “[a] description and safety assessment of the site on which the facility is to be located, with appropriate attention to features affecting facility design.”

The regulation 10 CFR 50.34(a)(3)(iii) requires that the PSAR include “[i]nformation relative to materials of construction, general arrangement, and approximate dimensions, sufficient to provide reasonable assurance that the final design will conform to the design bases with adequate margin for safety.”

The regulation 10 CFR 50.34(a)(4) requires, in part, that the PSAR include “[a] preliminary analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.”

ACU MSRR PSAR, Revision 1 (ML23319A094), Section 3.1.2, PDC 2, “Design bases for protection against natural phenomena,” states:

The safety related SSCs shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, and floods without loss of capability to perform their safety functions. The design bases for these SSCs shall reflect: (1) appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated, (2) appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena, and (3) the importance of the safety functions to be performed.

ACU MSRR PSAR, Revision 1, Section 3.1.2, PDC 4, “Environmental and dynamic effects design bases,” states, in part:

The safety related SSCs ... shall be appropriately protected against dynamic effects of events and conditions outside the MSRR facility.

The PSAR, Revision 1, Section 3.2.1.1, states that the “MSRR facility is designed to withstand the basic wind velocity of 120 mph for Risk Category IV structures.” The PSAR, Revision 1, Section 3.2.2.2, confirms that the 120 mph wind load is applicable to “[t]he above-grade structure of the research bay.” PSAR Revision 1, Section 3.2.2.1, also defines the design basis tornado for the safety-related portions of the MSRR facility to have a maximum wind speed of 230 mph and an 83 millibar pressure drop in accordance with guidance in NRC Regulatory Guide (RG) 1.76, “Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants,” Revision 1 (ML070360253).

However, it is not clear how PDCs 2 or 4 are met for the safety-related portions of the SERC, including consideration of lateral and dynamic loads due to the fact that non-safety portions of the SERC are designed for a lower (non-tornadic) wind load and failure of the non-safety portions of the SERC could have impacts on the safety-related portions, and including consideration of design basis tornado generated lateral and dynamic loads (which are separate from those of wind).

- A. How do safety-related portions of the as-built MSRR facility, including safety-related portions of the SERC research bay, the MSRR systems pit, and its foundation slab structure including the drilled piers comply with PDCs 2 and 4 with regard to the design basis tornado? Specifically, how are the safety-related structural portions of the facility designed to resist the effects of lateral and dynamic loads resulting from the design basis tornado? Summarize analyses performed and discuss results demonstrating adequacy of the design and resulting safety margins.
- B. Provide information such as a figure comparable to As-Built Drawing S-001 provided for audit on May 5, 2023, which includes design information (e.g., materials of construction) relevant to the constructed safety-related portions of the SERC research bay, MSRR pit and foundation slab structure including the drilled piers needed to demonstrate compliance with 10 CFR 50.34(a)(1)(i), 10 CFR 50.34(a)(3)(iii), 10 CFR 50.34(a)(4), and PDCs 2 and 4; and which clarifies what is meant by “other ACI applicable standards” used in the design and construction of MSRR safety-related facility SSCs as referred to in As-Built Drawing S-001.