ABILENE CHRISTIAN UNIVERSITY
Educating Students for Christian Service and Leadership Throughout the World

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U.S. Nuclear Regulatory Commission
Washington, DC 20555

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The purpose of this letter is to provide follow-up to the November 10, 2020 public meeting between ACU NEXT Lab and the Nuclear Regulatory Commission (NRC) staff. This letter is to request regulatory interpretations regarding the regulatory process and applicability of 10 CFR 50.10(a)(2)(x) to the erection of the Science and Engineering Research Center with space for a potential Molten Salt Research Reactor. ACU NEXT Lab requests the staff provides responses for the requests as they are determined by NRC rather than waiting for all questions to be answered before replying.

Sincerely,

Rusty Towell

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NRR

Regulatory Interpretation Requests

Applicability of 10 CFR 50.10(a)(2)(x) to the Erection of the Science and Engineering Research Center with Space for a Potential Molten Salt Research Reactor.

The Abilene Christian University (ACU) staff has researched the background of 10 CFR 50.10(a)(2)(x), which is part of 10 CFR 50.10 titled "license required; limited work authorization." The regulations in 10 CFR 50.10(a)(2) lists activities that are not construction under 10 CFR 50.10 and thus, may be performed without the issuance of a 10 CFR Part 50 Construction Permit (CP). The regulations in 10 CFR 50.10(a)(2)(x) states that construction does not include:

> (x) With respect to production or utilization facilities, other than testing facilities and nuclear power plants, required to be licensed under Section 104.a or Section 104.c of the Act, the erection of buildings which will be used for activities other than operation of a facility and which may also be used to house a facility (*e.g.*, the construction of a college laboratory building with space for installation of a training reactor).

This concept that the erection of a multipurpose building which may have space for a future research reactor is not considered construction requiring an NRC-issued CP is long standing in the regulations. The *Federal Register* published on September 9, 1960 (25 FR 8712), contained a final rule whose purpose was clarification of work permitted or prohibited with respect to any production or utilization facility prior to the issuance of a CP. A description of activities considered construction and activities that are not included in construction were added to 10 CFR 50.10. A new section (b) was added to 10 CFR 50.10 which reads:

> (b) No person shall begin the construction of a production or utilization facility on a site on which the facility is to be operated until a construction permit has been issued. As used in this paragraph, the term 'construction' shall be deemed to include pouring the foundation for, or the installation of, any portion of the permanent facility on the site; but does not include: (1) Site exploration, site excavation, preparation of the site for construction of the facility and construction of roadways, railroad spurs and transmission lines ; (2) Procurement or manufacture of components of the facility; (3) Construction of non-nuclear facilities (such as turbo-generators and turbine buildings) and temporary buildings (such as construction equipment storage sheds) for use in connection with the construction of the facility; and (4) With respect to production or utilization facilities, other than testing facilities, required to be licensed pursuant to section 104 a. or section 104 c. of the Act, the construction of buildings which will be used for activities other than operation of a facility and which may also be used to house a facility. (For example, the construction of a college laboratory building with space for installation of a training reactor is not affected by this paragraph.)

Item (4) on the list of activities not included in the definition of construction became the current 10 CFR 50.10(a)(2)(x). The proposed rule which appeared in the *Federal Register* on February 11, 1960 (25 FR 1224), did not contain this exclusion to the definition of construction. Item (4) appears to have been added to the final rule as the result of the Atomic Energy Commission staff accepting a comment from the public.

Two changes to the wording of 10 CFR 50.10(a)(2)(x) have occurred since 1960. The first is adding nuclear power plants as facilities not considered under 10 CFR 50.10(a)(2)(x). The second changed the activity from "construction" to "erection" of buildings which will be used for activities other than operation of a facility and which may also be used to house a facility. These changes appear to have been made in the final rule that appeared in the *Federal Register* on October 9, 2007 (72 FR 57441), related to limited work authorizations for nuclear power plants.

One possible interpretation is that based on this research, there appears to be no explanation of the regulation other than the wording of the regulation itself. ACU NEXT Lab believes the language does not prohibit erection of buildings which will be used for activities other than operation of a facility and which may also be used to house a facility.

ACU plans to request a CP for a Molten Salt Research Reactor (MSRR). ACU is also planning to erect a Science and Engineering Research Center (SERC), a new building which will have a research bay room with a floor pit and overhead crane. This research bay room could be used to house the MSRR. ACU is in the process of site selection for the MSRR. Several sites in addition to the SERC site are under consideration.

The planned MSRR:

1. Will meet the first definition of utilization facility in 10 CFR 50.2, any nuclear reactor other than one designed or used primarily for the formation of plutonium or U–233.
2. Will have a liquid core loading with a licensed thermal power level of 1 megawatt or less. Therefore, the MSRR will not be a testing facility.
3. Will not be a nuclear power plant.
4. Will not be licensed under section 103 or 104b of the Atomic Energy Act as a commercial or industrial facility.
5. Will be a facility which is useful in the conduct of research and development activities of the types specified in section 31 of the Atomic Energy Act, and as such, will be licensed under section 104c of the Atomic Energy Act.
6. Will meet the cost recovery limitations made to Section 104c of the AEA by the Nuclear Energy Innovation and Modernization Act (NEIMA).

Because of these attributes of the MSRR, ACU believes that the MSRR will be the type of facility described in 10 CFR 50.10(a)(2)(x), a utilization facility other than a testing facility or nuclear power reactor required to be licensed under section 104c of the Atomic Energy Act.

NRC question 1. Does NRC agree with ACU's interpretation that the proposed MSRR is the type of facility referred to in 10 CFR 50.10(a)(2)(x)? If not, why?

The SERC is planned as a multipurpose building, which in addition to the research bay, will contain laboratories for research into molten salt reactor technology, laboratories to support science and engineering education of students including molten salt reactor technology, offices for ACU faculty and staff and space that can be used for teaching classes. The erection of the SERC is not dependent on the placement of the MSRR in the SERC research bay. The research bay can support installation of an accelerator or other research apparatus.

Figure 1 shows an artist's view of the SERC with Figure 2 showing the proposed building layout. Figure 3 shows the SERC research bay where the MSRR could be placed. The design of the SERC is currently being finalized and may differ from that shown in the figures. If the MSRR were to be placed in the SERC, the potential reactor licensed area is highlighted in green in Figure 2. It consists of the research bay which would serve as the confinement for the reactor facility and contain space for the reactor, fuel storage and support equipment such as fission gas control, ventilation, and reactor heat transfer. The control room for the reactor, space for reactor support equipment outside the research bay, and a counting room to support research with reactor-licensed material would also be under the reactor license.

ACU believes that the SERC is the type of building referred to in 10 CFR 50.10(a)(2)(x). The SERC is a building which will be used for activities other than operation of a facility and which may also be used to house a facility.

NRC question 2. Does NRC agree with ACU's interpretation that the proposed SERC is the type of building referred to in 10 CFR 50.10(a)(2)(x)? If not, why?

Based on the discussion above, ACU believes that the erection of the SERC with potential space for a future MSRR meets 10 CFR 50.10(a)(2)(x) and is not considered construction that requires the issuance of an NRC CP.

NRC question 3. Does NRC agree with ACU's interpretation that erection of the SERC with potential space for a future MSRR meets 10 CFR 50.10(a)(2)(x) and is not considered construction that requires the issuance of an NRC CP. If not, why?

The Science and Engineering Research Center Erection and Potential Safety-Related Structures, Systems, or Components

The design of the SERC is in progress with a goal of finalizing the design in January 2021. Construction is planned to start in the February/March 2021 timeframe. The conceptual design of the MSRR is in progress with a CP application submission to NRC anticipated in late 2021. SERC construction would be at an advanced stage or complete when a MSRR CP application is submitted to the NRC.

At this time, all potential safety-related structures, systems, or components (SSCs) of the MSRR design have not been identified. Some SSCs could be dependent on the design of the building the MSRR is placed in. The design goal for the SERC is to have the research bay suitable for the installation of a future MSRR. This will involve the erection of SERC research bay features that could not easily be backfitted into the building later. Some examples are the building structure (walls, roof, floor, and floor pit), and support systems such as electrical, water, ventilation, and security systems. These features and systems will be designed with consideration given to the installation of a possible MSRR with margins to accommodate the uncertainties currently in the MSRR design. For example, the floor pit dimensions would allow placement of the MSRR into the pit and the research bay would be designed with floor and building structure suitable for the MSRR. There may be aspects of the SERC research bay that

would become MSRR SSCs that would be erected under 10 CFR 50.10(a)(2)(x) as construction not requiring an NRC-issued CP.

There appears to be no discussion in the statements of consideration for 10 CFR 50.10 over the years that describe the relationship between the erection of buildings not considered NRC CP-required construction and potential SSCs that may be part of that erection. As more detail was added over the years to the definition in 10 CFR 50.10 as to what is and is not CP-required construction, the wording of 10 CFR 50.10(a)(2)(x) has had only minor revision which did not change its basic meaning. It is reasonable to assume that the erection of the part of a building that would house a future research reactor would require the construction of some features that would be reactor SSCs or part of SSCs. This would be true even if the construction of that part of the building was the minimum needed to have a functioning building. There is no indication in the statements of consideration that an acceptable SSC (or part of an SSC) built under 10 CFR 50.10(a)(2)(x) would require rework or replacement after a CP was issued because it was not built under an NRC-issued CP.

Absent an explanation, ACU proposes the following. Any parts of the SERC that would become SSCs when the MSRR design is finalized would be reviewed as part of the ACU CP application. The CP application for the MSRR would identify and justify the preliminary design of SSCs specific to the proposed structure it would be located in. If the decision is made to place the MSRR in the SERC research bay, parts of the research bay that were determined to be MSRR SSCs in whole or part would be identified in the application. It would also be explained if additional construction would be needed to complete an SSC. SERC construction records, to the extent available, would support the evaluation that those aspects of the SERC related to whole or partial SSCs meet the design requirements presented in the ACU CP safety analysis report.

The NRC would determine that either the SSCs are acceptable as constructed or would require additional construction under the issued CP.

NRC question 4: Will parts of the SERC research bay erected under 10 CFR 50.10(a)(2)(x) that are subsequently determined in whole or part to be MSRR SSCs be approved by the CP? If the CP application contains an evaluation that concludes these SSCs are acceptable or need addition construction, and NRC reviews and agrees, can they remain in place as erected upon granting the CP? Or will they be required to be removed and reinstalled after a CP is issued?

Figure 1: ACU Science and Engineering Research Center

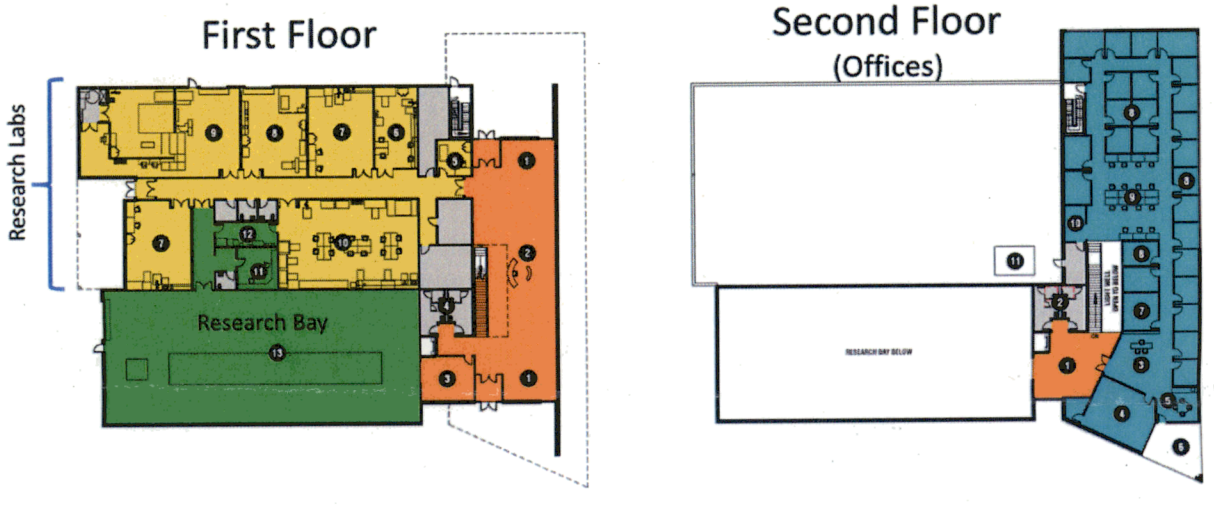

Figure 2: SERC floor plan. Green areas are the research bay and control room that could house the MSRR. Yellow areas are labs. Orange areas are public spaces and offices are on the second floor.

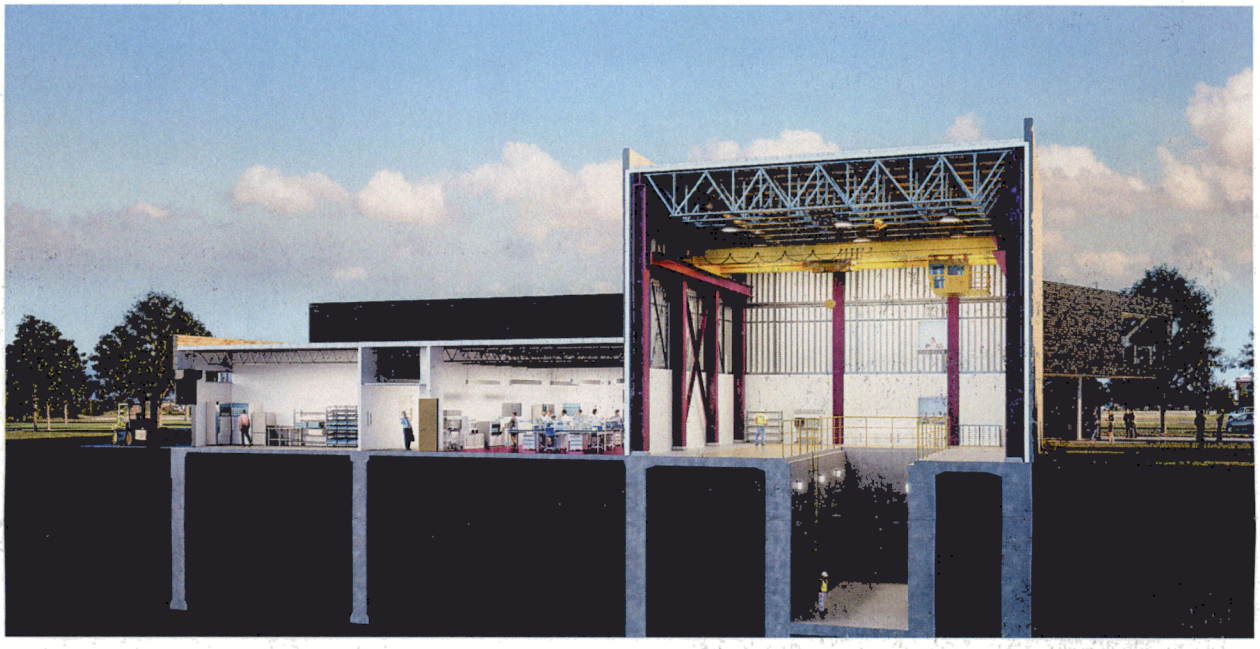

Figure 3: Cross section of SERC showing research bay with pit.