From: Mazza, Jan
Sent: Wednesday, September 23, 2020 4:11 PM
To: C Cochran
Cc: Alex Renner; Lupold, Timothy; Hayes, Michelle; Beasley, Benjamin; Drzewiecki, Timothy
Subject: OKLO POWER LLC. - REQUEST FOR ADDITIONAL INFORMATION REGARDING THE OKLO STEP 1 - REVIEW SAFETY CLASSIFICATION OF SSCs
Attachments: Oklo_Final_RAI_9775_SSC_9-23-2020.docx

Dear Ms. Cochran:
By letter dated March 11, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20075A000), Oklo Power LLC (Oklo), submitted a combined license (COL) application for one micro-reactor to be located at the Idaho National Laboratory. This proposed plant is to be designated as the Aurora. By letter dated June 5, 2020 (ADAMS Accession No. ML20149K616), the U.S. Nuclear Regulatory Commission (NRC) informed Oklo of its decision to accept the application for docketing and that a two-step approach will be used in order to gain a fulsome understanding of four key safety and design aspects of the licensing basis prior to establishing a schedule for the licensing review. One of those key safety and design aspects is an understanding of the safety classification of structures, systems, and components (SSCs). As part of the Step-1 Review, the NRC staff has identified additional information needed to support its review of the safety classification of SSCs.

A draft of this request for additional information (RAI) was transmitted to Oklo on September 15, 2020 and was discussed with Oklo on a conference call held September 23, 2020. The NRC staff is issuing this RAI as final and requests that Oklo provide a response to the RAI or a written request for additional time to respond, including the proposed response date and a brief explanation of the reason, by October 23, 2020.

The response to the RAI must be submitted in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.4, "Written communications," and be executed in a signed original document under oath or affirmation per 10 CFR 50.30(b), "Oath or affirmation,". Information included in the response that you consider sensitive or proprietary, and seek to have withheld from public disclosure, must be marked in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Any information related to safeguards should be submitted in accordance with 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

In the case that the NRC staff requires additional information beyond that provided in the response to this RAI, the NRC staff will request that information by separate correspondence. If you have any questions regarding the NRC staff's review or if you intend to request additional time to respond, please contact Jan Mazza at 301-415-0498 or by electronic mail at Jan.Mazza@nrc.gov.

Regards – Jan

Jan Mazza
Project Manager, Advanced Reactor Licensing Branch
Division of Advanced Reactors and
Non-Power Production and Utilization Facilities
NRC Office of Nuclear Reactor Regulation

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Request for Additional Information

Issue Date: 09/23/2020
Application Title: Oklo Aurora COL - Docket 52-049
Operating Company: Oklo Power LLC
Docket No. 52-049
Review Section: Aurora Step 1 – SSC
Application Section: Oklo COL Application Part II.02 Description of SSCs and Part II.04 Principal Design Criteria

Aurora Step 1 – SSC- 1

Regulatory Basis

10 CFR 50.2 defines safety-related structures, systems, and components (SSCs) as "those structures, systems and components that are relied upon to remain functional during and following design basis events to assure," in part:

"[t]he capability to shut down the reactor and maintain it in a safe shutdown condition; or

[t]he capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in § 50.34(a)(1) or § 100.11 of this chapter, as applicable."

The term "safety-related" is used in various locations throughout 10 CFR to scope in and classify SSCs and identify requirements related to qualification, procurement, fabrication, and function of these SSCs. Classification of a component as "safety related" or other recognized category aids the NRC staff's ability to make a finding regarding the ability of any given SSC to perform its stated function. Specifically, the application of the requirements in 10 CFR Part 50 Appendix B provide a pedigree for SSCs that the staff can rely on in making it's finding on SSCs without directly evaluating some features that contribute to their ability to perform satisfactorily in service. If the requirements and framework of 10 CFR Part 50 Appendix B are not applied, an appropriate pedigree and qualifications for affected SSCs need to be defined.

Appendix B to 10 CFR Part 50 requires that "Every applicant for a combined license under part 52 of this chapter is required by the provisions of § 52.79 of this chapter to include in its final safety analysis report a description of the quality assurance applied to the design, and to be applied to the fabrication, construction, and testing of the structures, systems, and components. As used in this appendix, 'quality assurance' comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service." The pertinent requirements of Appendix B, including each of the eighteen criteria, "apply to all activities affecting the safety-related functions of those structures, systems, and components; these activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying."

10 CFR 52.79(a)(2) requires, in part, a description and analysis of the SSCs of the facility with emphasis upon performance requirements and the bases, with technical justification therefor, upon which these requirements have been established. Additionally, 10 CFR 52.79(a)(2)(ii)

clarifies that the Commission will take into consideration the extent to which generally accepted engineering standards are applied to the design of the reactor.

Issue

FSAR Section 4.2, "Principal design criteria," identifies four principal design criteria (PDCs) for the Aurora and lists the supporting design bases, design commitments, and programmatic controls for the SSCs that are credited to meet the PDCs. FSAR Section 4.2 also clarifies that the PDCs for the Aurora closely parallel fundamental safety functions. Several of the SSCs that are identified in FSAR Section 4.2 as supporting PDCs appear to meet the Commissions' definition of *Safety-related SSCs* in 10 CFR 50.2, because (1) they are relied upon to shut down the reactor, and (2) they are relied upon to prevent or mitigate the consequences of accidents. For example, FSAR Section 5.6, "Safety analysis," credits the reactor trip system (RTS) to actuate the shutdown rod system (SRS) to shutdown the reactor and mitigate the consequences of the maximum credible accident (MCA) sequences of transient overpower and loss of heat sink. Accordingly, requirements associated with SSCs that meet the Commission's definition of *Safety-related SSCs* may apply to several SSCs in the Aurora design (e.g., 10 CFR 21, 10 CFR 50.49, Appendix B to 10 CFR 50).

Furthermore, the design bases and design commitments provided in the Aurora FSAR do not describe the standards used to design, fabricate, erect, and test SSCs commensurate with their importance to safety. NRC staff relies on this information to find reasonable assurance that SSCs will perform their safety functions as described in the FSAR. In evaluating this information, NRC staff considers the extent to which generally accepted engineering standards are applied to the design of the reactor.

NRC staff are seeking information on (1) how requirements associated with SSCs that satisfy the Commission's definition of *Safety-related SSC* are treated in the Aurora design, and (2) what standards Oklo used to design, fabricate, erect, and test SSCs commensurate with their importance to safety including the extent to which generally accepted consensus standards are applied to the design of the Aurora.

Request

Please describe how quality assurance is addressed for SSCs that are relied on to (1) shutdown the reactor, or (2) prevent or mitigate the consequences of accidents. In support of this description, please update the FSAR to describe and justify the methods used to design, fabricate, erect, and test SSCs commensurate with their importance to safety (i.e., SSCs that perform fundamental safety-functions) including the extent to which generally accepted consensus standards are applied. This update should consider additions to design bases, design commitments, and programmatic controls as necessary.

Aurora Step 1 – SSC- 2

Regulatory Basis

10 CFR 52.79(a)(2) requires a description and analysis of the SSCs of the facility with emphasis on performance requirements and the bases, with technical justification therefor, upon which these requirements have been established. Additionally, 10 CFR 52.79(a)(2)(ii) and 10 CFR

52.79(a)(2)(iv) clarify that the Commission will take into consideration the extent to which generally accepted engineering standards are applied to the design of the reactor, and the safety features that are to be engineered into the facility and those barriers that must be breached as a result of an accident before a release of radioactive material to the environment can occur.

Issue

The Aurora contains several SSCs that are available for defense-in-depth or otherwise contribute to reducing the risk of releasing radioactive materials. For example, FSAR Section 4.2.1, "PDC 1: Confinement," credits the fuel matrix as the primary confinement feature in the Aurora, but additional passive barriers to fission product release are discussed in FSAR Section 2.2.2.3, "Description of the reactor core system," FSAR Section 2.5.2.2, "Performance bases of the reactor enclosure system," and FSAR Section 2.10.2.2.2, "Performance bases of the building system." Additionally, FSAR Section 5.2.2, "Defense-in-depth principles," identifies several defense-in-depth considerations, including the fission product barriers. The Aurora approach to developing the PDCs, design bases, design commitments, and programmatic controls (described in FSAR Section 4.1.2, "Aurora approach") results in no design bases, design commitments, or programmatic controls specified to address the confinement function of the reactor cell can, capsule, or module shell. Accordingly, the FSAR does not provide a description of the standards used to design, fabricate, erect, and test these or other SSCs not credited in the proposed maximum credible accident, but that support the Aurora safety case through defense-in-depth or other risk-reducing functions. NRC staff relies on this information to find reasonable assurance that SSCs will perform their risk-reduction functions as described in the FSAR (e.g., defense-in-depth). In evaluating this information, NRC staff considers additional factors including (1) the extent to which generally accepted consensus standards are applied to the design of the SSCs, and (2) the possible use of performance bases for selected SSCs with licensee-controlled performance commitments and programmatic controls (e.g., expected surveillances to verify leakages into or from the capsule).

NRC staff are seeking information regarding the standards used to design, fabricate, erect, and test SSCs that are not identified as performing fundamental safety functions, but that support the Aurora safety case through defense-in-depth or other risk-reducing functions.

Request

Please update the FSAR to describe and justify the methods used to design, fabricate, erect, and test SSCs that are not identified as performing fundamental safety functions, but that support the Aurora safety case through defense-in-depth or other risk-reducing functions. This description should include factors considered such as the extent to which generally accepted consensus standards are applied to the design of the SSCs, and the use of controls such as defining performance bases with licensee-controlled performance commitments and programmatic controls.