



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 17, 2020

Ms. Caroline Cochran
Co-Founder,
Chief Executive Officer
Oklo, Inc.
230 East Caribbean Drive
Sunnyvale, CA 94089

SUBJECT: OKLO STEP 1 TECHNICAL REVIEW OF KEY SAFETY AND DESIGN ASPECT
ACTIVITIES RELATED TO THE APPLICABILITY OF REGULATIONS

Dear Ms. Cochran:

By letter dated June 5, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20149K616), the U.S. Nuclear Regulatory Commission (NRC) accepted the Oklo Aurora combined license (COL) application for docketing. The application is for a single micro-reactor to be located at the Idaho National Laboratory and was prepared pursuant to the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Sections 52.79 and 52.80. In the June 5, 2020, letter, the NRC staff described its plans to complete the review of the Oklo Aurora COL application in a two-step process. During Step 1, the staff is engaging Oklo in public meetings, conducting regulatory audits, and issuing requests for additional information on four key safety and design aspects of the licensing basis identified in the letter. The purpose of this letter is to document the completion of Step 1 activities for one of those key focus areas: the applicability of regulations to the Aurora. The status of the other three Step 1 focus areas will be communicated in a separate letter.

The Staff's Step 1 review was focused on regulations Oklo identified as not applicable to its Aurora design. The staff did not evaluate the acceptability of requested exemptions included in Part V of the Aurora COL application during Step 1. This evaluation will take place during Step 2 of the staff's review. Tables 2-1 through 2-6 in Part V of the Aurora COL application contain regulations Oklo identified as not applicable to the Aurora. The NRC staff reviewed the information provided by Oklo, conducted a regulatory audit, and determined that certain regulations identified as not applicable by Oklo are applicable to the Aurora and require either a demonstration of compliance or requests for exemptions. As described in the Aurora COL application and Oklo's public presentation on August 31, 2020 (ADAMS Accession No. ML20240A008), Oklo considers the applicability of a regulation to be "nested" in what Oklo asserts are the assumptions underpinning each regulation. In contrast, the NRC determined the applicability of the regulations listed in Tables 2-1 through 2-6 of Part V of the Aurora COL application based on the plain language of those regulations. Unless the plain language of the regulation limits its applicability to a particular reactor type or the regulation contains a specific entry condition that the Aurora design does not meet, the NRC considers the regulation applicable to the Oklo application.

Enclosure 1 to this letter documents the list of regulations the NRC has reviewed and dispositioned, divided into four groups as follows:

- Group 1 – 10 CFR 52.79, Contents of application, regulations that are not applicable to non-light water reactors (non-LWRs)
- Group 2 – 10 CFR 50.33, 52.79, and 52.80, Contents of application, regulations that are applicable to non-LWRs but are specifically inapplicable to the Aurora because the application content indicates the design does not meet the entry conditions prescribed by these regulations
- Group 3 – 10 CFR 50.33, 52.79, and 52.80, Contents of application, regulations that are applicable to non-LWRs, including the Aurora, and require Oklo to either comply with the regulation or request an exemption
- Group 4 – 10 CFR 52.79, Contents of application, regulations that are applicable to non-LWRs, but that refer to Part 50 regulations that are not applicable for non-LWRs

The staff has determined that regulations in Group 1 are inapplicable to all non-LWRs. The staff has also determined that while regulations in Group 2 are applicable to non-LWRs in general, they are specifically inapplicable to the Aurora because the COL application content indicates the design does not meet the entry conditions for these regulations. The staff agrees that regulations in Groups 1 and 2 are appropriately characterized in Tables 2-1 through 2-6 of Part V of the Aurora COL application.

The staff has determined that regulations in Group 3 apply to the Aurora and will either require demonstration of compliance or the submission of exemption requests in accordance with the requirements of 10 CFR 52.7 and 50.12. These regulations should be removed from Part V Tables 2-1 through 2-6 of the Aurora COL application. In some cases, it may be appropriate for Oklo to use the information originally contained in these tables to demonstrate that the regulation is met or as part of the justification to support a request for an exemption. The staff will evaluate the adequacy of this information in Step 2 of its review.

The Part 52 regulations identified in Group 4 are applicable to non-LWRs. However, they reference Part 50 regulations that are not applicable to non-LWRs. For this reason, the staff will assess and as appropriate develop and document exemptions for Group 4 regulations in accordance with the requirements of 10 CFR 50.12 or 52.7 in Step 2 of its review. The Group 4 regulations should be removed from Tables 2-1 through 2-6 of Part V of the Oklo application.

Under 10 CFR 52.79(a)(17), applicants for a COL must address the technically relevant portions of 10 CFR 50.34(f), except 10 CFR 50.34(f)(1)(xii), 10 CFR 50.34(f)(2)(ix), 10 CFR 50.34(f)(2)(xxv) and 10 CFR 50.34(f)(3)(v). Enclosure 2 to this letter includes a list of the regulations in 10 CFR 50.34(f) that the staff has determined are technically relevant to the Aurora design. Oklo must either demonstrate compliance with these technically relevant regulations in its final safety analysis report or request exemptions.

If you have any questions, I can be reached by phone at (301) 415-0498 or by email at Jan.Mazza@nrc.gov.

Sincerely,

/RA/

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

Docket No. 52-049

Enclosures:
As stated

cc w/enclosure: Distribution via List serv

SUBJECT: OKLO STEP 1 TECHNICAL REVIEW KEY SAFETY AND DESIGN ASPECT
ACTIVITIES RELATED TO THE APPLICABILITY OF REGULATIONS DATED
NOVEMBER 17, 2020

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ADAMS Accession No.: ML20300A593***via e-mail**

OFFICE	NRR/DANU/UARL/PM*	NRR/DANU/UARL/LA*	NRR/DANU/UART/TR*	NRR/DANU/UART/BC*
NAME	JMazza	SLent	TLupold	MHayes
DATE	11/2/2020	10/27/2020	11/9/2020	11/10/2020
OFFICE	OGC/NLO*	NRR/DANU/D*	NRR/DANU/UART/BC*	
NAME	JEzell	MShams	JMazza	
DATE	11/5/2020	11/17/2020	11/17/2020	

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Group 1: Title 10 of the *Code of Federal Regulations* (10 CFR) Section 52.79, Contents of applications, regulations that are not applicable to non-light water reactors:

- 52.79(a)(23) [Reserved]
- 52.79(a)(38), Prevention and mitigation of severe accidents for light-water reactors
- 52.79(a)(41), Evaluation against the Standard Review Plan for light-water reactors

Group 2: 10 CFR 50.33, 52.79, and 52.80, Contents of application, regulations that are applicable to non-light water reactors but are specifically inapplicable to the Aurora because the application content indicates the design does not meet the entry conditions prescribed by these regulations:

- 50.33(h), Earliest and latest dates for completion of the construction or alteration
- 50.33(j), Restricted data
- 52.79(a)(18), Risk-informed treatment of structures, systems, and components
- 52.79(a)(31), Multi-unit sites
- 52.80(c), Limited work authorization to be issued before COL

Group 3: 10 CFR 50.33, 52.79, and 52.80, Contents of applications, regulations that are applicable to non-light water reactors and require Oklo to either comply with the regulation or request an exemption:

- 50.33(i), Requirements related to generation and distribution of electric energy under a class 103 license
- 52.79(a)(4),¹ Principal design criteria (PDC)
- 52.79(a)(5),² Analysis and evaluation of structures, systems, and components
- 52.79(a)(6),³ Fire protection design features
- 52.79(a)(8), Combustible gas control
- 52.79(a)(10), Environmental qualification of electric equipment important to safety
- 52.79(a)(11), Codes and standards
- 52.79(a)(15), Monitoring the effectiveness of maintenance
- 52.79(a)(17), Three Mile Island requirements in 10 CFR 50.34(f) (see Enclosure 2)
- 52.79(a)(21), Emergency plans
- 52.79(a)(35), Physical security plan
- 52.79(a)(36), Safeguards contingency plan
- 52.79(a)(47), Aircraft impact assessment
- 52.80(d), Mitigation of beyond-design-basis events

¹ 10 CFR 52.79(a)(4) - 10 CFR Part 50, Appendix A is not required for non-LWRs, but it provides guidance for PDC development.

² 10 CFR 52.79(a)(5) – An analysis and evaluation of structures, systems, and components is required for all reactors. 10 CFR 52.79(a)(5) also references 10 CFR 50.46 which is not applicable to non-LWRs. It also references 10 CFR 50.46a regarding high point vents. This portion of the regulation has an entry condition that is not applicable to the Aurora design.

³ 10 CFR 52.79(a)(6) - A description and analysis of the fire protection design features is required for all reactors. 10 CFR 52.79(a)(6) also references 10 CFR Part 50, Appendix A, GDC 3. Non-LWRs are not required to demonstrate compliance with Appendix A; however, development of a PDC for fire protection is appropriate.

Group 4: 10 CFR 52.79, Contents of applications, regulations that are applicable to non-light water reactors, but that refer to regulations in Part 50 that are not applicable for non-light water reactors:

- 52.79(a)(7), Pressurized thermal shock (Ref. 10 CFR 50.60, Acceptance criteria for fracture prevention measures for light-water nuclear power reactors for normal operation, and 10 CFR 50.61, Fracture toughness requirements for protection against pressurized thermal shock events)
- 52.79(a)(9), Station blackout (Ref. 10 CFR 50.63, Loss of all alternating current power)
- 52.79(a)(12), Primary containment leakage rate testing program (Ref. 10 CFR Part 50 Appendix J, Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors)
- 52.79(a)(13), Reactor vessel material surveillance program (Ref. 10 CFR Part 50 Appendix H, Reactor Vessel Material Surveillance Program Requirements)
- 52.79(a)(16)(ii),⁴ Control over radioactive materials in gaseous and liquid effluents produced during normal reactor operations (Ref. 10 CFR Part 50 Appendix I, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents)
- 52.79(a)(42), Anticipated transients without scram (ATWS) (Ref. 10 CFR 50.62, Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light- water-cooled nuclear power plants)

⁴ 10 CFR 52.79(a)(16)(ii) – Part V of the COL application references Appendix I to Part 50 as the regulation that is inapplicable. 10 CFR 52.79(a)(16)(ii) references Appendix I. 10 CFR 59.79(a)(16)(i) remains applicable to the Aurora and requires that Oklo comply or requests an exemption.

The following Three Mile Island Nuclear Station (TMI)-related requirements in 10 CFR 50.34(f) are technically relevant to the Aurora design and will require the applicant to demonstrate compliance with the regulation or request exemptions:

- 10 CFR 50.34(f)(1)(i), Probabilistic Risk Assessment to seek improvements in reliability of heat removal systems
- 10 CFR 50.34(f)(2)(i), Control room simulator
- 10 CFR 50.34(f)(2)(ii), Plant procedure improvement program
- 10 CFR 50.34(f)(2)(iii), Control room human factors
- 10 CFR 50.34(f)(2)(iv), Safety parameter display system
- 10 CFR 50.34(f)(2)(v), Automatic indication of status of safety systems
- 10 CFR 50.34(f)(2)(vii), Radiation shielding design review
- 10 CFR 50.34(f)(2)(viii), Post-accident sampling
- 10 CFR 50.34(f)(2)(xviii), Coolant instrumentation
- 10 CFR 50.34(f)(2)(xix), Post-accident monitoring
- 10 CFR 50.34(f)(2)(xxvi), Leakage detection and control outside containment
- 10 CFR 50.34(f)(2)(xxvii), In-plant radiation monitoring
- 10 CFR 50.34(f)(2)(xxviii), Evaluate and preclude control room habitability issues during accidents
- 10 CFR 50.34(f)(3)(i), Industry experience
- 10 CFR 50.34(f)(3)(ii), Quality assurance (QA) list includes all structures, systems, and components important to safety
- 10 CFR 50.34(f)(3)(iii), QA program
- 10 CFR 50.34(f)(3)(vii), Management plan for design and construction activities