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

September 20, 2021

MEMORANDUM TO: William B. Kennedy, Acting Chief
Advanced Reactor Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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

SUBJECT: SUMMARY OF SEPTEMBER 1, 2021, MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION STAFF AND OKLO POWER, LLC, TO DISCUSS MAXIMUM CREDIBLE ACCIDENT METHODOLOGY AND PERFORMANCE-BASED LICENSING METHODOLOGY TOPICAL REPORTS
(EPID NOS. L-2021-TOP-0016 AND L-2021-TOP-0017)

A virtual observation public meeting was held on September 1, 2021, between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives from Oklo Power, LLC (Oklo) using the Microsoft Teams platform. The meeting notice, Oklo meeting slides, Oklo topical reports (Maximum Credible Accident Methodology and Performance-Based Licensing Methodology), and NRC completeness review results are located in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession Nos. ML21231A248, ML21244A005, ML21184A000, ML21201A010, and ML21201A104, respectively. The meeting attendees are included in the enclosure to this document.

The purpose of the meeting was for NRC staff and Oklo staff to discuss the supplemental information needed for the Maximum Credible Accident Methodology and Performance-Based Licensing Methodology Topical Reports as identified during the NRC completeness reviews.

Prior to the meeting, Oklo provided slides requesting clarification on the supplemental information needed for both of the topical reports in specific areas:

<u>Maximum Credible Accident Methodology Completeness Determination Item IV and Note 1</u>
The focus of Item IV was to communicate that the topical report did not identify the necessary conditions and interfaces essential to the implementation of the methodology (e.g., hazard identification team composition, information needs, documentation requirements).

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Note 1 provided examples of approaches that NRC staff identified through literature review of past NRC hazard identification techniques. Oklo suggested that the conditions and design interfaces are similar to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 Appendix B requirements and proposed to revise the topical report to add an approved NRC quality assurance (QA) program for design as a condition.

The NRC staff responded that 10 CFR Part 50 Appendix B does not provide enough specificity, making it difficult for a user to implement the methodology. The NRC suggested that Oklo look at state-of-the-art hazard identification approaches to answer questions such as: What skills, knowledge, and abilities do you need on the hazard identification team? what information is needed to implement the methodology? how do you document it?

Summary: The topical report needs supplemental information to make the methodology thorough, systematic, and repeatable. If Oklo references existing techniques, there needs to be a clear linkage between other documents and the requested supplemental information.

Performance-Based Licensing Methodology Completeness Determination Item I.C

The focus of Item I.C was to communicate that the topical report does not address the regulatory requirement under 10 CFR 50.34(f)(3)(ii) that an application must provide sufficient information to demonstrate that the QA list as required by 10 CFR Part 50, Appendix B, Criterion II, includes all structures, systems, and components (SSCs) important to safety. Oklo pointed to Sections 4.4 and 4.6 of the topical report and asserted that these sections provide for the systematic approach to classifying functions and features and describes how QA is applied to SSCs. The NRC staff considers Oklo's approach to identify functions and features to be a potentially acceptable process, but another step should be taken to translate the functions and features to SSCs. This would provide clarity on what parts of the QA program description apply. Regulations in 10 CFR 50.34(f)(3)(ii) are applicable to all types of reactors. The statement made in Section 3 of the topical report that states regulations do not require a classification of components to be submitted with license applications seems contradictory to this requirement. The topical report should identify how the list of SSCs that are important to safety, or in other words, safety-related or used for defense-in-depth, should or can be presented in an application.

Summary: Oklo staff stated that they understood what is needed for this item.

Performance-Based Licensing Methodology Completeness Determination Item I.D.1

The focus of Item I.D.1 was to communicate that the topical report does not address the function of shutting down the reactor. Oklo asserted that the topical report comprehensively discusses the 10 CFR 50.2 definition of safety-related SSCs and the technology-specific nature of items (1) and (2) of the definition and asked the NRC to provide the regulatory basis for the requested supplemental information. The NRC stated that it is the staff's position that shutting down the reactor and maintaining it in a safe shutdown condition is a safety-related function, regardless of the type of reactor, particularly if the system is relied upon to mitigate design basis accidents. The NRC also noted that the SHINE Medical Radioisotope Production Facility application provides some precedence in this area. For the SHINE Medical Radioisotope Production Facility, an exemption to the 10 CFR 50.2 definition of safety-related SSCs provided an alternate definition in this area. The Oklo topical report should either adhere to the 10 CFR 50.2 definition of safety-related or provide an alternative definition (that the NRC staff can evaluate), and as necessary, discuss the need for an exemption in this area.

Summary: Oklo stated that it will discuss this internally and communicate next steps later.

Performance-Based Licensing Methodology Completeness Determination Item I.D.2
The focus of Item I.D.2 was to communicate that the topical report does not address providing adequate defense-in-depth measures to protect against beyond-design-basis events. Oklo asked the staff to elaborate on the regulatory basis to support I.D.2. The NRC staff answered that defense-in-depth is part of the NRC safety philosophy. The regulatory basis stems from SECY 98-144, Regulatory Guide (RG) 1.174, and the severe accident policy statement. When developing performance-based methodologies, defense-in-depth is an important consideration. NRC is seeking to understand how the Oklo performance-based licensing methodology considers defense-in-depth. The NRC staff also noted that in a deterministic approach, an applicant is expected to show that the core will not overheat to the extent that off-site dose limits will be exceeded. In addition, the applicant then assumes that a release occurs, and defense-in-depth is considered to be able to limit the off-site exposures. In a probabilistic approach, the robabilistic risk assessment is used to look for vulnerabilities, which includes beyond-design-basis accidents.

Summary: Oklo stated that it will revisit defense-in-depth internally and communicate next steps later.

Performance-Based Licensing Methodology Completeness Determination Item I.D.3
The focus of Item I.D.3 was to communicate that the topical report does not address uncertainty in the process of selecting licensing basis events and design basis accidents. Oklo asked the NRC staff to clarify what is meant by uncertainty in selecting licensing basis events since the methodology does not use licensing basis events or design basis events. The NRC discussed Part 53 as an example to respond to Oklo's question. For Part 53, the NRC is currently taking an approach that identifies safety-related SSCs based on protecting the public from radiation exposure. It could then be acceptable to use SSCs with special treatment to address anticipated operational occurrences (including shutdown) provided:

- The overall risk for the facility is below the Quantitative Health Objectives
- A systematic search for licensing basis events is conducted
- Events with frequencies as low as 5E-7 are considered creditable and included in the analysis
- Adequate defense-in-depth is provided
- Reliability and availability targets for non-safety-related with special treatment SSCs are identified
- And there may be more

The supplemental information requested in I.D.1- I.D.4 was in the context of what is currently being done in the Part 53 development area, and the NRC offered to provide Oklo with references to "tabletop exercises" performed by non-light-water reactor vendors. Oklo stated that they had participated in some of the "table top" exercises and were aware of this information. The NRC staff further explained that the methodology should identify all the sequences that can go wrong and the uncertainties in event selection (e.g., event severity, performance of systems structures and components, initial conditions). Oklo should also ensure that methodology provides the appropriate tools to deal with these uncertainties, with the ultimate goal of ensuring a design has appropriate margin to accommodate the uncertainties. Oklo then pointed out that event selection is part of the Maximum Credible Accident Methodology topical report, and although Oklo plans to use these topical reports together, they

could also be used individually. The NRC recommended that this information be included in both topical reports.

Summary: Oklo agreed to modify the topical reports to provide the ability for them to be used together or individually.

Performance-Based Licensing Methodology Completeness Determination Item I.D.4
The focus of Item I.D.4 was to communicate that the topical report does not address ensuring that the overall risk to the public from operations of the facility under normal conditions, transients, and during and after accidents is acceptably low consistent with Commission policy. Oklo asked the NRC staff to elaborate on the Commission policy and its associated regulatory basis. The NRC staff answered that I.D.4 refers to the NRC safety goal policy statement, SECY-00-077, and reiterated that all the I.D.1 - I.D.4 items need to be addressed.

Performance-Based Licensing Methodology Completeness Determination Item II.
The focus of Item II. was to communicate that the topical report does not address any exemptions from regulatory requirements, pursuant to 10 CFR 50.12, “Specific exemptions,” that may be needed to implement the methodology. Oklo stated that in developing the methodology it did not identify any exemptions that must be requested to support licensing and asked the staff to clarify the comment. The NRC answered that throughout the discussions, several regulations have been discussed and may need exemptions if alternate approaches are being employed by the methodology (e.g., alternative definition is used for important to safety, use of codes and standards). The NRC further stated that if regulations are met, no exemptions are required. The NRC also observed that Oklo appears to be using alternatives without calling them exemptions.

Summary: Oklo’s position is that exemptions are not required for the Oklo Aurora design, but other applicants using the methodology may need to request exemptions. Oklo will add language to the topical report to clarify.

Meeting Conclusion
The NRC provided some closing remarks stating that Oklo should consider how it will address the gaps and the additional information needed to satisfy each of the areas that were identified in the completeness review results. In addition, NRC observed that there seems to a be misunderstanding of the intent of the topical reports. If this is not clearly defined, the staff may have to put limitations and conditions on the topical reports. The NRC also emphasized the need for the topical reports to contain sufficient information to ensure repeatability of the methodology. Oklo and the NRC agreed to continue discussions during the next public meeting.

Docket No.: 52-049

Enclosure:
Meeting Attendees

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DATE	09/17/2021	09/17/2021	09/17/2021	09/20/2021

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ATTENDEE LIST

Public Meeting with Oklo to Discuss Maximum Credible Accident Methodology and Performance-Based Licensing Methodology Topical Reports – September 1, 2021	
Name	**Affiliation**
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Williams, Donna	NRC
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Siwy, Alexandra	NRC
Carla Dwight	Public
Kennedy, William	NRC
Galletti, Greg	NRC
Ross Moore	Oklo Power, LLC (Oklo)
Caroline Cochran	Oklo
Alex Renner	Oklo
John Hansen	Oklo
Schaperow, Jason	NRC
Matis, Lisa	Public
Krsek, Robert	NRC
Taylor, Robert	NRC
Smith, Brian	NRC
Prescott, Paul	NRC
Ezell, Julie	NRC
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Nakanishi, Tony	NRC
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Adam Stein	Breakthrough Institute
Edwin Lyman	Union of Concerned Scientists
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