[redacted]

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
		SECTION I COMMENTS ON OKLO DESIGN FEATURES		
1	McMurray/Yeshnik	General Comment – Section 2 Oklo Design Overview		[redacted] } {(i)-(xi)} what components is Oklo taking credit for related to radionuclide retention? [redacted] } {(i)-(xi)} {eci}
2	McMurray/Yeshnik	General Comment – Section 2 Oklo Design Overview		Oklo report focuses on the fact that the design does not have a "circulating coolant" {[redacted] } {(i)-(xi)} {eci}
3	Madni	Section 3.4 No Offsite Power Dependence – Page 12	Second Paragraph sentences 4 and 5– The decay heat generated by the Oklo reactor one minute after shutdown is significantly less than the heat generated by a standard four-cylinder car engine2. Three days after shutdown, the Oklo reactor generates about as much decay heat as a lawn mower. {[redacted] } {(ii)-(iv), (vi), (ix)-(xi)} Therefore, a loss of offsite and onsite power has no impact on decay heat removal for the Oklo reactor.	What about the decay heat during the first minute after shutdown? What systems are there to remove this heat? [redacted] } {(ii)-(iv), (vi), (ix)-(xi)}

[redacted]

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4	**Hart**	Section 4.2 Containment Considerations – Page 15		Second paragraph incorrectly refers to 10 CFR 100.11. §100.11 does not apply to power reactor licensing after January 10, 1997. Instead, with respect to siting requirements for new power reactors, 10 CFR 100.21, "Non-seismic siting criteria," refers to the dose criteria in 10 CFR 50.34(a)(1), which are criteria for the safety assessment of the site and facility. The same requirement for a safety analysis using a "demonstrable containment leak rate" is given in 10 CFR 52.47(a)(2)(iv) for design certification applications and in 10 CFR 52.79(a)(1)(vi) for combined licenses.
5	**Mazza**	Page 13, Section 4 - Evaluation Against the Advanced Reactor Design Criteria		[redacted] ?} {(i)-(xi)} {eci}

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6	**Mazza**	Section 4.3.4 ARDC-4 Environmental and Dynamic Effects Design Bases – Page 17	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The SSCs in the Oklo reactor are designed to withstand dynamic effects, and environmental conditions during normal operation, maintenance, testing, and postulated accidents. Events and conditions outside of the nuclear power unit such as missiles, pipe whipping, and discharging fluids, are generally not of concern in the Oklo design. Missiles originating outside of the Oklo reactor are not a concern because the turbine-generator set used for the power conversion system is very small and all safety-related equipment is protected. Pipe whipping and discharging fluids will likely not be of concern in the core due to the use of non-pressurized heat pipes for the heat transport system.	[redacted] {(ii)-(iv), (vi), (ix)-(xi)}
7	**McMurray/Yeshnik**	Section 4.3.4 ARDC-4 Environmental and Dynamic Effects Design Bases – Page 17	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The SSCs in the Oklo reactor are designed to withstand dynamic effects, and environmental conditions during normal operation, maintenance, testing, and postulated accidents. Events and conditions outside of the nuclear power unit such as missiles, pipe whipping, and discharging fluids, are generally not of concern in the Oklo design. Missiles originating outside of the Oklo reactor are not a concern because the turbine-generator set used for the power conversion system is very small and all safety-related equipment is protected. Pipe	Oklo may still need to justify that external turbine missiles and secondary side pipe whip (high pressure steam gas) has no safety impact. The actual PDC is broad is enough to be applicable to external hazards. However, as written, the PDC does NOT give the ability to request leak before break. (*"However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely*

[redacted]

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			whipping and discharging fluids will likely not be of concern in the core due to the use of non-pressurized heat pipes for the heat transport system.	*low under conditions consistent with the design basis for the piping.")*
8	**Schmidt**	Section 4.4.1 ARDC-10 Reactor Design		From the Oklo Core Design Technical document, Figure 4, {[redacted] {(i)-(xi)} {eci}
9	**Ashcraft**	Section 4.4.4 ARDC-13 Instrumentation and Control – Page 19	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo reactor will be equipped with modern proven instrumentation and controls {[redacted] {(i)-(xi)} The quantity and types of instrumentation used in the Oklo design are designed to provide safe operation of SSCs during normal operation,	As written, it is unclear why this ARDC is [redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Consistent with the Southern Co. LMP white paper dealing with the modernization of the technical requirements for non-LWRs, should this statement

				read: "Non-Safety Related with Special Treatment" or

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			anticipated operational occurrences, and ~~abnormal operations~~accident conditions.	perhaps "Non-Safety Related with No Special Treatment"? According to section 5.3 of Oklo's report, "abnormal conditions" include: "loss of power, postulated adverse environments". In order to avoid defining a new term, suggest replacing this term with the terminology used in the ARDC.
10	**Mazza**	Section 4.4.4 ARDC-13 Instrumentation and Control – Page 19	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	How/will heat pipe failure be detected? {[redacted]} {(ii)-(iv), (vi), (ix-xi)}
11	**McMurray/Yeshnik**	Section 4.4.5 ARDC-14 Reactor Coolant Boundary	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Since the Oklo system that carries heat from the reactor to the secondary system does not employ a circulating coolant, traditional concerns with breach of a coolant boundary are essentially eliminated. Concerns with large volumes of rapidly circulating coolant that result in leakage, rapid failure, and gross rupture are not present in the Oklo system. [redacted] {(ii)-(iv), (vi), (ix-xi)} the heat transport system is designed to operate at or near sub- atmospheric pressure, reducing the probability and consequence of heat pipe failure. The heat pipes are	{[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} {[redacted]

			designed to accommodate operating temperatures, while	

[redacted]

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			maintaining appropriate mechanical limits, during normal and abnormal loadings (e.g., seismic). Fabrication of the heat pipes will be in accordance with Oklo's quality assurance program and will utilize techniques that reduce potential leaks and ruptures. Accordingly, the heat pipes will be monitored for the duration of core life for unacceptable degradation and performance. Chemical interactions between the heat pipe wall and the liquid metal are eliminated as they are chemically compatible materials.	[redacted]} {(i)-(xi)} {eci} Question related to operating with a failed heat pipe. In event of failed heat pipe, will the reactor continue to operate? {[redacted]} {(i)-(xi)} {eci} The Oklo report explains why depressurization is not a concern but the logic of the GDC is not addressed (i.e. the LWR concern of losing all liquid coolant and the resulting accident sequence). {[redacted]

				acceptable. The ARDC requirement "Extremely low

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				[redacted] } {(i)-(xi)} {eci}
12	**McMurray/Yeshnik**	Section 4.4.6 ARDC-15 Reactor Coolant System	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Since the Oklo system that carries heat from the reactor to the secondary system does not employ a circulating coolant, traditional concerns with breach of a coolant boundary are essentially eliminated. {[redacted] {(ii)-(iv), (vi), (ix-xi)}	Same comment as for ARDC 14 The ARDC discusses designing the primary system with sufficient margin to ensure that the design conditions are not exceeded. [redacted] } {(ii)-(iv), (vi), (ix-xi)} For example, if the primary boundary exceeds 800F the design condition of the RCS should include creep damage which needs to be part of the design basis. Additionally, this ARDC seems to be applicable. Oklo states that the "Protection and control setpoints will

				likely be based on these analyses." If the protection

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				and control systems needs to be designed to ensure that the primary system meets the design conditions, then ARDC-15 is applicable.
13	**Schmidt**	Section 4.4.6 ARDC-15 Reactor Coolant System	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	{[redacted]} {(ii)-(iv), (vi), (ix-xi)}
14	**VanWert**	Section 4.4.6 ARDC-15 Reactor Coolant System	Oklo Evaluation {"[redacted] [redacted]} {(ii)-(iv), (vi), (ix)-(xi)} "Since the Oklo system that carries heat from the reactor to the secondary system does not employ a circulating coolant, traditional concerns with breach of a coolant boundary are essentially eliminated."	The staff concern regarding breach of a coolant boundary is making sure that there is enough coolant to remove decay heat, not circulation of the coolant. [redacted]

[redacted]

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				[redacted] {(ii)-(iv), (vi), (ix-xi)}
15	**McMurray/Yeshnik**	Section 4.4.7 ARDC-16 Containment Design	Oklo Evaluation {[redacted]} {(i)-(xi)} {eci}	Based on the Oklo evaluation, {[redacted] [redacted] {(i)-(xi)} {eci}
16	**Schmidt**	Section 4.4.7 ARDC-16 Containment Design		The use of functional containment may mean a mechanistic source term model is needed as this was "assumed" for the MHTGR design. This needs additional discussion. {[redacted]} {(i)-(xi)} {eci} Needs additional discussion.

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17	**Fitzpatrick**	Section4.4.8 ARDC 17 Electric Power Systems - Page 21	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo design will likely employ safety-related SSCs that are entirely passive and do not depend on electric power to function. In the event of loss of power, the reactor will be shut down {[redacted]	From the NRC rationale for ARDC 17: “In this context, important to safety functions refer to the broader, potentially non-safety related functions such as post-accident monitoring, control room habitability, emergency lighting, radiation

No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
			[redacted] } {(i)-(xi)} {eci} [redacted] } {(ii)-(iv), (vi), (ix-xi)} *If electric power is not needed for anticipated operational occurrences or postulated accidents, the design shall demonstrate that power for important to safety functions is provided.*	monitoring, communications and/or any others that may be deemed appropriate for the given design. The electric power system for important to safety functions could be non-Class 1E and would not be required to have redundant power sources.” ARDC 17 was developed by the staff to accommodate very passive designs and still express staff concerns. As such, it was anticipated that addressing electrical power systems for advanced reactor designs within the context of ARDC 17’s flexibility, would reduce the need for RAIs and streamline the review. Oklo has not addressed the “important to safety” functions. Particularly if operators are on site. See PDC 19.
18	**Green**	Section 4.4.10 ARDC-19 Control Room – Page 22		Oklo’s description of the applicability of ARDC 19 focuses on the habitability concerns of the ARDC and does little to describe how the plant will be safely monitored and controlled. Additional information will be necessary before staff can decide if Oklo’s interpretation/application of ARDC 19 is adequate.

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
				A simple statement of "is not anticipated to require …" without being reviewed by NRC is not a sufficient basis to conclude for NRC {[redacted] [redacted] [redacted] [redacted]

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
				[redacted]} {(ii)-(iv), (vi), (ix-xi)}
19	**Ashcraft**	Section 4.5.2 ARDC-21 Protection System Reliability and Testability – Page 23	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The RPS will be of redundant and independent logic trains and will be designed for high functional reliability and in-service testing commensurate with the safety functions to be performed. The RPS system is designed with redundancy and independence goals to assure that no single failure results in loss of a protection function and removal from service of any component or channel does not result in loss of required minimum redundancy. No single ~~component~~ failure or removal from service of ~~a~~ any component or channel impairs the ability of the RPS to reliably perform its intended safety function when the reactor is in operation.	Suggested additions for clarity and consistency with the ARDC. Also, it is interesting that the proposed evaluation did not address this aspect of the ARDC [emphasis added]: "…removal from service of any component or channel does not result in loss of the required minimum redundancy…." Instead, their evaluation is hinged on the following aspect: "…unless the acceptable reliability of operation of the protection system can be otherwise demonstrated…" Suggest adding to the evaluation the following [slightly modified] sentence from section 5.3 of the Oklo's report.

20	**Ashcraft**	4.5.3 ARDC-22 Protection System	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Mechanical, thermal, and radiological environment conditions resulting from the effects of natural	Suggested additions for clarity and consistency with the ARDC

[redacted]

[redacted]

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		Independence – Page 23	phenomena, and of normal operating, maintenance, testing, and ~~or~~ postulated accident conditions on redundant channels will not interfere with the protection ~~system~~ function. - Redundant instrumentation will likely be electrically and physically separated. Utilizing multiple channel logic as part of the protection system allows the Oklo's protections system to be tested (e.g., maintenance, diagnostic mode) during normal operations without causing inadvertent reactor trips.	What is the purpose of this adverb (likely)? Its use weakens their safety argument and subsequently raises questions about the validity of their safety claim. Suggest deleting it. Also, I am not sure that you can justify a safety claim on "Protection System Independence" by relying solely on a "redundancy" argument. I would have expected to see safety arguments based on functional diversity or design.{
21	**VanWert**	Section 4.5.6 ARDC-25 Protection System Requirements for Reactivity Control Malfunctions	Oklo Evaluation {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} {[redacted]} {(i)-(xi)} {eci}	The operation of the reactor trip function is discussed in the Oklo evaluation. It is unclear whether the single-failure aspect of ARDC-25 is included. This comment is only meant to confirm that understanding.
22	**Schmidt**	Section 4.5.7 ARDC-26 Reactivity Control Systems	Oklo Evaluation {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	It appears that Oklo's evaluation indicates that ARDC-26 is met as follows: 1. {[redacted]

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				[redacted]

[redacted]

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
				[redacted]} {(i)-(xi)} {eci}
23	**Schmidt**	Section 4.5.8 ARDC-28 Reactivity Limits	Oklo Evaluation {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	It is not clear whether ARDC-28 is met. Staff typically evaluates rod ejection (PWR) or control rod drop (BWRs) even if not considered credible event. {[redacted]} {(i)-(xi)} {eci}

24	**McMurray/Yeshnik**	Section 4.6.1 ARDC-30 Quality of the Reactor Coolant Boundary	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Since the Oklo system that carries heat from the reactor to the secondary system does not employ a circulating coolant, traditional concerns with breach of a coolant boundary are essentially eliminated. Leakage in the reactor coolant boundary is not phenomenologically applicable to the Oklo design since there is no large volume of contaminated coolant {and the	[redacted]

[redacted]

No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
			[redacted] {(ii)-(iv), (vi), (ix-xi)} Nevertheless, the heat pipes, as part of the heat transport system, are designed such that they will retain their integrity during normal operation and postulated accidents. The Oklo design will monitor the heat pipes, as necessary, for performance assessment purpose and to note any unexpected degradation.	[redacted] } {(i)-(xi)} {eci}
25	**McMurray/Yeshnik**	Section 4.6.2 ARDC-31 Fracture Prevention of Reactor Coolant Boundary	<u>Oklo Evaluation – {</u>[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} Since the Oklo system that carries heat from the reactor to the secondary system does not employ a circulating coolant, traditional concerns with fracturing are essentially eliminated. Concerns with large volumes of rapidly circulating coolant that result in leakage, rapid failure, and gross rupture are not present in the Oklo system. {[redacted]	Oklo Evaluation states that the heat pipes will be designed to all of these things, but under the QA program not under any sort of ARDC/PDC. Note that PDC 1 deletes the references to quality standards… This is a similar question to ARDC 26 related to what is chosen as a PDC, and what "regulatory basis" the staff will have if application does not address creep fatigue, stress, etc. of the heat pipes. For instance

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			[redacted]} {(ii)-(iv), (vi), (ix-xi)} Nevertheless, the Oklo heat transport system and its associated components are under the appropriate Oklo quality assurance policies and are designed to minimize embrittlement and ensure rapidly propagating fracture is minimized. Additionally, the heat transport system is designed with considerations of operating temperatures, material degradation characteristics, creep, fatigue, stress rupture, and other conditions under operating, maintenance, testing, and postulated accident conditions, with relevant uncertainties. The heat pipe wall materials are selected such that they are chemically compatible with the working fluid.	could the failure of a heat pipe result in propagation of the fault due to a local hot spot? {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo evaluation states: "Nevertheless, the Oklo heat transport system and its associated components are under the appropriate Oklo quality assurance policies and are designed to minimize embrittlement and ensure rapidly propagating fracture is minimized." If brittle failure was not applicable then it would be completely unnecessary to design the Oklo reactor for this item {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}
26	**Schmidt**	Section 4.6.4 ARDC-33 Reactor Coolant Inventory Maintenance	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	{[redacted] [redacted]

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				[redacted] } {(ii)-(iv), (vi), (ix-xi)}
27	**Schmidt**	Section 4.6.6 ARDC 35 Emergency Core Cooling System – Page 28	Oklo Evaluation – { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)} { [redacted] {(i)-(xi)} {eci}	[redacted] {(i)-(xi)} {eci}
28	**McMurray/Yeshnik**	Section 4.6.9 ARDC-38 Containment Heat removal System (Comment applies to ARDC 39 and 40 as well)	Oklo Evaluation – { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)} No additional system specific to this criterion is present in the Oklo design. { [redacted] {(i)-(xi)} {eci}	{ [redacted] } {(i)-(xi)} {eci} ARDC 35 states that "RHR system safety function shall be to transfer heat from the reactor core during and following postulated accidents such that fuel and clad damage that could interfere with continued effective core cooling is

[redacted]

[redacted]

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				prevented." [redacted] } {(ii)-(iv), (vi), (ix-xi)}
29	**McMurray/Yeshnik**	Section 4.6.12 ARDC-41 Containment Atmosphere Cleanup (Comment applies to ARDC-42, 43 and 60 as well)	Oklo Evaluation – { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)} The Oklo design and analyses will demonstrate that the atmosphere inside the reactor enclosures, { [redacted] } {(ii)-(iv), (vi), (ix-xi)}	If a heat pipe or { [redacted] {(i)-(xi)} {eci}
30	**Li**	Sections 4.6.15-17 ARDC 44-46 Structural and Equipment Cooling	Oklo evaluation states that { [redacted] } {(ii)-(iv), (vi), (ix-xi)}	The statement in the Oklo evaluation without being reviewed by NRC is not a sufficient basis to conclude for NRC that ARDC-44, 45 and 46 are [redacted] } {(ii)-(iv), (vi), (ix-xi)} providing adequate cooling to SSCs important to safety, in addition to the normal functional requirement of Criterion 34 for decay heat removal from the reactor core, should be demonstrated and documented by Oklo's design/analysis, and should be reviewed by NRC. In addition, Criteria 34-37 must

[redacted]

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				be reworded to include this additional heat removal functional requirement.
31	**McMurray/Yeshnik**	Section 4.7.2 ARDC-51 Fracture Prevention of Containment Pressure Boundary	Oklo Evaluation – {[redacted] {(ii)-(iv), (vi), (ix-xi)}	[redacted] {(ii)-(iv), (vi), (ix)-(xi)} However, an accident (earthquake) could cause brittle failure - would relate to ARDC 2. Same with embrittlement. [redacted] } {(ii)-(iv), (vi), (ix-xi)}
32	**Madni**	Section 4.7.3 ARDC-52 Capability for Containment Leakage Rate Testing	Oklo Evaluation – [redacted] } {(ii)-(iv), (vi), (ix-xi)} will be tested appropriately to verify that the leak rates are acceptable at the design pressures.	Is "appropriately" equal to "periodic integrated leakage testing (from ARDC)"? Clarification needed.

33	**McMurray/Yeshnik**	Section 4.7.5 ARDC-54 Piping Systems Penetrating Containment	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo design does not have a primary cooling piping system leaving the reactor enclosures{[redacted]	{[redacted]

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		(Comment applies to ARDC-55 as well)	[redacted] } {(ii)-(iv), (vi), (ix-xi)}	[redacted] } {(ii)-(iv), (vi), (ix-xi)}
34	**Madni**	Section 4.7.6 ARDC-55 Reactor Coolant Boundary Penetrating Containment	Oklo Evaluation – { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)} { [redacted] } {(i)-(xi)} {eci}	Ok, but it is the designer's burden to make sure that it complies and can be verified.
35	**Madni**	Section 4.7.7 ARDC-56 Containment Isolation	Oklo Evaluation – { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)} { [redacted] } {(i)-(xi)} {eci}	[redacted] } {(ii)-(iv), (vi), (ix-xi)} Not sure if that pipe serves a safety function. If a closed pipe has a break at both ends, it may be better to have an isolation valve outside the containment to prevent enclosures bypass.

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36	**Hammelman**	Sections 4.8.2-4 ARDC 60-63 Fuel Storage and Handling	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo design will not have a traditional onsite fuel handling system, because refueling at a frequent interval is not part of the Oklo design. {[redacted]} {(i)-(xi)} {eci} Nevertheless, if other systems are deemed necessary to meet this criterion, they will be designed to ensure inadvertent criticality.	{[redacted]} {(i)-(xi)} {eci}

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SECTION II COMMENTS CONCERNING SECTION 5 OF THE OKLO REPORT				
37	**McMurray/Yeshnik**	General Comment – Purpose of Section 5		It appears that Oklo intends “Section 5 – Draft Principal Design Criteria,” to be the actual wording of their Proposed PDC. This is confusing because Oklo designates many of the ARDC to be {“[redacted] ii)-(iv), (vi), (ix)-(xi)} NRC may not be able to accept most of these as written and would ask RAIs to clarify the elements that are missing from the ARDC. Oklo should clarify why the text in Section 5 is different from the ARDCs that are {“[redacted].”}{(ii)-(iv) (vi) (ix)-(xi)} Oklo

				should also clarify if

[redacted]

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				the PDC wording in Section 5 applies to the ARDC that Oklo has designated as [redacted] } {(ii)-(iv), (vi), (ix)-(xi)}

[redacted]

38	**McMurray/Yeshnik**	Section 4.3.1 – ARDC-1 Quality Standards and Records	FROM SECTION 5.1 - The Oklo design follows a quality assurance program to provide adequate assurance that SSCs can perform their safety functions.	Oklo designates this ARDC as {"[redacted] {(ii)-(iv), (vi), (ix)-(xi)} Requirements for the fabrication, erection, and testing of components is not included in the PDC (i.e. "The Oklo design follows…"). Also the proposed PDC deletes requirements for the maintenance of records. Safety classification is described in evaluation, but that does not seem to be relevant given the fact that safety classification is left out of the text of the PDC. It is unclear if the classification of safety systems is part of this PDC. Most QAPDs describe how an organization meets the requirements of 10 CFR 50 Appendix B. An Appendix B program is intended to ensure that the design and licensing basis of a plant is maintained. This PDC pushes the design basis information into the QAPD and may require significant expansion of the QAPD. A staff re-evaluation of the adequacy of the QAPD may be necessary based upon the increased scope of the proposed Oklo PDC 1.

No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
39	**McMurray/Yeshnik**	Section 4.3.2 ARDC-2 Design Bases for Protection Against Natural Phenomena	FROM SECTION 5.1 - The Oklo SSCs important to safety includes allowances for natural environmental disturbances such as earthquakes, floods, and storms at the station site for normal and accident conditions.	EDITORIAL - Trailing sentence in the "evaluation" section. The Oklo PDC does not discuss the three sub items in the ARDC. The Oklo PDC uses "includes allowances for" rather than "shall be designed to withstand the effects of…" Oklo should clarify if the PDC language represents a technical difference compared to the ARDC language. The Oklo PDC specifies three natural disturbances while the ARDC describes five phenomena. Oklo should clarify if the PDC language represents a technical difference compared to the ARDC language.
40	**McMurray/Yeshnik**	Section 4.3.3 ARDC-3 Fire Protection	From Section 5.1 The Oklo design follows a fire protection program that minimizes the probability of fires and explosions. Fire detection and firefighting systems are provided to minimize the adverse effect of fires on SSCs with safety functions and are designed such that their inadvertent operation does not affect the capability of safety-related SSCs.	Oklo PDC doesn't contain all of the items within the ARDC.

[redacted]

[redacted]

No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
41	**VanWert**	Section 4.5.1 Protection System Functions ARDC-20 (also applies to Section 4.5.4 ARDC-23)	Oklo Evaluation {"[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The PDC in Section 5.3 and the ARDC discussion (Section 4.5.1) are different even though the disposition is {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)}	Similar to previous related comments. The deltas don't seem to be an issue at first read, but it is unclear if the changes in text indicate a change in the underlying position.
42	**McMurray/Yeshnik**	Section 4.5.7 ARDC-26 Reactivity Control Systems	FROM SECTION 5.3 - The Oklo unit includes three independent reactivity control means that employ different designs.	The PDC only states that Oklo will have three systems. Only the evaluation discusses how each system will meet the (4) items in the ARDC. The PDCs (GDCs) are used by the staff for RAIs. As this PDC is written, it does not address the entire scope of the ARDC that requires the (4) different functions. It only states that there will be three systems.
43	**McMurray/Yeshnik**	Section 4.5.8 ARDC-28 Reactivity Limits	{[redacted] {(i)-(xi)} {eci}	Is a rod ejection accident postulated? Liquid intrusion? Others? This would have to be provided in the application.
44	**McMurray/Yeshnik**	Section 4.5.9 ARDC-29 Protection Against AOOs	FROM SECTION 5.3 - The protection and reactivity control systems are designed to have a high probability of performing their safety-related functions in the event of an anticipated operational occurrence.	The PDC does not list the "examples" in the Oklo Evaluation (e.g., the combination of logic

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
			Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The protection system, with the reactivity control systems, have a high probability of performing their safety-related functions in the event of anticipate operational occurrences. This is achieved through the combination of logic arrangement, fail-safe design, inspection, testing, and defense-in-depth measures. Loss of power to the protection system results in a reactor trip.	arrangement, fail-safe design, inspection, testing, and defense-in-depth measures).
45	**McMurray/Yeshnik**	Section 4.6.3 ARDC-32 Inspection of the Reactor Coolant Boundary	Oklo Evaluation – [redacted] {(ii)-(iv), (vi), (ix-xi)} {[redacted]} {(i)-(xi)} {eci}	{"[redacted] {(i)-(xi)} {eci} Report needs to better define which components are

				credited.

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				[redacted] } {(ii)-(iv), (vi), (ix-xi)}
46	**McMurray/Yeshnik**	Section 4.6.5 ARDC-34 Residual Heat Removal	FROM SECTION 5.4 - A system to remove decay heat is provided and is entirely passive, using natural air draft-cooling to provide protection following complete loss of all electric power. The decay heat removal system is designed to transfer decay heat and other residual heat from the reactor core to an ultimate heat sink at a rate such that specified acceptable fuel design limits and the integrity of the fission product barriers are not exceeded. The decay heat removal system is designed to be always functioning, including under normal conditions, anticipated operational occurrences, and postulated accidents.	PDC states that the heat sink will ensure that fuel design limits and integrity of the fission product barriers are not exceeded. [redacted] [redacted] [redacted] } {(i)-(xi)} {eci}
47	**Madni**	Section 4.7.1 ARDC-50 Containment Design Basis	Oklo Evaluation – { [redacted]	The last sentence in the Oklo Evaluation is not clear. { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)}

[redacted]

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			[redacted] . } {(ii)-(iv), (vi), (ix-xi)}	

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
48	**VanWert**	Section 4.4.1 ARDC-10 Reactor Design	"The Oklo reactor, control, and protection systems…" [from Section 5.2]	The modifications to ARDC-10 provided in Section 5.2 removes "core" from the language but the discussion in Section 4.4.1 only discussed the removal of "coolant". It might be that the term "The Oklo reactor" was intended to cover "core". If so, the staff suggests not modifying the ARDC language or at least more clearly discussing any deltas in Section 4.4.1.
49	**VanWert**	Section 4.4.2 ARDC-11 Reactor Inherent Protection	Comparison between bullet 2 of Section 5.2 and the text in Section 4.4.2.	There are deltas between the PDC in bullet 2 of Section 5.2 and the disposition of the ARDC-11 provided in Section 4.4.2 even though it was dispositioned as {"[redacted]"} {(ii)-(iv), (vi), (ix)-(xi)}. The deltas generally appear to be inconsequential, but they cause the staff to consider each change in detail to understand if it changes the meaning of the original ARDC. If changes are intended, make sure to describe the basis and intent in Section 4.4.2.
50	**VanWert**	Section 4.4.3 Suppression of Reactor Power Oscillations ARDC-12	Comparison between bullet 3 of Section 5.2 and text in Section 4.4.3 shows a few differences	Some of the changes appear to soften the PDC when compared with the ARDC… for example, "tends to readily compensate for a rapid increase in reactivity" was changed to remove the word "readily". The disposition of ARDC-12 found in Section 4.4.3 had

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				said it was {[redacted]}{(ii)-(iv), (vi), (ix)-(xi)}, so it is unclear to the staff why changes were made.

[redacted]

No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
SECTION III GENERAL AND EDITORIAL COMMENTS				
51	**Mazza**	General Comment regarding Proprietary and ECI designation (e.g., page 11 has both)		Some pages are marked Proprietary and some both Proprietary and ECI/810. It is not clear which info is Proprietary and which is ECI/810 on these pages.
52	**Mazza**	General Comment on the scope of the Draft PDC Report		Does Oklo intend these PDCs to apply to the FOAK or Nth of a kind reactor? Oklo appears to leave some design aspects open { [redacted] i)-(xi)} {eci}
53	**Mazza**	General Comment on policy issues that may impact the Oklo review		There are policy issues that may need to be addressed in the very near future { [redacted] } {(ii)-(iv), (vi), (ix)-(xi)}
54		General Comment on ARDCs that are designated as "applicable" and "partially applicable"		It is not clear whether Oklo adopts the ARDC language for the ARDC that are designated as "applicable." It is not clear what the Oklo PDC language would be for ARDCs that are designated as "partially applicable."
55	**Mazza**	Section 1 Purpose – Page 6	Nonlight-water-reactor (non-LWR) designs applicants, such as Oklo, may be subject to Title 10 to the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and	Nonlight-water-reactor (non-LWR) designs applicants, such as Oklo, are subject

[redacted]

[redacted]

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No.	Reviewer(s)	Draft PDC Section/Page Number	Oklo Draft PDC Document Text	NRC Comment
			10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."	
56	**McMurray/Yeshnik**	General Comment – Section 2 Oklo Design Overview		Need more detailed images within the report, [redacted] {(i)-(xi)} {eci} This will help NRC understand the boundaries better.
57	**Madni**	Section 2 Oklo Design Overview – Page 6	Last sentence of the third paragraph - The low power density and burnup of the Oklo reactor, as well as the behavior of metal fuel, enable a simplified design with a minimal source term.	From Public sources, "*In a Testimony before the Committee on Science, Space and Technology, US House of Representatives, on July 19, 2017, Dr. DeWitte indicated among the achievements of EBR-II using metal fuel achieving burn ups 4 times higher than the current industry standard.*" It appears that low burnup is considered to be beneficial in the report. This conflicts with testimony.
58	**Madni**	Section 2.2 {[redacted]} {(i)-(xi)} {eci} – Page 8	{[redacted]} {(i)-(xi)} {eci}	{"[redacted].} {(i)-(xi)} {eci}

59	**Madni**	Section 3.1 Fast Spectrum and Metal Fuels	From the third paragraph - This lowered peak fuel temperature reduces technological and regulatory risk because it increases the margin to material failure in the reactor and reduces the risk of the system overheating.	How is "system overheating" defined?

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			Additionally, as mentioned before, metal fuel has a high thermal conductivity and a low heat capacity, which aids in keeping the fuel cooled and at appropriate temperatures.	Why "Additionally since this sentence is saying the same thing as the 1st sentence in this paragraph?
60	**Mazza**	Section 3.2 Reduced Source Term& Low Burnup - Page 11	{[redacted]} {(i)-(xi)} {eci}	{[redacted]} {(i)-(xi)} {eci}

[redacted]

[redacted]

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61	**Madni**	Section 3.3 Near-Atmospheric System – Page 12	First sentence – The Oklo reactor and supporting systems are designed to operate at a near-atmospheric pressure.	Define or clarify what the "supporting systems" are.
62	**McMurray/Yeshnik**	Section 4.3.5 ARDC-5 Sharing of Structures Systems and Components	From Section 5.1 - Sharing among safety-related SSCs and Oklo units will be avoided, unless it can be shown that sharing will not impair the ability to perform the safety functions, including multiple-unit events. Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} An Oklo unit is a single-unit plant. If multiple units are built on the same site, no safety-related system will be shared.	PDC contradicts the "evaluation" section by stating "unless can be shown that sharing will not impair…" although this is similar language to the ARDC.
63	**Madni**	Section 4.4.7 ARDC-16 Containment Design		{[redacted].} {(ii)-(iv), (vi), (ix-xi)}
64	**VanWert**	Section 4.5.7 ARDC-26 Reactivity Control Systems	Oklo Evaluation {"[redacted]"} {(ii)-(iv), (vi), (ix)-(xi)} {"[redacted]} {(i)-(xi)} {eci}	This as an example of an assertion that would need to be confirmed and/or addressed in the final design.

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65	**VanWert**	Section 4.5.8 ARDC-28 Reactivity Limits	Oklo Evaluation {"[redacted]"} {(ii)-(iv), (vi), (ix)-(xi)} {"[redacted]} {(i)-(xi)} {eci}	This as an example of an assertion that would need to be confirmed and/or addressed in the final design.
66	**McMurray/Yeshnik**	Section 4.8.3 ARDC-62 Prevention of Criticality in Fuel Storage and Handling	Oklo Evaluation – {[redacted]} {(ii)-(iv), (vi), (ix)-(xi)} The Oklo design will not have a traditional onsite fuel handling system, because refueling at a frequent interval is not part of the Oklo design. [redacted]} {(i)-(xi)} {eci}	{[redacted]} {(i)-(xi)} {eci}