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To: [Darrell Gardner](#); [Drew Peebles](#); [Martin Bryan](#)
Cc: [Beasley, Benjamin](#); [Cuadrado de Jesus, Samuel](#); [Schmidt, Jeffrey](#)
Subject: NRC Preliminary Questions on Hermes PSAR
Date: Wednesday, April 6, 2022 2:11:00 PM

Hello Darrell, Drew, Marty,

Please see below for a list of some more preliminary questions the NRC staff has prepared for Kairos related to the Hermes PSAR, specifically, Chapter 10 (Experiments), Sections 12.1 (Organization) and 12.2 (Review and Audit Activities), and Chapter 14 (Technical Specifications). The NRC staff would like to discuss these within the scope of the General Audit (see audit plan dated 2/10/2022, ADAMS Accession No. ML22039A336), and I am providing these in advance to facilitate discussion during an audit meeting. Once Kairos is ready to discuss, please let us know and we can set up a meeting. We will add this e-mail with questions to public ADAMS. If any questions, please let Ben, Sam, or I know.

Thanks,
Ed

Question Number	Question
10.1-1	<p>PSAR Section 10.1 states that Hermes will not “include special facilities dedicated to the conduct of reactor experiments or experimental programs.” However, PSAR Section 10.1 also states that the Hermes reactor vessel will be “equipped with a material surveillance system [MSS] to insert and remove material specimens to assess long term material performance.” PSAR Section 4.3.1.1.1 states that the MSS, which is supported by the reactor vessel top head, “provides a remote means to insert and remove material and fuel test specimens into and from the reactor to support testing.” PSAR Section 4.3.3 further states that the “MSS uses coupons and components monitoring to confirm that irradiation-affected corrosion is non-existent or manageable.”</p> <p>Please clarify the purpose(s) for the MSS, and how it will be used, to help the NRC staff to understand whether the MSS could be an “experimental facility” which should be analyzed based on the guidance in NUREG-1537, Parts 1 and 2, Chapter 10. Will it be solely intended for collecting data to monitor the performance of Hermes SSCs? Or, does Kairos intend to use it for testing and evaluation of, for example, other various material and fuel test specimens that are not necessarily representative of Hermes SSCs? Could the MSS or materials that are placed it affect reactor operation, or result in or contribute to an accident?</p>
12.1-1	<p>PSAR Section 12.1.2.8 states, “Radiation Protection has the authority to terminate unsafe activities pending review by management.” The guidance in NUREG-1537, Part 2, Section 12.1, states, “the radiation safety staff should encompass the clear responsibility and authority to interdict or terminate licensed activities that it believes are unsafe. This does not mean that the radiation safety staff possess absolute authority.</p>

	<p>If facility managers, the review and audit committee, and university or corporate upper management agree, the decision of the radiation safety staff could be overruled. However, the applicant should make clear that this would be a very rare occurrence that would be carefully analyzed and considered.” Please clarify what is meant by “pending review by management.” Does this mean that radiation safety staff would have to wait for management review and approval to terminate any activity? Or that management could subsequently overrule (following appropriate analysis and consideration) the radiation safety staff’s termination of an activity?</p>
12.1-2	<p>PSAR Section 12.1.4 states that ANSI/ANS-15.4-2007 “is used in the selection and training of personnel as applicable.” The NRC staff notes that there is a more recent version of this standard, ANSI/ANS-15.4-2016. Please clarify whether Kairos intended to refer to the 2007 or 2016 version.</p>
12.2-1	<p>PSAR Section 12.1.2.2 states that the Hermes Site Executive will be responsible for compliance with an OL and overall management of the Hermes facility. PSAR Section 12.2 states that the Hermes Plant Manager will establish a Review and Audit Committee, and the Plant Manager will ensure that appropriate technical expertise will be available for review and audit activities. PSAR Section 12.1.2.7 states that the Quality Manager, who reports to the Site Executive, is responsible for overseeing review and audit of plant operations by review and audit teams, and is responsible for auditing for compliance with regulatory requirements and procedures. PSAR Figure 12.1-1 indicates “Quality Assurance” and “Review/Audit Committee” as separately reporting to the Site Executive.</p> <p>The guidance in NUREG-1537, Part 2, Section 12.2, states that “[review and/or audit] [c]ommittee members should be appointed by the highest level of upper management.” Furthermore, ANSI/ANS-15.1-2007, Section 6.2.1, recommends that TSs require that review and/or audit committee members be appointed by Level 1 management (i.e., the highest-level facility management, who is the individual responsible for the facility’s license).</p> <p>Please clarify whether the Plant Manager, Quality Manager, or Site Executive will be responsible for appointing members of the Hermes Review and Audit Committee. In addition, please clarify the role of the Quality Manager and the review and audit teams that quality manager oversees; are the reviews and audits the Quality Manager is responsible for separate from those of the Review and Audit Committee discussed in PSAR Section 12.2?</p>
14-2	<p>In addition to ANSI/ANS-15.1-2007, will format and content of TS also be generally consistent with guidance in NUREG-1537, Part 1, Appendix 14.1, which clarifies some of what is in 15.1?</p>
14-3	<p>Regarding safety limits: are core exit reactor coolant temperatures and core power more appropriate as LSSSs, versus SLs? Should fuel temperature (along with vessel temperature) be an SL, and should core exit temperature and core power be LSSSs? Should vessel temperature</p>

	also be an LSSS (this is related/follow-up to question 14-1 that was sent to Kairos on 2/3/22 (ADAMS Accession No. ML22034A991) and discussed in a public meeting on 2/9/22)?
14-4	In the proposed safety limits and LSSSs, why are coolant exit and vessel surface temperatures plural? Does Kairos plan to have multiple SL/LSSS values for these? (also related/follow-up to question 14-1)
14-5	What does Kairos mean by having reactor power as an LCO? Would this be a steady-state power limit and the power scram setting (above steady-state) would be an LSSS?
14-6	Regarding reactor core parameters: what about shutdown margin, excess reactivity, and core reactivity (the NRC staff notes that the purpose of a core reactivity limit, and verifying core reactivity, might be to help identify issues like excessive damaged pebbles reducing reactivity)?
14-7	Regarding reactor control and safety system LCOs: what about control rods (e.g., LCOs for shutdown and control element operability and insertion ability), and scram channels/functions (e.g., LCOs for high level RPS functionality)?
14-8	Under coolant systems LCOs in PSAR Table 14.1-1, should “inlet gas system pressure” be “inert gas system pressure”?
14-9	Under ESF LCOs, what is meant by having reactor vessel integrity as an LCO? Is reactor vessel integrity (which Kairos says will be measured/determined by design temperature operating limit) more appropriate as SL/LSSS? Also, does Hermes need other LCO TSs on ESFs to capture the “functional containment” concept? Or would these possibly be worked into design features TSs? (also related/follow-up to question 14-1)
14-10	Is not having TSs on emergency power justified? Confirm that there are no safety-related emergency power systems. (related to some questions that will be sent separately for Chapter 8)
14-11	Is not having TSs on experiments justified? Confirm that Hermes will not have any experimental facilities, and discuss whether there may be any TSs associated with the MSS. (related to question 10.1-1)

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