

From: Dozier, Tami
Sent: Thursday, March 31, 2022 9:27 AM
To: Darrell Gardner
Cc: Martin Bryan; Austin Clark; Erwin, Kenneth; Beasley, Benjamin
Subject: Requests for Confirmation of Information for the Environmental Review of the Kairos Hermes Construction Permit Application
Attachments: Kairos Hermes Environmental RCIs.pdf

Darrell,

On February 2, 2022, the U.S. Nuclear Regulatory Commission (NRC) issued the Kairos Hermes Environmental Report (ER) Audit Plan, which was supplemented shortly after with one additional information request (ADAMS Accession No. ML22056A064). This audit plan described the scope, logistics, and other aspects of the staff's environmental audit, including a list of several information items the NRC staff identified to cover with the Kairos staff during the audit, which began on February 28, 2022 and is ongoing. As part of the ongoing audit, the staff has reviewed ER supporting documents that contain information which will likely be used in its Environmental Impact Statement (EIS). To the best of the staff's knowledge, some of the information reviewed is not on the docket or accessible in the public domain. Therefore, we request that you submit confirmation that the information gathered during the audit which is listed in the enclosure is correct or provide the associated correct information.

These requests for confirmation of information were discussed with Mr. Martin Bryan of your staff, and a mutually agreeable date for the response is within 30 days from the date of this email message.

Please note that this transmittal supersedes the transmittal of March 23, which had inadvertently sent an incorrect version of the RCIs.

If you have any questions on this matter, please let me know.

Tami Dozier

Tamsen Dozier
Environmental Project Manager
Nuclear Regulatory Commission
301-401-2699 (c)

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Options

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Kairos Hermes Test Reactor
Construction Permit Application Environmental Review
Requests for Confirmatory Information

Regulatory Basis:

Construction permit (CP) requirements are specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." Kairos submitted an Environmental Report (ER) as part of its CP application in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The Nuclear Regulatory Commission's (NRC) regulations at 10 CFR Part 51, which implement Section 102(2) of the National Environmental Policy Act (NEPA) of 1969, include requirements for applicants to provide information as may be useful in aiding the NRC staff in complying with NEPA. Review guidance for the staff is provided in the Final Interim Staff Guidance for Augmenting NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors", Parts 1 and 2 (ML12156A069 and ML12156A075).

Request for Confirmation of Information

On February 2, 2022, the NRC issued its plan for conducting an environmental audit (ML22056A064) related to the Kairos Hermes CP application. As part of the audit, the staff reviewed documents on the applicant electronic information portal (ML20014E6412), provided in response to the staff Audit Items outlined in Attachment 1 of the audit plan. Additionally, the staff held discussions with applicant staff related to these audit items. To the best of the staff's knowledge, some of the information reviewed is not on the docket or accessible in the public domain; therefore, the staff requests that Kairos submit confirmation that the information listed below is correct or provide the associated correct information.

Land Use

RCI-01:

Based on the staff's review of ER Section 3.1.1 and 4.1.1, and audit activities related to Audit Item LU-01, please confirm that the City of Oak Ridge has indicated in writing that the proposed Hermes reactor, which will be a non-power generation facility, falls within the range of activities allowed by the City zoning ordinance for the IND-2 zoning for the site.

RCI-02:

Based on the staff's review of ER Section 3.1.1 and 4.1.1, and audit activities related to Audit Item LU-03, please confirm:

- a) The tallest structure height for the proposed Hermes facilities will be less than 200 feet in height and not meet the definition of a flight obstruction as established in 14 CFR 77.17 (a).
- b) Kairos will notify the Federal Aviation Administration (FAA) in accordance with 14 CFR 77.9 prior to building any structures on the proposed Hermes site with a height that would exceed the imaginary surface described in 14 CFR 77.9 (b).

Hydrogeology and Water Resources

RCI-03

Based on the staff's review of ER Section 4.3 relating to site excavation and grading and audit activities related to Audit Item HYD-01, please confirm:

- a) The DOE has removed the previous excavation limit of 10 feet and disposal of any potentially contaminated soils would be segregated and stockpiled with disposal coordinated with DOE.
- b) Site drainage and topography will be minimally impacted by the onsite reuse of fill excavated to accommodate the foundations of the proposed facility.

RCI-04

Based on the staff review of ER Section 3.4 relating to water usage and audit activities related to Audit Item HYD-10, please confirm:

- a) The fire suppression system and the fire protection system are the same system as referred to in the ER.
- b) The system will require approximately 1,440 cubic meters of stored fire water and the spent fire water would be replaced within a required 8-hour period. In the unlikely event of a required full refill, this refill rate is equivalent to approximately 1.15 million gallons per day for 8 hours.

RCI-05

Based on the staff's review of ER Sections 3.4, 4.3 and 4.5 and audit activities related to Audit Item HYD-11, please confirm:

- a) Based on site conceptual modeling and field test results, an estimated upper bound construction dewatering rate is approximately 50 gallons per minute over an estimated foundation construction period of approximately 30 days, given an estimated approximate excavation extent of 140 feet by 250 feet benched down to a base measuring approximately 50 by 180 feet.
- b) Construction and any yet to be determined post-construction dewatering solutions will be compliant with DOE, EPA and, TDEC requirements consistent with any necessary permits or authorizations.

RCI-06

Based on the staff's review of ER Section 4.4, and audit activities related to Audit Item HYD-12, please confirm the intention of Kairos Power to follow any groundwater monitoring obligations imposed by the DOE for the site.

Ecological Resources

RCI--07:

Based on the staff's review of ER Section 4.5, and audit activities related to Audit Item ECO-10, please confirm that Kairos would transport any dewatered groundwater offsite for disposal or

treat the water sufficiently for return to the groundwater or surface water in accordance with applicable EPA, DOE, and State of Tennessee requirements.

RCI-08:

Based on the staff's review of ER Section 4.5, and audit activities related to Audit Item ECO-11, please confirm that excavation to build the Hermes reactor would involve a bounding groundwater dewatering volume of approximately 2.2 million gallons at the location of the proposed reactor, estimated based on excavation of an area of approximately 140 by 250 feet benched down to a base of approximately 50 by 180 feet at a depth of approximately 30 feet for a period of approximately 30 days.

Historic and Cultural Resources

RCI--09:

Based on the staff's review of ER Sections 1.4, 3.6, and 4.6, and audit activities related to Audit Item HCUL-5, please confirm that the following statements are correct:

- a) The reference to the Native American Graves Protection and Repatriation Act (NAGPRA) in ER Table 1.4-2 of the ER was an error.
- b) Since the lands are no longer considered Federal property, neither NAGPRA nor the Archaeological Resources Protection Act apply.

RCI-10

Based on the staff's review of ER Sections 4.6 and audit activities related to Audit Item HCUL-5, please confirm that in addition to the description in ER Section 4.6.1, related to development of an Archaeological Monitoring and Discovery Plan, Kairos will also notify the Tennessee State Historic Preservation Officer should human remains, or archaeological material be discovered during construction and operational activities.

RCI-11

Based on the staff's review of ER Sections 4.6 and 4.6.1, and audit activities related to Audit Item HCUL-6, please confirm the following:

- a) Kairos will develop the Archaeological Monitoring and Discovery plan and implement the plan prior to commencing construction activities.
- b) Kairos will incorporate into the plan existing applicable DOE-OREM procedural guidance.

Radiological Human Health

RCI-12

Based on the staff's review of ER Section 4.8.2.4, and audit activities related to Audit Item HHR-1, please confirm that Kairos applied the annual radiological gaseous effluent release

quantities from the Clinch River Early Site Permit Environmental Report, Revision 2, Table 3.5-4 along with the estimated 62,500 Curies per year of tritium from the heat rejection stack (see the revised ER page 4-55 in the February 18, 2022 Kairos letter) as GASPAR input parameters for estimating the site boundary and the maximally exposed individual doses provided in ER Tables 4.8-3 and 4.8-22.

Fuel Cycle and Radioactive Waste Management

RCI-13

During audit activities for Audit Item FCRW-6, related to the staff's review of ER Sections 2.6.1.2.3 and 4.9, Kairos stated that it has no plans to recover any captured tritium as a commercial commodity. To bound potential radiological waste impacts, Kairos assumes that both concentrated and dilute tritium materials will be disposed of as low-level radioactive waste. Additionally, by addressing tritium-bearing material as a Class B LLRW disposal stream to the Waste Control Specialist LLRW disposal site for concentrated tritium waste, and as a Class A disposal stream to the EnergySolutions disposal site for dilute tritium wastes, Kairos would bound the expected radiological waste impacts for the purposes of assessing environmental impacts for the construction permit. Please confirm that Kairos has no plans to recover any of the captured tritium for commercial purposes, and Waste Control Specialist can accept this form of Class B LLRW.

RCI-14

Based on the staff's review of ER Sections 2.6.1.1 and 4.9, and audit activities related to Audit Item FCRW-7, please confirm the following:

- a) The potential of a Class C LLRW classification for a Flibe waste stream to be disposed of during decommissioning would be because of the concentration levels for radionuclides other than tritium with their expected radionuclide concentration in the Flibe, being controlled by the technical specifications provided in PSAR Table 14.1-1.
- b) The resulting gamma activity is low enough that this should not result in significant radiation decomposition of the Flibe during long-term storage of this material.

Transportation of Radioactive Material

RCI-15

During the audit activities for Audit Item TR-1, related to the staff's review of Sections 4.10.2.2, 4.10.2.5, and 4.10.3.1, Kairos stated that their Hermes TRISO pebbles would have an equilibrium discharge burnup of about 6% FIMA (fissions per initial metal atom) as noted in PSAR Table 4.5-2, which would translate to approximately 57 GWd/MTU. Additionally, Kairos informed the staff they are considering the NAC-LWT package for spent TRISO shipments where two of the spent TRISO containers used within the Hermes facility could be placed into the NAC-LWT package. Please confirm that approximately 57 GWd/MTU is the burnup level for spent TRISO and the potential use of NAC-LWT truck shipment package holding two spent TRISO containers for any spent TRISO shipments.

RCI-16

During the audit activities for Audit Item TR-3, related to the staff's review of Sections 4.10.2.3, 4.10.2.5, and 4.10.3.2, Kairos stated they applied the following assumptions concerning the LLRW shipments: 1) the total number of shipment were split evenly for the 46 annual shipments of LLRW described in PNNL-29365 to account for Class A LLRW being shipped to the EnergySolutions LLRW disposal site at Clive, UT, and Class B and C LLRW being shipped to the Waste Control Specialist (WCS) LLRW disposal site near Andrews, TX; and 2) this split in disposal sites would not affect the overall results strictly based on distance because the shipping distances from the Kairos Hermes site to the two LLRW disposal sites are not drastically different (1,860 miles to the site in Utah and 1,200 miles to the WCS site in Texas). Please confirm the validity of these two assumptions for generating the impacts presented in ER Table 4.10-2 between the two LLRW disposal sites. The staff would also like confirmation that the volume of Flibe to be disposed of during decommissioning as Class B and/or Class C LLRW to be approximately 16 to 20 cubic meters.

Accidents

RCI-17

Based on the staff's review of ER Section 4.11.3, and audit activities related to Audit Item ACC-1, please confirm that the dominant contributors to the maximum hypothetical accident whole body and thyroid doses, for both at the exclusion area boundary and in the low population zone, provided in ER Table 4.11-1 are from gaseous radionuclides.

Cumulative Impacts

RCI-18

Based on audit activities related to Audit Item CMLT-1, please confirm that the land needed for the Atlas fuel fabrication facility is estimated to be no more than 30 acres, and that the water demands for Atlas are not expected to exceed 15,000 gallons per day.

Alternatives

RCI-19

Based on the staff's review of ER Section 5.4, and audit activities related to Audit Item ALT-01, please confirm that Alternative Site 1.1 is the Clinch River Nuclear Site, Alternative Site 1.2 is the Proposed Site, and Site 1.3 is another site in the City of Oak Ridge.

RCI-20

Based on the staff's review of ER Section 5.4, and audit activities related to Audit Item ALT-02, please confirm that under the Eagle Rock Alternative, the Hermes facilities would be built somewhere within the 592-acre tract of land formerly proposed for the Eagle Rock Enrichment Facility.

RCI-21

Based on the staff's review of ER Section 5.4, and audit activities related to Audit Item ALT-03, please confirm that sanitary wastewater and non-radiological liquid waste generated over the life cycle of the Hermes facilities at the Eagle Rock site would be handled by portable systems or discharged to a municipal wastewater treatment facility, that stormwater would be collected in a lined retention basin where it would ultimately evaporate, and that there would be no direct discharges of wastewater to surface water or groundwater.

RCI-22

Based on the staff's review of ER Section 5.4, and audit activities related to Audit Item ALT-04, please confirm the following:

- a) Kairos performed a search of the U.S. Fish & Wildlife Service Information for Planning and Consultation (IPaC) website on February 2, 2022 to obtain information on the possible occurrence of threatened and endangered species and critical habitat protected under the Endangered Species Act.
- b) For the purpose of this search, Kairos defined a polygon that encompasses the entire 592-acre former Eagle Rock Enrichment Facility plus any potentially necessary access roads.