

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

March 17, 2023

Jennifer K. Wheeler Director, Regulatory Affairs TRISO-X, LLC 801 Thompson Avenue Rockville, MD 20852

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE APPLICATION FROM TRISO-X, LLC FOR SPEICAL NUCLAR MATERIAL LICENSE FOR A FUEL FABRICATION FACILITY IN OAK RIDGE, TENNESSEE (DOCKET NUMBER: 70-7027)

Dear Jennifer Wheeler:

By letter dated November 18, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff accepted for detailed review an application for a special nuclear material license for use at a TRISO-X, LLC (TRISO-X) fuel fabrication facility in Oak Ridge, Tennessee. TRISO-X submitted the application in several parts including the safety analysis report dated April 5, 2022 (Agencywide Documents Access and Management System (ADAMS) ML22101A200), supplemented by letters dated October 13, 2022 (ML22286A144), and November 4, 2022 (ML22308A251), and an environmental report dated September 23, 2022 (ML22266A269).

The NRC staff is conducting a detailed technical review of your application including the environmental report and has determined that additional information is necessary in connection with its review and development of an environmental impact statement. The information needed by the staff is discussed in the enclosed request for additional information (RAI). We request that you provide responses within 30 days from the date of this letter. If you are unable to meet these deadlines, please notify the NRC staff in writing, within two weeks of receipt of this letter, of your new submittal date and the reasons for the delay.

J. Wheeler

The enclosed RAIs only address selected portions of the NRC staff review completed to date, and additional RAIs will be issued in the future as the staff's detailed review progresses. Please reference Docket No. 70-7027 in future correspondence related to the technical review for this licensing action. If you have any questions, please contact Jill Caverly of my staff at (301) 415-7674 or via email at Jill.Caverly@nrc.gov.

Sincerely,

Ret Sm Signed by Sun, Robert on 03/17/23

Robert Sun, Branch Chief Environmental Review Materials Branch Division of Rulemaking, Environmental and Financial Review Office of Nuclear Material Safety and Safeguards

Docket No.: 70-7027

Enclosure: Request for Additional Information Environmental Report - Part 1

REQUESTS FOR ADDITIONAL INFORMATION ON THE TRISO-X, LLC, ENVIRONMENTAL REPORT FOR THE PROPOSED FUEL FABRICATION FACILITY

PART 1

The purpose of this requests for additional information (RAIs) presented below is to obtain additional data and information from TRISO-X, LLC (TRISO-X), for the U.S. Nuclear Regulatory Commission (NRC) staff to complete the environmental review and development of an environmental impact statement (EIS) in support of the NRC's evaluation of the TRISO-X license application to construct, operate, and decommission a fuel fabrication facility (FFF) in Oak Ridge, Tennessee, to manufacture high-assay low-enriched uranium fuel up to 19.75 percent weight Uranium-235. The FFF will produce tristructural isotropic (TRISO) uranium fuel for use in both existing and advanced commercial nuclear reactors. The TRISO-X license application included an Environmental Report (ER) (TRISO-X, 2022), and these RAIs were developed by the NRC staff based on its review of the ER and other documentation independently obtained by the staff. The NRC's EIS is being prepared to fulfill the requirements of the National Environmental Policy Act of 1969, as amended (NEPA), and the NRC's NEPA implementing regulations in title 10 of the Code of Federal Regulations (CFR) part 51. In addition to the RAIs, the staff is also presenting observations of the application that TRISO may consider updating or providing additional information. These observations are not required information but would improve the application readability and understanding. If information is not provided, the staff request that TRISO-X say that no additional information will be provided for those observations.

It is important to note that unless TRISO-X requests otherwise, in accordance with NRC regulations in 10 CFR 2.390, reports, computer files, and other files and documentation that have been or will be provided to the NRC by TRISO-X and that are cited by the NRC staff as references in the EIS will be added to the NRC's Agencywide Documents Access and Management System (ADAMS) and made publicly available. Unless otherwise indicated, the NRC will make all references cited in the NRC's draft and final EIS publicly available at the time of publication of the draft and final EIS. In instances where TRISO-X determines that the requested information must remain proprietary, the NRC staff requests that, as practicable, a version of such documents be provided that contains the information NRC needs to complete the analysis and which can be made publicly available.

The RAIs or observations are presented in the following categories:

Surface Water (SW) Groundwater (GW) Threatened and Endangered Species (TES) Meteorology, Climatology, and Air Quality (AIR) Historic and Cultural Resources Public and Occupational Health and Safety (POH) Waste Management (WM) Environmental Consequences of Accidents (ACC) This information is needed in accordance with the NRC's NEPA implementing regulations contained in 10 CFR part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and the NRC staff guidance in NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs."

REQUESTS FOR ADDITIONAL INFORMATION

Surface Water

In Section 4.4.2.2.1.2, "Operation," of the ER, TRISO-X states that the FFF would comply with the Tennessee Department of Environment and Conservation's (TDEC) National Pollutant Discharge Elimination System permit for stormwater requirements and the City of Oak Ridge's Stormwater Management Ordinance. The following statements regarding storm water management were also found in this section:

- The existing drainage swale, a broad swale that lacks a defined channel but that drains the majority of the Horizon Center site (HCS), essentially all of the developed portion of the site, and the drainage area north of the HCS, is replaced with two perimeter drainage ditches that collect runoff and convey it to the detention system located immediately upstream of SD#1. Some diversion of drainage area would occur as a result of site development, with an additional 11.9 acre (ac. [4.82 hectares, or ha]) of area being diverted to SD#1.
- The detention system discharges to the SD#1 location and to the offsite topographic depression and karst swale west of the HCS. Within the 57ac. (23.1 ha) permanently developed portion of the HCS, there is approximately 24.5 ac. (9.9 ha) [1,067,224 square feet] of impervious land cover in the form of building roofs, paved roadways, and two asphalt parking lots. The impervious area, therefore, accounts for approximately 43 percent of the developed portion of the site and approximately 16 percent of the total drainage area to the detention system.
- The detention basin is divided into two separate sections—the forebay section is sized to collect the runoff from the entire permanent site areas and provide storage for the water quality volume (WQV) and a portion of the sediment deposited due to the settlement of total suspended solids present in the site runoff. The forebay is not lined and is allowed to infiltrate the WQV.

RAI ER-SW-1

Please provide details on how the facility's stormwater management program addresses specific requirements for local ordinances for development near karst features.

Section 14-505 (5) of the Oak Ridge Stormwater Ordinance contains specific requirements for development near karst features.

RAI ER-SW-2

Please provide details on how the facility's stormwater management program addresses exceptions/limitations to WQV/runoff reductions requirements in karst conditions outlined in the Oak Ridge Stormwater Ordinance.

Section 14-505 (7) of the Oak Ridge Stormwater Ordinance states that there are exceptions/limitations to WQV/runoff reduction requirements in karst conditions.

RAI ER-SW-3

Please provide a detailed description of how TRISO-X's permanent stormwater management program for the FFF complies with the contents of Appendix B, "Stormwater Design Guidelines for Karst Terrain," of the *Tennessee Permanent Stormwater Management and Design Guidance Manual* (TDEC, 2014).

Appendix B, "Stormwater Design Guidelines for Karst Terrain," of the *Tennessee Permanent Stormwater Management and Design Guidance Manual* outlines procedures and protocols that include *specific requirements, prohibitions, and recommendations* for permanent stormwater management in karst terrain.

RAI ER-SW-4

Given that the proposed activity would increase runoff volume to the offsite sinkhole west of SD#1, please provide documentation that the Class V UIC permit and legal agreements with the property owners have been properly addressed as required by the State stormwater management requirements.

Per the *Tennessee Permanent Stormwater Management and Design Guidance Manual* (TDEC, 2014):

"The act of directing increased stormwater runoff from developed land into a sinkhole or other karst feature constitutes a "modification" and as such, becomes a de facto improved sinkhole requiring a Class V UIC permit. This is even true if the improved sinkhole is downstream of stormwater treatment practices, either on site or off-site. Discharges to improved sinkholes on adjacent downstream properties are only allowed when appropriate legal agreements are made with the property owners of the improved sinkhole."

Groundwater

RAI ER-GW-1

Please provide the locations, descriptions, and flow/water quality data for springs along East Fork of Poplar Creek and Poplar Creek.

In Section 3.4.1.2.1, "Site Hydrogeology," of the ER, TRISO-X notes: "Karst features previously reported on lands adjacent to the HCS have included springs and sinkholes of various sizes." Nearby springs are typically discharge points for shallow groundwater in karst terrain. The northeast/southwest orientation of the local geology and adjacent sinkhole indicate that groundwater likely discharges at the East Fork of Poplar Creek to the southeast and to Poplar Creek to the southwest.

RAI ER-GW-2

Please provide an explanation as to why a dye tracer study was not conducted or not needed for the proposed facility.

Sections B.3.2 and B.4.4 of appendix B, "Stormwater Design Guidelines for Karst Terrain," of the *Tennessee Permanent Stormwater Management and Design Guidance Manual* (TDEC, 2014) advise that dye tracer studies be conducted for site developments in karst terrain.

OBSERVATION ER-GW-1

To improve readability and interpretation, please correlate geotechnical data provided in figures and tables to those provided for groundwater.

The cross sections generated for the geotechnical study show additional details of the subsurface including rock types, weathered rock zones, voids, differential weathering, and soil types.

Threatened and Endangered Species

RAI ER-TES-1

Provide the HCS parcel deed restrictions referenced by the U.S. Fish and Wildlife Service (USFWS) consultation letter dated April 15, 2022.

The USFWS states the HCS parcel has deed restrictions that direct appropriate environmental documentation requirements pursuant to NEPA.

RAI ER-TES-2

Provide the USFWS Information for Planning and Consultation (IPaC) query output on which TRISO-X bases its threatened and endangered species (TES) project impacts.

IPaC report documentation is required for reference in the EIS for Endangered Species Act (ESA) Section 7 consultation for project effects on TES.

RAI ER-TES-3

Provide the TDEC rare species database query output referenced by TRISO-X in its ER.

Rare species documentation is required for reference in the EIS for ESA Section 7 consultation for project effects on TES.

RAI ER-TES-4

Explain the inclusion of Lot 6b in the ecological resources project study area described in the TRISO-X ER. Detail any future design or construction plans for this lot and whether effects on vegetation and fauna habitat in this lot should be assumed as part of the ESA Section 7 consultation process or otherwise.

Design documentation (i.e., detailed project description and design plans to show areas of impact) is required to accurately describe the project impact Action Area in the EIS for ESA Section 7 consultation for project effects on TES.

RAI ER-TES-5

Provide correspondence from the Tennessee Wildlife Resources Agency, TDEC, USFWS, and/or other published literature regarding the following:

- a. Presence of documented or presumed bat hibernacula in the project vicinity (i.e., 10 miles) and/or documented karst caves that could be used as bat hibernacula or roosting sites in the project vicinity; and
- b. Presence of documented maternal colony and/or roost trees at the project site or in its vicinity.

Documentation (i.e., detailed project description and design plans to show areas of impact) is required to accurately describe the project impact Action Area in the EIS for ESA Section 7 consultation for project impacts on TES.

RAI ER-TES-6

If karst features that exist in or near the project site may be hydrologically connected to known or presumed occupied hibernacula or roost caves, detail what mitigation measures would be used to protect the karst systems from project effects (e.g., restricting herbicide use within 10 miles to herbicide specifically approved for use near karst or water; implementing effective Spill Prevention, Containment and Control programs; or other methods).

RAI ER-TES-7

Provide the field documentation (i.e., TES, terrestrial habitat, and/or ecological reports) for the field surveys (i.e., bat surveys) for ecological resources conducted September 8– 10, 2021, November 16–17, 2021, and April 26–27, 2022, as referenced in the ER, including, but not limited to, the following:

- a. Terrestrial habitat survey;
- b. Rare plant community surveys confirming absence of rare plant communities as asserted in Section 3.5.1 of the ER;
- c. Tree surveys documenting potential bat roost trees and confirming other forested areas that would be cleared during construction would not serve as bat roosting, maternal colony, and/or spring and fall staging and swarming habitat;
- d. Aquatic surveys conducted in the East Fork Poplar Creek and its tributaries;
- e. Bird surveys and seasonal eBird query output;
- f. Mammal surveys, specifically bat surveys; and
- g. Survey results of karst sinkholes with locations.

OBSERVATION-ER-TES-1

All reports and surveys should use a 0.25-mile survey boundary to capture cumulative impacts to species and their habitats or provide justification of why this buffer was not used.

OBSERVATION-ER-TES-2

Complete Section 7 coordination by providing the USFWS with relevant and detailed field surveys and subsequent reports covering TES, vegetation, habitat, karst areas, bat surveys and tree clearing locations for review and comment prior to any work being completed to close Section 7 obligations.

Meteorology, Climatology, and Air Quality

RAI ER-AIR-1

Provide a detailed description of the assumptions and parameters used in the Regulatory Guide 1.111 model to determine normalized concentration and deposition for the

locations that are expected to experience the highest environmental impacts under normal conditions of operation.

The ER does not provide sufficient information about models and assumptions used to determine normalized concentration and/or relative deposition under expected operating conditions.

RAI ER-AIR-2

Calculate the anticipated normalized concentration and relative deposition at points of potential maximum environmental concentration under normal conditions of operation.

The ER does not provide sufficient information about normalized concentration and/or relative deposition at points of potential maximum environmental concentration under normal conditions of operation.

Historic and Cultural Resources

OBSERVATION- ER-CUL-1

Provide a statement that although the portion of the current access path to the McKamey and Carmichael cemetery that goes through the site will not be available following construction and operation, the public would still be able to access the cemetery through other offsite means.

Public and Occupational Health and Safety

RAI ER-POH-1

Provide the expected relative atmospheric dispersion at the air intakes of the TRISO-X FFF and the Philotechnics facility.

The calculations of air dispersion should be consistent with the expected trends shown in RG 1.111 for an approximately 30-meter-high discharge (e.g., figure 7, page 1.111-22). Understanding the relationship between air emission sources and potential receptors is an important consideration when assessing air quality impacts.

RAI ER-POH-2

Provide the following information regarding the site-specific public dose calculation methods:

- Description of the physical release height(s) for radiological emissions and the plume rise.
- Documentation of the building wake turbulence calculation that demonstrates the radiological air emissions are not impacted by the building wake, including when the wind direction is parallel to the long axis of the main building.

Section 4.12.2.2.1 of the ER provides a limited description of the occupational and public dose calculations for the proposed action. The ER does not provide a clear documentation of the conservatism of the environmental air dispersion given that the TRISO-X FFF design proposes elevated radiological effluent release points.

Waste Management

RAI ER-WM-1

Provide information on current disposal options for all solid wastes including size and location of disposal sites as well as the plans for ultimate treatment and/or restoration of retired disposal sites.

Section 4.2.3.2 only discusses projected destination for disposal of radioactive waste. It does not discuss disposal options for solid and hazardous wastes or the size and location of all waste disposal sites and the plans for ultimate treatment and/or restoration of retired disposal sites. The discussion also needs to include the Tennessee regulations that allow disposal of free released radioactive waste at solid waste landfills. The discussion should also include options for disposal of higher activity radioactive waste not accepted at the Clive facility, if generated.

RAI ER-WM-2

Provide a description of the sources, types, quantities, composition of solid, hazardous, and mixed wastes expected from the proposed action.

Section 4.13.1 of the ER only discusses radioactive waste in detail. The ER should provide a more detailed description of the sources, types, quantities, composition of solid, hazardous, and mixed wastes expected to be generated.

RAI ER-WM-3

Describe the proposed waste management system designed to collect, store, and dispose of all other types of wastes generated by the proposed action.

All discussions of waste management systems in sections 4.13.2, 2.1.2.1.2.8, and 2.1.2.1.2.9 of the ER are incomplete and require a more in depth and coordinated description of the flow of all waste materials during collection, storage, treatment, and disposal. Radioactive waste is the only one that is discussed in any detail. Section 2.1.2.1.1.8 states facilities that handle and store radioactive materials are discussed in section 3.11.1. This section addresses natural sources of radiation and must be corrected.

RAI ER-WM-4

Provide additional details of TRISO-X's waste-minimization plan that includes any process changes or methods to reduce or eliminate wastes, including a description of methods to minimize the volume of waste.

Section 2.1.2.1.1.11 of the ER addresses the waste minimization plan but mostly discusses employee training and responsibilities. A more complete discussion is required that includes development of procedures, process changes, and methods to minimize or eliminate the toxicity and volumes of all waste that will be generated by facility operations.

Environmental Consequences of Accidents (ACC)

OBSERVATION- ER-ACC-1

In a letter from M.A. Bartlett (NRC) to J.K. Wheeler (TRISO-X, LLC), dated August 9, 2022, the NRC safety staff transmitted "Requests for Supplemental Information (RSIs) for the Acceptance Review of the TRISO-X, LLC License Application for a FFF." TRISO-X's Integrated Safety Analysis and ER indicate a lack of quantitative analysis and results for postulated (or design basis) radiological and chemical accidents and a lack of design detail for Items Relied on for Safety (IROFS) to ensure availability and reliability. In a letter from TRISO-X to the NRC, dated October 19, 2022, including Enclosures 2 and 3, TRISO-X provided responses to NRC safety staff's RSIs. The NRC EIS team is reviewing and coordinating the TRISO-X responses to NRC RSIs with the NRC safety staff to ensure that sufficient detail is provided, and the degree to which the NRC safety staff accepts TRISO-X RSI responses.

Section 4.12.2.3, "Environmental Effects of Accidents" of the ER provides a limited description of the environmental impacts associated with postulated (or design basis) radiological and hazardous chemical accidents that might occur at the proposed TRISO-X FFF, including a lack of design detail for IROFS implemented to prevent and mitigate such accidents. This is evidenced by the extensive RSIs already issued by the NRC.

In addition to the EIS, the NRC staff will perform an independent verification of the potential accident scenarios, radiological and chemical consequences, and safety features to prevent or mitigate such accidents at the proposed TRISO-X FFF in its Safety Evaluation Report (SER). The SER is part of the regulatory process that the NRC uses to decide whether to issue a construction permit and operating license for the proposed TRISO-X FFF.

General

RAI - ER-GEN -1

Provide updated information regarding the revised location of the proposed transmission line and substation that will bring power to the facility. Update the ER with associated changes to all resource areas.

The location and alignment of the incoming power transmission line has changed since the application was initially submitted.

REFERENCES

10 CFR part 51. *Code of Federal Regulations*, title 10, Energy, part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

NRC (U.S. Nuclear Regulatory Commission). 2021. "*Guidance for Electronic Submissions to the NRC*." ADAMS ML13031A056. Washington, DC: U.S. Nuclear Regulatory Commission.

NRC. 2022. Letter from M.A. Bartlett to J.K. Wheeler TRISO-X, LLC, dated August 9, 2022, regarding "Request for Supplemental Information for the Acceptance Review of the License Application for a Fuel Fabrication Facility (Docket Number: 70-7027)." Washington, D.C. ADAMS Package ML22166A042. NRC. 2021. "*Guidance for Electronic Submissions to the NRC*." ADAMS ML13031A056. Washington, DC: U.S. Nuclear Regulatory Commission.

TDEC (Tennessee Department of Environmental and Conservation). 2014. "*Tennessee Permanent Stormwater Management and Design Guidance Manual*." First Edition. Prepared by Tennessee Department of Environment and Conservation, Division of Water Resources; University of Tennessee, Department of Biosystems Engineering and Soil Science; Tennessee Water Resources Research Center; and Stormwater Management, Assistance, Research and Training (SMART) Center. December 2014.

THC (Tennessee Historical Commission). 2020. *"The Tennessee Historical and Architectural Survey Manual."* Tennessee Historical Commission, State Preservation Office. Updated 202.

TRISO-X, LLC. 2022. "*Environmental Report Submittal for the TRISO-X Fuel Fabrication Facility*." TRISO-X, LLC, Rockville, MD.

Letter to J. Wheeler re: TRISO-X Fuel Fabrication Facility Environmental Requests for Additional Information Part 1 DATE March 21, 2023

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