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TX0-LTR-0016

ELECTRONIC DELIVERY

April 14, 2023

Director, Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

References:
1) Docket No. 70-7027
2) TRISO-X letter from Jennifer Wheeler to Director, Office of Nuclear Material Safety and Safeguards, "TRISO-X Fuel Fabrication Facility Environmental Report Submittal," dated September 23, 2022
3) NRC letter from Robert Sun, Branch Chief, Environmental Review Materials Branch, to Jennifer K. Wheeler, "Request for Additional Information for the Application from TRISO-X, LLC for Special Nuclear Material License for a Fuel Fabrication Facility in Oak Ridge, Tennessee," dated March 17, 2023

Subject: **Response to Requests for Additional Information on the TRISO-X, LLC, Environmental Report for the Proposed Fuel Fabrication Facility**

TRISO-X, LLC (TRISO-X) hereby submits responses to the subject Requests for Additional Information (RAI), regarding the review of the Environmental Report for the TRISO-X Fuel Fabrication Facility (Reference 2). The enclosed responses are for the RAI set transmitted by letter dated March 17, 2023 (Reference 3).

Requests for Withholding

None. The enclosed submittal contains public information.

Summary of this Submittal

The following Enclosures are included with this letter.

Enclosure 1 – Responses to Requests for Additional Information

Enclosure 2 – Reference Material for Responses to Observation ER-GW-1 and RAIs ER-TES-1, ER-TES-2, and ER-TES-3

If there are questions or if additional information is required, please contact me at (865) 850-0893 or jwheeler@triso-x.com.

Sincerely,

Jennifer Wheeler

Jennifer K. Wheeler, P.E.
Vice President, Regulatory Affairs

TRISO-X, LLC
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Copy: Jill Caverly, US NRC
TRISO-X Regulatory Records File

Enclosure 1 – Responses to 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.

TRISO-X Response to RAI ER-SW-1

Subsequent to the submittal of the Environmental Report, TRISO-X prepared a stormwater pollution prevention plan (SWPPP) in accordance with the Oak Ridge Stormwater Ordinance and the current Tennessee Erosion and Sediment Control Handbook. The SWPPP has been submitted to and approved by both the City of Oak Ridge and the Tennessee Department of Environment and Conservation (TDEC). The SWPPP will be implemented before construction begins. The SWPPP includes installation and maintenance of Best Management Practices (BMPs) during land disturbing activities that are designed to effectively reduce erosion and

sedimentation impacts. The TDEC Division of Water Resources public permit information related to the SWPPP can be found at the following url:

https://dataviewers.tdec.tn.gov/dataviewers/f?p=2005:34051:16647810607448:::34051:P34051_PERMIT_NUMBER:TNR136931

Regarding the maintenance of natural drainage courses, the TRISO-X Fuel Fabrication Facility SWPPP, Section 5.3.1 states, “Existing natural conditions shall be preserved as much as feasible. Such practices may include preserving existing vegetation, vegetative buffer strips, and existing soil profile and topsoil, minimizing soil compaction, minimizing disturbance of steep slopes, phasing of construction operations to minimize the amount of disturbed land at any one time, and protective clearing or grubbing practices. No vegetative cover removal will be performed greater than 15 days prior to grading or earth work unless the area will be promptly seeded/mulched or have some other temporary cover installed.”

Additionally, the remaining areas of the Oak Ridge Stormwater Ordinance cited refer to development near karst features. As summarized in Section 3.3.2 of the Environmental Report, karst features, including sinkholes of various sizes, have been previously reported on lands adjacent to the HCS. No sinkholes were reported to occur directly on the HCS. However, based on the topography of the HCS, several shallow draws and depressions exist which could indicate karst features beneath the surface. One such feature is the existing drainage swale. This broad swale has characteristics similar to a “karst swale” as described by TDEC. The potential for sinkhole formation and karst features has been evaluated by two phases of a geotechnical soil boring investigation program in conjunction with a geophysical investigation. These investigations, which included deep rock coring at multiple locations, did not find large voids within the bedrock formation or in the subsurface overburden profiles. Therefore, because there is no reported incidence of sinkholes on the site and the geotechnical investigations did not find any sinkholes or karst features, the cited ordinance does not apply.

Regarding the specific requirements of Section 14-505 (5) of the Oak Ridge Stormwater Ordinance that are applicable to development near karst features:

- The pre-development natural drainage courses have been maintained. The inflow points to the site have not been changed or relocated, and the outflow points from the site have also been maintained. Detention basins are provided to keep the post-developed maximum rate of discharge from the site below the pre-developed site conditions.
- There are no sinkholes present on the site and therefore no structures will be built within the post-development contour line of any sinkhole.
- There are no sinkholes or karst features present on the site and therefore no removal of overburden in areas of karst features.
- There are no sinkholes on the site and therefore there will be no disturbance of any mature trees whose drip line canopy covers a karst feature.
- There are no sinkholes on the site and therefore, no change in the 100-year contour line or remediation of any sinkhole is required.
- The project is not expected to expose any karst features during the cutting of overburden. Cut and fill operations will be supervised by a qualified licensed professional. If any

unexpected karst features are exposed, TRISO-X will coordinate with the authorities, if required, and take appropriate mitigation procedures in accordance with the City and TDEC requirements. The Erosion and Sediment Control plan and the stormwater management plan will be amended accordingly.

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.

TRISO-X Response to RAI ER-SW-2

Section 14-505 (7) of the Oak Ridge Stormwater Ordinance provides general design performance requirements for permanent stormwater management. The City of Oak Ridge has reviewed and approved the TRISO-X FFF site preparation, grading, and stormwater management construction plans in accordance with the Oak Ridge Stormwater Ordinance and other applicable requirements.

According to the ordinance, runoff reduction practices are onsite measures that recharge surface water into the ground water system. Paragraph (a) of Section 14-505 (7) of the Oak Ridge Stormwater Ordinance provides the runoff reduction requirement. The first inch of rainfall must be 100% managed with no discharge to surface waters. Paragraph (b) of Section 14-505 (7) of the Oak Ridge Stormwater Ordinance provides limitations to the application of runoff reduction requirements including the presence of sinkholes or other karst features.

As described in the TRISO-X FFF SWPPP, Section 6.1, the detention basins have been designed with two separate sections. The forebay section is sized to collect the runoff from the entire permanent site areas and provide storage for partial WQV and sediment volume generated from the site. The main detention basin section receives stormwater overflow from the forebay section for a controlled release to the downstream natural drainage courses. The western detention basin discharges to the natural DOE green belt reservation and ultimately to the East Fork Poplar Creek. Detention basins on the east side of the site and the pre-existing drainage channel along the northeast side of the property discharge east of Renovare Boulevard to the East Fork Poplar Creek. Post construction stormwater controls are shown on the Overall Site Plan in Appendix E of the SWPPP.

Therefore, the TRISO-X stormwater management program addresses the required runoff reduction without the application of any exceptions.

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).

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-SW-3

The referenced manual states its primary purpose is to serve as design guidance and technical reference for designated and non-designated (unregulated) MS4 communities in Tennessee. It is intended to provide the information necessary to properly meet minimum permanent stormwater management requirements as specified in MS4 permits. As such, there are no compliance requirements contained in the manual outside of the TDEC regulations. TRISO-X SWPPP details the temporary and permanent controls required to accommodate the permanent, post construction, stormwater management needs of the site. This SWPPP and the associated designs have been prepared in accordance with the *TN Erosion & Sediment Control Handbook*, 4th edition, as well as the City of Oak Ridge's Stormwater Design Manual and Stormwater Management Ordinance (No. 1-2016).

Although not strictly applicable as noted above, the TRISO-X FFF meets the general stormwater design principles for karst provided in Appendix B, Section B5. Detailed site investigations were performed prior to beginning site and stormwater design to fully understand subsurface conditions, assess karst vulnerability, and define the actual drainage pattern present at the site. Detailed site investigations included topographic surveys, geotechnical investigations, and observations of drainage patterns and features. As stated in the response to RAI ER-SW-1, karst features, including sinkholes of various sizes, have been previously reported on lands adjacent to the Project Site. No sinkholes were reported to occur directly on the Project Site. However, based on the topography of the Project Site, several shallow draws and depressions exist which may reveal karst features beneath the surface. One such feature is represented by an existing drainage swale. This broad swale has characteristics similar to a "karst swale" as described by TDEC.

The site layout and design minimize site disturbance and changes to soil profile, including cuts, fills, excavation, and drainage alteration near the offsite karst features located west of the Project Site. The stormwater management design minimizes the volume and velocity of stormwater runoff generated by the use of the stormwater detention basin. There are no existing septic systems at the Project Site and TRISO-X FFF will be connected to the City of Oak Ridge water and sewer systems. Therefore, there will be no new septic systems. Lastly, the project design addresses both the flooding and water quality aspects of post development stormwater runoff. The project design maintains both the quality and quantity of runoff to predevelopment levels and minimizes rerouting of stormwater from existing drainage patterns.

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.

Enclosure 1 – Responses to Requests for Additional Information

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."

TRISO-X Response to RAI ER-SW-4

In conjunction with operation of the TRISO-X FFF, stormwater is released from the site detention basin at the outlet structure near the western side of the HCS identified in Figure 2.1-1 of the Environmental Report, to the ground surface at the southwestern portion of the HCS. Drainage from this location is noted to be conveyed by an existing drainage swale to an observed sinkhole feature in the adjacent parcel. Post-developed flows from the watershed and site runoff to the outlet area at the western edge of the HCS are calculated to be less than the existing condition. Therefore, no Class V UIC permit is required as stormwater runoff volume will not increase.

The quotation from the manual referenced comes from section B.4.3 and details underground injection permit requirements for "Class V" wells. Class V wells are defined as shallow wells used to place a variety of fluids directly below the land surface. By definition, a well is "any bored, drilled, driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system." In karst terrain, improved sinkholes are the most common type of Class V well that will be encountered, although some infiltration practices may also qualify.

Class V well requirements are primarily triggered by two conditions in karst terrain. The first and most serious condition is when increased post-development runoff is directed to an "improved sinkhole." EPA defines an "improved sinkhole" as a naturally occurring karst depression or other natural crevice, which has been modified by a man-made structure to direct fluids into the subsurface. EPA defines man-made structures as including pipes, swales, ditches, excavations, drains, graded slopes, or any other device that is intended to channel fluids toward or into a sinkhole.

In Tennessee, this definition would also include directing increased stormwater runoff volumes into an existing sinkhole from new upland development. As stated above, the stormwater runoff volume will not increase in the post-development condition; therefore, a Class V UIC permit is not required.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-GW-1

In ER Section 3.4.1.2.1, Site Hydrogeology, reference is made to Section 3.3.2, Karst Features. This section notes karst features previously reported on lands adjacent to the HCS have included springs and sinkholes of various sizes (DOE, 2013). This referenced document identifies two springs on Figure 3 near east of the confluence of East Fork and Poplar Creek springs on lands west of the HCS. Water quality data at location S7 downstream of one of the identified springs was collected on a seasonal basis and is reported in ER Tables 3.4.2-3 to 3.4.2-6. While this location is near one of the identified springs, it was noted to be influenced by backwater from the East Fork of Poplar Creek and is not truly representative of spring discharge. No spring flow measurements or water quality data were obtained during field studies or were included in the listed reference.

The following document is provided for additional perspective on these karst features; Figure 3 in that document identifies their locations relative to the HCS.

DOE, 2013. Implementation of Mitigation Action Plan for Parcel ED-1 on the Oak Ridge Reservation, Oak Ridge, Tennessee. May 21, 2013
https://doeic.science.energy.gov/uploads/E.0505.072.1340.pdf

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.

TRISO-X Response to RAI ER-GW-2

The referenced manual states that, as part of a detailed site investigation, if karst features are expected to receive additional runoff after land development, it is advisable to conduct dye tracing to determine the flow direction of water entering the subsurface. Section 4.4.1 of the Environmental Report contains details regarding the impacts to groundwater from stormwater. Post-developed flows from the watershed and site runoff to the outlet area at the western edge

of the HCS are calculated to be less than the existing condition, and thus no dye tracer study was conducted. Additionally, the TRISO-X FFF SWPPP described in the response to RAI ER-SW-1 contains the detailed stormwater calculations. Pre- and post-development runoff curve numbers have been determined based on the pre- and post-estimates for impervious surfaces within the project area. The resulting increase in overall impermeability produces an increase in runoff volume. However, detention basins are proposed for the new facility that accommodate and manage the increased runoff from developed areas of the site. As a result, the rate of discharge at the outfall locations are below the pre-developed site condition.

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.

TRISO-X Response to OBSERVATION ER-GW-1

Cross section in Figure 3.3.3-4 “Representative Fence Diagram Illustrating Geologic Cross Section of Horizon Center Site at A-A’” has been appropriately updated to reflect additional detail that is consistent with the cross sections contained in the geotechnical study. The revised figure is included in Enclosure 2 and will be included in the next revision of the Environmental Report.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-TES-1

Amendment Number Three (3) to Declaration of Covenants, Conditions, and Restrictions of the Horizon Center was recorded with the Roane County Register of Deeds on December 6, 2013, Deed Book 1487, Pages 815-854. A copy is included in Enclosure 2. The Covenants apply to the entirety of the Horizon Center industrial park, including the TRISO-X site which is located within the area labeled as Development Area 6 in Exhibit E. Article I defines the terms “natural area” and “sensitive resources.” Article V, Section 5.3.2, discusses protection of Indiana Bat Habitat.

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.

TRISO-X Response to RAI ER-TES-2

The USFWS IPaC query output dated March 14, 2022 (USFWS, 2022) is included in Enclosure 2.

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.

TRISO-X Response to RAI ER-TES-3

The TDEC Rare Species database query output dated September 21, 2021 (TDEC 2021) is included in Enclosure 2.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-TES-4

At the time the ecological field surveys were conducted in 2021 and 2022, TRISO-X was considering purchase of the entirety of Development Area 6 (approximately 151 acres) in the Horizon Center industrial park. At the time of the actual land transfer that was completed in June 2022, TRISO-X purchased approximately 110 acres of Development Area 6. Environmental Report Figure 2.3-1 shows the TRISO-X property as lot 6(a), and the adjoining property that was not purchased as lot 6(b). TRISO-X has no future plans to purchase the remaining approximately 40 acres of property.

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.

TRISO-X Response to RAI ER-TES-5

Initial agency consultation correspondence with the USFWS and TDEC dated March 9, 2022, and subsequent responses, is provided in ER Appendix 1A, reference 3, 4, 5 and 6.

As noted in ER Section 3.5.5:

- Fourteen potentially suitable bat roost trees were identified in the study area, seven of which are located on the TRISO-X property (Lot 6a).
- No caves or maternal roost sites were observed within or in proximity to the study area during the 2021 and 2022 field surveys.

Enclosure 1 – Responses to Requests for Additional Information

Additional literature that discusses bat hibernacula and roost trees in the project vicinity cited in the ER are provided as Enclosure 1- Additional literature. The additional literature includes:

- Department of Energy "Oak Ridge Reservation Annual Site Environmental Report" for 2020 dated September 2021 (DOE 2021). https://doeic.science.energy.gov/ASER/aser2020/REPORT%20FULL%202020%20ASER%20FINAL.pdf
- Oak Ridge National Laboratory "Wildlife Management Plan for the Oak Ridge Reservation" dated October 2019 (ORNL, 2019). https://info.ornl.gov/sites/publications/Files/Pub133467.pdf

Relevant past environmental documents that were reviewed but were not cited in the ER as part of the analysis of threatened and endangered species are described below. These documents are publicly available.

Several EAs related have been prepared by the DOE for projects on the Horizon Industrial site. These include:

- Environmental Assessment of the Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council. DOE/EA-1113. April 1996. https://doeic.science.energy.gov/uploads/E.0505.037.0657.pdf
- Environmental Assessment Addendum for the Proposed Title Transfer of Parcel ED-1. DOE/EA-1113-A. April 2003. https://doeic.science.energy.gov/uploads/A.0103.037.0003.pdf
- DOE 2020. Environmental Assessment Addendum for the Proposed Revitalization of Parcel ED-1 at the Horizon Center, Oak Ridge Tennessee. DOE/EA-1113-A2. August 2020. https://doeic.science.energy.gov/uploads/A.0100.037.2683.pdf
- Environmental Study Report Proposed 69-kV Delivery Point Horizon Center, Oak Ridge Tennessee. DOE/OR/-01-2639. January 2014. https://doeic.science.energy.gov/uploads/E.0505.076.1348.pdf
- DOE 2020. Addendum to Environmental Study Report Proposed 69-kV Delivery Point Horizon Center, Oak Ridge Tennessee. DOE/OR/-01-2639/A1. February 2020. https://doeic.science.energy.gov/uploads/E.0505.076.1407.pdf

The following Mitigation Action Plans were written to support the 1996 and 2003 EA:

- Mitigation Action Plan – Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council, East Tennessee Economic Council, U.S. Department of Energy, Office of Environmental Management, Oak Ridge, TN. DOE/EA-1113. April 1996. https://www.osti.gov/servlets/purl/390650
- Mitigation Action Plan for the Protection of the Natural Area on Parcel ED-1, U.S. Department of Energy, Oak Ridge Operations, Oak Ridge, TN. DOE/EA-1113-A. April 2003. https://doeic.science.energy.gov/uploads/A.0103.072.0004.pdf

Monitoring at Parcel ED-1 are compiled by DOE in the following annual reports:

- Annual Report - Implementation of Mitigation Action Plan for DOE/EA-1113: Lease of Parcel ED-1 on the Oak Ridge Reservation, Oak Ridge, Tennessee, Pre-Development Ecological Surveys, DOE/EA-1113/MAP-97. November 1997. https://doeic.science.energy.gov/uploads/E.0505.072.0674.pdf

- Annual Report - Implementation of Mitigation Action Plan for DOE/EA-1113: Lease of Parcel ED-I on the Oak Ridge Reservation Oak Ridge, Tennessee, DOE/EA-1113/MAP-98 (DOE 1998)]. Copy can be requested via https://doeic.science.energy.gov/Search.aspx, using "map-98" in search box.
- Annual Report - Implementation of Mitigation Action Plan for DOEIEA-1113: Lease of Parcel ED-1 of the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1113/MAP-99 (DOE 1999). Copy can be requested via https://doeic.science.energy.gov/Search.aspx, using "map-99" in search box.
- Annual Report - Implementation of Mitigation Action Plan for Lease of Parcel ED-I on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1113/MAP-00 (DOE 2000). Copy can be requested via https://doeic.science.energy.gov/Search.aspx, using "map-00" in search box.
- Implementation of Mitigation Action Plan for Parcel ED-1, DOE/OR/01-2585. May 2013. https://doeic.science.energy.gov/uploads/E.0505.072.1340.pdf

No monitoring data were collected at Parcel ED-1 in 2001. Annual monitoring was resumed in 2002 and continued through 2004.

- Annual Report, Calendar Year 2002 - Implementation of Mitigation Action Plan for Lease of Parcel ED-1 on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1113/MAP-02. May 2003. https://doeic.science.energy.gov/uploads/A.0100.072.0112.pdf
- Annual Report, Calendar Year 2003 - Implementation of Mitigation Action Plan for Lease of Parcel ED-I on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1113/MAP-03. July 2004. https://doeic.science.energy.gov/uploads/A.0100.072.1138.pdf
- Annual Report, Calendar Year 2004 - Implementation of Mitigation Action Plan for Lease of Parcel ED-I on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1113/MAP-04. June 2005. https://doeic.science.energy.gov/uploads/A.0100.072.1169.pdf

The Industrial Development Board of Oak Ridge (IDB) conducted Habitat Suitability Assessments for the Federally Endangered Indiana bat (*Myotis sodalis*) and the Federally Threatened northern long-eared bat (*Myotis septentrionalis*) on a portion of Area 6 and Area 5 in 2016. The results of these surveys were provided to TRISO-X by the IDB, the previous owner, during due diligence investigations related to the purchase of the property. Copies have been added to the Online Reference Portal for NRC review.

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).

Enclosure 1 – Responses to Requests for Additional Information

TRISO-X Response to RAI ER-TES-6

The following revisions shown in italics will be made to ER Section 4.4.1 Groundwater.

ER Section 4.4.1.2.1:

> The use of construction materials and equipment can result in the release of liquids and potentially cause impacts to groundwater quality. Such spills can include accidental releases of gasoline, diesel fuel, hydraulic lubricants, and other similar products used for construction equipment and materials. Proper engineering and design controls including development and following of BMPs such as concrete washout containment, construction entrance, and tire cleaning arrangement, and use of a Spill Prevention, Control, and Countermeasures (SPCC) plan reduces the potential impacts to groundwater during construction. In accordance with the SPCC plan, releases would also be avoided or minimized by regular maintenance and inspection of equipment and rapid response to clean-up spills that would contain and prevent contaminants from reaching soil, sediment, or water. *Use of herbicides to control unwanted vegetation growth have the potential to impact non-target vegetation, water sources, or fish and wildlife through inadvertent application, excess surface runoff, spray drift, and leaching through the soil profile. These impacts are minimized when herbicides are used according to the label recommendations and applied by trained applicators. Herbicides that may be used during construction near waterbodies or areas that drain to surrounding offsite karst areas would be limited to those approved for use in these areas and would be applied in accordance with manufacturer recommendations*. Federal and State regulations and permit requirements also address management and control of all potential pollutants at the facility through the use of structural and non-structural BMPs such that release of such materials to off-site waters is minimized. As such, the potential for a surface release of contaminants to migrate downward to the groundwater aquifer resources is limited.
>
> Implementation of engineering designs and controls including BMPs, *selective use of herbicides in sensitive areas* and a SPCC plan for construction would prevent water quality standards or limits from being exceeded; therefore, impacts to groundwater quality from construction of the TRISO-X FFF are SMALL.

ER Section 4.4.1.2.2 (paragraph added):

> *During operation, herbicide application is occasionally used around buildings and driveways as part of lawn maintenance activities to control weedy species. Herbicide application is only used for the control of targeted weedy plant species following herbicide label application rates and safety precautions. Herbicides that may be used in areas near waterbodies or areas that drain to karst areas would be limited to those approved for use in these areas and would be applied in accordance with manufacturer recommendations*.

The following revisions shown in italics will be made to ER Section 4.4.2 Surface Water.

ER Section 4.4.2.2.3.1

> BMPs such as slit fencing, straw wattles, concrete washout containment, construction entrance, and tire cleaning arrangement are utilized throughout the construction phase. *These measures minimize the potential for runoff of fuels, lubricants, oily wastes, chemical wastes and sanitary wastes. Impacts associated with the use of herbicides through inadvertent application, excess surface runoff, spray drift, and leaching through*

the soil profile are minimized when herbicides are used according to the label recommendations and applied by trained applicators. Herbicides that may be used during construction near waterbodies or areas that drain to karst areas would be limited to those approved for use in these areas and would be applied in accordance with manufacture recommendations.

ER Section 4.4.2.2.3.2 (paragraph added):

During operation, herbicide application is occasionally used around buildings and driveways as part of lawn maintenance activities to control weedy species. Herbicide application is only used for the control of targeted weedy plant species following herbicide label application rates and safety precautions. Herbicides that may be used in areas near waterbodies or areas that drain to karst areas would be limited to those approved for use in these areas and would be applied in accordance with manufacturer recommendations.

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.**

TRISO-X Response to RAI ER-TES-7

The requested field documentation has been added to the Online Reference Portal for NRC staff use to review and confirm that the summary of this information provided in the Environmental Report is complete.

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.

TRISO-X Response to OBSERVATION ER-TES-1

TRISO-X is not aware of the 0.25-mile survey buffer requirement referenced in the observation. However, data collected during the ecological surveys as well as the review of available public data related to ecological resources presented in ER Section 3.5 adequately characterized the

terrestrial and aquatic species and their habitat on the site and near site areas (defined as within a 0.5-mi. (0.8-km) radius of the HCS) which provides a context for impact assessment and the baseline for the evaluation of cumulative effects on ecological resources. Qualitative ecological surveys included the HCS (Lot 6a) and the wooded lot in proximity to and northeast of the HCS (Lot 6b). Selected field studies (avifaunal surveys) were also conducted in the lot west of the HCS (Lot 5). In addition, five stream habitats in proximity to the study area were evaluated during summer and fall 2021 and spring 2022 field surveys to assess the potential to support aquatic organisms and document observed aquatic biota. The extent of these surveys was established based upon review of available ecological monitoring data and initial reconnaissance of the site.

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.

TRISO-X Response to OBSERVATION ER-TES-2

Reference the response to RAI ER-TES-5 for additional publicly available documents that discuss ecological and other environmental topics, and two studies related to the potential for bat habitat that will be added to the Online Reference Portal. The seven potential bat roost trees identified as BRT-001 through BRT-007 in Table 3.5.5-2 and Figure 3.5-1 of the Environmental Report were removed at the end of March 2023 in accordance with Article 5.3.2 of the Declaration of Covenants, Conditions, and Restrictions provided in the response to RAI ER-TES-1 and the USFWS-directed “no-cut” period between April 15 and September 15.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-AIR-1

Per the TRISO-X response to RAI ER-POH-1, atmospheric relative concentration values (X/Qs) and ground deposition values (D/Qs) are calculated with the use of the XOQDOQ computer code (which implements RG 1.111). The meteorological input data is obtained from Tower D located near the Oak Ridge National Laboratory (ORNL), which is located in proximity to the TRISO-X Facility. The data was collected for the period 2016 to 2020 at 15 m above ground level. A ground-level release model, with a 10-meter release height and no vent velocity, is used in the XOQDOQ calculation. A ground-level release model provides the bounding values for the X/Q and D/Q values. 10 meters is used for the height of the release point because XOQDOQ treats a ground-level release as a release that is 10 meters above ground-level. Plume depletion via wet deposition is not modeled in this analysis. In addition, the XOQDOQ calculation does not model a building wake effect on the radiological air emissions (i.e., a value of 0 m^2 is used for the vent's building cross-sectional area).

The XOQDOQ calculation determines X/Q and D/Q values at the site boundary and as a function of distance out to 50 miles radially from the release point, in all sixteen (16) sectors. The largest X/Q value for the site boundary is 8.70E-04 s/m^3 (no decay/undepleted) and is in the S(South) sector. The largest D/Q value for the site boundary is 1.90E-07 $1/m^2$ and is also in the S sector.

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.

TRISO-X Response to RAI ER-AIR-2

Per the TRISO-X response to RAI ER-AIR-1, atmospheric relative concentration values (X/Qs) and ground deposition values (D/Qs) are calculated at the site boundary and as a function of distance out to 50 miles radially from the release point, in all sixteen (16) sectors. The largest X/Q value for the site boundary is 8.70E-04 s/m^3 (no decay/undepleted) and is in the S(South) sector. The largest D/Q value for the site boundary is 1.90E-07 $1/m^2$ and is also in the S sector.

Enclosure 1 – Responses to Requests for Additional Information

As noted in the TRISO-X response to RAI ER-POH-1, a ground-level release model is used in the dispersion and deposition calculation and provides the bounding values for the X/Q and D/Q values for locations at the site boundary and beyond. X/Q and D/Q values are needed for locations at the site boundary and beyond in order to determine the site boundary radionuclide concentrations and the member of the public dose consequences under normal conditions of operation. The site boundary radionuclide concentrations and the member of the public dose consequences are needed in order to satisfy the radiological criteria governed under 10 CFR 20 Appendix B and 10 CFR 20.1101(d). Since bounding values for the X/Q and D/Q values for the site boundary and beyond are calculated, and since X/Q and D/Q values decrease as a function of downwind distance under the ground-level release model, using a X/Q value of 8.70E-04 s/m^3 and a D/Q value of 1.90E-07 $1/m^2$ provides maximum environmental concentrations that can conservatively be used to satisfy the radiological criteria.

X/Q and D/Q values can also be used in developing a radiological environmental monitoring program (REMP). For the case where locations of potential maximum environmental concentrations are needed in establishing monitoring locations, the X/Q and D/Q values calculated beyond the site boundary out to 50 miles radially from the release point, in all sixteen (16) sectors, can be used. As documented in the dispersion and deposition calculation, the bounding general X/Q values for the 16 sectors from 0.25 miles to 50 miles are in the SW/ENE sectors The bounding general D/Q values from 0.25 miles to 50 miles for the 16 sectors are in the NE sector.

If it would help the NRC review, the dispersion and deposition calculation could be made available on the Online Reference Portal for NRC review/confirmation.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to OBSERVATION ER-CUL-1

The McKamey and Carmichael cemetery is located within public land zoned as a Greenbelt District. Although the cemetery can be accessed via a dirt road which traverses the HCS, this is located on private property. However, the cemetery can be accessed via the North Greenway Trail. Approximately 950 feet of the 16-mile trail extends in a general east west direction along the northern portion of the public Greenbelt where the cemetery is located. While the existing dirt road that goes through the site will not be available following construction and operation of the HCS, the public would still be able to access the cemetery through adjacent publicly available lands.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-POH-1

Regulatory Guide (RG) 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, provides guidance for estimating atmospheric transport and dispersion of gaseous effluents in routine releases from land-based light-water-cooled reactors, to be used in meeting radiological limits associated with the unrestricted area boundary and individuals in unrestricted areas (i.e., 10 CFR 20 Appendix B radionuclide concentration limits and 10 CFR 50 Appendix I member of the public dose limits). In addition, per the Regulatory Guide Periodic Review, conducted in 2014, RG 1.111 provides guidance for two general purposes; 1) "Establishing site atmospheric dispersion characteristics and parameters as part of...pursuant to 10 CFR 100.21(c)(1) requirements that airborne radiological effluent release limits associated with normal operation can be met for any individual located offsite", and 2) "Determining X/Q and D/Q values for use in an operating plant's Offsite Dose Calculation Manual (ODCM)...a facility's methodology for estimating the maximum potential annual radiation doses to the public...". As such, atmospheric relative concentration values (X/Qs) and ground deposition values (D/Qs) calculated with the use of the XOQDOQ computer code (which implements RG 1.111) are not determined for locations very near the site effluent release point (i.e., air intakes of the TRISO-X FFF).

The XOQDOQ calculation determines X/Q and D/Q values at the site boundary and as a function of distance out to 50 miles radially from the release point, in all sixteen (16) sectors. Although an explicit X/Q value is not determined for the specific Philotechnics facility location, the largest sector-dependent site boundary X/Q value can conservatively be used for the Philotechnics facility since the Philotechnics facility is located beyond the site boundary. The XOQDOQ calculation shows that the largest X/Q value for the site boundary is 8.70E-04 s/m^3.

Figure 7 of RG 1.111 ["Relative Deposition for 30-m Releases (Letters denote Pasquill Stability Class)] shows the relative deposition rate (per meter) as a function of plume travel distance (kilometers). The trend (initially increasing to a maximum and subsequently decreasing) shown in this figure is for a 30-m release (i.e., a non-ground-level release model). A 30-m release model does not match the 10-m ground-level release model that is used in the XOQDOQ calculation for determining X/Qs and D/Qs. As documented in the XOQDOQ calculation, a ground-level release model provides the bounding values for the X/Q and D/Q values, and 10-m is used for the height of the release point because XOQDOQ treats a ground-level release as a release that is 10-m above ground-level. It should also be noted that the XOQDOQ calculation has additional conservatisms; no modelling of building wake effects and use of minimum site boundary distances.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-POH-2

Per the TRISO-X response to RAI ER-POH-1, the release height used for the modelling of radiological emissions is 10 meters. 10 meters is the value used in the XOQDOQ computer code to model a ground-level release mode, which is the mode that provides bounding values for the atmospheric relative concentration values (X/Qs) and ground deposition values (D/Qs) (see TRISO-X response to RAI ER-POH-1 for details). As such, since a ground-level release model is used in the XOQDOQ calculation, no plume rise is modelled; plume rise being a variable used in XOQDOQ elevated and mixed-mode release models per NUREG/CR-2919, "XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations," September 1982.

The XOQDOQ calculation does not model a building wake effect on the radiological air emissions (i.e., a value of 0 m^2 is used for the vent's building cross-sectional area). Per Equation 7 of NUREG/CR-2919, using a value of 0 m^2 for the vent's building cross-sectional area produces a conservative estimate for the X/Q values at the locations of interest (i.e., site boundary and beyond; see TRISO-X response to RAI ER-POH-1 for details).

As described in Section 4.12.2.2.2.2 of the ER, administrative dose limits are implemented to control occupational radiation exposure to workers at the TRISO-X FFF. Administrative dose limits cannot be exceeded without management approval. Occupational exposure is controlled and monitored by the facility's radiation protection program and is maintained as low as is reasonably achievable (ALARA). Annual average dose to TRISO-X FFF workers is expected to be in line with other fuel fabrication facilities.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-WM-1

Per Section 6.4.2, Transportation Impacts, of NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report, August 2003, Section 4.2 of the ER describes the impacts to transportation corridors including the effects of transportation of radioactive materials (traffic impacts and radiation dose impacts). Transportation of nonradioactive waste is addressed in Section 4.2.2.5, which also discusses the impacts of the increased traffic due to the transportation of nonradioactive waste. Disposal options for nonradioactive solid and hazardous wastes, the size and location of all waste disposal sites and the plans for ultimate treatment and/or restoration of retired disposal sites does not need to be discussed in this section.

When the waste is not mixed with radioactive material, not municipal solid waste (MSW), and does not meet the listed or characteristic classification of a hazardous waste, the waste is then treated as a nonhazardous industrial waste and disposed off-site at an appropriate treatment, storage, or disposal facility (TSDF) accordingly. The county landfill in Roane County has been closed. However, Chestnut Ridge Landfill, located in Heiskell, TN (Anderson County), is available to receive Class I waste. This waste facility received 307,000 tons of waste in 2020. ER Section 4.13.3 will be revised to include the information in this paragraph.

Hazardous waste is discussed in ER Sections 2.1.2.1.1.9.1 and 2.1.2.1.1.9.2.

In Tennessee, disposal of free released radioactive waste at solid waste landfills is controlled under Tennessee's Bulk Survey for Release (BSFR) program that was developed in order to have a standardized process to analyze materials with extremely low levels of radioactive contamination for disposal in specified Class I landfills. These levels of contamination, while detectable with modern equipment, pose no hazard to human health or the environment by being disposed of in this manner.

There are four Class I landfills in Tennessee authorized to receive wastes under the BSFR program: Chestnut Ridge landfill facility in Heiskell (Anderson County), North Shelby County, South Shelby County, and Carter Valley in Hawkins County. The criteria for accepting material under the BSFR program are extremely conservative. BSFR waste cannot contribute more than five percent of the total landfill waste, and it cannot contribute a dose of more than one millirem per year to any member of the public. Any material that does not meet the strict requirements of Tennessee's BSFR program would need to be disposed of in a licensed radioactive waste

facility (Website: Bulk Survey For Release (tn.gov)). ER Section 4.13.3 will be revised to include the information about the BSFR program.

The TRISO-X Fuel Fabrication Facility (TRISO-X FFF) produces Class A waste. In the unlikely event that higher activity radioactive waste is produced it will be disposed of at a facility that accepts higher activity waste.

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.

TRISO-X Response to RAI ER-WM-2

Nonradioactive liquid and solid waste are generated by the operation of the TRISO-X Fuel Fabrication Facility (TRISO-X FFF). The U.S. Environmental Protection Agency (USEPA) regulates nonhazardous and hazardous solid waste under RCRA. The regulations governing hazardous waste identification, classification, generation, management and disposal are found in Title 40 of the Code of Federal Regulations (CFR) Parts 260 through 273. Title 40 CFR Parts 239 through 259 contain the regulations for nonhazardous solid waste.

Nonradioactive waste is generated via the process streams, from routine maintenance activities, and routine activities taking place at the facility.

Waste not categorized as municipal solid waste (MSW), radioactive, or mixed waste is examined to determine if it is nonhazardous or hazardous. Uncategorized waste is managed as hazardous until sufficient information is available to show the waste does not warrant hazardous classification (See ER Section 2.1.2.1.1.9 for further discussion of hazardous waste).

The estimated amount of nonradioactive waste generated at the facility on a monthly and annual basis is provided in Table ER-WM-2-1 (following page).

The information on mixed waste is provided in ER Section 2.1.2.1.1.8 and the quantity produced annually is provided in ER Table 2.1-2 along with the disposal destination.

Table ER-WM-2-1 will be incorporated into ER Section 4.13 as Table 4.13-1 and the text of ER Section 4.13.1 will be revised.

Enclosure 1 – Responses to Requests for Additional Information

Table ER-WM-2-1
Estimated Type and Quantity of Nonradioactive Wastes (Hazardous, Industrial)

Waste Stream	Classification	Monthly Effluent (kgs)	Annual Effluent (kgs)	Volume (gal.)	No. Drums[a]	Destination
HTCF Tar[d][e]	Liquid waste[b]; Hazardous	4024.5	48,294.2	10,933.5	404.9	WCS
Bags from IsoPress Area	Solid waste; Industrial	367.5	4409.8	1226.4	24.8	Waste Management Landfill TBD
Na_2CO_3, NaCl, and H_2O from TRISO Scrubber	Solid waste; Industrial	22,171.6	266,059.4	33,317	673.1	Waste Management Landfill in Emelle, AL
Graphite Matrix Powder Dust (PS)[c]	Solid waste; Industrial	1989.4	23,873.3	2790.9	56.4	Waste Management Landfill TBD
Graphite Matrix Powder Dust Production	Solid waste; Industrial	446.4	5356.5	626.2	12.6	Waste Management Landfill TBD
Total		28,999.4	347,993.2	48,894	1171.8	

Notes:

a) All drums are 55-gal.
b) Liquid waste is overpacked in 30-gal. drums within 55-gal. drums.
c) PS – Pebble Shaping.
d) HCTF – high-temperature carbonization furnace
e) All tar waste to be mixed with adsorbent. Adsorbent values are for Petroset II, a product of FluidTech.

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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.

TRISO-X Response to RAI ER-WM-3

The sanitary sewer system is described in ER Section 2.1.2.1.1.4.2.

Nonradioactive liquid and solid waste generated at the TRISO-X FFF is collected, and waste not categorized as municipal solid waste is examined and classified as either nonhazardous or hazardous. Hazardous waste is neutralized/stabilized if needed, particularly if corrosive. Wastes are staged for shipment off-site to licensed disposal facilities.

Hazardous waste is classified as either listed waste or characteristic waste. Listed wastes are generated from common manufacturing and industrial processes, specific industries, or discarded pure commercial grade chemicals. TRISO-X FFF's manufacturing and industrial process, as well as the raw materials used, are not listed in 40 CFR Part 261, Sections 31 through 34. Listed hazardous waste is not generated at the TRISO-X FFF (See ER Section 2.1.2.1.1.9.1).

Characteristic wastes have one or more property of toxicity, corrosivity, reactivity, or ignitability which qualify the waste as hazardous. Samples of uncategorized wastes are analyzed per USEPA approved Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium to determine if the waste exhibits any hazardous waste characteristics. Spent process chemicals (e.g., activated carbon and crystallizer bottoms containing formaldehyde) from the TRISO-X FFF require additional analysis to determine if classifications as hazardous waste due to characteristics of the waste are appropriate (See ER Section 2.1.2.1.1.9).

When the waste is not mixed with radioactive material, not MSW, and does not meet the listed or characteristic classification of a hazardous waste, the waste is then treated as a nonhazardous industrial waste and disposed off-site at an appropriate licensed treatment, storage, or disposal facility (TSDF) accordingly.

In the event analytical results show the waste to exhibit one or more of the hazardous characteristics, the material is stored temporarily on-site. Hazardous waste is consolidated as necessary and properly packaged then shipped off-site to an approved licensed hazardous waste TSDF. There is no hazardous waste disposal at the HCS (See ER Section 2.1.2.1.1.9.2).

See ER Section 4.13.4 for a description of the waste minimization plan.

The reference to ER Section 3.11.1 in ER Section 2.1.2.1.1.8 will be revised to ER Sections 3.11.1.2.3 and 3.11.1.2.4. These sections in the ER discuss facilities in the vicinity of the TRISO-X FFF that handle and store radioactive materials.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-WM-4

ER Section 2.1.2.1.1.11, Pollution Prevention and Waste Minimization will be revised to reference Section 4.13.4, Waste Minimization Plan. ER Section 4.13.4 will be revised to read:

> Pursuant to the regulations regarding hazardous waste management and the issuance of a license to operate the TRISO-X FFF, a pollution prevention and waste minimization program (PPWMP) will be developed and implemented to address storage and management oversight requirements. Elements of the waste minimization plan include the following, at a minimum:
>
> - Inventory identification and control.
> - Work planning to reduce waste generation.
> - Waste reduction methods and processes.
> - Key assumptions critical to successful implementation of waste management.
>
> These requirements are part of the USEPA RCRA hazardous waste regulations codified in 40 CFR 260 to 265 implementing Resource Conservation and Recovery Act (RCRA).
>
> The waste minimization plan will be followed to ensure that activities are conducted in a manner intended to reduce the potential for generation. The storage area will be monitored for radiation level and inspected for container integrity. Occupational exposures from on-site storage have been shown to be reduced by the application of waste minimization technologies and procedures. Radiological exposures from hazardous waste generation, treatment, storage, and off-site transportation activities will be in full compliance with the requirements stipulated in 10 CFR 20 for both radiological and nonradiological workers.
>
> **Inventory Management**
>
> Inventory management or control techniques will be used to reduce the possibility of generating mixed waste resulting from excess or out-of-date chemicals and hazardous substances. Where necessary, techniques will be implemented to reduce inventory size of hazardous chemicals, size of containers, and amount of chemicals, while increasing inventory turnover. Acquisition of new chemical supplies will be documented in a controlled process that addresses, as appropriate, the following:
>
> - Need for the chemical.
> - Availability of nonhazardous or less hazardous substitutes or alternatives.

- Amount of chemical required and the on-site inventory of the chemical.

Excess chemicals will be managed in accordance with the site's chemical management procedures. Excess chemicals that are deemed usable will be handled through an excess chemical program. Material control operations will be revised or expanded to reduce raw material and finished product loss, waste material, and damage during handling, production, and storage.

Recycling and Reuse

Recycling of waste types will be considered. Opportunities for reclamation and reuse of waste materials will be explored. Decontamination of tools, equipment, and materials for reuse or recycle will be used to minimize the amount of waste for disposal. Impediments to recycling, whether regulatory or procedural, will be challenged to encourage generators to recycle.

Segregation

When radiological or hazardous waste is generated, proper handling, containerization, and separation techniques will be employed, as applicable. This will be done to minimize cross contamination resulting in the generation of unnecessary mixed waste.

Work Planning

Planning will be completed to determine what materials and equipment are needed to perform the anticipated work. One objective of this planning is to prevent pollution, minimize the amount of mixed waste that may be generated, and use only what is absolutely necessary to accomplish the work. Planning will also be completed to prevent mixing of materials or waste types.

Employee Awareness and Engagement

- Employee training and education on general environmental activities and hazards regarding the facility, operations and the pollution prevention program, as well as waste minimization requirements, goals, and accomplishments.
- Employee training and education on specific environmental requirements and issues.
- Responsibilities for pollution prevention and waste minimization.
- Recognition of employees for efforts to improve environmental conditions.
- Requirements for employees to consider pollution prevention and waste minimization in day-to-day activities and engineering.

ER Section 4.13.4 will be revised to include this information on the waste minimization plan.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to OBSERVATION-ER-ACC-1

The TRISO-X License Application was accepted for review by the NRC on November 18, 2022. The NRC's safety reviews are ongoing, and TRISO-X is participating in technical audit meetings and will respond to formal RAI questions related to the Integrated Safety Analysis and Items Relied on for Safety as questions are issued.

Enclosure 1 – Responses to Requests for Additional Information

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.

TRISO-X Response to RAI ER-GEN-1

TRISO-X is actively working with the City of Oak Ridge to evaluate additional options for delivery of power to the site that consider current and future capacity needs and costs. The current estimate for completing and executing a written agreement between the City of Oak Ridge and TRISO-X that identifies the power delivery route is the end of May 2023. At that time, the Environmental Report (ER) resource areas will be reviewed to assess whether any changes to the ER are needed, or if the ER content bounds the change to the power delivery route. More information will be provided at a later date.