2020-002 EPRI Advanced Reactor Strategic Program (EPRI-AR)

March 9, 2020

Document Control Desk
U. S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Docket No. 99902021

Attention: Jordan Hoellman, NRO/DAR/ARPB

Subject: Response to Request for Additional Information (RAI) on Topical Report EPRI-AR-1(NP), "Uranium Oxycarbide (UCO) Tristructural Isotropic (TRISO) Coated Particle Fuel Performance"

Please find enclosed the Electric Power Research Institute (EPRI) response to a U. S. Nuclear Regulatory Commission (NRC) RAI related to its review of Topical Report EPRI-AR-1(NP). EPRI submitted Topical Report EPRI-AR-1(NP) "Uranium Oxycarbide (UCO) Tristructural Isotropic (TRISO) Coated Particle Fuel Performance" to the NRC for review on May 31, 2019. The NRC notified EPRI it had accepted the topical report for review by letter dated August 5, 2019. On October 8 and 9, 2019 the NRC conducted a regulatory audit of the topical report at the Idaho National Laboratory (INL) Offices and documented the results in an audit report dated November 19, 2019. On November 19, the NRC provided draft RAIs on the topical report (ML19336A057). EPRI, INL and the NRC met on December 9, 2019 for technical discussions and EPRI provided responses to the four RAIs by letter dated February 26, 2020. The fifth RAI, related to quality assurance, was discussed during a clarification phone call on January 15, 2020, and EPRI is providing a response to the fifth RAI in the enclosure to this letter. There are no planned changes to the topical report pursuant to the enclosed RAI response.

If you have questions about this submittal, please contact EPRI project manager Cristian Marciulescu by phone at 704-595-2401, or by email at cmarciulescu@epri.com.

Sincerely,
Helen Cothron
Digitally signed by Helen Cothron
Date: 2020.03.09 10:51:03 -04'00'

Helen Cothron
EPRI Advanced Nuclear Technology Program Manager

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Enclosure: Responses to EPRI-AR-1(NP) RAI#5

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Enclosure

Response to EPRI-AR-1(NP) Request for Additional Information (RAI) #5 Related to Quality Assurance

RAI #5

The staff assessment of "Next Generation Nuclear Plant Quality Assurance Program Description," dated September 12, 2012 (ADAMS Accession No. ML12241A157), found that the QAPD was acceptable for use during the technology development and high-level design phase of the NGNP project. As such, the staff is seeking clarification on the scope of the activities performed by Idaho National Laboratory to obtain and submit the data used by EPRI in their topical report titled "Uranium Oxycarbide (UCO) Tristructural Isotropic (TRISO) Coated Particle Fuel Performance: Topical Report EPRI-AR-I(NP)".

Response

The basic objectives of the NGNP QAPD, as stated in its Section 2.2, are to "... *assure that NGNP technology development activities result in defensible data and records, and that the NGNP is designed, constructed, and operated in accordance with governing regulations and license requirements.*" In the Nuclear Regulatory Commission's (NRC's) 2012 assessment report, the staff concluded that the quality assurance program described in the QAPD was acceptable for use during technology development and high-level design phases of the project.

The Electric Power Research Institute topical report covers foundational fuel performance testing from the Advanced Gas Reactor (AGR)-1 and AGR-2 tests including the irradiation, safety testing and post-irradiation examination results. These research and development activities are associated with "technology development" activities, and the quality assurance standards reflected in the NGNP QAPD and assessed by the NRC staff were implemented during the performance of those activities. A summary depiction of the key technology development activities performed in conjunction with the overall data collection sequence of fuel fabrication, irradiation, and post irradiation examination (PIE)/safety testing is provided in the following flowcharts (Figures 1-3).

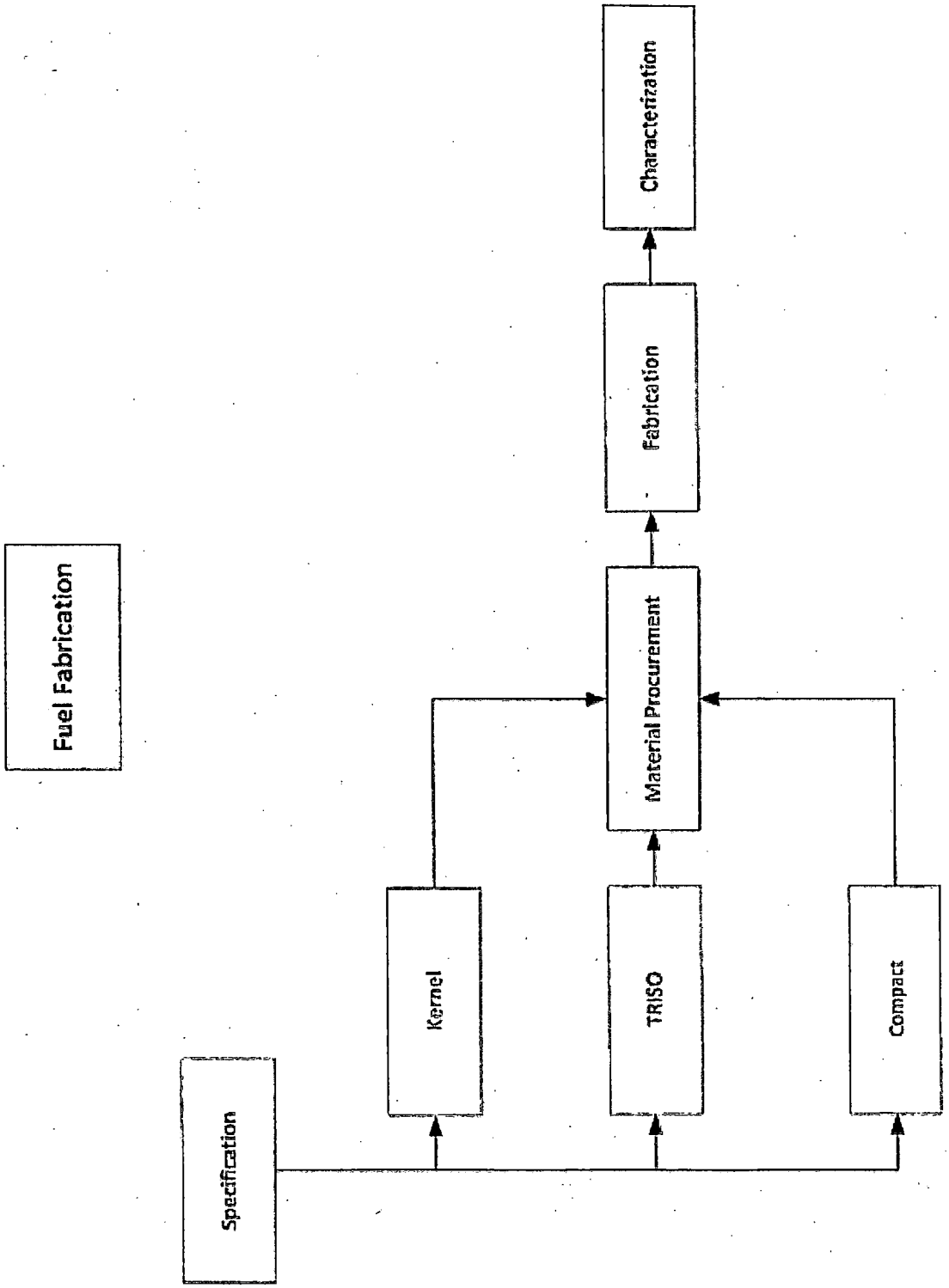
Fuel Fabrication
Specification
Kernel
TRISO
Compact
Material Procurement
Fabrication
Characterization

Figure 1.

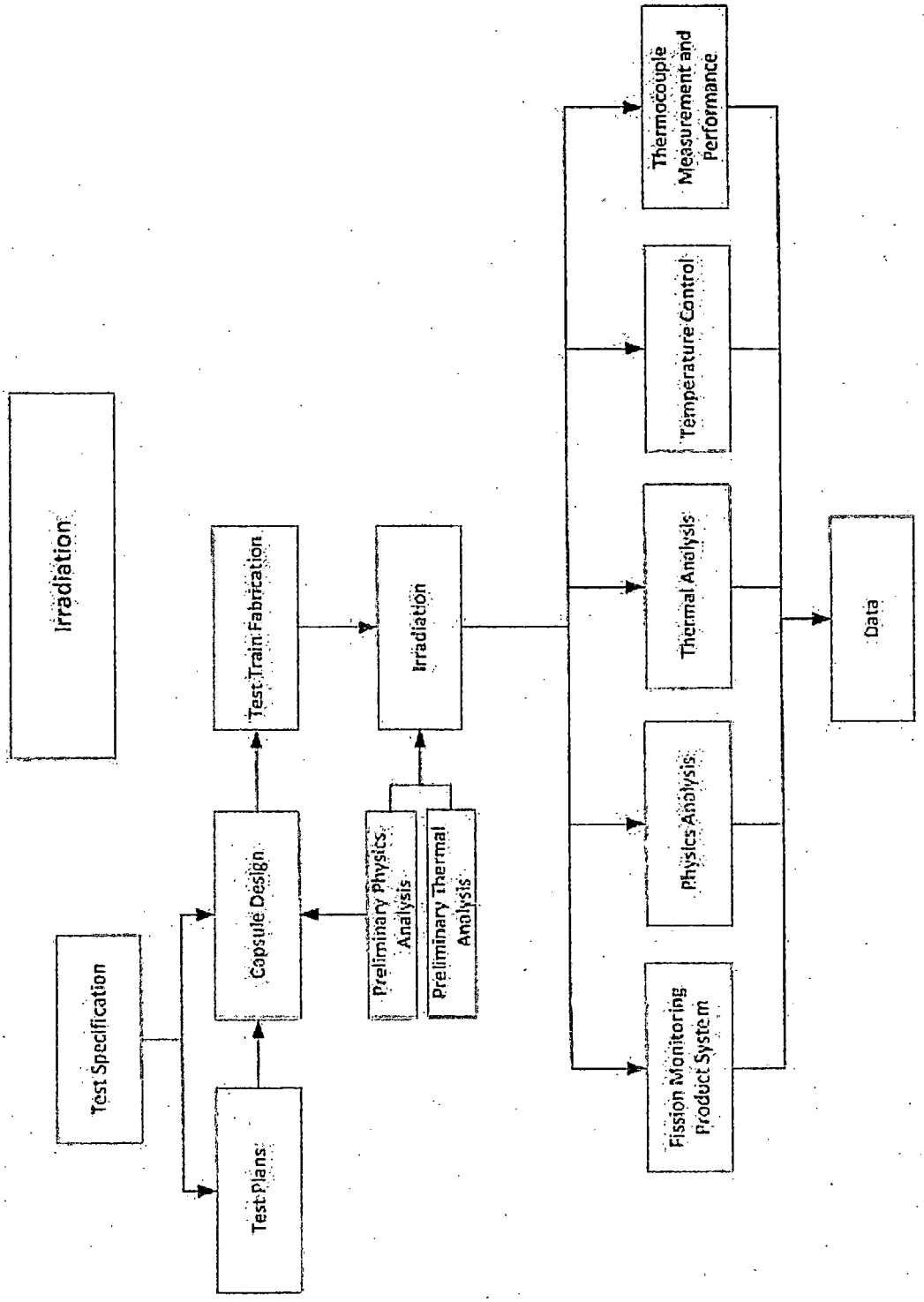
Irradiation
Test Specification
Test Plans
Capsule Design
Test Train Fabrication
Preliminary Physics Analysis
Preliminary Thermal Analysis
Irradiation
Thermocouple Measurement and Performance
Temperature Control
Thermal Analysis
Physics Analysis
Fission Monitoring Product System
Data

Figure 2.

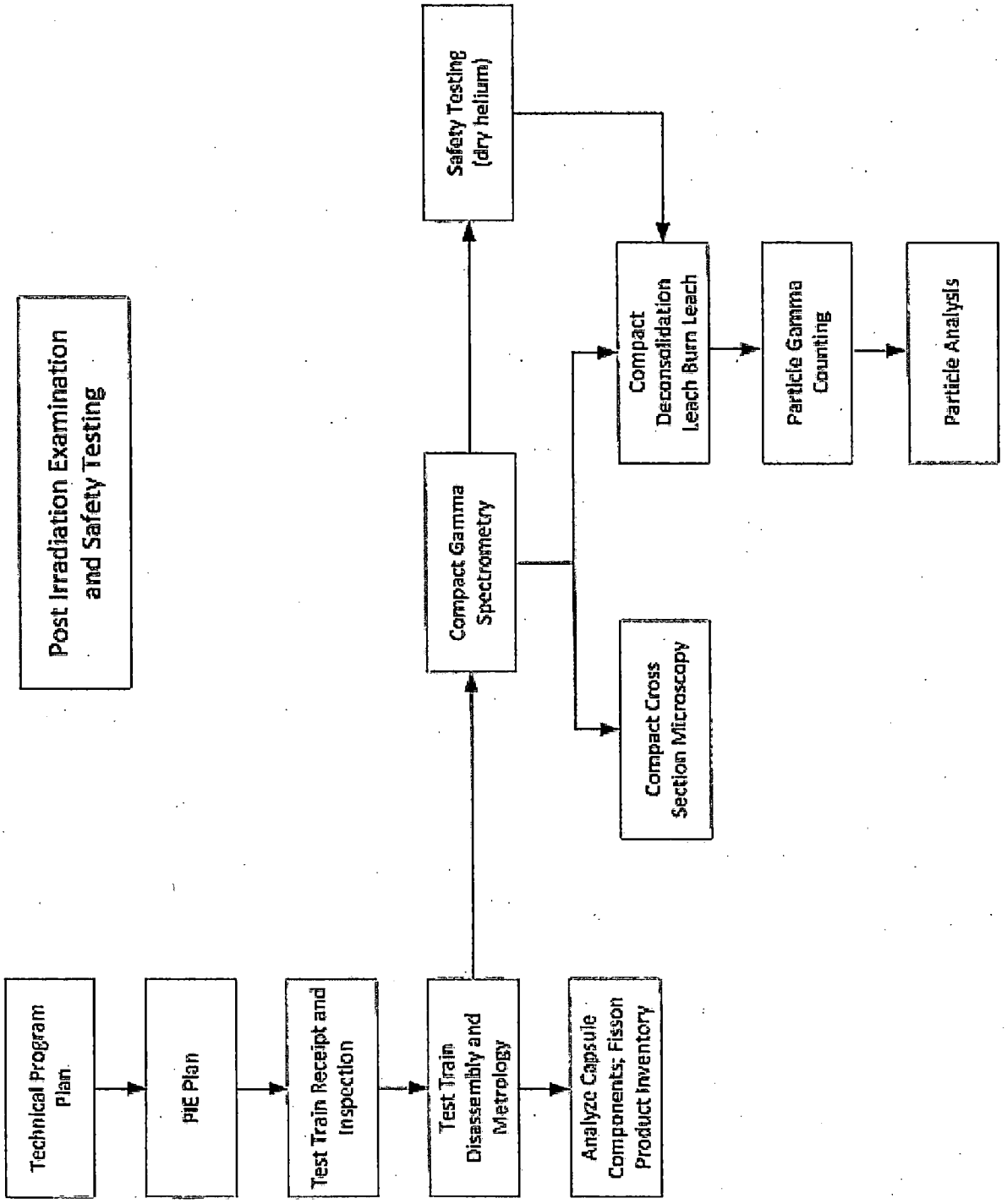
Post Irradiation Examination and Safety Testing
Technical Program Plan
PIE Plan
Test Train Receipt and Inspection
Test Train Disassembly and Metrology
Analyze Capsule Components; Fission Product Inventory
Compact Gamma Spectrometry
Safety Testing (dry helium)
Compact Deconsolidation Leach Burn Leach
Compact Cross Section Microscopy
Particle Gamma Counting
Particle Analysis

Figure 3.