

USNRC RIC 2017

Accident Tolerant Fuel Lead Test Assemblies

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Irradiating Lead Test Rods / Lead Test Assemblies

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LTR/LTAs play an important role in seeking NRC approval for new design features by

- 1) demonstrating in-reactor performance,
- 2) providing pool-side, post-irradiated examination (PIE) data collection for in-reactor characterization, and
- 3) providing irradiated material for subsequent hot-cell examination and research.

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LTR/LTA Safety Assessment

- Any changes in fuel geometry and/or fissile content must be accounted for in core physics and TH predictions
- Any changes in fuel composition or fissile content must be accounted for in radiological consequence predictions
- As a minimum, research must be conducted on any new material or design feature to fully characterize the unirradiated material, mechanical, chemical, thermal, and nuclear properties and its performance under a wide range of accident conditions
- As irradiation experience grows and irradiated material characterization matures, the latest state-of-knowledge must be considered in subsequent irradiation cycles and to justify the "limited" number and "nonlimiting" core locations for additional LTR/LTA programs.

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Is an exemption from 50.46/50.46c required for LTR/LTAs?

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- Applicability of 50.46 limited to UO_2 pellets within cylindrical zircaloy or ZIRLO cladding
 - 50.46 does not provide a means to comply with GDC-35 for any other fuel system combination
 - Exemptions have been issued to expand applicability to other zirconium-based cladding alloys (with UO_2 pellets)
 - Demonstration (via testing) of acceptable performance up to 2200F/17%ECR analytical limits
- An exemption to 50.46 is not required for LTR/LTAs irradiated under Technical Specification provisions
 - Safety assessment must address GDC-35 via knowledge of fuel performance under LOCA conditions and determination of limited quantity and nonlimiting core location

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- 50.46c recognizes that plant Technical Specifications allow for the irradiation of LTR/LTAs
- An exemption to 50.46c is **not** required for LTR/LTAs irradiated under these provisions
 - Safety assessment must address GDC-35 via knowledge of fuel performance under LOCA conditions and determination of limited quantity and nonlimiting core location

10 CFR 50.46c(k) Use of NRC-approved fuel in reactor.
(1) Fuel load. A licensee may not load fuel into a reactor unless the licensee determines that the fuel meets either the requirements of paragraph (d) of this section or, for uranium oxide and mixed uranium-plutonium oxide pellets within cylindrical zirconium-alloy cladding, the fuel specific analytical limits and requirements in paragraph (g) of this section, or otherwise complies with technical specifications governing lead test assemblies in its license.
