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Section A

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

May 26, 2022

Mr. Peter Hastings, Vice President,
Regulatory Affairs and Quality
Kairos Power, LLC
707 W Tower Ave
Alameda, CA 94501

SUBJECT: KAIROS POWER, LLC - SAFETY EVALUATION FOR, "REGULATORY ANALYSIS FOR THE KAIROS POWER FLUORIDE SALT-COOLED HIGH TEMPERATURE REACTOR," REVISION 4 (EPID NO: L-2021-TOP-0007/CAC NO. 000431)

Dear Mr. Hastings:

This letter provides the final safety evaluation for the Kairos Power LLC (Kairos) topical report KP-TR-004, "Regulatory Analysis for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor," Revision 4. By letter dated January 24, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19024A483), as supplemented by letters dated October 31, 2019, November 23, 2020, August 19, 2021, and January 18, 2022, (ADAMS Accession Nos. ML19304C666, ML20328A234, ML21231A296, and ML22018A161, respectively), Kairos submitted the topical report Revisions 0 through 4 for the U.S. Nuclear Regulatory Commission (NRC) staff review.

The NRC staff's final safety evaluation for topical report, "Regulatory Analysis for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor," Revision 4, is enclosed.

The NRC staff provided Kairos a draft of the safety evaluation for the purpose of identifying proprietary information on April 4, 2022 (ML22094A106). On April 15, 2022 (ML22133A093), Kairos confirmed that the SE does not include proprietary information.

The NRC staff requests that Kairos publish an accepted version of this topical report within 3 months of receipt of this letter. The accepted version shall incorporate this letter and the enclosed safety evaluation after the title page. The accepted version shall include an "-A" (designating accepted) following the topical report identification symbol.

If you have any questions, please contact Samuel Cuadrado at 301-415-2946 or via e mail at Samuel.CuadradodeJesus@nrc.gov.

Sincerely,

Signed by Kennedy, William
on 06/02/22

William B. Kennedy, Acting Chief
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Project No.: 99902069
Enclosure:
As stated

SUBJECT: KAIROS POWER, LLC - SAFETY EVALUATION FOR, “REGULATORY ANALYSIS FOR THE KAIROS POWER FLUORIDE SALT-COOLED HIGH TEMPERATURE REACTOR,” REVISION 4(EPID NO: L-2021-TOP-0007/CAC NO. 000431) DATE: MAY 26, 2022

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ADAMS Accession Nos.: ML22136A089 **NRR-043**

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

June 2, 2022

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO TOPICAL REPORT KP-TR-004, REVISION 4, "REGULATORY ANALYSIS FOR THE KAIROS POWER FLUORIDE SALT-COOLED HIGH TEMPERATURE REACTOR,"

(EPID NO. L-2021-TOP-0007)

PROJECT NO.: 99902069

1.0 INTRODUCTION

By letter dated January 24, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19024A483), Kairos Power LLC (Kairos, the applicant) submitted Revision 0 of Topical Report (TR), "Regulatory Analysis for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor," for the U.S. Nuclear Regulatory Commission (NRC) staff's review. By letter dated October 31, 2019 (ML19304C666), Kairos submitted Revision 1 of the TR to address the NRC staff's questions regarding Revision 0. Subsequent to this submission, Kairos decided to pursue licensing a test reactor before licensing a power reactor and, by letter dated November 23, 2020 (ML20328A234), submitted Revision 2 to expand the scope of the TR to cover the planned test reactor. On May 10, 2021 (ML21153A004), the NRC staff held a public meeting with Kairos to discuss the NRC staff's feedback on Revision 2 of the TR. On August 19, 2021 (ML21231A296), Kairos submitted Revision 3 of the TR. Subsequently, Kairos submitted the TR Revision 4, dated January 18, 2022 (ML22018A161), which is the subject of this safety evaluation (SE).

Kairos requested the NRC staff's review and approval of the TR Revision 4, including concurrence with the applicability of design-related and non-design related regulations to the Kairos Power Fluoride Salt-Cooled High Temperature Reactor (KP-FHR) power reactor, as listed in Appendices A and B, respectively. Kairos also requested the NRC staff's review and approval of the applicability of the design-related regulations and non-design-related regulations to the KP-FHR test reactor, as listed in Appendices D and E, respectively. Kairos expects that TR Revision 4, along with a separate TR regarding the KP-FHR principal design criteria (PDC) (ML20167A174) will be used by applicants for licenses, approvals, or certifications of a KP-FHR under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," and NRC staff reviewers. Kairos also performed a review of the NRC staff's regulatory guides and included a list in Appendices C and F of the TR of those it considered to be relevant to the KP-FHR. Kairos did not ask for a formal review of Appendices C and F.

2.0 REGULATORY EVALUATION

As part of broader efforts related to non-light-water reactors (non-LWRs), the NRC staff issued a Draft White Paper that evaluated the applicability of NRC regulations to non-LWRs (which focused on power reactors), dated July 2021 (ML21175A287). The draft white paper provisionally identified the generic applicability of the NRC regulations, noted that it was not final, and noted that circumstances that are applicable to specific non-LWR applicants could result in different applicability determinations for those designs. Kairos is pursuing the design, licensing, and deployment of the KP-FHR. To facilitate future licensing reviews, it is useful to identify the specific regulatory framework used for the KP-FHR during the initial stages of the licensing process. This TR performs that function for both a test reactor and a power reactor.

The TR Revision 4 reflects Kairos' screening of all 10 CFR Chapter I, "Nuclear Regulatory Commission," regulations applicable to a power reactor or a test reactor, including requirements in 10 CFR Part 20, "Standards for Protection Against Radiation"; Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material"; Part 40, "Domestic Licensing of Source Material"; Part 50; Part 52; Part 70, "Domestic Licensing of Special Nuclear Material"; and Part 73, "Physical Protection of Plants and Materials." The NRC staff evaluated the regulatory applicability tables in the TR Revision 4 against the Commission's regulations. The NRC staff considers the lists of regulatory applicability determinations to be references that can inform the content of future licensing applications that will be subject to the NRC staff's reviews.

3.0 TECHNICAL EVALUATION

3.1 INTRODUCTION

Kairos is pursuing the design, licensing, and deployment of a KP-FHR test reactor and a power reactor. To support these objectives, Kairos reviewed the NRC's regulations to identify the requirements that it considers to be applicable and appropriate to establish the regulatory framework for the NRC staff's review and licensing of the KP-FHR design, for both a test reactor and a power reactor. The NRC's regulations in 10 CFR Part 50 and 10 CFR Part 52 provide most of the regulations associated with the design and licensing of nuclear reactors.

Kairos categorized the NRC's regulations as those that apply, those that do not apply, and those from which Kairos believes an applicant will need an exemption for the design and licensing of the KP-FHR. Kairos indicated that its review of the regulations considered the KP-FHR unique design attributes.

3.1.1 Design Features

Section 1.1.1 of the TR provides an overview of the key design features of the KP-FHR. The KP-FHR uses tri-structural isotropic (TRISO) particles in pebble form as fuel, and fluoride salt to cool the reactor. Kairos states that the coolant is maintained at "near-atmospheric pressure" and circulated via pumps. In addition, Kairos indicated that the primary coolant transfers heat to an intermediate heat exchanger loop with nitrate salt that is "compatible with reactor coolant." It also states that the design uses a normal (non-emergency) decay heat removal system and a natural circulation vessel cooling decay heat removal system.-

Kairos indicated that the KP-FHR utilizes a functional containment approach, consistent with SECY-18-0096, "Functional Containment Performance Criteria for Non-Light-Water-Reactors," issued September 28, 2018 (ML18114A546), and the associated SRM-SECY-18-0096, "Staff Requirements - SECY-18-0096 - Functional Containment Performance Criteria for Non-Light Water-Reactors," issued December 4, 2018 (ML18338A502). Kairos stated that the ultimate design objective of the functional containment is to meet offsite dose requirements at the plant's exclusion area boundary with margin. According to Kairos, the TRISO fuel particles are the first and primary barrier against the release of radionuclides. In addition, Kairos stated that the fluoride salt coolant is also capable of retaining fission products, aiding in ensuring radionuclides are not released beyond applicable limits.

3.1.2 Regulatory Review

Section 1.2 of the TR outlines Kairos' discussion of the regulatory background. The regulations in 10 CFR Chapter I contain the requirements that must be met to design, license, and operate a nuclear reactor. The TR notes that not all regulations are required to be addressed by every reactor design type as some are design specific, and some regulations are applicable only to non-reactor facilities or other NRC-licensed activities. Additionally, the TR indicates that the regulations allow for exemptions, if appropriate and properly justified, and identifies those regulatory requirements from which Kairos expects a future applicant will need to request exemptions.

3.1.3 NRC Staff Evaluation

As part of the review and evaluation of the proposed classifications, the NRC staff considered the TR descriptions of aspects of the KP-FHR technology that led Kairos to conclude that some of the NRC's regulations do not apply to certain KP-FHR design characteristics. As part of this review, the NRC staff identified several key design features that influenced the Kairos analysis of the regulatory framework and established the design as being different from a light water reactor (LWR). These features include:

- A chemically stable coolant. Adverse interactions between the coolant/fuel, coolant/coolant boundary, and coolant/atmosphere all represent important considerations that could influence the applicable regulations. While the TR states the coolant is "chemically stable," Kairos has not demonstrated this feature in its TR. Verification of coolant performance will be necessary to ensure that the proposed regulations related to the reactor coolant and reactor coolant systems represent an adequate set of criteria.

- TRISO fuel particles and fuel pebbles. This fuel form represents the foundation of the functional containment approach proposed by Kairos. The NRC staff notes that Kairos will need to establish and document performance criteria consistent with the methodology outlined in SECY-18-0096. This entails identifying both event sequences to ensure the plant-level performance criteria are met and those structures, systems, and components (SSCs) and programmatic controls needed to fulfill important safety functions and controlling parameters for the design and operation of risk-significant SSCs. The TR states that the TRISO fuel particles

and the fluoride salt reactor coolant provide the credited functions during accident conditions and that the integrity of the entire reactor coolant system is not necessary during accident conditions. If additional design features are needed to provide credited design functions, Kairos will need to reevaluate whether these regulations represent the appropriate set of applicable regulations.

- An intermediate coolant loop using a coolant that is chemically compatible with reactor coolant. Verification that secondary coolant is demonstrated not to have a significant impact on the primary system is necessary to ensure the proposed regulations represent an adequate set associated with the primary coolant.

- "Near-atmospheric" pressure for the reactor coolant system. The absence of an energetic release of coolant during a loss-of-coolant type accident results in a fundamentally different risk profile of the KP-FHR compared to the LWR designs. This characteristic is important to ensure the proposed regulations applicable to the reactor coolant pressure boundary are appropriate.

Kairos requested the NRC staff's approval of the identified list of regulations applicable to the KP-FHR design without the detailed system specifications, drawings, and calculations. The NRC staff acknowledges that continued development of the KP-FHR may result in changes to design features outlined in Section 1 of the TR. In this event, a revision to the identified regulations in the TR may be necessary. These key design features of the KP-FHR, if changed, could necessitate the modification or addition of regulations and, therefore, the use of the TR is restricted as discussed in Section 4.0, "Limitations and Conditions," of this SE.

The NRC staff finds that, based on the information Kairos has provided on the KP-FHR as of January 18, 2022, when TR Revision 4 was submitted, the regulations identified in Tables A-1, A-2, A-3, A-4, B-1, B-2, D-1, D-2, D-3, E-1, and E-2 of the TR generally encompass the regulations a KP-FHR power or test reactor must address. The NRC staff also recognizes that the spectrum of regulations that apply to a given application, whether a power or test reactor, will differ based on the scope of approval requested and specific applicability to the prospective application types identified in the tables in the TR appendices. Further findings on these tables are listed below in this SE.

3.2 REGULATORY ANALYSIS METHODOLOGY

Section 2 of the TR describes the process used by Kairos to identify a regulatory framework for the KP-FHR. For each regulation, Kairos' cross-discipline engineering and licensing team screened the content and categorized the regulation based on the type or nature of the regulation. The TR states that screening categories are not defined in the NRC's regulations or guidance but were defined by the Kairos review team to facilitate and document its review. The TR indicates the initial screening of the regulations was done, in part, to distinguish requirements specifically relevant to the technical design of the facility from requirements considered to be administrative, process, or programmatic in nature, a distinction that Kairos deemed useful to its development of functional design requirements and performance of design reviews. The screening categories that the Kairos' review team established and defined are stated below:

- **Regulatory Process** – Rules and guidance associated with NRC implemented activities [e.g., the conduct of NRC inspections].

- **Not applicable** – Rules and guidance not applicable to nuclear reactors. [Example: regulations specific to a production or fuel fabrication facility].

- **Administrative** – Rules, guidance, and support information associated with the conduct of an applicant or licensee. Examples: 10 CFR 50.5 [Deliberate misconduct], 50.7 [Employee protection], 50.9 [Completeness and accuracy of information].

- **Process** – Rules and guidance related to regulatory processes required for an applicant or licensee (primarily activities that require procedures). […]

- **Program** – Rules and guidance related to regulatory or operational programs. Examples: inservice inspection, quality assurance.

- **Design** – Rules and guidance related to plant design, engineering, and analyses. In cases where requirements include administrative, process or program requirements in addition to design, the requirement is conservatively categorized as design. […]

The TR states that if regulations were not initially screened out as being "not applicable," Kairos further evaluated them for specific applicability to the KP-FHR technology using the following evaluation categories:

- **Applies –** The regulation applies to the KP-FHR […] as written.

- **Does Not Apply –** The regulation is not literally applicable to the KP-FHR due to the wording of the rule or [does not have a technically applicable basis or is directly not applicable] to the KP-FHR technology. Examples are requirements that apply to LWRs only, certain reactor developers/vendors, or to existing licensed facilities only. [Also, some of] the regulations apply to a plant licensed in a specific time period [that] is no longer applicable [and some] apply to test reactors [and] do not apply to power reactors.

- **Exemption –** This category is used where the regulation is literally applicable to the design of KP-FHR […], but it requires a design solution or feature that the KP-FHR technology does not include or [Kairos] intends to provide an acceptable alternative design solution. […]

The TR further indicates that, in some instances, specific 10 CFR Chapter I requirements may be applicable to the KP-FHR design, but only for a certain licensing pathway or application type. Thus, the TR identifies which NRC requirements are deemed applicable to a specific KP-FHR licensing path or license application type (i.e., Construction Permit, Operating License, Limited Work Authorization, Standard Design Approval, Combined Operating License, Design Certification, Manufacturing License, or Early Site Permit).

3.2.1 NRC Staff Evaluation

The NRC staff reviewed the Kairos categorization scheme against the existing regulatory framework and determined that the proposed scheme allows for classification of regulations to be applied in a future application. The NRC staff considers the evaluation categories ("applies," "does not apply," and "exemption") generally appropriate to identify the regulations listed in Appendices A, B, D, and E; however, the NRC staff does not reach a finding as to the propriety of the screening criteria used to group them because the criteria do not alter regulatory requirements.

In addition, the NRC staff also reviewed the regulations that Kairos designated as "exemption," which reflect Kairos' position that certain requirements should not apply to the KP-FHR design or that Kairos plans to seek relief premised on an alternate solution. The NRC staff finds that, with the exception of the conclusions that the 10 CFR 50.2 safety-related SSC definition and that 10 CFR 50.34(a)(4) requires a test reactor applicant to submit analyses related to 10 CFR 50.46 and 10 CFR 50.46a, the regulations designated as "exemption" may apply (in whole or in part) to the licensing of the KP-FHR. The 10 CFR 50.2 safety-related SSC definition and the portion of 10 CFR 50.34(a)(4) related to 10 CFR 50.46 are not required when applied to a testing facility. The NRC staff acknowledges that, under the NRC's regulations, an interested person may request (and the NRC staff may grant) an exemption from the requirements of a regulation, provided that the NRC staff can make the requisite findings. The NRC staff's consideration of whether an exemption is appropriate or can be justified will await consideration of detailed information submitted in a license application. Accordingly, this SE does not reach any conclusion as to the acceptability or viability of any exemption request. The evaluation of whether an exemption should be granted would occur after the submittal of a specific exemption request and would be documented in the SE associated with a future licensing submittal.

Although the NRC staff does not reach a conclusion regarding the appropriateness of all screening criteria, the NRC staff generally finds that the methodology described in the TR is a detailed approach and is acceptable to identify the design and licensing requirements applicable to the KP-FHR. The NRC staff's evaluation of the Kairos team's assessment of the regulations is provided in the subsequent sections of this SE.

3.3 RESULTS

3.3.1 Summary of Results

Section 3.1 of the TR provides a summary of the results of the regulatory review as it applies to the KP-FHR power reactor. The results were grouped as follows:

- Design regulatory requirements in 10 CFR that apply.
- Design regulatory requirements in 10 CFR that do not apply.
- Regulatory requirements in 10 CFR from which Kairos believes an applicant will require an exemption.
- Non-design regulatory requirements in 10 CFR that apply.
- Non-design regulatory requirements in 10 CFR that do not apply.

Appendix A of the TR provides tables that list the applicability of the design regulatory requirements to the KP-FHR design in accordance with the first three groups listed above. Appendix B of the TR provides tables that list the applicability to the KP-FHR design of the non-design regulatory requirements to the KP-FHR design in accordance with the last two groups listed above.

Section 3.2 of the TR provides a summary of the results of the regulatory review as it applies to the KP-FHR test reactor in a similar form to the power reactor listed above, with Appendix D listing the design regulatory requirements and Appendix E listing the non-design regulatory requirements.

The NRC staff's evaluation of the Kairos determinations regarding the applicability of NRC regulations listed in TR tables to the Kairos power and test reactor is provided below.

3.3.2 NRC Staff Evaluation

The NRC staff determined that Kairos adequately implemented the methodology described in the TR and that the tables in the appendices to the report adequately group the regulatory requirements for the two types of Kairos reactors. The NRC staff's review focused on the minimum required level of detail for a given regulation or approval, but some regulatory licenses and approvals (such as a standard design approval) allow for flexibility in scope and level of detail. Providing additional pre-application information on the scope of the requested approval is an option available to applicants and is encouraged to assist the NRC staff in performing an efficient review of the application.

The TR distinguishes between design and non-design requirements for power and test reactors in Appendices A and B. The TR lists the "Design" requirements that Kairos categorized as being applicable to the KP-FHR technology and included in the list regulatory requirements to be addressed as part of the KP-FHR design requirements identification process. Because the TR does not request that the NRC staff confirm that the design versus non-design distinctions drawn are appropriate, the NRC staff does not reach any conclusions regarding these categorizations.

The NRC staff independently reviewed the regulatory requirements in 10 CFR Chapter I and determined that, in general, Kairos correctly categorized the applicability of the regulations listed in Appendices A, B, D, and E to a KP-FHR power or test reactor. The NRC staff also finds that the use of the regulatory applicability statements can generally inform the contents of a future application, provided the applicant conforms to the limitations and conditions stated in Section 4.0 of this TR and meets the regulations in effect at the time of the submittal of the future application. Further, the NRC staff compared the general design characteristics of the Kairos facility (described in the Kairos design overview documentation submitted by Kairos as part of its pre-application activities (ML20045E423)) to the LWR requirements in the NRC's regulations and determined that the features set forth in Section 3.1.3 and accompanying condition set forth in this SE are sufficient to distinguish the KP-FHR from a LWR design, and therefore the requirements applicable to LWRs only do not apply to the proposed KP-FHR. In order to demonstrate reasonable assurance of adequate protection of public health and safety or no undue risk, an applicant could decide to be informed by or voluntarily address requirements that apply to other facility types. Similarly, the NRC staff's decisions could be informed by content of regulatory provisions that Kairos has deemed inapplicable.

In this regard, the NRC staff observed that, based on preliminary interactions with Kairos, the applicant's determinations of the applicability of regulations to the KP-FHR design largely conforms with expected applicability of regulations for a generic non-LWR design, as described in the NRC staff draft white paper on that topic (ML20241A024). As part of its initial examination of the report conducted to enhance its understanding of Revision 2, the NRC staff provided feedback to Kairos, noting areas in the TR Tables A-1, A-2, A-3, A-4, B-1, B-2, D-1, D-2, D-3, E-1, and E-2 that could benefit from discussions at an upcoming public meeting or correction (ML21104A420). This feedback provides a detailed documentation of the NRC staff's initial review regarding the applicable regulations with respect to the assessment provided in the TR. At a public meeting held on May 10, 2021 (ML21153A004). Kairos and the NRC staff discussed areas where Kairos sought clarification and documented its changes in the TR Revision 4. The NRC staff finds that the tables listed above incorporated the NRC staff's feedback to Kairos and generally can be used to inform a future applicant's determination of regulatory applicability for the KP-FHR design.

However, the NRC staff's approval of the TR Tables A-1, A-2, A-3, A-4, B-1, B-2, D-1, D-2, D-3, E-1, and E-2 is limited to the applicability determination noted for each regulation (e.g., 50.34(b)(1)), and does not include the associated title, bases, or supporting information provided in these tables. Because the NRC staff identified inaccuracies in some of the bases stated for Kairos' determinations, the NRC staff does not approve the stated bases for the applicability determination, even though the inaccuracies did not undermine the ultimate applicability determination. The NRC staff also found that, in some cases the table entries lack a consistent level of detail with respect to applicability determinations of detailed individual regulations. Requirements at lower levels of detail may differ from the assessed applicability (as an example, specific individual regulations within an appendix to a part may be inapplicable even if the entire appendix is specified to be applicable).

Kairos's regulatory applicability determinations regarding 10 CFR 50.2 definitions also contain inaccuracies. Some licensing types specified in the TR are not accurate for all uses of the definition and may be over- or under-specified. The NRC staff's position is that, regardless of the reactor technology, the definition is applicable. Mapping all the regulatory definitions to each of the contextual use cases would present issues related to the specificity of information available at this juncture (compared with having a detailed application ready for submittal with all the associated context), and the licensing cases intended by Kairos for the KP-FHR should not interfere with the stated purpose of this TR. As such, the NRC staff finds the table to be acceptable for the purposes outlined here subject to the restrictions specified in Limitation and Condition 3.

With the exception of the determination that 10 CFR 50.55a(h)(3) applies to a testing facility and 10 CFR 50.46 partially applies to the KP-FHR power reactor (as noted in Table 1), the NRC staff finds that an applicant will need to demonstrate that it meets regulations designated as "apply" (e.g., those in Table A-1) when it submits its application (unless an exemption is requested and justified). At this time, the NRC staff makes no finding as to whether the KP-FHR can satisfy applicable NRC requirements. The NRC staff further finds that regulations that are designated as inapplicable (e.g., those in Table A-2, listed above in this paragraph), need not to be met and no information related to these regulations is required in a future KP-FHR application that references this TR, subject to the limitations and conditions associated with this SE.

The TR also includes Kairos' positions on possible guidance applicability, but these statements do not appear to be comprehensive and are not within the scope of the approval requested in the TR (i.e., the approval of Appendices A and B for the power reactor and Appendices D and E for the test reactor). As such, the NRC staff does not reach any conclusions regarding the content in Appendix C or F.

3.4 Applicant Conclusions

The TR Section 3.4 states that the applicable regulatory requirements in Appendices A, B, D, and E, along with the PDC identified separately in another TR for the power reactor (ML19212A756), provide a comprehensive regulatory framework for the design and licensing of the KP-FHR. Kairos concluded that while some of the existing NRC regulations are not directly applicable to the KP-FHR design and licensing, there are a sufficient set of applicable regulations to support the conduct of a safety review and enable a conclusion of reasonable assurance of adequate protection of public health and safety.

3.4.1 NRC Staff Evaluation

As stated above, the NRC staff concludes that Kairos developed an acceptable methodology for identifying the regulatory framework for licenses, approvals, and certifications of a KP-FHR under 10 CFR 50 and 10 CFR 52, based on the information provided in the TR. The NRC staff will review any license application that uses the KP-FHR design to determine whether the design falls within the parameters of the TR, whether the regulatory framework for the KP-FHR is acceptable, and whether the submitted design complies with all the applicable requirements.

Although Kairos requests the review and approval of the list of regulations deemed applicable to the KP-FHR design in Appendices A, B, D, and E, a final NRC staff determination regarding the applicable regulations will await review at the time of a license application submittal. While the lists provided by Kairos appear to be inclusive, a determination of applicable regulations at the time of the application submittal may be influenced by the application type, ongoing rulemaking efforts at the agency (such as the Part 53 rulemaking, discussed in SECY-200032 (ML19340A056)), and additional design details not yet available. Therefore, the NRC staff's approval of this TR does not presume that Appendices A, B, D, and E contain the comprehensive regulations that will be applicable to any future application, but only that the applicability determinations in those appendices are appropriate based on the design information available to the NRC staff when the TR Revision 4 was submitted.

The NRC staff further recognizes that the TR is based on information known to Kairos as of the TR submission date; further, the NRC staff finds the Appendices A, B, D, and E lists of the KP-FHR-applicable regulations to be acceptable based on the limitations and conditions provided below and the facts available at the time of a license application submittal. If those facts change, applicability may change as well. The applicability determined in this SE is based on the scope of information submitted. Some regulations, for instance, have technology-based entry conditions within the text of the regulation; if it is not established whether that entry condition is satisfied based on the below limitations and conditions associated with the KP-FHR design, the regulation was deemed applicable until additional information is available to satisfy any such entry condition.

4.0 LIMITATIONS AND CONDITIONS

In reviewing the TR, the NRC staff noted that Section 1.1 of the TR identifies certain design criteria, which are inherent in the KP-FHR design. Because these criteria are an important element of the NRC staff's review, the criteria are herein adopted by the NRC staff as technical limitations and conditions regarding its review of Appendices A, B, D, and E in the TR:

1. (Section 3.1.3) As presented in the TR, there are key design features without which the proposed regulatory applicability statements would not be appropriate or encompass the full set of necessary design criteria. Therefore, a KP-FHR design referencing the TR must have the following:

   - A "chemically stable molten fluoride salt mixture" coolant.
   - TRISO fuel particles and fuel pebbles that, combined with other design features as applicable, demonstrate functional containment performance criteria consistent with SECY-18-0096 and applicable regulatory dose requirements.
   - An intermediate coolant loop using a coolant that is compatible with reactor coolant, and that is demonstrated not to have a safety significant impact on the primary system.
   - "Near-atmospheric" primary coolant pressures.
   - The ability to ensure core cooling by maintaining coverage of the reactor fuel with reactor coolant.

   These key design features of the KP-FHR, if changed, could necessitate modification of the applicability or inapplicability of regulations described in Appendices A, B, D, and E of the TR. Approval in this TR is therefore limited to the explicit information conveyed in the TR and based on the NRC staff's current understanding of the design.

Further, as stated above, the NRC staff will evaluate an application against the Commission's regulations at the time of a license application submittal. Therefore, the TR is subject to the following regulatory related limitations and conditions:

2. The NRC staff's approval of this TR does not endorse the use of the tables in Appendices A, B, D, and E as a final comprehensive list of applicable regulations for a future KP-FHR application, but only as an assessment of applicable regulations provided at the relevant level of detail within the tables. The NRC staff will determine the full scope of regulations that apply to a future application at the time of a license application submittal based on the regulations that are in effect at that time. For example, regulatory applicability may depend on the scope of the submittal materials requirements that apply to combined licenses and operating licenses licensees but would likely not apply to design certification licensees and may or may not apply to a construction permit applicant. At the time of approval of this evaluation, the applicability statements in the

tables are generally correct for the described KP-FHR based on information considered in this SE.

3. This SE does not override the requirements within the regulations themselves. The information provided in this TR was used to provide an assessment of applicability based on the information available to the NRC staff at the time of the review and represents one potentially adequate method for complying with the regulations. If at the time of the detailed review of an application the applicability determinations noted here conflict with any regulatory requirements or subsequent NRC interpretations of its regulations, those requirements and interpretations would take precedence over the positions in this TR.

5.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the TR describes an acceptable methodology for determining the applicable regulatory requirements for the KP-FHR power and test reactor, and that its assessment of the regulations will help to identify an appropriate set of regulations applicable for the KP-FHR subject to the limitations and conditions listed in Section 4.0 of this SE. Based on the information considered by the NRC staff as of the date of this SE, with the exception of the items identified in Section 3.2.1 and Section 3.3.2 above, the applicability statements in the tables of Appendices A, B, D, and E correctly identify regulations applicable to the proposed KP-FHR. A more detailed evaluation of applicable regulations and other necessary requirements for licensing the Kairos facility will accompany the NRC staff's SE following the completion of a specific facility's design and submittal of a license application.

6.0 REFERENCES

1. Kairos Power LLC, "Principal Design Criteria for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor," KP-TR-003, Revision 1, July 2019, (ADAMS Accession No. ML19212A756)
2. Kairos Power LLC, "KP-FHR Risk-Informed Performance-Based Licensing Basis Development Methodology Topical Report," KP-TR-009, August 2019, (ADAMS Accession No. ML19217A420)
3. Nuclear Energy Institute, "Risk-Informed Performance-Based Technology Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development," NEI 18-04 (Draft).
4. U.S. Nuclear Regulatory Commission, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors," DG-1353, April 2019.
5. U.S. Nuclear Regulatory Commission, "Functional Containment Performance Criteria for Non Light-Water-Reactors," SECY-18-0096, October 16, 2018.
6. U.S. Nuclear Regulatory Commission, "Staff Requirements - SECY-18-0096 Functional Containment Performance Criteria for Non-Light-Water-Reactors," December 4, 2018.

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Section B

KP-TR-004-NP-A

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Regulatory Analysis for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor

Topical Report

Revision 4
January 2022

Non-Proprietary

Rev	Description of Change	Date
0	Initial Issuance	January 2019
1	Revised to address NRC questions, provided by emails dated August 15, 2019 and September 6, 2019 on the initial revision.	October 2019
2	Updated to include regulatory analysis for a KP-FHR test reactor and feedback from the NRC (NRC Staff Draft White Paper Analysis of Applicability of NRC Regulations for Non-Light Water Reactors).	November 2020
3	Updated to include feedback from NRC staff review.	August 2021
4	Updated the applicability of 10 CFR 20.1301(e) and 10 CFR 74 for the test reactor, and to incorporate feedback from NRC staff review regarding editorial corrections and applicability of certain definitions.	January 2022

Executive Summary

This topical report reviews and identifies the Nuclear Regulatory Commission (NRC) regulatory requirements applicable to the Kairos Power Fluoride Salt-Cooled, High Temperature Reactor (KP-FHR), including both the KP-FHR commercial power reactor and the KP-FHR nuclear test reactor. This regulatory review considers the relevant NRC requirements in Title 10 of the Code of Federal Regulations (10 CFR). The regulatory analysis identifies the regulations that apply to the KP-FHR, those that do not apply and those that require an exemption from the regulations. The analysis is based on consideration of the unique design features of the KP-FHR technology which are summarized in this report.

Kairos Power has concluded that the regulatory requirements reflected herein are sufficient to conduct the NRC review of a license application and to reach a conclusion of reasonable assurance of adequate protection of public health and safety. Kairos Power is requesting NRC review and approval of this topical report for use by future applicants for licenses under 10 CFR 50 and 10 CFR 52 related to the KP-FHR.

In addition, the report reviews existing regulatory guidance in NRC Regulatory Guides (RG) for suitability to the design and licensing of KP-FHRs. However, Kairos Power is not requesting review and approval of the acceptability of Regulatory Guides or other guidance documents for use by future applicants at this time.

Table of Contents

ABBREVIATIONS

Abbreviation or Acronym	Definition
AC	Alternating Current
ALARA	As Low As is Reasonably Achievable
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transient Without Scram
BWR	Boiling Water Reactor
B&W	Babcock and Wilcox
CFR	Code of Federal Regulations
COL	Combined License
CP	Construction Permit
DC	Design Certification
DOE	Department of Energy
ECCS	Emergency Core Cooling System
EPZ	Emergency Planning Zone
EQ	Environmental Qualification
ER	Environmental Report
ESP	Early Site Permit
FHR	Fluoride Salt-Cooled High Temperature Reactor
FSAR	Final Safety Analysis Report
GSI	Generic Safety Issue
HEU	Highly Enriched Uranium
IEEE	Institute of Electrical and Electronics Engineers
ISI	Inservice Inspection
ITAAC	Inspections, Tests, Analyses, and Acceptance Criteria
KP-FHR	Kairos Power Fluoride Salt-Cooled High Temperature Reactor
LCO	Limiting Condition for Operation
LLC	Limited Liability Corporation
LMP	Licensing Modernization Project
LOCA	Loss of Coolant Accident
LWA	Limited Work Authorization
LWR	Light Water Reactor

Abbreviation or Acronym	Definition
MHTGR	Modular High Temperature Gas-Cooled Reactor
ML	Manufacturing License
OBE	Operating Basis Earthquake
OL	Operating License
NRC	Nuclear Regulatory Commission
PDC	Principal Design Criteria
PRA	Probabilistic Risk Assessment
PSAR	Preliminary Safety Analysis Report
PSI	Preservice Inspection
PWR	Pressurized Water Reactor
QA	Quality Assurance
QC	Quality Control
RCS	Reactor Coolant System
RCP	Reactor Coolant Pump
RG	Regulatory Guide
RIM	Reliability and Integrity Management
SDA	Standard Design Approval
SNM	Special Nuclear Material
SRP	Standard Review Plan
SSC	Structures, Systems, and Components
TMI	Three Mile Island
TRISO	Tri-structural Isotropic

1 INTRODUCTION

Kairos Power LLC (Kairos Power) is pursuing the design, licensing, and deployment of Fluoride Salt-Cooled, High Temperature Reactors (FHR) including a nuclear test reactor and commercial power reactors. To support these objectives, Kairos Power has reviewed the regulations in 10 CFR to confirm the requirements that are applicable to establish the framework for NRC review and licensing of the KP-FHR designs (subsequently referred to as power reactor and test reactor respectively). Nuclear Regulatory Commission (NRC) regulations in 10 CFR Part 50 and Part 52 provide most of the regulations associated with design and licensing of nuclear reactors. However, this review also included the remainder of 10 CFR Parts 1 through 199 to identify other relevant design and licensing requirements. The review of regulations summarized in this topical report categorizes the NRC regulations into those that apply, regulations that do not apply, and regulations that require an exemption for the design and licensing. The review of the regulations is performed in consideration of the KP-FHR reactor's unique design attributes.

Kairos Power is requesting NRC review and approval of this topical report, including concurrence with the applicability of design-related regulations in Appendix A and non-design related regulations in Appendix B for a KP-FHR power reactor as well as design related regulations in Appendix D and non-design related regulations in Appendix E for the KP-FHR test reactor. The results of this topical report, along with a separate topical report which establishes the principal design criteria for the KP-FHR (Reference 1), are expected to be used by applicants and NRC reviewers as a regulatory framework for licenses, approvals, and/or certifications of a KP-FHR under 10 CFR 50 and 10 CFR 52.

A review of NRC RGs is also performed to identify those RGs that may be useful or relevant for demonstrating conformance to the set of applicable regulations. While NRC comments on the appropriateness of the RG conclusions in Appendix C and Appendix F are welcome, Kairos Power is not requesting formal review and approval of the acceptability of these RGs for use at this time. The degree of conformance or use of a particular RG will be identified as part of other license application documents such as safety analysis reports or topical and technical reports.

1.1 DESIGN FEATURES

1.1.1 Design Background

To facilitate NRC review and approval of the regulatory analysis for use by future applicants, key design features are provided in this section which are considered inherent to the KP-FHR technology. These features are not expected to change during the design development by Kairos Power and provide the basis to support the safety review of the regulatory analysis. Should fundamental changes occur to these key design features or revised regulations be promulgated that affect the regulatory analysis for the KP-FHR, such changes would be reconciled and addressed in future license application submittals.

The KP-FHR is a U.S.-developed Generation IV advanced reactor technology. In the last decade, U.S. national laboratories and universities have developed pre-conceptual Fluoride Salt-Cooled High Temperature Reactor (FHR) designs with different fuel geometries, core configurations, heat transport system configurations, power cycles, and power levels. More recently, University of California at Berkeley developed the Mark 1 pebble-bed FHR, incorporating lessons learned from the previous decade of FHR pre-conceptual designs (Reference 2). Kairos Power has built on the foundation laid by Department of Energy (DOE)-sponsored university Integrated Research Projects to develop the KP-FHR.

Although not intended to support the findings necessary to approve the applicability of regulations provided in this report, additional design description information for the KP-FHR power reactor is provided in the "Design Overview of the Kairos Power Fluoride Salt-Cooled, High Temperature Reactor (KP-FHR)" Technical Report (Reference 3).

1.1.2 Key Design Features of the KP-FHR

The KP-FHR is a high temperature reactor with molten fluoride salt coolant operating at near-atmospheric pressure. The fuel in the KP-FHR is based on the Tri-Structural Isotropic (TRISO) high-temperature carbonaceous-matrix coated particle fuel developed for high-temperature gas-cooled reactors in a pebble fuel element. Coatings on the particle fuel provide retention of fission products. The reactor coolant is a chemically stable molten fluoride salt mixture, 2·7LiF:BeF2 (Flibe with enrichment of the 7Li isotope) which also provides retention of fission products that escape from any fuel defects. A primary coolant loop circulates the reactor coolant using pumps and transfers the heat to a heat exchanger. The design includes decay heat removal capability for both normal conditions and accident conditions. Passive decay heat removal, along with natural circulation in the reactor vessel, is used to remove decay heat in response to a design basis accident. The KP-FHR does not rely on electrical power to achieve and maintain safe shutdown for design basis accidents.

The KP-FHR design relies on a functional containment approach similar to the Modular High Temperature Gas-Cooled Reactor (MHTGR) instead of the typical light water reactor (LWR) low-leakage, pressure retaining containment structure. The KP-FHR functional containment safety design objective is to meet 10 CFR 50.34 (10 CFR 52.79) offsite dose requirements at the plant's exclusion area boundary (EAB) with margin. A functional containment is defined in RG 1.232 as a "barrier, or set of barriers taken together, that effectively limit the physical transport and release of radionuclides to the environment across a full range of normal operating conditions, anticipated operational occurrences, and accident conditions. RG 1.232 includes an example design criterion for the functional containment (MHTGR Criterion 16). As also stated in RG 1.232, the NRC has reviewed the functional containment concept and found it "generally acceptable," provided that "appropriate performance requirements and criteria" are developed. The NRC staff has developed a proposed methodology for establishing functional containment performance criteria for non-LWRs, which is presented in SECY-18-0096. This SECY document has been approved by the Commission.

The functional containment approach for the KP-FHR is to control radionuclides primarily at their source within the coated fuel particle under normal operations and accident conditions without requiring active design features or operator actions. The KP-FHR design relies primarily on the multiple barriers within the TRISO fuel particles to ensure that the dose at the site boundary as a consequence of postulated accidents meets regulatory limits. However, in the KP-FHR as opposed to the MHTGR, the molten salt coolant serves as a distinct additional barrier providing retention of fission products that escape the fuel particle and fuel pebble barriers. This additional retention is a key feature of the enhanced safety and reduced source term in the KP-FHR.

1.2 REGULATORY BACKGROUND

The NRC regulatory framework (regulations and guidance) for the design and licensing of nuclear facilities has evolved over many years of light water reactor licensing experience and is currently contained in the following document types:

- Regulations
  - 10 CFR Parts 1-199
- Guidance
  - NRC Regulatory Guides
  - Standard Review Plans
  - Interim Staff Guidance, Generic Letters, Bulletins, Generic Safety Issues (GSI)

The regulations in 10 CFR Parts 1-199 contain the requirements that must be met to design, license, and operate a nuclear facility. Not all regulations are required to be addressed by every reactor design type (some are design specific) and some regulations are applicable only to non-reactor facilities or other NRC licensed activities. Additionally, the regulations allow for exemptions if appropriate and properly justified. For example, 10 CFR 50.12 identifies the standards for exemptions from 10 CFR 50 requirements.

While the regulations in 10 CFR contain requirements that must be met (if applicable), NRC guidance provides approaches or methods that have been determined to be acceptable by the NRC for demonstrating a requirement has been met. However, regulatory guidance does not represent requirements and applicants for licenses may propose alternative approaches or methods for demonstrating conformance to regulations. Although conformance with guidance documents is not specifically required, they represent a useful tool for developing and submitting an application. Kairos Power has considered NRC Regulatory Guides for relevance to the requirements applicable to the design of the KP-FHR power reactor and the KP-FHR test reactor as part of this review.

There are several licensing pathways provided in 10 CFR 50 and 10 CFR 52. Kairos Power anticipates that the initial plant license applications for the KP-FHR test reactor and initial commercial power reactor will be submitted under 10 CFR 50. However, multiple licensing paths are viable, so all regulations are evaluated in this report, with a consideration of applicability of the license pathway. Kairos Power has also evaluated the NRC analysis in SECY-15-0002, “Proposed Updates of Licensing Policies, Rules, and Guidance for Future New Reactor Applications,” which recommends rulemaking to better align the requirements in 10 CFR 52 and 10 CFR 50. Accordingly, this report considers the recommendations in this SECY and associated staff requirements memorandum as part of the evaluation of licensing requirements in both 10 CFR 50 and 10 CFR 52 for applicability to the KP-FHR reactor design.

2 REGULATORY ANALYSIS METHODOLOGY

2.1 SCOPE

This section describes the process used by Kairos Power to perform the regulatory analysis for the KP-FHR power reactor and test reactor. NRC regulations and guidance were reviewed to establish a licensing framework applicable to the design and licensing of the KP-FHR design. The scope of regulations and guidance included in this review are the NRC document types in Section 1.2.

2.2 METHODOLOGY

A methodical process was used to review NRC regulations and guidance to determine if the licensing framework is applicable and sufficient for the design and licensing of the KP-FHR power reactor and test reactor. The regulations and guidance documents in Section 1.2 were compiled in a tabular form to facilitate screening, review and evaluation. Different levels of granularity were used in the review of different document types. For example, 10 CFR 50, 10 CFR 51, and 10 CFR 52 were compiled in smaller discrete elements to aid in assigning them as requirements for the KP-FHR design. CFRs other than Part 50 and 52 were screened and reviewed primarily at the part level. Note that the selection of principal design criteria required by 10 CFR 50, Appendix A, was performed separate from this review and documented in a separate topical report (Reference 1), using the guidance in Regulatory Guide 1.232 (Reference 4).

For each regulation, the content was screened by a cross-discipline engineering and licensing team and categorized based on the type or nature of the regulation. Note that these screening categories are not defined in NRC regulations or guidance but were defined by the review team to facilitate and document the review. One objective of the initial screening of the regulations was to distinguish requirements specifically relevant to the design of the plant from requirements considered to be administrative, process, or programmatic in nature. This distinction is useful to the development of functional design requirements and performance of design reviews. The screening categories established by the team are defined below:

- **Regulatory Process** – Rules and guidance associated with NRC implemented activities. Example: conduct of inspections by the NRC.
- **Not applicable** – Rules and guidance not applicable to nuclear reactors. Example: regulations specific to a production or fuel fabrication facility.
- **Administrative** – Rules, guidance, and support information associated with the conduct of an applicant or licensee. Examples: 10 CFR 50.5, 50.7, 50.9.
- **Process** – Rules and guidance related to regulatory processes required for an applicant or licensee (primarily activities that require procedures). Example: 10 CFR 50.59, changes tests and experiments.
- **Program** – Rules and guidance related to regulatory or operational programs. Examples: in-service inspection, quality assurance.
- **Design** – Rules and guidance related to plant design, engineering, and analyses. In cases where requirements include administrative, process or program requirements in addition to

design, the requirement is conservatively categorized as design. Examples are those regulations related to the contents of applications, or that establish criticality requirements. These requirements have elements consistent with the definitions of multiple review categories.

Regulations that were not initially screened out as not applicable were subsequently further evaluated for specific applicability to the KP-FHR technology. The requirements categorized as "Design" and found to be applicable to the KP-FHR technology establish the list of regulatory requirements to be addressed as part of the KP-FHR design requirements identification process.

The evaluation categories are defined:

- **Applies –** The regulation applies to the KP-FHR power reactor and the KP-FHR test reactor as written.
- **Does Not Apply –** The regulation is not literally applicable to the KP-FHR due to the wording of the rule or is not technically relevant or directly applicable to the KP-FHR technology. Examples are requirements that apply to LWRs only, certain reactor developers/vendors, or to existing licensed plants only. In some cases, the regulations apply to a plant licensed in a specific time period which is no longer applicable. In addition, some of the regulations apply only to power reactors and do not apply to test reactors. There are also some regulations that apply to test reactors but do not apply to power reactors.
- **Exemption –** This category is used where the regulation is literally applicable to the design of KP-FHR power reactors or KP-FHR test reactors, but it requires a design solution or feature that the KP-FHR technology does not include or intends to provide an acceptable alternative design solution. An example is the requirement in 10 CFR 50.34(a)(4) to perform an evaluation of Emergency Core Cooling System (ECCS) cooling in accordance with 10 CFR 50.46. This requirement is applicable because the language of the rule as written applies to all reactor designs. However, the KP-FHR utilizes a passive residual heat removal system that removes decay heat. With a low pressure near atmospheric design, ECCS is not needed nor included in the design technology and 10 CFR 50.46 does not apply. Therefore, the wording in this regulation cannot be met with the proposed technology and an exemption from the regulation is required.

In some instances, specific regulatory requirements in the 10 CFR may be applicable to the KP-FHR power reactor or test reactor design, but only for a certain licensing pathway or application type. In these cases, requirements deemed applicable to a specific KP-FHR licensing path or application type are designated with an application type. These license application types are listed below:

CP – Construction Permit

OL – Operating License

LWA – Limited Work Authorization

SDA – Standard Design Approval

COL – Combined License

DC – Design Certification

ML – Manufacturing License

ESP – Early Site Permit

3 REGULATORY ANALYSIS RESULTS

The regulations in 10 CFR Parts 1-199 and relevant regulatory guidance documents were reviewed and categorized with respect to their applicability as described in Section 2.2. In the remainder of this document, the regulations in 10 CFR 1-199 are referred to as 10 CFR. The results of the review are summarized in the subsections below. Section 3.1 summarizes the regulatory review for the KP-FHR power reactor and Section 3.2 summarizes the regulatory review for the KP-FHR test reactor. The results are summarized for the power reactor in Appendices A, B, and C. The results for the test reactor are summarized in Appendices D, E, and F.

A comparison is provided in Table 1 showing (at a high level) differences between the regulatory analysis of the power reactor and the test reactor. This table does not include all regulations in 10 CFR 1-199 and is an provided for summary level information only.

3.1 REGULATION REVIEW RESULTS FOR A KP-FHR POWER REACTOR

Section 3.1.1 discusses the design-related requirements in 10 CFR that apply, Section 3.1.2 the design related requirements that do not apply, Section 3.1.3 the requirements that require an exemption, and Section 3.1.4 the non-design requirements.

3.1.1 Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor

A review was conducted of the design-related regulations in 10 CFR to determine which requirements apply to the KP-FHR technology. The review category descriptions provided in Section 2.2 were used in making these determinations.

The results of this review are tabulated in Appendix A for design-related requirements. The regulations determined to apply to the design of the KP-FHR are listed in Table A-1 for 10 CFR.

3.1.2 Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor

A review was conducted of design-related regulations in 10 CFR to determine which requirements do not apply to the KP-FHR technology. These design-related requirements do not literally apply to KP-FHR (e.g. applicable to LWRs only, certain developers/vendors, or to existing plants only).

The results of this review are tabulated in Table A-2. The table provides an explanation for why the regulation does not apply to the KP-FHR.

3.1.3 Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Power Reactor

As discussed in Section 2.2, some of the regulations in 10 CFR require an exemption for use with the KP-FHR, depending on the licensing pathway and test or power reactor. The 10 CFR regulations that are determined to require an exemption to license a KP-FHR power reactor are provided in Table A-3 and Table A-4. Note that these tables include all exemptions for the 10 CFRs for both design and non-design, unlike the other tables in this Appendix, to ensure each exemption “topic” includes all relevant regulations. The requirements that require an exemption are related to seven (7) regulatory topics including: Reactor Coolant Pressure Boundary, Emergency Core Cooling, Criticality Accident Requirements, Emergency Plans, PRA Records, Material Control and Accounting (MC&A) and Part 52

regulations referencing Part 50 regulations not applicable to non-LWRs. In some cases, a design feature may be addressed in multiple regulations, and those regulations are grouped together in Tables A-3 and A-4. It should be noted that in many cases the regulations requiring an exemption involve a minor wording change to one portion of the requirement. The portions of the regulation that are not being changed are not included in the APPLIES table to avoid having the same regulation in multiple tables. The exempted regulations in these exemption tables can be assumed to apply.

3.1.3.1 Reactor Coolant Pressure Boundary

This exemption is necessary because of how the regulation refers to the wording reactor coolant pressure boundary. This terminology is found in the definitions of the regulations and several other regulations, each of which is discussed in this section.

Definitions

The underlined portions of the definitions for basic component and safety-related structure, system and component in 10 CFR 50.2 need to be modified.

> *Basic component means, for the purposes of §50.55(e) of this chapter: (1) When applied to nuclear power reactors, any plant structure, system, component, or part thereof necessary to assure (i) The integrity of the reactor coolant pressure boundary, (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition, or (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable. (2) When applied to other types of facilities or portions of such facilities for which construction permits are issued under §50.23, a component, structure, system or part thereof that is directly procured by the construction permit holder for the facility subject to the regulations of this part and in which a defect or failure to comply with any applicable regulation in this chapter, order, or license issued by the Commission could create a substantial safety hazard.*
>
> *(3) In all cases, basic component includes safety related design, analysis, inspection, testing, fabrication, replacement parts, or consulting services that are associated with the component hardware, whether these services are performed by the component supplier or other supplier.*
>
> *Safety-related structures, systems and components means those structures, systems and components that are relied upon to remain functional during and following design basis events to assure: (1) The integrity of the reactor coolant pressure boundary (2) The capability to shut down the reactor and maintain it in a safe shutdown condition; or (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in §50.34(a)(1) or §100.11 of this chapter, as applicable.*

Both of the definitions refer to “reactor coolant pressure boundary”, which is a light water reactor term. In a light-water reactor, a primary function of the reactor coolant pressure boundary is to keep the water subcooled in a PWR and near nucleate boiling in a BWR. In addition, the reactor coolant pressure boundary of a light water reactor provides a fission product retention barrier for the release of radionuclides. The technology associated with the KP-FHR is based on a near atmospheric pressure design

and the KP-FHR reactor coolant boundary does not provide a similar pressure related or fission product retention function. Both RG 1.232, Guidance for Developing Principal Design Criteria for Non-Light Water Reactors (Reference 4) and the Kairos Power topical report on Principal Design Criteria for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor (Reference 1) utilize the term "reactor coolant boundary" instead of reactor coolant pressure boundary. Also as described in Section 1.1, the equivalent fission product barrier function is provided by the functional containment rather than a pressure retaining fluid system boundary and physical containment structure. The integrity of some portions of the KP-FHR reactor coolant boundary may be credited to perform a safety significant function and where "safety significant" is determined using the methodology described in Reference 8. Therefore, the words "integrity of the reactor coolant pressure boundary" will be changed to "integrity of the safety-significant portions of the reactor coolant boundary" in each definition during the licensing process. Note that an evaluation of the defense in depth of the resultant design is also demonstrated using the methodology described in Reference 8. It is not appropriate to replace the existing language with "integrity of the functional containment" since this function is performance based on TRISO based fuel technology and is not an "absolute" integrity. The performance function of the functional containment is already captured in the remaining language under item (3), "the capability to prevent or mitigate the consequences of accidents…". The functional containment is a feature which serves this capability. Therefore, an equivalent level of safety is provided by the remaining language and no additional content is necessary.

Several other regulations that refer to the term reactor coolant pressure boundary would need to be included in the exemption request with the same modification, including: 10 CFR 50.49(b), Environmental Qualification of Electric Equipment Important to Safety, 10 CFR 50.65, Maintenance Rule, and 10 CFR Appendix S, Seismic. The portion of each of these rules requiring the above modification is underlined below.

Environmental Qualification of Electric Equipment Important to Safety

Environmental Qualification is contained in 10 CFR 50.49(b) as shown below and includes a reference to reactor coolant pressure boundary.

> *(b) Electric equipment important to safety covered by this section is: (1) Safety-related electric equipment.[3] Safety-related electric equipment is referred to as "Class 1E" equipment in IEEE 323-1974. Copies of this standard may be obtained from the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017. (i) This equipment is that relied upon to remain functional during and following design basis events to ensure - (A) The integrity of the reactor coolant pressure boundary; (B) The capability to shut down the reactor and maintain it in a safe shutdown condition; or (C) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable. (ii) Design basis events are defined as conditions of normal operation, including anticipated operational occurrences, design basis accidents, external events, and natural phenomena for which the plant must be designed to ensure functions (b)(1)(i) (A) through (C) of this section. (2) Nonsafety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions specified in subparagraphs (b)(1)(i)(A) through (C) of this section by the safety-related equipment. (3) Certain post-accident monitoring equipment.[4]*

Footnote 3: Safety-related electric equipment is referred to as "Class 1E" equipment in IEEE 323-1974. Copies of this standard may be obtained from the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017.

Footnote 4: Specific guidance concerning the types of variables to be monitored is provided in Revision 2 of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." Copies of the Regulatory Guide may be purchased through the U.S. Government Publishing Office by calling 202-512-1800 or by writing to the U.S. Government Publishing Office, P.O. Box 37082, Washington, DC 20013-7082.

Maintenance Rule

The maintenance rule is contained in 10 CFR 50.65, which is shown below and includes a reference to reactor coolant pressure boundary.

The requirements of this section are applicable during all conditions of plant operation, including normal shutdown operations. (a)(1) Each holder of an operating license for a nuclear power plant under this part and each holder of a combined license underpart 52 of this chapter after the Commission makes the finding under §52.103(g) of this chapter, shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience. When the performance or condition of a structure, system, or component does not meet established goals, appropriate corrective action shall be taken. For a nuclear power plant for which the licensee has submitted the certifications specified in §50.82(a)(1) or 52.110(a)(1) of this chapter, as applicable, this section shall only apply to the extent that the licensee shall monitor the performance or condition of all structures, systems, or components associated with the storage, control, and maintenance of spent fuel in a safe condition, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions. (2) Monitoring as specified in paragraph (a)(1) of this section is not required where it has been demonstrated that the performance or condition of a structure, system, or component is being effectively controlled through the performance of appropriate preventive maintenance, such that the structure, system, or component remains capable of performing its intended function. (3) Performance and condition monitoring activities and associated goals and preventive maintenance activities shall be evaluated at least every refueling cycle provided the interval between evaluations does not exceed 24 months. The evaluations shall take into account, where practical, industry-wide operating experience. Adjustments shall be made where necessary to ensure that the objective of preventing failures of structures, systems, and components through maintenance is appropriately balanced against the

objective of minimizing unavailability of structures, systems, and components due to monitoring or preventive maintenance. (4) Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety.(b) The scope of the monitoring program specified in paragraph (a)(1) of this section shall include safety related and nonsafety related structures, systems, and components, as follows: (1) Safety-related structures, systems and components that are relied upon to remain functional during and following design basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable. (2) Nonsafety related structures, systems, or components: (i) That are relied upon to mitigate accidents or transients or are used in plant emergency operating procedures (EOPs); or (ii) Whose failure could prevent safety-related structures, systems, and components from fulfilling their safety-related function; or (iii) Whose failure could cause a reactor scram or actuation of a safety-related system. (c) The requirements of this section shall be implemented by each licensee no later than July 10, 1996.

Seismic

10 CFR 50.54(ff) references earthquake engineering criteria in Appendix S, which includes a reference to reactor coolant pressure boundary.

GENERAL INFORMATION This appendix applies to applicants for a construction permit or operating license under part 50, or a design certification, combined license, design approval, or manufacturing license under part 52 of this chapter, on or after January 10, 1997. However, for either an operating license applicant or holder whose construction permit was issued before January 10, 1997, the earthquake engineering criteria in Section VI of appendix A to 10 CFR part 100 continue to apply. Paragraphs IV.a.1.i, IV.a.1.ii, IV.4.b, and IV.4.c of this appendix apply to applicants for an early site permit under part 52. I. INTRODUCTION (a) Each applicant for a construction permit, operating license, design certification, combined license, design approval, or manufacturing license is required by §§50.34(a)(12), 50.34(b)(10), or 10 CFR 52.47, 52.79, 52.137, or 52.157, and General Design Criterion 2 of appendix A to this part, to design nuclear power plant structures, systems, and components important to safety to withstand the effects of natural phenomena, such as earthquakes, without loss of capability to perform their safety functions. Also, as specified in §50.54(ff), nuclear power plants that have implemented the earthquake engineering criteria described herein must shutdown if the criteria in paragraph IV(a)(3) of this appendix are exceeded. (b) These criteria implement General Design Criterion 2 insofar as it requires structures, systems, and components important to safety to withstand the effects of earthquakes. II. SCOPE The evaluations described in this appendix are within the scope of investigations permitted by §50.10(c)(1). III. DEFINITIONS As used in these criteria: Combined license means a

combined construction permit and operating license with conditions for a nuclear power facility issued under subpart C of part 52 of this chapter. Design Approval means an NRC staff approval, issued under subpart E of part 52 of this chapter, of a final standard design for a nuclear power reactor of the type described in 10 CFR 50.22. Design Certification means a Commission approval, issued under subpart B of part 52 of this chapter, of a standard design for a nuclear power facility. Manufacturing license means a license, issued under subpart F of part 52 of this chapter, authorizing the manufacture of nuclear power reactors but not their installation into facilities located at the sites on which the facilities are to be operated. Operating basis earthquake ground motion (OBE) is the vibratory ground motion for which those features of the nuclear powerplant necessary for continued operation without undue risk to the health and safety of the public will remain functional. The operating basis earthquake ground motion is only associated with plant shutdown and inspection unless specifically selected by the applicant as a design input. Response spectrum is a plot of the maximum responses (acceleration, velocity, or displacement) of idealized single-degree-of-freedom oscillators as a function of the natural frequencies of the oscillators for a given damping value. The response spectrum is calculated for a specified vibratory motion input at the oscillators' supports. Safe-shutdown earthquake ground motion (SSE) is the vibratory ground motion for which certain structures, systems, and components must be designed to remain functional. Structures, systems, and components required to withstand the effects of the safe-shutdown earthquake ground motion or surface deformation are those necessary to assure: (1) The integrity of the reactor coolant pressure boundary; (2) The capability to shut down the reactor and maintain it in a safe-shutdown condition; or (3) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of §50.34(a)(1). Surface deformation is distortion of geologic strata at or near the ground surface by the processes of folding or faulting as a result of various earth forces. Tectonic surface deformation is associated with earthquake processes.

An additional regulation, 10 CFR 50.36(c)(2)(ii), refers to the term reactor coolant pressure boundary and would be included in the same modification. Due to the context, the modification for this rule is slightly different than the modification discussed above. The modification to the underlined portion of this regulation is discussed below.

Technical Specifications, Limiting Condition for Operation (LCO) Criteria

10 CFR 50.36(c)(2)(ii) states:

(ii) A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of the following criteria:(A) Criterion 1. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. (B) Criterion 2. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. (C) Criterion 3. A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either

> *assumes the failure of or presents a challenge to the integrity of a fission product barrier. (D) Criterion 4. A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.*

The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in a KP-FHR, the reactor coolant boundary does not serve this function. Fission product retention is provided by the functional containment. Therefore, the statement, "significant abnormal degradation of the reactor coolant pressure boundary" is not applicable and will be replaced by "significant abnormal degradation of the functional containment."

3.1.3.2 Emergency Core Cooling System

There are several regulations that specify a requirement for an analysis and evaluation of the ECCS, including 10 CFR 50.34(a)(4), 10 CFR 50.34(b)(4), 10 CFR 52.47(a)(4), 10 CFR 52.79(a)(5), 10 CFR 52.137(a)(4), and 10 CFR 52.157(f)(1). As an example, 10 CFR 50.34(b)(4), Contents of Applications, specifies the following requirement:

> *A final analysis and evaluation of the design and performance of structures, systems, and components with the objective stated in paragraph (a)(4) of this section and taking into account any pertinent information developed since the submittal of the preliminary safety analysis report (PSAR). Analysis and evaluation of ECCS cooling performance following postulated loss-of-coolant accidents shall be performed in accordance with the requirements of §50.46 for facilities for which a license to operate may be issued after December 28, 1974.*

While the first sentence of the requirement is applicable to KP-FHR, the second sentence requires an exemption. ECCS is an LWR term typically associated with a system that injects coolant into an LWR to replace reactor coolant inventory lost as a result of a loss of coolant accident (LOCA). A large LOCA is characterized by a rapid loss of inventory and reduction in Reactor Coolant System (RCS) pressure. The KP-FHR design features preclude a significant loss of coolant. These features include operation at near atmospheric pressure, not having any significant piping penetrations to the vessel below the free surface of the coolant and control of cover gas to prevent significant entrainment in the primary system. As such, the design does not require replacement of reactor coolant inventory to meet fundamental safety design objectives. Leakage from the reactor coolant system is managed by the Inventory Control System. The KP-FHR decay heat removal function is accomplished using a Passive Residual Heat Removal System.

3.1.3.3 Pressurized Thermal Shock

10 CFR 50.34(b)(9) requires a description of protection against pressurized thermal shock events and references 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to light water reactors.

> *A description of protection provided against pressurized thermal shock events, including projected values of the reference temperature for reactor vessel beltline materials as defined in § 50.61 (b)(1) and (b)(2).*

The KP-FHR operates at near atmospheric conditions and therefore cannot experience pressurized thermal shock therefore the KP-FHR power reactor will require an exemption to this regulation.

3.1.3.4 Criticality Accident Requirements

Requirement for criticality accidents are provided in 10 CFR 50.68 (shown below) and also by reference in 10 CFR 52.47(a)(14), 10 CFR 52.47(a)(17), 10 CFR 52.79(a)(43), 10 CFR 52.137(a)(17), and 10 CFR 52.157(f)(8).

> *(a) Each holder of a construction permit or operating license for a nuclear power reactor issued under this part or a combined license for a nuclear power reactor issued under part 52 of this chapter, shall comply with either 10 CFR 70.24 of this chapter or the requirements in paragraph (b) of this section.*
>
> *(b) Each licensee shall comply with the following requirements in lieu of maintaining a monitoring system capable of detecting a criticality as described in 10 CFR 70.24:*
>
> *(1) Plant procedures shall prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water.(2) The estimated ratio of neutron production to neutron absorption and leakage (k-effective) of the fresh fuel in the fresh fuel storage racks shall be calculated assuming the racks are loaded with fuel of the maximum fuel assembly reactivity and flooded with unborated water and must not exceed 0.95, at a 95 percent probability, 95 percent confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such flooding or if fresh fuel storage racks are not used.*
>
> *(3) If optimum moderation of fresh fuel in the fresh fuel storage racks occurs when the racks are assumed to be loaded with fuel of the maximum fuel assembly reactivity and filled with low-density hydrogenous fluid, the k-effective corresponding to this optimum moderation must not exceed 0.98, at a 95 percent probability, 95 percent confidence level. This evaluation need not be performed if administrative controls and/or design features prevent such moderation or if fresh fuel storage racks are not used.*
>
> *(4) If no credit for soluble boron is taken, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with unborated water. If credit is taken for soluble boron, the k-effective of the spent fuel storage racks loaded with fuel of the maximum fuel assembly reactivity must not exceed 0.95, at a 95 percent probability, 95 percent confidence level, if flooded with borated water, and the k-effective must remain below 1.0 (subcritical), at a 95 percent probability, 95 percent confidence level, if flooded with unborated water.*
>
> *(5) The quantity of Special Nuclear Material (SNM), other than nuclear fuel stored onsite, is less than the quantity necessary for a critical mass.*
>
> *(6) Radiation monitors are provided in storage and associated handling areas when fuel is present to detect excessive radiation levels and to initiate appropriate safety actions.*
>
> *(7) The maximum nominal U-235 enrichment of the fresh fuel assemblies is limited to five (5.0) percent by weight.*

> *(8) The Final Safety Analysis Report (FSAR) is amended no later than the next update which 50.71(e) of this part requires, indicating that the licensee has chosen to comply with 50.68 (b).*

Paragraph (b) of this regulation provides LWR-centric conditions for criticality safety. The KP-FHR fuel design differs significantly from traditional fuel types used in LWRs. KP-FHR fuel will be enriched to a percentage higher than is specified in the regulation. Additional terminology such as fuel assemblies does not describe KP-FHR technology. Licensees for the KP-FHR will require an exemption to 10 CFR 50.68(b) to provide criteria that are relevant to the KP-FHR design.

3.1.3.5 Emergency Plans

The requirements for emergency planning are contained in 10 CFR 50.47 (which references 10 CFR 50, Appendix E) and 10 CFR 52.79 (a)(21) and 10 CFR 52.79 (a)(22). The requirement in 10 CFR 50.47 states the following in the introduction:

> *(a)(1)(i) Except as provided in paragraph (d) of this section, no initial operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency….*

The emergency planning requirements are relevant to the design in that a fundamental design objective of the KP-FHR is to limit the release of radionuclides to a sufficiently small amount to permit a significantly reduced emergency planning zone (EPZ). The combination of TRISO fuel, radioactivity retaining reactor coolant, and low primary system operating pressure results in relatively small source terms for the KP-FHR. The fuel and coolant design minimize the release of radioactivity and the low reactor coolant operating pressure significantly reduces the driving force to release radionuclides outside of plant structures. The radioactive consequences of accidents are anticipated to be low enough to enable an EPZ to be located at a site boundary that is substantially smaller than established for typical large LWR facilities. Rulemaking activities are being pursued by the industry and NRC to provide alternative regulations for small reactors. The purpose of this rulemaking is to develop a consequence-oriented, performance-based, and technology-inclusive approach to emergency planning. This rulemaking is expected to adopt a scalable plume exposure pathway EPZ that will take into account: (1) the dose/distance boundaries to which planning for initiation of predetermined protective actions is warranted, (2) the time-dependent characteristics of potential releases and exposures, and (3) the isotopic characteristics of radioactive materials that can potentially be released off site into the environment.

Since these alternative regulations are not yet available, an exemption may be needed to the existing emergency planning rules.

It should be noted that even if rulemaking is adopted, some portions of the current emergency plan rules may still apply, for example the emergency plan change process.

3.1.3.6 PRA Records

The regulation in 10 CFR 50.71(h)(1) contains language that refers to an LWR-specific PRA.

> *(h)(1) No later than the scheduled date for initial loading of fuel, each holder of a combined license under subpart C of 10 CFR part 52 shall develop a level 1 and a level 2 probabilistic risk assessment (PRA). The PRA must cover those initiating events and modes for which NRC-endorsed consensus standards on PRA exist one year prior to the scheduled date for initial loading of fuel.*

Kairos Power intends to implement a PRA for the power reactor consistent with the non-LWR PRA standard, ASME/ANS RA-S-1.4 (Reference 9). This standard does not use the Level 1, 2, and 3 model for structuring the PRA as these levels are rooted in an LWR definition of core damage. Therefore, Kairos Power will not use the terms "Level 1" or "Level 2" when referring to the KP-FHR PRA. The 10 CFR 50.71(h)(1) regulation will need to be modified via exemption to allow a technology neutral PRA by removing "level 1 and a level 2" from the text cited above for applications under the 10 CFR 52 pathway.

3.1.3.7 Material Control and Accounting

Part 74 of 10 CFR addresses Material Control and Accounting (MC&A) of Special Nuclear Material. Part 74 defines three categories of special nuclear material, low strategic significance (Category III), moderate strategic significance (Category II), and formula quantity (Category I) of SNM. The regulations for low strategic significance material accounting are contained in Subpart C of 10 CFR 74 (citations 10 CFR 74.31 and 10 CFR 74.33). The regulations for moderate strategic significance are found in Subpart D of 10 CFR 74 (citations 10 CFR 74.41 CFR 74.43, and 10 CFR 74.45).

Kairos Power expects to use primarily Category II SNM in the power reactor but also may use Category III material as well. Current operating reactors have applied for and received approval for exemptions from the requirements in Subpart C (10 CFR 74.31 and 10 CFR 74.33). This is because the requirements for Subpart C and Subpart D were intended for facilities that use bulk accounting of special nuclear material throughout the facility. In contrast, a reactor licensee typically uses item accounting for onsite special nuclear material. A KP-FHR facility would use bulk accounting only for limited portions of the facility (e.g., the reactor vessel) and those portions would employ automated systems that do not allow direct contact with special nuclear material. Kairos Power intends to submit an exemption from most of the requirements in both Subpart C of 10 CFR 74 (citation 10 CFR 74.31) and Subpart D of 10 CFR 74 (citations 10 CFR 74. 41 CFR 74.43, and 10 CFR 74.45). The exemptions from those subparts are also consistent with the regulatory framework for reactors which are subject to additional physical protection requirements under 10 CFR Part 73, mitigating the potential for theft or diversion of special nuclear material.

3.1.3.8 Part 52 Regulations Referencing Part 50 Regulations

An applicant under 10 CFR 52 would need to apply for exemptions from the regulations identified in Table A-4. These regulations are required for non-LWRs because they cross reference 10 CFR 50 regulations that are applicable to LWRs only. The regulations requiring exemptions pertain to seven (7) different topics: Analysis of SSCs and Emergency Core Cooling System (ECCS) Evaluation, Anticipated Transient Without Scram (ATWS), Station Blackout (SBO), Pressurized Thermal Shock Events, Containment Leak Rate, Reactor Vessel Surveillance Program and Effluent Monitoring and Sampling Program.

3.1.4 Non-Design Regulatory Requirements in 10 CFR for a KP-FHR Power Reactor

Non-design related regulations in 10 CFR are summarized in Appendix B. Non-design related regulations include Administrative, Regulatory Process, Process, and Program as described in Section 2.2. The majority of these regulations apply to licensing of the KP-FHR. The non-design regulations that apply to KP-FHR are provided in Table B-1 and those that do not apply are provided in Table B-2. As previously discussed, the exemptions to non-design regulations are not included in Appendix B and instead are included with the design-related exemptions in Appendix A, Table A-3 and A-4.

The non-design regulations in Table B-1 and B-2 were reviewed for applicability and are presented at the part level for all parts except Part 50, 51, and 52. The non-design regulations are primarily program and process and in most cases are specific to an activity. So, if the activity is performed, most if not all of the requirements within the part are applicable.

3.1.5 Regulatory Guidance for a KP-FHR Power Reactor

As discussed previously regulatory guidance is not a requirement but may provide useful information to meet a requirement. Regulatory guides and standard review plans were reviewed for relevance to the design of the KP-FHR and discussed below.

3.1.5.1 Regulatory Guides for a KP-FHR

Regulatory Guides (RG) are issued by NRC to provide guidance to licensees and applicants on implementing specific parts of regulations, techniques used by the NRC staff in evaluating specific problems or postulated accidents, and data needed by NRC staff for review of applications. A review was conducted of NRC Regulatory Guides applicable to determine which ones are relevant to the KP-FHR technology. Regulatory Guides are issued by the staff in the following Divisions:

(a) Power Reactors

(b) Research and Test Reactors

(c) Fuels and Materials Facilities

(d) Environmental and Siting

(e) Materials and Plant Protection

(f) Products

(g) Transportation

(h) Occupational Health

(i) Antitrust and Financial Review

(j) General

The review only considered Regulatory Guides from Divisions 1, 2, 4, 5, 8, and 9 as other division RGs are specifically not applicable (e.g., Division 3 Regulatory Guides are specifically applicable to fuel and material facilities). The guidance in the Division 2 RGs is considered applicable to the KP-FHR test reactor and is discussed in Section 3.2.5 and Table F-1. Division 3 RGs are not considered applicable to the design because the KP-FHR is not a fuels or material facility. Similarly, Division 6 and 7 RGs are not considered

applicable because they apply to products and to transportation, neither of which establish guidance to the KP-FHR.

Much of the guidance in Division 1 RGs are based on LWR technology and were concluded to have limited applicability for design or review of the KP-FHR. The details of the screening review are not included in this report. However, Table C-1 provide a list of the regulatory guides that were considered technology neutral guidance to meet associated regulations. These regulatory guides are mainly in seismic, security, and radiation protection, i.e. topic areas that are generally technology neutral. Note the evaluation of regulatory guides was performed at the document level rather than individual regulatory positions taken within the document. Future license applications and licensing reports for the KP-FHR design will address how the applicable regulatory requirements are satisfied and the degree to which individual regulatory guide positions are used to demonstrate that conformance to regulations.

3.1.5.2 Standard Review Plans for a KP-FHR Power Reactor

The NRC has developed a number of standard review plans (SRP) for staff use in reviewing proposed licensing actions. These licensing actions may relate to constructing, operating, or decommissioning a nuclear facility or possessing, using, storing, or transporting nuclear materials or waste. Consideration of applicable SRP content is relevant to establishing the framework for design and licensing of the KP-FHR because the SRP is intended to be a comprehensive and integrated document that provides the NRC reviewer with guidance that describes methods or approaches that the staff has found acceptable for meeting NRC requirements. However, the SRP contain guidance and compliance with an SRP is not required to be met by applicants. Alternative approaches which comply with regulations may be proposed by applicants.

Two SRP are identified for relevance to the review of reactor plant designs: NUREG-0800 and NUREG-1537. Based on their stated scope and purpose, neither of these SRPs is directly applicable to the KP-FHR power reactor. Nevertheless, Kairos Power reviewed these SRPs for insights as discussed below.

3.1.5.3 NUREG-0800 for a KP-FHR Power Reactor

NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition” (Reference 5), has been used to conduct reviews of nuclear plants since 1975. The regulations in 10 CFR 50.34(h) require that LWR applications include an evaluation of the facility against the SRP in effect 6 months prior to the date of the application. Because the KP-FHR is a non-LWR technology, this regulation is not applicable (See Section 3.1.1). A significant revision of this SRP was issued in March 2007. Revisions to subsections of the SRP were subsequently issued and maintained for use by the staff and public. NUREG-0800 has two parts; Part 1 is the LWR Edition and Part 2 is the LWR Small Modular Reactor Edition. At this time, Part 2 contains a design specific review standard for the NuScale SMR. Both editions are specific to LWRs and this guidance is not directly applicable to non-LWRs.

While some portions of NUREG-0800 (typically those portions not related to the nuclear steam supply system) could be used for the KP-FHR, the majority of this SRP is not directly applicable. A review of NUREG-0800 Chapter 4, “Reactor,” by Oak Ridge National Laboratory (Reference 6) demonstrated that significant changes were necessary for the existing LWR guidance to be applied to non-LWR designs such as sodium fast reactors and MHTGRs. A detailed review of NUREG-0800 Chapter 5, “Reactor Coolant System and Connected Systems,” by Kairos Power similarly concluded that approximately only one-third

of the existing LWR acceptance criteria were relevant to the KP-FHR design. Likewise, a review of Chapter 6, “Engineered Safety Features," produced similar results of low applicability primarily due to substantial technology differences between LWRs and the KP-FHR.

Advanced reactor technologies, such as represented by the KP-FHR, rely on simpler, passive safety strategies and are less complex than the designs on which this SRP was based. As a result, review guidance in safety significant chapters (such as fuel, reactor vessel and coolant piping, engineered safety features) of the SRP are generally not useful to support a review of the KP-FHR design. Additionally, while content in other areas might be technically relevant, the content is based on designs which rely on active support systems to accomplish safety functions and would require a level of detail and review significantly beyond what would be necessary for the low-safety significance of equivalent systems in the KP-FHR. The Kairos Power review concludes that this SRP is generally not suited to conduct a review of the KP-FHR design. Therefore, a detailed applicability of the content in this SRP to the KP-FHR is not provided in this report.

3.1.5.3.1 NUREG-1537 for a KP-FHR Power Reactor

In 1996, the NRC published NUREG-1537, “Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria” (Reference 7). This NUREG was issued in two parts; Part 1 provides a format and content guide for applicants, and Part 2 provides a standard review plan for NRC staff to conduct its review.

This standard review plan was developed for research and test reactors with a consideration of Light Water Reactor design.

The Kairos Power review of NUREG-1537 concludes that this SRP is not directly applicable to a power reactor, in some cases, it includes more technology neutral review approaches and could be adapted to conduct a review on non-LWR designs. This SRP is based on a deterministic safety analysis approach and does not consider the risk informed, performance-based approaches developed by the licensing modernization program (LMP) described in NEI 18-04.

3.1.5.3.2 Other Safety Analysis Report Guidance for a KP-FHR Power Reactor

NRC and industry are working on several projects to develop guidance applicable to the content for safety analysis reports for advanced reactor designs. These efforts include industry led technology inclusive content of application project (TICAP) which is based on consideration of LMP, and NRC led advanced reactor content of application project (ARCAP). These two efforts are being developed in parallel and are expected to be complementary. Kairos Power intends to inform its application for the KP-FHR power reactor considering the guidance produced by each of these efforts. Given that these efforts are not complete, Kairos Power has not provided an assessment of their guidance and is not requesting NRC review of a format and content approach for a KP-FHR power reactor as part of this report.

3.2 REGULATION REVIEW RESULTS FOR A KP-FHR TEST REACTOR

3.2.1 Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Test Reactor

A review was conducted of the design-related regulations in 10 CFR to determine which requirements apply to the KP-FHR test reactor. The review category descriptions provided in Section 2.2 were used in making these determinations.

The results of this review are tabulated in Appendix D for design-related requirements. The regulations determined to apply to the KP-FHR test reactor are listed in Table D-1. Each applicable requirement is allocated an application type as described in Section 2.2.

3.2.2 Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-Test Reactor

A review was conducted of design-related regulations in 10 CFR to determine which requirements do not apply to the KP-FHR test reactor. These design-related requirements do not apply to the KP-FHR test reactor because they are applicable to power reactors, LWRs, certain developers/vendors, or to existing plants.

The results of this review are tabulated in Table D-2. The table provides a brief rationale for why the regulation does not apply to a KP-FHR test reactor.

3.2.3 Regulatory Requirements in 10 CFR That Require an Exemption for KP-FHR Test Reactor

The test reactor exemption topics were determined to be Reactor Coolant Pressure Boundary, Analysis of SSCs and ECCS Evaluation, and Material Control and Accounting. Exemptions are not needed for criticality accident, emergency plans and PRA records as these regulations are specific to power reactors and do not apply to a test reactor.

The regulations that require an exemption to license the KP-FHR test reactor are provided in Table D-3. Note that this table includes all exemptions for the 10 CFRs for both design and non-design, unlike the other tables in this licensing topical report, to ensure each exemption "topic" includes all relevant regulations. As discussed in Section 3.1.3, in many cases the regulations requiring an exemption involve a minor wording change to one portion of the requirement. The portions of the regulation that are not being changed are not included in the APPLIES table to avoid having the same regulation in multiple tables. The exempted regulations in these exemption tables can be assumed to apply.

3.2.3.1 Reactor Coolant Pressure Boundary

This exemption is necessary for the KP-FHR test reactor because of how the regulation refers to the wording reactor coolant pressure boundary. This terminology is found in 10 CFR 50.2.

Definitions

The underlined portions of the definitions for basic component and safety-related structure, system and component in 10 CFR 50.2 need to be modified.

> *Basic component means, for the purposes of §50.55(e) of this chapter: (1) When applied to nuclear power reactors, any plant structure, system, component, or part thereof*

necessary to assure (i) The integrity of the reactor coolant pressure boundary, (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition, or (iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable. (2) When applied to other types of facilities or portions of such facilities for which construction permits are issued under §50.23, a component, structure, system or part thereof that is directly procured by the construction permit holder for the facility subject to the regulations of this part and in which a defect or failure to comply with any applicable regulation in this chapter, order, or license issued by the Commission could create a substantial safety hazard.

(3) In all cases, basic component includes safety related design, analysis, inspection, testing, fabrication, replacement parts, or consulting services that are associated with the component hardware, whether these services are performed by the component supplier or other supplier.

Safety-related structures, systems and components means those structures, systems and components that are relied upon to remain functional during and following design basis events to assure: (1) The integrity of the reactor coolant pressure boundary (2) The capability to shut down the reactor and maintain it in a safe shutdown condition; or (3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in §50.34(a)(1) or §100.11 of this chapter, as applicable.

Both of the definitions refer to “reactor coolant pressure boundary”, which is a light water reactor term. In a light-water reactor, a primary function of the reactor coolant pressure boundary is to keep the water subcooled in a PWR and near nucleate boiling in a BWR. In addition, the reactor coolant pressure boundary of a light water reactor provides a fission product retention barrier for the release of radionuclides. The technology associated with the KP-FHR is based on a near atmospheric pressure design and the KP-FHR reactor coolant boundary does not provide a similar pressure related or fission product retention function. Both RG 1.232, Guidance for Developing Principal Design Criteria for Non-Light Water Reactors (Reference 4) and the Kairos Power topical report on Principal Design Criteria for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor (Reference 1) utilize the term “reactor coolant boundary” instead of reactor coolant pressure boundary. Also as described in Section 1.1, the equivalent fission product barrier function is provided by the functional containment rather than a pressure retaining fluid system boundary and physical containment structure. The integrity of some portions of the KP-FHR reactor coolant boundary may be credited to perform a safety significant function and where “safety significant” is determined using the methodology described in Reference 8. Therefore, the words “integrity of the reactor coolant pressure boundary” will be changed to “integrity of the safety-significant portions of the reactor coolant boundary” in each definition during the licensing process. Note that an evaluation of the defense in depth of the resultant design is also demonstrated using the methodology described in Reference 8. It is not appropriate to replace the existing language with “integrity of the functional containment” since this function is performance based on TRISO based fuel technology and is not an “absolute” integrity. The performance function of the functional containment is already captured in the remaining language under item (3), “the capability to prevent or mitigate the consequences of accidents…”. The functional containment is a feature which serves this capability. Therefore, an equivalent level of safety is provided by the remaining language and no additional content is necessary.

An additional regulation, 10 CFR 50.36(c)(2)(ii), refers to the term reactor coolant pressure boundary and would be included in the same modification. Due to the context, the modification for this rule is slightly different than the modification discussed above. The modification to the underlined portion of this regulation is discussed below.

Technical Specifications, Limiting Condition for Operation (LCO) Criteria

10 CFR 50.36(c)(2)(ii) states:

> *(ii) A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of the following criteria:(A) Criterion 1. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary. (B) Criterion 2. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. (C) Criterion 3. A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. (D) Criterion 4. A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.*

The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in a KP-FHR, the reactor coolant boundary does not serve this function. Fission product retention is provided by the functional containment. Therefore, the statement, "significant abnormal degradation of the reactor coolant pressure boundary" is not applicable and will be replaced by "significant abnormal degradation of the functional containment."

3.2.3.2 Emergency Core Cooling

There are several regulations that specify a requirement for an analysis and evaluation of the ECCS, including 10 CFR 50.34(a)(4) and 10 CFR 50.34(b)(4). As an example, 10 CFR 50.34(b)(4), Contents of Applications, specifies the following requirement:

> *A final analysis and evaluation of the design and performance of structures, systems, and components with the objective stated in paragraph (a)(4) of this section and taking into account any pertinent information developed since the submittal of the preliminary safety analysis report (PSAR). Analysis and evaluation of ECCS cooling performance following postulated loss-of-coolant accidents shall be performed in accordance with the requirements of §50.46 for facilities for which a license to operate may be issued after December 28, 1974.*

While the first sentence of the requirement is applicable to the KP-FHR test reactor, the second sentence requires an exemption. ECCS is an LWR term typically associated with a system that injects coolant into an LWR to replace reactor coolant inventory lost as a result of a loss of coolant accident (LOCA). A large LOCA is characterized by a rapid loss of inventory and reduction in Reactor Coolant System (RCS) pressure. The KP-FHR test reactor design features preclude a significant loss of coolant. These features include operation at near atmospheric pressure, not having any significant piping penetrations to the vessel below the free surface of the coolant and control of cover gas to prevent significant

entrainment in the primary system. As such, the design does not require replacement of reactor coolant inventory to meet fundamental safety design objectives. Leakage from the reactor coolant system is managed by the Inventory Control System. The KP-FHR test reactor decay heat removal function is accomplished using a Passive Residual Heat Removal System.

3.2.3.3 Pressurized Thermal Shock

10 CFR 50.34(b)(9) requires a description of protection against pressurized thermal shock events and references 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to light water reactors.

> *A description of protection provided against pressurized thermal shock events, including projected values of the reference temperature for reactor vessel beltline materials as defined in § 50.61 (b)(1) and (b)(2).*

The KP-FHR operates at near atmospheric conditions and therefore cannot experience pressurized thermal shock therefore the KP-FHR test reactor will require an exemption to this regulation.

3.2.3.4 Material Control and Accounting

Part 74 of 10 CFR addresses Material Control and Accounting (MC&A) of Special Nuclear Material. Part 74 defines three categories of special nuclear material, low strategic significance (Category III), moderate strategic significance (Category II), and formula quantity (Category I) of SNM. The regulations for low strategic significance material accounting are contained in Subpart C of 10 CFR 74 (citations 10 CFR 74.31 and 10 CFR 74.33). The regulations for moderate strategic significance are found in Subpart D of 10 CFR 74 (citations 10 CFR 74.41 CFR 74.43, and 10 CFR 74.45).

Kairos Power expects to use primarily Category II SNM in the test reactor but also may use Category III material as well. Current operating reactors have applied for and received approval for exemptions from the requirements in Subpart C (10 CFR 74.31 and 10 CFR 74.33). This is because the requirements for Subpart C and Subpart D were intended for facilities that use bulk accounting of special nuclear material throughout the facility. In contrast, a reactor licensee typically uses item accounting for onsite special nuclear material. A KP-FHR facility would use bulk accounting only for limited portions of the facility (e.g., the reactor vessel) and those portions would employ automated systems that do not allow direct contact with special nuclear material. Kairos Power intends to submit an exemption from most of the requirements in both Subpart C of 10 CFR 74 (citation 10 CFR 74.31) and Subpart D of 10 CFR 74 (citations 10 CFR 74. 41 CFR 74.43, and 10 CFR 74.45). The exemptions from those subparts are also consistent with the regulatory framework for reactors which are subject to additional physical protection requirements under 10 CFR Part 73, mitigating the potential for theft or diversion of special nuclear material.

3.2.4 Non-Design Regulatory Requirements for KP-FHR Test Reactor

Non-design related regulations in 10 CFR are summarized in Appendix E. Non-design related regulations include Administrative, Regulatory Process, Process, and Program as described in Section 2.2. The non-design regulations that apply to the KP-FHR test reactor are provided in Table E-1 and those that do not apply are provided in Table E-2. As previously discussed, the exemptions to non-design regulations

are not included in Appendix E but are instead included with the design-related exemptions in Appendix D, Table D-3.

The non-design regulations in Table E-1, and E-2 were reviewed for applicability and are presented primarily at the part level for all parts except Part 50, 51, and 52. The non-design regulations are primarily program and process related and in most cases are specific to an activity. So, if the activity is performed, most if not all of the requirements within the part are applicable.

3.2.5 Regulatory Guidance for the KP-FHR Test Reactor

In 1996, the NRC published NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Standard Review Plan and Acceptance Criteria" (Reference 7). This NUREG was issued in two parts; Part 1 provides a format and content guide for applicants, and Part 2 provides a standard review plan for NRC staff to conduct its review.

This standard review plan is specifically developed for test reactors and will be used as a basis for the format and content for the license application for the KP-FHR test reactor.

The regulatory guides that may apply to the KP-FHR Test Reactor are provided in Table F-1.

3.3 CONCLUSIONS

Kairos Power has reviewed and identified the relevant NRC regulations and guidance applicable to both the KP-FHR power reactor and KP-FHR test reactor. The review identified design-related and non-design related regulatory requirements from 10 CFR Parts 1-199 that are applicable to KP-FHR design and licensing and associated NRC Regulatory Guides that may be useful for demonstrating how the design satisfies the applicable regulations.

The applicable regulatory requirements in Appendices A and B, along with the Principal Design Criteria identified separately in Reference 1, provide a comprehensive licensing framework for the design and licensing of the KP-FHR power reactor. The applicable regulatory requirements in Appendices D and E, along with the Principal Design Criteria in Reference 1, provide a comprehensive licensing framework for the design and licensing of the KP-FHR nuclear test reactor. While some of the existing NRC regulations are not directly applicable to the KP-FHR reactor designs and licensing strategies, there are a sufficient set of applicable regulations to support the conduct of a safety review and enable a conclusion of reasonable assurance of adequate protection of public health and safety.

The review also concludes that the SRP guidance provided in NUREG-1537, although oriented towards smaller scale reactor designs, is useful to support advanced reactor designs such as the KP-FHR power reactor. NUREG-1537 is directly applicable to the KP-FHR test reactor.

Kairos Power requests NRC approval of the applicability determinations regarding design-related regulations in Appendix A and non-design related regulations in Appendix B for use in the KP-FHR nuclear power reactor design and licensing. Kairos Power also requests the approval of the applicability determinations in Appendices D and E for the KP-FHR test reactor.

4 REFERENCES

1. Kairos Power LLC, "Principal Design Criteria for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor," KP-TR-003-NP-A, June 2020. (ML20167A174)
2. University of California Berkeley Nuclear Engineering. 2015. *Fluoride Salt Cooled High Temperature Reactor*. [ONLINE] Available at: http://fhr.nuc.berkeley.edu. (Accessed 26 June 2018).
3. Kairos Power, LLC, "Design Overview for the Kairos Power Fluoride Salt-Cooled, High Temperature Reactor," KP-TR-001-P, February 2020. (ML20045E423)
4. US Nuclear Regulatory Commission, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors," RG 1.232, Revision 0, April 2018.
5. US Nuclear Regulatory Commission, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," NUREG-0800.
6. Oak Ridge National Laboratory, "Proposed Adaptation of the Standard Review Plan NUREG-0800, Chapter 4 (Reactor) for Sodium-Cooled Fast Reactors and Modular High-Temperature Gas-Cooled Reactors," ORNL/TM-2017/151, March 2017.
7. US Nuclear Regulatory Commission, "Guidelines for Reviewing Applications for the Licensing of Non-Power Reactors," NUREG-1537, February 1996.
8. Kairos Power LLC, "KP-FHR Risk-Informed Performance-Based Licensing Basis Development Methodology Topical Report," KP-TR-009, Revision 1, April 2020.
9. ASME/ANS, "Probabilistic Risk Assessment Standard for Advanced Non-LWR Nuclear Power Plants," ASME/ANS RA-S-1.4.

Table 1. High-Level Regulatory Comparison Between the KP-FHR Power and Test Reactor

Citation	Topic	Power Reactor	Test Reactor
10 CFR 19	Notices, Instructions	APPLIES	APPLIES
10 CFR 20	Radiation Protection	APPLIES	Mostly APPLIES
10 CFR 21	Reporting of Defects	APPLIES	APPLIES
10 CFR 26	Fitness for Duty	APPLIES	DOES NOT APPLY
10 CFR 30	Byproduct Material	Mostly APPLIES	Mostly APPLIES
10 CFR 37	Physical Protection Cat I/II Material	APPLIES	APPLIES
10 CFR 40	Source Material	Mostly APPLIES	Mostly APPLIES
10 CFR 50.2	Definitions	Mostly APPLIES	Mostly APPLIES
10 CFR 50.10 – 10 CFR 50.13	License Requirements	APPLIES	APPLIES
10 CFR 50.20	Classes of License	APPLIES	APPLIES
10 CFR 50.21	Class 104 Licenses	DOES NOT APPLY	APPLIES
10 CFR 50.22	Class 103 Licenses	APPLIES	DOES NOT APPLY
10 CFR 50.23	Construction Permits	APPLIES	APPLIES
10 CFR 50.34(a)	General Content of Applications	APPLIES	Mostly APPLIES
10 CFR 50.34(b)(1)	Environmental and Met Monitoring	APPLIES	APPLIES
10 CFR 50.34(b)(2)	Description/Analysis of SSCs	APPLIES	APPLIES
10 CFR 50.34(b)(3)	Radioactive Materials	APPLIES	APPLIES
10 CFR 50.34(b)(4)	Analysis of SSCs	EXEMPTION	EXEMPTION
10 CFR 50.34(b)(5)	Research & Development	APPLIES	APPLIES
10 CFR 50.34(b)(6)	Organization and QA	APPLIES	Mostly APPLIES
10 CFR 50.34(b)(7)	Technical Qualifications	APPLIES	APPLIES
10 CFR 50.34(b)(8)	Operator Qualification	APPLIES	APPLIES
10 CFR 50.34(b)(9)	Pressurized Thermal Shock	EXEMPTION	EXEMPTION
10 CFR 50.34(b)(10)	Seismic Criteria	APPLIES	DOES NOT APPLY
10 CFR 50.34(b)(11)	Siting Criteria	APPLIES	DOES NOT APPLY
10 CFR 50.34(b)(12)	Aircraft Impact	APPLIES	DOES NOT APPLY
10 CFR 50.34(c)	Physical Security Plan	APPLIES	DOES NOT APPLY
10 CFR 50.34(d)	Safeguards Contingency Plan	APPLIES	DOES NOT APPLY
10 CFR 50.34(e)	Safeguards Contingency Plan	APPLIES	APPLIES
10 CFR 50.34(f)	TMI Requirements	Partially APPLIES	DOES NOT APPLY

Citation	Topic	Power Reactor	Test Reactor
10 CFR 50.34(g)	Combustible Gas Control	APPLIES	APPLIES
10 CFR 50.34(h)	SRP	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.34(i)	Loss Of Large Area of Plant	APPLIES	DOES NOT APPLY
10 CFR 50.34a(a)	Radiation Control Measures	APPLIES	DOES NOT APPLY
10 CFR 50.34a(b)	Estimate of Radionuclides	APPLIES	DOES NOT APPLY
10 CFR 50.34a(c)	Gas/Liquid Effluents	APPLIES	DOES NOT APPLY
10 CFR 50.34a(d)	Effluent Equipment	APPLIES	DOES NOT APPLY
10 CFR 50.34a(e)	Control/Release of Effluents	APPLIES	DOES NOT APPLY
10 CFR 50.35	Issuance of CP	APPLIES	APPLIES
10 CFR 50.36	Technical Specifications	Mostly APPLIES	Mostly APPLIES
10 CFR 50.43	Additional Standards	APPLIES	Partially APPLIES
10 CFR 50.44	Combustible	Partially APPLIES	Partially APPLIES
10 CFR 50.46	Emergency Core Cooling System Acceptance Criteria	Partially APPLIES	DOES NOT APPLY
10 CFR 50.47	Emergency Planning	EXEMPTION	DOES NOT APPLY
10 CFR 50.48	Fire Protection	Mostly APPLIES	Partially APPLIES
10 CFR 50.49	Environmental Qualification	Mostly APPLIES	DOES NOT APPLY
10 CFR 50.54	Conditions of Licenses	Mostly APPLIES	Mostly APPLIES
10 CFR 50.55	Codes & Standards	Mostly APPLIES	Mostly APPLIES
10 CFR 50.61	Fracture Toughness	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.62	Anticipated Transients Without Scram	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.63	Station Blackout	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.65	Maintenance Rule	EXEMPTION	DOES NOT APPLY
10 CFR 50.66	Pressurized Thermal Shock	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.67	Accident Source Term	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.68	Criticality Accident	Partially APPLIES	DOES NOT APPLY
10 CFR 50.69	Risk Informed Categorization	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50.71	Maintenance of Records	APPLIES	Mostly APPLIES
10 CFR 50.72	Immediate Reports	APPLIES	DOES NOT APPLY
10 CFR 50.73	Licensee Event Reports	APPLIES	DOES NOT APPLY
10 CFR 50.75	Decommissioning	Mostly APPLIES	Partially APPLIES

Citation	Topic	Power Reactor	Test Reactor
10 CFR 50.90 – 10 CFR 50.92	Amendments	APPLIES	APPLIES
10 CFR 50.100	Revocation, Suspension, Modification	APPLIES	APPLIES
10 CFR 50.109	Backfitting	Mostly APPLIES	DOES NOT APPLY
10 CFR 50.110	Violations	APPLIES	APPLIES
10 CFR 50.111	Criminal Penalties	APPLIES	APPLIES
10 CFR 50.120	Training of Personnel	APPLIES	DOES NOT APPLY
10 CFR 50.150	Aircraft Impact	APPLIES	DOES NOT APPLY
10 CFR 50.155	Mitigation of BDBEs	APPLIES	DOES NOT APPLY
10 CFR 50 Appendix	A – Design Criteria	Partially APPLIES	DOES NOT APPLY
10 CFR 50 Appendix	B – Quality Assurance	APPLIES	DOES NOT APPLY
10 CFR 50 Appendix	C – Financial Data	APPLIES	APPLIES
10 CFR 50 Appendix	E – Emergency Planning	EXEMPTION	Partially APPLIES
10 CFR 50 Appendix	F – Fuel Reprocessing	APPLIES	APPLIES
10 CFR 50 Appendix	G – Fracture Toughness	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	H – Vessel Surveillance	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	I – As Low As Reasonably Achievable	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	J – Containment Leakage	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	N – Standardization of nuclear power plant designs	APPLIES	DOES NOT APPLY
10 CFR 50 Appendix	K – Emergency Core Cooling System	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	Q – Pre-Application Early Review	APPLIES	APPLIES
10 CFR 50 Appendix	R – Fire Protection	DOES NOT APPLY	DOES NOT APPLY
10 CFR 50 Appendix	S - Seismic	APPLIES	DOES NOT APPLY
10 CFR 51	Environmental Review	Mostly APPLIES	Mostly APPLIES
10 CFR 52	Licenses, Certifications, and Approvals	Mostly APPLIES	DOES NOT APPLY
10 CFR 54	License Renewal	APPLIES	DOES NOT APPLY
10 CFR 55	Operator Licensing	APPLIES	APPLIES
10 CFR 70	Special Nuclear Material	Mostly APPLIES	Mostly APPLIES
10 CFR 72	Independent Spent Fuel Storage Installation	APPLIES	DOES NOT APPLY
10 CFR 73	Physical Protection	Mostly APPLIES	Mostly APPLIES
10 CFR 74	Material Control and Accounting	Mostly APPLIES	Mostly APPLIES
10 CFR 100	Site Criteria	Mostly APPLIES	Mostly APPLIES
10 CFR 170	Fees	APPLIES	APPLIES

NOTE: Mostly APPLIES means more than half the requirements in a regulation apply. Partially APPLIES means less than half apply.

APPENDIX A: DESIGN REGULATORY REQUIREMENTS IN 10 CFR FOR A KP-FHR POWER REACTOR

The following is a summary of the Design Related Tables in this Appendix.

Table Number	Title
A-1	Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor
A-2	Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor
A-3	All Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Power Reactor
A-4	Exemptions from 10 CFR 52 Regulations Referencing 10 CFR 50 Regulations

Table A-1. Design Related Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 20.1406	Minimization of Contamination	SDA, COL, DC, ML, CP, OL
10 CFR 20.1601	Control of Access to High Radiation Areas.	SDA, OL, COL, DC, ML, CP
10 CFR 20.1602	Control of Access to Very High Radiation Areas	SDA, COL, DC, ML, CP, OL
10 CFR 20.1701	Use of Process or Other Engineering Controls	SDA, COL, DC, ML, CP, OL
10 CFR 50.2	Definitions - Alternate AC Source	CP, OL, COL
10 CFR 50.2	Definitions – Controls	CP, OL, COL
10 CFR 50.2	Definitions - Design Bases	CP, OL, COL
10 CFR 50.2	Definitions - Exclusion Area	CP, OL, COL
10 CFR 50.2	Definitions - Highly Enriched Uranium (HEU)	CP, OL, COL
10 CFR 50.2	Definitions - Low Enriched Uranium Fuel	CP, OL, COL
10 CFR 50.2	Definitions - Low Population Zone	CP, OL, COL
10 CFR 50.2	Definitions - Nuclear reactor	CP, OL, COL
10 CFR 50.2	Definitions - Safe shutdown	CP, OL, COL
10 CFR 50.2	Definitions - Source material	CP, OL, COL
10 CFR 50.2	Definitions - Station blackout	CP, OL, COL
10 CFR 50.34(a)(1)(ii)(A)	Intended Use of Reactor	CP, COL, ESP
10 CFR 50.34(a)(1)(ii)(B)	Engineering Standards	CP, COL, ESP
10 CFR 50.34(a)(1)(ii)(C)	Unique Design Features	CP, COL, ESP
10 CFR 50.34(a)(1)(ii)(D)	Safety Features of Design to Prevent Dose **Note:** The second sentence of Footnote 6 in this regulation is an observation and not a requirement or mandate on the source term to be considered for major accidents	CP, COL, ESP
10 CFR 50.34(a)(5)	Design Parameters that Depend on Tech Specs	CP
10 CFR 50.34(a)(8)	SSCs that Require Research and Development	CP
10 CFR 50.34(a)(12)	Seismic Criterion	CP
10 CFR 50.34(a)(13)	Aircraft Impact	CP
10 CFR 50.34(b)(3)	Types and Controls of Radioactive Materials	OL
10 CFR 50.34(b)(10)	Seismic Criteria in Appendix S	OL
10 CFR 50.34(b)(11)	Siting Criteria	OL
10 CFR 50.34(b)(12)	Aircraft Impact	OL
10 CFR 50.34(f)(1)(i)	Additional TMI-related requirements – PRA	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(iii)	Additional TMI-related requirements – Control Room Human Factors	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(iv)	Additional TMI-related requirements – Safety Parameter Display System	DC, SDA, COL[1]

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.34 (f)(2)(v)	Additional TMI-related requirements – Automatic Indication of Status of Safety Systems	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(vi)	Additional TMI-related requirements – High Point Venting of RCS	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(vii)	Additional TMI-related requirements – Radiation Shielding Design Review	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(xviii)	Additional TMI-related requirements – Coolant Instrumentation	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(xix)	Additional TMI-related requirements – Post-Accident Monitoring	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(xxvii)	Additional TMI-related requirements – Inplant Radiation Monitoring	DC, SDA, COL[1]
10 CFR 50.34(f)(2)(xxviii)	Additional TMI-related requirements – Control Room Habitability	DC, SDA, COL[1]
10 CFR 50.34(g)	Combustible Gas Control	CP, OL
10 CFR 50.34(i)	Mitigation of beyond-design-basis events	CP, OL
10 CFR 50.34a(a)	Preliminary design of equipment that maintains Rad material control	CP, DC, ML, SDA, OL
10 CFR 50.34a(b)	Estimate of radionuclides during normal operation	CP, DC, ML, SDA, OL
10 CFR 50.34a(c)	Gaseous and liquid effluents	OL
10 CFR 50.34a(d)	Equipment for control of gaseous and liquid effluents	COL
10 CFR 50.34a(e)	Description of equipment for control of gaseous and liquid effluents	SDA, DC, ML
10 CFR 50.36(c)(1)(i)(A)	Technical specifications – Limits	OL, COL, DC, ML
10 CFR50.36(c)(1)(ii)(A)	Technical specifications - Limiting safety system settings	OL, COL, DC, ML
10CFR 50.36(c)(2)(i)	Technical specifications – LCOs	OL, COL, DC, ML
10 CFR 50.36(c)(2)(ii)(B),(C),(D)	Limiting Conditions for Operation	OL, COL, DC, ML
10 CFR 50.36 (c)(3),(c)(4),(c)(5) (	Technical specifications - Grandfather clause and administrative	OL, COL, DC, ML
10 CFR 50.36 (c)(6),(c)(7),(c)(8),(d) and (e)	Technical specifications - Grandfather clause and administrative	OL, COL
10 CFR 50.36a	Technical specifications on effluents from nuclear power reactors	OL, COL, DC, ML

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.43(e)(1)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	DC, COL, ML, OL, SDA
10 CFR 50.43(e)(2)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	DC, COL, ML, OL, SDA
10 CFR 50.44(d)	Combustible gas control for nuclear power reactors	CP, OL, SDA, DC, COL, ML
10 CFR 50.46a	Acceptance criteria for reactor coolant system venting systems	CP, OL, COL, SDA, DC, ML
10 CFR 50.46a(a)	Acceptance criteria for reactor coolant system venting systems	CP, OL, COL, SDA, DC, ML
10CFR 50.46 a(b)	Acceptance criteria for reactor coolant system venting systems	CP, OL, COL, SDA, DC, ML
10 CFR 50.46a(c)	Acceptance criteria for reactor coolant system venting systems	CP, OL, COL, SDA, DC, ML
10 CFR 50.48(a)(4)	Fire Protection	SDA, DC, ML
10 CFR 50.49(c)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(d)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(d)(1)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(d)(2)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(d)(3)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(1)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(2)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.49(e)(3)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(4)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(5)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(6)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(7)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(e)(8)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(f)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(l)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.54(ff)	Seismic	OL, COL
10 CFR 50.54(hh)	Aircraft Impact	OL, COL
10 CFR 50.55a(a)	Codes and Standards – Documents Approved for Incorporation by Reference	CP, OL, COL, SDA LWA, DC
10 CFR 50.55a(h)(3)	Codes and Standards - Protection and Safety Systems	CP, OL, DC, COL, SDA
10 CFR 50.55a(z)	Codes and Standards - Alternatives to Codes and Standards Requirements	CP, OL, DC, COL, SDA
10 CFR 50.68(a)	Criticality	CP, OL, COL
10 CFR 50.68(c)	Criticality	CP, OL, COL
10 CFR 50.71(h)(2)	PRA Upgrades	COL
10 CFR 50.71(h)(3)	PRA Upgrades	COL
10 CFR 50.150(b)	Aircraft Impact	CP, OL, COL, DC, SDA, ML
10 CFR 50.150(c)(5)	Aircraft Impact	DC, ML
10 CFR 50 Appendix A	Design Criteria **Note:** Only the Introduction applies.	CP, OL, COL, ESP, SDA, DC, ML

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50 Appendix F	Siting of Fuel Reprocessing Plants and Related Waste Management Facilities	OL, COL
10 CFR 50 Appendix S IV(a)	Seismic	CP, OL, DC, COL, SDA, ESP, ML
10 CFR 50 Appendix S IV(a)(1)(i)	Seismic	CP, OL, DC, COL, SDA, ESP, ML
10 CFR 50 Appendix S IV(a)(1)(ii)	Seismic	CP, OL, DC, COL, SDA, ESP, ML
10 CFR 50 Appendix S IV(a)(1)(iii)	Seismic	CP, OL, DC, COL, SDA, ML
10 CFR 50 Appendix S IV(a)(1)(iv)	Seismic	CP, OL, DC, COL, SDA, ML
10 CFR 50 Appendix S IV(a)(2)	Seismic	CP, OL, DC, COL, SDA, ML
10 CFR 50 Appendix S IV(a)(3)	Seismic	CP, OL, DC, COL, SDA, ML
10 CFR 50 Appendix S IV(a)(4)	Seismic	CP, OL, DC, COL, SDA, , ML
10 CFR 50 Appendix S IV(b)	Seismic	CP, OL, DC, COL, SDA, ESP, ML
10 CFR 50 Appendix S IV(c)	Seismic	CP, OL, DC, COL, SDA, ESP, ML
10 CFR 52.47(a)(1)	Standard Design Certification – FSAR	DC
10 CFR 52.47 (a)(2)	Standard Design Certification - Description of SSCs and Dose Limits **Note:** The second sentence of Footnote 3 in this regulation is an observation and not a requirement or mandate on the source term to be considered for major accidents.	DC
10 CFR 52.47(a)(3)	Standard Design Certification – PDCs	DC
10 CFR 52.47(a)(5)	Standard Design Certification - Radioactivity Control	DC
10 CFR 52.47(a)(6)	Standard Design Certification - Minimization of Contamination	DC
10 CFR 52.47(a)(8)	Standard Design Certification - TMI Requirements	DC
10 CFR 52.47(a)(10)	Standard Design Certification - Gaseous and liquid effluents	DC
10 CFR 52.47(a)(11)	Standard Design Certification - Technical Specification	DC
10 CFR 52.47(a)(12)	Standard Design Certification - Combustible Gas Control	DC

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.47(a)(13)	Standard Design Certification - Electrical Equipment	DC
10 CFR 52.47(a)(18)	Standard Design Certification - Fire Protection	DC
10 CFR 52.47(a)(20)	Standard Design Certification - Seismic Criteria	DC
10 CFR 52.47(a)(21)	Standard Design Certification - NUREG-0933	DC
10 CFR 52.47(a)(22)	Standard Design Certification - Operating Experience	DC
10 CFR 52.47(a)(24)	Standard Design Certification - Portions of Plant not Seeking Certification	DC
10 CFR 52.47(a)(25)	Standard Design Certification - Portions of Plant not Seeking Certification	DC
10 CFR 52.47(a)(26)	Standard Design Certification - Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)	DC
10 CFR 52.47(a)(27)	Standard Design Certification – PRA	DC
10 CFR 52.47(a)(28)	Standard Design Certification - Aircraft Impact	DC
10 CFR 52.47(b)	Standard Design Certification - ITAAC and ER	DC
10 CFR 52.47(c)(2)	Standard Design Certification - Site Specific Elements of Application	DC
10 CFR 52.47(c)(3)	Standard Design Certification - Site Specific Elements of Application	DC
10 CFR 52.79(a)(1)	COL - Contents of Application **Note**: The second sentence of Footnote 5 in this regulation is an observation and not a requirement or mandate on the source term to be considered for major accidents.	COL
10 CFR 52.79(a)(2)	COL - Contents of Application	COL
10 CFR 52.79(a)(3)	COL - Contents of Application	COL
10 CFR 52.79(a)(4)	COL - Contents of Application	COL
10 CFR 52.79(a)(6)	COL - Fire Protection	COL
10 CFR 52.79(a)(8)	COL - Combustible gas control	COL
10 CFR 52.79(a)(16)(i)	COL - Radioactive gaseous and liquid effluent control	COL
10 CFR 52.79(a)(17)	COL – TMI	COL
10 CFR 52.79(a)(19)	COL – Seismic	COL
10 CFR 52.79(a)(20)	COL - Unresolved Safety Issues	COL
10 CFR 52.79(a)(21)(22)	COL – Emergency Plans	COL
10 CFR 52.79(a)(45)	COL - Minimization of Contamination	COL
10 CFR 52.79(a)(46)	COL – PRA	COL
10 CFR 52.79(a)(47)	COL - Aircraft Impact	COL
10 CFR 52.79(d)(2)	COL - Interface Requirements	COL
10 CFR 52.79(e)(2)	COL - Interface Requirements	COL

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.79(e)(3)	COL - Manufacturing License Requirements	COL
10 CFR 52.137	Contents of Applications	SDA
10 CFR 52.137(a)	Contents of Applications	SDA
10 CFR 52.137(a)(1)	Standard Design Approval - Contents of Application	SDA
10 CFR 52.137(a)(2)	Standard Design Approval - Contents of Application **Note**: The second sentence in Footnote 9 in this regulation is an observation and not a requirement or mandate on the source term to be considered for major accidents.	SDA
10 CFR 52.137(a)(3)	Standard Design Approval – PDCs	SDA
10 CFR 52.137(a)(5)	Standard Design Approval - Control and Limits of Radioactive Effluents	SDA
10 CFR 52.137(a)(6)	Standard Design Approval - 10 CFR 20.1406 Requirements	SDA
10 CFR 52.137(a)(10)	Standard Design Approval - Control of Radioactive Effluent	SDA
10 CFR 52.137(a)(11)	Standard Design Approval - Emergency Plans	SDA
10 CFR 52.137(a)(12)	Standard Design Approval - Combustible Gas Control	SDA
10 CFR 52.137(a)(13)	Standard Design Approval – EQ	SDA
10 CFR 52.137(a)(18)	Standard Design Approval - Fire Protection	SDA
10 CFR 52.137(a)(20)	Standard Design Approval - Seismic	SDA
10 CFR 52.137(a)(21)	Standard Design Approval - Unresolved Safety Issues	SDA
10 CFR 52.137(a)(22)	Standard Design Approval - Operating Experience	SDA
10 CFR 52.137(a)(24)	Standard Design Approval – Interfaces	SDA
10 CFR 52.137(a)(25)	Standard Design Approval – PRA	SDA
10 CFR 52.137(b)	Standard Design Approval - Additional Standards	SDA
10 CFR 52.157(a)	Manufacturing License – PDCs	ML
10 CFR 52.157(b)	Manufacturing License - Design Bases	ML
10 CFR 52.157(c)	Manufacturing License - Description of SSCs, use of reactor, standards, consequences.	ML
10 CFR 52.157(d)	Manufacturing License - Dose Limits	ML
10 CFR 52.157(e)	Manufacturing License - Radioactivity Control	ML
10 CFR 52.157(f)(2)	Manufacturing License - Fire Protection	ML
10 CFR 52.157(f)(4)	Manufacturing License - Combustible Gas Control	ML

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.157(f)(6)	Manufacturing License - Electric Equipment Important to Safety	ML
10 CFR 52.157(f)(9)	Manufacturing License - Minimization of Contamination	ML
10 CFR 52.157(f)(11)	Manufacturing License	ML
10 CFR 52.157(f)(12)	Manufacturing License - TMI Requirements	ML
10 CFR 52.157(f)(14)	Manufacturing License - Seismic Criteria	ML
10 CFR 52.157(f)(15)	Manufacturing License - Additional Standards and Provisions	ML
10 CFR 52.157(f)(18)	Manufacturing License - Technical Specifications	ML
10 CFR 52.157(f)(19)	Manufacturing License - Site Parameters	ML
10 CFR 52.157(f)(20)	Manufacturing License - Interface Requirements	ML
10 CFR 52.157(f)(21)	Manufacturing License - Interface Requirements	ML
10 CFR 52.157(f)(22)	Manufacturing License - Conceptual Nuclear Power Plant Design	ML
10 CFR 52.157(f)(25)	Manufacturing License - Module Configuration	ML
10 CFR 52.157(f)(27)	Manufacturing License - Parameters used for Testing and Operation	ML
10 CFR 52.157(f)(28)	Manufacturing License - NUREG-0933 Unresolved Safety Issues	ML
10 CFR 52.157(f)(29)	Manufacturing License - Operating Experience	ML
10 CFR 52.157(f)(31)	Manufacturing License - PRA Results	ML
10 CFR 52.157(f)(32)	Manufacturing License	ML
10 CFR 52.158(a)	Manufacturing License – ITAAC	ML
10 CFR 70.22(g)	Contents of applications	CP, OL, COL
10 CFR 70.22(i)(1-2)	Contents of applications	CP, OL, COL
10 CFR 70.24	Criticality Accident Requirements	CP, OL, COL
10 CFR 73.54	Protection of digital computer and communication systems and networks	OL, COL
10 CFR 73.55	Requirements for physical protection of licensed activities in nuclear power reactors against radiological sabotage	CP, OL, COL, DC, ML, SDA
10 CFR 73.67	Licensee fixed site and in-transit requirements for the physical protection of special nuclear material of moderate and low strategic significance	CP, OL, COL

A-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 75	Safeguards on Nuclear Material	CP, OL, COL, ESP, DC, SDA
10 CFR 100.1	Proposed Siting per 10 CFR 50 and 52	CP, OL, COL, ESP, DC, SDA
10 CFR 100.20	Factors to be considered when evaluating sites	CP, OL, COL, ESP, DC, SDA
10 CFR 100.21	Non-seismic site criteria	CP, OL, COL, ESP, DC, SDA
10 CFR 100.23	Geologic and seismic siting criteria	CP, OL, COL, ESP, DC, SDA

[1]10 CFR 50.34(f) requirements are only applicable to non-LWR applicants pursuing a license under 10 CFR Part 52.

Table A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.34(f)(1)(ii)	Auxiliary Feedwater System	Applicable to Pressurized Water Reactors (PWRs) only
10 CFR 50.34(f)(1)(iii)	RCP Seal Damage	Not technically relevant
10 CFR 50.34(f)(1)(iv)	Stuck Open Power Operated Relief Valve LOCA	Applicable to PWRs only
10 CFR 50.34(f)(1)(v)	High Pressure Coolant Injection and Reactor Core Isolation Cooling	Applicable to Boiling Water Reactors (BWRs) only
10 CFR 50.34(f)(1)(vi)	Relief Valves	Applicable to BWRs only
10 CFR 50.34(f)(1)(vii)	Automatic Depressurization System	Applicable to BWRs only
10 CFR 50.34(f)(1)(viii)	Core Spray and Low-Pressure Coolant Injection Systems	Applicable to BWRs only
10 CFR 50.34(f)(1)(ix)	Reactor Core Isolation Cooling and High-Pressure Coolant Injection Systems	Applicable to BWRs only
10 CFR 50.34(f)(1)(x)	Automatic Depressurization System	Applicable to BWRs only
10 CFR 50.34(f)(1)(xi)	Depressurization Methods	Applicable to BWRs only
10 CFR 50.34(f)(1)(xii)	Zirc-Water Hydrogen Production	Exception provided by 10 CFR 50.34(f) introduction for applications under Part 52.
10 CFR 50.34(f)(2)(i)	Control Room Simulator	Not applicable for applications under Part 52.
10 CFR 50.34(f)(2)(viii)	Post-Accident Sampling	Not technically relevant
10 CFR 50.34(f)(2)(ix)	Fuel Clad Metal Water Reaction	Exception provided by 10 CFR 50.34 introduction for applications under Part 52.

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.34(f)(2)(x)	PWR Relief and Safety Valves	Not technically relevant
10 CFR 50.34(f)(2)(xi)	PWR Relief and Safety Valves	Not technically relevant
10 CFR 50.34(f)(2)(xii)	Pressurizer Control	Applicable to PWRs only
10 CFR 50.34(f)(2)(xiii)	Pressurizer Control	Applicable to PWRs only
10 CFR 50.34(f)(2)(xiv)	Containment Isolation	Not technically relevant
10 CFR 50.34(f)(2)(xv)	Containment Purging	Not technically relevant
10 CFR 50.34(f)(2)(xvi)	Severe Overcooling Event Criterion	Applicable to Babcock and Wilcox (B&W)-designed plants only
10 CFR 50.34(f)(2)(xvii)	Control Room Instrumentation for Containment Functions	Not technically relevant
10 CFR 50.34(f)(2)(xx)	Emergency Power Sources	Applicable to PWRs only
10 CFR 50.34(f)(2)(xxi)	Auxiliary Heat Removal Systems	Applicable to BWRs only
10 CFR 50.34(f)(2)(xxii)	Failure Modes and Effects Analysis of Integrated Control System	Applicable to B&W-designed plants only
10 CFR 50.34(f)(2)(xxiii)	Reactor Protection System	Applicable to B&W-designed plants only
10 CFR 50.34(f)(2)(xxiv)	Reactor Water Level Indication	Applicable to BWRs only
10 CFR 50.34(f)(2)(xxv)	Technical Support Center	Applicable to LWRs only
10 CFR 50.34(f)(2)(xxvi)	Leakage control outside containment	Not technically relevant
10 CFR 50.34(f)(3)(iv)	Dedicated Containment Penetrations	Not technically relevant

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.34(f)(3)(v)	Containment	Exception provided by 10 CFR 50.34(f) introduction for applications under Part 52.
10 CFR 50.34(f)(3)(vi)	Containment	Not technically relevant.
10 CFR 50.36(c)(1)(i)(B)	Technical specifications – Limits	Applicable to fuel reprocessing plants.
10 CFR 50.36(c)(1)(ii)(B)	Technical specifications – Limits	Applicable to fuel reprocessing plants.
10 CFR 50.36(c)(2)(iii)	Technical specifications – Limits	Applies to licenses prior August 18, 1995
10 CFR 50.44(a-c)	Combustible gas control for nuclear power reactor	Applicable to LWRs only with traditional containment designs.
10 CFR 50.46	Acceptance criteria for ECCS for light-water nuclear power reactors	Applicable to LWRs only
10 CFR 50.48(b)	Fire protection (Appendix R)	Not applicable to new plants
10 CFR 50.48(c)	Fire protection	Applicable to LWRs only
10 CFR 50.49(g)	Environmental qualification of electric equipment important to safety for nuclear power plants.	Not applicable to new plants
10 CFR 50.49(i)	Environmental qualification of electric equipment important to safety for nuclear power plants	Not applicable to new plants
10 CFR 50.49(k)	Environmental qualification of electric	Not applicable to new plants

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
	equipment important to safety for nuclear power plants	
10 CFR 50.54(o)	Containment	Applicable to LWRs only
10 CFR 50.55a(b)	Codes and Standards – Use and Conditions on the Use of Standards	Applicable to LWRs only.
10 CFR 50.55a(c)	Codes and Standards – Reactor Coolant Pressure Boundary	Applicable to LWRs only.
10 CFR 50.55a(d)	Codes and Standards – Quality Group B	Applicable to LWRs only.
10 CFR 50.55a(e)	Codes and Standards – Quality Group C	Applicable to LWRs only.
10 CFR 50.55a(f)	Codes and Standards – Preservice and Inservice Testing Requirements	Applicable to LWRs only.
10 CFR 50.55a(g)	Codes and Standards – Preservice and Inservice Inspection Requirements	Applicable to LWRs only.
10 CFR 50.55a(h)(1)	Codes and Standards	Reserved
10 CFR 50.55a(h)(2)	Codes and Standards	Applicable to CPs issued prior to May 13, 1999 only
10 CFR 50.60	Fracture Prevention for LWRs	Applicable to LWRs only
10 CFR 50.61	Thermal Shock Events	Applicable to PWRs only

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.61a	Thermal Shock Events	Applicable to PWRs only
10 CFR 50.62	ATWS	Applicable to LWRs only
10 CFR 50.63	Loss of AC Power	Applicable to LWRs only
10 CFR 50.64	HEU	This rule pertains to all non-power reactors
10 CFR 50.66	Reactor Pressure Vessel	Applicable to LWRs only
10 CFR 50.67	Accident Source Term	Applicable to OLs issues prior to January 10, 1997 only
10 CFR 50.69	Risk-informed categorization of SSCs	10 CFR 50.69 is an optional requirement that applies to light water reactors only. KP-FHR design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 50 Appendix G	Fracture Toughness	Applicable to LWRs only
10 CFR 50 Appendix H	Reactor Vessel Surveillance	Applicable to LWRs only
10 CFR 50 Appendix I	ALARA	Applicable to LWRs only.
10 CFR 50 Appendix J	Containment Leakage	Applies to LWRs only
10 CFR 50 Appendix K	ECCS Evaluation Models	Appendix K is referenced by 10 CFR 50.46 as acceptable evaluation model requirements for ECCS evaluation. However, 10 CFR 50.46 is applicable to LWRs only.
10 CFR 50 Appendix R	Appendix R Fire Protection	Applicable to licensees prior to January 1, 1979 only
10 CFR 52.47(a)(9)	Standard Design Certification - Standard Review Plan	Applicable to LWRs only
10 CFR 52.47(a)(23)	Standard Design Certification - Severe Accidents	Applicable to LWRs only. KP-FHR power reactor design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 52.47(c)(1)	Standard Design Certification - Site Specific Elements of Application	Applicable to LWRs that are an evolutionary change from plants licensed prior to April 18, 1989 only.
10 CFR 52.79(a)(18)	COL - Risk-informed categorization of SSCs	10 CFR 50.69 is an optional requirement. KP-FHR design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 52.79(a)(38)	COL - Severe Accident	Applicable to LWRs only. KP-FHR power reactor design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 52.79(a)(41)	COL - Terms and Conditions of License	Applicable to LWRs only
10 CFR 52.137(a)(9)	Standard Design Approval - Contents of Application Technical Information	Applicable to LWRs only
10 CFR 52.137(a)(23)	Standard Design Approval - Severe Accidents	Applicable to LWRs only. KP-FHR power reactor design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 52.157(f)(13)	Manufacturing License - Risk-Informed Treatment of SSCs	10 CFR 50.69 is an optional requirement. KP-FHR power reactor design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 52.157(f)(23)	Manufacturing License - Severe Accident Mitigation	Applicable to LWRs only. KP-FHR power reactor design will be risk informed per the risk-informed, performance-based licensing basis methodology (Reference 8).
10 CFR 52.157(f)(30)	Manufacturing License - SRP	Applicable to LWRs only
10 CFR 52 Appendix A	Design Certification Rule for the U.S. Advanced Boiling Water Reactor	Applicable to ABWRs
10 CFR 52 Appendix B	Design Certification Rule for the System 80+ Design	Applicable to System 80+ Design
10 CFR 52 Appendix C	Design Certification Rule for the AP600 Design	Applicable to the AP600 Design
10 CFR 52 Appendix D	Design Certification Rule	Applicable to the AP1000 Design

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
	for the AP1000 Design	
10 CFR 52 Appendix E	Design Certification Rule for the ESBWR Design	Applicable to the ESBWR Design
10 CFR 70.22 (h)	Contents of applications	Does not apply to reactors licensed under Part 50.
10 CFR 70.61	Additional contents of applications	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.63	Additional contents of applications	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.64	Additional contents of applications	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.65	Additional contents of applications	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.66	Additional requirements for approval of license application	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.72	Facility change and change process	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 73.45(a-f)	Performance capabilities for fixed site physical protection systems	This regulation does not apply because of conformance with 10 CFR 73.6.
10 CFR 73.46(c)	Fixed site physical protection systems, subsystems, components, and procedures	This regulation applies to a fuel fabrication facility that uses Category I SNM.
10 CFR 73.46(e)	Fixed site physical	This regulation applies to a fuel fabrication facility that uses Category I SNM.

A-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
	protection systems, subsystems, components, and procedures	
10 CFR 73.46(f)	Fixed site physical protection systems, subsystems, components, and procedures	This regulation applies to a fuel fabrication facility that uses Category I SNM.
10 CFR 74.31	Nuclear material control and accounting for special nuclear material of low strategic significance	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.41	Nuclear material control and accounting for special nuclear material of moderate strategic significance	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.43	Internal controls, inventory, and records.	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.45	Measurements and measurement control.	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 100.10 – 10 CFR 100.11	Evaluation factors	This regulation applies to test reactors and stationary power reactor applications submitted before January 10, 1997
10 CFR 100 Appendix A	Seismic and Geologic Siting Criteria for Nuclear Power Plants	Does not apply to applications after 1997.

Table A-3. All Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Power Reactors

A-3: All Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.2 (Definitions – Basic Component), 10 CFR 50.2 (Definitions – Safety-related structures, systems, and components), 10 CFR 50.2 (Reactor Coolant Pressure Boundary), 10 CFR 50.36(c)(2)(ii)(A), 10 CFR 50.49(b), 10 CFR 50.65, 10 CFR 50 Appendix S through III	Reactor Coolant Pressure Boundary	The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in a KP-FHR, the reactor coolant boundary does not serve this function. Fission product retention is provided by the functional containment. Therefore, the statement in 10 CFR 50.2 (2 instances), 10 CFR 50.49 (b), and 10 CFR 50.65, "The integrity of the reactor coolant pressure boundary" is not applicable and will be deleted by exemption. In 10 CFR 50.36 (c)(2)(ii), “significant abnormal degradation of the reactor coolant pressure boundary” is not applicable and will be replaced by “significant abnormal degradation of the functional containment.”
10 CFR 50.34(a)(4), 10 CFR 50.34(b)(4), 10 CFR 52.47(a)(4), 10 CFR 52.79(a)(5), 10 CFR 52.137(a)(4), 10 CFR 52.157(f)(1)	Analysis of SSCs and ECCS Evaluation	The first sentence in each of these citations refers to the analysis and evaluation of the design and performance of SSCs, which is still applicable to the KP-FHR. However, the second sentence of each citation states that an analysis and evaluation of the ECCS cooling performance shall be provided in accordance with 10 CFR 50.46. KP-FHR has a passive Residual Heat Removal system that removes decay heat. With a low-pressure design, ECCS is not needed and 10 CFR 50.46 does not apply. Therefore, a partial exemption is required for these requirements.
10 CFR 50.34(b)(9)	Pressurized Thermal Shock	This regulation requires a description of protection against pressurized thermal shock events and reference 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to light water reactors. The KP-FHR operates at near atmospheric conditions and therefore cannot experience pressurized thermal shock

A-3: All Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Power Reactor		
Citation	Topic	Rationale
		therefore KP-FHR power reactor applicants will require an exemption to this regulation.
10 CFR 50.47 10 CFR 50 Appendix E	Emergency Plans	Kairos Power intends to implement alternate 50.160 rule for EP when approved through rulemaking OR will take exemption from Appendix E and 10 CFR 50.47, similar to Tennessee Valley Authority Clinch River.
10 CFR 50.68 (b), 10 CFR 52.47(a)(17), 10 CFR 52.79(a)(43), 10 CFR 52.137(a)(17), 10 CFR 52.157(f)(8)	Criticality	Paragraph (b) of 10 CFR 50.68 provides LWR-centric conditions for criticality safety. The KP-FHR fuel design differs significantly from traditional fuel types used in LWRs. KP-FHR fuel will be enriched to a percentage higher than is specified in the regulation. Additional terminology such as fuel assemblies does not describe KP-FHR technology. Licensees for the KP-FHR will require an exemption to provide criteria that is relevant to the KP-FHR design. The corresponding regulations in 10 CFR 52 that cite 10 CFR 50.68 would be included in the exemption if applicable to the application type.
10 CFR 50.71(h)(1)	PRA Records	Level 1 and Level 2 PRA terminology is not used for non-LWR PRAs and applicants for a COL would need to revise this wording as described in Section 3.1.3.5.
10 CFR 52	10 CFR 52 Regulations Referencing 10 CFR 50 Regulations Limited to LWRs	For applications under a 10 CFR 52 pathway, regulations referenced in Table A-4 invoke 10 CFR 50 regulations that refer specifically to LWRs. Therefore, an exemption in required.

Table A-4. Exemptions from 10 CFR 52 Regulations Referencing 10 CFR 50 Regulations

A-4: Exemptions from 10 CFR 52 Regulations Referencing 10 CFR 50 Regulations		
Citation	Topic	Rationale
10 CFR 52.47(a)(4), 10 CFR 52.79(a)(5), 10 CFR 52.137(a)(4), 10 CFR 52.157(f)(1)	Analysis of SSCs and ECCS Evaluation	The first sentence in each of these citations refers to the analysis and evaluation of the design and performance of SSCs, which is still applicable to the KP-FHR. However, the second sentence of each citation states that an analysis and evaluation of the ECCS cooling performance shall be provided in accordance with 10 CFR 50.46. KP-FHR has a passive Residual Heat Removal system that removes decay heat. With a low-pressure design, ECCS is not needed and 10 CFR 50.46 does not apply. Therefore, a partial exemption is required for these requirements.
10 CFR 52.47(a)(15) 10 CFR 52.79(a)(42) 10 CFR 52.137(a)(15) 10 CFR 52.157(f)(7)	Anticipated Transient Without Scram (ATWS)	These regulations reference 10 CFR 50.62 which is only applicable to light water reactors. Therefore KP-FHR power reactor applicants will need an exemption from these regulations.
10 CFR 52.47(a)(16) 10 CFR 52.79(a)(9) 10 CFR 52.137(a)(16) 10 CFR 52.157(f)(5)	Station Blackout (SBO)	These regulations reference 10 CFR 10 CFR 50.63, which is only applicable to light water reactors. Therefore KP-FHR power reactor applicants will need an exemption from these regulations.
10 CFR 50.34(b)(9) 10 CFR 52.47(a)(14) 10 CFR 52.79(a)(7) 10 CFR 52.137(a)(14) 10 CFR 52.157(f)(3)	Pressurized Thermal Shock Events	These regulations require a description of protection against pressurized thermal shock events and reference 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to light water reactors. The KP-FHR operates at near atmospheric conditions and therefore cannot experience pressurized thermal shock therefore KP-FHR power reactor applicants will require an exemption to these regulations.
10 CFR 52.79(a)(12)	Containment Leak Rate	The sited regulation references 10 CFR 50 Appendix J which is only applicable to light water reactors. Therefore KP-FHR power reactor applicants will require an exemption to the regulation.

A-4: Exemptions from 10 CFR 52 Regulations Referencing 10 CFR 50 Regulations		
Citation	Topic	Rationale
10 CFR 52.79(a)(13)	Reactor Vessel Surveillance Program	The sited regulation references 10 CFR 50 Appendix H which is only applicable to light water reactors. Therefore KP-FHR power reactor applicants will require an exemption to the regulation.
10 CFR 52.79(a)(16)(ii)	Effluent Monitoring and Sampling Program	The sited regulation references 10 CFR 50 Appendix I which is only applicable to light water reactors. Therefore KP-FHR power reactor applicants will require an exemption to the regulation.

APPENDIX B: NON-DESIGN REGULATORY REQUIREMENTS IN 10 CFR FOR A KP-FHR POWER REACTOR

This appendix summarizes the applicability of regulations that are not related to design. These categories include Administrative, Regulatory Process, Process, and Program as described in Section 2.2. The overwhelming majority of these regulations apply to a KP-FHR as would be expected. As mentioned previously, exemptions from non-design requirements are included in Table A-3.

Table Number	Title
B-1	Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor
B-2	Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor

Table B-1. Non-Design Related Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 2	Agency Rules of Practice and Procedure	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 9	Public Records	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 10	Criteria and procedures for determining eligibility for access to restricted data or national security information or an employment clearance	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 11	Criteria and procedures for determining eligibility for access to restricted data or national security information or an employment clearance	OL, COL
10 CFR 12	Implementation of equal access	OL, COL
10 CFR 15	Debt collection procedures	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 19	Notices, instructions and reports to workers: inspection and investigations	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 20	Standards for protection against ionizing radiation Note: All rules in this part apply to a KP-FHR power reactor. Design rules for a power reactor in this part are identified in Table A-1.	OL, COL, ML, DC, SDA, CP
10 CFR 21	Reporting of defects and noncompliance	OL, COL, ML, DC, SDA, LWA
10 CFR 25	Access authorization - Purpose	OL, COL, CP, SDA, LWA, DC, ML, ESP
10 CFR 26	Fitness for duty programs	OL, COL, ML, LWA, CP
10 CFR 30	Rules of general applicability to domestic licensing of byproduct material **Note:** Most of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include: 10 CFR 30.12, 10 CFR 30.21; and 10 CFR 30.32(j)	OL, COL, CP, ML
10 CFR 31	General domestic licenses for byproduct material	OL, COL
10 CFR 34	Licenses for industrial radiography and radiation safety requirements for industrial radiographic operations	OL, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 37	Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material	OL, COL
10 CFR 40	Domestic licensing of source material **Note:** Most of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include: 10 CFR 40.2a; 10 CFR 40.11 through 10 CFR 40.12; 10 CFR 40.22; 10 CFR 40.23; 10 CFR 40.25; 10 CFR 40.27; 10 CFR 40.28; 10 CFR 40.31 (h), (j-l); 10 CFR 40.33 through 10 CFR 40.36; 10 CFR 40.54; 10 CFR 40.55; 10 CFR 40.65; 10 CFR 40.66, and 10 CFR 40 Appendix A	OL, COL, CP, ML
10 CFR 50.1	Basis, purpose, and procedures applicable.	CP, OL, COL, ML, ESP, LWA, DC, SDA
10 CFR 50.2	Definitions - Act	CP, OL, COL
10 CFR 50.2	Definitions - Applicant	CP, OL, COL
10 CFR 50.2	Definitions - Atomic Energy	CP, OL, COL
10 CFR 50.2	Definitions - Atomic Weapon	CP, OL, COL
10 CFR 50.2	Definitions - Byproduct Material	CP, OL, COL
10 CFR 50.2	Definitions - Certified Fuel Handler	CP, OL, COL
10 CFR 50.2	Definitions - Commission	CP, OL, COL
10 CFR 50.2	Definitions - Committed Dose Equivalent	CP, OL, COL
10 CFR 50.2	Definitions - Committed Effective Dose	CP, OL, COL
10 CFR 50.2	Definitions - Common Defense and Security	CP, OL, COL
10 CFR 50.2	Definitions - Construction	CP, OL, COL
10 CFR 50.2	Definitions - Cost of Service Regulations	CP, OL, COL
10 CFR 50.2	Definitions - Decommission	CP, OL, COL
10 CFR 50.2	Definitions - Deep Dose Equivalent	CP, OL, COL
10 CFR 50.2	Definitions - Defect	CP, OL, COL
10 CFR 50.2	Definitions - DOE	CP, OL, COL
10 CFR 50.2	Definitions - Deviation	CP, OL, COL
10 CFR 50.2	Definitions - Director	CP, OL, COL
10 CFR 50.2	Definitions - Discovery	CP, OL, COL
10 CFR 50.2	Definitions - Electric Utility	CP, OL, COL
10 CFR 50.2	Definitions - Evaluation	CP, OL, COL
10 CFR 50.2	Definitions - Government Agency	CP, OL, COL
10 CFR 50.2	Definitions - Historical Site Assessment	CP, OL, COL
10 CFR 50.2	Definitions - Impacted Areas	CP, OL, COL
10 CFR 50.2	Definitions - Incentive regulation	CP, OL
10 CFR 50.2	Definitions - Major Decommissioning Activity & Major Radioactive Components	CP, OL, COL
10 CFR 50.2	Definitions - License & Licensee	CP, OL, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.2	Definitions - Non-bypassable charges	CP, OL, COL
10 CFR 50.2	Definitions - Non-impacted areas	CP, OL, COL
10 CFR 50.2	Definitions - Notification	CP, OL, COL
10 CFR 50.2	Definitions - Permanent cessation of operation(s)	CP, OL, COL
10 CFR 50.2	Definitions – Permanent Fuel Removal	CP, OL, COL
10 CFR 50.2	Definitions - Person	CP, OL, COL
10 CFR 50.2	Definitions - Price-cap regulation	CP, OL, COL
10 CFR 50.2	Definitions - Procurement document	CP, OL, COL
10 CFR 50.2	Definitions - Produce	CP, OL, COL
10 CFR 50.2	Definitions - Prototype plant	CP, OL, COL
10 CFR 50.2	Definitions - Research and development	CP, OL, COL
10 CFR 50.2	Definitions - Responsible officer	CP, OL, COL
10 CFR 50.2	Definitions - Restricted Data	CP, OL, COL
10 CFR 50.2	Definitions – Source Term	CP, OL, COL
10 CFR 50.2	Definitions - Special nuclear material	CP, OL, COL
10 CFR 50.2	Definitions - Substantial safety hazard	CP, OL, COL
10 CFR 50.2	Definitions - TEDE	CP, OL, COL
10 CFR 50.2	Definitions - United States	CP, OL, COL
10 CFR 50.2	Definitions - Utilization facility	CP, OL, COL
10 CFR 50.2	Definitions - Federal Government funding for conversion & Federal Licensee	CP, OL, COL
10 CFR 50.2	Definitions – Fuel Acceptable to the Commission	CP, OL, COL
10 CFR 50.2	Definitions - Non-power reactor	CP, OL, COL
10 CFR 50.2	Definitions - Production facility	CP, OL, COL
10 CFR 50.2	Definitions - Unique purpose	CP, OL, COL
10 CFR 50.3	Interpretations	CP, OL, COL, ML, ESP, LWA, DC, SDA
10 CFR 50.4	Written communications	CP, OL, LWA
10 CFR 50.5	Deliberate misconduct	CP, OL, LWA
10 CFR 50.7	Employee protection	CP, OL, LWA
10 CFR 50.8	Information collection requirements: Office of Management and Budget approval.	CP, OL, LWA
10 CFR 50.9	Completeness and accuracy of information	CP, OL, LWA
10 CFR 50.10	License required; LWA	CP, OL
10 CFR 50.11	Exceptions and exemptions from licensing requirements	CP, OL
10 CFR 50.12	Specific exemptions	CP, OL, COL, ML, ESP, LWA, DC, SDA

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.13	Attacks and destructive acts by enemies of the United States; and defense activities	CP, OL
10 CFR 50.20	Two classes of licenses	CP, OL
10 CFR 50.22	Class 103 licenses for commercial and industrial facilities	CP, OL
10 CFR 50.23	CPs	CP, OL, COL
10 CFR 50.30	Filing of application; oath or affirmation	CP, OL, COL, ESP, ML, SDA
10 CFR 50.31	Combining applications	CP, OL
10 CFR 50.32	Elimination of repetition	CP, OL
10 CFR 50.33	Applicant Information	CP, COL, OL, ESP
10 CFR 50.34(a)	Contents of Applications, Technical Information	CP
10 CFR 50.34(a)(1)	Contents of Applications, Technical Information	CP, ESP
10 CFR 50.34(a)(1)(i)	PSAR Content	CP, COL, ESP
10 CFR 50.34 (a)(1)(ii)(E)	Application Content	CP, COL, ESP
10 CFR 50.34(a)(2)	Summary Description of Facility	CP, COL, ESP
10 CFR 50.34(a)(3)	Preliminary Design of Facility and Principal Design Criteria	CP, COL, ESP
10 CFR 50.34(a)(6)	Organization, Training, and Operations	CP, COL, ESP
10 CFR 50.34(a)(7)	QA Program	CP, COL, ESP
10 CFR 50.34(a)(9)	Technical Qualifications of Applicant	CP, COL, ESP
10 CFR 50.34(a)(10)	Emergency Coping Plan	CP, COL, ESP
10 CFR 50.34(a)(11)	Construction Hazards	CP, COL, ESP
10 CFR 50.34(b)	Safety Analysis of Design Bases	OL
10 CFR 50.34(b)(1)	Environmental and Meteorological Monitoring	OL
10 CFR 50.34(b)(2)	Description and Analysis of SSCs	OL
10 CFR 50.34(b)(5)	Research and Development Results	OL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.34(b)(6)	Applicant's Organization and QA Program	OL
10 CFR 50.34(b)(7)	Technical Qualifications of Applicant	OL
10 CFR 50.34(b)(8)	Operator Qualification Program	OL
10 CFR 50.34(c)	Physical Security Plan	OL
10 CFR 50.34(d)	Safeguards Contingency Plan	OL
10 CFR 50.34(e)	Safeguards Contingency Plan	OL
10 CFR 50.34(f)	Additional TMI-related requirements	DC, SDA, COL[1]
10 CFR 50.34(f)(1)	Additional TMI-related requirements – studies to be submitted as part of the final safety analysis report	DC, SDA, COL[1]
10 CFR 50.34(f)(2)	Additional TMI-related requirements – information required to satisfy 10 CFR 50.35(a)(2) and unresolved generic safety issues	DC, SDA, COL[1]
10 CFR 50.34(f)(3)	Additional TMI-related requirements – information required to satisfy 50.34(a)(1), technical qualifications, and management structure and competence	DC, SDA, COL[1]
10 CFR 50.34(f)(3)(i)	Additional TMI-related requirements – Industry Experience	DC, SDA, COL[1]
10 CFR 50.34(f)(3)(ii)	Additional TMI-related requirements - QA	DC, SDA, COL[1]
10 CFR 50.34(f)(3)(iii)	Additional TMI-related requirements – QA	DC, SDA, COL[1]
10 CFR 50.34(f)(3)(vii)	Additional TMI-related requirements – Management Plan for Design and Construction Activities	DC, SDA, COL[1]
10 CFR 50.35	Issuance of CPs	CP
10 CFR 50.36(a)(1)	Technical specifications	OL, COL
10 CFR 50.36(a)(2)	Technical specifications	DC, ML
10 CFR 50.36(b)	Technical specifications	OL, COL
10 CFR 50.36b	Environmental conditions	CP, COL, OL, ESP
10 CFR 50.37	Agreement limiting access to Classified Information	CP, OL, COL, SDA, DC, ML, ESP

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.38	Ineligibility of certain applicants	OL, COL, ESP, CP, ML, DC, SDA
10 CFR 50.39	Public inspection of applications	CP, OL, COL, SDA, DC, ESP, LWA, ML
10 CFR 50.40	Common standards	CP, OL, COL, ML, ESP
10 CFR 50.42	Additional standard for class 103 licenses	CP, OL, COL, ML, ESP
10 CFR 50.43(a-d)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	OL, COL, CP, ML, ESP
10 CFR 50.43(e)	Additional standards and provisions affecting class 103 licenses and certifications for commercial power	DC, COL, ML, OL, SDA
10 CFR 50.45	Standards for CPs, OL, and COLs	CP, OL, COL
10 CFR 50.48(a)(1)	Fire Protection	CP, OL
10 CFR 50.48(a)(1)(i)	Fire Protection	OL, COL
10 CFR 50.48(a)(1)(ii)	Fire Protection	OL, COL
10 CFR 50.48(a)(1)(iii)	Fire Protection	OL, COL
10 CFR 50.48(a)(1)(iv)	Fire Protection	OL, COL
10 CFR 50.48(a)(2)	Fire Protection	OL, COL
10 CFR 50.48(a)(2)(i)	Fire Protection	OL, COL
10 CFR 50.48(a)(2)(ii)	Fire Protection	OL, COL
10 CFR 50.48(a)(2)(iii)	Fire Protection	OL, COL
10 CFR 50.48(a)(3)	Fire Protection	OL, COL
10 CFR 50.48(f)	Fire Protection	OL, COL
10 CFR 50.49(a)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.49(j)	Environmental qualification of electric equipment important to safety for nuclear power plants	OL, COL, ML
10 CFR 50.50	Issuance of licenses and CPs	CP, OL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.51	Continuation of license	CP, OL
10 CFR 50.52	Combining licenses	CP, OL
10 CFR 50.53	Jurisdictional limitations	CP, OL
10 CFR 50.54	Conditions of licenses	OL, COL
10 CFR 50.54(a)	Conditions of licenses - Quality Assurance	OL, COL
10 CFR 50.54(b)	Conditions of licenses - Special Nuclear Material	OL, COL
10 CFR 50.54(c)	Conditions of licenses - Special Nuclear Material	OL, COL
10 CFR 50.54(d)	Conditions of licenses - State of War	OL, COL
10 CFR 50.54(e)	Conditions of licenses - Subject to revocation	OL, COL
10 CFR 50.54(f)	Conditions of licenses - Licensee Request to Modify, suspend or revoke.	OL, COL
10 CFR 50.54(g)	Conditions of licenses - Antitrust Laws	OL, COL
10 CFR 50.54(h)	Conditions of licenses – Modification of license	OL, COL
10 CFR 50.54(i)	Conditions of licenses - Operators	OL, COL
10 CFR 50.54(j)	Conditions of licenses - Operators	OL, COL
10 CFR 50.54(k)	Conditions of licenses - Operators	OL, COL
10 CFR 50.54(l)	Conditions of licenses - Operators	OL, COL
10 CFR 50.54(m)	Conditions of licenses - Operators	OL, COL
10 CFR 50.54(n)	Conditions of licenses - Alteration of facility	OL, COL
10 CFR 50.54(p)	Safeguards	OL, COL
10 CFR 50.54(q)	Emergency Plans	OL, COL
10 CFR 50.54(s)	Emergency Plans	OL
10 CFR 50.54(t)	Emergency Plans	OL, COL
10 CFR 50.54(v)	Safeguards Information	OL, COL
10 CFR 50.54(w)	Insurance	OL, COL
10 CFR 50.54(x)	Operations	OL, COL
10 CFR 50.54(y)	Operations	OL, COL
10 CFR 50.54(z)	Operations	OL, COL
10 CFR 50.54(aa)	Environmental	OL, COL
10 CFR 50.54(bb)	Decommissioning	OL, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.54(cc)	Bankruptcy	OL, COL
10 CFR 50.54(dd)	Operations	OL, COL
10 CFR 50.54(ee)	Byproduct and SNM license	OL, COL
10 CFR 50.54(gg)	Emergency Plans	COL
10 CFR 50.54(jj)	Codes and Standards	OL, COL
10 CFR 50.55	Terms and Conditions of license	CP, ESP, COL, ML
10 CFR 50.55(a)-(c)	Terms and Conditions of license	CP
10 CFR 50.55(d)	Terms and Conditions of license	CP, OL
10 CFR 50.55(e)(1)	Definition	CP, COL, ML
10 CFR 50.55(e)(2)	Defects	CP, COL, ML
10 CFR 50.55(e)(3)	Defects	CP, COL, ML
10 CFR 50.55(e)(4)	Defects	CP, COL, ML
10 CFR 50.55(e)(5)	Defects	CP, COL, ML
10 CFR 50.55(e)(6)	Defects	CP, COL, LWA, ML
10 CFR 50.55(e)(7)	Defects	CP, COL, LWA, ML
10 CFR 50.55(e)(8)	Defects	CP, COL, LWA, ML
10 CFR 50.55(e)(9)	Records	CP, COL, ML
10 CFR 50.55(f)	Quality Assurance Criteria	CP, OL, COL, ESP, ML
10 CFR 50.55(i)	Quality Assurance Plan	CP, OL, COL, ESP, DC, ML
10 CFR 50.56	License	CP, OL
10 CFR 50.57	License	OL
10 CFR 50.58	License	CP, OL
10 CFR 50.59	Changes, Tests, and Experiments	OL, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.70	Inspections	CP, OL, COL, ESP, ML
10 CFR 50.71(a)	Records	CP, OL, COL, ML, ESP
10 CFR 50.71(b)	Records	CP, OL, COL,
10 CFR 50.71(c-d)	Records	CP, OL, COL, ML, LWA, ESP, SDA, DC
10 CFR 50.71(e)	Records	OL, COL
10 CFR 50.71(f)	Records	ML
10 CFR 50.71(g)	Records	OL, COL
10 CFR 50.72(a)	Notifications	OL, COL
10 CFR 50.72(b)	Notifications	OL, COL
10 CFR 50.72(c)	Notifications	OL, COL
10 CFR 50.73	Notifications	OL, COL
10 CFR 50.74	Notifications	OL, COL
10 CFR 50.75(a-c)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)(i)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)(ii)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)(iii)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)(iv-v)	Decommissioning	OL, COL
10 CFR 50.75(e)(1)(vi)	Decommissioning	OL, COL
10 CFR 50.75(e)(2)	Decommissioning	OL, COL
10 CFR 50.75(e)(3)	Decommissioning	COL
10 CFR 50.75(f)	Decommissioning	OL, COL
10 CFR 50.75(g)	Decommissioning	OL, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.75(h)	Decommissioning	OL, COL
10 CFR 50.76	Financial	OL, COL
10 CFR 50.78	Safeguards	CP, OL, COL
10 CFR 50.80	License	OL, COL, CP, ESP, ML
10 CFR 50.81	Financial	OL, COL, CP, ESP, ML
10 CFR 50.82	License	OL, COL
10 CFR 50.83	Unreleased Use	OL, COL
10 CFR 50.90	Amendments	OL, COL, CP, ESP, ML
10 CFR 50.91	Amendments	OL, COL
10 CFR 50.92	Amendments	OL, COL, CP, ESP, ML
10 CFR 50.100	License	OL, COL, CP, ESP, ML, SDA
10 CFR 50.101	License	OL, COL, CP, ML
10 CFR 50.102	License	OL, COL
10 CFR 50.103	License	OL, COL, CP, ESP, ML
10 CFR 50.109(a)	Backfitting	CP, OL, COL, DC, ESP, ML, SDA
10 CFR 50.109(c-d)	Backfitting	CP, OL, COL, ML, SDA
10 CFR 50.109(e)	Backfitting	CP, OL, COL, DC, ESP, ML, SDA
10 CFR 50.110	Violations	CP, OL, LWA
10 CFR 50.111	Violations	CP, OL, SDA, ML, LWA
10 CFR 50.120	Training	OL, COL
10 CFR 50.150(a)	Aircraft Impact	CP, OL, COL, DC, SDA, ML
10 CFR 50.150(c)	Aircraft Impact	COL, OL, SDA, ML, DC, CP
10 CFR 50.150(c)(1)	Aircraft Impact	CP

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 50.150(c)(2)	Aircraft Impact	OL
10 CFR 50.150(c)(3)	Aircraft Impact	DC
10 CFR 50.150(c)(4)	Aircraft Impact	COL, SDA, ML
10 CFR 50.155(c)(5)	Mitigation of beyond-design-basis events	OL, COL, DC
10 CFR 50 Appendix B Introduction	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Organization	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Quality Assurance Program	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Design Control	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Procurement Document Control	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Document Control	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Procurement Document Control	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Control of Purchased Material,	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
Equipment, and Services		
10 CFR 50 Appendix B Identification and Control of Materials, Parts, and Components	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Control of Special Processes	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Inspection	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Test Control	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Control of Measuring and Test Equipment	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Handling, Storage and Shipping	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Inspection, Test, and Operating Status	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Nonconforming Materials,	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
Parts, or Components		
10 CFR 50 Appendix B Corrective Action	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Quality Assurance Records	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix B Audits	Quality Assurance	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 50 Appendix C General Information	Financial	CP, COL
10 CFR 50 Appendix C, I	Financial - Applicants Which Are Established Organizations	CP, COL
10 CFR 50 Appendix C ,II	Financial - Applicants Which Are Newly Formed Entities	CP, COL
10 CFR 50 Appendix C, III	Financial - Annual Financial Statement	CP, COL
10 CFR 50 Appendix C, IV	Financial - Additional Information	CP, COL
10 CFR 50 Appendix N	Standardization	CP, OL
10 CFR 50 Appendix Q	Site Suitability	CP, OL
10 CFR 51	Environmental protection regulations for domestic licensing and related regulatory functions **Note:** Most of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include: 10 CFR 51.11; 10 CFR 51.51; 10 CFR 51.52; 10 CFR 51.62; 10 CFR 51.67; 10 CFR 51.99; 10 CFR 51.109 and 10 CFR 51.110	CP, OL, LWA, COL, DC, SDA, ML, ESP
10 CFR 52.0	Regulatory Process	COL, SDA, ESP, ML, DC
10 CFR 52.1	Definitions	COL, SDA, ESP, DC, ML

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.2	Regulatory Process	COL, SDA, ESP, ML, DC
10 CFR 52.3	Written Communications	COL, SDA, ESP, ML, DC
10 CFR 52.4	Deliberate Misconduct	COL, SDA, ESP, ML, DC
10 CFR 52.5	Employee Protection	COL, SDA, ESP, ML, DC
10 CFR 52.6	Completeness and accuracy of information	COL, SDA, ESP, ML, DC
10 CFR 52.7	Regulatory Process	COL, SDA, ESP, ML, DC
10 CFR 52.8	Combining Licenses	DC, COL, SDA, ESP, ML
10 CFR 52.9	Regulatory Process	COL, SDA, ESP, ML, DC
10 CFR 52.10	Attacks and Destructive acts	COL, SDA, ESP, ML, DC
10 CFR 52.11	Regulatory Process	COL, SDA, ESP, ML, DC
10 CFR 52.12	Early Site Permit - Scope	ESP
10 CFR 52.13	Early Site Permit - Relationship to other subparts	ESP
10 CFR 52.15	Early Site Permit - Filing of applications	ESP
10 CFR 52.16	Early Site Permit - Contents of application; general information	ESP
10 CFR 52.17	Subpart A – Early Site Permit – Contents of application; technology information	ESP
10 CFR 52.18	Early Site Permit - Standards for review of application	ESP
10 CFR 52.21	Early Site Permit – Administrative review of applications; hearings	ESP
10 CFR 52.23	Early Site Permit – Referral to the Advisory Committee on Reactor Safeguards (ACRS)	ESP
10 CFR 52.24	Early Site Permit -Issuance of early site permit	ESP, CP, COL
10 CFR 52.25	Early Site Permit – Extent of activities permitted	ESP
10 CFR 52.26	Early Site Permit – Duration of permit	ESP, CP, COL
10 CFR 52.27	Early Site Permit – Limited work authorization after issuance of early site permit	ESP, LWA
10 CFR 52.28	Early Site Permit – Transfer of early site permit	ESP
10 CFR 52.29	Early Site Permit – Application for renewal	ESP
10 CFR 52.31	Early Site Permit – Criteria for renewal	ESP
10 CFR 52.33	Early Site Permit – Duration of renewal	ESP
10 CFR 52.35	Early Site Permit – Use of site for other purposes	ESP

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.39	Early Site Permit – Finality of early site permit determinations	ESP, CP, COL, OL
10 CFR 52.41	Standard Design Certification Scope	DC
10 CFR 52.43	Standard Design Certification Relation to other Subparts	DC, COL, ML
10 CFR 52.45	Standard Design Certification Filing of Applications	DC
10 CFR 52.46	Standard Design Certification - General Information	DC
10 CFR 52.47 (1st paragraph)	Standard Design Certification - Sufficient Level of Design Information	DC
10 CFR 52.47(a)(7)	Standard Design Certification - Technical Qualifications	DC
10 CFR 52.47(a)(19)	Standard Design Certification - QA Criteria	DC
10 CFR 52.47(d)	Standard Design Certification - Safeguards Information	DC
10 CFR 52.48	Standard Design Certification - Review Compliance	DC
10 CFR 52.51	Standard Design Certification - Rule Issuance	DC
10 CFR 52.53	Standard Design Certification - Advisory Committee on Reactor Safeguards	DC
10 CFR 52.54	Standard Design Certification - Issuance of Standard Design Certification	DC
10 CFR 52.55	Standard Design Certification - Duration of Certification	DC, CP, OL, COL
10 CFR 52.57	Standard Design Certification - Application for Renewal	DC
10 CFR 52.59	Standard Design Certification - Criteria for Renewal	DC
10 CFR 52.61	Standard Design Certification - Duration of Renewal	DC
10 CFR 52.63	Standard Design Certification - Finality of Standard Design Certifications	DC, CP, OL, COL, ML
10 CFR 52.71	Subpart C - COLs	COL
10 CFR 52.73	COL - Relationships	COL
10 CFR 52.75	COL - Filing application	COL
10 CFR 52.77	COL - Contents of Application	COL
10 CFR 52.79(a) first paragraph	COL - Contents of Application	COL
10 CFR 52.79(a)(10)	COL - EQ	COL
10 CFR 52.79(a)(11)	COL - ASME	COL,
10 CFR 52.79(a)(14)	COL - Operator Training	COL
10 CFR 52.79(a)(15)	COL - Maintenance Program	COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.79(a)(24)	COL - Emergency Plan	COL
10 CFR 52.79(a)(25)	COL - Quality Assurance Program	COL
10 CFR 52.79(a)(26)	COL - Organization	COL
10 CFR 52.79(a)(27)	COL - Managerial and Administrative Controls	COL
10 CFR 52.79(a)(28)	COL - Preoperational Testing and Initial Operations	COL
10 CFR 52.79(a)(29)	COL - Conduct of Normal Operations	COL
10 CFR 52.79(a)(30)	COL - Technical Specifications	COL
10 CFR 52.79(a)(31)	COL - Hazards	COL
10 CFR 52.79(a)(32)	COL - Qualifications	COL
10 CFR 52.79(a)(33)	COL - Training	COL
10 CFR 52.79(a)(34)	COL - Training	COL
10 CFR 52.79(a)(35)	COL - Security	COL
10 CFR 52.79(a)(36)	COL - Safeguards	COL
10 CFR 52.79(a)(37)	COL - Operating Experience	COL
10 CFR 52.79(a)(39)	COL - Radiation Protection	COL
10 CFR 52.79(a)(40)	COL - Fire Protection	COL
10 CFR 52.79(a)(44)	COL - Fitness for Duty	COL
10 CFR 52.79(b)	COL - Referenced ESP	COL
10 CFR 52.79(b)(1)	COL - Referenced ESP	COL
10 CFR 52.79(b)(2)	COL - Referenced ESP	COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.79(b)(3)	COL - Referenced ESP	COL
10 CFR 52.79(b)(4)	COL - Referenced ESP	COL
10 CFR 52.79(b)(5)	COL - Referenced ESP	COL
10 CFR 52.79(c)	COL - Referenced SDA	COL
10 CFR 52.79(c)(1)	COL - Referenced SDA	COL
10 CFR 52.79(c)(2)	COL - Referenced SDA	COL
10 CFR 52.79(d)	COL - Referenced SDA	COL
10 CFR 52.79(d)(1)	COL - Referenced SDA	COL
10 CFR 52.79(d)(3)	COL - Design Certification Rule	COL
10 CFR 52.79(e)	COL - Manufacturing License Reference	COL
10 CFR 52.79(e)(1)	COL - Manufacturing License Reference	COL
10 CFR 52.79(f)	COL - Safeguards	COL
10 CFR 52.80	COL - ITAAC	COL, LWA
10 CFR 52.81	COL - Standards for Review of Application	COL
10 CFR 52.83	COL - Finality of License	COL
10 CFR 52.85	COL - Finality of License	COL
10 CFR 52.87	COL - Finality of License	COL
10 CFR 52.91	COL - LWA	COL, LWA
10 CFR 52.93	COL - Exemptions	COL, CP
10 CFR 52.97	COL - Issuance of Combined License	COL
10 CFR 52.98	COL - Finality of License	COL
10 CFR 52.99	COL - ITAAC	COL
10 CFR 52.103	COL - Operation under a Combined License	COL
10 CFR 52.104	COL - Duration of Combined License	COL
10 CFR 52.105	COL - Transfer of combined license	COL
10 CFR 52.107	COL - License Renewal	COL
10 CFR 52.109	COL - Decommissioning	COL
10 CFR 52.110	COL - Decommissioning	COL
10 CFR 52.131	Standard Design Approval - Scope of Subpart E	SDA
10 CFR 52.133	Standard Design Approval - Relationship to other Subparts	SDA, CP, COL

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.135	Standard Design Approval - Application	SDA
10 CFR 52.136	Standard Design Approval - Contents of Application	SDA
10 CFR 52.137(a)(7)	Standard Design Approval - Applicant Qualifications	SDA
10 CFR 52.137(a)(8)	Standard Design Approval - Contents of Application Technical Information	SDA
10 CFR 52.137(a)(19)	Standard Design Approval - Quality Assurance Program	SDA
10 CFR 52.137(a)(26)	Standard Design Approval - Aircraft Impact	SDA
10 CFR 52.139	Standard Design Approval - Regulatory Process	SDA
10 CFR 52.141	Standard Design Approval - Regulatory Process	SDA
10 CFR 52.143	Standard Design Approval - Regulatory Process	SDA
10 CFR 52.145	Standard Design Approval - Finality of Standard Design	SDA
10 CFR 52.147	Standard Design Approval - Regulatory Process	SDA, CP, OL, COL, ML
10 CFR 52.151	Manufacturing License - License Type	ML
10 CFR 52.153	Manufacturing License - Relationship to other subparts	ML
10 CFR 52.155	Manufacturing License - Filing Application	ML
10 CFR 52.156	Manufacturing License - 50.33 requirements	ML
10 CFR 52.157 (first paragraph)	Manufacturing License - FSAR	ML
10 CFR 52.157(f)(16)	Manufacturing License - Technical Qualifications	ML
10 CFR 52.157(f)(17)	Manufacturing License - QA Program	ML
10 CFR 52.157(f)(26)	Manufacturing License - Management Plan	ML
10 CFR 52.158(b)	Manufacturing License - Environmental Report	ML
10 CFR 52.159	Manufacturing License - Standards for Review	ML
10 CFR 52.163	Manufacturing License - Application Review	ML
10 CFR 52.165	Manufacturing License - ACRS	ML
10 CFR 52.167	Manufacturing License - Issuance of License	ML
10 CFR 52.171	Manufacturing License - Finality of Manufacturing License	ML, CP, OL, COL
10 CFR 52.173	Manufacturing License - Duration of License	ML
10 CFR 52.175	Manufacturing License - License Transfer	ML
10 CFR 52.177	Manufacturing License - Application for renewal	ML
10 CFR 52.179	Manufacturing License - Criteria for renewal	ML

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 52.181	Manufacturing License - Duration of Renewal	ML
10 CFR 52.301	Enforcement Violations	CP, OL, LWA, COL, SDA, ESP, ML
10 CFR 52.303	Enforcement. Criminal Penalties	CP, OL, LWA, COL, SDA, ESP, ML
10 CFR 52 Appendix N	Standardization of Nuclear Power Plant Designs	COL
10 CFR 54	Requirements for renewal of OLs for nuclear power plants	OL, COL
10 CFR 55	Operator's Licenses	OL, COL
10 CFR 70	Domestic Licensing of Special Nuclear Material **Note:** Most of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include: 10 CFR 70.11 through 10 CFR 70.14; 10 CFR 70.22(f), 10 CFR 70.22(j); 10 CFR 70.22(m-n); 10 CFR 70.23a; 10 CFR 70.39, 10 CFR 70.40, 10 CFR 70.59; 10 CFR 70.60; 10 CFR 70.62, 10 CFR 70.73; 10 CFR 70.74 and 10 CFR 70.76	CP, OL, COL, ML
10 CFR 71	Packaging and transportation of radioactive material	CP, OL, COL, ML
10 CFR 72	Licensing requirements for independent storage of spent nuclear fuel and high-level waste	OL, COL
10 CFR 73	Physical protection of plants and materials **Note:** Most of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include 10 CFR 73.20; 10 CFR 73.23; 10 CFR 73.25; 10 CFR 73.26; 10 CFR 73.27; 10 CFR 73.45(g); 10 CFR 73.50; 10 CFR 73.60; 10 CFR 73.70; and 10 CFR 73.74	OL, COL, ML, DC, SDA, CP, ESP
10 CFR 74	Accounting for SNM **Note:** Many of the non-design rules in this part apply to the KP-FHR power reactor. Exceptions include: 10 CFR 74.33	CP, OL, COL
10 CFR 95	Facility security clearance and safeguarding of national security information and restricted data	CP, OL, LWA, COL, SDA, ESP, ML
10 CFR 100.2	Proposed Siting per 10 CFR 50 and 52 - Scope	CP, OL, COL, ESP, SDA, DC, ML

B-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Power Reactor		
Citation	Topic	Application Type
10 CFR 100.3	Proposed Siting per 10 CFR 50 and 52 - Definitions	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 100.4	Communications	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 100.8	Information collection requirements: OMB approval	CP, OL, COL, ESP, SDA, DC, ML
10 CFR 110	Export and import of nuclear equipment and material	COL, OL, ESP, SDA, DC, ML
10 CFR 140	Financial protection and indemnity agreements - Purpose	CP, COL, OL
10 CFR 170	Fees for reactor licenses and fuel cycle licenses and materials licenses - Purpose	CP, OL, LWA, COL, SDA, DC, ESP, ML
10 CFR 171.1	Annual Fees charged to license holders - Purpose	OL, COL

[1]10 CFR 50.34(f) requirements are only applicable to non-LWR applicants pursuing a license under 10 CFR Part 52.

Table B-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor

B-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 1	Statement of organization and general information	General information about NRC
10 CFR 4	Nondiscrimination in federally assisted programs	NRC Practices
10 CFR 5	Nondiscrimination on the basis of sex in education programs	Applicable to educational activities
10 CFR 7	Advisory committees	General information about ACRS
10 CFR 8	Interpretations	Reserved
10 CFR 13	Fraud civil penalties	Applicable to civil penalties
10 CFR 14	Administrative claims under federal tort act	Applicable to NRC employees
10 CFR 16	Salary offset procedures for collecting debt	Applies to NRC employees
10 CFR 30.12	Persons using byproduct material under certain DOE and NRC contracts	Applies to work done under DOE and NRC contracts
10 CFR 30.21	Radioactive Drug: Capsules Containing Carbon-14 Urea For “In-Vivo” Diagnostic Use for Humans	Requirements not applicable to power reactors
10 CFR 30.32(j)	Applications for Specific Licenses	Requirements not applicable to power reactors
10 CFR 32	Specific domestic licenses to manufacture or transfer items containing byproduct material	Requirement not applicable to power reactors
10 CFR 33	Specific domestic licenses of broad scope for byproduct material	Requirement not applicable to power reactors
10 CFR 35	Medical use of byproduct material	Medical uses only
10 CFR 36	License and radiation safety requirements for irradiators	Irradiators only
10 CFR 39	Licenses and radiation safety for well logging	Not expected to be a Kairos activity
10 CFR 40.2a	Coverage of inactive tailings sites	Not applicable to power reactors.
10 CFR 40.11	Exemptions	Not applicable to power reactors.
10 CFR 40.12	Exemptions	Not applicable to power reactors.
10 CFR 40.22	Small quantities of source material	Not applicable to power reactors.
10 CFR 40.23	General license for carriers of transient shipments of natural uranium other than in the form of ore or ore residue	Not applicable to power reactors.
10 CFR 40.25	General license for use of certain industrial products or devices	Not applicable to power reactors.

B-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 40.27	General license for custody and long-term care of residual radioactive material disposal sites	Not applicable to power reactors.
10 CFR 40.28	General license for custody and long-term care of uranium or thorium byproduct materials disposal sites	Not applicable to power reactors.
10 CFR 40.31(h), (j-l)	Application for specific licenses	Not applicable to power reactors.
10 CFR 40.33-40.36	License applications	Not applicable to power reactors.
10 CFR 40.54	Requirements for license to initially transfer source material for use under the 'small quantities of source material' general license	Not applicable to power reactors.
10 CFR 40.55	Conditions of licenses to initially transfer source material for use under the 'small quantities of source material' general license: Quality control, labeling, safety instructions, and records and reports	Not applicable to power reactors.
10 CFR 40.56	Restrictions on the use of Australian-obligated source material	Not applicable to non-military usage.
10 CFR 40.65	Effluent monitoring reporting requirements	Not applicable to power reactors.
10 CFR 40.66	Requirements for advance notice of export shipments of natural uranium	Not applicable to power reactors.
10 CFR 40 Appendix A	Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content	Not applicable to power reactors.
10 CFR 50.2	Definitions – Testing facility	Not applicable to power reactors
10 CFR 50.21	Class 104 Licenses for Research and Test Facilities	Not applicable to power reactors
10 CFR 50.34(f)(2)(ii)	Plant procedure improvement program	Not applicable for applicants under Part 52.
10 CFR 50.34(h)	Evaluation of facility against NUREG-0800	SRP does not apply to KP-FHR
10 CFR 50.49(h)	Environmental qualification of electric equipment important to safety for nuclear power plants.	Not applicable to new plants. See 50.49(g)
10 CFR 50.55(g-h)	Reserved	No requirement
10 CFR 50.75(d)	Decommissioning	Non-power reactor only

B-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 50.109(b)	Backfitting	Not prior to October 21, 1985
10 CFR 51.11	Relationship to other subparts	Reserved
10 CFR 51.51	Environmental Effects of Uranium Fuel Cycle	Applicable to LWRs only.
10 CFR 51.52	Transportation of Fuel and Waste	Applicable to LWRs only.
10 CFR 51.62	Environmental Report – Land Disposal of Radioactive Waste Licensed Under 10 CFR 61	Applicable to a geological repository
10 CFR 51.67	Environmental information concerning geological repositories	Applicable to a geological repository
10 CFR 51.99	Reserved	No requirement
10 CFR 51.109	Public hearings in proceedings for issuance of materials license with respect to a geologic repository	Applicable to a geological repository
10 CFR 51.110	Reserved	No requirement
10 CFR 53	Reserved	No requirement
10 CFR 60	Disposal of high-level wastes in geological repositories	Not an expected Kairos activity
10 CFR 61	Licensing requirements for land disposal of radioactive waste	Not an expected Kairos activity
10 CFR 62	Criteria for emergency access to non-federal and regional low-level waste disposal facilities	Not an expected Kairos activity
10 CFR 63	Disposal of high-level waste at Yucca Mountain	Project suspended
10 CFR 70.11-70.14	Exemptions	Kairos Power does not meet exemptions to 10 CFR 70 Subpart B.
10 CFR 70.22(f)	Contents of applications – special nuclear material in a plutonium processing and fuel fabrication plant	Applicable to plutonium processing and fuel fabrication plant.
10 CFR 70.22(j)	Contents of applications – license to possess or use uranium-235, uranium-233, or plutonium	Not applicable to reactors licensed under 10 CFR 50.
10 CFR 70.22(m-n)	Contents of applications – uranium enrichment	Applicable to uranium enrichment facility.
10 CFR 70.23a	Hearing required for uranium enrichment facility	Applicable to uranium enrichment facility.
10 CFR 70.39	Specific licenses for the manufacture or initial transfer of calibration or reference sources	Applicable to manufacture and transfer of plutonium calibration or reference sources.
10 CFR 70.40	Ineligibility of certain applicants	Ineligibility not relevant to Kairos Power.

B-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Power Reactor		
Citation	Topic	Rationale
10 CFR 70.59	Effluent monitoring reporting requirements	Not applicable to power reactors.
10 CFR 70.60	Applicability	Will not be engaged in the applicable activities in Subpart H.
10 CFR 70.62	Safety program and integrated safety analysis	Applicable to applicants subject to 10 CFR 70.61.
10 CFR 70.73	Renewal of licenses	Will not be engaged in the applicable activities in Subpart H.
10 CFR 70.74	Additional reporting requirements	Will not be engaged in the applicable activities in Subpart H.
10 CFR 70.76	Backfitting	Will not be engaged in the applicable activities in Subpart H.
10 CFR 73.20	General performance objective and requirements	Exemption per 10 CFR 73.6 – less than 20 percent U-235 enrichment.
10 CFR 73.25	Performance capabilities for physical protection of strategic SNM in transit	Exemption per 10 CFR 73.6 – less than 20 percent U-235 enrichment.
10 CFR 73.26	Transportation physical protection systems, subsystems, components, and procedures	Exemption per 10 CFR 73.6 – less than 20 percent U-235 enrichment.
10 CFR 73.27	Notification requirements	Exemption per 10 CFR 73.6 – less than 20 percent U-235 enrichment.
10 CFR 73.45(g)	Physical protection plan response	Exemption per 10 CFR 73.6 – less than 20 percent U-235 enrichment.
10 CFR 73.50	Requirements for physical protection of licensed activities	Not applicable to reactors licensed under 10 CFR 50.
10 CFR 73.60	Additional requirements for physical protection at nonpower reactors	Not applicable to power reactors.
10 CFR 74.33	Nuclear Material Accounting	Applies to an enrichment facility
10 CFR 76	Certification of gaseous diffusion plants	Enrichment facilities only
10 CFR 81	Standard specifications for the granting of patent licenses	Applies to NRC
10 CFR 150	Agreement State Rules	Does not apply to production facilities or applications
10 CFR 160	Trespassing on commission property	Unlikely to be applicable to KP-FHR
10 CFR 172-199	Reserved	No requirement

APPENDIX C: REGULATORY GUIDES RELEVANT TO A KP-FHR POWER REACTOR

The following Table C-1 summarizes the Regulatory Guides that may be relevant to the design and licensing of the KP-FHR Power Reactor.

Table C-1. Regulatory Guides Relevant to the KP-FHR Power Reactor

Table C-1. Regulatory Guides Relevant to a KP-FHR Power Reactor	
Number	Title
Regulatory Guide 1.12	Nuclear Power Plant Instrumentation for Earthquakes
Regulatory Guide 1.22	Periodic Testing of Protection System Actuation Functions (Safety Guide 22)
Regulatory Guide 1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (Safety Guide 30)
Regulatory Guide 1.31	Control of Ferrite Content in Stainless Steel Weld Metal
Regulatory Guide 1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems
Regulatory Guide 1.59	Design Basis Floods for Nuclear Power Plants
Regulatory Guide 1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants
Regulatory Guide 1.61	Damping Values for Seismic Design of Nuclear Power Plants
Regulatory Guide 1.69	Concrete Radiation Shields and Generic Shield Testing for Nuclear Power Plants
Regulatory Guide 1.76	Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants
Regulatory Guide 1.78	Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release
Regulatory Guide 1.87	Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors
Regulatory Guide 1.92	Combining Modal Responses and Spatial Components in Seismic Response Analysis
Regulatory Guide 1.102	Flood Protection for Nuclear Power Plants
Regulatory Guide 1.105	Setpoints for Safety-Related Instrumentation
Regulatory Guide 1.115	Protection Against Low-Trajectory Turbine Missiles
Regulatory Guide 1.145	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants
Regulatory Guide 1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.153	Criteria for Safety Systems (12/85)
Regulatory Guide 1.168	Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.169	Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.170	Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.171	Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants

Table C-1. Regulatory Guides Relevant to a KP-FHR Power Reactor	
Number	Title
Regulatory Guide 1.172	Software Requirement Specifications for Digital Computer Software and Complex Electronics Used in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.173	Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants
Regulatory Guide 1.118	Periodic Testing of Electric Power and Protection Systems
Regulatory Guide 1.122	Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components
Regulatory Guide 1.125	Physical Models for Design and Operation of Hydraulic Structures and Systems for Nuclear Power Plants
Regulatory Guide 1.128	Installation Design and Installation of Vented Lead-Acid Storage Batteries for Nuclear Power Plants
Regulatory Guide 1.129	Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants
Regulatory Guide 1.151	Instrument Sensing Lines
Regulatory Guide 1.156	Qualification of Connection Assemblies for Nuclear Power Plants
Regulatory Guide 1.180	Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems
Regulatory Guide 1.189	Fire Protection for Nuclear Power Plants
Regulatory Guide 1.199	Anchoring Components and Structural Supports in Concrete
Regulatory Guide 1.203	Transient and Accident Analysis Methods
Regulatory Guide 1.204	Guidelines for Lightning Protection of Nuclear Power Plants
Regulatory Guide 1.209	Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants
Regulatory Guide 1.210	Qualification of Safety-Related Battery Chargers and Inverters for Nuclear Power Plants
Regulatory Guide 1.211	Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants
Regulatory Guide 1.212	Sizing of Large Lead-Acid Storage Batteries
Regulatory Guide 1.213	Qualification of Safety-Related Motor Control Centers for Nuclear Power Plants
Regulatory Guide 1.214	Response Strategies for Potential Aircraft Threats
Regulatory Guide 1.221	Design-Basis Hurricane and Hurricane Missiles for Nuclear Power Plants
Regulatory Guide 1.232	Developing Principal Design Criteria for Non-Light Water Reactors
Regulatory Guide 1.233	Guidance for a Technology-Inclusive, Risk Informed and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors
Regulatory Guide 4.21	Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning
Regulatory Guide 5.7	Entry/Exit Control for Protected Areas, Vital Areas, and Material Access Areas
Regulatory Guide 5.27	Special Nuclear Material Doorway Monitors

Table C-1. Regulatory Guides Relevant to a KP-FHR Power Reactor	
Number	Title
Regulatory Guide 5.44	Perimeter Intrusion Alarm Systems
Regulatory Guide 5.71	Cyber Security Programs for Nuclear Facilities
Regulatory Guide 8.2	Administrative Practices in Radiation Surveys and Monitoring
Regulatory Guide 8.9	Acceptable Concepts, Models, Equations and Assumptions for a Bioassay Program
Regulatory Guide 8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable.
Regulatory Guide 8.13	Instruction Concerning Prenatal Radiation Exposure
Regulatory Guide 8.15	Acceptable Programs for Respiratory Protection
Regulatory Guide 8.29	Instruction Concerning Risks from Occupational Radiation Exposure
Regulatory Guide 8.34	Monitoring Criteria and Methods to Calculate Occupational Radiation Doses

APPENDIX D: DESIGN REGULATORY REQUIREMENTS IN 10 CFR FOR A KP-FHR TEST REACTOR

The following is a summary of the Design Related Tables for a KP-FHR test reactor in this Appendix.

Table Number	Title
D-1	Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor
D-2	Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor
D-3	Design Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Test Reactor

Table D-1. Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor

D-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 20.1406	Minimization of Contamination	CP, OL
10 CFR 20.1601	Control Of Access To High Radiation Areas.	CP, OL
10 CFR 20.1602	Control Of Access To Very High Radiation Areas.	CP, OL
10 CFR 20.1701	Use Of Process Or Other Engineering Controls.	CP, OL
10 CFR 50.2	Definitions – Basic Component	CP, OL
10 CFR 50.2	Definitions. - Controls	CP, OL
10 CFR 50.2	Definitions. - Exclusion Area	CP, OL
10 CFR 50.2	Definitions. - Fuel Acceptable to the Commission	CP, OL
10 CFR 50.2	Definitions - Highly Enriched Uranium	CP, OL
10 CFR 50.2	Definitions. - Low Enriched Uranium	CP, OL
10 CFR 50.2	Definitions. - Low Population Zone	CP, OL
10 CFR 50.2	Definitions. - Nuclear reactor	CP, OL
10 CFR 50.2	Definitions. - Safe shutdown	CP, OL
10 CFR 50.2	Definitions. - Source material	CP, OL
10 CFR 50.2	Definitions. - Design Bases	CP, OL
10 CFR 50.2	Definitions. - Alternate AC Source	CP, OL
10 CFR 50.2	Definitions. - Station Blackout	CP, OL
10 CFR 50.34(a)(5)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(8)	Contents of applications; technical information.	CP
10 CFR 50.34(b)(3)	Contents of applications; technical information.	OL
10 CFR 50.34(g)	Contents of applications; technical information. [combustible gas control]	CP, OL
10 CFR 50.36(c)(1)(i)(A)	Technical specifications. Limits	OL
10 CFR 50.36(c)(1)(ii)(A)	Technical specifications. Limiting safety system settings	OL
10 CFR 50.36(c)(2)(i)	Technical specifications. LCOs	OL
10 CFR 50.36(c)(2)(ii)(B),(C),(D)	Technical specifications. LCOs	OL
10 CFR 50.36 (c)(3), (c)(4), (c)(5),	Technical specifications. LCOs	OL
10 CFR 50.36(c)(6), (c)(7), (c)(8), (d) and (e)	Technical specifications. LCOs	OL
10 CFR 50.43(e)(1-2)	Additional standards and provisions affecting class 103 licenses.	CP, OL
10 CFR 50.44(d)	Combustible gas control for nuclear power reactors.	CP, OL
10 CFR 50.55a(a)(1)(i)-(iv)	Codes and standards - ASME Rules for Construction Inservice Inspection, Operation and Maintenance of Nuclear Vessels and Components.	CP, OL

D-1. Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 50.55a(a)(2-4)	Codes and standards.	CP, OL
10 CFR 50.55a(h)(3)	Codes and standards - Conditions on Section XI Code	CP, OL
10 CFR 50.55a(z)	Codes and standards - Conditions on Section XI Code	CP, OL
10 CFR 50.64	Limitations on the Use of Highly Enriched (HEU) Uranium in domestic Non Power Reactors	CP, OL
10 CFR 50 Appendix E I	Emergency Planning and Preparedness for Production and Utilization Facilities - Introduction	CP, OL
10 CFR 50 Appendix E IV E 1-7	Emergency Planning and Preparedness for Production and Utilization Facilities - Plan Content Emergency Facilities and Equipment	OL
10 CFR 50 Appendix E IV E 9	Emergency Planning and Preparedness for Production and Utilization Facilities - Plan Content Emergency Facilities and Equipment - Communications	OL
10 CFR 50 Appendix E IV E 9a, b	Emergency Planning and Preparedness for Production and Utilization Facilities - Plan Content Emergency Facilities and Equipment - Communications	OL
10 CFR 50 Appendix E VI 1	Emergency Response Data System	CP, OL
10 CFR 50 Appendix F	Siting of Fuel Reprocessing Plants and Related Waste Management Facilities	OL
10 CFR 70.22(g)	Contents of applications	CP, OL
10 CFR 70.22(i)(1-2)	Contents of applications	CP, OL
10 CFR 70.24	Criticality accident requirements	CP, OL
10 CFR 73.67	Licensee fixed site and in-transit requirements for the physical protection	CP, OL
10 CFR 75	Safeguards on Nuclear Material	CP, OL
10 CFR 100.1	Proposed Siting per 10 CFR 50 and 52	CP, OL
10 CFR 100.10	Factors to be considered when evaluating sites	CP, OL
10 CFR 100.11	Determination of exclusion area, low population zone, and population center distance	CP, OL

Table D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50.34(a)(1)(ii)(A)-(D)	Contents of applications; technical information.	Applicable to stationary power reactors
10 CFR 50.34(a)(12 -13)	Contents of applications; technical information.	Applicable to power reactors only
10 CFR 50.34(b)(10)-(12)	Contents of applications; technical information.	Applies to power reactors
10 CFR 50.34(f)(1)(i-xii)	Contents of applications; technical information.	Applicable to LWRs
10 CFR 50.34(f)(2)(i)	Contents of applications; technical information.	Applicable to LWRs
10 CFR 50.34(f)(2)(iii)-(xxviii)	Contents of applications; technical information.	Applicable to LWRs
10 CFR 50.34(f)(3)(iv-vi)	Contents of application; technical information – technical qualifications	Applicable to LWRs
10 CFR 50.34(i)	Contents of application; technical information – Loss of Large Areas of the Plant	Applicable to power reactors only
10 CFR 50.34a	Design objectives for equipment to control releases of radioactive material in effluents - nuclear power reactors.	Applicable to power reactors
10 CFR 50.36(c)(1)(i)(B)	Technical specifications – Limits	Applicable to fuel reprocessing plants.
10 CFR 50.36(c)(1)(ii)(B)	Technical specifications – Limits	Applicable to fuel reprocessing plants.
10 CFR 50.36(c)(2)(iii)	Technical specifications – Limits	Applies to licenses prior August 18, 1995
10 CFR 50.36a	Technical specifications on effluents from nuclear power reactors.	Applicable to power reactors
10 CFR 50.44(a-c)	Combustible gas control for nuclear power reactors.	These regulations apply to currently licensed power reactors and future water-cooled and non-water-cooled power reactor designs
10 CFR 50.46	Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors.	Applicable to LWRs only
10 CFR 50.46a	Acceptance criteria for reactor coolant system venting systems.	Applicable to power reactors
10 CFR 50.47(b)(8-9)	Emergency plans.	Applicable to power reactors
10 CFR 50.47(c)(2)	Emergency plans.	Applicable to power reactors

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50.47(d)(4)	Emergency plans.	Applicable to power reactors
10 CFR 50.48(a)(4)	Fire protection. Part 52	Applicable to power reactors
10 CFR 50.48(b)	Fire protection. Appendix R	Appendix R applies to existing plants licensed before January 1, 1979
10 CFR 50.48(c)	Fire protection. NFPA	Applicable to LWRs only
10 CFR 50.49(b-g)	Environmental qualification of electric equipment important to safety for nuclear power plants.	Applicable to power reactors
10 CFR 50.49(i)	Environmental qualification of electric equipment important to safety for nuclear power plants.	For existing nuclear power reactors licensees
10 CFR 50.49(k)	Environmental qualification of electric equipment important to safety for nuclear power plants.	For existing nuclear power reactors licensees
10 CFR 50.49(l)	Environmental qualification of electric equipment important to safety for nuclear power plants.	Applicable to power reactors
10 CFR 50.54(o)	Conditions of licenses.	Applicable to water cooled reactors
10 CFR 50.54(ff)	Conditions of licenses.	Applicable to power reactors
10 CFR 50.54(hh)	Conditions of licenses.	Applicable to power reactors
10 CFR 50.55a(b-g)	Codes and standards - Conditions on Section XI Code	Applicable to power reactors
10 CFR 50.55a(h)(1)	Codes and standards - Conditions on Section XI Code	Reserved
10 CFR 50.55a(h)(2)	Codes and standards - Conditions on Section XI Code	Applicable to CPs issued prior to May 13, 1999 only
10 CFR 50.60	Acceptance criteria for fracture prevention measures for light water nuclear power reactors for normal operation.	Applicable to power reactors
10 CFR 50.61	Fracture toughness requirements for protection against pressurized thermal shock events.	Applicable to water cooled reactors
10 CFR 50.61a	Alternate fracture toughness requirements for protection against pressurized thermal shock events.	Applicable to water cooled reactors
10 CFR 50.62	Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants.	Applicable to power reactors.

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50.63	Loss of all alternating current power.	Applicable to LWRs
10 CFR 50.66	Requirements for thermal annealing of the reactor pressure vessel.	Applicable to LWRs
10 CFR 50.67	Accident source term	For existing nuclear power reactors licensees
10 CFR 50.68	Criticality accident requirements.	Applicable to power reactors only
10 CFR 50.69	Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors.	Applicable to power reactors only
10 CFR 50.71(h)(2-3)	Maintenance of records, making of reports.	Applicable to power reactors only
10 CFR 50.150(b)	Aircraft impact assessment.	Applicability limited to power reactors and Part 52 applicants.
10 CFR 50.150(c)(5)	Aircraft impact assessment.	Applicability limited to power reactors and Part 52 applicants.
10 CFR 50 Appendix A	General Design Criteria for Nuclear Power Plants	Applicable to power reactors only
10 CFR 50 Appendix E IV E 8.a-b	Emergency Planning and Preparedness - Plan Content Emergency Facilities and Equipment	Applicable to power reactors only
10 CFR 50 Appendix E IV E 8.c	Emergency Planning and Preparedness - Plan Content Emergency Facilities and Equipment	Applicable to power reactors only
10 CFR 50 Appendix E IV E 8.d	Emergency Planning and Preparedness - Plan Content Emergency Facilities and Equipment	Applicable to power reactors only
10 CFR 50 Appendix E IV E 8.e	Emergency Planning and Preparedness - Plan Content Emergency Facilities and Equipment	Applicable to power reactors only
10 CFR 50 Appendix E IV E 9.c-d	Emergency Planning and Preparedness - Plan Content Emergency Facilities and Equipment	Applicable to power reactors only

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50 Appendix E VI 2	Emergency Planning and Preparedness for Production and Utilization Facilities - ERDS	Applicable to power reactors only
10 CFR 50 Appendix E VI 2a	Emergency Planning and Preparedness for Production and Utilization Facilities - ERDS	Applicable to power reactors only
10 CFR 50 Appendix E VI 2b	Emergency Planning and Preparedness for Production and Utilization Facilities - ERDS	Applicable to power reactors only
10 CFR 50 Appendix E VI 2c	Emergency Planning and Preparedness for Production and Utilization Facilities - ERDS	Applicable to power reactors only
10 CFR 50 Appendix G	Fracture Toughness Requirements	Applicable to power reactors only
10 CFR 50 Appendix H	Reactor Vessel Material Surveillance Program Requirements	Applicable to power reactors only
10 CFR 50 Appendix I	ALARA	Applies to water cooled reactors
10 CFR 50 Appendix J	Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors	Applies to water cooled reactors
10 CFR 50 Appendix K	ECCS Evaluation Models	Applicable to LWRs
10 CFR 50 Appendix R	Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979	Applicable to power reactors only
10 CFR 50 Appendix S IV	Application to Engineering Design	Applicable to power reactors only
10 CFR 52.47(a)(1-6)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors only
10 CFR 52.47(a)(8-18)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors only
10 CFR 52.47(a)(20-28)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors only
10 CFR 52.47(b)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors only

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 52.47(c)(1-3)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors only
10 CFR 52.79(a)(1-9)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(a)(12-13)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(a)(16-20)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(a)(38)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(a)(41-43)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(a)(45-47)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(d)(2)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.79(e)(2-3)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.137(a)(1-6)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors only
10 CFR 52.137(a)(9-18)	Subpart E-Standard Design Approvals - Contents of	Applicable to power reactors only

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
	Applications; Technical Information	
10 CFR 52.137(a)(20-25)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors only
10 CFR 52.137(b)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors only
10 CFR 52.157(a-e)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.157(f)(1-9)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.157(f)(11-15)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.157(f)(18-23)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.157(f)(25)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.157(f)(27-32)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors only
10 CFR 52.158(a)	Subpart F—Manufacturing Licenses. Contents of application; additional technical information.	Applicable to power reactors only
10 CFR 52 Appendix A	Design Certification Rule for the U.S. Advanced Boiling Water Reactor	Applicable to ABWRs
10 CFR 52 Appendix B	Design Certification Rule for the System 80+ Design	Applicable to System 80+ Designs

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 52 Appendix C	Design Certification Rule for the AP600 Design	Applicable to the AP600 Design
10 CFR 52 Appendix D	Design Certification Rule for the AP1000 Design	Applicable to the AP1000 Design
10 CFR 52 Appendix E	Design Certification Rule for the ESBWR Design	Applicable to the ESBWR Design
10 CFR 70.22(h)	Contents of applications	Not applicable for Part 50 licenses
10 CFR 70.61	Performance requirements	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.63	Safety program and integrated safety analysis	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.64	Requirements for new facilities or new processes at existing facilities	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.65	Additional content of applications	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.66	Additional requirements for approval of license application	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 70.72	Facility changes and change process	This regulation applies to enriched uranium processing and fabrication facilities.
10 CFR 73.45(a-f)	Performance capabilities for fixed site physical protection systems	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(c)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(e)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(f)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.54	Protection of digital computer and communication systems and networks	Applicability limited to nuclear power plants
10 CFR 73.55	Requirements for physical protection of licensed activities in	Applicability limited to nuclear power reactor licensees

D-2. Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
	nuclear power reactors against radiological sabotage	
10 CFR 74.31	Nuclear material control and accounting for special nuclear material of low strategic significance	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.41	Nuclear material control and accounting for special nuclear material of moderate strategic significance	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.43	Internal controls, inventory, and records.	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 74.45	Measurements and measurement control.	Not applicable to nuclear reactors licensed pursuant to 10 CFR 50
10 CFR 100.20	Factors to be considered when evaluating sites	Applicable to power reactors only
10 CFR 100.21	Non-seismic site criteria	Applicable to power reactors only
10 CFR 100.23	Geologic and seismic siting criteria	Applicable to power reactors only
10 CFR 100 Appendix A	Seismic and Geologic Siting Criteria for Nuclear Power Plants	Applicable to power reactors only

Table D-3. Design Regulatory Requirements in 10 CFR That Require an Exemption for a KP-FHR Test Reactor

Citation	Topic	Rationale
10 CFR 50.2 (Definitions - Reactor Coolant Pressure Boundary)	Reactor Coolant Pressure Boundary	The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in a KP-FHR, the reactor coolant boundary does not serve this function. Fission product retention is provided by the functional containment. Therefore, the definition in 10 CFR 50.2 is not applicable and will be deleted by exemption.
10 CFR 50.2 (Definitions – Safety-related structures, systems, and components)	Reactor Coolant Pressure Boundary	The definition of safety related structures, systems, and components refers to the reactor coolant pressure boundary. However, the KP-FHR will not have a reactor coolant pressure boundary as defined in 10 CFR 50.2 therefore an exemption is required for the definition of safety related structures, systems, and components.
10 CFR 50.34(a)(4)	Analysis of SSCs and ECCS Evaluation	The first sentence of the regulation refers to the analysis and evaluation of the design and performance of SSCs, which is still applicable to the KP-FHR. However, the second sentence of the citation states that an analysis and evaluation of the ECCS cooling performance shall be provided in accordance with 10 CFR 50.46. The KP-FHR test reactor will likely have a passive Residual Heat Removal system that removes decay heat. With a low-pressure design, ECCS is not needed and 10 CFR 50.46 does not apply. Therefore, a partial exemption is required for this requirement.
10 CFR 50.34(b)(4)	Analysis of SSCs and ECCS Evaluation	The regulation states that "analysis and evaluation of ECCS cooling performance following postulated loss-of-coolant accidents shall be performed in accordance with the requirements of 50.46 for facilities for which a license to

Citation	Topic	Rationale
		operate may be issued after December 28, 1974." The term facility is generic as it does not discount non-power or testing facilities. The KP-FHR test reactor is non-pressurized and will likely have a passive RHR system to remove decay heat
10 CFR 50.34(b)(9)	Pressurized Thermal Shock	This regulation requires a description of protection against pressurized thermal shock events and reference 10 CFR 50.60 and/or 10 CFR 50.61, which are only applicable to light water reactors. The KP-FHR operates at near atmospheric conditions and therefore cannot experience pressurized thermal shock therefore KP-FHR test reactor applicants will require an exemption to this regulation.
10 CFR 50.36(c)(2)(ii)(A)	Reactor Coolant Pressure Boundary	The reactor coolant pressure boundary for an LWR provides a fission product retention barrier for the release of radionuclides. However, in the KP-FHR test reactor, the reactor coolant boundary does not serve this function. Fission product retention is provided by the functional containment. Therefore, the statement, "The integrity of the reactor coolant pressure boundary" will be modified to: "The integrity of the safety significant portions of the reactor coolant boundary"

APPENDIX E: NON-DESIGN REGULATORY REQUIREMENTS IN 10 CFR FOR KP-FHR TEST REACTOR

This appendix summarizes the applicability of regulations that are not related to the design of the KP-FHR test reactor. These categories include Administrative, Regulatory Process, Process and Program as described in Section 2.2. Exemptions for non-design requirements for the KP-FHR test reactor are included in Table D-3.

Table Number	Title
E-1	Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor
E-2	Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor

Table E-1. Non-Design Regulatory Requirements in 10 CFR That Apply to a KP-FHR Test Reactor

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 2	Agency Rules of Practice and Procedure	CP, OL
10 CFR 9	Public records	CP, OL
10 CFR 10	Criteria and procedures for determining eligibility for access to restricted data	CP, OL
10 CFR 11.1	Purpose – Special Nuclear Material Access	OL
10 CFR 11.3	Scope.	OL
10 CFR 11.5	Policy.	OL
10 CFR 11.7	Definitions.	OL
10 CFR 11.8	Information collection requirements: OMB approval.	OL
10 CFR 11.9	Specific exemptions.	OL
10 CFR 11.10	Maintenance of records.	OL
10 CFR 11.15	Application for special nuclear material access authorization.	OL
10 CFR 11.16	Cancellation of request for special nuclear material access authorization.	OL
10 CFR 11.21	Application of the criteria.	OL
10 CFR 11.30	Violations.	OL
10 CFR 11.32	Criminal penalties.	OL
10 CFR 12	Implementation of equal access	OL
10 CFR 15	Debt collection procedures	CP, OL
10 CFR 19	Notices, Instructions and Reports to Workers; Inspections and Investigations	CP, OL
10 CFR 20.1001-10 CFR 20.1009	Subpart A – General Provisions	CP, OL
10 CFR 20.1101	Subpart B - Radiation Protection Program	CP, OL
10 CFR 20.1201-10 CFR 20.1208	Subpart C - Occupational Dose Limits	CP, OL
10 CFR 20.1301(a)-(d), (f)	Subpart D - Dose Limits for Individual Members of the Public	CP, OL
10 CFR 20.1302	Subpart D – Dose Limits for Individual Members of the Public	CP, OL
10 CFR 20.1401-10 CFR 20.1405	Subpart E—Radiological Criteria for License Termination	CP, OL
10 CFR 20.1501-10 CFR 20.1502	Subpart F – Surveys and Monitoring	CP, OL
10 CFR 20.1702-10 CFR 20.1705	Subpart H – Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas	CP, OL
10 CFR 20.1801-10 CFR 20.1802	Subpart I – Storage and Control of Licensed Material	CP, OL
10 CFR 20.1901-10 CFR 20.1904	Subpart J - Precautionary Procedures	CP, OL
10 CFR 20.1905(a-f), 10 CFR 20.1906	Subpart J - Precautionary Procedures	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 20.2001- 10 CFR 20.2008	Subpart K – Waste Disposal	CP, OL
10 CFR 20.2101- 10 CFR 20.2110	Subpart L - Records	CP, OL
10 CFR 20.2201- 10 CFR 20.2207	Subpart M - Reports	CP, OL
10 CFR 20.2301- 10 CFR 20.2302	Subpart N – Exemptions and Additional Requirements	CP, OL
10 CFR 20.2401- 10 CFR 20.2402	Subpart O – Enforcement	CP, OL
10 CFR 20 Appendix A	Factors for Respirators	CP, OL
10 CFR 20 Appendix B	Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage	CP, OL
10 CFR 20 Appendix C	Requiring Labeling	CP, OL
10 CFR 20 Appendix D	Regional Offices	CP, OL
10 CFR 20 Appendix E	Source Thresholds	CP, OL
10 CFR 20 Appendix G	Transfer of Low-Level Waste for Land Disposal Facilities	CP, OL
10 CFR 21	Reporting of Defects and Noncompliance	OL, CP
10 CFR 25	Purpose	OL, CP
10 CFR 30.1 - 10 CFR 30.10	General Provisions	CP, OL
10 CFR 30.11	Specific Exemptions	CP, OL
10 CFR 30.13- 10 CFR 30.20	Exemptions	CP, OL
10 CFR 30.22	Certain Industrial Conflicts	CP, OL
10 CFR 30.31	Types of Conflicts	CP, OL
10 CFR 30.32(a)-(i)	Application for Specific Licenses	CP, OL
10 CFR 30.33	General Requirements for Issuance of Specific Licenses	CP, OL
10 CFR 30.34	Terms and Conditions of Licenses	CP, OL
10 CFR 30.35	Financial Assurance and Recordkeeping for Decommissioning	CP, OL
10 CFR 30.36	Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas	CP, OL
10 CFR 30.37	Application for Renewal of Licenses	CP, OL
10 CFR 30.38	Application for Amendment of Licenses and Registration Certificates	CP, OL
10 CFR 30.39	Commission Action on Applications to Renew or Amend	CP, OL
10 CFR 30.41	Transfer of Byproduct Material	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 30.50 – 10 CFR 30.55	Records, Inspections, Tests and Reports	CP, OL
10 CFR 30.61 – 10 CFR 30.64	Enforcement	CP, OL
10 CFR 30.70	Schedule A - Exempt concentrations.	CP, OL
10 CFR 30.71	Schedule B	CP, OL
10 CFR 30.72	Schedule C—Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release	CP, OL
10 CFR 30 Appendix A	Criteria Relating to Use of Financial Tests and Parent Company Guarantees for Providing Reasonable Assurance of Funds for Decommissioning	CP, OL
10 CFR 30 Appendix B	Quantities of Licensed Material Requiring Labeling	CP, OL
10 CFR 30 Appendix C	Appendix C to Part 30—Criteria Relating to Use of Financial Tests and Self Guarantees for Providing Reasonable Assurance of Funds for Decommissioning	CP, OL
10 CFR 30 Appendix D	Criteria Relating to Use of Financial Tests and Self-Guarantee for Providing Reasonable Assurance of Funds for Decommissioning By Commercial Companies That Have No Outstanding Rated Bonds	CP, OL
10 CFR 30 Appendix E	Criteria Relating to Use of Financial Tests and Self-Guarantee for Providing Reasonable Assurance of Funds for Decommissioning By Nonprofit Colleges, Universities, And Hospitals	CP, OL
10 CFR 31	General domestic licenses for byproduct material	OL
10 CFR 34	Licenses for industrial radiography and radiation safety requirements for industrial radiographic operations	CP, OL
10 CFR 37	Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material	OL
10 CFR 40.1	Purpose	CP, OL
10 CFR 40.2	Scope	CP, OL
10 CFR 40.3 – 10 CFR 40.10	General Provisions	CP, OL
10 CFR 40.11	Persons Using Source Material Under Certain Department of Energy and NRC Contracts	CP, OL
10 CFR 40.13	Unimportant Quantities of Source Material	CP, OL
10 CFR 40.14	Specific Exemptions	CP, OL
10 CFR 40.20	Types of licenses	CP, OL
10 CFR 40.21	General licenses to receive title to source or byproduct material	CP, OL
10 CFR 40.22	Small Quantities of Source Material	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 40.25	General license for use of certain industrial products or devices	CP, OL
10 CFR 40.31(a-g)	Application for specific licenses	CP, OL
10 CFR 40.31(i)	Decommissioning	CP, OL
10 CFR 40.31(m)	Safeguards Information	CP, OL
10 CFR 40.32	General requirements for issuance of specific licenses	CP, OL
10 CFR 40.36	Financial assurance and recordkeeping for decommissioning	CP, OL
10 CFR 40.38	Ineligibility of certain applicants	CP, OL
10 CFR 40.41 – 10 CFR 40.46	Licenses	CP, OL
10 CFR 40.51	Transfer of source or byproduct material	CP, OL
10 CFR 40.60(a-c)	Reports, Records, and Inspections	CP, OL
10 CFR 40.61	Records	CP, OL
10 CFR 40.62	Inspections	CP, OL
10 CFR 40.63	Tests	CP, OL
10 CFR 40.64(a-d)	Reports	CP, OL
10 CFR 40.67	Requirement for advance notice for importation of natural uranium	CP, OL
10 CFR 40.71	Modification and revocation of licenses	CP, OL
10 CFR 40.81	Violations	CP, OL
10 CFR 40.82	Criminal Penalties	CP, OL
10 CFR 50.1	Basis, purpose, and procedures applicable.	CP, OL
10 CFR 50.2	Definitions. -Act	CP, OL
10 CFR 50.2	Definitions. - Applicant	CP, OL
10 CFR 50.2	Definitions – Atomic Weapon	CP, OL
10 CFR 50.2	Definitions. -Byproduct Material	CP, OL
10 CFR 50.2	Definitions. - Committed Dose Equivalent	CP, OL
10 CFR 50.2	Definitions. - Committed Effective Dose	CP, OL
10 CFR 50.2	Definitions. - Common Defense and Security	CP, OL
10 CFR 50.2	Definitions. – Construction or Constructing	CP, OL
10 CFR 50.2	Definitions. - Cost of Service	CP, OL
10 CFR 50.2	Definitions. - Decommission	CP, OL
10 CFR 50.2	Definitions. - Deep Dose Equivalent	CP, OL
10 CFR 50.2	Definitions. - Defect	CP, OL
10 CFR 50.2	Definitions. -DOE	CP, OL
10 CFR 50.2	Definitions. - Deviation	CP, OL
10 CFR 50.2	Definitions. - Director	CP, OL
10 CFR 50.2	Definitions. - Discovery	CP, OL
10 CFR 50.2	Definitions. -Electric Utility	CP, OL
10 CFR 50.2	Definitions. -Evaluation	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 50.2	Definitions. - Federal Government funding for conversion & Federal Licensee	CP, OL
10 CFR 50.2	Definitions. - Government Agency	CP, OL
10 CFR 50.2	Definitions. - Historical Site Assessment	CP, OL
10 CFR 50.2	Definitions. - Impacted Areas	CP, OL
10 CFR 50.2	Definitions. -Incentive regulation	CP, OL
10 CFR 50.2	Definitions. - License & Licensee	CP, OL
10 CFR 50.2	Definitions. - Non-impacted areas	CP, OL
10 CFR 50.2	Definitions. - Non-power reactor	CP, OL
10 CFR 50.2	Definitions. - Notification	CP, OL
10 CFR 50.2	Definitions. - Person	CP, OL
10 CFR 50.2	Definitions. - Price-cap regulation	CP, OL
10 CFR 50.2	Definitions. - Procurement document	CP, OL
10 CFR 50.2	Definitions. - Produce	CP, OL
10 CFR 50.2	Definitions. - Prototype plant	CP, OL
10 CFR 50.2	Definitions. - Research and development	CP, OL
10 CFR 50.2	Definitions. - Responsible officer	CP, OL
10 CFR 50.2	Definitions. - Restricted Data	CP, OL
10 CFR 50.2	Definitions. - Special nuclear material	CP, OL
10 CFR 50.2	Definitions. - Substantial safety hazard	CP, OL
10 CFR 50.2	Definitions. - Testing facility	CP, OL
10 CFR 50.2	Definitions. - United States	CP, OL
10 CFR 50.2	Definitions. - Utilization facility	CP, OL
10 CFR 50.2	Definitions. - Certified Fuel Handler	CP, OL
10 CFR 50.2	Definitions. -Major Decommissioning Activity & Major Radioactive Components	CP, OL
10 CFR 50.2	Definitions. - Non-bypassable charges	CP, OL
10 CFR 50.2	Definitions. - Permanent cessation of operation(s)	CP, OL
10 CFR 50.2	Definitions. - Production facility	CP, OL
10 CFR 50.2	Definitions. - Unique purpose	CP, OL
10 CFR 50.3 – 10 CFR 50.9	General Provisions	CP, OL
10 CFR 50.10- 10 CFR 50.13	Requirement of License, Exemptions	CP, OL
10 CFR 50.20	Two classes of licenses.	CP, OL
10 CFR 50.21	Class 104 licenses; for medical therapy and research and development facilities.	CP, OL
10 CFR 50.23	Construction permits.	CP, OL
10 CFR 50.30	Filing of application; oath or affirmation.	CP, OL
10 CFR 50.31	Combining applications.	CP, OL
10 CFR 50.32	Elimination of repetition.	CP, OL
10 CFR 50.33	Contents of applications; general information.	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 50.34(a)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(1)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(1)(i)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(2-3)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(6-7)	Contents of applications; technical information.	CP
10 CFR 50.34(a)(9-11)	Contents of applications; technical information.	CP
10 CFR 50.34(b)(1-2)	Contents of applications; technical information.	OL
10 CFR 50.34(b)(5)	Contents of applications; technical information.	OL
10 CFR 50.34(b)(6)(i)	Contents of applications; technical information.	OL
10 CFR 50.34(b)(6)(ii)	Contents of applications; technical information. **Note:** Only the first sentence of this regulation is applicable	OL
10 CFR 50.34(b)(6)(iii-vi)	Contents of applications; technical information.	OL
10 CFR 50.34(b)(7-8)	Contents of applications; technical information.	OL
10 CFR 50.34(e)	Contents of applications; technical information.	OL
10 CFR 50.35	Issuance of construction permits.	CP
10 CFR 50.36(a)(1)	Technical specifications.	OL
10 CFR 50.36(b)	Technical specifications.	OL
10 CFR 50.36b	Environmental conditions.	CP, OL
10 CFR 50.37	Agreement limiting access to Classified Information.	CP, OL
10 CFR 50.38	Ineligibility of certain applicants.	OL, CP
10 CFR 50.39	Public inspection of applications.	CP, OL
10 CFR 50.40	Common standards.	CP, OL
10 CFR 50.41	Additional standards for class 104 licenses.	CP, OL
10 CFR 50.45	Standards for construction permits, operating licenses, and combined licenses.	CP, OL
10 CFR 50.48(a)(1-3)	Fire protection. Program - Plan	OL
10 CFR 50.48(f)	Fire Protection	OL
10 CFR 50.50	Issuance of licenses and CPs	CP, OL
10 CFR 50.51	Continuation of license	CP, OL
10 CFR 50.52	Combining licenses	CP, OL
10 CFR 50.53	Jurisdictional limitations	CP, OL
10 CFR 50.54(b-n)	Conditions of licenses.	OL
10 CFR 50.54(p-q)	Conditions of licenses.	OL
10 CFR 50.54(v)	Conditions of licenses.	OL
10 CFR 50.54(x-y)	Conditions of licenses.	OL
10 CFR 50.54((aa), (cc), (ee)	Conditions of licenses	OL
10 CFR 50.54(jj)	Conditions of licenses.	OL
10 CFR 50.55(a-e)	Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses.	CP

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 50.55(i)	Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses.	CP, OL
10 CFR 50.55a(a)(1)(v)	Codes and standards. [ASME NQA]	CP, OL
10 CFR 50.56	Conversion of construction permit to license; or amendment of license.	CP, OL
10 CFR 50.57	Issuance of operating license.	OL
10 CFR 50.58	Hearings and report of the Advisory Committee on Reactor Safeguards.	CP, OL
10 CFR 50.59	Changes, tests, and experiments.	OL
10 CFR 50.70	Inspections.	CP, OL
10 CFR 50.71(a-d)	Maintenance of records, making of reports.	CP, OL
10 CFR 50.71(g)	Maintenance of records, making of reports.	OL
10 CFR 50.74	Notification of change in operator or senior operator status.	OL
10 CFR 50.75(a)	Reporting and recordkeeping for decommissioning planning.	OL
10 CFR 50.75(d)	Reporting and recordkeeping for decommissioning planning.	OL
10 CFR 50.75(e)(1-2)	Reporting and recordkeeping for decommissioning planning.	OL
10 CFR 50.75(f-h)	Reporting and recordkeeping for decommissioning planning.	OL
10 CFR 50.78	Facility information and verification.	CP, OL
10 CFR 50.80	Transfer of licenses.	OL, CP
10 CFR 50.81	Creditor regulations.	OL, CP
10 CFR 50.82	Termination of license.	OL
10 CFR 50.90	Application for amendment of license, construction permit, or early site permit.	CP, OL
10 CFR 50.91	Notice for public comment; State consultation.	OL
10 CFR 50.92	Issuance of amendment.	CP, OL
10 CFR 50.100	Revocation, suspension, modification of licenses, permits, and approvals for cause.	OL, CP
10 CFR 50.101	Retaking possession of special nuclear material.	CP, OL
10 CFR 50.102	Commission order for operation after revocation.	OL
10 CFR 50.103	Suspension and operation in war or national emergency.	OL, CP
10 CFR 50.110	Violations.	CP, OL, LWA
10 CFR 50.111	Criminal penalties.	CP, OL, LWA
10 CFR 50 Appendix C	General Information	CP,
10 CFR 50 Appendix C I	Applicants Which Are Established Organizations	CP
10 CFR 50 Appendix C II	Applicants Which Are Newly Formed Entities	CP

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 50 Appendix C III	Annual Financial Statement	CP
10 CFR 50 Appendix C IV	Additional Information	CP
10 CFR 50 Appendix E II	The Preliminary Safety Analysis Report	CP
10 CFR 50 Appendix E III	The Final Safety Analysis Report, Site Safety Analysis Report	OL
10 CFR 50 Appendix E IV 1 (first sentence)	Content of Emergency Plans	OL
10 CFR 50 Appendix E IV A	Content of Emergency Plans: Organization	OL
10 CFR 50 Appendix E IV B	Content of Emergency Plans: Assessment Actions	OL
10 CFR 50 Appendix E IV C	Content of Emergency Plans: Activation of Emergency Organization	OL
10 CFR 50 Appendix E IV D	Content of Emergency Plans: Notification Procedures	OL
10 CFR 50 Appendix E IV F 1	Contents of Emergency Plans: Training	OL
10 CFR 50 Appendix E IV F 2 a-c, e-h	Contents of Emergency Plans – Exercises	OL
10 CFR 50 Appendix E IV G-H	Contents of Emergency Plants: Maintaining Emergency Preparedness, Recovery	OL
10 CFR 50 Appendix E V	Implementing Procedures	CP, OL
10 CFR 50 Appendix E VI 3-4	Emergency Response Data System	CP, OL
10 CFR 50 Appendix Q	Pre-Application Early Review of Site Suitability Issues	CP, OL
10 CFR 51.1	Scope	CP, OL
10 CFR 51.2	Subparts	CP, OL
10 CFR 51.3	Resolution of Conflict	CP, OL
10 CFR 51.4	Definitions	CP, OL
10 CFR 51.5	Interpretations	CP, OL
10 CFR 51.6	Specific Exemptions	CP, OL
10 CFR 51.10	Purpose and Scope of Subpart; Application of Regulations of Council on Environmental Quality	CP, OL
10 CFR 51.12	Application of Subpart to Ongoing Environmental Work	CP, OL
10 CFR 51.13	Emergencies	CP, OL
10 CFR 51.14	Definitions	CP, OL
10 CFR 51.15	Time Schedules	CP, OL
10 CFR 51.16	Proprietary Information	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 51.17	Information Collection Requirements; OMB Approval	CP, OL
10 CFR 51.20	Criteria for and Identification of Licensing and Regulatory Actions Requiring Environmental Impact Statements	CP, OL
10 CFR 51.21	Criteria for and identification of licensing and regulatory actions requiring environmental assessments	CP, OL
10 CFR 51.22	Criterion for categorical exclusion	CP, OL
10 CFR 51.25	Determination to prepare environmental impact statement	CP, OL
10 CFR 51.26	Requirement to publish notice of intent and conduct scoping process	CP, OL
10 CFR 51.27	Notice of Intent	CP, OL
10 CFR 51.28	Scoping - Participants	CP, OL
10 CFR 51.29	Scoping - Environmental Impact Statement	CP, OL
10 CFR 51.30	Environmental Assessment	CP, OL
10 CFR 51.32	Finding of No Significant Impact	CP, OL
10 CFR 51.33	Draft Finding of No Significant Impact	CP, OL
10 CFR 51.34	Preparation of Finding of No Significant Impact	CP, OL
10 CFR 51.35	Requirement to publish Finding of No Significant Impact	CP, OL
10 CFR 51.40	Consultation with NRC Staff	CP, OL
10 CFR 51.41	Requirement to Submit Environmental Information	CP, OL
10 CFR 51.45	Environmental Reports	CP, OL
10 CFR 51.49	Environmental Reports	CP
10 CFR 51.50	Environmental Reports	CP
10 CFR 51.53	Environmental Reports	OL
10 CFR 51.58	Environmental Report - Number of Copies; Distribution	CP, OL
10 CFR 51.68	Environmental and Environmental Reports	CP, OL
10 CFR 51.70	Draft Environmental - Impact Statement—General	CP, OL
10 CFR 51.71	Draft Environmental - Impact Statement—Contents	CP, OL
10 CFR 51.72	Supplement To Draft Environmental Impact Statement	CP, OL
10 CFR 51.73	Request for comments on draft environmental impact statement.	CP, OL
10 CFR 51.74	Distribution of draft environmental impact statement and supplement	CP, OL
10 CFR 51.75	Draft Environmental - Impact Statement Construction Permit, Early Site Permit, Or Combined License	CP
10 CFR 51.76	Draft Environmental Impact Statement—Limited Work Authorization	CP
10 CFR 51.77	Distribution of Draft Environmental Impact Statement	OL, CP
10 CFR 51.90 – 10 CFR 51.94	Final Environmental Impact Statements – General Requirements	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 51.95	Final Environmental Impact Statements – Production and Utilization Facilities	CP, OL
10 CFR 51.100	Timing on Commission Action	CP, OL
10 CFR 51.101	Limitations and Environmental Reports	CP, OL
10 CFR 51.102	Requirement to provided Record of Decision	CP, OL
10 CFR 51.103	Record Of - Decision—General	CP, OL
10 CFR 51.104	Proceeding Using Public Hearings	CP, OL
10 CFR 51.105	Public Hearings in Proceedings for issuance of Construction Permits or Early Site Permits	CP, OL
10 CFR 51.106	Public hearings in proceedings for issuance of operating licenses	CP, OL
10 CFR 51.116	Notice of Intent	CP, OL
10 CFR 51.117	Draft Environmental Impact Statement—Notice of Availability	CP, OL
10 CFR 51.118	Final Environmental Impact Statement—Notice of Availability	CP, OL
10 CFR 51.119	Publication of finding of no significant impact; distribution	CP, OL
10 CFR 51.120	Availability of environmental documents for public inspection	CP, OL
10 CFR 51.121	Status of NEPA actions	CP, OL
10 CFR 51.122	List of Interested Organizations and Groups	CP, OL
10 CFR 51.123	Charges for environmental documents; distribution to public; distribution to governmental agencies	CP, OL
10 CFR 51.124	Commission Duty to Comment	CP, OL
10 CFR 51.125	Responsible Official	CP, OL
10 CFR 51 Appendix A	Appendix A to Subpart A—Format for Presentation of Material in Environmental Impact Statements	CP, OL
10 CFR 55	Purpose - Operators' Licenses	OL
10 CFR 70.1- 10 CFR 70.10	Subpart A – General Provisions – Domestic Licensing of Special Nuclear Material	CP, OL
10 CFR 70.17	Subpart B - Exemptions	CP, OL
10 CFR 70.18- 10 CFR 70.20	Subpart C – General Licenses	CP, OL
10 CFR 70.20a	General license to possess special nuclear material for transport	CP, OL
10 CFR 70.20b	General Licenses - for carriers of transient shipments of formula quantities of strategic special nuclear material	CP, OL
10 CFR 70.21	Subpart D – License Applications - Filing	CP, OL
10 CFR 70.22(a-e)	Subpart D – License Applications - Contents of applications	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 70.22(i)(3), (4)	Subpart D – License Applications - Contents of applications	CP, OL
10 CFR 70.22(k-l)	Subpart D – License Applications - Contents of applications	CP, OL
10 CFR 70.23	Subpart D – License Applications - Requirements for the approval of applications	CP, OL
10 CFR 70.25	Financial Assurance and Recordkeeping for Decommissioning	CP, OL
10 CFR 70.31- 10 CFR 70.40	Subpart E - Licenses	CP, OL
10 CFR 70.41- 10 CFR 70.44	Subpart F – Acquisition, Use and Transfer of Special Nuclear Material, Creditors' Rights	CP, OL
10 CFR 70.50	Reporting Requirements	CP, OL
10 CFR 70.51- 10 CFR 70.56	Subpart G – Special Nuclear Material Control, Records, Reports and Inspections	OL
10 CFR 70.81- 10 CFR 70.82	Subpart I – Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material.	CP, OL
10 CFR 70.91- 10 CFR 70.92	Subpart J - Enforcement	CP, OL
10 CFR 70 Appendix A	Reportable Safety Events	CP, OL
10 CFR 71	Packaging and transportation of radioactive material	CP, OL
10 CFR 73.1	Purpose and scope	CP, OL
10 CFR 73.2	Definitions	CP, OL
10 CFR 73.3	Interpretations	CP, OL
10 CFR 73.4	Communications	CP, OL
10 CFR 73.5	Specific exemptions	CP, OL
10 CFR 73.6	Exemptions for certain quantities and kinds of special nuclear material	CP, OL
10 CFR 73.8	Information collection requirements: OMB approval	CP, OL
10 CFR 73.21	Protection of Safeguards Information: Performance Requirements	CP, OL
10 CFR 73.23	Protection of Safeguards Information—Modified Handling: Specific Requirements	CP, OL
10 CFR 73.24	Prohibitions	CP, OL
10 CFR 73.28	Security background checks for secure transfer of nuclear materials	CP, OL
10 CFR 73.35	Requirements for physical protection of irradiated reactor fuel (100 grams or less) in transit	CP, OL
10 CFR 73.37	Requirements for physical protection of irradiated reactor fuel in transit	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 73.38	Personnel access authorization requirements for irradiated reactor fuel in transit	CP, OL
10 CFR 73.40	Physical protection: General requirements at fixed sites	CP, OL
10 CFR 73.57	Requirements for criminal history records checks of individuals granted unescorted access to a nuclear power facility, a non-power reactor, or access to Safeguards Information	CP, OL
10 CFR 73.59	Relief from fingerprinting, identification and criminal history records checks	CP, OL
10 CFR 73.61	Relief from fingerprinting and criminal history records check for designated categories	OL
10 CFR 73.70	Records	CP, OL
10 CFR 73.71	Reporting of safeguards events	CP, OL
10 CFR 73.72	Requirement for advance notice of shipment of formula quantities of strategic special nuclear material	CP, OL
10 CFR 73.73	Requirement of advanced notifications of LEU shipments	CP, OL
10 CFR 73.74	Requirement for advance notice and protection of import shipments	OL, CP
10 CFR 73.75	Posting	CP, OL
10 CFR 73.80	Violations	CP, OL
10 CFR 73.81	Criminal penalties	CP, OL
10 CFR 73 Appendix A	U.S. Nuclear Regulatory Commission Offices and Classified Mailing Addresses	CP, OL
10 CFR 73 Appendix B	General Criteria for Security Personnel	CP, OL
10 CFR 73 Appendix C	Licensee Safeguards Contingency Plans	CP, OL
10 CFR 73 Appendix D	Physical Protection of Irradiated Reactor Fuel in Transit, Training Program Subject Schedule	CP, OL
10 CFR 73 Appendix E	Levels of Physical Protection To Be Applied in International Transport of Nuclear Material	CP, OL
10 CFR 73 Appendix F	Nations That Are Parties to the Convention	CP, OL
10 CFR 73 Appendix G	Reportable Safeguards Events	CP, OL
10 CFR 73 Appendix H	Weapons Qualification Criteria	CP, OL
10 CFR 74.1	Material Control and Accounting of Special Nuclear Material - Purpose	CP, OL
10 CFR 74.2	Material Control and Accounting of Special Nuclear Material - Scope	CP, OL
10 CFR 74.4	Definitions	CP, OL
10 CFR 74.5	Interpretations	CP, OL
10 CFR 74.6	Communications	CP, OL
10 CFR 74.7	Specific Exemptions	CP, OL
10 CFR 74.8	Information Collection Requirements: OMB Approval	CP, OL

Table E-1. Non-Design Regulatory Requirement in 10 CFR That Apply to a KP-FHR Test Reactor		
Citation	Topic	Application Type
10 CFR 74.11	Reports of Loss or Theft or Attempted Theft or Unauthorized Production of SNM	CP, OL
10 CFR 74.13	Material Status Reports	CP, OL
10 CFR 74.15	Nuclear Material Transaction Report	CP, OL
10 CFR 74.17	SNM Physical Inventory Summary Report	CP, OL
10 CFR 74.19	Recordkeeping	CP, OL
10 CFR 74.81 – 10 CFR 74.84	Subpart F - Enforcement	CP, OL
10 CFR 95	Facility security clearance and safeguarding of national security information and restricted data	CP, OL
10 CFR 100.2	Scope – Proposed Siting per 10 CFR 50 and 52	CP, OL
10 CFR 100.3	Definitions	CP, OL
10 CFR 100.4	Communications	CP, OL
10 CFR 100.8	Information collection requirements: OMB approval	CP, OL
10 CFR 110	Export and import of nuclear equipment and material	OL
10 CFR 140	Purpose – Financial Protection	CP, OL
10 CFR 170	Purpose – Annual Fees for licensing	CP, OL
10 CFR 171.1	Purpose – Annual Fees charged to license holders	OL

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 1	Organization and general information	General information about the NRC
10 CFR 4	Non-discrimination in federally assisted programs	Applies to NRC
10 CFR 5	Non-discrimination in education programs	Applicable to academic institutions
10 CFR 7	Advisory Committees	Applies to NRC
10 CFR 8	Reserved	Reserved
10 CFR 11.11	General requirements.	The rule states an exception for non-power reactor facilities.
10 CFR 11.13	Special requirements for transportation.	§11.13 applies to licensees subject to §§73.20, 73.25, 73.26, 73.27. Non-power reactors are not subject to these.
10 CFR 13	Fraud civil penalties	Applicable to civil penalties
10 CFR 14	Administrative claims under federal tort act	Applies to NRC
10 CFR 16	Salary offset procedures for collecting debt	Applies to NRC
10 CFR 20.1301(e)	Dose limits for individual members of the public	40 CFR 190 applies to power reactors
10 CFR 20.1905(g)	Precautionary Procedures	Not applicable to non-power reactors
10 CFR 20 Appendix F	Reserved	Reserved
10 CFR 26	Fitness for Duty Program - Scope	Applies to power reactors
10 CFR 30.12	Persons Using Byproduct Material Under Certain Department of Energy and Nuclear Regulatory Commission Contracts	Applies to work done under DOE and NRC contracts
10 CFR 30.21	Radioactive Drug: Capsules Containing Carbon-14 Urea For "In Vivo" Diagnostic Use for Humans	Requirement not applicable to research and test reactors.
10 CFR 30.32(j)	Application for Specific License	Requirements not applicable to reactors.
10 CFR 32	Specific domestic licenses to manufacture or transfer items containing byproduct material	Requirements not applicable to reactors.
10 CFR 33	Specific domestic licenses of broad scope for byproduct material	Requirements not applicable to reactors.
10 CFR 35	Medical use of byproduct material	Requirements applicable to medical uses only.
10 CFR 36	License and radiation safety requirements for irradiators	Requirements applicable to irradiators only

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 39	Licenses and radiation safety for well logging.	Not part of a KP-FHR Test Reactor
10 CFR 40.2a	Coverage of Inactive Tailings Sites	Not part of a KP-FHR Test Reactor
10 CFR 40.12	Carriers	Applicable to carriers and the US Postal Service.
10 CFR 40.23	General License for Carriers of Transient Shipments of Natural Uranium other than in the Form of Ore or Ore Residue	Not applicable to non-power reactors
10 CFR 40.26	General license for possession and storage of byproduct material as defined in this part	Regulation no longer in effect
10 CFR 40.27	General license for custody and long-term care of residual radioactive material disposal sites	Not applicable to non-power reactors
10 CFR 40.28	General license for custody and long-term care of uranium or thorium byproduct materials disposal sites	Not applicable to non-power reactors
10 CFR 40.31(h,j-l)	Application for Specific Licenses	Not applicable to non-power reactors
10 CFR 40.33	Issuance of a license for a uranium enrichment facility	Applicable only to enrichment facilities
10 CFR 40.34	Special requirements for issuance of specific licenses	Applicable to the manufacture of industrial products only.
10 CFR 40.35	Conditions of specific licenses issued pursuant to § 40.34	Applicable to the manufacture of industrial products only.
10 CFR 40.52	Certain items containing source material; requirements for license to apply or initially transfer	Applicable to the manufacture of industrial products only.
10 CFR 40.53	Conditions for licenses issued for initial transfer of certain items containing source material: Quality control, labeling, and records and reports	Applicable to the manufacture of industrial products only.
10 CFR 40.54	Requirements for license to initially transfer source material for use under the 'small quantities of source material' general license	Referenced requirements are not applicable.
10 CFR 40.55	Conditions of licenses to initially transfer source material	Referenced requirement is not applicable.
10 CFR 40.56	Restrictions on the use of Australian-obligated source material	Applicable to military applications of source material
10 CFR 40.65	Effluent Monitoring Reporting Requirements	Applicable to uranium enrichment facilities

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 40.66	Requirements for advance notice of export shipments of natural uranium	Applicable to the export of uranium ore
10 CFR 40 Appendix A	Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content	Applicable to the operation of uranium mills.
10 CFR 50.22	Class 103 licenses; for commercial and industrial facilities	Power reactors only
10 CFR 50.34(a)(1)(ii)(E)	Contents of applications; technical information.	Applies to stationary power reactors
10 CFR 50.34(b)(6)(vii)	Contents of applications; technical information: Applicant's Organization and QA Program	Applies to nuclear power reactors
10 CFR 50.34(c)(1-3)	Contents of applications; technical information: Physical Security Plan	Referenced regulations in Part 73 does not apply.
10 CFR 50.34(d)	Contents of applications; technical information: Safeguards Contingency Plan	Referenced regulations in Part 73 do not apply
10 CFR 50.34(f)(1)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(f)(2)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(f)(2)(ii)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(f)(3)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(f)(3)(i-iii)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(f)(3)(vii)	Contents of applications; technical information: Additional TMI Requirements	Applicable to LWRs per the first paragraph of 10 CFR 50.34 (f)
10 CFR 50.34(h)	Contents of applications; technical information: Conformance with SRP	Applicable to LWR designs
10 CFR 50.36(a)(2)	Technical specifications.	Applicable to Part 52 applicants

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50.42	Additional standards for class 103 licenses	Commercial licenses only.
10 CFR 50.43	Additional standards for class 103 licenses	Commercial licenses only.
10 CFR 50.47(a)(1-2)	Emergency plans.	Applicable to power reactors.
10 CFR 50.47(b)(1-7)	Emergency plans.	Applicable to power reactors.
10 CFR 50.47(b)(10-16)	Emergency plans.	Applicable to power reactors.
10 CFR 50.47(c)(1)	Emergency plans.	Applicable to power reactors.
10 CFR 50.47 (d)	Emergency plans.	Applicable to power reactors.
10 CFR 50.47(e)	Emergency plans.	Applicable to power reactors.
10 CFR 50.49(a)	Environmental qualification of electrical equipment important to safety for nuclear power plants	Applicable to power reactors.
10 CFR 50.49(h)	Environmental qualification of electric equipment important to safety for nuclear power plants.	For existing licenses
10 CFR 50.49(j)	Environmental qualification of electric equipment important to safety for nuclear power plants.	Applicable to nuclear power reactors.
10 CFR 50.54(a)	Conditions of Licenses – Environmental	Applicable to nuclear power reactors.
10 CFR 50.54(s-t)	Conditions of licenses.	Applicable to nuclear power reactors.
10 CFR 50.54(w)	Conditions of licenses.	Applicable to nuclear power reactors.
10 CFR 50.54(z)	Conditions of licenses.	Applicable to nuclear power reactors.
10 CFR 50.54(dd)	Conditions of licenses.	Applicable to nuclear power reactors.
10 CFR 50.54(gg)	Conditions of licenses.	Applicable to nuclear power reactors.
10 CFR 50.55(f-h)	Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses.	Applicable to nuclear power reactors.
10 CFR 50.65	Requirements for monitoring the effectiveness of maintenance at nuclear power plants.	Applicable to power reactors
10 CFR 50.71(e-f)	Maintenance of records, making of reports.	Applicable to power reactors
10 CFR 50.71(h)(1)	Maintenance of records, making of reports	Applicable to power reactors
10 CFR 50.72	Immediate notification Requirements for operating power reactors	Applicable to power reactors
10 CFR 50.73	Licensee event report system.	Applicable to power reactors

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50.75(b)	Reporting and recordkeeping for decommissioning planning.	Applicability statement specifies power reactors and Part 52 applicants subject to Subpart C.
10 CFR 50.75(c)	Reporting and recordkeeping for decommissioning planning.	Specific to PWRs and BWRs
10 CFR 50.76	Licensee's change of status; financial qualifications.	Applicable to power reactors
10 CFR 50.83	Release of part of a power reactor facility or site for unrestricted use	Applicable to power reactors
10 CFR 50.109	Backfitting	Does not apply to test reactors via longstanding Commission policy.
10 CFR 50.120	Training and qualification of nuclear power plant personnel.	Applicability limited to power reactors and Part 52 applicants.
10 CFR 50.150(a)	Aircraft impact assessment.	Applicability limited to power reactors and Part 52 applicants.
10 CFR 50.150(c)(1-4)	Aircraft impact assessment.	Applicability limited to power reactors and Part 52 applicants.
10 CFR 50.155	Mitigation of beyond-design basis events	Applicability limited to power reactor applicants.
10 CFR 50 Appendix B	Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants	Applicable to power reactors
10 CFR 50 Appendix E IV 1	Content of Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 2	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 3	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 4	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 5	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 6	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV 7	Emergency Plans	Applicable to power reactors
10 CFR 50 Appendix E IV F 2 d, i, j	Training	Applicable to power reactors
10 CFR 50 Appendix E IV I	Onsite Protective Actions During Hostile Action	Applicable to power reactors

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 50 Appendix E VI 2	Emergency Response Data System	Applicable to power reactors
10 CFR 50 Appendix N	Standardization of Nuclear Power Plant Designs: Permits to Construct and Licenses to Operate Nuclear Power Reactors of Identical Design at Multiple Sites	Applicable to power reactors
10 CFR 50 Appendix S - thru III.	Earthquake Engineering Criteria for Nuclear Power Plants - General Information, Introduction, Scope, Definitions	Applicable to power reactors
10 CFR 51.11	Relationship to other Subparts	Reserved
10 CFR 51.23	Environmental impacts of continued storage of spent nuclear fuel	Does not apply per 79 FR 56243
10 CFR 51.31	Determination Based on Environmental Assessment	Applicable to a standard design certificate submittal and manufacturing license only
10 CFR 51.51	Uranium fuel cycle environmental data—Table S-3	Light water-cooled power reactors only
10 CFR 51.52	Environmental effects of transportation of fuel and waste—Table S-4	Light water-cooled power reactors only
10 CFR 51.54	Environmental Report - Manufacturing License	Applicable for a manufacturing license only
10 CFR 51.55	Environmental Report - Standard Design Certification	Applicable to a standard design certificate submittal
10 CFR 51.60	Environmental Report – Materials Licenses	Not applicable to the materials licenses associated with a test reactor
10 CFR 51.61	Environmental Report – ISFSI or Monitored Retrievable Storage Installation License	Applicable to materials licenses only
10 CFR 51.62	Environmental Report - Land Disposal of Radioactive Waste Licensed Under 10 CFR Part 61	Applicable to a geological repository
10 CFR 51.66	Environmental Report - Number of Copies; Distribution	Not applicable to the materials licenses associated with a test reactor.
10 CFR 51.67	Environmental information concerning geologic repositories	Applicable to a geological repository
10 CFR 51.80 - 10 CFR 51.81	Draft Environmental Impact Statements – Material Licenses	Activities are not associated with a test reactor license

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 51.85 - 10 CFR 51.86	Draft Environmental Impact Statements – Rulemaking	Activities are not associated with a test reactor license
10 CFR 51.88	Draft Environmental Impact Statements – Proposals for Legislation	Activities are not associated with a test reactor license
10 CFR 51.97	Final Environmental Impact Statements – Materials Licenses	This regulation is applicable to ISFSI, Monitored Retrievable Storage, and Uranium Enrichment Facilities only.
10 CFR 51.99	Reserved	Reserved
10 CFR 51.105a	Public Hearings in Proceedings for Issuance of Manufacturing Licenses	Applicable to a manufacturing license submittal only.
10 CFR 51.107	Public hearings in proceedings for issuance of combined licenses; limited work authorizations	Not applicable to test reactor
10 CFR 51.108	Public hearings on Commission findings that inspections, tests, analyses, and acceptance criteria of combined licenses are met	Not applicable to test reactor
10 CFR 51.109	Public hearings in proceedings for issuance of materials license with respect to a geologic repository	Applicable to a geological repository
10 CFR 51.110	Reserved	Reserved
10 CFR 51 Appendix B	Appendix B to Subpart A— Environmental Effect of Renewing the Operating License of a Nuclear Power Plant	Applicable to power reactors
10 CFR 52.0 – 10 CFR 52.11	General Provisions: Licenses, Certifications, and Approvals for Nuclear Power Plants	Per 10 CFR 52.0 Scope; applicability of 10 CFR Chapter 1 provisions section (a) the part pertains to nuclear power facilities licensed under Section 103 of the AEA.
10 CFR 52.12- 10 CFR 52.39	Subpart A – Early Sight Permits	Applicable to power reactors
10 CFR 52.41- 10 CFR 52.46	Subpart B--Standard Design Certifications.	Applicable to power reactors
10 CFR 52.47 1st paragraph	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors
10 CFR 52.47(a)(7)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 52.47(a)(19)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors
10 CFR 52.47(d)	Subpart B--Standard Design Certifications. Contents of applications; technical information.	Applicable to power reactors
10 CFR 52.48-10 CFR 52.63	Subpart B--Standard Design Certifications.	Applicable to power reactors
10 CFR 52.71-10 CFR 52.77	Subpart C--Combined Licenses.	Applicable to power reactors
10 CFR 52.79 (a) first paragraph	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(10-11)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(14-15)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(21-23)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(24-37)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(39-40)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(a)(44)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(b)(1-5)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(c)(1-2)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(d)(1)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 52.79(d)(3)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(e)(1)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.79(f)	Subpart C-Combined Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.80 – 10 CFR 52.110	Subpart C-Combined Licenses.	Applicable to power reactors
10 CFR 52.131-10 CFR 52.136	Subpart E-Standard Design Approvals	Applicable to power reactors
10 CFR 52.137(a)(7)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors
10 CFR 52.137(a)(8)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors
10 CFR 52.137(a)(19)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors
10 CFR 52.137(a)(26)	Subpart E-Standard Design Approvals - Contents of Applications; Technical Information	Applicable to power reactors
10 CFR 52.139-10 CFR 52.147	Subpart E-Standard Design Approvals	Applicable to power reactors
10 CFR 52.151-10 CFR 52.156	Subpart F—Manufacturing Licenses	Applicable to power reactors
10 CFR 52.157 (first paragraph)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.157(f)(16)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.157(f)(17)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 52.157(f)(26)	Subpart F—Manufacturing Licenses. Contents of applications; technical information in final safety analysis report.	Applicable to power reactors
10 CFR 52.158(b)	Subpart F—Manufacturing Licenses. Contents of application; additional technical information.	Applicable to power reactors
10 CFR 52.159-10 CFR 52.181	Subpart F—Manufacturing Licenses.	Applicable to power reactors
10 CFR 52.301-10 CFR 52.303	Subpart H--Enforcement	Applicable to power reactors
10 CFR 54	Requirements for renewal of OLs for nuclear power plants	Applicable to nuclear power plants
10 CFR 60	Disposal of high-level wastes in geological repositories	Pertains to geologic repositories -e.g., Yucca Mountain
10 CFR 61	Licensing requirements for land disposal of radioactive waste	Not expected to be a Kairos Power activity as it pertains to land disposal of radioactive waste
10 CFR 62	Criteria for emergency access to non-federal and regional low-level waste disposal facilities	Not expected to be applicable to the KP-FHR test reactor
10 CFR 63	Disposal of high-level waste at Yucca Mountain	Project suspended
10 CFR 70.11	Persons using special nuclear material under certain Department of Energy and Nuclear Regulatory Commission contracts	Applicable to DOE and NRC contractors only
10 CFR 70.12	Carriers	Applicable to carriers only
10 CFR 70.13	Department of Defense	States this part does not apply to the Department of Defense
10 CFR 70.14	Foreign military aircraft	States this part does not apply to foreign military aircraft
10 CFR 70.22(f)	Contents of applications	Applicable to plutonium processing in a fuel fabrication plant.
10 CFR 70.22(j)	Contents of applications	The KP-FHR will not use highly enriched uranium.
10 CFR 70.22(m-n)	Contents of applications	Applicable to uranium enrichment facilities only
10 CFR 70.23a	Hearing required for uranium enrichment facility	Applicable to uranium enrichment facilities only
10 CFR 70.59	Effluent monitoring reporting requirements	The KP-FHR test reactor will not use SNM for processing, fuel fabrication,

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
		scrap recovery, conversion of uranium hexafluoride, or uranium enrichment.
10 CFR 70.60 – 70.76	Subpart H - Additional Requirements for Certain Licensees Authorized To Possess a Critical Mass of Special Nuclear Material	Applies to enrichment facilities and fabrication facilities.
10 CFR 70.73	Renewal of licenses	Exempted per 10 CFR 70.60
10 CFR 70.74	Additional reporting requirements	Exempted per 10 CFR 70.60
10 CFR 70.76	Backfitting	Exempted per 10 CFR 70.60
10 CFR 72	Licensing requirements for independent storage of spent nuclear fuel and high-level waste	Applicable to power reactors
10 CFR 73.20	General performance objective and requirements	Does not apply per 10 CFR 73.6
10 CFR 73.22	Protection of Safeguards Information: Specific Requirements	Applicable to power reactors
10 CFR 73.25	Performance capabilities for physical protection of strategic special nuclear material in transit	Does not apply per 10 CFR 73.6
10 CFR 73.26	Transportation physical protection systems, subsystems, components, and procedures	Does not apply per 10 CFR 73.6
10 CFR 73.27	Notification requirements	Exemption statement in 10 CFR 73.6
10 CFR 73.45(g)	Performance capabilities for fixed site physical protection systems	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(a-b)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(d)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.46(g-i)	Fixed site physical protection systems, subsystems, components, and procedures	Non-power reactors are exempted from this requirement in 10 CFR 73.6
10 CFR 73.50	Requirements for physical protection of licensed activities	The KP-FHR test reactor will be licensed under 10 CFR 50.
10 CFR 73.51	Requirements for the physical protection of stored spent nuclear fuel and high-level radioactive waste	Applies only if Part 72 applies, which it does not.

Table E-2. Non-Design Regulatory Requirements in 10 CFR That Do Not Apply to a KP-FHR Test Reactor		
Citation	Topic	Rationale
10 CFR 73.56	Personnel access authorization requirements for nuclear power plants	Applicability limited to "nuclear power reactor" licensees
10 CFR 73.58	Safety/security interface requirements for nuclear power reactors	Applicability limited to "nuclear power reactor" licensees
10 CFR 73.60	Additional requirements for physical protection at nonpower reactors	The KP-FHR test reactor does not use HEU
10 CFR 73.77	Cyber security event notifications	Applies to licensees subject to 73.54. The KP-FHR test reactor will not be subject to 73.54 because 73.54 applies to power reactor licensees.
10 CFR 74.33	Nuclear Material and Accounting	Applies to Uranium Enrichment Facilities
10 CFR 74.51 – 10 CFR 74.59	Subpart E – Formula Quantities of Strategic SNM	The KP-FHR test reactor does not contain SNM of high strategic significance
10 CFR 76	Certification for gaseous diffusion plants	Applicable to enrichment facilities only.
10 CFR 81	Standard specifications for the granting of patent licenses	Applies to NRC
10 CFR 150	Agreement State rules	The KP-FHR test reactor will have more than a critical mass of special nuclear material and byproduct material on site.
10 CFR 160	Trespassing on commission property	Applies to trespassing at NRC facilities.
10 CFR 172- 10 CFR 199	Reserved	Reserved

APPENDIX F: REGULATORY GUIDES RELEVANT TO A KP-FHR TEST REACTOR

The following Table F-1 summaries the Regulatory Guides that may be relevant to the design and licensing of a KP-FHR test reactor.

Table F-1. Regulatory Guides Relevant to a KP-FHR Test Reactor

Table F-1. Regulatory Guides Relevant to a KP-FHR Test Reactor	
Number	Title
Regulatory Guide 1.232	Developing Principal Design Criteria for Non-Light Water Reactors
Regulatory Guide 2.2	Development of Technical Specifications for Experiments in Research Reactors
Regulatory Guide 2.5	Quality Assurance Program Requirements for Research and Test Reactors
Regulatory Guide 2.6	Emergency Planning for Research and Test Reactors
Regulatory Guide 4.20	Constraints on Releases of Airborne Radioactive Materials to the Environment for Licensees other than Power Reactors
Regulatory Guide 5.71	Cyber Security Programs for Nuclear Facilities
Regulatory Guide 8.2	Administrative Practices in Radiation Surveys and Monitoring
Regulatory Guide 8.9	Acceptable Concepts, Models, Equations and Assumptions for a Bioassay Program
Regulatory Guide 8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Is Reasonably Achievable.
Regulatory Guide 8.13	Instruction Concerning Prenatal Radiation Exposure
Regulatory Guide 8.15	Acceptable Programs for Respiratory Protection
Regulatory Guide 8.29	Instruction Concerning Risks from Occupational Radiation Exposure
Regulatory Guide 8.34	Monitoring Criteria and Methods to Calculate Occupational Radiation Doses