UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY

THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING KAIROS POWER LLC TOPICAL REPORT

KP-TR-007-NP, "QUALITY ASSURANCE PROGRAM FOR THE KAIROS POWER FLUORIDE SALT-COOLED HIGH TEMPERATURE REACTOR," REVISION 3

FOR A STANDARD DESIGN APPROVAL, A DESIGN CERTIFICATION, AN EARLY SITE PERMIT, A LIMITED WORK AUTHORIZATION, A CONSTRUCTION PERMIT AN OPERATING LICENSE, AND/OR A COMBINED LICENSE FOR THE KAIROS POWER FLUORIDE SALT-COOLED HIGH TEMPERATURE REACTOR

EPID NO. L-2020-TOP-0030

1.0 INTRODUCTION

By letter dated May 15, 2020 (Reference 1), Kairos Power LLC (Kairos) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review KP-TR-007-NP Topical Report (TR) "Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor." This TR addresses power-reactor quality assurance requirements to support license applications for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor (KP-FHR). The Kairos Quality Assurance Program description (QAPD) was submitted in accordance with the guidance of NUREG-0800, "Standard Review Plan [SRP] for the Review ofSafety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicant," Revision 1, dated August 2015 (Reference 2). As part of its review the NRC staff sent 3 sets of preliminary clarification questions to Kairos on September 18, 2020, October 29, 2020, and January 15, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML20273A292, ML20311A231, and ML21025A053, respectively). By letter dated March 8, 2021 (Reference 3), Kairos provided Revision 1 of TR KP-TR-007-NP (Reference 4), which contains changes as a result of the NRC staff's preliminary clarification questions, which were discussed in public meetings held on October 7, 2020; November 19, 2020; and February 5, 2021 (ADAMS Accession Nos. ML21130A627, ML21073A003, and ML21292A273 respectively). In response to clarifications requested by the NRC staff during teleconferences held with Kairos on April 6, 2021 and April 21, 2021, Kairos submitted Revision 2 (Reference 5) and Revision 3 (Reference 6) of KP-TR-007-NP by letters dated April 15, 2021 (Reference 7), and April 26, 2021, respectively (Reference 8). An additional clarification question was sent to

Kairos on July 7, 2021 (ADAMS Accession No. ML21189A308) and discussed in a public meeting held on July 14, 2021 (ADAMS Accession No. ML21306A342).

Kairos' QAPD TR, KP-TR-007-NP, addresses design, construction, and operations phase activities, including those in support of a Standard Design Approval (SDA), a Design Certification (DC), an Early Site Permit (ESP), a Limited Work Authorization (LWA), a Construction Permit (CP), an Operating License (OL), and/or a Combined License (COL) for the KP-FHR. The QAPD is based on the applicable portions of both Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and the American Society of Mechanical Engineers (ASME) NQA 1-2015, "Quality Assurance Program Requirements for Nuclear Facility Applications," (Reference 9), as endorsed by NRC Regulatory Guide (RG) 1.28, "Quality Assurance Program Criteria (Design and Construction)," Revision 5 (Reference 10).

2.0 REGULATORY EVALUATION

Appendix B to 10 CFR Part 50 sets forth regulatory requirements related to quality assurance programs (QAPs). Appendix B to 10 CFR Part 50 establishes quality assurance (QA) requirements for the design, fabrication, construction, and testing of structures, systems, and components (SSCs) for the facility and for managerial and administrative controls to be used to assure safe operation. The pertinent requirements of Appendix B to 10 CFR Part 50 apply to all activities affecting the safety-related functions of those SSCs and include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying SSCs.

Regulations in 10 CFR 50.10, "License required; limited work authorization," establish the technical information requirements for LWA applications. Regulations in 10 CFR 50.10(d)(3)(i) require that LWA applications contain a description of the activities requested to be performed; a safety analysis report (SAR) as required by 10 CFR 50.34, "Contents of applications; technical information," 10 CFR 52.17, "Contents of applications; technical information," or 10 CFR 52.79, "Contents of applications; technical information in final safety analysis report," as applicable; and the design and construction information otherwise required by the Commission's rules and regulations, but limited to those portions of the facility that are within the scope of the LWA.

Regulations in 10 CFR 50.34 establish the technical requirements for CP and OL applications. Regulations in 10 CFR 50.34(a)(7) require that CP applications provide a description of the QAP to be applied to the design,fabrication, construction, and testing of the SSCs of the facility. Further, 10 CFR 50.34(a)(7) requires that the description of the QAP include a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 will be satisfied. Finally, 10 CFR 50.34(b)(6)(ii) requires that the OL application contain information on the managerial and administrative controls to be used to assure safe operation consistent with the requirements of Appendix B to 10 CFR Part 50 and a discussion of how such requirements will be satisfied.

Regulations in 10 CFR 50.34(f)(3)(ii) and (iii) specify additional design and construction QA requirements for DC, SDA, and COL applications related to the list of SSCs subject to QA requirements, independence of the QA organization, QA and quality control (QC) implementation at construction sites, establishing criteria for QA programmatic requirements, the role of QA personnel in quality-related procedures and in design and analysis activities, qualification of QA and QC personnel and sizing of QA staff, and procedures for maintaining "as-built" documentation.

Regulations in 10 CFR 52.17 establish the technical information requirements for ESP applications. Section 52.17(a)(1)(xi) requires that ESP applications provide a description of the QAP applied to site-related activities for the future design, fabrication, construction, and testing of the SSCs of a facility or facilities that may be constructed on the site, including a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 will be satisfied

Regulations in 10 CFR 52.47, "Contents of applications; technical information," establish the technical information requirements for DC applications. Section 10 CFR 52.47(a)(19) requires that DC applications provide a description of the QAP applied to the design of the SSCs of the facility. Further, 10 CFR 52.47(a)(19) requires that the description of the QAP include a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 have been satisfied.

Regulations in 10 CFR 52.79 establish the technical information requirements for COL applications. Section 52.79(a)(25) requires that COL applications provide a description of the QAP applied to the design, and to be applied to the fabrication, construction, and testing of the SSCs of the facility. Further, 10 CFR 52.79(a)(25) requires that the description of the QAP include a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 have been and will be satisfied, and also include a discussion of how the QAP will be implemented. Finally, 10 CFR 52.79(a)(27) requires that the application contain information on the managerial and administrative controls to be used to assure safe operation consistent with the requirements of Appendix B to 10 CFR Part 50 and a discussion of how such requirements will be satisfied.

Regulations in 10 CFR 52.137, "Contents of applications; technical information," establish the technical information requirements for SDA applications. Regulations in 10 CFR 52.137(a)(19) require that SDA applications provide a description of the QAP applied to the design of the SSCs of the facility. Further, 10 CFR 52.137(a)(19) requires that the description of the QAP include a discussion of how the applicable requirements of Appendix B to 10 CFR Part 50 have been satisfied.

3.0 EVALUATION

In evaluating the adequacy of Kairos' QAPD, the NRC staff utilized the guidance contained in Section 17.5 of the SRP, which provides guidance to the NRC staff for the review of a QAPD for DC, ESP, COL, CP, and OL applicants. Section 17.5 of the SRP is based on Appendix B to 10 CFR Part 50 and describes regulatory and industry guidance determined to be acceptable methods for meeting the requirements of Appendix B to 10 CFR Part 50. Section 17.5 of the SRP does not specifically address SDAs and LWAs. However, the requirements of Appendix B to 10 CFR Part 50 that would be applied to a COL encompass the quality-related activities for an SDA or an LWA. The ASME standard NQA-1-2015 Edition, upon which Kairos' QAPD is based, is endorsed (with certain exceptions and clarifications) by the NRC in RG 1.28, Revision 5, as providing an adequate basis for complying with 10 CFR Part 50, Appendix B.

3.1 Quality Assurance Program Overview

Topical report KP-TR-007-NP, Revision 3, provides for the control of Kairos' activities affecting the quality and performance of safety-related SSCs and select non-safety-related SSCs to the design, construction, and operations phase activities, including those in support of an SDA, a DC, an ESP, an LWA, a CP, an OL, and/or a COL for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor (KP-FHR).

3.1.1 Organization

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.A for providing an organizational description that includes an organizational structure, functional responsibilities, levels of authority, and interfaces for establishing, executing, and verifying the implementation of Kairos' QAP. For the organizations performing quality assurance functions, the Kairos' QAPD establishes organizations with sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions. Kairos' QAPD also provides an organizational structure where persons and organizations performing quality assurance functions report to a higher management level to maintain the required authority and organizational freedom, including sufficient independence from cost and schedule, when opposed to safety, considerations. Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(F) by providing during design, that Safety Assurance and Quality Management is responsible to size the Quality Assurance staff commensurate with the duties and responsibilities assigned. During construction and operations, this responsibility transitions to the Site Executive. In addition, responsibility and authority for planning, establishing, and implementing an effective overall QAP are clearly described and defined, including identifying the position responsible for directing and managing Kairos' QAP during the design, construction, and operational phases. Kairos' QAPD provides the authority and responsibility to stop work in progress not being done in accordance with approved procedures or where safety of personnel or SSC integrity may be jeopardized.

Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(A) by providing that independence be maintained between the organization(s) performing the checking (quality assurance and control) functions and the organizations performing the functions.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 1, "Organization," without further clarifications or exceptions. The NRC staff determined that Kairos' organization controls as described above comply with the requirements of Criterion I, "Organization," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.2 Quality Assurance Program

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.B for establishing the necessary measures to implement a QAP to ensure that the design, construction, and operation of the KP-FHR is in accordance with governing regulations. The QAP applies to those quality-related activities that involve the functions of SSCs associated with the design, construction, and operational phases (including SDA, DC, ESP, LWA, CP, OL, and/or COL activities) of the KP-FHR. The QAP also applies to the fuel characterization, and to the managerial and administrative controls to be used to ensure that the KP-FHR complies with the applicable regulatory requirements. Examples of ESP, CP/OL, or COL program safety-related activities include, but are not limited to, site-specific engineering related to safety-related SSCs, site geotechnical investigations, site engineering analysis, seismic analysis, and meteorological analysis.

A list or system used to identify which SSCs and activities to which the Kairos' QAPD applies is maintained. Kairos may delegate all or part of the activities for which it is responsible to others; however, Kairos retains overall responsibility for QAP program effectiveness. Kairos' QAPD provides measures to assess the adequacy of the QAP to ensure its effective implementation at least once each year or at least once during the life of the activity, whichever is shorter. In addition, Kairos' QAPD applies a grace period of 90 days to activities that must be performed on

a periodic basis. The grace period does not allow the "clock" for a particular activity to be reset forward and therefore the next assessment would need to be performed within a year of the original due date. However, the "clock" for an activity is reset backwards by performing the activity early, meaning that the next assessment would be due within a year of the date of the last completed assessment.

Kairos' QAPD follows the guidance of SRP Section 17.5, paragraphs II.S and II.T, and satisfies 10 CFR 50.34(f)(3)(iii)(E) by providing the necessary measures to establish and maintain formal indoctrination and training programs for personnel performing, verifying, or maintaining activities within the scope of the QAP to ensure that suitable proficiency is achieved and maintained. Kairos' QAPD provides the minimum training requirements for all personnel responsible for implementation of Kairos' QAP.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 2, "Quality Assurance Program," with the following three clarifications and exceptions.

1. For Section 302, "Inspection and Test," Kairos commits to the use of NQA-1-2015, Subpart 3.1-2.3 guidance.

The NRC staff evaluated this proposed clarification and determined that the guidance in Subpart 3.1-2.3 can be used to meet the requirements of Appendix B to 10 CFR Part 50 and is equivalent to the guidance in SRP Section 17.5, paragraph II.T.5. Therefore, the NRC staff finds the use of Subpart 3.1-2.3 of NQA-1-2015 for qualification of inspection and test personnel acceptable.

2. Kairos follows Section 301, "Nondestructive Examination (NDE)," for qualification of nondestructive examination personnel, except that Kairos will follow the applicable standard cited in the version(s) of Section III and Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code approved by the NRC for use at Kairos' sites for the scope of activities governed by these cited standards.

The regulations in 10 CFR 50.55a, "Codes and Standards," endorses versions of ASME B&PV Code Sections III and XI for activities within the scope of these sections. Therefore, the NRC staff finds the alternative proposed for the use of Sections III and XI of the ASME B&PV Code for qualification of nondestructive examination personnel to be acceptable.

3. Section 401, "Inspection and Test Personnel," item (g), on records of qualification, provides that the date of certification expiration be included on the qualification record. Kairos considers the certification expiration date to be the date from the certification or recertification date plus the certification interval time and its inclusion on the qualification record is optional.

The NRC staff evaluated this exception and determined that the date of certification establishes the expiration date, when combined with the certification interval. The certification interval is normally a function of a code or standard and is identified in the organization's procedure; therefore, because having both dates on the form is redundant, the NRC staff determined the exception to be acceptable.

The NRC staff determined that Kairos' QAP controls, as described above, comply with the requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.3 Design Control

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.C, for establishing the necessary measures to control the design, design changes, and temporary modifications of items that are subject to the provisions of the QAP. The Kairos design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces within Kairos and with its suppliers. These provisions ensure that design inputs (e.g., design bases and the performance, regulatory, quality, and quality verification requirements) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions). In addition, Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(H) by providing for design documents to be reviewed by individuals knowledgeable in QA to ensure that the documents contain the necessary QA requirements.

Kairos' QAPD provides for design verification to ensure that items, computer programs, and activities subject to the provisions of the QAP are suitable for their intended application, consistent with their effect on safety. Design changes are subjected to these controls, which include verification measures commensurate with those applied to original plant design. Design verifications are performed by competent individuals or groups other than those who performed the original design, but who may be from the same organization. The extent of the design verification required is a function of the importance to safety of the item or computer program under consideration, the complexity of the design, the degree of standardization, the state-of-the-art, and the similarity with previously proven designs. Verification methods may include, but are not limited to, design reviews, alternative calculations, and qualification testing.

The Kairos QAP governs the development, procurement, testing, maintenance, control, and use of computer applications and digital equipment software when used in safety-related applications and designated non-safety-related applications. Pre-verified computer programs are controlled using a software configuration management process. Kairos and its suppliers are responsible for developing, approving, and issuing procedures, as necessary, to control the use of such computer application and digital equipment software. Procedures require that the application software be assigned a proper quality classification and that the associated quality requirements be consistent with this classification.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 3, "Design Control," Subpart 2.7, "Quality Assurance Requirements for Computer Software for Nuclear Facility Applications," Subpart 2.14, "Quality Assurance Requirements for Commercial-Grade Items and Services," and Subpart 2.20, "Quality Assurance Requirements for Subsurface Investigations for Nuclear Facilities," without further clarifications or exceptions. The NRC staff determined that Kairos' design controls as described above comply with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.4 Procurement Document Control

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.D, for establishing the necessary administrative controls and processes to ensure that applicable regulatory, technical, and QAP requirements are included or referenced in procurement documents. The applicable technical, regulatory, administrative, quality, and reporting requirements (e.g., specifications,

codes, standards, tests, inspections, special processes, and 10 CFR Part 21, “Reporting of Defects and Noncompliance”) are invoked for the procurement of items and services. In addition, Kairos QAPD states that procurement documents require suppliers to have a documented QAP that meets the applicable requirements of Appendix B to 10 CFR Part 50, as necessary based on the procurement scope or, alternatively, allows the supplier to work under Kairos’ approved QAP.

Kairos’ QAPD commits to the quality standards described in NQA-1-2015, Requirement 4, “Procurement Document Control,” with the following three clarifications and exceptions:

1. Section 100, “General,” of Requirement 4 requires that suppliers have a QAP consistent with applicable requirements. For services performed by a supplier, Kairos’ procurement documents may allow the supplier to work under Kairos’ QAP, including implementing procedures, in lieu of the supplier having its own QAP.

The NRC staff evaluated this proposed exception and determined that it provides adequate control for establishing and executing the responsibilities for the QAP. In addition, Criterion IV, “Procurement Document Control,” of Appendix B to 10 CFR Part 50, requires suppliers to have a QAP consistent with the regulations. Therefore, the NRC staff determined that the exception is acceptable.

2. Sections 300, “Procurement Document Review,” and 400, “Procurement Document Changes,” of Requirement 4, require the review of technical and QAP requirements of procurement documents prior to award of a contract and for procurement document changes. Kairos may satisfy this requirement through the review of the procurement specification when the specification contains the technical and QA requirements of the procurement.

The NRC staff evaluated this proposed clarification and determined that it provides adequate QA review of procurement documents before awarding the contract and after any change to the contract. Therefore, the NRC staff determined that the clarification is acceptable.

3. Sections 202, “Technical Requirements,” and 203, “Quality Assurance Program Requirements,” of Requirement 4, require that the technical and quality requirements be specified in the procurement documents. As a clarification, procurement documents for commercial-grade items that will be procured by Kairos for use as safety-related items shall contain technical and quality requirements such that the procured item can be appropriately dedicated in accordance with Kairos’ QAP, Part II, Section 7, “Control of Purchased Material, Equipment, and Services.”

The NRC staff evaluated this proposed clarification and determined that is consistent with NRC staff guidance provided in Generic Letter (GL) 89-02, “Actions to Improve the Detection of Counterfeit and Fraudulently Marked Products,” dated March 21, 1989 (ADAMS Accession No. ML031140060), and GL 91-05, “Licensee Commercial-Grade Procurement and Dedication Programs,” dated April 9, 1991 (ADAMS Accession No. ML031140508), as delineated in SRP Section 17.5, paragraphs II.V.1.d and II.V.1.e.

The NRC staff determined that Kairos’ procurement document controls as described above comply with the requirements of Criterion IV of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.5 Instructions, Procedures, and Drawings

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.E, for establishing the necessary measures and governing procedures to ensure that activities affecting quality are prescribed by and performed in accordance with instructions, procedures, or drawings of a type appropriate to the circumstances and which, where applicable, include quantitative or qualitative acceptance criteria to implement the QAP as described in Kairos' QAP TR.
Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 5, "Instructions, Procedures, and Drawings," without further clarifications or exceptions. The NRC staff determined that Kairos controls for instructions, procedures, and dr
awings, as described above, comply with the requirements of Criterion V, "Instructions, Procedures, and Drawings," ofAppendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.6 Document Control

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.F, for establishing the necessary measures and governing procedures to control the preparation, issuance, and revision of documents that specify quality requirements or prescribe how activities affecting quality, including organizational interfaces, are controlled. Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(G) by providing that the types of documents to be controlled include as-built drawings. Kairos' QAPD provides measures to ensure that documents, including revisions or changes (other than those defined in implementing procedures as minor changes), are reviewed and approved by the same organization that performed the original review and approval unless other organizations are specifically designated. Kairos maintains a list of all controlled documents, identifying the current approved revision or date, so personnel can determine the appropriate document for use. Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(C) by providing that during the ESP or construction phase, procedures for design, construction, and installation are also reviewed by the organization responsible for quality verification to ensure quality assurance measures have been appropriately applied.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 6, "Document Control," without further clarifications or exceptions. The NRC staff determined that Kairos' document controls as described above comply with the requirements of Criterion VI, "Document Control," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.7 Control of Purchased Material, Equipment, and Services

Kairos' QAPD follows the guidance of SRP Section 17.5, Subsection II.G, for establishing the necessary measures and governing procedures to control the procurement of items and services to ensure conformance with specified requirements. These measures provide for the evaluation of prospective suppliers and selection of qualified suppliers only, evaluation of objective evidence of on-going acceptable quality furnished by the supplier, source verification and inspection, audit, and examination of items or services.

Kairos' QAPD establishes and implements measures to assess the quality of purchased items and services, whether purchased directly or through contractors, at intervals and to a depth consistent with the items or service's importance to safety, complexity, quantity, and the frequency of procurement. In addition, Kairos' QAPD provides for auditing and evaluating suppliers to ensure that qualified suppliers continue to provide acceptable products and services.

Kairos' QAPD provides for using source verification, receipt inspection, pre- and post-installation tests, certificates of conformance, and review of documentation (e.g., Certified Material Test Reports/Certificates) for accepting purchased items and services. In addition, controls are implemented for the selection, determination of suitability for intended use (critical characteristics), evaluation, receipt, and acceptance of commercial-grade services or items to ensure they will perform satisfactorily in-service in safety-related applications.

Kairos' QAPD commits to implement the quality standards described in NQA-1-2015, Requirement 7, "Control of Purchased Items and Services," Subpart 2.14, "Quality Assurance Requirements for Commercial Grade Items and Services," and the regulatory positions described in RG 1.28, Revision 5, with the following two clarifications and exceptions:

1. Section 200, "Supplier Evaluation and Selection," of Requirement 7 requires the purchaser to evaluate the supplier's capability to provide items or services in accordance with the requirements of the procurement documents. Kairos considers that 10 CFR Part 50 and 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," licensees, Authorized Nuclear Inspection (ANI) agencies, National Institute of Standards and Technology (NIST), or other State and Federal agencies, which may provide items or services to Kairos' plants, are not required to be evaluated or audited.

The NRC staff acknowledges that 10 CFR Part 50 and 10 CFR Part 52 licensees, ANI agencies, NIST, or other State and Federal agencies work under their own quality programs, and no additional audit or evaluation is required by Kairos. The NRC staff determined that this approach is acceptable for applicants, as these are organizations known to the NRC to have QAPs with the necessary quality and programmatic controls and have proven abilities and disciplines. However, Kairos is still responsible for ensuring that the items and services procured conform to the applicable criteria in Appendix B to 10 CFR Part 50, ASME B&PV Code requirements, and other regulatory requirements and commitments. Kairos is also responsible for ensuring that procured items or services are suitable for the intended application, as well as for documenting the associated evaluation.

The NRC staff evaluated this proposed exception and determined that it provides an appropriate level of quality and safety. Therefore, the NRC staff concluded that this alternative is acceptable.

2. As a clarification to Section 700, "Commercial Grade Items and Services," of Requirement 7, Kairos will implement the guidance from Nuclear Energy Institute (NEI) 14-05A, "Guidelines for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services," Revision 1 (Reference 11), for using the International Laboratory Accreditation (ILAC) accreditation process in lieu of performing commercial-grade surveys as part of the commercial-grade dedication process. In an SE dated November 23, 2020 (Reference 12), the NRC staff concluded that NEI 14-05A, Revision 1, provides an acceptable approach for licensees and suppliers of basic components for using the ILAC accreditation process in lieu of performing commercial-grade surveys as part of the commercial-grade dedication process.

The NRC staff evaluated this proposed clarification and determined that it is consistent with the NRC's current regulatory position regarding the acceptability of procuring commercial-grade calibration and testing services from laboratories accredited by ILAC. Therefore, the NRC staff concluded that this alternative is acceptable.

The NRC staff determined that Kairos' controls for purchased material, equipment, and services as described above comply with the requirements of Criterion VII, of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.8 Identification and Control of Materials, Parts, and Components

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.H, for establishing the necessary measures and governing procedures to identify and control items to prevent the use of incorrect or defective items. This includes controls for consumable materials and items with limited shelf life. The identification of items is maintained throughout fabrication, erection, installation, and use so that the item can be traced to its documentation, consistent with the item's effect on safety. Identification locations and methods are selected so as not to affect the function or quality of the item.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 8, "Identification and Control of Items," without further clarifications or exceptions. The NRC staff determined that Kairos' identification and controls for materials, parts, and components as described above comply with the requirements of Criterion VIII, "Identification and Control of Materials, Parts, and Components," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.9 Control of Special Processes

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.I, for establishing the necessary measures and governing procedures to ensure that special processes such as welding, heat treating, and non-destructive examination are controlled. Special processes are accomplished by qualified personnel using qualified procedures and equipment, and in accordance with applicable codes, standards, specifications, criteria, or other special requirements. Special processes are those where the results are highly dependent on the control of the process or the skill of the operator, or both, and for which the specified quality cannot be fully and readily determined by inspection or test of the final product.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 9, "Control of Special Processes," without further clarifications or exceptions. The NRC staff determined that Kairos' control of special processes as described above comply with the requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.10 Inspection

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.J, for establishing the necessary measures and governing procedures to implement inspections that ensure items, services, and activities affecting safety meet established requirements and conform to applicable documented specifications, instructions, procedures, and design documents. Types of inspections may include those verifications related to procurement, such as source, in-process, final, and receipt inspection, as well as construction, installation, maintenance, modification, in-service, and operations activities.

These types of inspections will be performed by properly qualified personnel independent of those who performed or directly supervised the work, and the inspection results will be documented.

Kairos' inspection program establishes measures for planning the inspections, such as measures for: (1) the party responsible for performing the inspection; (2) the application of hold points which require witnessing or inspecting; (3) the acceptance criteria for inspection; (4) the frequency of inspections; and (5) the identification of special tools required to perform the inspection. Inspection plans are based on: (1) the importance of the item to safety; (2) the complexity of the item; (3) the technical requirements to be met; and (4) the design specifications. Inspection information and results, such as rejection, acceptance criteria, re-inspection results, and the person(s) performing the inspection are documented. The documentation of this information is the responsibility of the inspector, reviewed by authorized personnel qualified to evaluate the technical adequacy of the inspection results, and controlled by instructions, procedures, and drawings.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 10, "Inspection," and Subparts 2.5, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Facilities," and 2.8, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Items for Nuclear Facilities," without further clarifications or exceptions. The NRC staff determined that Kairos' inspection controls as described above comply with the requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.11 Test Control

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.K, for establishing the necessary measures and governing procedures to demonstrate that items subject to the provisions of the QAPD will perform satisfactorily in-service, that the plant can be operated safely as designed, and that the operation of the plant, as a whole, is satisfactory. Test programs include criteria for determining when testing is required, such as proof tests before installation, pre-operational tests, post-maintenance tests, post-modification tests, in-service tests, and operational tests to demonstrate that performance of plant systems is in accordance with design. Test programs also include provisions to establish and adjust test schedules, and to maintain status for periodic or recurring tests. Tests are performed according to applicable procedures that include, consistent with the effect on safety: (1) instructions and prerequisites to perform the tests; (2) use of proper test equipment; (3) acceptance criteria; and (4) mandatory verification points as necessary to confirm satisfactory test completion. Test results are documented and evaluated by the organization performing the test and reviewed by a responsible authority to ensure that the test requirements have been satisfied. If acceptance criteria are not met, re-testing is performed as needed to confirm acceptability following correction of the system or equipment deficiencies that caused the failure.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 11, "Test Control," and Subpart 2.7, "Quality Assurance Requirements for Computer Software for Nuclear Facility Applications," without further clarifications or exceptions. The NRC staff determined that Kairos' testing controls as described above comply with the requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.12 Control of Measuring and Test Equipment

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.L, for establishing the necessary measures and governing procedures to control the calibration, maintenance, and use of measuring and test equipment (M&TE) that provides data to verify acceptance criteria are met for information important to safe plant operation.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 12, "Control of Measuring and Test Equipment," without further clarifications or exceptions. The NRC staff determined that Kairos' controls for M&TE, as described above, comply with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.13 Handling, Storage, and Shipping

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.M, for establishing the necessary measures and governing procedures to control the handling, storage, packaging, shipping, cleaning, and preservation of test and irradiated items to prevent inadvertent damage or loss, and to minimize deterioration. Items are appropriately marked and labeled during packaging, shipping, handling, and storage to identify, maintain, and preserve the item's integrity and provide indication of the needs for special controls. Any special controls (e.g., shock absorbers, inert gas atmospheres, specific moisture content levels, and temperature levels) are provided when required. In addition, any special or additional handling, storage, shipping, cleaning, and preservation requirements are identified in the procurement documents. Special handling tools and equipment are controlled to ensure safe and adequate handling. These special tools and handling equipment are inspected and tested in accordance with procedures at specified time intervals or prior to use. Kairos' QAPD establishes housekeeping practices to account for conditions or environments that could affect the quality of SSCs within the plant.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 13, "Handling, Storage, and Shipping," without further clarifications or exceptions. Kairos' QAPD also commits, during the construction and operational phases of the plant, to conformance with NQA-1-2015, Subpart 2.1, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Facilities," Subpart 2.2, "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Facilities," Subpart 2.3, "Quality Assurance Requirements for Housekeeping at Nuclear Facilities," and Subpart 3.2-2.1, "Implementing Guidance for Part II, Requirement 2.1: Cleaning of Fluid Systems," with the following four alternatives and exceptions:

1. Subpart 2.1, Section 301, "Cleanness Classification," and 302, "Cleanness Class Criteria," establish criteria for classifying items into cleanness classes and requirements for each class. Instead of using the cleanness level system of Subpart 2.1, Kairos may establish cleanness requirements on a case-by-case basis, consistent with the other provisions of Subpart 2.1. Kairos establishes appropriate cleanliness controls for work on safety-related equipment to minimize introduction of foreign material and maintain system/component cleanliness throughout maintenance or modification activities, including documented verification of absence of foreign material prior to system closure.

The NRC staff determined that this proposed alternative is acceptable, on the basis that this alternative is consistent with the NRC staff guidance provided in SRP Section 17.5 and was approved previously in the NRC staff's SE for the Nuclear Management Company (NMC) QA TR dated March 24, 2005 (ADAMS Accession No. ML050700416).

2. Subpart 2.2, Section 201, "Classification of Items," establishes criteria for classifying items into protection levels. Instead of classifying items into protection levels during the operational phase, Kairos may establish controls for the packaging, shipping, handling, and storage of such items on a case-by-case basis with due regard for the item's complexity, use, and sensitivity to damage. Prior to installation or use, the items are inspected and

serviced as necessary to ensure that no damage or deterioration exists which could affect their function.

The NRC staff determined that this proposed alternative is acceptable, on the basis that this alternative is consistent with the NRC staff guidance provided in SRP Section 17.5 and was approved previously in the NRC staff's SE for the NMC QA TR dated March 24, 2005.

3. Subpart 2.2, Section 606, "Storage Records," requires written records be prepared containing information on personnel access. As an exception to this requirement, Kairos' documents establish controls for storage areas that describe those authorized to access areas and the requirements for recording access of personnel. However, these records of access are not considered quality records and will be retained in accordance with the administrative controls of the applicable plant.

The NRC staff determined that this proposed exception is acceptable, on the basis that these records do not meet the classification of a quality record as defined in NQA-1-2015, Requirement 17.

4. Subpart 2.3, Section 202, "Classification of Cleanness," requires the establishment of five zone designations for housekeeping cleanliness controls. Instead of the five-level zone designation, Kairos bases its control over housekeeping activities on a consideration of what is necessary and appropriate for the activity involved. The controls are implemented through procedures or instructions which, in the case of maintenance or modification work, are developed on a case-by-case basis. Factors considered in developing the procedures and instructions include cleanliness control, personnel safety, fire prevention and protection, radiation control, and security. The procedures and instructions make use of standard janitorial and work practices to the extent possible.

The NRC staff determined that this proposed alternative is acceptable, on the basis that this alternative is consistent with the NRC staff guidance provided in SRP Section 17.5 and was approved previously in the NRC staff's SE for the NMC QA TR dated March 24, 2005.

The NRC staff determined that Kairos' controls for handling, storage, and shipping as described above comply with the requirements of Criterion XIII, "Handling, Storage, and Shipping," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.14 Inspection, Test, and Operating Status

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.N, for establishing the necessary measures and governing procedures to identify the inspection, test, and operating status of items and components subject to the provisions of the QAPD in order to maintain personnel and reactor safety and avoid inadvertent operation of equipment. Measures are provided for the verification of inspections, tests, and operating status to preclude bypassing of inspections or tests, or to preclude inadvertent operation. These measures require the inspection, test, or operating status be verified before release, fabrication, receipt, installation, test, or use. Temporary design modifications are controlled by procedures which incorporate the applicable requirements.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 14, "Inspection, Test, and Operating Status," without further clarifications or exceptions. The NRC staff determined that Kairos' inspection, test, and operating status controls as described above

comply with the requirements of Criterion XIV, “Inspection, Test, and Operating Status,” of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.15 Nonconforming Materials, Parts, or Components

Kairos’ QAPD conforms to SRP Section 17.5, Subsection II.O, for establishing the necessary measures and governing procedures to control items, including services that do not conform to specified requirements, to prevent inadvertent installation or use. Controls provide for the identification, documentation, evaluation, segregation (when practical), and disposition of non-conforming items, and notification to affected organizations. Controls are also provided to address conditional release of non-conforming items for use with appropriate controls prior to resolution and disposition of the non-conformance, including maintaining identification of the item and documenting the basis for such release.

Non-conforming items are evaluated for impact on the operability of quality SSCs to ensure that the final condition does not adversely affect safety, operation, or maintenance of the item or service. Non-conforming items which are dispositioned “repair” or “use-as-is” are subject to design control measures commensurate with those applied to the original design. Non-conformance dispositions are reviewed for adequacy, analysis of quality trends, and reported to designated management.

Significant trends are reported to management in accordance with Kairos’ procedures, regulatory requirements, and industry standards.

Kairos’ QAPD provides for establishing the appropriate interfaces between the QAP for identification and control of nonconforming materials, parts, or components, and the non-QA reporting program in order to satisfy the requirements of 10 CFR Part 52, 10 CFR 50.55, “Conditions of construction permits, early site permits, combined licenses, and manufacturing licenses,” and 10 CFR Part 21 during the design, construction, and operational phases.

Kairos’ QAPD commits to the quality standards described in NQA-1-2015, Requirement 15, “Control of Nonconforming Items,” without further clarifications or exceptions. The NRC staff determined that Kairos’ controls for nonconforming materials, parts, or components as described above comply with the requirements of Criterion XV, “Nonconforming Materials, Parts, or Components,” of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.16 Corrective Action

Kairos’ QAPD conforms to SRP Section 17.5, Subsection II.P, for establishing the necessary measures and governing procedures to promptly identify, control, document, classify, and correct conditions adverse to quality. Kairos’ QAPD provides for procedures to ensure that corrective actions are documented and initiated following the determination of conditions adverse to quality in accordance with regulatory requirements and applicable quality standards.

Reports of conditions adverse to quality are analyzed to identify trends. Significant conditions adverse to quality and significant adverse trends are documented and reported to responsible management. In the case of a significant condition adverse to quality, the cause is determined and actions to preclude recurrence are taken. In the case of suppliers working on safety-related activities, or other similar situations, Kairos may delegate specific responsibilities for corrective actions, but maintains responsibility for the effectiveness of corrective action measures.

Kairos' QAPD provides for establishing the appropriate interfaces between the QAP for corrective actions and the non-QA Reporting program in order to satisfy the requirements of 10 CFR Part 52, 10 CFR 50.55, and 10 CFR Part 21 during the design, construction, and operational phases.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 16, "Corrective Action," without further clarifications or exceptions.

The NRC staff determined that Kairos' corrective action controls as described above comply with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.17 Quality Assurance Records

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.Q, for establishing the necessary measures to ensure that enough records of items and activities affecting quality are developed, reviewed, approved, issued, used, and revised to reflect completed work. The provisions of such procedures establish the scope of the records retention program for Kairos and include requirements for records administration including receipt, preservation, retention, storage, safekeeping, retrieval, access controls, user privileges, and final disposition.

Kairos' QAPD establishes measures to ensure that sufficient records of completed items and activities affecting quality are appropriately stored. The records and retention times are based on Regulatory Positions C.3.a.(1) and C.3.a.(2) of RG 1.28, Revision 5. In all cases where state, local, or other agencies have more restrictive requirements for record retention, Kairos' QAPD provides that those more restrictive requirements will be met.

When using optical disks for electronic records storage and retrieval systems, Kairos' QAPD conforms with the NRC guidance provided in NRC's GL 88-18, "Plant Record Storage on Optical Disks," Regulatory Issue Summary (RIS) 2000-18, "Guidance on Managing Quality Assurance Records in Electronic Media," and the associated Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guidelines (TG), including TG 11-2011, "Authentication of Records and Media," TG 15-2011, "Management of Electronic Records," TG 16-2011, "Software Configuration Management and Quality Assurance," and TG 21-2011, "Electronic Records Protection and Restoration."

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 17, "Quality Assurance Records," and the regulatory positions described in RG 1.28, Revision 5, without further clarifications or exceptions. The NRC staff determined that Kairos' controls for QA records as described above comply with the requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.1.18 Audits

Kairos' QAPD conforms to SRP Section 17.5, Subsection II.R, for establishing the necessary measures to implement audits to verify that activities covered by the QAPD are performed in conformance with the established requirements and performance criteria are met. The audit program is also reviewed for effectiveness as part of the overall audit process. Audits of suppliers of safety-related components and/or services are conducted as described in Section 3.1.7 of this SE.

Kairos' QAPD provides for conducting periodic audits to determine the adequacy of programs and procedures, and to determine if they are meaningful and comply with the overall QAPD. Audits are performed in such a manner as to ensure that an audit of all applicable QAP elements is completed for each functional area at least once each year or at least once during the life of the activity, whichever is shorter. The scope of the audit is determined by the quality status and safety importance of the activities being performed. Audits are conducted by trained personnel not having direct responsibilities in the area being audited and in accordance with preplanned and approved audit plans or checklists, under the direction of a qualified lead auditor and the cognizance Quality Assurance Manager.

Kairos' QAPD provides for all audit results to be documented and reviewed by responsible management. Management responds to all audit findings and initiates corrective actions where indicated. In addition, where corrective actions are indicated, a documented follow-up of the applicable areas through inspections, review, re-audits, or other appropriate means is conducted to verify the implementation and effectiveness of the assigned corrective actions.

Kairos' QAPD commits to the quality standards described in NQA-1-2015, Requirement 18, "Audits," and the regulatory positions described in RG 1.28, Revision 5, without further clarifications or exceptions. The NRC staff determined that Kairos' QA controls for audits as described above comply with the requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50, and therefore, are acceptable.

3.2 Non-Safety-Related SSC Quality Control

3.2.1 Non-Safety-Related SSCs With Special Treatment

Kairos' QAPD conforms to SRP Section 17.5, Paragraph II.U.1, for establishing necessary measures and governing procedures to address certain non-safety-related SSCs for which Appendix B to 10 CFR Part 50 is not applicable but are considered significant contributors to plant safety. Kairos' QAPD applies specific controls to those items in a selective manner to target characteristics or critical attributes that render the SSC a significant contributor to plant safety.

3.2.2 Non-Safety-Related SSCs Credited for Regulatory Events

In establishing the quality requirements for non-safety-related SSCs credited for regulatory events, Kairos' QAPD conforms to SRP Section 17.5, Paragraph II.U.2, as applicable to the KP-FHR, and Kairos Power commits to implement the following:

- Regulatory Position 1.7, "Quality Assurance," in RG 1.189, "Fire Protection for Nuclear Power Plants," Revision 3, for the fire protection system
- Part III, Section 1 of Kairos' QAPD, for implementing the quality requirements for the anticipated transient without scram (ATWS) equipment to the extent that any equipment have been identified to be important to safety in case of ATWS.

- Part III, Section 1 of Kairos' QAPD, for implementing the quality requirements for the station blackout (SBO) equipment to the extent that any equipment has been identified to be important to safety in case of SBO.

3.3 Regulatory Commitments

Kairos' QAPD conforms to SRP Section 17.5, paragraph II.V, as applicable to the KP-FHR, for establishing QAP commitments. Kairos commits to conform with the following NRC RGs and other QA standards (or acceptable alternatives) to supplement and support the QAP, as applicable:

- RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," Revision 4, dated June 2019. RG 1.8 provides guidance that is acceptable to the NRC staff regarding qualifications and training for nuclear power plant personnel.

- RG 1.28, "Quality Assurance Program Criteria (Design and Construction)," Revision 5, dated October 2017. RG 1.28 describes a method acceptable to the NRC staff for complying with the provisions of Appendix B to 10 CFR Part 50 with regards to establishing and implementing the requisite QAP for the design and construction of nuclear power plants. Kairos will implement Revision 5 to RG 1.28.

- RG 1.29, "Seismic Design Classification," Revision 5, dated July 2016. RG 1.29 defines light water reactor systems required to withstand a safe shutdown earthquake.

- RG 1.33, "Quality Assurance Program Requirements (Operation)," Revision 3, dated June 2013. RG 1.33 describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to overall QAP requirements for the operation phase of nuclear power plants.

- Commitments consistent with the regulatory positions of RG 1.37, "Quality Assurance Requirements for Cleaning of Fluids Systems and Associated Components of Water-Cooled Nuclear Power Plants," Revision 1 dated March 2007. The regulatory positions of this RG were addressed in NQA-1 Part II, Subpart 2.1 and subsequently accepted by RG 1.28. The staff evaluated the applicability of Subpart 2.1 as described in Section 3.1.13 of this SE.

- Commitments consistent with GL 89-02 and GL 90-05, as described above in Section 3.1.4 of this SE.

- ASME NQA-1-2015, "Quality Assurance Requirements for Nuclear Facility Applications," Part I, "Requirements for Quality Assurance Programs for Nuclear Facilities," and Part II, "Quality Assurance Requirements for Nuclear Facility Applications," as described above in Sections 3.1.1 through 3.1.18 of this SE.

- NEI 14-05A, "Guidelines for the Use of Accreditation in Lieu of Commercial Grade Surveys for Procurement of Laboratory Calibration and Test Services," Revision 1, as described in Section 3.1.7 of this SE.

- NIRMA TGs 11-2011, 15-2011, 16-2011, and 21-2011 as described in Section 3.1.17 of this SE.

Kairos provided for the Classification of SSCs in staff approved KP-FHR, "Risk-Informed Performance-Based Licensing Basis Development Methodology Topical Report," (Revision 1) dated November 23, 2020 (ADAMS Accession No. ML20328A230).

Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(ii) by providing that the QA list required by Criterion II of Appendix B to 10 CFR Part 50 includes all SSCs important to safety.

Kairos' QAPD satisfies 10 CFR 50.34(f)(3)(iii)(D) by establishing criteria for determining QA programmatic requirements. Kairos' QAPD commits to conformance with ASME NQA-1-2015, as endorsed by RG 1.28, Revision 5 (see Section 3.3 above). Kairos' QAPD also commits to conformance with RG 1.33, Revision 3 (see Section 3.3 above) for operations phase specific QA requirements. The NRC staff determined that Kairos' QA controls as described in the QAPD conform to the staff's guidance in SRP Section 17.5 and comply with the requirements of Appendix B to 10 CFR Part 50, and therefore, are acceptable. Kairos' commitment to conformance with NQA-1 also satisfies 10 CFR 50.34(f)(3)(iii)(B) by establishing criteria for performing QA control functions at construction to the maximum extent feasible. Subpart 2.8, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Items for Nuclear Facilities," provides amplified requirements, in part, for inspection and testing during the construction phase and into operations. Subpart 2.8 requires material verification, receipt inspection, preinstallation verification, physical installation inspections, installation area inspections, post-installation inspections, inspections of work areas and the work in progress, pressure testing, and ensuring systems are cleaned and maintained once installed. This also includes inspection and testing during the preoperational phase of construction.

4.0 CONCLUSION

Kairos' QAPD delineates the policies, processes, and controls established by Kairos and associated implementing documents relative to U.S. domestic licensing requirements for nuclear power plants. Together, the QAP documents defined in the QAPD provide for control of Kairos' activities that affect the quality of safety-related nuclear plant SSCs and include all planned and systematic activities necessary to provide adequate confidence that such SSCs will perform satisfactorily in-service.

Kairos' QAPD may also be applied to certain equipment and activities that are not safety-related, but support safe plant operations, or where other NRC guidance establishes programmatic controls.

Kairos' QAPD conforms to the format of SRP Section 17.5. The NRC staff used the acceptance criteria of SRP Section 17.5 as the basis for evaluating the compliance of Kairos' QAPD with the provisions of 10 CFR 50.10(d)(3)(i), 10 CFR 50.34(a)(7), 10 CFR 50.34(b)(6)(ii), 10 CFR 50.34(f)(3)(ii) and (iii), 10 CFR 52.17(a)(1)(xi), 10 CFR 52.47(a)(19), 10 CFR 52.79(a)(25), 10 CFR 52.79(a)(27), 10 CFR 52.137(a)(19), and Appendix B to 10 CFR Part 50. On the basis of its review of the Kairos QAPD, the NRC staff concludes that:

- The Kairos QAPD adequately describes the authority and responsibility of management and supervisory personnel, performance and verification personnel, and self-assessment personnel, in relation to activities to which the Kairos QAP is applicable.

- The Kairos QAPD adequately provides for organizations and personnel to perform verification and self-assessment functions related to Kairos' activities that affect the quality of safety-related nuclear plant SSCs, as well as select non-safety-related SSCs, with these organizations and personnel having the authority and independence to conduct activities without undue influence from those directly responsible for costs and schedules.

- The Kairos QAPD adequately applies to activities and items that are important to safety.

- The Kairos QAPD adequately establishes controls that, when properly implemented, comply with the applicable requirements of 10 CFR Part 50, 10 CFR 50.34(f), 10 CFR Part 52, 10 CFR 50.55, Appendix B to 10 CFR Part 50, and 10 CFR Part 21, consistent with the criteria contained in SRP Section 17.5, as well as the relevant regulatory guidance.

Based on the review, as documented above, the NRC staff determined that Kairos' QAPD adequately describes Kairos' QAP. Accordingly, the NRC staff concludes that Kairos' QAP complies with the applicable NRC regulations and conforms with applicable industry standards and can be used by Kairos for activities associated with the design, construction, and operations of the Kairos Power Fluoride Salt-Cooled High Temperature Reactor.

5.0 REFERENCES

1. Letter from Peter Hastings, Vice President Regulatory Affairs and Quality, Kairos Power, to the NRC Document Control Desk, “Kairos Power LLC Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report,” dated May 15, 2020 (ADAMS Accession No. ML20136A414)

2. NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 17.5, “Quality Assurance Program Description – Design Certification, Early Site Permit and New License Applicants,” Revision 1, dated August 2015 (ADAMS Accession No. ML15037A441)

3. Letter from Peter Hastings, Vice President Regulatory Affairs and Quality, Kairos Power, to the NRC Document Control Desk, “Kairos Power, LLC - Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report (Revision 1),” dated March 8, 2021 (ADAMS Accession No. ML21071A082)

4. Kairos Power, LLC - KP-TR-007-NP, "Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report," Revision 1 (Non-Proprietary), dated March 2021 (ADAMS Accession No. ML21071A083)

5. Kairos Power, LLC - KP-TR-007-NP, "Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report," Revision 2 (Non-Proprietary), dated April 2021 (ADAMS Accession No. ML21105A519)

6. Kairos Power, LLC - KP-TR-007-NP, "Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report," Revision 3 (Non-Proprietary), dated April 2021 (ADAMS Accession No. ML21117A048)

7. Letter from Peter Hastings, Vice President Regulatory Affairs and Quality, Kairos Power, to the NRC Document Control Desk, “Kairos Power LLC - Quality Assurance Program for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report (Revision 2),” dated April 15, 2021 (ADAMS Accession No. ML21105A518)

8. Letter from Peter Hastings, Vice President Regulatory Affairs and Quality, Kairos Power, to the NRC Document Control Desk, “Kairos Power LLC - Quality AssuranceProgram for the Kairos Power Fluoride Salt-Cooled High Temperature Reactor Topical Report (Revision 3),” dated April 26, 2021 (ADAMS Accession No. ML21117A047)

9. American Society of Mechanical Engineers NQA-1-2015, “Quality Assurance Program Requirements for Nuclear Facility Applications,” New York, NY, dated February 20, 2015

10. Regulatory Guide (RG) 1.28, “Quality Assurance Program Criteria (Design and Construction),” Revision 5, dated October 2017 (ADAMS Accession No. ML17207A293)

11. Revision 1 of NEI 14-05A, “Guidelines for the Use of Accreditation in Lieu of Commercial-Grade Surveys for Procurement of Laboratory Calibration and Test Services,” dated September 2020 (ADAMS Accession No. ML20259B731)

12. Final Safety Evaluation by the Office of Nuclear Reactor Regulation for the Nuclear Energy Institute Technical Report NEI 14-05A, “Guidelines for the Use of Accreditation in Lieu of Commercial-Grade Surveys for Procurement of Laboratory Calibration and Test Services,” Revision 1, February 19, 2021 (ADAMS Accession No. ML20322A019)

13. Approval of Nuclear Management Company Quality Assurance Topical Report dated March 24, 2005 (ADAMS Accession No. ML050700416)

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