SAFETY EVALUATION REPORT BY

THE OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

ZION NUCLEAR POWER STATION, UNITS 1 AND 2

LICENSE AMENDMENT CHANGE REQUEST

RELATED TO THE UNLOADED SPENT FUEL POOL

DOCKET NOs. 50-295 and 50-304

1.0 BACKGROUND

Zion Nuclear Power Station Unit Nos. 1 and 2 (ZNPS) was shut down on February 21, 1997, and is currently in a permanently shut-down and defueled condition. In a letter dated February 13, 1998 (Reference 1), Commonwealth Edison Company (ComEd), the former licensee, informed the NRC that ZNPS had permanently ceased power operations. In a letter dated March 9, 1998 (Reference 2), ComEd informed the NRC that ZNPS has removed all fuel from the reactors, moved it to the fuel pool, and certified that the units would remain permanently defueled. In a letter dated May 4, 1998 (Reference 3), the NRC acknowledged that pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.82(a)(2), the 10 CFR Part 50 licenses for ZNPS, Units 1 and 2 no longer authorize operation of the reactors, or emplacement or retention of fuel in the reactor vessels.

Zion*Solutions*, LLC (ZS) is the current holder of Facility Operating License Nos. DPR-39 and DPR-48. The license, pursuant to the Atomic Energy Act of 1954 and 10 CFR Part 50, allows ZS to possess spent nuclear fuel at the permanently shut-down and defueled ZNPS facility. In a letter dated January 25, 2008 (Reference 4), Exelon Generation Company, LLC notified the NRC that the spent nuclear fuel and GTCC will be stored in an Independent Spent Fuel Storage Installation (ISFSI) to be constructed by ZS and maintained onsite until final disposition. ZS is currently in the process of transferring the spent nuclear fuel from the spent fuel pool to the ISFSI and expects to complete the process by January 2015.

2.0 INTRODUCTION

By letter dated March 17, 2014 (Reference 5), as supplemented September 10, 2014, (Reference 6), ZS proposed, pursuant to 10 CFR 50.90, to amend its licenses, DPR-39 and DPR-48, and revise the ZNPS Technical Specifications to reflect the removal of all the spent fuel from the ZNPS spent fuel pool. The proposed changes will result in Technical Specifications (TS) that will be applicable to the ZNPS once the last spent fuel assembly has been removed from the spent fuel pool and placed at the ISFSI.

The proposed changes to both Facility Operating Licenses modify Section 2.C.(6) to specify the ZNPS Independent Spent Fuel Storage Installation Physical Security Plan, eliminate Section

2.C.(7) Spent Fuel Pool Modification, and eliminate Section 2.C.(16), related to the single-failure proof fuel building crane.

The proposed changes to the TS eliminate provisions of the specifications applicable to spent fuel stored in the spent fuel pool and relocate much of the remaining TS administrative requirements to the Quality Assurance Project Plan (QAPP). These changes are proposed pursuant to the criteria contained in 10 CFR 50.36 and in accordance with recommendations contained in NRC Administrative Letter 95-06.

3.0 REGULATORY EVALUATION

In 10 CFR 50.36, the Commission established its regulatory requirements related to the content of TSs. In doing so, the Commission placed emphasis on those matters related to the prevention of accidents and mitigation of accident consequences; the Commission noted that applicants were expected to incorporate into their TSs "those items that are directly related to maintaining the integrity of the physical barriers designed to contain radioactivity." ["Technical Specification for Facility Licenses; Safety Analysis Reports," 33 FR 18610 (December 17, 1968)]. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. However, the rule does not specify the particular requirements to be included in a plant's TSs.

On July 22, 1993, the Commission published a Policy Statement (58 FR 39132) on the scope and purpose of TSs for nuclear power plants. This Policy Statement included guidance criteria to be used in determining which of the LCOs and associated surveillances should remain in the TSs. The Policy Statement established four criteria to define the scope of equipment and parameters to be included in the improved standard technical specifications. These criteria were developed for licenses authorizing operation and focused on instrumentation to detect degradation of the reactor coolant system pressure boundary and on equipment or process variables that affect the integrity of fission product barriers during design-basis accidents (DBAs) or transients. The fourth criterion refers to the use of operating experience and probabilistic risk assessment to identify and include in the TS structures, systems, and components shown to be significant to public health and safety. These criteria, codified by 10 CFR 50.36, are the source of the TS requirements for facilities licensed under 10 CFR Part 50. A general discussion of these considerations is provided below.

Criterion 1 of 10 CFR 50.36(c)(2)(ii)(A) states that TS LCOs must be established for "installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary." Since the ZNPS facility is no longer licensed to operate, this criterion is not applicable.

Criterion 2 of 10 CFR 50.36(c)(2)(ii)(B) states that TS LCOs must be established for a "process variable, design feature, or operating restriction that is an initial condition of a DBA or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." The purpose of this criterion is to capture those process variables that have initial values assumed in the DBA and transient analyses, and which are monitored and controlled during power operation. Since the ZNPS facility is no longer licensed to operate, this criterion is not applicable.

Criterion 3 of 10 CFR 50.36(c)(2)(ii)(C) states that TS LCOs must be established for structures, systems, or components (SSCs) that are part of the primary success path and which function or actuate to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The intent of this criterion is to capture into the TS those SSCs that are part of the primary success path of a safety sequence analysis. The primary success path of a safety sequence analysis consists of a combination and sequences of equipment needed to operate (including consideration of the single failure criterion), so that the plant response to DBAs and transients limits the consequences of these events to within the appropriate acceptance criteria. Since fuel will have been removed from the spent fuel pool at the ZNPS facility prior to implementation of this amendment, this criterion is not applicable.

Criterion 4 of 10 CFR 50.36(c)(2)(ii)(D) states the TS LCOs must be established for SSCs which operating experience or probabilistic risk assessment has shown to be significant to public health and safety. The intent of this criterion is that risk insights and operating experience be factored into the establishment of TS LCOs. Since fuel will have been removed from the spent fuel pool at the ZNPS facility prior to implementation of this amendment, this criterion is not applicable.

Addressing administrative controls, 10 CFR 50.36(c)(5) states that they “are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner.” The particular administrative controls to be included in the TSs, therefore, are the provisions that the Commission deems essential for the safe operation of the facility that are not already covered by other regulations. Accordingly, the NRC staff has determined that administrative control requirements that are not specifically required under Section 50.36(c)(5), and which are not otherwise necessary to obviate the possibility of an abnormal situation, or an event giving rise to an immediate threat to the public health and safety, may be relocated to more appropriate documents (e.g., Quality Assurance Program, Security Plan, or Emergency Plan), which are subject to regulatory controls. Similarly, while the required content of TS administrative controls are specified in 10 CFR 50.36(c)(5), particular details may be relocated to licensee-controlled documents, where other regulations provide adequate regulatory control.

The QA program is a logical candidate for relocations of administrative controls due to the controls imposed by such regulations as Appendix B to 10 CFR Part 50, the existing NRC-approved QA plans and commitments to industry QA standards, and the established QA program change control process of 10 CFR 50.54(a).

The NRC Administrative Letter (AL) 95-06, "Relocation of Technical Specification Administrative Controls Related to Quality Assurance," (http://www.nrc.gov/reading-rm/doc-collections/gen-comm/admin-letters/1995/al95006.html) provides guidance to licensees requesting amendments that relocate administrative controls to NRC-approved QA program descriptions, where subsequent changes are controlled pursuant to 10 CFR 50.54(a). AL 95-06 provides specific guidance in the areas of: (1) independent safety engineering group, (2) reviews and audits, (3) procedure review process, and (4) records and record retention.

Some relocations are specifically discussed in AL 95-06, while others are similar in nature. Relocations not specifically discussed in AL 95-06 are evaluated with respect to the appropriateness of the relocation. Editorial changes are allowed without basis by 10 CFR 50.54(a)(3) and are not explicitly evaluated.

4.0 TECHNICAL EVALUATION

The licensee is currently in the process of transferring all the spent nuclear fuel from the SFP to an ISFSI. After all the spent nuclear fuel has been transferred from the SFP to the ISFSI, many of the requirements in the license or technical specifications are inapplicable or are no longer appropriate. The licensee has proposed multiple changes to the license and technical specifications to reflect the change in status of spent fuel storage. Each of the proposed changes is evaluated below based on the premise that the changes will not take effect until after all the spent nuclear fuel has been transferred to the ISFSI.

4.1 Facility Operating License Changes

The licensee has proposed changes to License Condition (LC) 2.C.(6), to delete reference to the Commission-approved physical security, guard training and qualification, and safeguards contingency plans entitled: "Zion Nuclear Power Station Security Plan," "Zion Nuclear Power Station Training and Qualification Plan," and; "Zion Nuclear Power Station Safeguards Contingency Plan." Reference to the "Zion Nuclear Power Station Independent Spent Fuel Storage Installation Physical Security Plan," would be retained. Following the transfer of all the spent fuel to the ISFSI, 10 CFR Part 73 compliant security plans would only be required for the protection of the spent fuel at the ISFSI. Therefore, the "Zion Nuclear Power Station Security Plan," "Zion Nuclear Power Station Training and Qualification Plan," and "Zion Nuclear Power Station Safeguards Contingency Plan," would no longer be required for the power station facility. Adequate protection of the remaining nuclear materials at the power station would be provided by the licensee's compliance with the requirements of 10 CFR Part 37. Based on these considerations, the proposed changes to LC 2.C.(6) are acceptable.

The licensee has proposed to delete LC 2.C.(7), "Spent Fuel Pool Modifications," which specifies authorized modifications to the spent fuel pool. Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Additionally, as discussed below, the licensee would add a limitation in the TS to prohibit storage of spent fuel in the spent fuel pool. With spent fuel storage no longer allowed in the spent fuel pool, the specification of authorized modifications would no longer be needed. Therefore, the proposed deletion is acceptable.

The licensee has proposed to delete LC 2.C.(16), which specifies changes to the Defueled Safety Analysis Report in support of NRC approval of the single-failure proof Fuel Building crane to be used for fuel transfer operations. Following the transfer of all spent fuel to the ISFSI, the single-failure proof Fuel Building crane would no longer be needed for fuel transfer operations and the approval of the crane for such use would no longer be needed. Therefore, the deletion of LC 2.C.(16) is acceptable.

4.2 Technical Specification Changes

The licensee has proposed to delete TS Section 1.0. "Use and Application," which includes: "Definitions," "Logical Connectors," "Completion Times," and "Frequency." As will be discussed later in this safety evaluation, all the TS that use or refer to the definition of actions, logical connectors, completion times, or frequency are to be deleted. Without any reference to actions, logical connectors, completion times, or frequency, they need not be defined in the TS. The proposed deletion is administrative and acceptable.
The licensee has proposed to delete TS Section 3.0 which includes: "Limited Conditions for

Operation (LCO) Applicability," and "Surveillance Requirement (SR) Applicability." As will be discussed later in this safety evaluation, all the TS that use or refer to LCOs or SRs are to be deleted. Without any reference to LCOs or SRs there is no need for them to be defined in the TS. The proposed deletion is administrative and acceptable.

The licensee has proposed to delete TS Section 3.1, "Defueled Plant Systems," which includes: TS 3.1.1, "Spent Fuel Pool Water Level," 3.1.2 "Spent Fuel Pool Boron Concentration," and 3.2.3 "Spent Fuel Assembly Storage." TS 3.1.1 specifies the minimum water level in the spent fuel pool during movement of irradiated fuel assemblies in the spent fuel pool and provides surveillance and action requirements for not meeting the specification. TS 3.1.2, specifies the minimum boron concentration in the spent fuel pool during movement or storage of fuel assemblies in the spent fuel pool and provides surveillance and action requirements for not meeting the specification. TS 3.1.3, specifies the enrichment and burn-up limits for fuel stored in the spent fuel pool and provides surveillance and action requirements for not meeting the specification. Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Additionally, as discussed below, the licensee is adding a limitation in the TS which prohibits storage of spent fuel in the spent fuel pool. With spent fuel storage no longer allowed in the spent fuel pool the specifications included in TS 3.1 are no longer needed, so the proposed deletion is acceptable.

The licensee has proposed the deletion of the current contents of TS Section 4.2, "Fuel Storage," which includes TS 4.2.1, "Criticality," TS 4.2.2, "Drainage," and TS 4.2.3, "Capacity." TS 4.2.1, specifies fuel enrichment, K_{eff} [K effective is the average number of neutrons from one fission that cause another fission], rack design, and pool storage location requirements to ensure that fuel stored in the pool is protected from accidental criticality. TS 4.2.2, specifies fuel pool design requirements to prevent drainage. TS 4.2.3, specifies storage capacity limits for fuel assemblies in the spent fuel pool. The license has also proposed the addition of TS 4.2.4, which will read: "Spent fuel shall not be stored in the spent fuel pool." Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Additionally, the licensee is adding a limitation in the TS which prohibits storage of spent fuel in the spent fuel pool. With spent fuel storage no longer allowed in the spent fuel pool the specifications currently included in TS 4.2 are no longer needed, therefore the proposed deletion is acceptable. The proposed addition of TS 4.2.4 provides a prohibition against the storage of spent fuel in the spent fuel pool, which supports the licensee's other proposed changes and ensures that fuel will not be placed in a spent fuel pool that has regulatory controls removed, and is therefore acceptable.

The licensee has proposed to relocate TS 5.1, "Responsibility," to the Quality Assurance Program Plan (QAPP) except for TS 5.1.1, which specifies that the shift supervisor is responsible for the shift command function. The transfer of the administrative controls in TS 5.1 is consistent with the guidance in AL 95-06, and therefore, is acceptable. The position of shift supervisor described in TS 5.1.1 is a holdover from the control room function of supervising multiple functions of an operating nuclear power plant. With the limited requirements for supervision of the passive fuel storage at the ISFSI or with respect to the decommissioning of the former power generation facility, that position is no longer required and the proposed deletion of TS 5.1.1 is acceptable.

The licensee has proposed to revise TS 5.2, "Organization," by relocating to the QAPP TS 5.2.1, except for the portion of TS 5.2.1.d, related to individuals who train Certified Fuel Handlers, which will be deleted, and by deleting TS 5.2.2. The transfer of the administrative

controls in TS 5.2.1, is consistent with the guidance in AL 95-06, and therefore, is acceptable. The portion of TS 5.2.1, to be deleted specifies requirements for individuals who train Certified Fuel Handlers. Following the transfer of all spent fuel to the ISFSI, and the new prohibition from placing fuel in the spent fuel pool, there will no longer be a need for Certified Fuel Handlers; therefore this proposed deletion is acceptable. TS 5.2.2, "Facility Staff," currently specifies the organizations and positions for activities affecting the safe storage of irradiated fuel. The licensee's QAPP addresses any necessary organizational requirements for the fuel in the ISFSI. Therefore the deletion of TS 5.2.2 after the fuel has been moved will have no impact and is acceptable.

The licensee has proposed the relocation of TS 5.3, "Facility Staff Qualifications," to the QAPP except for the portion related to the Decommissioning Operations Manager. The transfer of the administrative controls in TS 5.3 is consistent with the guidance in AL 95-06, and therefore, is acceptable. The position of Decommissioning Operations Manager was designated in lieu of the ANSI N18.1, "Selection and Training of Nuclear Power Plant Personnel," position of Operations Manager. The Decommissioning Operations Manager was required by TS 5.3.1, to be qualified as either a Certified Fuel Handler or Senior Reactor Operator. Following the transfer of all spent fuel to the ISFSI, there will no longer be a need for a manager to be qualified as either a Certified Fuel Handler or Senior Reactor Operator. Therefore the deletion of this requirement from the TS is acceptable.

The licensee has proposed to delete TS 5.4, "Training," in its entirety. TS 5.4, specifies the requirement to have a training program for the Certified Fuel Handlers. Following the transfer of all spent fuel to the ISFSI, there will no longer be a need for Certified Fuel Handlers or an associated training program. Therefore the deletion of this requirement from the TS is acceptable.

The licensee has proposed the relocation of TS 5.5, "Procedures," to the QAPP except for TS 5.5.1.a., specifying procedures applicable to the safe storage of nuclear fuel recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February, 1978, which is to be deleted. The transfer of the administrative controls in TS 5.5 is consistent with the guidance in AL 95-06, and therefore, is acceptable. The guidance in Regulatory Guide 1.33, Revision 2, Appendix A, addresses the wet storage of nuclear fuel in a spent fuel pool. Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Additionally, as discussed above, the licensee is adding a limitation in TS 4.2.4, which prohibits storage of spent fuel in the spent fuel pool. With spent fuel storage no longer allowed in the spent fuel pool the specifications included in TS 5.5.1.a., would no longer be needed, so the proposed deletion is acceptable.

The licensee has proposed the relocation of TS 5.6, "Programs and Manuals," to the QAPP except for TS 5.6.4, "Technical Specification (TS) Bases Control Program," which is to be deleted. The transfer of the administrative controls in TS 5.6 is consistent with the guidance in AL 95-06, and therefore, is acceptable. TS 5.6.4, specifies the process for changes to the TS Bases. Currently the TS Bases are all related to storage of spent fuel in the spent fuel pool, specifically the requirements in TS 4.2, which the licensee would delete as described above. Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Therefore the bases for now deleted TS requirements are no longer needed, and the proposed deletion of TS 5.6.4, is acceptable.

The license has proposed to relocate TS 5.7, “Reporting Requirements,” to the QAPP in its entirety. The transfer of the administrative controls in TS 5.7 is consistent with the guidance in AL 95-06, and therefore, is acceptable.

The license has proposed to relocate TS 5.9, “Reviews,” to the QAPP in its entirety. The transfer of the administrative controls in TS 5.9 is consistent with the guidance in AL 95-06, and therefore, is acceptable.

The licensee has proposed the deletion of the Permanently Defueled Technical Specification Bases in its entirety. Currently the TS Bases are all related to storage of spent fuel in the spent fuel pool, specifically the requirements in TS 4.2, which the licensee would delete as described above. Following the transfer of all spent fuel to the ISFSI, the spent fuel pool will no longer be used for spent fuel storage. Therefore the bases for now-deleted TS requirements would no longer be needed, and the proposed deletion of the Bases is acceptable.

Other editorial changes were proposed by the licensee to facilitate the transfer of the TS requirements to the QAPP. These changes are administrative in nature and are acceptable.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments include changes to requirements with respect to installation or use of a facility component located within the protected area and changes to recordkeeping, reporting, or administrative procedures or requirements. NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration (79 FR 38594; July 8, 2014), and there has been no public comment on such finding. The September 10, 2014, supplement provided clarifying information and did not change the scope of the application. Accordingly, the amendment meets the eligibility criteria for categorical exclusions set forth in 10 CFR 51.22(c)(9) or 10 CFR 51.22(c)(10)(ii). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment. The State official had no comments.

7.0 CONCLUSION

The changes proposed by this license amendment request will delete requirements that are rendered not applicable following the transfer of spent nuclear fuel to the ISFSI and relocate administrative controls consistent with NRC Administrative Letter 95-06. On the basis of its review, NRC staff concluded that the licensee’s request will adequately address the regulatory safety requirements for a permanently shut-down nuclear power facility with the spent nuclear fuel transferred to dry cask storage in an ISFSI. The staff, therefore, concludes that the license amendment request is acceptable.

The staff has concluded, based on the considerations discussed above, that: 1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; and 2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security nor to the health and safety of the public.

8.0 REFERENCES

1. Letter from Commonwealth Edison Company to U.S. Nuclear Regulatory Commission, "Zion Nuclear Power Station, Unit Nos. 1 and 2 Certification of Permanent Cessation of Operations," dated February 13, 1998 (ADAMS Legacy No. 9802200407).

2. Letter from Commonwealth Edison Company to U.S. Nuclear Regulatory Commission, "Zion Nuclear Power Station, Unit Nos. 1 and 2 Certification of Permanent Fuel Removal," dated March 9, 1998 (ADAMS Legacy No. 9803110251).

3. Letter from U.S. Nuclear Regulatory Commission to Oliver Kingsley, Commonwealth Edison Company, "Certification of Permanent Cessation of Power Operation and Permanent Removal of Fuel from the Reactor for Zion Nuclear Power Station, Units 1 and 2, dated May 4, 1998 (ADAMS Legacy No. 99805080144).

4. Letter from Exelon Generation Company, LLC to U.S. Nuclear Regulatory Commission, "Application for License Transfers and Conforming Administrative License Amendments," dated January 25, 2008 (ADAMS Accession No. ML080310521).

5. Letter from Zion*Solutions* to U.S. Nuclear Regulatory Commission, "Zion Nuclear Power Station, Units 1 and 2, License Amendment Change Request Related to the Unloaded Spent Fuel Pool," dated March 17, 2014 (ADAMS Accession No. ML14078A049)

6. Letter from Zion*Solutions* to U.S. Nuclear Regulatory Commission, "Zion Nuclear Power Station, Units 1 and 2, Supplement 1 to License Amendment Change Request Related to the Unloaded Spent Fuel Pool," dated September 10, 2014 (ADAMS Accession No. ML14255A007)

Principal Contributor: John Hickman