Nebraska Public Power District

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NLS2006028
October 17, 2006

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: License Amendment Request to Revise Technical Specification - Onsite Spent Fuel Storage Expansion
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The purpose of this letter is for the Nebraska Public Power District (NPPD) to request an amendment to Facility Operating License DPR-46 in accordance with the provisions of 10 CFR 50.4 and 10 CFR 50.90 to revise the Cooper Nuclear Station (CNS) Technical Specifications (TS). This request revises TS Section 4.3.1.1.c by adding a new nominal center-to-center distance between fuel assemblies for the new storage racks, and revises TS Section 4.3.3 by increasing the capacity of the spent fuel storage pool from 2366 assemblies to 2651 assemblies.

CNS lost full core offload capability when spent fuel was discharged to the spent fuel pool (SFP) following the last refueling outage, conducted during January and February 2005. The requested increase in capacity will restore full core offload capability until the receipt of new fuel for Cycle 26 near the end of Cycle 25, sometime in summer 2009. This increased capacity is based on placing two new racks into the SFP. The first rack will be placed into the SFP following issuance of the amendment. The only location in the SFP to place the second rack is the cask set-down area. Therefore, the second rack will not be placed in the pool unless there is a need to unload the complete core. NPPD is pursuing dry cask storage for long range spent fuel management.

NPPD requests Nuclear Regulatory Commission (NRC) approval of the proposed TS change and issuance of the requested license amendment by August 31, 2007. The amendment will be implemented within 30 days of issuance of the amendment.

Attachment 1 provides a description of the proposed TS change, the technical analysis basis for the change, the no significant hazards consideration evaluation pursuant to 10 CFR 50.91(a)(1), and the environmental impact evaluation pursuant to 10 CFR 51.22. Attachment 2 provides marked up pages with the specific changes to the current CNS TS. Attachment 3 provides the revised TS pages in final format. No Bases pages are affected by this amendment request.

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The information supporting this proposed change was prepared by Holtec International (Holtec) and is considered to be proprietary pursuant to 10 CFR 2.390(a)(4). The supporting information also contains information considered by Global Nuclear Fuels (GNF) to be proprietary. The proprietary Holtec report is provided as Enclosure 1, with both Holtec and GNF specific proprietary text shaded. The Holtec affidavit required by 10 CFR 2.390(b)(1) requesting that this report be withheld from public disclosure is provided as Enclosure 2. The GNF affidavit required by 10 CFR 2.390(b)(1) requesting that this report be withheld from public disclosure is provided as Enclosure 3. A nonproprietary version of Enclosure 1 suitable for public disclosure is provided as Enclosure 4.

This proposed TS change has been reviewed by the necessary safety review committees (Station Operations Review Committee and Safety Review and Audit Board). Amendments to the CNS Facility Operating License through Amendment 224 dated October 3, 2006, have been incorporated into this request. This request is submitted under oath pursuant to 10 CFR 50.30(b).

By copy of this letter and its attachments, the appropriate State of Nebraska official is notified in accordance with 10 CFR 50.91(b)(1). Copies to the NRC Region IV office and the CNS Resident Inspector are also being provided in accordance with 10 CFR 50.4(b)(1).

Should you have any questions concerning this matter, please contact Paul Fleming, Licensing Manager, at (402) 825-2774.

I declare under penalty of perjury that the foregoing is true and correct.

Executed On: October 17, 2006
Date

Sincerely,

Stewart B. Minahan
General Manager of Plant Operations

/rr

Attachments
Enclosures

cc: Regional Administrator w/ attachments and enclosures
USNRC - Region IV

Cooper Project Manager w/ attachments and enclosures
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachments and enclosures
USNRC - CNS

Nebraska Health and Human Service w/ attachments and enclosures
Department of Regulation and Licensure

NPG Distribution w/o attachments or enclosures

CNS Records w/ attachments and enclosures

ATTACHMENT 1

LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION - ONSITE SPENT FUEL STORAGE EXPANSION

COOPER NUCLEAR STATION
DOCKET NO. 50-298, DPR-46

Revised Technical Specification Page

4.0-2

1.0 Description

This license amendment request (LAR) proposes an increase in the allowable onsite storage capacity of spent fuel assemblies in the spent fuel pool for the Cooper Nuclear Station (CNS), Operating License No. DPR-46. This increased capacity will be made available by two new spent fuel storage racks.

2.0 Proposed Change

This LAR proposes to revise Technical Specifications (TS) to increase the licensed storage capacity of spent fuel assemblies by 285, from the current limit of 2366 to a new limit of 2651, and to specify a center-to-center dimension between fuel assemblies for the new racks. The LAR proposes the following specific TS changes:

1. In TS 4.3, "Fuel Storage," revise subsection 4.3.1.1.c, "Criticality," to reflect the nominal center-to-center dimension between fuel assemblies in the new fuel racks. This section currently addresses the nominal center-to-center dimension between fuel assemblies placed in the existing Boral-poisoned storage racks. These racks have a center-to-center dimension of 6 9/16 inch. This dimension in the new Metamic-poisoned racks is 6.108 inches. The proposed revised section reads:

   > "A nominal 6 9/16 inch center-to center distance between fuel assemblies placed in the Boral-poisoned storage racks. A nominal 6.108 inch center-to-center distance between fuel assemblies placed in the Metamic-poisoned racks."

2. In TS 4.3, "Fuel Storage," revise subsection 4.3.3, "Capacity," to reflect an increased storage capacity of the spent fuel pool (SFP). The current number of fuel assemblies authorized to be stored in the SFP is 2366. It is proposed that this be increased by 285 assemblies, to a new capacity of 2651.

There are no TS Bases for these sections.

3.0 Background

The CNS SFP currently contains 13 storage racks with a capacity of 2366 Boiling Water Reactor fuel assemblies. Currently the SFP does not have sufficient capacity to accommodate a full core offload. This capability was lost when the spent fuel was discharged to the SFP during the last refueling outage in January and February of 2005.

NPPD has evaluated spent fuel storage alternatives that are currently feasible for use at CNS. The evaluation concluded that increasing the storage capacity of the SFP is currently the most cost-effective alternative to restore and maintain full core offload capability at CNS as an interim action until dry storage of spent fuel can be implemented.

Increasing the capacity of the SFP to 2651 is based on adding two racks into the SFP. The first rack is a 9 x 13 cell rack that will add 117 storage locations. This rack will be placed into the SFP area north of the cask set down area. The second rack is a 14 x 13 cell rack (non-rectangular array) that will add 168 storage locations. The only available space in the SFP to place this second rack is the cask set-down area. This second rack will be placed in the SFP only if there is a need to offload the entire core into the SFP.

This increased capacity will provide full core offload capability until receipt of the new fuel for Cycle 26 in summer 2009.

For the long term resolution of SFP storage capability, NPPD intends to proceed with the establishment of an Independent Spent Fuel Storage Installation. The licensing, engineering, construction, and training activities required for an undertaking of this magnitude are described in Appendix 11.A of Enclosure 1, Holtec International report entitled "Licensing Report on the Wet Fuel Storage Capacity Expansion at Cooper Nuclear Station," (Holtec Report No. 2043224).

4.0 Technical Analysis

Enclosure 1 presents the information needed for NRC review of the proposed rack expansion and issuance of the requested license amendment, including the design basis, analysis methodology, and evaluation results for the proposed storage racks at CNS. The following is an overview of the proposed rack expansion and a summary of the information presented in Enclosure 1. (None of the information in Attachment 1 is proprietary to either Holtec International or to Global Nuclear Fuels.)

The new storage racks will be provided by Holtec International and will be free standing and self-supporting. The new storage racks will be mounted on platforms. Seismic restraints for the existing racks in the vicinity of the shipping cask set-down area of the SFP will not be affected by the new racks.

The new racks will be separated from each other by a gap of approximately 23 inches. The smallest gap between the new racks and the walls of the SFP will be 10-1/16 inches. The smallest gap between the new racks and the nearest structural member will be 3-29/32 inches. There will be at least 27 inches between the new racks and the existing racks.

With the expanded capacity, the SFP cooling system will be required to remove an increased heat load while maintaining the pool water temperature at or below the design limit of 150°F bulk water temperature. The SFP thermal performance and criticality response have been reanalyzed considering the increased storage capacity. An analysis of the seismic response of the new racks was conducted. The results of these analyses have shown that the pool storage systems remain adequate. The design and analyses performed demonstrate that the new storage racks are consistent with the governing requirements of applicable codes and standards. NRC guidance provided in NRC memorandum, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications," dated April 14, 1978, as modified by amendment dated January 18, 1979 (Reference 1) was used in preparing the Holtec Licensing Report.

Mechanical Design Evaluation

The new fuel rack design has been evaluated with respect to mechanical and material qualifications, neutron poison, fuel handling ability, fuel interfaces, and accident considerations. The details of this evaluation are provided in Enclosure 1.

The principal construction material for the new racks will be SA240 Type 304 stainless steel. The rack designs, material selection and fabrication process will comply with the applicable ASTM Standards, A240, A276, A479, A564 and others, for service in the nuclear environment. The governing quality assurance requirements for fabrication of the racks are in accordance with the quality assurance and quality control requirements of 10CFR50, Appendix B.

Primary nuclear criticality control in the new racks is provided by means of a fixed neutron absorber (Metamic) integrated within the rack structure. The use of Metamic in wet storage pool applications has previously been approved by the NRC for use at Clinton Power Station, Unit 1 (Facility Operating License No. NPF-62), by Amendment 170, dated October 31, 2005 (Reference 2).

The installation of the new fuel storage racks will preserve space for thermal expansion and seismic movement. The new storage racks will be positioned on newly designed platforms that serve to provide a flat and level bearing surface for the rack modules. The racks will be supported by relatively short supports called "shear pads" made of stainless plate stock and welded to the underside of the rack baseplate. Because the shear pads are short (side dimension is over three times the thickness), they will resist any lateral load at the rack/platform interface during seismic events. The short height of the shear pads and their maximized spacing help to minimize rocking of the racks under seismic conditions.

Criticality Considerations

The new spent fuel storage racks are designed to maintain the required subcriticality margin when fully loaded with unirradiated fuel assemblies of maximum allowed enrichment at a temperature corresponding to the highest reactivity. For reactivity control in the racks, neutron absorber panels will be used. The panels have been sized to sufficiently shadow the active fuel height of fuel assemblies stored in the pool. The panels will be held in place and protected against damage by a stainless steel jacket welded to the cell walls. The panels will be mounted on the exterior or on the interior of the cells, wherever required to satisfy criticality analysis requirements.

The new racks are designed to assure that the neutron multiplication factor (k_{eff}) is equal to or less than 0.95 with the racks fully loaded with fuel of the highest anticipated reactivity and pool flooded with unborated water at a temperature corresponding to the highest reactivity. The maximum calculated reactivity includes a margin for uncertainty in reactivity calculations and in mechanical tolerances, statistically combined, giving assurance the true k_{eff} will be less than 0.95 with a 95% probability at a 95% confidence level. Reactivity effects of abnormal and accident conditions are also evaluated to assure that under credible abnormal or accident conditions, the reactivity will be maintained less than 0.95. The accidents and malfunctions evaluated included impact on criticality of water temperature and density effects; and impact on criticality of eccentric positioning of fuel assemblies within the rack. The minimum subcriticality margin (i.e., k_{eff} less than or equal to 0.95) will be maintained.

Thermal Hydraulics and Spent Fuel Pool Cooling

A comprehensive thermal-hydraulic evaluation of the spent fuel pool under the expanded storage configuration has been prepared to analyze the thermal performance (provided in Enclosure 1). For this evaluation, the historical discharge schedule was used for past outages and 160 bundles per discharge is assumed for future refueling outages. Evaluations performed for the SFP cooling system conservatively considered the decay heat from 17 previous cycles, plus the decay heat from various sizes of core discharge after an 18-month cycle. The quantity of fuel assemblies from this discharge history exceeds the proposed 2651 designed available storage locations for the full core offload. The calculation of the long-term decay heat for thermal analysis of the pool was performed using the industry standard ORIGEN2 isotope depletion and generation computer code developed by the Oak Ridge National Laboratory. The time-variant decay heat generated by the most recent outage discharge was assumed to take place after a cooling time of 67 hours and with the highest rate of fuel transfer from the vessel to the pool to maximize the heat addition. The SFP bulk temperature is limited to the design value of 150°F for any partial core or full core offload. Procedural controls ensure that transferring fuel assemblies to the SFP will not result in exceeding this temperature limit.

The local water temperatures are determined assuming the pool is at its peak bulk temperature. The hydraulic resistance of the fuel storage rack cells is conservatively based on the most restrictive water inlet geometry and also conservatively includes the effects of a blockage due to a dropped fuel assembly lying horizontally on top of the racks. The fuel assemblies with the highest decay heat generation rates are conservatively grouped together in the center of the storage rack. A conservative value for the axial peaking power factor was used to determine the bounding fuel cladding temperatures.

For the case with Fuel Pool Cooling (FPC) system operating, the calculated maximum local water temperature is determined to be 186°F in the hottest channel, coinciding in time with the highest pool bulk temperature of 150°F. The maximum fuel cladding temperature is calculated to be 207°F. The boiling temperature at the top of the fuel, based on a minimum water level in the pool of 21 feet above the top of the racks, will be approximately 236°F. TS require that the minimum SFP water level be $\geq$ 21 feet 6 inches over the top of spent fuel assemblies seated in the storage racks. This indicates that the channel will remain in subcooled flow, when the FPC system is operating.

For the case without FPC operating, the maximum local water temperature and the bounding fuel cladding temperature both exceed the 236°F local saturation temperature at the top of the racks so a Departure from Nucleate Boiling (DNB) evaluation is required. This evaluation determined that DNB will not occur. In both the FPC operating case and the FPC not operating case the bounding fuel cladding temperature did not exceed the current licensing limit of 350°F.

Thermal analyses to support this amendment request were completed assuming a minimum in-core hold time of 67 hours. This limit of 67 hours was the licensing basis (based on dose calculations) at the time the analyses were performed. This limit was changed to 24 hours by Amendment No. 222, dated September 5, 2006, to the CNS operating license. Regardless, the in-core hold time will not be less than the minimum time required by the thermal analyses or dose calculations, including in-core hold times of any future revisions of the analyses.

Seismic and Structural Evaluation

The pool floor was evaluated for the increased load of the new racks fully loaded with fuel, and the pool floor liner was evaluated for loadings under the seismic conditions for the new racks. The new racks/platforms have no other structural interactions with the rest of the SFP. The analysis considered the loads from seismic, thermal, and mechanical forces to determine the margin of safety in the structural integrity of the fuel racks, the spent fuel pool and liner. The loads, load combinations, and acceptance criteria were based on American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section III, Subsection NF, and on NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP) Section 3.8.4, Appendix D.

The final configuration of the pool will consist of the existing racks, which remain fully restrained against seismic motion, and two new free standing and self-supporting racks. The new racks are sufficiently separated from the existing racks and from each other to attenuate hydrodynamic effects. This separation avoids inter-rack fluid-coupling interactions and seismic motion interactions. As the existing rack array remains unaffected by the new rack additions, the seismic analyses were performed for the new racks only, using the "single rack seismic analysis" procedure. The seismic analyses were based on time-history simulations of the Operating Basis Earthquake (OBE) condition and the Safe Shutdown Earthquake (SSE) condition. The maximum seismic reactions were combined by square root sum of the squares method, and the resultant stresses compared against the applicable allowable stress limits.

The results indicate that the maximum seismic displacements do not pose a threat of impact between the top of the new racks and the pool walls, the existing racks, or the structural members of the existing rack seismic restraint system. The resultant member and weld stresses in the racks are below allowable stresses, with a safety factor of at least 1.01. Therefore, the racks will remain functional during and after an SSE event.

The rack analysis also provided pedestal to bearing pad impact loads resulting from lift-off and subsequent resettling during seismic events. The pool floor stresses were evaluated for these impact loads and determined to remain within the allowable limits, even when considering the worst-case pedestal location with respect to leak chases.

In addition to the seismic evaluations, the storage racks were also analyzed for postulated accident conditions. A fuel handling accident involving a fuel assembly dropped from the highest possible lift height of the fuel-handling platform would not compromise the integrity of the rack neutron absorber or the ability of the racks to maintain a subcritical storage configuration. For a drop onto the top of the rack, permanent deformation of the rack would be limited to the region above the top of the active fuel region of the stored fuel. Therefore, the damage does not extend into the active fuel region of the stored fuel. For a drop into an empty cell which impacts the rack baseplate, the maximum cell baseplate deformation is less than three inches, which is acceptable with respect to the criticality analysis. A fuel assembly drop onto the racks will not result in failure of the fuel pool liner. Additionally, the rack walls were demonstrated to be structurally sound under the uplift load caused by a postulated stuck fuel assembly. Thus, the functionality of the rack would not be affected by postulated accident conditions.

The SFP is a reinforced concrete structure, completely lined with seam-welded stainless steel plates welded to reinforcing members (channels, I-beams, etc.) embedded in concrete. Appropriate portions of the pool structure have been analyzed using a finite element model with static applied loads. The individual loads components are combined using factored load combinations mandated by SRP Section 3.8.4. The following discrete load combinations were considered:

- Dead Loads (weight of the slab, fuel racks and rack platforms)
- Live Loads (weight of the stored fuel assemblies and a shipping cask)
- Seismic Loads (generated by the OBE and the SSE)
- Thermal Load (resulting from a thermal gradient based on an assumed interior surface of 160°F bulk pool temperature and an assumed exterior surface of 85°F ambient temperature.)

The results of the analyses performed on the spent fuel pool slab demonstrate that, for the bounding factored load combinations, the structural integrity of the pool is maintained when its slab is assumed to be loaded with all storage locations in the existing, as well as the new racks, fully loaded with channeled fuel.

Radiological Considerations

Radiological consequences of the fuel handling accident are not affected by this change. The procedures and equipment used to move fuel remain unchanged and therefore, the drop height of a fuel assembly and the resulting fuel damage will not be changed. A rack drop involving radiological consequences is precluded, since rack movement during the removal and installation phase will follow safe load paths that prevent heavy loads from being transported over the stored spent fuel. Thus, there are no credible radiological consequences from this accident. Enclosure 1, Chapter 10, provides a detailed discussion of heavy load considerations for the proposed pool capacity expansion.

Loss of spent fuel pool cooling at CNS is mitigated by supplying makeup water to the pool prior to the time that the temperature of the pool reaches boiling. The time to boil represents the onset of loss of pool water inventory. Adequate shielding is provided by a minimum of eight and one-half feet of water above irradiated fuel located in the SFP. A minimum of 21 feet, 6 inches above the top of the irradiated fuel assemblies is required by TS 3.7.6. Boiling would have to continue for some period of time to reduce the level in the SFP from this minimum level to eight and one-half feet. Thus, the time for the dose rate above the SFP to increase significantly would be much greater than the time to boil.

The current minimum time to boil, based on a complete core offload in the SFP, is five hours. The thermal-hydraulic analysis performed in support of this amendment request determined, for a complete loss of forced cooling with a complete core offload, that the minimum time to boil has been reduced to 4.19 hours. This remains sufficient time for the operators to provide makeup water.

Radiological conditions in the Reactor Building near the SFP are typically dominated by the most recently discharged batch of spent fuel. Since the new storage racks will be located closer to the west SFP wall, an increase in the radiological doses in adjacent areas is expected. The potential exists for an unacceptable dose rate to be present in plant areas adjacent to the exterior surface of the west wall of the SFP if the new racks are filled with freshly discharged fuel. Calculations show that 5-year cooled spent fuel placed in storage locations adjacent to the SFP wall can be used for shielding. As necessary, cooled fuel will be placed in the outer storage locations in the new racks to provide shielding from freshly discharged fuel assemblies. The procedure for controlling storage of spent fuel in the SFP will be revised to require the placement of the appropriate number of rows of cooled fuel.

Load Handling Considerations

The method of handling fuel is not changed since the same equipment and procedures will be used. During spent fuel rack installation, work in the spent fuel pool area will be controlled and performed in accordance with specific written procedures. Any movement of fuel assemblies required to be performed to support the modification (e.g., removal of steel structures in the vicinity of the shipping cask area and installation of racks) will be performed in the same manner as during normal refueling operations. Shipping cask movements in the SFP will not be performed during the modification period. There is no change to the methods or equipment to be used in moving fuel casks.

A new rack lifting rig will be introduced to install the new racks. This temporary lift device has been designed to meet the requirements of NUREG 0612 and ANSI N14.6. A rack drop event is commonly referred to as a "heavy load drop" over the pools. Racks will not be allowed to travel over any racks containing fuel assemblies, thus a rack drop onto fuel is precluded. A rack drop to the pool liner is not a postulated event, since the lifting components either provide redundancy in supporting the racks or are designed with safety margins greater than a factor of ten. Movements of heavy loads over the pool will comply with the applicable administrative controls and guidelines (i.e. plant procedures, NUREG 0612, etc.).

Enclosure 1, Chapter 10, describes the controls that will be used during installation of the new spent fuel racks. Personnel from Holtec will perform activities to install the new racks. Thus, the specific actions to be taken by Holtec personnel, discussed in Chapter 10, are not considered to be commitments by NPPD.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

Nebraska Public Power District (NPPD) is requesting a revision to the Facility Operating License No. DPR-46 for Cooper Nuclear Station (CNS). The proposed change revises Technical Specifications (TS) 4.3.1.1.c to reflect the center-to-center distance between fuel assemblies in the new spent fuel storage racks and TS 4.3.3 to reflect an increased capacity of the spent fuel pool (SFP). These changes are needed to support installation of two new spent fuel storage racks in the SFP.

CNS lost full core off-load capability when spent fuel assemblies were permanently discharged from the reactor and placed into the SFP during the last refueling outage. The proposed expansion will increase the approved total storage space from 2366 to 2651 fuel assemblies. One new rack will be placed in the liner platform area adjacent to the shipping cask area of the SFP. Only in the event that a full core offload is required will the second new storage rack be placed in the shipping cask area of the SFP. The increased capacity will provide full core offload capability until new fuel for Operating Cycle 26 is received in summer 2009.

NPPD has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below.

1. **Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No.

   The probability of a seismic event, and the resulting loss of spent fuel pool cooling flow, is not influenced by the proposed changes. In addition, the probability of an accidental fuel assembly drop or misloading is primarily influenced by the methods used to lift and move these loads. The method of handling fuel will not be changed since the same equipment and procedures will be used. Shipping cask movements in the SFP will not be performed during installation of the new racks. There is no change to the methods or equipment to be used in moving fuel casks. Expanding the spent fuel storage capacity does not have a significant impact on the frequency of occurrence for any accident previously evaluated.

Therefore, this change will not significantly increase the probability of occurrence of any accident previously analyzed.

The consequences of a dropped spent fuel assembly in the SFP have been re-evaluated for the proposed change by analyzing a potential impact onto the new racks. The results show that the postulated accident of a fuel assembly striking the new storage racks will not distort the racks sufficiently to impair their functionality. The minimum subcriticality margin required by the current TS (i.e., neutron multiplication factor [k_{eff}] less than or equal to 0.95) will be maintained. The structural damage to the Reactor Building, pool liner, and fuel assembly resulting from a dropped fuel assembly striking the pool floor or another assembly located in the racks is primarily dependent on the mass of the falling object and the drop height. Since these two parameters are not changed by the proposed modification, the postulated structural damage to these items remains unchanged. The radiological dose at the exclusion area boundary will not be increased since no changes are being made to in-core hold time or burnup as a result of the proposed amendment.

Loss of SFP cooling was evaluated. The concern with this event is a reduction of spent fuel pool water inventory as a result of boiling in the fuel pool, with the inventory reduction resulting in an unacceptable increase in dose rates. Loss of spent fuel pool cooling at CNS is mitigated procedurally by supplying makeup water to the pool prior to the time that the temperature of the pool reaches boiling. The thermal-hydraulic analysis for the proposed license amendment determined, for a complete loss of forced cooling and a full core discharge, that the minimum time to boil is 4.19 hours. This has been determined to be sufficient time for the operators to provide alternate means of makeup water to the SFP before the water begins to boil. Based on this the consequences of a loss of SFP cooling are not significantly increased.

The consequences of a design basis seismic event are evaluated on the basis of subsequent fuel damage or compromise of the fuel storage or building configurations leading to radiological or criticality concerns. The new racks have been analyzed in their new configuration and were found to be safe during seismic motion. Fuel has been determined to remain intact and the storage racks maintain the fuel and fixed poison configurations subsequent to a seismic event. The structural capability of the pool and liner will not be exceeded under the anticipated combinations of dead weight, thermal, and seismic loads. The Reactor Building structure will remain intact during a seismic event and will continue to adequately support and protect the fuel racks, storage array, and pool moderator/coolant. Therefore, the consequences of a design basis seismic event are not increased.

The consequence of a fuel misloading accident has been analyzed for the worst possible storage configuration subsequent to the proposed modification. It has been determined that the consequences remain acceptable with respect to the same criteria used previously.

Therefore, the proposed change does not result in a significant increase in the consequences of a previously evaluated accident.

In summary, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No.

   A drop of a fuel assembly onto fuel assemblies stored in the SFP has been previously analyzed for CNS and is not a new or different kind of accident. The only event which would represent a new or different kind of accident is an accidental drop of a rack during movement in the pool.

   Dropping a rack onto stored spent fuel or the pool floor liner, commonly referred to as a "heavy load drop," is not postulated due to the defense-in-depth approach to be taken. A lifting rig designed to meet the requirements of NUREG 0612 and ANSI N14.6 will be used to install the new racks. Dropping a new rack onto fuel is precluded by not allowing the new racks being placed into the SFP to travel over racks containing fuel assemblies. A rack drop to the pool liner is not postulated since the lifting components either provide redundancy in supporting the racks or are designed with safety margins greater than a factor of ten. Movements of heavy loads over the pool will comply with the applicable administrative controls and guidelines (i.e. plant procedures, NUREG 0612, etc.). Therefore, the rack drop does not represent a new or different kind of accident.

   The proposed change does not alter the operation of the plant or equipment credited for the mitigation of the design basis accidents. The proposed change does not affect the important parameters required to ensure safe fuel storage.

   In summary, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. **Does the proposed amendment involve a significant reduction in a margin of safety?**

Response: No.

The function of the spent fuel pool is to store the fuel assemblies in a subcritical and coolable configuration under postulated environmental and abnormal loadings, such as an earthquake or fuel assembly drop. The new rack design meets the applicable requirements for safe storage and is functionally compatible with the SFP.

The Holtec Licensing Report was prepared using the guidance of the applicable provisions of the NRC Guidance entitled, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications." The rack materials used are compatible with the spent fuel assemblies and the SFP environment. The design of the new racks preserves the proper margin of safety during abnormal loads, e.g., loads from a seismic event, a dropped assembly, and tensile loads from a stuck fuel assembly. It has been shown that such loads will not invalidate the mechanical design and material selection to safely store fuel in a coolable and subcritical configuration.

The methodology used in the criticality analysis of the expanded spent fuel pool complies with the appropriate NRC guidelines and the ANSI standards (Draft GDC 66, NUREG 0800, Section 9.1.2, the OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications, Reg. Guide 1.13, and ANSI ANS 8.17).

The subcriticality margin (k_{eff}) for spent fuel stored in the SFP is required to be less than or equal to 0.95 under normal storage, fuel handling, and accident conditions, including uncertainties. This margin will be maintained with the proposed increased capacity.

The thermal-hydraulic and cooling evaluation of the pool determined that the pool can be maintained below the specified thermal limits under the conditions of the maximum heat load. The pool temperature will not exceed the design temperature of 150°F during operation of the cooling systems. The maximum local water temperature in the hot channel will remain below the boiling point. The maximum cladding temperature after a loss of cooling remains less than the current licensing basis value of 350°F with bulk boiling in the pool. The stored fuel will not undergo any significant heat up with blockage of a dropped fuel assembly lying horizontally on top of the racks. The thermal limits specified for the evaluations performed to support the proposed change are the same as those which were used in the previous evaluations.

The time to boiling, in the event of a complete loss of SFP cooling with a full core discharge, has been reduced from 5 hours to 4.19 hours. However, this has been determined to be sufficient time for providing makeup to the SFP.

Based on the above it is concluded that the proposed change does not involve a significant reduction in a margin of safety.

Conclusion

Based on the above, NPPD concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92, paragraph (c), and, accordingly, a finding of no significant hazards consideration is justified.

5.2 Applicable Regulatory Requirements/Criteria

The construction of CNS predated the 1971 issuance of 10 CFR 50 Appendix A, "General Design Criteria for Nuclear Power Plants." CNS is designed to be in conformance with the intent of the Draft General Design Criteria (GDC), published in the Federal Register on July 11, 1967, except where commitments have been made to specific 1971 GDCs. The applicable GDCs are:

Draft GDC 66 - Prevention of Fuel Storage Criticality

"Criticality in new and spent fuel storage shall be prevented by physical systems or processes. Such means as geometrically safe configurations shall be emphasized over procedural controls."

The proposed changes do not impact the design or use of the existing storage racks and the new storage racks have been designed to prevent criticality in the racks.

Draft GDC 67 - Fuel and Waste Storage Decay Heat

"Reliable decay heat removal systems shall be designed to prevent damage to the fuel in storage facilities that could result in radioactivity release to plant operating area or the public environs."

The fuel pool cooling system is designed to remove the decay heat released from the spent fuel assemblies stored in the SFP. Analysis demonstrates that existing decay heat removal systems are capable of removing the total decay heat from the existing stored fuel plus the additional fuel that will be stored. The ability to provide makeup water to the SFP prior to damage of the stored fuel as a result of lowered level and exposure of the fuel, in the event of a complete loss of SFP cooling, ensures that CNS continues to comply with Draft GDC 67.

Draft GDC 68 - Fuel and Waste Storage Radiation Shielding

"Shielding for radiation protection shall be provided in the design of spent fuel and waste storage facilities as required to meet the requirements of 10CFR20."

The proposed change does not impact the shielding above and around the existing fuel storage racks and thus does not impact radiation protection for this area. The new racks will be set down into the SFP such that fuel stored in the new racks will have the same depth of water above them. Therefore the dose rate above the new racks will be consistent with dose rates above the existing racks. Conservative calculations show the potential for increased occupational dose rates external to the SFP on the same level as the fuel with newly discharged fuel in storage locations adjacent to the SFP west wall. Administrative controls ensure that dose rates in accessible areas are properly monitored, and managed, and appropriate steps taken to reduce these dose rates. If necessary, cooled fuel will be used as a barrier in rows of the new Metamic-poisoned storage racks closest to the west wall of the SFP. The increase in occupational radiation exposure to individuals due to storage of additional fuel in the SFP will be negligible.

Draft GDC 69 - Protection Against Radioactivity Release From Spent Fuel and Waste Storage

"Containment of fuel and waste storage shall be provided if accidents could lead to release of undue amounts of radioactivity to the public environs."

Expansion of the spent fuel storage capacity does not impact compliance with this GDC. These systems will continue to provide suitable shielding, cooling, containment, confinement, and filtering systems, and protection against significant reduction in fuel storage coolant inventory under accident conditions. No changes are being made to fuel handling equipment or procedures or heavy load movement equipment or procedures.

Conclusion

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met. NPPD has determined that the proposed change does not require any exemptions or relief from regulatory requirements, other than the TS, and does not affect conformance with any Draft GDC differently than described in the CNS Safety Analysis Report. Applicable regulatory requirements will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained. The report provided in Enclosure 1 documents the design and analyses performed to demonstrate that the new racks are consistent with the governing requirements of the applicable codes and standards.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation." However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," Paragraph (c)(9). Therefore, pursuant to 10 CFR 51.22, Paragraph (b), no environmental impact statement or environmental assessment needs be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. U. S. NRC memorandum, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications," dated April 14, 1978, as modified by amendment dated January 18, 1979.

2. Letter to Christopher M. Crane (AmerGen Energy Company, LLC) from Kahtan N. Jabbour (NRC) dated October 31, 2005, "Clinton Power Station, Unit 1 - Issuance of an Amendment RE: Onsite Spent Fuel Storage Expansion (TAC NO MC4202)"

ATTACHMENT 2

LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION - ONSITE SPENT FUEL STORAGE EXPANSION

COOPER NUCLEAR STATION
DOCKET NO. 50-298, DPR-46

Technical Specification Page – Markup Format

4.0-2

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum exposure-dependent k-infinity of 1.29.

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section X-3 of the USAR; and

c. A nominal 6 9/16 inch center-to-center distance between fuel assemblies placed in the Boral-poisoned storage racks. A nominal 6.108 inch center-to-center distance between fuel assemblies placed in the Metamic-poisoned storage racks.

4.3.1.2 The new fuel storage racks shall not be used for fuel storage.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 977 ft 2.75 inches.

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than ~~2366~~ 2651 fuel assemblies.

ATTACHMENT 3

LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION - ONSITE SPENT FUEL STORAGE EXPANSION

COOPER NUCLEAR STATION
DOCKET NO. 50-298, DPR-46

Technical Specification Page – Final Typed Format

4.0-2

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

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a. Fuel assemblies having a maximum exposure-dependent k-infinity of 1.29.

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4.3.3 Capacity

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Correspondence Number: NLS2006028

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
As necessary, cooled fuel will be placed in the outer storage locations in the new racks to provide shielding from freshly discharged fuel assemblies. The procedure for controlling storage of spent fuel in the spent fuel pool will be revised to require the placement of the appropriate number of rows of cooled fuel.	NLS2006028-01	Placement of the new racks in the spent fuel pool