

October 5, 2006

Mr. Rick A. Muench
President and Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
Post Office Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - ISSUANCE OF AMENDMENT RE:
REVISE CONTAINMENT SUMP SURVEILLANCE REQUIREMENT TO VERIFY
STRAINER INTEGRITY (TAC NO. MD2317)

Dear Mr. Muench:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 168 to Facility Operating License No. NPF-42 for the Wolf Creek Generating Station. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated June 2, 2006 (WO 06-0023).

The amendment revises Surveillance Requirement 3.5.2.8 by replacing the phrase "trash racks and screens" with the word "strainers." The amendment reflects the replacement of the containment sump suction inlet trash racks and screens with a complex strainer design with significantly larger effective area in the upcoming Refueling Outage 15. This installation is in response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004.

A copy of our related Safety Evaluation is enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Jack Donohew, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosures: 1. Amendment No. 168 to NPF-42
2. Safety Evaluation

cc w/encls: See next page

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Enclosures: 1. Amendment No. 168 to NPF-42
2. Safety Evaluation

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OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	SSIB/BC	EEMB/BC	OGC-NLO subject to edits	NRR/LPL4/BC
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DATE	8/12/06	9/27/06	7/17/06	7/13/06	9/25/06	10/3/06

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WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 168
License No. NPF-42

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment to the Wolf Creek Generating Station (the facility) Facility Operating License No. NPF-42 filed by the Wolf Creek Nuclear Operating Corporation (the Corporation), dated June 2, 2006, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, as amended, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility Operating License No. NPF-42 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 168, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated in the license. The Corporation shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented prior to the entry into Mode 4 in the restart from the fall 2006 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

David Terao, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: October 5, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 168

FACILITY OPERATING LICENSE NO. NPF-42

DOCKET NO. 50-482

Replace the following page of the Appendix A Technical Specifications with the attached page. The revised page is identified by an amendment number and contains a marginal line indicating the area of change. The corresponding overleaf page is provided to maintain document completeness.

REMOVE

3.5-5

INSERT

3.5-5

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 168 TO FACILITY OPERATING LICENSE NO. NPF-42

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By application dated June 2, 2006 (Agencywide Documents Access and Management System Accession No. ML061640353), Wolf Creek Nuclear Operating Corporation (the licensee) requested changes to the Technical Specifications (TSs, Appendix A to Facility Operating License No. NPF-42) for the Wolf Creek Generating Station (WCGS). The proposed amendment would revise Surveillance Requirement (SR) 3.5.2.8 by replacing the phrase "trash racks and screens" in the SR with the word "strainers."

The proposed amendment reflects the replacement of the containment sump suction inlet trash racks and screens with a new strainer design with significantly larger effective screen area in the upcoming Refueling Outage 15, scheduled for the fall of 2006. This installation by the licensee is in response to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004.

2.0 REGULATORY EVALUATION

The license amendment request (LAR) involves replacing the current "trash racks and screens" of the containment sump by installing new "strainers" that increase the area that would screen debris from the water in the containment sump. The Nuclear Regulatory Commission's (NRC's) regulatory requirements related to the application to replace the existing containment sump screen or strainer are the following:

- Paragraph 50.46(b)(5) of Title 10 to Part 50 of the *Code of Federal Regulations* (10 CFR 50.46(b)(5)), "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," which states that after any calculated successful initial operation of the emergency core cooling system (ECCS), the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.
- General Design Criterion (GDC) 35, "Emergency core cooling," in Appendix A to 10 CFR Part 50, which requires in part abundant long term emergency core cooling to

transfer heat from the reactor core following any loss of reactor coolant at a rate such that: (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reactions reaction is limited to negligible amounts.

- GDC 38, "Containment heat removal," which requires in part that the system safety function shall be to maintain containment pressure and temperature at acceptably low levels.
- GDC 41, "Containment atmosphere cleanup," which requires in part that the containment cleanup systems control substances which may be released into the containment. These systems shall be provided as necessary to reduce the concentration and quality of fission products released to the environment following postulated accidents and to control the concentration of hydrogen or oxygen and other substances in the containment atmosphere following postulated accidents to assure that containment integrity is maintained.

NRC GL 2004-02, which addresses safety issues associated with Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR [pressurized-water reactor] Sump Performance," requested that PWR licensees improve their plant capability to meet the requirements of 10 CFR 50.46(b)(5) for long-term cooling in the aftermath of a design-basis loss-of-coolant accident (LOCA) with debris loading in the containment sumps.

This amendment only affects the containment sump in terms of the screens or strainers that remove debris during accidents. The trash racks, screens, or strainers ensure that sufficient flow from the sump to the ECCS pumps (to provide cooling to the core) and containment spray system (CSS) pumps (to provide spray for cooling of the containment and to reduce the radioiodine and particulate radioactivity in the containment atmosphere). Therefore, 10 CFR 50.46(b)(5) and GDC 35, 38, and 41 must be addressed in the license amendment as to the requirements for long term flow from the containment sumps to the ECCS and CSS with debris loading in the containment sumps. The amendment does not involve a change to the design, testing, or inspection requirements for the ECCS and CSS in GDC 36 through 43, and GDC 50.

3.0 BACKGROUND

GSI-191 addresses PWR sump performance issues during DBAs, including the possibility that debris could accumulate on the screens of the recirculation sump inside containment resulting in a loss of net positive suction head (NPSH) margin to the ECCS pumps when drawing suction from the sump during an accident. Loss of NPSH margin could impede or prevent the flow of water needed from the sump to the ECCS pumps to meet the ECCS requirements in 10 CFR 50.46(b)(5), which requires that licensees design their ECCS to meet five criteria, one of which is to provide long-term cooling to the core. The ECCS must be able to provide cooling for a sufficient duration that the core temperature is maintained at an acceptably low value and for the period of time required by the long-lived radioactivity in the core. Loss of NPSH margin could also prevent the CSS pumps from providing adequate containment spray flow.

NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003, requested information from PWR licensees, including WCGS, to verify compliance with NRC regulations and to ensure that any

interim risks associated with post-accident debris blockage are minimized while evaluations using the latest sump knowledge proceed. GL 2004-02 is the follow-on generic communication to the bulletin, which requested information on the results of the evaluations referenced in the bulletin.

In its application, the licensee stated that it had evaluated the containment recirculation sumps for adverse effects due to debris blockage of flow paths necessary for ECCS and CSS recirculation and containment drainage. The licensee stated that it concluded from the evaluation that a new larger sump strainer of a different design was needed by December 31, 2007, to continue to comply with applicable regulatory requirements. This modification will be completed during the upcoming Refueling Outage 15 to meet the NRC-requested schedule in GL 2004-02.

4.0 NRC STAFF TECHNICAL EVALUATION

4.1 Proposed TS Change

The proposed change revises SR 3.5.2.8 to replace the current phrase "trash racks and screens" with the word "strainers." This change reflects the replacement of the containment sump suction inlet trash racks and screens with a complex strainer design with significantly larger effective area. There is no change to the following: (1) the requirement to verify that, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the sump inlet screens show no evidence of structural stress or abnormal corrosion or (2) the surveillance test interval of 18 months.

4.2 Change to Containment Strainer Design

The existing containment sump trash racks and screens are addressed in Section 6.2.2.1.2.2, on the CSS, of the WCGS Updated Safety Analysis Report. There are two containment recirculation sumps that are located in the containment floor or base slab. During and following a LOCA event, these sumps collect water from: (1) the ECCS and reactor coolant system that is discharged into containment and (2) the CSS that is sprayed into containment. During recirculation, the sumps provide the water for the ECCS pumps to continue cooling the core and the CSS to continue spraying into the containment. The existing trash racks and screens prevent debris in the sumps from: (1) reducing the flow to the ECCS and CSS from the sumps such that the flow would be less than that needed to meet the design-basis accident analyses, (2) causing the loss-of-function of any safety-related ECCS and CSS components, and (3) blocking passages in the fuel or CSS spray nozzles.

In its application, the licensee described the new sump strainer design. The new sump strainers to be installed increase the available strainer area from less than 400 square feet to approximately 6400 square feet. The new design will remove the existing screen hardware and replace it with new fabricated strainer assemblies utilizing the Performance Contracting Inc., Sure-Flow™, strainer system. Inside each sump, 16 stacks (72 total modules) of the strainer assemblies will be installed and will extend approximately 1 foot above the containment floor. The sumps are located 8 feet into the base slab. The licensee stated that the strainer design was chosen based on the largest available sump strainer area that would fit within the bounds of the existing sump area and to be compatible with the anticipated water level. The new sump

strainer is designed to reduce both head loss and the ingestion of debris, which could affect downstream components. The licensee stated further that the sump strainers are sized to preclude the passage of debris large enough to cause loss-of-function of any downstream safety-related CSS and ECCS components or block flow passages such as flow channels in the fuel and the CSS nozzles. Therefore, they are required to support operation of the supported systems during postulated DBAs in which the safety analysis takes credit for recirculation flow from the sumps to these systems.

The licensee is undertaking activities to ensure that the functionality of the containment recirculation sump under debris loading conditions at WCGS will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of NRC GL 2004-02 by December 31, 2007. Compliance will be ensured through analysis, testing, modifications to increase the available recirculation sump screen area, other changes to the plant to reduce the potential debris loading on the installed containment recirculation sump strainers, and programmatic and process changes to ensure continued compliance.

The licensee stated that the proposed amendment to TS SR 3.5.2.8 is necessary to reflect the new strainer design. Although the configurations of the existing trash racks and screens and the replacement sump strainer assemblies are different, they serve the same fundamental purpose of passively removing debris from the recirculation sump's suction supply to the supported system pumps. The descriptive terminology of trash racks and screens is not descriptive of the new sump strainers. The licensee further stated that the proposed replacement of "trash racks and screens" with "strainers" is a descriptive change and the revised SR 3.5.2.8 will continue to ensure the containment recirculation sump strainers are not restricted by debris and show no evidence of structural distress or abnormal corrosion.

4.3 Technical Evaluation

GSI-191 was established by the NRC to determine whether transport and accumulation of debris in a PWR containment following a LOCA would impede the long-term operation of the ECCS or CSS. The NRC is currently implementing its plan to request that PWR licensees evaluate the potential for adverse post-accident debris blockage effects and implement necessary actions to resolve concerns associated with GSI-191. This action plan includes a review of all licensee responses to GL 2004-02 and plant audits as needed to confirm proper evaluation and corrective actions to address all technical issues associated with proper sump performance.

In its responses to GL 2004-02, the licensee submitted a letter dated August 31, 2005, under oath and affirmation, that addressed the new sump strainer design. In that letter, the licensee provided the following information:

1. In the response to NRC Requested Information 2(d)(vii) on verification that the strength of the strainers is adequate to protect the debris screens from missiles and other large debris (i.e., capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions), the licensee stated that the location of the sumps is outside the secondary shield walls and, therefore, outside the zone of influence of LOCA break locations. As stated in Section 6.2.2.1 of the WCGS Updated Safety Analysis Report,

the containment recirculation sumps are covered with concrete pads supporting the accumulator tanks so debris cannot fall directly onto the screening structure. Also, in replacing the trash racks and screens with strainers in the containment sump, the licensee is not changing any containment structures, piping, or system fluid flows and pressures. In the call with the licensee on July 11, 2006 (ADAMS Accession No. ML062640291), the licensee explained that the current protection of the existing trash racks and screens in the containment sump against missiles, jet impingement, and high energy pipe whip will protect the new strainers being installed. Based on the above considerations, the NRC staff concludes that the new sump strainers are protected against pipe whip, jet impingement, and the impact of internally-generated missiles in a LOCA.

2. In NRC Requested Information 2(a), the NRC staff requested confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements listed in GL 2004-02. The regulatory requirements listed in the GL include GDC 35 and 10 CFR 50.46(b)(5). In its response to the question, the licensee stated that activities are underway to ensure the ECCS and CSS recirculation functions under debris loading conditions will continue to be in compliance with the regulatory requirements listed in GL 2004-02, and these activities will be achieved through analysis, evaluations, plant modifications, and plant program and process changes that will be implemented through December 31, 2007. The "analysis, evaluations, plant modifications, and plant program and process changes" referred to by the licensee are the regulatory commitments in Attachment III to the August 31, 2005, letter, which were updated in the licensee's letter dated May 31, 2006. The licensee stated that upon completion of these activities the new sump strainer design will be in compliance with GDC 35, 38, and 41, and 10 CFR 50.46(b)(5) for long term ECCS and CSS flow with debris loading in the containment sumps.

The licensee has not completed its activities to show that the new sump strainer design is consistent with the revised recirculation sump evaluation methodologies cited in GL 2004-02. One of these activities is the installation of new sump strainers that will significantly increase the surface area to screen debris from the recirculation water supply to the ECCS and CSS during an accident. The other activities and the scheduled completion of these activities are addressed in the licensee's letter dated May 31, 2006, where the licensee updated the status of its implementation of GL 2004-02.

The NRC staff has also reviewed the licensee's new sump strainer design. In its application, the licensee stated that: (1) the strainers are sized to preclude the passage of debris large enough to cause loss-of-function of any downstream safety-related CSS and ECCS components or block flow passages in the fuel and CSS spray nozzles, and (2) its evaluations of the strainers confirm compliance with all regulatory requirements. Based on the new sump strainer design with the significantly increased surface area and the licensee's determination that the new strainers satisfy the WCGS current licensing basis, the NRC staff concludes that the new sump strainers are functionally equivalent to the existing trash racks and screens under the current non-mechanistic licensing basis for meeting the requirements of 10 CFR 50.46(b)(5) and GDC 35, 38, and 41 for long-term cooling of the core, and containment heat removal and atmosphere cleanup.

In response to GL 2004-02, the licensee is undertaking activities to ensure that the new sump strainers will be in compliance with the requirements of 10 CFR 50.46(b)(5), and GDC 35 and GDC 41, using an acceptable mechanistic sump performance methodology. This is the intent of GL 2004-02. The NRC staff has reviewed the licensee's schedule to implement its activities for meeting GL 2004-02, which includes the installation of the new sump strainer design in the upcoming Refueling Outage 15. The regulatory commitments and updated schedule out to December 31, 2007, in Attachment I to the licensee's letter dated May 31, 2006, show that the licensee will complete GL 2004-02 implementing activities by the NRC staff's requested completion date. Assurance that the new strainer design satisfies an acceptable mechanistic sump performance methodology will be provided by the NRC staff's review of the licensee's GL 2004-02 supplemental responses and the NRC staff's other generic review activities necessary to close out GL 2004-02 and GSI-191. Based on this, the NRC staff concludes that the licensee's GL 2004-02 schedule is acceptable.

Based on the above evaluation, the NRC staff also concludes that the proposed amendment is acceptable.

5.0 STATE CONSULTATION

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

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes a surveillance requirement. The 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 and there has been no public comment on such finding (71 FR 40756), which was published in the *Federal Register* on July 18, 2006. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission 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, (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.

Principal Contributor: Jack Donohew

Date: October 5, 2006

Wolf Creek Generating Station

cc:

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