March 16, 2005

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: REVISED SEAL INJECTION FLOW RATES (TAC NO. MC3864)

Dear Mr. Muench:

The Commission has issued the enclosed Amendment No. 160 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 July 22, 2004.

The amendment revises TS Figure 3.5.5-1, "Seal Injection Flow Limits," to reflect flow limits that allow a higher seal injection flow for a given differential pressure between the charging pump discharge header and the reactor coolant system.

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, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosures: 1. Amendment No. 160 to NPF-42
2. Safety Evaluation

cc w/encls: See next page

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WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 160
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 July 22, 2004, 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. 160, 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 startup from Refueling Outage 14.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/
Robert A. Gramm, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: March 16, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 160

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 amendment number and contains marginal lines indicating the areas of change. The corresponding overleaf page is provided to maintain document completeness.

REMOVE	INSERT
3.5-12	3.5-12

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 160 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 July 22, 2004, 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 change would revise TS Figure 3.5.5-1, "Seal Injection Flow Limits," to reflect flow limits that allow a higher seal injection flow for a given differential pressure between the charging pump discharge header and the reactor coolant system (RCS). The licensee requests approval of the proposed amendment to allow for repositioning the seal injection throttle valves during the upcoming refueling outage.

The NRC staff also considered relevant information in the WCGS Updated Safety Analysis Report (USAR).

2.0 REGULATORY EVALUATION

The regulation at Title 10, *Code of Federal Regulations* (10 CFR), Section 50.36(c)(3) states that, "Surveillance requirements [SRs] are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation [LCOs] will be met."

Also, the seal injection flow valves are subjected to SRs as specified in SR 3.5.5.1. In considering changes to SR 3.5.5.1, the requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," concerning the maximum peak clad temperature (PCT) for design basis accidents (DBAs) having to be less than 2200EF, in 10 CFR 50.46(b)(1), must be met.

Also, the DBA analyses in Chapter 15 of the licensee's USAR have been reviewed by the NRC staff, and the NRC staff concluded, at the time the plant was licensed, that the consequences of these DBAs are within the regulations. If changes to the plant in the proposed amendment remain within the consequences of the appropriate DBAs in the USAR, then the NRC staff concludes that the DBAs remain within the regulations.

3.0 TECHNICAL EVALUATION

3.1 System Description and Requirements

The seal injection system is described in Section 9.3.4.2.1.1, "Charging, Letdown and Seal Water System," of the WCGS USAR as follows:

> A portion of the charging flow is directed to the reactor coolant pumps (RCP) (nominally 8 gpm [gallon per minute] per pump) through a seal water injection filter. The flow is directed to a point above the pump shaft bearing. Here the flow splits, and a portion (nominally 5 gpm per pump) enters the RCS through the labyrinth seals and thermal barrier. The remainder of the flow is directed upward along the pump shaft to the number 1 seal leakoff.

The seal water injection flow rate is adjusted via four seal injection throttle valves, one per RCP. The seal injection throttle valves are the subject of SR 3.5.5.1 which requires that the licensee "Verify manual seal injection throttle valves are adjusted to give a flow within the limits of Figure 3.5.5-1," which specifies an allowable region of seal injection flow as a function of differential pressure between the charging pump discharge header and the RCS. The licensee has proposed a change to Figure 3.5.5-1 to increase allowable seal injection flow over the full specified range of charging pump discharge header pressure minus RCS pressure. The modified Figure 3.5.5-1 is generated using CRANE Technical Paper No. 410, Equation 3-14 (as was used for the existing Figure 3.5.5-1), with a lower resistance coefficient corresponding to the increased opening of the four seal injection throttle valves.

3.2 Loss-of-Coolant Accident (LOCA) Analyses

Seal water injection flow rate affects the LOCA analyses because centrifugal charging pump (CCP) flow is credited for core cooling. In the LOCA analyses, the seal water injection flow is not credited for core cooling so an increase in seal water injection flow rate results in a decrease in the remaining charging flow available for core cooling since seal water injection flow is not isolated in the event of a LOCA. Under the current limits of TS Figure 3.5.5-1, 72 gpm of charging flow are diverted to seal water injection flow under LOCA conditions with 0 psig RCS pressure. The licensee's proposed revision to Figure 3.5.5-1 would increase allowable seal water injection flow under LOCA conditions to 90 gpm. Table 1 of the July 22, 2004 submittal shows that for a seal injection rate of 90 gpm, the charging/safety injection rate is 317.48 gpm compared to 326.85 gpm for the safety analysis of record (approximately a 10 gpm difference); for higher RCS pressures, the difference between the charging/safety injection rate and the value in the safety analysis of record is less than 10 gpm.

3.2.1 Large Break LOCA (LBLOCA)

Table 15.6-13 of the WCGS USAR shows the total ECCS flow rates available during a postulated LBLOCA. Under conditions of 0 psig RCS pressure (maximum flow), 2834.19 gpm, 444.82 gpm and 326.85 gpm would be provided by the residual heat removal (RHR), safety injection (SI) and CCPs, respectively. The licensee stated that a decrease in CCP flow due to the proposed increase in seal injection is very small compared to the total flow rate available

following a LBLOCA and, therefore, the limiting PCT of 1916EF that it calculated remains essentially unchanged. Since LOCA hydraulic force calculations do not model SI flow, there are no changes in this analysis. The effect of the proposed increase in seal injection has a small effect on the LOCA mass and energy release and a correspondingly small effect on subsequent containment pressure response (.28 lbm/sec increase in release of saturated steam at the containment design pressure of 60 psig).

During the post-LOCA recirculation phase, the RHR pumps take suction from the containment sumps and provide suction to the SI pumps and CCPs. In the recirculation phase, the licensee's specific flow calculations indicate a potential CCP runout flow increase of 24 gpm (from a design runout limit of 556 gpm to 580 gpm) due to the suction boost during recirculation. The runout flow limit is verified periodically during shutdown.

Because the CCP has a design runout limit of 556 gpm, the licensee stated that the higher runout flow of 580 gpm could possibly challenge the operability of the pump and damage the pump; however, the pump manufacturer has confirmed that the higher runout limit of 580 gpm would be acceptable for CCP operation. Since the required surveillance tests are normally performed by the licensee in the injection mode of ECCS operation with the runout limit of 556 gpm, the increase in overall CCP flow as a result of the proposed increase in seal injection flow would continue to meet this limit for non-recirculation and, thereby, not challenge the vendor's runout flow limit of 580 gpm for acceptable pump operation.

With regard to long-term cooling, with an estimated decay heat of 31.2 MWt at 12 hours after shutdown (see Appendix A in Westinghouse Nuclear Safety Advisory Letter [NSAL] 92-010), the minimum ECCS flow required for core cooling is calculated to be approximately 250 gpm, based on the algorithm provided in NSAL-92-010. Knowing that each CCP or SI pump is capable of providing more than 300 gpm to the three remaining intact loops when the RCS is depressurized to atmospheric conditions, there is reasonable assurance that operating with only one CCP, with reduced charging flow due to increased seal injection, or SI pump would be acceptable 12 hours after LOCA initiation, from the standpoint of meeting long-term core cooling requirements.

The NRC staff concludes that, for the LBLOCA, the licensee's calculated PCT should not significantly increase. The calculated PCT will remain less than 2200EF so that the licensee will continue to comply with the requirements of 10 CFR 50.46(b)(1), and the containment and equipment design limits will not be exceeded for the proposed increase in seal injection flow.

3.2.2 Small Break LOCA (SBLOCA)

Table 15.6-14 of the WCGS USAR shows the total emergency core cooling water flow rates available during a postulated SBLOCA. Under conditions of 0 psig RCS pressure, 444.82 gpm and 326.85 gpm would be provided by SI and CCP, respectively. The decrease in CCP flow due to the proposed increase in seal injection is small, but more significant than the LBLOCA due to the lower flow available under SBLOCA conditions. The licensee calculates that the limiting PCT of 1510.0EF, for the analysis of record, will increase by 35EF for this case. The resulting SBLOCA PCT, together with the margin allocations reported in the licensee’s letter to the NRC dated March 25, 2004, results in a PCT of 1672EF. The 1672EF was calculated by the

licensee and provided in its application as the new PCT for the SBLOCA with the proposed increase in the seal injection flow.

Based on the licensee's newly calculated PCT for the SBLOCA for the proposed increase in the seal injection flow, the NRC staff concludes that, for the SBLOCA, the proposed amendment will result in a PCT of 1672EF. This PCT is well below the 2200EF limit. Based on this, the NRC staff further concludes that the licensee complies with the requirements of 10 CFR 50.46(b)(1) for the proposed increase in seal injection flow.

3.3 Other Accident and Transient Analyses

The licensee evaluated additional accident and transient scenarios that could be affected by reduced CCP flow as a result of increased seal injection flow.

The licensee considered the effects of reduced CCP flow on nuclear steam supply system (NSSS) transients, cold overpressure, and trip analyses. For NSSS transients (inadvertent SI and reactor trip case C[1]), higher CCP charging rates are conservative so that no changes to transient analyses are needed for reduced CCP flow rates. Likewise, for cold overpressure, higher CCP charging rates are conservative in that they result in higher RCS pressure overshoot and thus higher CCP flow rates are conservative.

The licensee reviewed the impact of reduced CCP flow on containment pressure resulting from a main steam line break (MSLB). Lower CCP flow tends to have a negative effect on containment pressure due to higher mass/energy release from the break. The current licensing basis analyses (.8 square foot MSLB at 50 percent power) shows that peak containment pressure is 48.9 psig compared to a containment design pressure of 60 psig. The licensee concluded that the lower CCP flow rate is more than compensated by flow from the intermediate head SI pumps which are currently not credited in the analysis.

For the steam generator tube rupture (SGTR), maximizing CCP flow leads to a higher primary to secondary pressure differential with a correspondingly high break flow and duration. This added conservatism assumed to maximize the potential for steam generator overfill is more than sufficient to bound any variation in RCS inventory due to an increase in seal injection flow. Accordingly, the licensee stated that the SGTR dose will remain well within the doses specified in 10 CFR 100.11.

In its application, the licensee concluded that its evaluation of the proposed increase in seal injection flow did not change the consequences in the USAR of DBAs, other than of the LBLOCA and SBLOCA. The LBLOCA and SBLOCA are addressed in Section 3.2.1 and 3.2.2 of this Safety Evaluation. Based on this, the NRC staff concludes that the non-LOCA assessment of the impact of the increase in seal injection flow remains within the existing USAR Chapter 15 non-LOCA accident analyses.

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[1] WCGS USAR Section 3.9(N).1.1, "Design Transients" identifies Case "C" as a reactor trip with cooldown resulting in actuation of safety injection.

3.4 Proposed Change to the TS

Based upon the NRC staff's conclusions in Sections 3.2 and 3.3, herein, the NRC staff concludes that the proposed amendment is within the regulations and, therefore, it is acceptable to revise TS Figure 3.5.5-1, "Seal Injection Flow Limits," to reflect flow limits that allow a higher seal injection flow for a given differential pressure between the charging pump discharge header and the RCS. Based on this, the NRC staff further concludes that the proposed change is acceptable.

4.0 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.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment 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 (69 FR 53115). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). 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.

6.0 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 Contributors: David Jaffe
Jack Donohew

Date: March 16, 2005