April 17, 2007

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: ADOPTING TSTF-372 ON LIMITING CONDITION FOR OPERATION 3.0.8, INOPERABILITY OF SNUBBERS (TAC NO. MD3816)

Dear Mr. Muench:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 173 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 December 15, 2006 (ET 06-0053).

The amendment revised the TSs to adopt NRC-approved Revision 4 to Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler TSTF-372, "Addition of LCO [Limiting Condition for Operation] 3.0.8, Inoperability of Snubbers." The amendment added (1) a new LCO 3.0.8 addressing situations where one or more required snubbers are unable to perform their associated support function(s) and (2) a reference to LCO 3.0.8 in LCO 3.0.1, which describes when LCOs shall be met.

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. 173 to NPF-42
2. Safety Evaluation

cc w/encls: See next page

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ADAMS Accession No.: Pkg ML070550018 (Amendment/License ML070550019, TS Pgs ML070550020) *See SE input dated 2/8/07.

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	ITSB/BC*	OGC	NRR/LPL4/BC
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DATE	4/12/07	4/12/07	2/8/07	4/5/07	4/13/07

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WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 173
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 December 15, 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 and Paragraph 2.C.(2) of Facility Operating License No. NPF-42 as indicated in the attachment to this license amendment.

3. The license amendment is effective as of its date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility
Operating License and
Technical Specifications

Date of Issuance: April 17, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 173

FACILITY OPERATING LICENSE NO. NPF-42

DOCKET NO. 50-482

Replace the following pages of the Facility Operating License No. NPF-42 and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License

REMOVE	INSERT
- 4 -	- 4 -

Technical Specifications

REMOVE	INSERT
i	i
3.0-1	3.0-1
3.0-2	3.0-2
3.0-3	3.0-3
3.0-4	3.0-4
----	3.0-5

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 173, 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) Antitrust Conditions

Kansas Gas & Electric Company and Kansas City Power & Light Company shall comply with the antitrust conditions delineated in Appendix C to this license.

(4) Environmental Qualification (Section 3.11, SSER #4, Section 3.11, SSER #5)*

Deleted per Amendment No. 141.

(5) Fire Protection (Section 9.5.1, SER, Section 9.5.1.8, SSER #5)

(a) The Operating Corporation shall maintain in effect all provisions of the approved fire protection program as described in the SNUPPs Final Safety Analysis Report for the facility through Revision 17, the Wolf Creek site addendum through Revision 15, and as approved in the SER through Supplement 5, subject to provisions b and c below.

(b) The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(c) Deleted.

(6) Qualification of Personnel (Section 13.1.2, SSER #5, Section 18, SSER #1)

Deleted per Amendment No. 141.

*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 173 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 December 15, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML063610195), 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 modify TS requirements for inoperable snubbers by adopting the Nuclear Regulatory Commission (NRC)-approved Revision 4 to Technical Specification Task Force (TSTF) Standard Technical Specification (STS) Change Traveler TSTF-372, "Addition of LCO [Limiting Condition for Operation] 3.0.8, Inoperability of Snubbers." The amendment would add (1) a new LCO 3.0.8 addressing situations where one or more required snubbers are unable to perform their associated support function(s) (i.e., the snubber is inoperable) and (2) a reference to LCO 3.0.8 in LCO 3.0.1, which describes when LCOs shall be met. A notice announcing the availablity of this proposed TS change using the NRC's consolidated line item improvement process (CLIIP) was published in the *Federal Register* on May 4, 2005 (70 FR 23252).

On April 23, 2004, the Nuclear Energy Institute (NEI) Risk Informed Technical Specifications Task Force (RITSTF) submitted a proposed change, TSTF-372, Revision 4, to the STS on behalf of the industry (TSTF-372, Revisions 1 through 3 were prior draft iterations). TSTF-372, Revision 4, is a proposal to add an LCO 3.0.8 allowing a delay time for entering a supported system TS, when the inoperability is due solely to an inoperable snubber, if risk is assessed and managed. The postulated seismic event requiring snubbers is a low-probability occurrence, and the overall TS system safety function would still be available for the vast majority of anticipated challenges.

This proposal is one of the industry's initiatives being developed under the risk-informed TS program. These initiatives are intended to maintain or improve safety through the incorporation of risk assessment and management techniques in the TS, while reducing unnecessary burden and making TS requirements consistent with the NRC's other risk-informed regulatory requirements, in particular the Maintenance Rule.

The proposed change adds a new LCO, LCO 3.0.8, to Section 3.0, "Limiting Condition for Operation (LCO) Applicability," of the TSs. LCO 3.0.8 allows licensees to delay declaring an LCO not met for equipment that is supported by snubbers unable to perform their associated

support functions when the risk associated with the delay is assessed and managed. This new LCO 3.0.8 states:

> When one or more required snubbers are unable to perform their associated support function(s), any affected supported LCO(s) are not required to be declared not met solely for this reason if risk is assessed and managed, and:
>
> a. the snubbers not able to perform their associated support function(s) are associated with only one train or subsystem of a multiple train or subsystem supported system or are associated with a single train or subsystem supported system and are able to perform their associated support function within 72 hours; or
>
> b. the snubbers not able to perform their associated support function(s) are associated with more than one train or subsystem of a multiple train or subsystem supported system and are able to perform their associated support function within 12 hours.
>
> At the end of the specified period the required snubbers must be able to perform their associated support function(s), or the affected supported system LCO(s) shall be declared not met.

In adding the new LCO 3.0.8 to Section 3.0 of the TSs, LCO 3.0.1 would be revised to state that "LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2, ~~and~~ LCO 3.0.7, **and LCO 3.0.8**." The change to LCO 3.0.1 is shown in ~~strikeout~~ (deleting the word "and") and **bold** (adding the phrase "and LCO 3.0.8").

The NRC staff's model safety evaluation (SE) was issued in the *Federal Register* CLIIP notice of availability for TSTF-372, Revision 4 (ADAMS Accession No. ML051160013). In its submittal, the licensee said that it reviewed the NRC staff's model SE, as well as the information provided to support TSTF-372, and has concluded that the justifications presented in the NEI TSTF-372, Revision 4, proposal and NRC staff's model SE are applicable to WCGS and justify the proposed amendment.

2.0 REGULATORY EVALUATION

In Section 50.36 of Title 10 of the *Code of Federal Regulations* (10 CFR 50.36), the Commission established its regulatory requirements related to the content of the TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. The rule does not specify the particular requirements to be included in a plant's TSs. As stated in 10 CFR 50.36(c)(2)(i), the "[l]imiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications ..." TS Section 3.0, "LCO and SR Applicability," provides details or ground rules for complying with the LCOs.

Snubbers are used in areas where restricting thermal growth during normal operation would induce excessive stresses in the piping nozzles or other equipment. Although snubbers are classified as component-standard supports, they are not designed to provide any transmission of force during normal plant operations. However, in the presence of dynamic transient loadings, which are induced by seismic events as well as by plant accidents and transients, a snubber functions as a rigid support. The location and size of the snubbers are determined by stress analyses based on different combinations of load conditions, which depend on the design classification of the particular piping.

Prior to the conversion to the improved STS, such as NUREG-1431 for Westinghouse plants, including WCGS, TS requirements applied directly to snubbers. These requirements included:

- A requirement that snubbers be functional and in service when the supported equipment is required to be operable,
- A requirement that snubber removal for testing be done only during plant shutdown,
- A requirement that snubber removal for testing be done on a one-at-a-time basis when supported equipment is required to be operable during shutdown,
- A requirement to repair or replace within 72 hours of any snubbers found to be inoperable during operation in Modes 1 through 4, to avoid declaring any supported equipment inoperable,
- A requirement that each snubber be demonstrated operable by periodic visual inspections, and
- A requirement to perform functional tests on a representative sample of at least 10 percent of plant snubbers, at least once every 18 months during shutdown.

In the late 1980s, a joint initiative of the NRC and industry was undertaken to improve the STS. This effort identified the snubbers as candidates for relocation to a licensee-controlled document, based on the fact that the TS requirements for snubbers did not meet any of the four criteria in 10 CFR 50.36(c)(2)(ii) for inclusion in the improved STS. The NRC approved the relocation without placing any restriction on the use of the relocated requirements. However, this relocation resulted in different interpretations between the NRC and the industry regarding its implementation.

The NRC has stated that since snubbers are supporting safety equipment that is in the TSs, the definition of OPERABILITY must be used to immediately evaluate equipment supported by a removed snubber and, if found inoperable, the appropriate TS-required actions must be entered. This interpretation has in practice eliminated the 72-hour delay to enter the actions for the supported equipment that existed prior to the conversion to the improved STS (the only exception is if the supported system has been analyzed and determined to be OPERABLE without the snubber). The industry has argued that since the NRC approved the relocation without placing any restriction on the use of the relocated requirements, the licensee-controlled document requirements for snubbers should be invoked before the supported system's TS

requirements become applicable. The industry's interpretation would, in effect, restore the 72-hour delay to enter the actions for the supported equipment that existed prior to the conversion to the improved STS. The industry's proposal would allow a time delay for all conditions, including snubber removal for testing at power.

The option to relocate the snubbers to a licensee-controlled document, as part of the conversion to improved STS, has resulted in non-uniform and inconsistent treatment of snubbers. On the one hand, licensees that have relocated snubbers from their TSs are allowed to change the TS requirements for snubbers under 10 CFR 50.59, but they are not allowed a 72-hour delay before they enter the actions for the supported equipment. On the other hand, licensees that have not converted to improved STS have retained the 72-hour delay if snubbers are found to be inoperable, but they are not allowed to use 10 CFR 50.59 to change TS requirements for snubbers. It should also be noted that a few licensees that converted to the improved STS chose not to relocate the snubbers to a licensee-controlled document and, thus, retained the 72-hour delay. In addition, it is important to note that, unlike licensees that have not relocated the snubbers from their TSs, licensees that have relocated can perform functional tests on the snubbers at power (as long as they enter the actions for the supported equipment) and at the same time can reduce the testing frequency (as compared to licensees that have not relocated) if it is justified by 10 CFR 50.59 assessments. Some potential undesirable consequences of this inconsistent treatment of snubbers are:

- Performance of testing during crowded time period windows when the supported system is inoperable with the potential to reduce the snubber testing to a minimum since the snubber requirements that have been relocated from TSs are controlled by the licensee,

- Performance of testing during crowded windows when the supported system is inoperable with the potential to increase the unavailability of safety systems, and

- Performance of testing and maintenance on snubbers affecting multiple trains of the same supported system during the 7 hours allotted before entering MODE 3 under LCO 3.0.3.

To remove the inconsistency in the treatment of snubbers among plants, the TSTF proposed a risk-informed TS change that introduces a delay time before entering the actions for the supported equipment, when one or more snubbers are found inoperable or removed for testing, if risk is assessed and managed. Such a delay time will provide needed flexibility in the performance of maintenance and testing during power operation and at the same time will enhance overall plant safety by:

- Avoiding unnecessary unscheduled plant shutdowns and, thus, minimizing plant transition and realignment risks,

- Avoiding reduced snubber testing and, thus, increasing the availability of snubbers to perform their supporting function,

- Performing most of the required testing and maintenance during the delay time when the supported system is available to mitigate most challenges and, thus, avoiding increases in safety system unavailability, and

- Providing explicit risk-informed guidance in areas where that guidance currently does not exist, such as the treatment of snubbers impacting more than one redundant train of a supported system.

3.0 TECHNICAL EVALUATION[1]

The industry submitted TSTF-372, Revision 4, in support of the proposed TS change. This submittal (Reference 1) documents a risk-informed analysis of the proposed TS change. Probabilistic risk assessment (PRA) results and insights are used, in combination with deterministic and defense-in-depth arguments, to identify and justify delay times for entering the actions for the supported equipment associated with inoperable snubbers at nuclear power plants. This is in accordance with guidance provided in Regulatory Guides (RGs) 1.174 and 1.177 (References 2 and 3, respectively).

The risk impact associated with the proposed delay times for entering the TS actions for the supported equipment can be assessed using the same approach as that used for allowed completion time (CT) extensions. Therefore, the risk assessment was performed following the three-tiered approach recommended in RG 1.177 for evaluating proposed extensions in currently allowed CTs:

- The first tier involves the assessment of the change in plant risk due to the proposed TS change. Such risk change is expressed (1) by the change in the average yearly core damage frequency (ΔCDF) and the average yearly large early release frequency (ΔLERF) and (2) by the incremental conditional core damage probability (ICCDP) and the incremental conditional large early release probability (ICLERP). The assessed ΔCDF and ΔLERF values are compared to acceptance guidelines, consistent with the Commission's Safety Goal Policy Statement, as documented in RG 1.174, so that the plant's average baseline risk is maintained within a minimal range. The assessed ICCDP and ICLERP values are compared to acceptance guidelines provided in RG 1.177, which aim at ensuring that the plant risk does not increase unacceptably during the period the equipment is taken out of service.

- The second tier involves the identification of potentially high-risk configurations that could exist if equipment in addition to that associated with the change were to be taken out of service simultaneously, or other risk-significant operational factors, such as concurrent equipment testing, were also involved. The objective is to ensure that appropriate restrictions are in place to avoid any potential high-risk configurations.

---

[1] The following technical evaluation is presented in terms of the bounding assessment of this change for all commercial nuclear power plants, including WCGS, performed as part of the approval of TSTF-372, Revision 4, and publication of the CLIIP notices.

- The third tier involves the establishment of an overall configuration risk management program (CRMP) to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified. The objective of the CRMP is to manage configuration-specific risk by appropriate scheduling of plant activities and/or appropriate compensatory measures.

A simplified bounding risk assessment was performed to justify the proposed addition of LCO 3.0.8 to the TSs. This approach was necessitated by: (1) the general nature of the proposed TS changes (i.e., they apply to all plants and are associated with an undetermined number of snubbers that are not able to perform their function), (2) the lack of detailed engineering analyses that establish the relationship between earthquake level and supported-system pipe failure probability when one or more snubbers are inoperable, and (3) the lack of seismic risk assessment models for most plants. The simplified risk assessment is based on the following major assumptions, which the NRC staff finds acceptable, as discussed below:

- The accident sequences contributing to the risk increase associated with the proposed TS changes are assumed to be initiated by a seismically-induced loss-of-offsite power (LOOP) event with concurrent loss of all safety-system trains supported by the out-of-service snubbers. In the case of snubbers associated with more than one train (or subsystem) of the same system, it is assumed that all affected trains (or subsystems) of the supported system are failed. This assumption was introduced to allow the performance of a simple bounding risk-assessment approach with application to all plants. This approach was selected due to the lack of detailed plant-specific seismic risk assessments for most plants and the lack of fragility data for piping when one or more supporting snubbers are inoperable.

- The LOOP event is assumed to occur due to the seismically-induced failure of the ceramic insulators used in the power distribution systems. These ceramic insulators have a high confidence (95 percent) of low probability (5 percent) of failure (HCLPF) of about 0.1g, expressed in terms of peak ground acceleration. Thus, a magnitude 0.1g earthquake is conservatively assumed to have a 5 percent probability of causing a LOOP initiating event. The fact that no LOOP events caused by higher magnitude earthquakes were considered is justified because (1) the frequency of earthquakes decreases with increasing magnitude and (2) historical data (References 4 and 5) indicate that the mean seismic capacity of ceramic insulators (used in seismic PRAs), in terms of peak ground acceleration, is about 0.3g, which is significantly higher than the 0.1g HCLPF value. Therefore, the simplified analysis, even though it does not consider LOOP events caused by earthquakes of a magnitude higher than 0.1g, bounds a detailed analysis that would use mean seismic failure probabilities (fragilities) for the ceramic insulators.

- Analytical and experimental results obtained in the mid-1980s as part of the industry's "Snubber Reduction Program" (References 4 and 6) indicated that piping systems have large margins against seismic stress. The assumption that

a magnitude 0.1g earthquake would cause the failure of all safety-system trains supported by the out-of-service snubbers is very conservative, because safety piping systems could withstand much higher seismic stresses even when one or more supporting snubbers are out of service. The actual piping failure probability is a function of the stress allowable and the number of snubbers removed for maintenance or testing. Since the licensee-controlled testing is done on only a small (about 10 percent) representative sample of the total snubber population, typically only a few snubbers supporting a given safety system are out for testing at a time. Furthermore, since the testing of snubbers is a planned activity, licensees have flexibility in selecting a sample set of snubbers for testing from a much larger population by conducting configuration-specific engineering and/or risk assessments. Such a selection of snubbers for testing provides confidence that the supported systems would perform their functions in the presence of a design-basis earthquake and other dynamic loads and, in any case, the risk impact of the activity will remain within the limits of acceptability defined in risk-informed RGs 1.174 and 1.177.

- The analysis assumes that one train (or subsystem) of all safety systems is unavailable during snubber testing or maintenance (an entire system is assumed unavailable if a removed snubber is associated with both trains of a two-train system). This is a very conservative assumption for the case of corrective maintenance, since it is unlikely that a visual inspection will reveal that one or more snubbers across all supported systems are inoperable. This assumption is also conservative for the case of the licensee testing of snubbers, since such testing is performed only on a small representative sample.

- In general, no credit is taken for recovery actions and alternative means of performing a function, such as the function performed by a system assumed failed (e.g., when LCO 3.0.8b applies). However, most plants have reliable alternative means of performing certain critical functions. For example, feed and bleed (F&B) can be used to remove heat in most pressurized-water reactors (PWRs) when auxiliary feedwater (AFW), the most important system in mitigating LOOP accidents, is unavailable. A 10-percent failure probability for recovery actions to provide core cooling using alternative means is assumed for Diablo Canyon, the only West Coast PWR plant with F&B capability, when a snubber impacting more than one train of the AFW system (i.e., when LCO 3.0.8b is applicable) is out of service. This failure probability value is significantly higher than the value of 2.2E-2 used in the Diablo Canyon PRA. Furthermore, Diablo Canyon has analyzed the impact of a single limiting snubber failure, and concluded that no single snubber failure would impact two trains of the AFW. No credit for recovery actions to provide core cooling using alternative means is necessary for West Coast PWR plants with no F&B capability, because it has been determined that there is no single snubber whose non-functionality would disable two trains of an AFW in a seismic event of magnitude up to the plant's safe shutdown earthquake (SSE). It should be noted that a similar credit could have been applied to most Central and Eastern U.S. plants, but this was not necessary to demonstrate the low-risk impact of the proposed TS change

due to the lower earthquake frequencies at Central and Eastern U.S. plants as compared to West Coast plants.

- The earthquake frequency at the 0.1g level was assumed to be 1E-3/year for Central and Eastern U.S. plants and 1E-1/year for West Coast plants. Each of these two values envelop the range of earthquake frequency values at the 0.1g level, for Central and Eastern U.S. and West Coast sites, respectively (References 5 and 7).

- The risk impact associated with non-LOOP accident sequences (e.g., seismically initiated loss-of-coolant accident (LOCA) or anticipated transient without scram (ATWS) sequences) was not assessed. However, this risk impact is small compared to the risk impact associated with the LOOP accident sequences modeled in the simplified bounding risk assessment. Non-LOOP accident sequences, due to the ruggedness of nuclear power plant designs, require seismically-induced failures that occur at earthquake levels above 0.3g. Thus, the frequency of earthquakes initiating non-LOOP accident sequences is much smaller than the frequency of seismically-initiated LOOP events. Furthermore, because of the conservative assumption made for LOOP sequences that a 0.1g level earthquake would fail all piping associated with inoperable snubbers, non-LOOP sequences would not include any more failures associated with inoperable snubbers than would LOOP sequences. Therefore, the risk impact of inoperable snubbers associated with non-LOOP accident sequences is small compared to the risk impact associated with the LOOP accident sequences modeled in the simplified bounding risk assessment.

- The risk impact of dynamic loadings other than seismic loads is not assessed. These shock-type loads include thrust loads, blowdown loads, waterhammer loads, steamhammer loads, LOCA loads, and pipe rupture loads. However, there are some important distinctions between non-seismic (shock-type) loads and seismic loads, which indicate that, in general, the risk impact of the out-of-service snubbers is smaller for non-seismic loads than for seismic loads. First, while a seismic load affects the entire plant, the impact of a non-seismic load is localized to a certain system or area of the plant. Second, although non-seismic shock loads may be higher in total force and the impact could be as much or more than seismic loads, generally they are of much shorter duration than seismic loads. Third, the impact of non-seismic loads is more plant specific, and, thus, is harder to analyze generically than is the impact of seismic loads. For these reasons, licensees will be required to confirm, every time LCO 3.0.8a is used, that at least one train of each system that is supported by the inoperable snubber(s) would remain capable of performing the system's required safety or support functions for postulated design loads other than seismic loads.

3.1 Risk Assessment Results and Insights

The results and insights from the implementation of the three-tiered approach of RG 1.177 to support the proposed addition of LCO 3.0.8 to the TSs are summarized and evaluated in the following Sections 3.1.1 to 3.1.3.

3.1.1 Risk Impact

The bounding risk assessment approach, discussed in the beginning of Section 3.0 of this SE, was implemented generically for all U.S. operating nuclear power plants. Risk assessments were performed for two categories of plants, Central and East Coast plants and West Coast plants, based on historical seismic hazard curves (earthquake frequencies and associated magnitudes). The first category, Central and East Coast plants, includes the vast majority of the U.S. nuclear power plant population (Reference 7). For each category of plants, two risk assessments were performed:

- The first risk assessment applies to cases where all inoperable snubbers are associated with only one train (or subsystem) of the impacted safety systems. It was conservatively assumed that a single train (or subsystem) of each safety system is unavailable. It was also assumed that the probability of non-mitigation using the unaffected redundant trains (or subsystems) is 2 percent. This is a conservative value, given that for core damage to occur under those conditions, two or more failures are required.

- The second risk assessment applies to the case where one or more of the inoperable snubbers are associated with multiple trains (or subsystems) of the same safety systems. It was assumed in this bounding analysis, except for West Coast PWR plants, that all safety systems are unavailable to mitigate the accident. Credit for using F&B to provide core cooling is taken for plants having F&B capability (e.g., Diablo Canyon) when a snubber impacting more than one train of the AFW system is inoperable. Credit for one AFW train to provide core cooling is taken for West Coast PWR plants with no F&B capability (e.g., San Onofre), because it has been determined that there is no single snubber whose non-functionality would disable two trains of the AFW in a seismic event of a magnitude up to the plant's SSE.

The results of the performed risk assessments, in terms of core damage and large early release risk impacts, are summarized in Table 1 (below on the next page). The first row lists the conditional risk increase, in terms of CDF (core damage frequency), ΔR_{CDF}, caused by the out-of-service snubbers (as assumed in the bounding analysis). The second and third rows list the ICCDP and the ICLERP values, respectively. For the case where all inoperable snubbers are associated with only one train (or subsystem) of the supported safety systems, the ICCDP was obtained by multiplying the corresponding ΔR_{CDF} value by the time fraction of the proposed 72-hour delay to enter the actions for the supported equipment. For the case where one or more of the inoperable snubbers are associated with multiple trains (or subsystems) of the same safety system, the ICCDP was obtained by multiplying the corresponding ΔR_{CDF} value by the time fraction of the proposed 12-hour delay to enter the actions for the supported equipment. The ICLERP values were obtained by multiplying the corresponding ICCDP values by 0.1 (i.e., by assuming that the ICLERP value is an order of magnitude less than the ICCDP value). This assumption is conservative, because containment bypass scenarios, such as steam generator tube rupture accidents and interfacing system LOCAs, would not be uniquely affected by the out-of-service snubbers. Finally, the fourth and fifth rows list the assessed ΔCDF and ΔLERF values, respectively. These values were obtained by dividing the corresponding ICCDP and ICLERP values by 1.5 (i.e., by assuming that the snubbers are

tested every 18 months, as was the case before the snubbers were relocated to a licensee-controlled document). This assumption is reasonable because (1) it is not expected that licensees would test the snubbers more often than what used to be required by the TSs, and (2) testing of snubbers is associated with higher risk impact than is the average corrective maintenance of snubbers found inoperable by visual inspection (testing is expected to involve significantly more snubbers out of service than corrective maintenance). The assessed ΔCDF and ΔLERF values are compared to acceptance guidelines, consistent with the Commission's Safety Goal Policy Statement as documented in RG 1.174, so that the plant's average baseline risk is maintained within a minimal range. This comparison indicates that the addition of LCO 3.0.8 to the existing TSs would have an insignificant risk impact.

Table 1
Bounding Risk Assessment Results for Snubbers Impacting a Single Train and Multiple Trains of a Supported System

	Central and East Cost Plants		West Coast Plants	
	Single Train	**Multiple Trains**	**Single Train**	**Multiple Trains**
ΔR_{CDF}/yr	1E-6	5E-6	1E-4	5E-4
ICCDP	8E-9	7E-9	8E-7	7E-7
ICLERP	8E-10	7E-10	8E-8	7E-8
ΔCDF/yr	5E-9	5E-9	5E-7	5E-7
ΔLERF/yr	5E-10	5E-10	5E-8	5E-8

The assessed ΔCDF and ΔLERF values meet the acceptance criteria of 1E-6/year and 1E-7/year, respectively, based on guidance provided in RG 1.174. This conclusion is valid without taking any credit for the removal of potential undesirable consequences associated with the current inconsistent treatment of snubbers (e.g., reduced snubber-testing frequency, increased safety-system unavailability, and treatment of snubbers impacting multiple trains) discussed in Section 1.0 above of this SE, and given the bounding nature of the risk assessment.

The assessed ICCDP and ICLERP values are compared to acceptance guidelines provided in RG 1.177, which aim to ensure that the plant risk does not increase unacceptably during the period the equipment is taken out of service. This comparison indicates that the addition of LCO 3.0.8 to the existing TSs meets the RG 1.177 numerical guidelines of 5E-7 for ICCDP and 5E-8 for ICLERP. The small deviations shown for West Coast plants are acceptable because of the bounding nature of the risk assessments, as discussed in the beginning of Section 3.0 of this SE.

The risk assessment results of Table 1 are also compared to guidance provided in the revised Section 11 of NUMARC 93-01, Revision 2 (Reference 8), endorsed by RG 1.182 (Reference 9), for implementing the requirements of paragraph (a)(4) of the Maintenance Rule, 10 CFR 50.65. Such guidance is summarized in Table 2. Guidance regarding the acceptability of conditional

risk increase in terms of CDF (i.e., ΔR_{CDF}) for a planned configuration is provided. This guidance states that a specific configuration that is associated with a CDF higher than 1E-3/year should not be entered voluntarily. In RG 1.182, the NRC staff did not take a position on the value of 1E-3/year. Since the assessed conditional risk increase, ΔR_{CDF}, is significantly less than 1E-3/year, NUMARC states that plant configurations including out-of-service snubbers and other equipment may be entered voluntarily if supported by the results of the risk assessment required by 10 CFR 50.65(a)(4), by LCO 3.0.8, or by other TSs.

Table 2
Guidance for Implementing 10 CFR 50.65(a)(4)

ΔR_{CDF}	**Guidance**	
Greater than 1E-3/year	Configuration should not normally be entered voluntarily.	
ICCDP	**Guidance**	**ICLERP**
Greater than 1E-5	Configuration should not normally be entered voluntarily	Greater than 1E-6
1E-6 to 1E-5	Assess non-quantifiable factors; Establish risk management actions	1E-7 to 1E-6
Less than 1E-6	Normal work controls	Less than 1E-7

Guidance regarding the acceptability of ICCDP and ICLERP values for a specific planned configuration and the establishment of risk management actions is also provided in NUMARC 93-01. This guidance, as shown in Table 2, states that a specific plant configuration that is associated with ICCDP and ICLERP values below 1E-6 and 1E-7, respectively, is considered to require "normal work controls." Table 1 (above) shows that, for the majority of plants (i.e., for all plants in the Central and East Coast category), the conservatively assessed ICCDP and ICLERP values are over an order of magnitude less than what is recommended as the threshold for the "normal work controls" region. For West Coast plants, the conservatively assessed ICCDP and ICLERP values are still within the "normal work controls" region. Thus, the risk contribution from out-of-service snubbers is within the normal range of maintenance activities carried out at a plant. Therefore, plant configurations involving out-of-service snubbers and other equipment may be entered voluntarily if supported by the results of the risk assessment required by 10 CFR 50.65(a)(4), by LCO 3.0.8, or by other TSs. However, based on the results of configuration-specific risk assessments required by 10 CFR 50.65(a)(4) or by other TSs, this simplified bounding analysis indicates that, for West Coast plants, the provisions of LCO 3.0.8 must be used cautiously and in conjunction with appropriate management actions, especially when equipment other than snubbers is also inoperable.

The NRC staff finds that the risk assessment results support the proposed addition of LCO 3.0.8 to the TSs. The risk increases associated with this TS change will be insignificant (based on guidance provided in RGs 1.174 and 1.177) and within the range of risks associated with normal maintenance activities. In addition, LCO 3.0.8 will remove potential undesirable consequences stemming from the current inconsistent treatment of snubbers in the Improved

STS, such as reduced frequency of snubber testing, increased safety system unavailability, and the treatment of snubbers impacting multiple trains.

3.1.2 Identification of High-Risk Configurations

The second tier of the three-tiered approach recommended in RG 1.177 involves the identification of potentially high-risk configurations that could exist if equipment, in addition to that associated with the TS change, were to be taken out of service simultaneously. Insights from the risk assessments, in conjunction with important assumptions made in the analysis and defense-in-depth considerations, were used to identify such configurations. To avoid these potentially high-risk configurations, specific restrictions to the implementation of the proposed TS changes were identified.

For cases where all inoperable snubbers are associated with only one train (or subsystem) of the impacted systems (i.e., when LCO 3.0.8a applies), it was assumed in the analysis that there will be unaffected redundant trains (or subsystems) available to mitigate the seismically-initiated LOOP accident sequences. This assumption implies that there will be at least one success path available when LCO 3.0.8a applies. Therefore, potentially high-risk configurations can be avoided by ensuring that such a success path exists when LCO 3.0.8a applies. Based on a review of the accident sequences that contribute to the risk increase associated with LCO 3.0.8a, as modeled by the simplified bounding analysis (i.e., accident sequences initiated by a seismically-induced LOOP event with concurrent loss of all safety-system trains supported by the out-of-service snubbers), the following restriction was identified, for PWRs such as WCGS, to prevent potentially high-risk configurations:

- For PWR plants, at least one AFW train (including a minimum set of supporting equipment required for its successful operation) not associated with the inoperable snubber(s), must be available when LCO 3.0.8a is used.

For cases where one or more of the inoperable snubbers are associated with multiple trains (or subsystems) of the same safety system (i.e., when LCO 3.0.8b applies), it was assumed in the bounding analysis (except for West Coast plants) that all safety systems are unavailable to mitigate the accident. Credit for using F&B to provide core cooling is taken for plants having F&B capability (e.g., Diablo Canyon) when a snubber impacting more than one train of the AFW system is inoperable. Credit for one AFW train to provide core cooling is taken for West Coast PWR plants with no F&B capability (e.g., San Onofre) because it has been determined that there is no single snubber whose non-functionality would disable more than one train of the AFW in a seismic event of magnitude up to the plant's SSE. Based on a review of the accident sequences that contribute to the risk increase associated with LCO 3.0.8b (as modeled by the simplified bounding analysis) and on defense-in-depth considerations, the following restrictions were identified, for PWRs such as WCGS, to prevent potentially high-risk configurations:

- LCO 3.0.8b cannot be used at West Coast PWR plants with no F&B capability when a snubber whose non-functionality would disable more than one train of AFW in a seismic event of magnitude up to the plant's SSE is inoperable (it should be noted, however, that based on information provided by the industry, there is no plant that falls in this category), and

- When LCO 3.0.8b is used at PWR plants, at least one AFW train (including a minimum set of supporting equipment required for its successful operation) not associated with the inoperable snubber(s), or some alternative means of core cooling (e.g., F&B, fire water system or "aggressive secondary cooldown" using the steam generators) must be available.

3.1.3 Configuration Risk Management

The third tier of the three-tiered approach recommended in RG 1.177 involves the establishment of an overall CRMP to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified. The objective of the CRMP is to manage configuration-specific risk by appropriate scheduling of plant activities and/or appropriate compensatory measures. This objective is met by licensee programs to comply with the requirements of paragraph (a)(4) of the Maintenance Rule (10 CFR 50.65) to assess and manage risk resulting from maintenance activities, and by the TSs requiring risk assessments and management using (a)(4) processes if no maintenance is in progress. These programs can support licensee decision-making regarding the appropriate actions to manage risk whenever a risk-informed TS is entered. Because the 10 CFR 50.65(a)(4) guidance, the revised (May 2000) Section 11 of NUMARC 93-01, does not currently address seismic risk, licensees adopting this change must ensure that the proposed LCO 3.0.8 is considered with respect to other plant maintenance activities and integrated into the existing 10 CFR 50.65(a)(4) process, whether the process is invoked by a TS or by (a)(4) itself. This is the second stipulation item in the next section on summary and conclusions, and is addressed in that section.

3.2 Summary and Conclusions

The option to relocate the snubbers to a licensee-controlled document, as part of the conversion to Improved STS, has resulted in non-uniform and inconsistent treatment of snubbers. Some potential undesirable consequences of this inconsistent treatment of snubbers are:

- Performance of testing during crowded windows when the supported system is inoperable, with the potential to reduce the snubber testing to a minimum since the relocated snubber requirements are controlled by the licensee,

- Performance of testing during crowded windows when the supported system is inoperable, with the potential to increase the unavailability of safety systems, or

- Performance of testing and maintenance on snubbers affecting multiple trains of the same supported system during the 7 hours allotted before entering MODE 3 under LCO 3.0.3.

To remove the inconsistency among plants in the treatment of snubbers, licensees are proposing a risk-informed TS change that introduces a delay time before entering the actions for the supported equipment when one or more snubbers are found inoperable or removed for testing. Such a delay time will provide needed flexibility in the performance of maintenance and testing during power operation and, at the same time, will enhance overall plant safety by

(1) avoiding unnecessary unscheduled plant shutdowns, thus, minimizing plant transition and realignment risks; (2) avoiding reduced snubber testing, thus, increasing the availability of snubbers to perform their supporting function; (3) performing most of the required testing and maintenance during the delay time when the supported system is available to mitigate most challenges, thus, avoiding increases in safety-system unavailability; and (4) providing explicit risk-informed guidance in areas in which that guidance currently does not exist, such as the treatment of snubbers impacting more than one redundant train of a supported system.

The risk impact of the proposed TS changes was assessed following the three-tiered approach recommended in RG 1.177. A simplified bounding risk assessment was performed to justify the proposed TS changes. This bounding assessment assumes that the risk increase associated with the proposed addition of LCO 3.0.8 to the TSs is associated with accident sequences initiated by a seismically-induced LOOP event with concurrent loss of all safety-system trains supported by the out-of-service snubbers. In the case of snubbers associated with more than one train, it is assumed that all affected trains of the supported system are failed. This assumption was introduced to allow the performance of a simple bounding risk assessment approach with application to all plants and was selected due to the lack of detailed plant-specific seismic risk assessments for most plants and the lack of fragility data for piping when one or more supporting snubbers are inoperable. The impact from the addition of the proposed LCO 3.0.8 to the TSs on defense-in-depth was also evaluated in conjunction with the risk assessment results.

Based on this integrated evaluation, the NRC staff concludes that the proposed addition of LCO 3.0.8 to the TS would lead to insignificant risk increases, if any. Indeed, this conclusion is true without taking any credit for the removal of potential undesirable consequences associated with the current inconsistent treatment of snubbers, such as the effects of avoiding a potential reduction in the snubber-testing frequency and increased safety-system unavailability. Consistent with the NRC staff's approval of TSTF-372, licensees implementing LCO 3.0.8 must, as applicable, operate in accordance with the following stipulations for PWRs such as WCGS:

1. Appropriate plant procedures and administrative controls will be used to implement the following Tier 2 Restrictions.

   (a) At least one AFW train (including a minimum set of supporting equipment required for its successful operation) not associated with the inoperable snubber(s) must be available when LCO 3.0.8a is used at PWR plants.

   (b) At least one AFW train (including a minimum set of supporting equipment required for its successful operation) not associated with the inoperable snubber(s), or some alternative means of core cooling (e.g., F&B, fire water system or "aggressive secondary cooldown" using the steam generators), must be available when LCO 3.0.8b is used at PWR plants.

   (c) LCO 3.0.8b cannot be used by West Coast PWR plants with no F&B capability when a snubber, whose non-functionality would disable more than one train of AFW in a seismic event of magnitude up to the plant's SSE, is inoperable.

(d) Every time the provisions of LCO 3.0.8 are used, licensees will be required to confirm that at least one train (or subsystem) of systems supported by the inoperable snubbers would remain capable of performing the system's required safety or support functions for postulated-design loads other than seismic loads. LCO 3.0.8 does not apply to non-seismic snubbers. In addition, a record of the design function of the inoperable snubber (i.e., seismic vs. non-seismic), the implementation of any applicable Tier 2 restrictions, and the associated plant configuration shall all be available on a recoverable basis for staff inspection.

2. Should licensees implement the provisions of LCO 3.0.8 for snubbers, which include delay times to enter the actions for the supported equipment when one or more snubbers are out of service for maintenance or testing, it must be done in accordance with an overall CRMP to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified and avoided, as discussed in the proposed TS Bases. This objective is met by licensee programs to comply with the requirements of paragraph(a)(4) of the Maintenance Rule, 10 CFR 50.65, to assess and manage risk resulting from maintenance activities or when this process is invoked by LCO 3.0.8 or other TSs. These programs can support licensee decision-making regarding the appropriate actions to manage risk whenever a risk-informed TS is entered. Because the 10 CFR 50.65(a)(4) guidance, the revised (May 2000) Section 11 of NUMARC 93-01, does not currently address seismic risk, licensees adopting this change must ensure that the proposed LCO 3.0.8 is considered in conjunction with other plant maintenance activities and integrated into the existing 10 CFR 50.65(a)(4) process. In the absence of a detailed seismic PRA, a bounding risk assessment, such as that utilized in this SE, shall be followed.

In its application, the licensee stated that it reviewed the NRC staff's model SE for TSTF-372, Revision 4, as well as the information provided to support TSTF-372, Revision 4. Further, in Section 4.1 of Attachment I to its application, the licensee concluded that the justifications presented in the TSTF-372, Revision 4, proposal and the NRC staff's model SE are applicable to WCGS, and justify this amendment. As the stipulations listed above were part of the justifications presented in the NRC staff's model SE, these stipulations apply to the licensee's implementation of LCO 3.0.8. Based on its own review of the licensee's application, the NRC staff concludes that the proposed LCO 3.0.8 is an acceptable method to address the current inconsistent treatment of snubbers in the Improved STS.

Based on the above summary and conclusions, the NRC staff concludes that the proposed LCO 3.0.8, which will be in Section 3.0 of the TSs on LCO applicability, properly defines the rules and practices for the affected support LCOs for when one or more snubbers are unable to perform their associated support function(s). Therefore, the NRC staff further concludes that the proposed LCO 3.0.8 meets 10 CFR 50.36.

With the addition of LCO 3.0.8 to Section 3.0 of the TSs, there will be another LCO in that section, besides LCO 3.0.2 and LCO 3.0.7, that explains, in this case for snubbers, when LCOs do not have to be declared not met. Because of this, LCO 3.0.8 has to be listed in LCO 3.0.1 of

TS Section 3.0. This is an administrative change that does not change any requirements in the TSs and is needed to identify the exceptions to LCO 3.0.1. Based on these considerations, the NRC staff concludes that the addition of LCO 3.0.8 to LCO 3.0.1 meets 10 CFR 50.36, and is, therefore, acceptable.

Also, with the addition of LCO 3.0.8 to the TSs, there is the addition of a new page to TS Chapter 3.0 on LCO and SR applicability. Therefore, the Table of Contents has to be revised to show that the page number for "Surveillance Requirement (SR) Applicability" is now 3.0-4. This is an administrative change to account for the addition of a new page to the "Limiting Condition for Operation (LCO) Applicability" in this amendment and does not alter any requirement in the TSs. Because the change is administrative and is necessary to show the correct page number for "Surveillance Requirement (SR) Applicability" in the Table of Contents, the NRC staff concludes that it is acceptable.

The licensee identified changes to the TS Bases for its proposed amendment. The NRC staff has reviewed these changes and has no disagreement with them. Changes to the TS Bases are controlled through TS 5.5.14, "Technical Specification (TS) Bases Control Program."

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 requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. 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 (72 FR 154; published on January 3, 2007). 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.

7.0 REFERENCES

1. TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers," April 23, 2004.

2. RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," NRC, July 1998.

3. RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," NRC, August 1998.

4. Budnitz, R. J. et. al., "An Approach to the Quantification of Seismic Margins in Nuclear Power Plants," NUREG/CR-4334, Lawrence Livermore National Laboratory, July 1985.

5. Advanced Light Water Reactor Utility Requirements Document, Volume 2, ALWR [Advanced Light-Water Reactor] Evolutionary Plant, PRA Key Assumptions and Groundrules, Electric Power Research Institute, August 1990.

6. Bier V. M., et. al., "Development and Application of a Comprehensive Framework for Assessing Alternative Approaches to Snubber Reduction," International Topical Conference on Probabilistic Safety Assessment and Risk Management PSA '87, Swiss Federal Institute of Technology, Zurich, August 30-September 4, 1987.

7. NUREG-1488, "Revised Livermore Seismic Hazard Estimates for Sixty-Nine Nuclear Power Plant Sites East of the Rocky Mountains," April 1994.

8. NEI, Revised Section 11 of Revision 2 of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power plants," May 2000.

9. RG 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants," NRC, May 2000.

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