UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 6, 2009

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE TO ADD LIMITING CONDITION FOR OPERATION (LCO) 3.0.8 ON THE INOPERABILITY OF SNUBBERS AND RELOCATE TECHNICAL SPECIFICATION 3.7.8 TO THE TECHNICAL REQUIREMENTS MANUAL (TAC NO. MD9483)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 283 to Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2 (ANO-2). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 21, 2008, as supplemented by letter dated December 11, 2008.

The amendment relocates ANO-2 TS 3.7.8, "Shock Suppressors (Snubbers)," to the Technical Requirements Manual. In addition, the amendment modifies the TS by adding Limiting Condition for Operation (LCO) 3.0.8 on the inoperability of snubbers using the Consolidated Line Item Improvement Process. The amendment also makes conforming changes to TS LCO 3.0.1. The changes relating to the addition of LCO 3.0.8 are consistent with NRC-approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification change TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers."

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

Sincerely,

Alan Wang

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 283 to NPF-6
2. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 283
Renewed License No. NPF-6

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated July 21, 2008, as supplemented by letter dated December 11, 2008, 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, 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 Renewed Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 283, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License No. NPF-6
Technical Specifications

Date of Issuance: March 6, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 283

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Replace the following pages of the Renewed Facility Operating License No. NPF-6 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.

Operating License

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Technical Specifications

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| 3/4 0-1 | 3/4 0-1 |
| 3/4 0-1a | 3/4 0-1a |
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| 3/4 7-23 | -- |
| 3/4 7-23a | -- |
| 3/4 7-23b | -- |
| 3/4 7-23c | -- |
| 3/4 7-23d | -- |
| 3/4 7-24 | -- |
| 3/4 7-26 | -- |
| 3/4 7-26a | -- |

(4) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) EOI, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to conditions specified in the following Commission regulations in 10 CFR Chapter 1; Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at steady state reactor core power levels not in excess of 3026 megawatts thermal. Prior to attaining this power level EOI shall comply with the conditions in Paragraph 2.C.(3).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 283 are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

Exemptive 2nd paragraph of 2.C.2 deleted per Amendment 20, 3/3/81.

(3) Additional Conditions

The matters specified in the following conditions shall be completed to the satisfaction of the Commission within the stated time periods following issuance of the renewed license or within the operational restrictions indicated. The removal of these conditions shall be made by an amendment to the renewed license supported by a favorable evaluation by the Commission.

2.C.(3)(a) Deleted per Amendment 24, 6/19/81.

## 3/4 LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

### 3/4.0 APPLICABILITY

LIMITING CONDITION FOR OPERATION

3.0.1 Limiting Conditions for Operation (LCO) and ACTION requirements shall be applicable during the OPERATIONAL MODES or other conditions specified for each specification, except as provided in LCO 3.0.2 and 3.0.8.

3.0.2 Adherence to the requirements of the Limiting Condition for Operation and/or associated ACTION within the specified time interval shall constitute compliance with the specification, except as provided in Specification 3.0.6. In the event the Limiting Condition for Operation is restored prior to expiration of the specified time interval, completion of the ACTION statement is not required.

3.0.3 In the event a Limiting Condition for Operation and/or associated ACTION requirements cannot be satisfied because of circumstances in excess of those addressed in the specification within 1 hour, action shall be initiated to place the unit in a mode in which the specification does not apply by placing it, as applicable, in at least HOT STANDBY within 6 hours, in at least HOT SHUTDOWN within the next 6 hours, and in at least COLD SHUTDOWN within the following 24 hours unless corrective measures are completed that permit operation under the permissible ACTION statements for the specified time interval as measured from initial discovery or until the reactor is placed in a MODE in which the specification is not applicable. Exceptions to these requirements shall be stated in the individual specification.

3.0.4 When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

a. When the associated ACTIONs to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications, or

c. When an allowance is stated in the individual value, parameter, or other Specification.

This specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONs or that are part of a shutdown of the unit.

LIMITING CONDITION FOR OPERATION

3.0.5 When a system, subsystem, train, component or device is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of its applicable Limiting Condition for Operation, provided: (1) its corresponding normal or emergency power source is OPERABLE; and (2) all of its redundant system(s), subsystem(s), train(s), component(s), and device(s) are OPERABLE, or likewise satisfy the requirements of this specification. Unless both conditions (1) and (2) are satisfied within 2 hours, action shall be initiated to place the unit in a MODE in which the applicable Limiting Condition for Operation does not apply by placing it, as applicable, in at least HOT STANDBY within 6 hours, in at least HOT SHUTDOWN within the next 6 hours, and in at least COLD SHUTDOWN within the following 24 hours. This specification is not applicable in MODES 5 or 6.

3.0.6 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

3.0.7 To be used later.

3.0.8 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.

SURVEILLANCE REQUIREMENTS

4.7.6.1.1 Each control room emergency air conditioning system shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Starting each unit from the control room, and

2. Verifying that each unit operates for at least 1 hour and maintains the control room air temperature ≤ 84°F D.B.

b. At least once per 18 months by verifying a system flow rate of 9900 cfm ± 10%.

4.7.6.1.2 Each control room emergency air filtration system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that the system operates for at least 15 minutes.

b. At least once per 18 months by verifying that on a control room high radiation signal, either actual or simulated, the system automatically isolates the control room and switches into a recirculation mode of operation.

c. By performing the required Control Room Emergency Ventilation filter testing in accordance with the Ventilation Filter Testing Program (VFTP).

d. At least once per 18 months verify VSF-9 makeup flow rate is ≥ 300 and ≤ 366 cfm when supplying the control room with outside air.

e. At least once per 18 months verify 2VSF-9 makeup flow rate is ≥ 418.5 and ≤ 511.5 cfm when supplying the control room with outside air.

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 283 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

## 1.0 INTRODUCTION

By application dated July 21, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082040918), as supplemented by letter dated December 11, 2008 (ADAMS Accession No. ML083460648), Entergy Operations, Inc. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit No. 2 (ANO-2). The supplemental letter dated December 11, 2008, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 4, 2008 (73 FR 65693).

The proposed change would add the Limiting Condition for Operation (LCO) 3.0.8 to address conditions where one or more snubbers are unable to perform their associated support function. The change is based on Technical Specification Task Force (TSTF) change traveler, TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers," which has been approved generically for the Standard Technical Specifications (STS; NUREGs 1430-1434). A notice announcing the availability of this proposed TS change using the consolidated line item improvement process (CLIIP) was published in the *Federal Register* on May 4, 2005 (70 FR 23252). ANO-2 has not converted to the STSs, therefore, to take advantage of TSTF-372, Revision 4, the licensee has also proposed to relocate ANO-2 TS 3.7.8, "Shock Suppressors (Snubbers)," to the Technical Requirements Manual (TRM). A description of TSTF-372 and its associated TS changes now follows.

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 standard technical specifications (STS) (NUREGs 1430-1434) 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 STS 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 TS, while reducing unnecessary burden and making TS requirements consistent with the Commission's other risk-informed regulatory requirements, in particular, the Maintenance Rule in Section 50.65 of Title 10 of the *Code of Federal Regulations* (10 CFR 50.65).

The proposed change adds a new LCO 3.0.8 to the TS. LCO 3.0.8 allows licensees to delay declaring an LCO not met for equipment, supported by snubbers unable to perform their associated support functions, when risk 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.

The proposed TS change is further described in Section 2.0. The technical evaluation and approach used to assess its risk impact is discussed in Section 3.0 with the specific results and insights of the risk assessment discussed in Section 3.1. Section 3.2 summarizes the NRC staff's conclusions from the review of the proposed TS change.

## 2.0 REGULATORY EVALUATION

In 10 CFR 50.36, "Technical specifications," the Commission established its regulatory requirements related to the content of TS. Pursuant to 10 CFR 50.36, TS 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 TS. As stated in 10 CFR 50.36(c)(2)(i), LCOs "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 specification until the condition can be met." TS Section 3.0, on "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 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 analysis based on different combinations of load conditions, depending on the design classification of the particular piping.

Prior to a plant's conversion to the improved STS, TS requirements applied directly to snubbers. The 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 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 TS, 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, plants that have relocated snubbers from their TS are allowed to change the TS requirements for snubbers under the auspices of 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, plants 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 plants 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 plants that have not relocated, plants 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 plants that have not relocated) if it is justified by 10 CFR 50.59 assessments. This does not replace licensee obligations to meet the requirements of 10 CFR 50.55a or to request approved alternatives to the Code. 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 TS 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 in which 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

The industry submitted TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers" 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 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.

- 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 TS. 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 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 0.1 g, expressed in terms of peak ground acceleration. Thus, a magnitude 0.1 g earthquake is conservatively assumed to have 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 0.3 g, which is significantly higher than the 0.1 g HCLPF value. Therefore, the simplified analysis, even though it does not consider LOOP events caused by earthquakes of magnitude higher than 0.1 g, bounds a detailed analysis which would use mean seismic failure probabilities (fragilities) for the ceramic insulators.

- Analytical and experimental results obtained in the 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 0.1 g 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 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-controlled 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. Similarly, if high pressure makeup (e.g., reactor core isolation cooling) and heat removal capability (e.g., suppression pool cooling) are unavailable in boiling-water reactors (BWRs), reactor depressurization in conjunction with low pressure makeup (e.g., low pressure coolant injection) and heat removal capability (e.g., shutdown cooling) can be used to cool the core. 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 Diablo Canyon's 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 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 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 East Coast 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 East Coast 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 0.1 g 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 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 0.3 g. 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 0.1 g level earthquake would fail all piping associated with inoperable snubbers, non-LOOP sequences would not include any more failures associated with inoperable snubbers than 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 harder to analyze generically, than for seismic loads. For these reasons, licensees will be required to confirm every time LCO 3.0.8 is used, that at least one train of each system that is supported by the inoperable snubber(s) would remain capable of performing their 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 TS 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 Section 3.0, 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 that all safety systems are unavailable to mitigate the accident, except for West Coast PWR plants. 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 AFW in a seismic event of 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). The first row lists the conditional risk increase, in terms of CDF (core damage frequency), $\Delta R_{CDF}$, caused by the out-of-service snubbers (as assumed in the bounding analysis). The second and third rows list the ICCDP (incremental conditional core damage probability) and the ICLERP (incremental conditional large early release probability) 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 $\Delta R_{CDF}$ 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 $\Delta R_{CDF}$ 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). This assumption is conservative since containment bypass scenarios, such as steam generator tube rupture accidents and interfacing system loss-of-coolant accidents, would not be uniquely affected by the out-of-service snubbers. Finally, the fourth and fifth rows list the assessed $\Delta$CDF and $\Delta$LERF 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 TS, and (2) testing of snubbers is associated with higher risk impact than 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 TS 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 Coast Plants | | West Coast Plants | |
|---|---|---|---|---|
| | **Single Train** | **Multiple Train** | **Single Train** | **Multiple Train** |
| $\Delta R_{CDF}$ /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 true 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 above, 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 at ensuring 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 TS 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 Section 2.

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., $\Delta R_{CDF}$) 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. Since the assessed conditional risk increase, $\Delta R_{CDF}$, is significantly less than 1E-3/year, 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)**

| $\Delta R_{CDF}$ | 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<br>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 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 TS. However, based on the results of the 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, based on the results of configuration-specific risk assessments required by 10 CFR 50.65(a)(4), by LCO 3.0.8, or by other TSs.

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 TS, 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 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 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 defense-in-depth considerations, the following restrictions were identified 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, firewater 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 TS requiring risk assessments and management using 10 CFR 50.65(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. Since 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.

3.1.4 Optional Changes and Variations

The licensee proposed three deviations from the NRC staff model safety evaluation (SE). The first deviation is related to item 1(a), Section 3.2 of the model SE, which assumes the availability of one emergency feedwater (EFW) train during application of LCO 3.0.8. The licensee stated that condition 1(a) does not address the lower modes of operation when EFW is not required to be operable or Steam Generators (SGs) are otherwise unavailable. The TS Bases clarify that when EFW is not required to be operable by TSs, the redundant train core cooling source being relied upon during these lower modes of operation will be considered sufficient to meet the intent of the TSTF-372 model SE.

The second deviation is related to item 1(b), Section 3.2 of the model SE, which requires the availability of EFW (or other core cooling method in lower modes of operation) during periods when one or more required snubbers are inoperable during application of LCO 3.0.8. The licensee's supplemental letter dated December 11, 2008, discussed that the submittal letter did not describe redundant EFW or core cooling source requirements. The licensee chooses to describe these restrictions in the TS Bases because ANO-2 is a two-train facility and no redundant EFW train would exist for a snubber that affects both trains of a given system.

The third deviation is related to item 1(e), Section 3.2 of the model SE, which contains the statement: "LCO 3.0.8 does not apply to non-seismic snubbers." The licensee stated that "[t]his [limitation] does not appear to be captured in the implementation process of the TSTF. Therefore, Entergy proposes to include this statement in the LCO 3.0.8 TS Bases...." The licensee also proposes an additional change to the Bases to include guidance associated with the intent of this statement which is contained in the model SE and in TSTF-IG-05-03, Implementation Guidance for TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers."

These model SE deviations from the approved TSTF-372 TS Bases modify the discussion and clarify the guidance on redundant EFW or core cooling requirements for various modes of operation used to implement Tier 2 Restrictions. Reliance on the redundant train core cooling source during modes where the EFW is not required by TSs provides an equivalent safety margin, meets the intent of the staff safety evaluation conditions and are, therefore, acceptable.

3.1.5 Relocating Current TS 3.7.8, Shock Suppressors (Snubbers)

ANO-2 has not converted to the STSs, and therefore, the TS snubber requirements have not been relocated to a licensee-controlled document. To be consistent with NUREG-1432 and the TSTF-372, the licensee has proposed to relocate he snubber-related requirements of TS 3.7.8 to the Technical Requirements Manual. The NRC Final Policy Statement on Technical Specifications states that LCOs and associated requirements that do not satisfy or fall within any of the four specified criteria presently contained in 10 CFR 50.36, may be relocated from existing TS (an NRC-controlled document) to appropriate licensee-controlled documents.

Shock suppressors (snubbers) are used on piping systems or equipment to limit displacement from dynamic loads such as earthquake or thermal-hydraulic transient, while allowing is placement from thermal expansion. Snubbers are not active components, but are a type of support like springs, base plates, or struts with the same potential for impact on operability as any support. The majority of snubbers at ANO-2 are installed on Seismic Class I piping, which include the safety systems. Snubber testing is required by 10 CFR 50.55a to be performed in accordance with ASME/American Nuclear Standards Institute (ANSI) OM Part 4, "Examination and Performance Testing of Nuclear Power Plant Dynamic Restraints." Thus, specifying such testing in the TS is unnecessary. A snubber is not a component that is part of the primary success path and which functions or actuates to mitigate a design-basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. Thus, TS requirements for snubbers do not meet the criteria of 10 CFR 50.36(c)(2)(ii) for retention in the TS.

In addition, snubber degradation does not necessarily render the associated safety system inoperable. Rather, it is appropriate to evaluate issues with a snubber using existing guidance for degraded or nonconforming conditions and corrective action programs. If a problem with one or more snubbers does make a system or component inoperable, the TS for the affected system will define the appropriate remedial actions. Testing will be adequately controlled in accordance with TS 6.5.8, Inservice Test Program, 10 CFR 50.55a, and 10 CFR 50.59.

Relocation of TS 3/4 7.8 requirements to the TRM is acceptable since changes to the TRM are controlled by 10 CFR 50.59. The new location of TS 3/4 7.8 requirements will continue to be implemented by appropriate station procedures (i.e., operating procedures, maintenance procedures, surveillance and testing procedures, and work control procedures). This change is also consistent with the Standard Technical Specifications Combustion Engineering Plants, NUREG-1432.

3.1.6 Format and Administrative Changes

TSTF-372 adds the LCO 3.0.8 reference to LCO 3.0.1. Currently, the STS has reference to LCO 3.0.2 and 3.0.7 within LCO 3.0.1. The licensee stated that ANO-2 TS does not contain

LCO 3.0.7 (associated with Special Test Exceptions); therefore, reference to LCO 3.0.7 is not included in the ANO-2 LCO 3.0.1. However, reference to LCO 3.0.2 should be included and, therefore, the licensee is adding this reference to the ANO-2 LCO 3.0.1 to gain consistency with the STS.

As discussed above, ANO-2 does not have an LCO 3.0.7. However, in TS numbered pages consistent (where possible) with the STS, the licensee proposes to add an LCO 3.0.7 placeholder, which will permit using the LCO 3.0.8 designation for snubbers, consistent with TSTF-372 and the STS. TS page numbers are revised to account for pages being deleted by the relocation of TS 3.7.8. This change is administrative in nature.

These format and administrative changes are required to ensure consistent use and application of the requirement of LCO 3.0.8 and are, therefore, acceptable.

3.2 Summary and Conclusions

The relocation of the snubbers TS to a licensee controlled document, as part of this amendment, 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.

- 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 which 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 TS 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 TS 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 and inherent in the implementation of TSTF-372, ANO-2 must, as applicable, operate in accordance with the following stipulations with deviations noted in Section 3.1 above:

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) Not applicable to ANO-2.

   (d) Not applicable to ANO-2.

   (e) Every time the provisions of LCO 3.0.8a 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 their 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 versus non-seismic), the implementation of any applicable Tier 2 restrictions, and the associated plant configuration shall be available on a recoverable basis for staff inspection.

2. When the licensee implements 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 TS. These programs can support licensee decision-making regarding the appropriate actions to manage risk whenever a risk-informed TS is entered. Since the 10 CFR 50.65(a)(4) guidance, the revised (May 2000) Section 11 of NUMARC 93-01, does not currently address seismic risk, the licensee 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 utilized in this SE, shall be followed.

Based on the above, the NRC staff concludes that the proposed LCO 3.0.8, which will be in Section 3.0 of the TS 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). In addition, the NRC staff concludes that the snubber TSs do not satisfy or fall within any of the four specified criteria presently contained in 10 CFR 50.36 and, therefore, may be relocated from existing TS to an appropriate licensee-controlled document. Therefore, the NRC staff further concludes that the proposed LCO and relocation 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, that explains, in this case for snubbers, when LCOs do not have to be declared not met. Because of this, LCO 3.0.2 and 3.0.8 have to be listed in LCO 3.0.1 of Section 3.0 of TS. This is an administrative change that does not change any requirements in the TSs and is needed to identify the exceptions to TS 3.0.1. Based on these considerations, the NRC staff concludes that the addition of LCO 3.0.2 and 3.0.8 to LCO 3.0.1 meets 10 CFR 50.36, and is, therefore, acceptable.

4.3 Regulatory Commitments

In the Entergy letter dated July 21, 2008, the licensee has made the following regulatory commitments with respect to this license amendment request:

1. Entergy will establish the Technical Specification (TS) Bases for Limiting Condition for Operation (LCO) 3.0.8 as adopted with the applicable license amendment.

2. Entergy will ensure, during the relocation of TS 3.7.8 snubber requirements to the Technical Requirements Manual (TRM) that the TRM Actions are modified, in accordance with 10 CFR 50.59, to require recognition of the design function of the inoperable snubber (i.e., seismic

vs. non-seismic) and implementation of any Tier 2 restrictions each time a required snubber is rendered inoperable.

3. Entergy will revise station procedures or administrative process to ensure seismic risks are considered during application of the LCO 3.0.8 delay period when one or more snubbers are inoperable.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas 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 and change surveillance requirements. 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 considerations, and there has been no public comment on the finding published in the *Federal Register* on November 4, 2008 (73 FR 65693). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) [and (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.

## 6.0 CONCLUSION

The Commission has concluded, on the basis of 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. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998 (ADAMS Accession No. ML003740133).

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," August 1998 (ADAMS Accession No. ML003740176).

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

5. Advanced Light Water Reactor Utility Requirements Document, Volume 2, ALWR 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. U.S. Nuclear Regulatory Commission, NUREG-1488, "Revised Livermore Seismic Hazard Estimates for Sixty-Nine Nuclear Power Plant Sites East of the Rocky Mountains," April 1994.

8. Nuclear Energy Institute, 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. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants," May 2000 (ADAMS Accession No. ML003740117).

Principal Contributor: Carl Schulten

Date: March 6, 2009

March 6, 2009

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE TO ADD LIMITING CONDITION FOR OPERATION (LCO) 3.0.8 ON THE INOPERABILITY OF SNUBBERS AND RELOCATE TECHNICAL SPECIFICATION 3.7.8 TO THE TECHNICAL REQUIREMENTS MANUAL (TAC NO. MD9483)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 283 to Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2 (ANO-2). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 21, 2008, as supplemented by letter dated December 11, 2008.

The amendment relocates ANO-2 TS 3.7.8, "Shock Suppressors (Snubbers)," to the Technical Requirements Manual. In addition, the amendment modifies the TS by adding Limiting Condition for Operation (LCO) 3.0.8 on the inoperability of snubbers using the Consolidated Line Item Improvement Process. The amendment also makes conforming changes to TS LCO 3.0.1. The changes relating to the addition of LCO 3.0.8 are consistent with NRC-approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification change TSTF-372, Revision 4, "Addition of LCO 3.0.8, Inoperability of Snubbers."

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

Sincerely,

/RA/

Alan B. Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368
Enclosures:
1. Amendment No. 283 to NPF-6
2. Safety Evaluation
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**ADAMS Accession No. ML090360056** *SE input memo

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|---|---|---|---|---|---|---|
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| DATE | 2/12/09 | 2/11/09 | 1/14/09 | -- | 3/6/09 | 3/6/09 |

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