

February 29, 2008

Mr. M. R. Blevins
Executive Vice President
& Chief Nuclear Officer
Luminant Generation Company LLC
ATTN: Regulatory Affairs
P. O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 –
ISSUANCE OF AMENDMENTS RE: REVISION TO TECHNICAL
REQUIREMENTS SURVEILLANCE 13.3.33.2 (TAC NOS. MD5639 AND
MD5640)

Dear Mr. Blevins:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 143 to Facility Operating License No. NPF-87 and Amendment No. 143 to Facility Operating License No. NPF-89 for Comanche Peak Steam Electric Station (CPSES), Units 1 and 2, respectively. The amendments consist of changes to the Technical Requirements Manual, Technical Requirements Surveillance (TRS) 13.3.33.2 in response to your application dated May 22, 2007, as supplemented by letter dated December 5, 2007.

The amendments revise the TRS frequency from 12 to 26 weeks for the turbine stop and control valves for CPSES, Units 1 and 2.

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/

Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-445 and 50-446

Enclosures: 1. Amendment No. 143 to NPF-87
2. Amendment No. 143 to NPF-89
3. Safety Evaluation

cc w/encls: See next page

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ADAMS Accession No.: ML080220107

(*) SE dated 1/8/08

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DATE	2/14/08	2/14/08	1/8/08	2/15/08	2/27/08	2/29/08

OFFICIAL AGENCY RECORD

Comanche Peak Steam Electric Station

cc:

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LUMINANT GENERATION COMPANY LLC
COMANCHE PEAK STEAM ELECTRIC STATION, UNIT NO. 1
DOCKET NO. 50-445
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 143
License No. NPF-87

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by TXU Generation Company LP (subsequently renamed Luminant Generation Company LLC) dated May 22, 2007, as supplemented by letter dated December 5, 2007, 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 page changes as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-87 is hereby amended to read as follows:

- (2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 143 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. Luminant Generation Company LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan 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 120 days from 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 No. NPF-87

Date of Issuance: February 29, 2008

LUMINANT GENERATION COMPANY LLC
COMANCHE PEAK STEAM ELECTRIC STATION, UNIT NO. 2
DOCKET NO. 50-446
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 143
License No. NPF-89

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by TXU Generation Company LP (subsequently renamed Luminant Generation Company LLC) dated May 22, 2007, as supplemented by letter dated December 5, 2007, 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 page changes as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-89 is hereby amended to read as follows:

- (2) Technical Specifications and Environmental Protection Plan

- The Technical Specifications contained in Appendix A as revised through Amendment No. 143 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. Luminant Generation Company LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days from 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 No. NPF-89

Date of Issuance: February 29, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 143

TO FACILITY OPERATING LICENSE NO. NPF-87

AND AMENDMENT NO. 143

TO FACILITY OPERATING LICENSE NO. NPF-89

DOCKET NOS. 50-445 AND 50-446

Replace the following pages of the Facility Operating License Nos. NPF-87 and NPF-89 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 No. NPF-87

REMOVE

INSERT

3

3

Facility Operating License No. NPF-89

REMOVE

INSERT

3

3

- (3) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, and described in the Final Safety Analysis Report, as supplemented and amended;
 - (4) Luminant Generation Company LLC, 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) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required, any byproduct, source, and 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) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Parts 30, 40 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 license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I 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
Luminant Generation Company LLC is authorized to operate the facility at reactor core power levels not in excess of 3458 megawatts thermal in accordance with the conditions specified herein.
 - (2) Technical Specifications and Environmental Protection Plan
The Technical Specifications contained in Appendix A as revised through Amendment No. 143 the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. Luminant Generation Company LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

- (3) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time, special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, and described in the Final Safety Analysis Report, as supplemented and amended;
- (4) Luminant Generation Company LLC, 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) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required, any byproduct, source, and 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) Luminant Generation Company LLC, pursuant to the Act and 10 CFR Parts 30, 40 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 license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I 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

Luminant Generation Company LLC is authorized to operate the facility at reactor core power levels not in excess of 3458 megawatts thermal in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A as revised through Amendment No. 143 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into this license. Luminant Generation Company LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Antitrust Conditions

DELETED

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 143 TO
FACILITY OPERATING LICENSE NO. NPF-87
AND AMENDMENT NO. 143 TO
FACILITY OPERATING LICENSE NO. NPF-89
LUMINANT GENERATION COMPANY LLC
COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2
DOCKET NOS. 50-445 AND 50-446

1.0 INTRODUCTION

By letter dated May 22, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML071500316), as supplemented by letter dated December 5, 2007 (ADAMS Accession No. ML073620217), TXU Generation Company LP (subsequently renamed Luminant Generation Company LLC) (the licensee), submitted License Amendment Request (LAR) No. 07-001 to apply for a revision to technical requirements surveillance (TRS) 13.3.33.2 regarding testing frequency for the turbine stop and control valves for Comanche Peak Steam Electric Station (CPSES), Units 1 and 2. Specifically, the licensee proposed to increase the testing interval for each of the high-pressure (HP) and low-pressure (LP) turbine stop and control valves from 12 weeks to 26 weeks.

The LAR is based on revised turbine missile failure probabilities for an overspeed event greater than 120 percent of turbine rated speed considering a new digital overspeed trip protection system at CPSES, Units 1 and 2.

The supplemental letter dated December 5, 2007, 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 August 14, 2007 (72 FR 45462).

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion 4 requires that structures, systems, and components (SSCs) important to safety be protected against the effects of missiles that might result from equipment failures. The steam turbine is considered to be one of these components because if its massive rotors fail at a high-rotating speed during normal operating conditions of a nuclear unit, high-energy missiles could be generated that have the potential to damage safety-related SSCs.

In the past, evaluation of the likelihood of turbine missiles followed Regulatory Guide (RG) 1.115, Revision 1, "Protection Against Low-Trajectory Turbine Missiles," and three Standard Review Plan (SRP, NUREG-0800) sections: Section 3.5.1.3, "Turbine Missiles," Section 10.2, "Turbine Generator," and Section 10.2.3, "Turbine Disk Integrity." As specified in SRP Section 3.5.1.3, the probability of unacceptable damage from turbine missiles is expressed as the product of the following items: (1) the probability of turbine missile generation resulting in the ejection of turbine disk (or internal structure) fragments through the turbine casing, P_1 , (2) the probability of ejected missiles perforating intervening barriers and striking safety-related SSCs, P_2 , and (3) the probability of struck SSCs failing to perform their safety functions, P_3 . Over the years, the U.S. Nuclear Regulatory Commission (NRC) staff has shifted its emphasis in the review of turbine missile issues from the strike and damage probability $P_2 \times P_3$ to the missile generation probability P_1 . The minimum reliability requirement for loading the turbine and bringing the system on-line was established in Appendix U of NUREG-1048, Supplement No. 6, "Safety Evaluation Report Related to the Operation of Hope Creek Generating Station," as $P_1 < 10^{-4}$ for favorably-oriented turbines and $P_1 < 10^{-5}$ for unfavorably-oriented turbines.

RG 1.115, Revision 1 defines favorably-oriented turbines as those with plant-essential systems and their protecting structures located outside the ± 25 -degree lines emanating from the centers of the first and last LP turbine wheels as measured from the plane of the wheels. This RG also defines "high-trajectory" missiles as those being ejected upward through the turbine casing and "low-trajectory" or "direct" missiles as those being ejected from the turbine casing directly toward an essential system.

RG 1.115, Revision 1 provides guidance for only low-trajectory turbine missiles. The RG considers the protection of an essential system acceptable if the system and any protecting structure are located outside the low-trajectory missile strike zones (or, equivalently, if the turbine is favorably oriented).

For high-trajectory turbine missiles, the NRC has been using the criteria established in Appendix U of NUREG-1048, Supplement No. 6 in its evaluation. Currently, the maintenance and inspection of turbine rotors and valves are based on the P_1 calculation, operating experience of similar equipment, and inspection results. Future plant-specific applications such as this LAR must demonstrate that the revised turbine missile probability still meets the above-mentioned criterion for P_1 .

3.0 TECHNICAL EVALUATION

To support the LAR to increase the testing interval for turbine stop and control valves from 12 to 26 weeks, the licensee provided qualitative and quantitative evaluations in the submittal. The licensee's qualitative evaluation addressed turbine orientation and placement, shielding, the inspection program, and overspeed protection. The licensee's quantitative evaluation addressed quality assurance in design and fabrication, the testing program, and the overspeed protection system.

3.1 Qualitative Evaluation

3.1.1 Turbine Orientation and Placement

The CPSES, Units 1 and 2 turbines are favorably-oriented relative to the containment building with the turbine axis radial to the containment building in accordance with RG 1.115, Revision 1 as described in CPSES, Units 1 and 2 final safety analysis report, Section 3.5.1.3, Figure 3.5-3. The CPSES, Units 1 and 2 turbines are oriented such that low-trajectory turbine missiles cannot strike any of the essential systems. This will remain unchanged after implementation of the LAR. Hence, low-trajectory turbine missiles are not a concern for the CPSES, Units 1 and 2 LAR and the licensee's evaluation is appropriate. As such, only high-trajectory missiles are evaluated in this safety evaluation (SE).

3.1.2 Shielding Against Turbine Missiles

CPSES, Units 1 and 2 LP turbines were designed to prevent turbine missiles from penetrating turbine casing until the turbines reach 145 percent of their rated speed and to prevent disks from reaching final ductile failure until the turbines reach 160 percent of their rated speed. These design features remain unchanged after implementation of the LAR. The submittal did not identify any additional shielding against turbine missiles. This is appropriate because as long as the acceptance criteria for P₁ established in Appendix U of NUREG-1048, Supplement No. 6 is satisfied, information on shielding is not needed.

3.1.3. Inspection Program

The current inspection program requires the licensee to:

- disassemble the turbine at approximately 12-year intervals and conduct visual, surface, and ultrasonic (UT) examinations;
- perform UT inspection of the disk bore and keyway areas for each LP turbine every 100,000 operating hours;
- conduct visual examinations at accessible turbine locations during refueling outages every 3 years;
- disassemble one HP stop valve and control valve every 40 months to conduct visual and surface examinations of the valve seat, disk, and stem; and
- perform visual examinations at one LP stop valve and control valve accessible from associated piping.

This inspection program will remain unchanged after implementation of the LAR. Hence, the licensee's evaluation is appropriate.

3.1.4 Overspeed Protection

Overspeed protection is provided by the electro-hydraulic control system and the overspeed protection system. The licensee replaced the original turbine overspeed protection system pursuant to the requirements of 10 CFR 50.59. The original control and overspeed protection system consisted of (1) an electro-hydraulic control system, (2) a backup mechanical-hydraulic control system and load rejection relay, and (3) a mechanical overspeed protection system. In NUREG-0797, "Safety Evaluation Report Related to the Operation of Comanche Peak Steam Electric Station, Units 1 and 2," the staff concluded that the original turbine overspeed protection system satisfied the intent of the NRC Standard Review Plan (NUREG-75/087), Section 10.2, Part III, with respect to redundancy for overspeed protection. The replacement turbine overspeed protection system has multiple-speed channels, diverse hardware and software logic, and multiple turbine trip block (TTB) solenoid valves and hydraulic pistons. Consistent with the original licensing basis, the staff found the overspeed protection system continues to meet the intent of the NRC Standard Review Plan (NUREG-0800), Section 10.2, Part III, with respect to redundancy. The licensee stated that the trip function test of TTB every 14 days will remain unchanged after implementation of the LAR. The turbine vendor modeled the reliability of the turbine overspeed system considering the detailed design and the frequency of testing. Hence, the licensee's evaluation of the overspeed protection system is appropriate.

3.2 Quantitative Evaluation

The only quantitative evaluation required to support this LAR is for high-trajectory turbine missiles. The NRC staff established criteria in Appendix U of NUREG-1048, Supplement No. 6, "Safety Evaluation Report Related to the Operation of Hope Creek Generating Station," to limit the probability of generating high-trajectory turbine missiles under the postulated turbine overspeed event. Similar to the low-trajectory turbine missiles, shielding is not required if the probability of generating high-trajectory turbine missiles is below the threshold values established by the NRC staff. The revised probability of generating high-trajectory turbine missiles due to the proposed longer testing interval for turbine stop and control valves is discussed in the following sections along with the factors which affect the calculations.

3.2.1 Methodology

The NRC staff approved Siemens Westinghouse Power Corporation's missile analysis methodology for General Electric nuclear steam turbine rotors in an SE dated July 22, 2003 (ADAMS Accession No. ML032180141). To make sure that all modifications to CPSES, Units 1 and 2, since generic approval dated July 22, 2003, are acceptable, the NRC staff, in a request for additional information (RAI), requested the licensee to identify any deviations between the proposed methodology for CPSES, Units 1 and 2, and the one approved by SE dated July 22, 2003. The licensee confirmed in its letter dated December 5, 2007, that no changes were made to the methodology approved by the NRC staff on July 22, 2003. Therefore, the methodology used by the licensee to assess the CPSES, Units 1 and 2 turbines is acceptable. The licensee provided the NRC staff with detailed probability calculation results in its letter dated December 5, 2007. The NRC staff's evaluation narrowly examined the input changes to the computer program for probability calculations based on the NRC staff-approved methodology.

3.2.2 Input Changes

Both CPSES units have been retrofitted with new LP turbines that significantly reduce missile probability by improving turbine design, such as use of fewer disks, increasing residual compressive stresses to reduce susceptibility to stress-corrosion cracking (SCC), removal of disk keyways to the downstream side for the first and second stages to reduce stresses for SCC growth calculations, and use of disks without keyways for the third and the fourth stages to reduce the stress concentration factor. The licensee stated in its December 5, 2007, response to the NRC staff's RAI that the plant-specific missile probability report incorporates the current HP and LP turbine design, the digital overspeed trip system, and the planned HP turbine retrofit for uprate conditions. Based on this information, the NRC staff determined that the licensee's plant-specific missile probability analysis results are credible because they are based on the updated design and fabrication information regarding the CPSES, Units 1 and 2 turbines.

Currently, TRS 13.3.33.1 requires that the TTB test be conducted once every 14 days. The current TRS 13.3.33.2 requires HP and LP valves be tested once every 12 weeks using the manual test or an automatic turbine test. The TTB test remains unchanged while this LAR requests to change the HP and LP valve test frequency to once every 26 weeks. The purpose of the HP and LP valve test is to ensure that all turbine steam inlet valves are capable of closing to protect the turbine from excessive overspeed and, subsequently, missile generation. The HP and LP valve test frequency is an input to the turbine high-trajectory missile analysis, and the analysis results indicate that this change has a noticeable, but acceptable, impact on the resulting probability of turbine high-trajectory missiles.

The December 5, 2007, response to the NRC staff's RAI indicated that the licensee used an initial crack size of 0 millimeter in its evaluation of the probability of disk burst at up to 120 percent of the rated speed (P_{2r}) and the probability of case penetration given a disk burst at up to 120 percent of the rated speed (P_{3r}), which are part of the P_1 calculation. This is not consistent with the NRC staff's July 22, 2003, SE. However, the contribution to P_1 by P_{2r} and P_{3r} is negligible as evidenced by the calculated results documented in the December 5, 2007, response to the NRC staff's RAI.

3.3 Results of the Qualitative and Quantitative Evaluations

After incorporating the input changes as described above, the updated probability of turbine high-trajectory missile generation for the proposed valve test frequency is 1.56×10^{-4} per 100,000 hours. In addition to the detailed probability calculations, the licensee's December 5, 2007, response also showed that the corresponding probability for the quarterly valve test is 3.69×10^{-5} (converted by the NRC staff) per 100,000 hours. Although the revised probability of turbine high-trajectory missile generation is 4.23 times its current value, it is still less than the NRC criterion of 11.42×10^{-4} per 100,000 hours of operation for favorably-oriented turbines (converted from the criterion of 10^{-4} per year).

The NRC staff reviewed the licensee's proposed LAR to increase the testing interval for the HP and LP turbine stop and control valves from 12 weeks to 26 weeks. Based on the evaluation performed by NRC staff, it has been determined that the licensee's qualitative analysis, which demonstrated that all relevant technical areas remain unchanged, is appropriate. The NRC staff also determined that the licensee's quantitative analysis, which demonstrated that the

probability of generating high-trajectory turbine missiles during a postulated turbine overspeed event is below the NRC's criterion, is appropriate. Since the probability of high-trajectory turbine missile generation remains below the acceptable limit, the LAR for CPSES, Units 1 and 2 is acceptable.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to 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 amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on August 14, 2007 (72 FR 45462). Accordingly, the amendments meet 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 amendments.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Simon Sheng
Steve Jones

Date: February 29, 2008