

Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
P. O. Box B
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February 13, 1997

SUBJECT: ISSUANCE OF AMENDMENT NO. 123 TO FACILITY OPERATING LICENSE
NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. M96365)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No. 123 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 25, 1996, as supplemented by letter dated January 27, 1997.

The amendment changes the Appendix A TSs by modifying TS 3/4.7.4, "Ultimate Heat Sink," to incorporate more restrictive fan operability requirements and lower the maximum allowed basin temperature.

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

Sincerely,

ORIGINAL SIGNED BY:

Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 123 to NPF-38
2. Safety Evaluation

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

February 13, 1997

Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

SUBJECT: ISSUANCE OF AMENDMENT NO. 123 TO FACILITY OPERATING LICENSE
NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. M96365)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No.123 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 25, 1996, as supplemented by letter dated January 27, 1997.

The amendment changes the Appendix A TSs by modifying TS 3/4.7.4, "Ultimate Heat Sink," to incorporate more restrictive fan operability requirements and lower the maximum allowed basin temperature.

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

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Chandu P. Patel

Chandu P. Patel, Project Manager
Project Directorate IV-1
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Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No.123 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

Mr. Charles M. Dugger
Entergy Operations, Inc.

Waterford 3

cc:

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

ENERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 123
License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Operations, Inc. (the licensee) dated July 25, 1996, as supplemented by letter dated January 27, 1997, 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 amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-38 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. 123, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee 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 to be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Chandu P. Patel
Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: February 13, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 123
TO FACILITY OPERATING LICENSE NO. NPF-38
DOCKET NO. 50-382

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE PAGES

3/4 7-12
3/4 7-13
3/4 7-14
B 3/4 7-4

INSERT PAGES

3/4 7-12
3/4 7-13
3/4 7-14
B 3/4 7-4

PLANT SYSTEMS

3/4.7.3 COMPONENT COOLING WATER AND AUXILIARY COMPONENT COOLING WATER SYSTEMS

LIMITING CONDITION FOR OPERATION

3.7.3 At least two independent component cooling water and associated auxiliary component cooling water trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one component cooling water and associated auxiliary component cooling water train OPERABLE, restore at least two trains to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.3 Each component cooling water and associated auxiliary component cooling water train shall be demonstrated OPERABLE:

- a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. At least once per 18 months, during shutdown, by verifying that each automatic valve servicing safety-related equipment actuates to its correct position on SIAS and CSAS test signals.
- c. At least once per 18 months by verifying that each component cooling water and associated auxiliary component cooling water pump starts automatically on an SIAS test signal.

PLANT SYSTEMS

3/4.7.4 ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.4 Two independent trains of ultimate heat sink (UHS) cooling towers shall be OPERABLE with each train consisting of a dry cooling tower (DCT) and a wet mechanical draft cooling tower (WCT) and its associated water basin with:

- a. A minimum water level in each wet tower basin of 97% (-9.86 ft MSL)
- b. An average basin water temperature of less than or equal to 89°F.
- c. Fans as required by Table 3.7-3.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

- a. With 1 UHS train inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With both UHS trains inoperable, restore at least one UHS train to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.

PLANT SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

- c. With a Tornado Watch in effect, all 9 DCT fans under the missile protected portion of the DCT shall be OPERABLE. If the number of fans OPERABLE is less than required, restore the inoperable fan(s) to OPERABLE status within 1 hour, or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.
- d. With any UHS fan inoperable, determine the outside ambient temperature at least once every 2 hours and verify that the minimum fan requirements of Table 3.7-3 are satisfied.

SURVEILLANCE REQUIREMENTS

- 4.7.4. Each train of UHS shall be determined OPERABLE:
 - a. At least once per 24 hours by verifying the average water temperature and water level to be within specified limits.
 - b. At least once per 31 days, by verifying that each wet tower and dry tower fan that is not already running, starts and operates for at least 15 minutes.

TABLE 3.7-3

ULTIMATE HEAT SINK MINIMUM FAN REQUIREMENTS PER TRAIN

AMBIENT CONDITION	<u>DRY COOLING TOWER</u>			
	<u>DRY BULB \geq 98°F</u>	<u>< 98°F DRY BULB \geq 91°F</u>	<u>< 91°F DRY BULB \geq 77°F</u>	<u>DRY BULB < 77°F</u>
Fan Requirements ⁽¹⁾	15	14*	12*	9*

AMBIENT CONDITION	<u>WET COOLING TOWER</u>			
	<u>WET BULB \geq 75°F</u>	<u>< 75°F WET BULB \geq 70°F</u>	<u>WET BULB < 70°F</u>	
Fan Requirements ⁽¹⁾	8	7**	4**	9*

(1) With any of the above required UHS fan inoperable comply with ACTION d.

* With a tornado watch in effect, all 9 DCT fans under the missile protected portion of the DCT shall be OPERABLE.

** With any WCT fan(s) out-of-service in any cell, covers must be in place on the out-of-service fan(s) or the entire cell (i.e. 4 fans) must be declared out-of-service. If four fans are out of service in the same cell, the covers do not have to be installed.

3/4.7.1.4 ACTIVITY

The limitations on secondary system specific activity ensure that the resultant offsite radiation dose will be limited to a small fraction of 10 CFR Part 100 limits in the event of a steam line rupture. This dose also includes the effects of a coincident 1 gpm primary to secondary tube leak in the steam generator of the affected steam line and a concurrent loss-of-offsite electrical power. These values are consistent with the assumptions used in the safety analyses.

3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVE

The OPERABILITY of the main steam line isolation valves ensures that no more than one steam generator will blow down in the event of a steam line rupture. This restriction is required to (1) minimize the positive reactivity effects of the Reactor Coolant System cooldown associated with the blowdown, and (2) limit the pressure rise within containment in the event the steam line rupture occurs within containment. The OPERABILITY of the main steam isolation valves within the closure times of the Surveillance Requirements are consistent with the assumptions used in the safety analyses.

3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator secondary pressure and temperature ensures that the pressure induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitation to 115°F and 210 psig is based on a steam generator RT_{NDT} of 40°F and is sufficient to prevent brittle fracture. Below this temperature of 115°F the system pressure must be limited to a maximum of 20% of the secondary hydrostatic test pressure of 1375 psia (corrected for instrument error). Should steam generator temperature drop below 115°F an engineering evaluation of the effects of the overpressurization is required. However, to reduce the potential for brittle failure the steam generator temperature may be increased to a limit of 200°F while performing the evaluation. The limitations on the primary side of the steam generator are bounded by the restrictions on the reactor coolant system in Specification 3.4.8.1.

3/4.7.3 COMPONENT COOLING WATER AND AUXILIARY COMPONENT COOLING WATER SYSTEMS

The OPERABILITY of the component cooling water system and its corresponding auxiliary component cooling water system ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of these systems, assuming a single failure, is consistent with the assumptions used in the safety analyses.

PLANT SYSTEMS
BASES

3/4.7.4 ULTIMATE HEAT SINK

The limitations on the ultimate heat sink level, temperature, and number of fans ensure that sufficient cooling capacity is available to either (1) provide normal cooldown of the facility, or (2) to mitigate the effects of accident conditions within acceptable limits.

The UHS consists of two dry cooling towers (DCTs), two wet cooling towers (WCTs), and water stored in WCT basins. Each of two 100 percent capacity loops employs a dry and wet cooling tower.

Each DCT consists of five separate cells. Cooling air for each cell is provided by 3 fans, for a total of 15 per DCT. The cooling coils on three cells of each DCT (i.e. 60%) are protected from tornado missiles by grating located above the coils and capable of withstanding tornado missile impact. With a Tornado Watch in effect and the number of fans OPERABLE within the missile protected area of a DCT less than that required by Table 3.7-3, ACTION e requires the restoration of inoperable fans within 1 hour or plant shutdown as specified. This ACTION is based on FSAR analysis (subsection 9.2.5.3.3) that assumes the worst case single failure as, 1 emergency diesel generator coincident with a loss of offsite power. This failure occurs subsequent to a tornado strike and 60% cooling capacity of a DCT is assumed available.

Each WCT has a basin which is capable of storing sufficient water to bring the plant to safe shutdown under all accident conditions. Item a of LCO 3/4.7.4 requires a minimum water level in each WCT basin of 97% (-9.86 ft MSL). The bases for this elevation is WCT water evaporation and drift loss calculations, which concluded that during a LOCA 168,738 gallons would be consumed from one WCT basin. When the WCT basin water level is maintained at - 9.86 ft MSL, each basin has a minimum capacity of 174,000 gallons. Each WCT consists of two cells, each cell is serviced by 4 induced draft fans, for a total of 8 per WCT. There is a concrete partition between the cells that prevents air recirculation between the fans of each cell. Covers are required on fans declared out-of-service to prevent air recirculation between fans within a cell.

Table 3.7-3 specifies increased or decreased fan OPERABILITY requirements based on outside air temperature and humidity. The table provides the cooling tower fan OPERABILITY requirements that may vary with outside ambient conditions. Fan OPERABILITY requirements are specified for each controlling parameter (i.e., dry bulb temperatures for DCT fans and wet bulb temperatures for WCT fans). The calculated temperature values (EC-M95-009) associated with DCT and WCT fan requirements have been rounded in the conservative direction and lowered one full degree to account for minor inaccuracies. Failure to meet the OPERABILITY requirements of Table 3.7-3 requires entry into the applicable action. Because temperature and humidity are subject to change during the day, ACTION d requires periodic temperature readings to verify compliance with Table 3.7-3 when any cooling tower fan is inoperable.

The limitations on minimum water level and maximum temperature are based on providing a 30-day cooling water supply to safety-related equipment without exceeding their design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants," March 1974.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 123 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated July 25, 1996, as supplemented by letter dated January 27, 1997, Entergy Operations, Inc. (the licensee), submitted a request for changes to the Waterford Steam Electric Station, Unit 3, Technical Specifications (TSs). The requested changes would modify TS 3/4.7.4 to incorporate more restrictive fan operability requirements and lower the maximum allowed basin temperature. The proposed change became necessary when the licensee determined that system fouling had not been adequately addressed and analyzed in the thermal design performance evaluation for the ultimate heat sink (UHS) and, therefore, the licensee concluded that the existing TS for the UHS was not conservative with respect to the revised design basis calculations.

The January 27, 1997, letter withdrew the proposal to remove descriptive information from TS 3/4.7.4. Their amendment of the application did not change the initial proposed no significant hazards consideration determination and the application as amended, remained within the scope of the original notice.

2.0 DISCUSSION

The ultimate heat sink at Waterford, Unit 3 is redundant and consists of two forced draft dry cooling towers (DCTs) and two mechanical draft wet cooling towers (WCTs) with water stored in the basins of the WCTs. Each train of the UHS uses one DCT and one WCT which are essentially in series. During normal plant operation two component cooling water (CCW) system loops supply cooling water to all the plant loads using the DCTs for final heat removal. Although the DCTs are the primary heat sink for the CCW system, each CCW loop also has a CCW heat exchanger which is supplied cooling water from an auxiliary component cooling water (ACCW) system train which uses one of the two WCTs for heat removal. CCW flows through the CCW heat exchanger whenever the CCW system is in operation and ACCW flow is supplied to the CCW heat exchanger whenever the DCT is not adequate to maintain CCW temperature within the desired range. The ACCW system and WCTs are designed to operate following an accident and whenever the heat rejection capacity of the DCTs is exceeded or ambient environmental conditions prohibit the DCTs from rejecting their design

heat load. Each DCT is sized to dissipate approximately 60 percent of the heat removed by the CCW system following a design basis loss of coolant accident (LOCA) while each WCT is sized to dissipate approximately 40 percent of this design basis heat load. Therefore, each train of the UHS, consisting of a CCW train and an ACCW train, is designed to be 100 percent redundant under the worst case design basis accident conditions.

The DCTs are forced draft, dry type, parallel flow heat exchangers with each tower consisting of five separate cells. Each cell contains two 40 foot finned vertical cooling coils with forced cooling air flow on the outside of the tubes that is supplied by three fans for each cell. Therefore, there is a total of 15 fans for each DCT. The DCT fans are started and secured automatically to maintain the CCW system temperature at a predetermined value measured at the outlet of the CCW heat exchanger. When the CCW temperature in a CCW loop exceeds that value, the associated ACCW pump starts to initiate additional CCW cooling via the WCT.

The WCTs are mechanical draft, wet type, mixed flow heat exchangers with each tower consisting of two cells. Each cell is serviced by four induced draft fans for a total of 8 fans per WCT. There is a concrete partition that prevents air recirculation between the fans of each cell. The WCT fans are automatically started whenever the water temperature in the WCT basin exceeds a predetermined setpoint, and continue to run until they are shut off by the operator. Unlike the DCTs, the forced air actually contacts ACCW during the heat removal process. ACCW enters the WCT and is sprayed downward towards the basin into fill modules separating the water into droplets. Air is drawn upward through the modules and spray area by the fans which are located at the top of the tower.

During refueling outage number six (RF-6), testing revealed fouling in the CCW heat exchangers that resulted in degraded system performance. The heat exchangers (shell side) were cleaned during RF-6 and a task force was established by the licensee, to incorporate a maximum fouling factor into the UHS design basis. The task force identified conservatism in the UHS performance analysis to provide margin for fouling in the CCW heat exchangers. However, the task force also discovered that the minimum fan requirements in TS 3/4.7.4 were determined by using start-up test data and the design basis calculations did not include adequate margin to allow for system fouling that can occur during the life of the plant.

The initial calculation demonstrated that the UHS had sufficient capacity to dissipate the heat loads following a design basis LOCA and assuming the historical highest dry bulb temperature and highest historical wet bulb temperature. However, DCT performance is not affected by wet bulb temperature and WCT performance is not affected by dry bulb temperature. Since the historically high temperatures do not occur at the same time, the margin associated with this conservative assumption was reduced and used to determine the maximum fouling that can occur in the CCW heat exchangers. A revised calculation determined that the most limiting meteorological condition was 102 degrees Fahrenheit (°F) dry bulb coincident with 78°F wet bulb.

Changing the UHS meteorological design basis required a reduced WCT basin temperature to provide additional allowance for fouling in the CCW heat exchanger. With the initial design basis, the effectiveness of the CCW heat exchanger was optimum and, therefore, design WCT basin temperature was only required to be maintained at or below 95°F. With the revised design basis, the allowance for CCW heat exchanger fouling requires the WCT basin temperature to be maintained at or below 89°F to preserve heat exchanger capacity.

Failure to incorporate an adequate equipment fouling factor in the original UHS design analysis also resulted in less conservative UHS minimum fan operability requirements specified in Table 3.7-3 of TS 3/4.7.4. The revised analysis considered the WCTs and DCTs separately in order not to affect the CCW heat exchanger design basis fouling and to preserve the design basis heat load that each UHS component is expected to dissipate following the design basis LOCA. TS Table 3.7-3 currently specifies minimum number of combined DCT and WCT fans whenever a specified value of wet or dry bulb temperature is exceeded. The proposed revision to Table 3.7-3 separates the number of DCT fans and WCT fans required to be operable such that the DCT fans are only associated with the dry bulb temperature and the WCT fans are only associated with the wet bulb temperature.

In addition to the proposed changes to the WCT basin temperature and the minimum fan requirements identified in Table 3.7-3, the licensee also proposed a number of other changes to TS 3/4.7.4 and its Bases that are primarily administrative in nature to clarify the specification and make it consistent with the revised analysis.

3.0 EVALUATION

The licensee's proposed revision to TS 3/4.7.4 includes two primary technical changes, the first is to the maximum allowed WCT basin temperature and the second is to the minimum required number of operable cooling tower fans. The existing specification identifies a basin water temperature for the WCT of less than or equal to 95°F as a limiting condition for operation (LCO). The proposed change would revise this LCO to specify that the basin water temperature must be less than or equal to 89°F for continued operation. The proposed change is conservative in that the upper temperature limit for continued plant operation has been reduced. The proposed new limit is also consistent with the licensee's revised transient heat analysis for the UHS which included equipment fouling factors that are conservative and consistent with actual plant experience. The methodology used in the licensee's revised analysis is consistent with the recommendations of Regulatory Guide 1.27 "Ultimate Heat Sink for Nuclear Power Plants," and the results of the analysis verified that CCW system temperatures would remain within equipment limits throughout the course of a design basis accident. The proposed change to the temperature limit is, therefore, acceptable.

The proposed changes to the UHS minimum fan requirements are contained in revised Table 3.7-3. The existing table specifies the minimum number of fans for both the DCT and WCT fans for specified ambient conditions which include either dry or wet bulb temperature. The revised table specifies the minimum number of DCT fans that are required for specified dry bulb temperatures and the minimum number of WCT fans for specified wet bulb temperature. The proposed separation of the wet and dry cooling tower fan requirements is acceptable because the wet bulb temperature is not a controlling factor in DCT performance and conversely, the dry bulb temperature is not a controlling factor in WCT performance. Therefore, the proposed separation is more consistent with cooling tower performance and with the actual transient heat analysis. Additionally, there are no situations where the required number of operable fans for either the WCT or the DCT have been reduced by the proposed revision, they have either remained the same or have been increased. The only changes to the number of fans required to be operable are for a higher number of fans under certain ambient conditions. Thus, all changes to the required number of fans are conservative and, therefore, acceptable.

The proposed administrative changes and the changes to the Bases for TS 3/4.7.4 do not alter any of the actual requirements of TS 3/4.7.4 but provide for more concise and clear requirements that are consistent with the actual plant design and analysis. They are, therefore, also acceptable.

Based on its evaluation the staff concluded that the proposed changes are consistent with Regulatory Guide 1.27, are conservative in nature, provide clearer and more concise requirements that reflect the latest UHS transient heat analysis at Waterford, Unit 3. The staff, therefore, concludes that the proposed changes to TS 3/4.7.4 and its Bases are acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes 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 consideration and there has been no public comment on such finding (61 FR 58903). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: W. LeFave

Date: February 13, 1997