ENTERGY

Entergy Operations, Inc.
P.O. Box B
Killona, LA 70066-0751
Tel 504 739 6661

Ross P. Barkhurst
Vice President Operations
Waterford 3

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A4.05
PR

November 7, 1995

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Technical Specification Change Request NPF-38-173

Gentlemen:

The attached description and safety analysis supports a change to the Waterford 3 Technical Specifications (TS). The subject change request modifies specification 3/4.5.1 SAFETY INJECTION TANKS by increasing the specified range associated with Safety Injection Tank water level and nitrogen cover pressure.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.



A001

Waterford 3 requests that the implementation date for this change be within 60 days of NRC issuance of the amendment to allow for distribution and procedural revisions necessary to implement this change. Although this request is neither exigent nor emergency, your prompt review is requested.

Should you have any questions or comments concerning this request, please contact Paul Caropino at (504)739-6692.

Very truly yours,

RPBarkhurst

R.P. Barkhurst
Vice President, Operations
Waterford 3

RPB/PLC/ssf
Attachments: Affidavit
NPF-38-173

cc: L.J. Callan, NRC Region IV
C.P. Patel, NRC-NRR
R.B. McGehee
N.S. Reynolds
NRC Resident Inspectors Office
Administrator Radiation Protection Division
(State of Louisiana)
American Nuclear Insurers

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

| | | |
|---|---|---|
| In the matter of | ) | |
| | ) | |
| Entergy Operations, Incorporated | ) | Docket No. 50-382 |
| Waterford 3 Steam Electric Station | ) | |

AFFIDAVIT

R.P. Barkhurst, being duly sworn, hereby deposes and says that he is Vice President Operations - Waterford 3 of Entergy Operations, Incorporated; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached Technical Specification Change Request NPF-38-173; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

R.P. Barkhurst
Vice President Operations - Waterford 3

| | | |
|---|---|---|
| STATE OF LOUISIANA | ) | |
| | ) | ss |
| PARISH OF ST. CHARLES | ) | |

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 7TH day of NOVEMBER, 1995.

Notary Public

My Commission expires WITH LIFE.

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-38-173

This proposed change modifies Technical Specification (TS) 3.5.1, "SAFETY INJECTION TANKS" by increasing the specified range for Safety Injection Tank (SIT) contained borated water volume and nitrogen cover pressure.

Existing Specification

See Attachment A

Proposed Specification

See Attachment B

Description

The four Safety Injection Tanks (SITs) function to supply borated water to the reactor vessel during the blowdown phase of a Large Break Loss of Coolant Accident (LBLOCA), and to provide inventory to help accomplish the refill phase that follows.

The blowdown phase of a large break LOCA is the initial period of the transient during which the RCS departs from equilibrium conditions, and heat from fission product decay, hot internals, and the vessel continues to be transferred to the reactor coolant. The blowdown phase of the transient ends when the RCS pressure falls to a value approaching that of the containment atmosphere.

The refill phase of a LOCA follows immediately when reactor coolant inventory has vacated the core through steam flashing and ejection out through the break. The balance of the SITs' inventory is then available to help fill the lower plenum and reactor vessel downcomer to establish a recovery level at the bottom of the core and ongoing reflood of the core with the addition of safety injection water.

The SITs are pressure vessels, partially filled with borated water and pressurized with nitrogen gas. The SITs are passive components, since no operator or control action is required for them to perform their function. Internal tank pressure is sufficient to discharge the contents to the RCS, if RCS pressure decreases below the SIT pressure following a LOCA.

Each SIT is piped into one RCS cold leg via the injection lines utilized by the High Pressure Safety Injection and Low Pressure Safety Injection (HPSI and LPSI) systems. Each SIT is isolated from the RCS by a motor operated isolation valve and two check valves in series. The motor operated isolation valves are normally open, with power removed from the valve motor to prevent inadvertent closure prior to or during an accident.

The SIT gas and water volumes, gas pressure, and outlet pipe size are selected to allow three of the four SITs to cover the core. Thus, limiting Peak Clad Temperature (PCT) clad oxidation. The need to ensure that three SITs are adequate for this function is consistent with the LOCA assumption that the entire contents of one SIT will be lost via the break during the blowdown phase of a LOCA.

TS Limiting Condition for Operation (LCO) 3.5.1 specifies minimum and maximum SIT level and SIT nitrogen pressure requirements to preserve the following aspects derived from the safety analysis:

- The minimum volume requirement ensures that three SITs can provide adequate inventory to reflood the core and downcomer to the elevation of the bottom of the inlet nozzles following a LOCA.

- The maximum volume limit is based on maintaining an adequate gas volume to ensure proper injection and the ability of the SITs to fully discharge.

- The minimum nitrogen cover pressure requirements ensures that the contained gas volume will generate discharge flow rates during injection that are consistent with those assumed in the safety analysis.

- The maximum nitrogen cover pressure limit ensures that sufficient inventory exists at the end of the blowdown period to reflood the core (i.e. water does not inject too early and go out the break).

The Safety Injection System (SIS) is maintained at a high pressure that accounts for some SIT bypass leakage. When the level is low, the SIT is filled using the HPSI pumps. The periodic cycling of the valves that function to maintain SIT volume, tends to impact the valve's leak-tight characteristics, such that over time there is a frequent need to fill. Maintaining the proposed TS SIT level should have an overall positive effect by reducing the excessive cycling of SIS components, thereby reducing SIT leakage. In addition to addressing leakage concerns, this proposal will also reduce the potential for operator distraction.

Discussion

The proposed change would revise the SIT minimum water level and maximum nitrogen gas pressure specified in TS 3.5.1, items b and d. The current LCO for the SIT requires that four SITs be operable with a water volume in the range of 1679 cubic feet (78%) to 1807 cubic feet (83.8%) and a nitrogen cover pressure between 600 psig to 625 psig.

The proposed change recommends an expanded range of 925.6 cubic feet (40%) to 1807 cubic feet (83.8%) for SIT level and 600 psig to 670 psig for SIT pressure indicators.

The supporting analysis was performed in two steps:

1. The first step was a parametric study of SIT level and pressure, over the expanded ranges, to determine the limiting SIT conditions for use in the LBLOCA analysis. The parametric study evaluated the following combinations of SIT levels and pressures:

   - Minimum Level - Minimum Pressure
   - Maximum Level - Minimum Pressure
   - Minimum Level - Maximum Pressure
   - Maximum Level - Maximum pressure

   The evaluation determined that for the range of level (40% to 83.8% indicated) and pressure (600 to 670 psig indicated) that was investigated, maximum level and minimum pressure are the limiting SIT conditions for the LBLOCA analysis. Maximum level verses minimum level is limiting because it minimizes the gas volume. This results in a lower SIT flow rate, that increases the time required to refill the reactor vessel lower plenum and the downcomer to

the elevation of the bottom of the inlet nozzles. Increasing the refill time has a direct, adverse impact on the hot rod cladding temperature. For minimum level, the SITs were calculated to empty just before the downcommer is filled to the bottom of the inlet nozzles. Minimum pressure is limiting for the obvious reason that decreasing pressure results in a decrease in SIT flow rate.

2. The second step was to redo the Waterford 3 Analysis Of Record (AOR) using ABB/CE's NRC-approved LBLOCA ECCS performance evaluation model with the limiting SIT conditions. The Waterford 3 LBLOCA AOR was reanalyzed using maximum SIT volume and minimum SIT pressure. In addition, the analysis used core related inputs for Cycle 8. The analysis demonstrated conformance to the ECCS acceptance criteria of 10CFR50.46 as follows:

| Parameter | AOR Value (current) | NEW Value (with the proposed change) | Criterion |
|---|---|---|---|
| Peak Cladding Temperature (°F) | 2173 | 2177 | 2200 |
| Maximum Cladding Oxidation (%) | 8.40 | 8.55 | 17 |
| Core-Wide Cladding Oxidation (%) | < 0.805 | < 0.805 | 1 |

A Small Break LOCA (SBLOCA) evaluation was also performed to justify the values for the SIT level range and the maximum SIT pressure that were used in the LBLOCA AOR. The SBLOCA evaluation concluded that the changes are acceptable and the SBLOCA AOR remains applicable for the new SIT level range and maximum pressure. The changes are acceptable primarily because the limiting SBLOCA, the 0.04 $ft^2$ discharge leg break, does not credit injection from SITs. Breaks larger than 0.04 $ft^2$ do credit injection from SITs. For these breaks, increasing SIT pressure and decreasing SIT level results in an increase SIT flow rate and, therefore, would improve the transient results.

Safety Analysis

The proposed change described above shall be deemed to involve a significant hazards consideration if there is a positive finding in any of the following areas:

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequence of any accident?

   Response: No

   Operation of the facility in accordance with this change does not involve an increase in the probability of any accident. The SITs are used to mitigate the consequences of an accident and are not accident initiators.

   The proposed change would actually decrease the consequence of events such as LOCA which would result in rapid RCS depressurization.

   By reducing SIT level, the initial nitrogen gas volume is increased which results in an increase in the SIT flow rate into the RCS for a given RCS pressure transient. This decreases the time required to fill the reactor vessel lower plenum after the end of blowdown. During refill, fuel cladding temperature increases rapidly due to insufficient cooling which is provided solely by rod to rod thermal radiation. Decreasing the refill time therefore, results in lower cladding temperature at the start of core reflood which results in lower Peak Cladd g Temperature (PCT) during reflood.

   Increasing the nitrogen cover pressure would also result in increased SIT flow rate and would be beneficial as described above.

   Therefore, the proposed change will not involve a significant increase in the probability or consequence of any accident

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

The proposed change will not create any new system connections or interactions. Thus, no new modes of failure are introduced. The increased range for SIT pressure and level is actually beneficial in maintaining lower PCT following a LOCA.

Therefore, the proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

   Response: No

   The impact of the proposed changes on the Waterford 3 FSAR analyses have been evaluated. The AOR shows that PCT and maximum cladding oxidation would increase slightly as a result of this change. However, they both remain below the acceptance criteria values of 2200 °F and 17% for PCT and maximum cladding oxidation, respectively. The system capabilities to mitigate the consequences of accidents will be the same as they were prior to these changes. Therefore, the proposed changes does not involve a reduction in a margin of safety.

Safety and Significant Hazard Determination

Based on the above safety analysis, it is concluded that: (1) the proposed change does not constitute a significant hazards consideration as defined by 10 CFR 50.92; and (2) there is a reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

NPF-38-173
ATTACHMENT A