CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9807070334 DOC.DATE: 98/06/26 NOTARIZED: NO DOCKET #
FACIL:50-260 Browns Ferry Nuclear Power Station, Unit 2, Tennessee 05000260
50-296 Browns Ferry Nuclear Power Station, Unit 3, Tennessee 05000296

AUTH.NAME AUTHOR AFFILIATION
ABNEY,T.E. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION
Records Management Branch (Document Control Desk)

SUBJECT: Submits supplemental info & response to NRC 980313 RAI re Units 2 & 3 TS change TS-384,re power uprate operation.

DISTRIBUTION CODE: D030D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 18
TITLE: TVA Facilities - Routine Correspondence

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3	1	1	PD2-3-PD	1	1
	DEAGAZIO,A	1	1			
INTERNAL:	ACRS	1	1	~~FILE CENTER 01~~	1	1
	OGC/HDS3	1	0	RES/DE/SSEB/SES	1	1
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

C A T E G O R Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL DESK (DCD) ON EXTENSION 415-2083

TOTAL NUMBER OF COPIES REQUIRED: LTTR 9 ENCL 8

TVA

Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

June 26, 1998

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

Gentlemen:

In the Matter of	)	Docket Nos. 50-260
Tennessee Valley Authority	)	50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - SUPPLEMENTAL INFORMATION AND RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATING TO UNITS 2 AND 3 TECHNICAL SPECIFICATION (TS) CHANGE NO. TS-384 - POWER UPRATE OPERATION (TAC NOS. M99711 AND M99712)

This letter provides supplemental information in support of TS-384. On October 1, 1997, TVA provided TS-384, an amendment to Operating Licenses DPR-52 and DPR-68 that will allow Units 2 and 3 to operate at an uprated power level of 3458 MWt.

The enclosures to this letter provide supplemental information regarding TS-384 Supplement 1 dated March 16, 1998 (Enclosure 1) and the NRC request for additional information (RAI) dated March 13, 1998 (Enclosure 2). This information completes the outstanding issues for Supplement 1 and the referenced RAI.

D030

There are no new commitments made in this letter. If you have any questions, please telephone me at (256) 729-2636.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

Enclosures
cc (Enclosures):

Albert W. De Agazio, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. Harold O. Christensen, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

NRC Resident Inspector
BFN Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611

L. Raghavan, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

REFERENCES

1. TVA letter to NRC dated October 1, 1997, Browns Ferry Nuclear Plant (BFN) - Units 2 and 3 - Technical Specification (TS) Change TS-384 - Request For License Amendment for Power Uprate Operation

2. TVA letter to NRC dated March 16, 1998, Browns Ferry Nuclear Plant (BFN) - Units 2 and 3 Technical Specification (TS) No. 384 Supplement 1 - Request for License Amendment for Power Uprate Operation

3. NRC letter to TVA dated March 13, 1998, Browns Ferry Nuclear Plant, Units 2 and 3: Request for Additional Information Relating to Technical Specification (TS) Change No. TS-384 - Power Uprate Operation (TAC Nos. M99711 and M99712)

4. TVA letter to NRC dated May 20, 1998, Browns Ferry Nuclear Plant (BFN) - Response to Request for Additional Information (RAI) Regarding Units 2 and 3 Technical Specification (TS) Change TS-384, Request for License Amendment for Power Uprate Operation (TAC Nos. M99711 and M99712)

ENCLOSURE 1
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNITS 2 AND 3

SUPPLEMENTAL INFORMATION REGARDING TECHNICAL SPECIFICATION (TS)
NO. 384 SUPPLEMENT 1, DATED MARCH 16, 1998

This enclosure provides the results of the primary containment structural design evaluation as committed to in TS-384 Supplement 1 dated March 16, 1998. TVA has completed the evaluation of the primary containment structural design to ensure the capability to mitigate and withstand high energy line breaks (HELB) inside primary containment. An evaluation of the primary containment structural design and equipment located inside primary containment has determined that at uprated conditions, the containment and equipment located inside primary containment will continue to perform their design functions.

For breaks inside primary containment, the release of steam will increase the temperature and pressure of the primary containment atmosphere. Analyses were performed to determine the primary containment atmosphere response for these breaks in order to evaluate safety-related equipment and containment structure integrity. Steam line breaks, with areas of 0.01 ft^2, 0.1 ft^2, and 0.5 ft^2 were analyzed to determine the primary containment pressure and temperature response over a 100-day period.

Analyses at power uprate conditions have concluded that a main steam line break (MSLB) will result in a peak primary containment pressure of 32.3 psig and air space temperature of 336°F. This peak pressure is bounded by the drywell shell design of 56 psig. Although the peak air space temperature is higher than the drywell shell design temperature value of 281°F, the shell temperature is calculated not to exceed 281°F due to the short duration (approximately 12 minutes) that the drywell air space would be above 281°F.

TVA has also reviewed the calculations associated with the upper and lower drywell steel platforms, pipe supports, pipe anchor supports/frames and supports for items such as conduit, cable tray and heating ventilation and air conditioning ducts in the primary containment. It has been concluded that these structures are not affected by the small increase in pressure and air space temperature, and will continue to perform their design function at power uprate conditions.

Additionally, an evaluation of the reactor components within the primary containment, including the reactor pressure vessel stabilizer, control rod drive housing supports, refueling bellows and the reactor vessel support, has been performed. This evaluation shows that there is no effect on the structural design basis analysis for these items associated with power uprate.

ENCLOSURE 2
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNITS 2 AND 3

BROWNS FERRY NUCLEAR PLANT (BFN) - SUPPLEMENTAL INFORMATION REGARDING NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) DATED MARCH 13, 1998

This enclosure provides the TVA supplemental response to the March 13, 1998 NRC RAI. The following supplements the information provided in the May 20, 1998 response to the RAI.

NRC REQUEST A.4

The environmental qualification (EQ) of mechanical equipment inside and outside containment has not been addressed. Please demonstrate that plant operations at the proposed uprated power level will have no impact on the EQ of mechanical equipment inside and outside containment.

TVA REPLY

TVA has evaluated environmental changes that could affect safety related mechanical equipment inside and outside primary containment and determined that there are no detrimental effects due to power uprate conditions. The incremental changes in the environmental conditions due to power uprate operation do not impact the ability of mechanical equipment to perform their safety functions. A discussion of the evaluation is included below.

Evaluation

- Background

BFN does not have a licensing requirement to establish or maintain a formal mechanical environmental qualification program. In order to demonstrate the ability of the plant to successfully operate under normal uprated conditions and to mitigate the design basis accidents and transients, an evaluation has been conducted to determine the effects of the environmental changes associated with power uprate.

In order to demonstrate the ability of mechanical equipment to function, the conditions both internal and external to the equipment were evaluated. The internal conditions are associated with the process conditions of mechanical equipment. External environmental conditions were evaluated for normal, abnormal, and accident conditions.

The external conditions evaluation were based upon the analyzed change in the environments following the implementation of power uprate as developed for the environmental qualification of safety related electrical equipment. These values were utilized for mechanical equipment evaluations.

For environmental qualification of safety related electrical equipment, the plant has been categorized into two primary designations relative to environments: mild and harsh. A mild environment is one in which the combination of both the normal and post accident conditions do not represent a threat to the performance of equipment even if the equipment's environmental qualification has not been formally documented. The environmental limits for mild environments are such that mechanical equipment would not be adversely affected by these environmental conditions.

In order to demonstrate the above described qualification for electrical equipment in harsh environments, the plant environments are established for normal, abnormal and accident conditions on an area/room basis. Bounding accident environments are created by loss of coolant accidents (LOCA) and/or high energy line breaks (HELB). Neither fuel handling accidents nor control rod drop accidents produce limiting conditions and, therefore, are not discussed. It has been previously concluded that no areas of the plant that were considered mild prior to power uprate will transition to harsh due to the effects of power uprate.

<u>Evaluation Process</u>

A two step process was followed to evaluate mechanical safety related equipment located in harsh environments. First, a systematic, room by room, evaluation of the changes in the environments due to power uprate was performed. Secondly, for equipment in areas whose environments will be changed by power uprate, effects of environmental changes on mechanical equipment were evaluated. This evaluation focused on the effects imposed by the changes created by power uprate. This evaluation utilized inputs (temperature, pressure, flooding, humidity and radiation) from the normal and accident analyses which provided environmental conditions for each room to be evaluated.

Effects of Temperature

Elevated temperature can and will alter the mechanical properties of materials, from both short term and long term exposures. These effects are dependent on the temperatures that are reached and the duration for which temperatures are sustained.

Increases in system operating temperatures due to power uprate will not result in a change to the existing EQ design parameters. The systems will continue to function at conditions within the design parameters.

Power uprate analyses have established new temperatures and profiles for the thermal environment in the plant using analysis methods as previously discussed in the May 20, 1998 response to the RAI. In some cases the temperatures remain the same while in other locations the temperatures either increase or decrease. The categorizations of changes are as follows:

Decreases in Temperature

For certain locations, no additional analyses are required since the environmental conditions that are experienced in these rooms are bounded by pre-uprated operating conditions.

Small Increases in Temperature

The temperature in a room increased on the order of 5°F as a result of power uprate. The potential of a mechanical device being noticeably susceptible to an increase in temperature of this magnitude will not occur and, therefore, no additional evaluations were performed to ensure the ability of mechanical equipment to perform safety functions.

Temperature Increases Below the Bounding Room Maximum

Some rooms experience temperature increases of greater than 5°F for a given break case; however, the maximum temperature for that break case is bounded by a pre-uprate break in another system. These cases require no further evaluation.

Temperature Increases with Short Duration Peaks

The power uprate environmental profiles indicate that there are short duration, typically 10 minutes or less, rapid increase and subsequent decrease in temperatures. These increases in short term temperatures have been evaluated and determined to pose no detrimental effect on the operation of mechanical equipment. The evaluation is based on the relatively short duration over which they occur, and the time response of the material heat-up relative to the length of time for which the increase is in effect. In most cases the non-metallic items are internal to the devices and thus shielded from the effects of short term exposures. Additionally, insulation covering many of those components provides thermal shielding for the component. For short term temperature transients, typically less than 10 minutes, the capability of mechanical equipment to perform safety related functions will not be adversely affected; therefore, no further evaluation is required.

Temperature Increases on Equipment that is not Required

The maximum temperature increase for a room is caused by a line break for which mechanical equipment in the room is not required to function. In these cases, the temperature increases will have no consequence; therefore, no further evaluation is required.

Process Fluid Driven Environmental Conditions

For temperature increases in the environment, even after a line break accident, the maximum temperature in the environment will not approach the temperatures imposed by the process fluids in normal operation. For these cases, no additional effects are imposed by an increase in the environmental temperatures. Therefore, no further analysis is required.

Four rooms remain outside those cases listed above. Those rooms requiring additional evaluation for both Unit 2 and 3 are the drywell and the north east core spray room. For these rooms, a more in-depth review was performed where specific components were identified and evaluated for effects.

Units 2 and 3 Drywell

There are two scenarios where temperatures increase due to power uprate. The peak drywell temperature for a design basis LOCA increased slightly from 295°F to 297°F. However, the limiting event for drywell temperature is the main steam line break (MSLB) for which the peak temperature increased from 322°F to 336°F. These temperature increases are applicable to both units.

The safety related mechanical equipment in the drywell can be segregated into two categories; 1) those mechanical devices that experience process conditions that are more severe than the post-accident environmental conditions, and 2) mechanical devices for which the normal process conditions are less severe than the post-accident environmental conditions. For items in the first category, no further analysis is required. For those remaining mechanical devices, additional evaluations were performed as described below:

Control Rod Drives (CRD)

The CRDs are located on the under side of the reactor vessel and extend into the reactor core. The components that reside in the core region reach higher temperatures than the temperature profiles for the drywell; therefore, the components in that area are designed for that service. The portion of the CRD that mates with the lower portion of the reactor vessel, which contains non-metallic O-rings, is normally heated to reactor vessel temperatures which are in excess of the environmental temperature profiles. These O-rings are designed for that service temperature and; therefore, no further evaluation is required.

Check Valves

Several safety related check valves are located in the drywell including the residual heat removal, recirculation pump seals, reactor building closed cooling water, and core spray check valves. These valves provide primary containment isolation functions. These valves contain no non-metallic components and are, therefore, not considered for environmental impact.

Pneumatic Valves

The drywell has two applications of safety related pneumatic valves: the reactor head vent valves and the drywell sump isolation valves. The reactor head vent valves are normally closed, fail closed valves. The drywell sump isolation valves are normally closed, fail closed valves. In both cases, the result of a failure in the non-metallic components caused by the increase of drywell temperatures of 14°F would not affect the safe shutdown of the plant.

Torus to Drywell Vacuum Breakers

The torus to drywell vacuum breakers are designed to control pressures between the torus and the drywell. These devices are essentially check valves. These valves contain no non-metallic components and are, therefore, not considered for environmental impact.

Units 2 and 3 North East Core Spray Room

The north east core spray room has an increase of 20°F in Unit 2 and 10°F in Unit 3 but both increase only to 150°F. These increases are caused by different postulated line breaks; a Main Steam/Feedwater Line break for Unit 3 and a high pressure coolant injection system line break for Unit 2.

Mechanical equipment in that room was also reviewed from the perspective that only mechanical components containing water are located in that room. Since the peak temperature is relatively low (150°F), the temperature increase is relatively small, and considering the fact that the associated equipment contains water, the rate of thermal change of the mechanical component is relatively slow. The relatively small temperature increase and the limited duration, coupled with the available heat sink, will not result in an appreciable temperature increase of mechanical equipment.

The internal process and external environmental temperatures changes associated with power uprate will have no effect on mechanical equipment's capability to perform safety related functions.

Effects of Radiation

Radiation, in excessive amounts, can and will alter the mechanical properties of non-metallic materials both in the short term and long term exposures. Of the 33 rooms evaluated, nine rooms had an increase in 40 year normal dose and one room had an increase in post accident gamma dose as a result of power uprate.

For certain areas outside the drywell, the normal doses will increase 5% or less corresponding to the 5% increase in core thermal power; however, the total accident doses are not increased by power uprate. For areas containing safety related mechanical equipment, the increase in normal dose has no significant impact on mechanical devices since the normal dose is significantly less than the total integrated dose.

The drywell will experience a power uprate induced effect of increasing the post accident gamma dose coming directly from the pipes but will also experience a larger, offsetting reduction in the airborne gamma dose. These offsetting changes are due to the transition in source term methodology (TID 14844 conversion to the ORIGIN model) rather than due to power uprate.

- The only area outside of primary containment which will experience a increase in excess of 5% in accident dose (gamma dose) is the standby gas treatment (SGT) room. This room is calculated to experience an 8% increase due to iodine loading on the charcoal filter banks. The increase in iodine loading is due to a combination of power uprate and the transition in source term methodology (TID 14844 conversion to the ORIGIN model).

A review of the safety related mechanical equipment in this room determined that the only equipment which could contain non-metallic components are dampers, fans, ductwork connection boots, and the charcoal filter beds.

Dampers

The dampers are primarily metallic; however, there are non-metallic sealing gaskets that are used for mechanical joint integrity. Although it is not anticipated that these gaskets will be adversely affected by the increased radiation, a total failure of the gaskets would allow some additional leakage but, will not negate the ability of the system to perform its safety function.

Fans

The fans associated with the SGT system are primarily metallic and have, as their only non-metallic parts, fan belts, which drive the fan assemblies. Each fan is equipped with 3 parallel belts of the same size driving the same pulley. The belts were evaluated and determined to be unaffected by radiation dose increases of 8% over the pre-uprate levels.

Ductwork Connection Boots

The ductwork connection boots are designed to provide a flexible coupling from one section of ductwork to another. The installed boots are made from a neoprene coated nylon fabric which has been determined to be resistant to radiation dose increases of 8% over the pre-uprate levels.

Charcoal Filter Beds

The charcoal is a non-metallic material whose purpose is to collect the iodine. An increase in dose will not affect the ability of the charcoal to perform its function.

These increases in radiological conditions do not introduce a quantifiable decrease in the design basis performance of mechanical equipment.

Effects of Humidity

No change will occur as a result of operating at power uprated conditions to the moisture concentration which is presently utilized as the design basis conditions; therefore, there is no impact on the performance of safety related mechanical equipment.

Effects of Pressure

Power uprate will not change the design requirements of any plant systems. The systems will continue to function at conditions within the pre-uprate EQ design basis. Therefore, power uprate will not cause any equipment to be required to function beyond its design capability.

No increases in environmental pressures have been postulated for operation at power uprated conditions. The peak drywell pressure will remain within the design pressure of the drywell shell and the internal equipment located within. The environmental pressure within the reactor building is controlled by the secondary containment blowout panels which are not affected by power uprate.

Therefore, there is no impact on the performance of safety related mechanical equipment as a result of pressures associated with power uprate.

Effects of Submergence

There are no significant changes in internal flood levels resulting from power uprate that would affect mechanical equipment. The flood levels are controlled by the overall physical design of the plant (i.e., relative location of stairwells and hatches, height of door sills/door louvers, etc.). These features are unaffected by power uprate.

Conclusion

The changes to plant conditions, both process and environmental, created by power uprate have been evaluated and determined not to prevent mechanical equipment from performing its safety related functions. Mechanical equipment has been reviewed for changes in temperature, humidity, radiation, flooding and pressure. Mechanical equipment has been evaluated for normal, abnormal and accident conditions to ensure that it will perform its safety related functions following the implementation of power uprate. Short term temperature increases have been evaluated and determined to pose no detrimental effect on the operation of mechanical equipment. This based on the relatively short duration over which they occur and the time response of the material heat-up relative to the length of time for which the increase is in effect. In most cases, the non-metallic items are internal to the devices and, thus shielded from the effects of short term exposures. Additionally, the insulation covering many of those components which provides thermal shielding for the component. No change will occur in the postulated post event humidity condition. Power uprate will not increase the environmental pressure nor system internal design pressure. There are no changes in internal submergence levels. Most areas of the plant experience either an insignificant or no increase in total integrated radiation dose. For the areas found to experience a larger increase in dose, an evaluation of mechanical equipment determined the equipment's ability to perform safety related functions would not be negated by the environmental effects of power uprate.

NRC REQUEST C

ENVIRONMENTAL QUALIFICATION FOR SAFETY-RELATED ELECTRICAL EQUIPMENT

For each component/equipment type (or one representative/ bounding example of a component/equipment type) where expected environmental conditions at the uprate power level exceeds the environmental conditions tested to, provide the following:

1. A description showing the relationship between environmental conditions (i.e., temperature vs. time) tested to, the expected environmental conditions at current power levels, and the expected environmental conditions at the power uprate level from time 0 (initiation of accident) to the time the component/equipment type is required to remain operable for post LOCA operation.

2. An evaluation demonstrating qualification for each segment of the uprate power level temperature response that is not enveloped by the environmental conditions (i.e., temperature) tested to.

3. Where (or if) margins derived through the use of the Arrhenius methodology are utilized as part of the basis for concluding continued qualification, provide the Arrhenius calculation at the current (if applicable/available) and uprate power levels. Define the margins available for the current and uprate power levels and describe and justify the reduced margin for the uprate power level.

TVA REPLY

An evaluation has been performed for the Equipment Qualification Data Packages (EQDPs) which document the qualification of safety-related electrical equipment currently installed at BFN. No cases were identified where the environmental conditions at the uprate power level exceed the conditions to which the equipment was tested.

The safety related electrical equipment located in harsh environment areas was evaluated and determined to be qualified for the normal, abnormal and accident environments for operation at power uprate conditions. The environmental conditions have been revised for the harsh environment areas based on analyses performed at power uprate conditions. For reactor building areas outside primary containment, the HELB analyses for power uprate were performed using the GOTHIC computer code. The pre-uprate analyses were performed using the MONSTER computer code. Evaluations of the pre-uprate and post-uprate HELB analyses indicate the differences in the results are primarily due to the change in computer codes and are not the result of power uprate as discussed in TS-384 Supplement 1 dated March 16, 1998. Since the power uprate analyses were performed using different computer codes than the pre-uprate analyses, it is difficult to determine the impact on the analytical results from power uprate alone.

Short term and long term (100 day) containment response analyses were performed for both the design basis LOCA and the bounding MSLB inside primary containment. These analyses were performed using the GE proprietary computer codes M3CPT and SHEX. The resulting pressure and temperature profiles from these analyses were used to evaluate the safety related electrical equipment located inside containment.

Pre-uprate radiological doses were calculated using source term inventories based on TID-14844 for 1000 effective full power days of operation. The radiological analyses for power uprate are based on source term inventories generated using the ORIGEN methodology as discussed in TS-384 Supplement 1, dated March 16, 1998. The power uprate analyses were based on operation at 3458 MWt for 1400 effective full power days of operation to include the effects on extended fuel cycles as well as power uprate. Due to the change in source term methodology, some of the primary sources for post-accident radiation doses (i.e., airborne gamma and airborne beta) actually decreased compared to the doses calculated in the pre-uprate analyses. Doses due to iodine sources increased due to the combined effects of both the change in methodology and the increase in core thermal power. Therefore, it is difficult to determine the change in radiation doses due to power uprate alone.

Environmental Changes Inside Primary Containment

Pressure

The limiting event for drywell pressure is the design basis LOCA for which the peak containment pressure increased from 49.6 psig to 50.6 psig. However, the safety-related electrical equipment within scope of the BFN 10 CFR 50.49 EQ program has been evaluated for a peak containment pressure of 55 psig. Therefore, there was no impact on the pressure evaluations previously performed for equipment located inside containment.

Temperature

Changes to normal and abnormal temperatures inside containment are expected to be small since the normal operating temperature for the reactor vessel increases by less than 4°F for power uprate. The normal and abnormal temperatures currently used for qualification of electrical equipment located inside containment were evaluated and determined to bound the temperatures expected during operation at power uprate conditions.

The peak drywell temperature for a design basis LOCA increased slightly from 295°F to 297°F. However, the limiting event for drywell temperature is the MSLB for which the peak temperature increased from 322°F to 336°F. Due to the increase in the peak post-accident temperature in the drywell, the margins between the peak accident temperatures and the peak test temperatures were reduced. In some cases, the margin for the peak temperature was less than the 15°F suggested by IEEE 323-1974. The technical justification for accepting the reduced margins is based on a review of electrical equipment qualification test reports. These reports indicate the test temperatures exceeded the plant peak temperature requirements for extended periods of time when compared to the short duration of the accident profile.

Although the peak containment temperature increased for the MSLB, the duration of the MSLB temperature transient is shorter and the long term temperatures are lower than the pre-uprate MSLB profile. Therefore, the power uprate MSLB profile inside containment is actually less severe for post accident operability than the profile used for pre-uprate EQ evaluations. Calculations performed using the Arrhenius methodology show an increase in margin compared to the pre-uprate calculations for the same equipment.

Radiation

There is no change to accident radiation doses inside primary containment due to the change from TID-14844 to ORIGEN methodology as discussed in TS-384 Supplement 1, dated March 16, 1998. The power uprate radiological evaluations indicate that the normal radiation increased inside primary containment. The demonstrated dose for the safety related electrical equipment located inside containment was determined to be greater than the total integrated dose (normal plus accident) including margin.

Humidity

There is no change to the normal or abnormal humidity values for power uprate conditions. The accident humidity value remains at 100% for power uprate conditions.

Submergence

There is no change to flood levels inside the drywell due to power uprate conditions.

Environmental Changes Outside of Primary Containment

Pressure

The GOTHIC analysis results indicate the peak pressures for HELBS in reactor building areas outside of primary containment are lower than the peak pressures from the pre-uprate MONSTER analysis. Therefore, there was no impact on the pressure evaluations previously performed for electrical equipment located outside of primary containment.

Temperature

The peak reactor building temperatures for HELB events calculated using the GOTHIC computer codes were higher for certain areas than the pre-uprate peak temperatures calculated using the MONSTER computer code. Although the peak accident temperature increased in some reactor building areas, the margins between the peak accident temperatures and the peak test temperatures for the safety related electrical equipment were greater than the 15°F suggested by IEEE 323-1974 with the exception of certain Limitorque motor operators in the torus room. The technical justification for accepting the less than suggested 15°F margin is based on a review of the equipment qualification test report. The report indicates the motor operators were tested at 250°F for greater than 24 hours. Although the plant profile reaches a peak temperature

of 250°F, the duration of the accident temperature transient is extremely short and the room temperature decreases to less than 180°F in one minute. The power uprate HELB profiles outside primary containment are generally less severe for post accident operability than the profiles used for pre-uprate EQ evaluations. Calculations performed using the Arrhenius methodology show an increase in margin compared to the pre-uprate calculations for most equipment.

Radiation

The normal operating doses for most reactor building areas were bounded by the normal radiation doses used for previous equipment qualification evaluations. In a few areas, the normal radiation doses increased as the result of operation at power uprate conditions. The only area where the accident radiation dose increased above the dose used for previous equipment qualification evaluations was in the SGT building. These radiation dose increases were evaluated and determined to be acceptable since the total integrated dose, including margin, is less than the demonstrated dose for the affected equipment.

Humidity

There is no change to the normal, abnormal or accident humidity values for power uprate conditions.

Submergence

There were small increases in the total mass releases for HELBs due to power uprate conditions which resulted in less than 0.1 inch increases in calculated flood levels. There was no impact on the electrical equipment submergence evaluations.