

ANNUAL REPORT OF
FACILITY CHANGES, TESTS, AND EXPERIMENTS
AT CRYSTAL RIVER UNIT 3
IN ACCORDANCE WITH 10 CFR 50.59(b)

REPORTING PERIOD
JANUARY 1 - DECEMBER 31, 1991

In the attached report, each number refers to the Safety Evaluation questions listed below:

1. Is the probability of occurrence or the consequences of an accident or malfunction evaluated in the FSAR increased?
YES __, NO __
2. Is the possibility of an accident or malfunction of a different type than any evaluated in the FSAR created?
YES __, NO __
3. Is the margin of safety, as defined in the bases for any Technical Specification reduced?
YES __, NO __

10 CFR 50.59 EVALUATIONS PERFORMED
ON PLANT MODIFICATIONS
IN ACCORDANCE WITH MAR PROCEDURES

FACILITY MODIFICATION
MAR 77-07-01-01
REMOTE SHUTDOWN SYSTEM

SAFETY EVALUATION

1. No, this modification provides additional electrical and mechanical equipment which interfaces with existing plant equipment and systems. This equipment is Class 1E qualified and the instruments and tubing are seismically supported and separated in accordance with plant design criteria. The basic systems and functions have not been altered.
2. No, this modification does not alter the fluid system design as previously evaluated. This modification provides dedicated controls to safely shutdown the plant in the event of a control room fire. NRC letter dated January 6, 1983 transmitted approval of the Remote Shutdown System. design.
3. No, this modification will not degrade the performance of any engineered safety features required by the Technical Specifications.

FACILITY MODIFICATION

MAR 87-10-19-01
EMERGENCY DIESEL GENERATOR (EDG) LOAD CALCULATION

SAFETY EVALUATION

1. No, this update of the EDG load calculations includes the changes due to several MARs which modified EDG loads to provide for better block loading distribution and reduction in loads. FPC calculations E-91-0026, "Emergency Generator "A" Loading Evaluation" and E-91-0027, "Emergency Generator "B" Loading Evaluation" are the culmination of an effort to reduce the EDG load so that it remains within established ratings. Since the EDG load is reduced and modifications have been made to the EDGs for increased capacity, the possibility of an accident as previously evaluated is reduced or remains the same. Safety evaluations have been completed for each MAR making changes to the EDGs or their loadings. This change documents new EDG loadings due to incorporation of the MARs into the EDG KW loading calculations. The EDG MARs have determined that the EDG modifications and resulting loads does not change the consequences of an accident previously evaluated in the FSAR. This change does not modify any equipment in either the EDGs or their loads. The consequences remain unchanged.
2. No, the EDG loading calculations confirm that the EDGs can operate within their load ratings and the equipment can mitigate any design basis accident.
3. No, the EDG load calculations determined by this change are less than those previously calculated. The margin of safety is actually increased or conservatively remains the same.

FACILITY MODIFICATION

MAR 88-10-20-01
Non-IE Electrical Power System

SAFETY EVALUATION

1. No, the modification consists of a single 250 VAC battery, a single 125/250 VDC main distribution switchboard, three 125 VDC battery chargers, and associated bus duct, disconnect switches, transfer switch, and relocating some Class 1E circuits to Class 1E distribution panels. The new system will provide power to existing 125/250 VDC distribution panels which are being reassigned to the non-1E system from the Class 1E DC Power System. This battery system will not provide power to any safety-related circuits.
2. No, this modification dedicates a non-1E battery system to power non-safety-related circuits. It is not necessary for this system to be available for mitigation of design basis accidents.
3. No, the non-Class 1E battery is not covered by the Technical Specifications. Relocating the Class 1E circuits to a Class 1E distribution panel does not affect any safety margin.

FACILITY MODIFICATION

MAR 91-01-06-01
ADDITION OF A SW SYSTEM DEMINERALIZER

SAFETY EVALUATION

1. No, the addition of a new demineralizer will provide a means to remove contamination from the SW System in any operating mode. Flow circulated through the new branch line containing the demineralizer will be limited to less than 1% of SWP-1C total flow capability (6900 gpm). The new piping and components will be designed to maintain the integrity of the SW System with respect to pressure boundary and seismic qualification. Additionally, the modification will not cause the SW System and its components to be operated outside their existing design limitations. The change will not degrade the SW System capability to provide cooling water flow to safety related equipment during both normal and post accident operation.
2. No, there are no new system interfaces created and no changes are being made to function or the operational characteristics of the SW System which would introduce a new type accident or malfunction.
3. No, Technical Specification 3/4.7.3 addresses the SW System. This Technical Specification requires that as a minimum two emergency pumps and three heat exchangers be operable in Modes 1, 2, 3, and 4. The operability of the SW System is not affected by the addition of this demineralizer and the system margin of safety is not impacted.

FACILITY MODIFICATION

MAR 90-05-01-02
PENETRATION COOLING SYSTEM

SAFETY EVALUATION

1. No, this change modifies the operation of the Penetration Cooling System. It has been determined that the air pressure in the duct where fire damper FD-278 is installed is too high to allow for the proper closure of the damper. A temperature switch is being installed in the duct, upstream of fire damper FD-278, which will automatically shutdown the Penetration Cooling Fans AHF-9A and AHF-9B on indication of high temperature. When the fans stop, the fire damper will be able to close when the fusible link breaks apart.

The temperature switch setpoint is lower than fusible link break apart temperature. Therefore, the fans will shutdown prior to the time at which the fusible links functions allowing the damper to close.

The modification is compatible with existing fire detection capabilities of the ventilation systems. FSAR Section 9.7.2.7.i will be revised to reflect the fact that the penetration cooling fans will stop on indication of high temperature in the ductwork upstream of fire damper FD-278 allowing the damper to close.

2. No, the Penetration Cooling System is designed to operate under normal plant conditions and it is not required to perform any safety-related function. This modification is being added to improve the operability of the system under normal plant conditions.
3. No, the margin of safety for the Penetration Cooling System is not defined in the Technical Specifications.

10 CFR 50.59 EVALUATIONS
PERFORMED ON FSAR TEXT CHANGES
IN ACCORDANCE WITH PROCEDURE NOD-11

FSAR SECTION 14.1.2.4 - MODERATOR DILUTION ACCIDENT

1. No, this FSAR text change clarifies the basis for moderator dilution accident. The event description still considers failures which allow the RCS to be diluted and the consequences are unchanged. The event assumes operator error causes the dilution since there are no demineralizer water connections to either the Makeup System or the Decay Heat Removal System that operate automatically. The revision did not change anything that would affect the probability or consequences of an accident or malfunction.
2. No, all possible events are covered by the initial assumptions and a moderator dilution event from any source is considered.
3. No, the margin of safety for this event is not defined in the Technical Specifications, however, the results show no unacceptable consequences.

FSAR SECTION 9.7.2.1.j - PLANT VENTILATION SYSTEMS

1. No, this text change removes fans AHF-24A/24B and AHF-29A/B from the listing of fans loaded on the ES buses during a loss of offsite power. These fans are non-safety related and are not required during a loss of offsite power event and they do not receive ES power.
2. No, these fans are not required during a loss of offsite power event and the loss of ventilation to the Intermediate Building would have no effect on the safe shutdown of the plant.
3. No, these fans are not covered by Technical Specifications and there is no decrease in the margin of safety.

FSAR SECTION 5.4.5.5 - SEISMIC EVALUATION

1. No, the utilization of the earthquake experience database, and the SQUG methodology for seismic adequacy evaluation of commercial grade replacement items, used in nuclear safety related applications, is endorsed by the NRC in NUREG-1211. Hence if a commercial grade replacement is determined to meet the SQUG acceptability requirements, it is considered seismically adequate, and the probability of an occurrence of a malfunction or equipment is not increased.
2. No, if a commercial grade replacement item is determined to be seismically acceptable based on the earthquake experience, then the item is seismically acceptable for nuclear plant usage. The possibility for a different type of malfunction due to seismic adequacy is not created.
3. No, the Technical Specifications do not address the method by which a commercial grade replacement item is to be determined seismically acceptable. The margin of safety is not reduced.

FSAR SECTION 6.3.1 - RB EMERGENCY COOLING SYSTEM

1. No, the revised text clarifies the FSAR by stating that all of the listed combinations of RB spray systems and RB cooling units are capable of maintaining the RB below the design pressure of 55 psig and the design temperature of 281°F. A minimum of one spray train and one cooling unit is required to accomplish both heat removal and iodine reduction during the long term accident recovery. The text clarification will have no effect on the operation of the plant or any system within the plant.
2. No, the clarification will have no effect on the operation of the plant. Therefore, the possibility of an accident or malfunction of a different type than previously evaluated in the FSAR will not be created.
3. No, the equipment operation is not being changed by this clarification and Technical Specification equipment is not affected by this change.

FSAR SECTION 14B.4.3 - POST ACCIDENT HYDROGEN GENERATION

1. No, this change is only making an editorial change. The setpoints and alarm points do not change.
2. No, the control point of 3.5 Vol% and the lower flammability limit of 4.1 Vol% do not change.
3. No, the total safety margin value of 0.6 Vol% hydrogen did not change.

FSAR SECTION 1.3.2.12 - PIPING

1. No, Code Case 83, dated October 1970, expands on the allowable undercut and the reinforcement thickness for butt welded joints in Class 1, 2, and 3 piping systems. The Construction Code affected by this Code Case is USAS/ANSI B31.7-1969. This code is the code of record for CR-3. The reinforcement thickness allowed by the Code Case was implemented procedure PTL-Q-12 during the construction of CR-3. The Code Case allows the use of the reinforcement thickness provided all other requirements of Subsection 1-727.4 are met. The reinforcement thickness affects the stresses in the piping system. As the height of the reinforcement increases, the fatigue strength of the butt weld reduces. Based upon this, the Code limits the height of the reinforcement and applies factors to the calculated stress. These factors are the stress indices. The stress indices are tabulated in Appendix D of USAS B31.7 for various types of welds. The pipe analysis performed under the Code incorporates those indices as required by Subsection 1-705, Analysis of Piping Components. Since the Code Case does not change the stress indices listed in USAS B31.7, the structural integrity of the piping systems are not affected by the reinforcement thickness in Code Case 83.
2. No, the calculated stresses in the piping systems listed in FSAR Section 1.3.2.12 are less than the allowable stresses in the design code. Since the stress indices were not changed, as a result of the reinforcement thickness in Code Case 83, the calculated stresses will not change. The structural integrity of the piping system is still valid.
3. No, the Technical Specifications do not address the margin of safety due to undercut and weld reinforcement. Section 3/4.4.10 does address the structural integrity of ASME Code Class 1, 2, and 3 components. The integrity of the systems are not reduced since the allowable amount of the undercut and weld reinforcement is the same as that used in the construction of CR-3. This conclusion is based on a comparison of the allowable values in Procedure PTL-Q-12 and Code Case 83.

FSAR CHAPTERS 7 & 8 - ELECTRICAL SEPARATION

1. No, the purpose of the electrical separation criteria for Crystal River Unit 3 is to establish and document the minimum separation distances between raceways and cables of redundant trains for different types of possible configurations in the plant. The intent of the minimum separation requirements is to assure that a single credible event will not prevent the associated safety function due to electrical conductor damage.

The revised electrical separation criteria provides the criteria for achieving the circuit independence by physical separation and electrical isolation of circuits and equipment which are redundant. The revised criteria does not change or address the determination of what is to be considered redundant.

The electrical separation requirements are not part of the FSAR Chapter 14 Safety Analysis; however, the analyses assume redundant systems are independent and satisfy the single failure. The separation requirements for the redundant systems at CR-3 are governed by the design input documents which are based on common engineering and industry practices. Therefore, the systems requiring redundancy to mitigate the Design Basis Accident (DBA) as previously evaluated in the FSAR Chapter 14 are not impacted.

FSAR Section 7.1.3.1.5 addresses the separation criteria internal to the control board and relay racks. FSAR section 8.2.2.12 includes separation requirements for external raceways in accordance with Draft 1, dated October 20, 1971, Section 8.0 of the proposed guide for the Design and Installation of Cable Systems in Power Generating Stations. These are the commitments to which CR-3 was issued an operating license. The revised electrical separation criteria still meets these requirements and commitments.

In addition, the separation criteria has identified the minimum separation distances for configurations not specifically addressed previously in the criteria, based on the IEEE paper 90WM254-3 EC, "Cable Separation - What Do Industry Testing Program Show". This IEEE paper contains the results of industry testing completed by members of the nuclear industry for internally generated electrical faults with IEEE Power Engineering Society committee's data analysis and recommended separation distances. The added configurations are considered clarification of practices currently being performed at CR-3.

The minimum separation distances in the revised separation criteria are limited to the Non-Hazardous Areas (such as cable spreading room) and limited Hazard Areas (outside cable spreading room but not Hazardous Area) where the only energy available to damage electrical circuits is that energy associated with failure or faults internal to electrical equipment or cables within the area. The CR-3 installation was evaluated against the revised separation criteria and found acceptable as documented in "Electrical Circuit Physical Separation Walkdown and Evaluation Report". Where it was not practical to meet the minimum separation distances as

required by the criteria, a case specific evaluation is being performed to document the case as a permanent deviation to the separation criteria.

Separation for external sources of energy (e.g. exposure fires, pipe breaks, missiles, etc. in a Hazardous Area) is not addressed and therefore the analyses such as HELB, Fire Study (Appendix R) are still valid, and have not been changed by the criteria revision.

The cable used at CR-3 in safety related applications is qualified to meet the IEEE-383 and the insulation rating exceeds the circuit voltage. In addition, the separation between raceways carrying circuits of the same separation group but of different voltage level and cable type is maintained. Therefore, any fault within the raceway will not exceed the rating of the cable insulation.

The safety related circuits are routed in their respective train A or train B cable tray. The non-safety related circuits routed along with safety-related circuits are treated as the same channel as the safety related circuit to which it has been grouped and are not permitted to route with safety related circuits of a redundant channel. Because of this physical limitation on separation, an electrical fault will not propagate from one redundant channel to the other (i.e. train A to train B or vice versa). This maintains the safety related circuit of one channel independent of any other channel and as such integrity of safety function is assured.

The information such as ampacity derating factor, cable tray and conduit fill, weight limitations and cable ampacity sizing is removed from the revised separation criteria since FPC has adopted two new criteria 1) Cable Tray and Conduit Fill and Weight Limitation and 2) Cable ampacity sizing to address the same.

Based on the above discussions, enhancement to the electrical separation criteria does not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety as previously evaluated in the FSAR.

2. No, the revision to the electrical separation criteria does not change the function of any component or system nor adds any new control features. Also, it does not add any new components, equipment, or systems which exceed the design basis of the plant as described in the FSAR. The revised separation criteria still meets the intent of physical separation for independence of Class 1E circuits and single failure criteria.

Therefore, it does not create the possibility for an accident or malfunction of a different type than any previously evaluated in the FSAR.

3. No, the electrical power, control and instrumentation cable for redundant equipment is required to be physically separated to assure that no single credible event will prevent operation of the safety function due to electrical conductor damage. The critical functions include the reactor protection, engineering safeguard, and reactor shutdown. The Technical

Specification provides the limiting conditions for operation and surveillance requirements for components or channels associated with reactor protection, engineering safeguard, and reactor shutdown. The minimum separation distances provided in the separation design criteria are not specifically addressed in the Technical Specification. The margin of safety would be reduced if this change would increase the potential for a system or component to be rendered inoperable. However, the revised separation criteria does not change the number of channels/trains required and independence of Class 1E circuits is still maintained.

Therefore, the margin of safety as defined in the bases of Technical Specification is not reduced.

FSAR SECTION 8.2.2.11.f - INTERLOCKED ARMOR CABLE

1. No, the use of non interlocked armor cable versus rubber insulated cable in no way impacts the operability of equipment. Rubber insulated cable meets the life expectancy, environmental, and physical parameters required of plant equipment, the same as interlocked armor cable. A review of cable vendors data shows that interlocked armor and rubber insulated cable have equivalent ampacity characteristics and match the ampacities listed in IPCEA Publication No. P-46-426, "Cable Ampacities for Three-Conductor Copper Cable in 40°C Ambient Air," page 309. Since the current carrying capabilities of the two types of cables are equivalent, the performance of the equipment is not impacted.
2. No, there is no change to the system, basic equipment or intended operability. The use of rubber insulated cable or interlocked armor cable is of no consequence to the current postulated accident or malfunction scenarios since both types of cable provide the necessary physical and environmental integrity based on the plant parameters to support the equipment.
3. No, the margin of safety for rubber insulated cable versus interlocked armor cable is not defined in the Technical Specifications. The rubber insulated cable and interlocked armor cable both meet the industry standards for their application in this modification and this envelopes the plant physical and environmental characteristics.

FSAR SECTION 5.3.2 - ISOLATION SYSTEM

1. No, this change is to bring the FSAR into agreement with the Technical Specifications and current plant operations. Type IV containment penetrations may be opened during reactor operation under continuous administrative control. This action is permitted per Technical Specification 3.6.3.1, Containment Isolation Valves. This FSAR change has no impact on the probability or the consequences of an accident or malfunction because the opening of these valves is currently permitted by Technical Specifications.
2. No, revising the FSAR to make it agree with the Technical Specifications will not create any new accidents or malfunctions. The opening of a containment isolation valve under administrative control is permitted by Technical Specification. The valve can be closed if necessary.
3. No, opening the valves under administrative control is permitted by the Technical Specifications. Therefore, the margin of safety as defined in the Technical Specifications will not be affected.