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MIDDLE SOUTH UTILITIES SYSTEM

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April 28, 1987

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

SUBJECT: Waterford SES Unit 3
Docket No. 50-382
Response to NRC Questions Relating to the
Control Systems Single Failure Study

REFERENCE: LP&L Letter W3P86-1641 dated July 2, 1986

Gentlemen:

In response to an open item identified in the Waterford 3 Safety Evaluation Report (Supplements 1 and 8) LP&L, in the referenced letter, submitted the results of a Control Systems Single Failure Study. The study concluded that any single power supply, sensor or impulse line failure would not result in consequences outside the bounds of FSAR Chapter 15.

Following the initial review of this study several questions were raised regarding the assumptions and methods that were used. Enclosed please find the LP&L response to these questions.

If there are any questions or if additional information is required, please contact me or Mike Meisner at (504) 595-2832.

Yours very truly,

K.W. Cook
Nuclear Safety & Regulatory
Affairs Manager

KWC/DPS/plm

cc: E.L. Blake, W.M. Stevenson, J.A. Calvo, J.H. Wilson, R.D. Martin,
NRC Resident Inspector's Office (W3)

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QUESTIONS AND COMMENTS REGARDING THE ASSUMPTIONS AND METHODS IN THE WATERFORD SINGLE FAILURE ANALYSIS

1. QUESTION

Methodology Section 2.4, in discussing the comparison with FSAR Chapter 15 states that "Concurrent random failures or other events not directly related to or caused by the power source, sensor, or impulse line failures were not considered". This assumption is not in agreement with the NRC requirement to assume the worst case single active failure in addition to the initiating event. To what extent would incorporating this requirement effect the results of this study.

RESPONSE

Control system malfunctions were considered as potential initiating events when the Chapter 15 Safety Analysis was performed and, as shown in the response to Question 3, these events are bounded by moderate frequency incidents. If the worst single active failure was added to the control system malfunction, the results would be no more severe than the bounding moderate frequency incident plus the worst single active failure. Using the guidelines of FSAR Table 15.0-2, a moderate frequency incident plus a single active failure would be classified as an infrequent incident. Hence, incorporating a single active failure into the control systems failure study would change the classification of the bounding Chapter 15 event from a moderate frequency incident to an infrequent incident.

2. QUESTION

It was not clear from the information provided in this study at what level failures of power supplies have been addressed. It would appear that, at the most failures of AC sources have been only addressed to the 480 VAC level. It appears likely that in most cases only single 120 VAC supplies have been considered. As a significant number of the power supplies identified in the analysis originate from the 4160 VAC AB bus, a higher level failure has the potential of causing a large number of failures of individual control circuits. It does not appear that the analysis adequately addresses this occurrence.

RESPONSE

A thorough and comprehensive analysis was performed to evaluate the effects of cascading power losses due to the failures of higher level distribution panels and load centers in IE Bulletin 79-27, "Loss of Non Class IE Instrumentation and Control Power System Bus During Operation" analysis. The experience from IE Bulletin 79-27 study was directly applied to this study. The failures contributing to the loss of a high level bus could come from the interlock relays, isolation relays and control circuit of the current breaker. The power sources to the interlock relays, isolation relays and control circuits were lower level power sources such as 120 VAC or 125 DC power sources which have been picked up and reviewed in this study. In addition, the power supplies to all of the analyzed control systems fed from 120 VAC power sources which are also fed from 125 VDC distribution panel through an inverter upon loss of a higher level AC bus. Therefore, the dominant power supply failures are the low level buses.

3. QUESTION

Using the NRC event classification, a power supply failure or sensor failure would be classified as an incident of moderate frequency. In several instances in the event summary, the FSAR bounding event is one which is usually classified as a limiting fault. Examples are found in the loss of power supply 120 VAC 3014AB, which references the feedwater line break and the failure of pressurizer level sensor LT-110X, which references a loss of coolant accident. As a limiting fault allows much greater consequences, use of a limiting fault as a bounding case for an incident of moderate frequency would not be appropriate unless it can be shown that the bounding event meets the much more restrictive limits of an incident of moderate frequency.

RESPONSE

The failure of common sensors, impulse lines or power supplies that can contribute to multiple control system malfunctions were initially compared to limiting faults because it was the intent of this study to take credit only for those FSAR Chapter 15 events which clearly bounded the control system failures. However, after performing a more detailed review of both the effects of multiple control system failures and the moderate frequency incidents described in Chapter 15, it has been determined that all control system failures are bounded by moderate frequency incidents.

The following changes should be made to the Control Systems Failures study to reflect these changes:

3.1 Table 1 - Loss of Common Power Supply to Multiple Control Systems

A. 120 VAC PDP 3014AB

Replace the bounding event writeup with the following:

The failure of 120 VAC power supply PDP 3014AB would result in an increase in RCS pressure, a decrease in steam generator level and an eventual reactor trip on high pressurizer pressure or low steam generator level. The combined effects of this failure are bounded by FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

3.2 Table 3 - Common Impulse Line Rupture to Multiple Control Systems

A. RC1A-7-T-45

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-7-T-45 (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.2 Table 3 (Cont'd.)

B. RC1A-3-T-46

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-3-T-46 (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.3 Table 1 - Sensor Failures: Pressurizer Level Control System

A. LT-110X (when X channel is selected)

Replace the bounding event writeup with the following:

The failure of sensor LT-110X (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

B. LT-110Y (when Y channel is selected)

Replace the bounding event writeup with the following:

The failure of sensor LT-110Y (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.4 Table 2 - Impulse Line Rupture: Pressurizer Level Control System

A. RC1A-7-T-45

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-7-T-45 (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.4 Table 2 (Cont'd.)

B. RC1A-3-T-46

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-3-T-46 (high) would result in a decrease in pressurizer pressure and level resulting in potential damage to the pressurizer heaters and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.5 Table 1 - Sensor Failures: Pressurizer Pressure Control System

A. PT-100X (when X channel is selected)

Replace the bounding event writeup with the following:

The failure of PT-100X (high) would result in a decrease in RCS pressure and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

B. PT-100Y (when Y channel is selected)

Replace the bounding event writeup with the following:

The failure of PT-100X (high) would result in a decrease in RCS pressure and an eventual reactor trip on low pressurizer pressure or low DNBR. The combined effects of this failure are bounded by FSAR Section 15.1.1.3, Increased Main Steam Flow.

3.6 Table 1 - Impulse Line Rupture: Pressurizer Pressure Control System

A. RC1A-7-T-45

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-7-T-45 (low) would result in an increase in RCS pressure and an eventual reactor trip on high pressurizer pressure. The combined effects of this failure are bounded by FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

B. RC1A-3-T-46

Replace the bounding event writeup with the following:

The failure of impulse line RC1A-3-T-46 (low) would result in an increase in RCS pressure and an eventual reactor trip on high pressurizer pressure. The combined effects of this failure are bounded by FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

3.7 Table 1 - Sensor Failure: Feedwater Control System

A. LT-1111, LT-1105, FT-1011, FT-1111, LT-1121, LT-1106, FT-1021, FT-1121

Replace the bounding event in this table with FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

3.8 Table 2 - Impulse Line Rupture: Feedwater Control System

A. RC1A-6-T-39, RC1D-1-T-42, RC1A-1-T-43, AC24-2-T-140, RC2A-2-T-56, RC2D-1-T-59, RC2B-3-T-60, AC24-6-T-142

Replace the bounding event in this table with FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

3.9 Table 3 - Loss of Power Supply: Feedwater Control System

A. ADVAC PDP 3014AB

Replace the bounding event in this table with FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

3.10 Table 1 - Loss of Power Supply: Electric Power Distribution System

A. 120 VAC PDP 3014AB

Replace the bounding event writeup with the following:

The failure of 120 VAC power supply PDP 3014AB would result in an increase in RCS pressure, a decrease in steam generator level and an eventual reactor trip on high pressurizer pressure or low steam generator level. The combined effects of this failure are bounded by FSAR Section 15.2.1.3, Loss of Condenser Vacuum.

QUESTIONS AND COMMENTS REGARDING THE FAULT TREES ASSOCIATED WITH THE WATERFORD SINGLE FAILURE ANALYSIS

1. Reference: Zone F/2, F/5, F/10, and F/13 on Fault Tree No. 1100, Sheet 1 of 1.

   Concern: These zones show relay R/TT-5 coil common for both Feedwater Pump A and B. Is this relay a single relay with multiple contacts as input for Pump A signal 1 and 2 and for Pump B signal 1 and 2 or is it to be assumed that there is one relay for Pump A signal 1, one relay for Pump A signal 2, with the same for Pump B; therefore maintaining channel independence or is it correct to assume one single relay R/TT-5 and handling it as a common single failure to both Pump A and B.

   As basic events to relay R/TT-5, the zones show SGFW Pump A trip 1 and 2, along with 125 VDC PDP 3AB-DC-A available. Thus trip 1 and 2 both energize relay R/TT-5. Again no channel trip separation for Pump A with respect to channel trips and power supply. The same applies to Pump B. Or is it to be assumed that basic event '125 VDC PDP . . .' and 'SGFW Pump A trip 1' only apply under 'Loss of Feedwater Pump A signal 1 present', and '125 VDC PDP. . .' and 'SGFW Pump A trip 2' only apply under 'Loss of Feedwater Pump A signal Z present.' This concern is applicable to other Fault Trees with similar construction.

   RESPONSE

   A. "Relay R/TT-5" is actually two independent relays with the same tag/designation (one for Feedwater Pump A and one for Feedwater Pump B). Each relay, in turn, actuates two contacts (i.e., signal 1, signal 2). Therefore independence is maintained and no single failure exists.

   B. "Trip 1 and Trip 2" are low pressure switches which actuate in a two out of two logic. As above, there exists two pressure switches per feedwater pumps with the same tag designation. Therefore, independence is maintained and no single failure exists.

2. Reference: Zone D/6 on Fault Tree No. 1202, Sheet 1 of 1

   Concern: This zone shows a condition shown as 'Valve Already Open'. This condition is shown inside a symbol not standard to fault tree symbols. Is this symbol assumed to be an inhibit gate or as another gate symbol or fault tree symbol. What type of logic is to be assumed for development of cutsets for this event.

   RESPONSE

   "Valve Already Open" is a system pre-existing condition. Valve opening is initially selected by energizing relay coil U. However, on loss of power to the select switch, the previous selected valve remains in the selected position. The symbol under question is used as a "decision gate". The probability of P=1 was conservatively assumed for 120 VAC PDP 396AB unavailable. Therefore, the fault tree for event "Relay U Contacts Closure" can be reduced to "120 VAC PDP 396AB Unavailable" in the fault tree analysis.

3. Reference: Zone D/15 on Fault Tree No. 1204, Sheet 2 of 4.

Concern: This zone shows power source '120 VAC PDP 362SAB unavailable' as the basic event for both relay A and B. It appears that two channels (relay A and B) were established but there is no independence of power therefore an established single failure. Did the analysis performed assume that the power source 3625AB was a common basic event (single failure) or as a basic event for relay A and a different basic event for relay B.

RESPONSE

The fault tree analysis was performed based on 120 VAC 362 SAB being a common basic event to relays A and B. The fault tree was drawn as shown only for convenience.

4. Reference: Zone D/10 on Fault Tree No. 1204, Sheet 3 of 4.

Concern: This is identical to the concern of item 3 above with the availability of PDP 362SAB. Did the analysis performed assume a single common basic event (single failure) or as a basic event for relay A and a different basic event for relay B.

4. Reference: Zone D/10 (Cont'd.)

RESPONSE

The fault tree analysis was performed based on 120 VAC 362SAB being a common basic event to relays A and B. The fault tree was drawn as shown only for convenience.

5. Reference: Zone D/6 and D/10 on Fault Tree No. 1204, Sheet 4 of 4.

Concern: This is identical to the Concern of item 3 except with respect to power source 3AB3S. Did the analysis performed assume a single common basic event (single failure) or as a basic event for Relay 27-1 and a different basic event for relay 27-2.

RESPONSE

Unavailability of power bus 4KV SWGR 3AB3S will result in no voltage between 4KV SWGR 3AB3S phases A & C and phases A & B. This would cause relays 27-1 and 27-2 coil not to energize. Therefore, 4kv SWGR 3AB3S is a common basic event for relays 27-1 and 27-2 and was analyzed as such.

6. Reference: Zone B/6 and I/4 on Fault Tree No. 1301, Sheet 1 of 2.

Concern: Zone B/6 shows two identified events 'PZR Proportional Heater Bank 1 . . .' and '. . Bank 2. .'. The tree shows commonality to both events. It is to be assumed that the fault tree under these two events should be duplicated with one under the event for heater bank 1 and the other under heater bank 2; and each basic event which does not show a character designator is to be assumed as separate for each bank.

Zone J/4 shows commonality of power sources. Is it assumed that these basic events are to be duplicated under relay 27-11X, 27-21X and 27-31X and were just drawn as shown for convenience.

RESPONSE

The referenced zone has been modified to reflect the following reviewer's concern:

A) Fault trees should be read as one under the event for heater bank 1 and the other under heater bank 2; and each basic event which does not show a character designator is to be assumed as separate for each heater bank.

B) The basic events are common to relays 27-11X, 27-21X and 27-31X. These undervoltage relays are arranged in a three out of three logic to generate a loss of voltage signal.

The fault tree was drawn as shown only for drafting convenience. A modification to Fault Tree No. 1301, Sheet 1 of 2, is attached.

7. Reference: Zone B/9 on Fault Tree No. 1302, Sheet 1 of 1.
Zone B/6 and B/12 on Fault Tree No. 1303, Sheet 1 of 1.
Zone B/7 on Fault Tree No. 1304, Sheet 1 of 1.
Zone B/8 on Fault Tree No. 1305, Sheet 1 of 1.

Concern: The construction of the fault trees referenced are identical to Fault Tree 1301 and the same concern is applicable to these fault trees in regard to duplication and commonality of basic events. Is it to be assumed the basic tree is to be duplicated for each designated event box and that each basic event which does not show a character designator is assumed as separate and is only used for that portion of the tree. On Fault Tree No. 1302 where does character designator aa come into use. On Fault Tree No. 1303 both valve RC301A & B use impulse line RC1B-3-T-46. Is this correct?

On Fault Tree No. 1304 Zone G/3 shouldn't the character designator be 3 ccl instead of 3 bbl-DC-S. What effect does improper identification of events have on analysis results.

RESPONSE

The referenced zones have been modified to reflect the following reviewer's concern:

A) The fault trees were constructed to duplicate each designated event box and that each basic event which did not show a character designator is separate and is only used for that portion of the tree. The fault trees were drawn as shown only for drafting convenience.

B) Character designator aa was inadvertently omitted during drafting and should be added to the event box as "PZR Backup Heater Ckt Brkr aa Tripped when CS In Auto Position" (Zone C/8).

C) Both Pressurizer normal spray valves RC301A and RC301B receive the same modulation signal from either CP-30 or CP 31. Therefore, they do have the same impulse line.

D) A drafting error at the zone G/3 of the fault tree 1304, 3bb1-DC-S should be revised to 3cc1-DC-S. The proper identification was used in the original fault tree analysis.

A modification to Fault Trees Nos. 1301, 1302, 1303 and 1304 is attached.

8. Reference: Zone C/7 and C/12 on Fault Tree No. 1400, Sheet 1 of 1. Zone E/6, E/12, G/6, and G/12 on Fault Tree No. 1500, Sheet 1 of 1.

Concern: It is assumed that for Zone C/7 and C/12 on Fault Tree No. 1400 that the fault tree under transfer FOD and INAD is to be duplicated 6 times and the basic events are separate and only for that portion of the tree duplicated. Is this the same assumption taken in the original analysis and determination of cutsets.

For Zone E/6 and E/12 on Fault Tree No. 1500, is it correct to assume the tree under event 'SG No. 1 FWP Flow Demand High' is to be duplicated and placed under 'SG No. 2'.

For Zone G/6 and G/12, is it to be assumed that transfer HI DEMAND is to be duplicated with one underneath CP-11A High and the other underneath CP-11B High with each basic event being separate and only for that portion of the tree duplicated.

RESPONSE

A) The fault tree under transfer gate "FOD" and "INAD" were duplicated six times and the basic events were separated and only for that portion of the tree duplicated. The fault tree analysis took this into account and was reflected in the minimum cutsets listed in Tables 1, 2 and 3 of the Steam Bypass Control System section.

B) The fault tree under "SG. No. 1 FWP Flow Demand High" is duplicated and placed under "SG No. 2 FWP Flow Demand High". The fault tree was drawn in this fashion for drafting convenience only.

C) The "HI Demand" transfer is duplicated, one under CP-11A and the other under CP-11B, with each basic event separate and duplicated for that portion of the tree. The fault tree was drawn in this fashion for drafting convenience only.

9. Reference: Zone F/7 and B/10 on Fault Tree No. 1600, Sheet 1 of 2.

Concern: Transfer TAVG shown in Zone F/7 shows transfer to Fault Tree 1600 Sheet 2 and 1601. Transfer to tree 1601 is not proper or correct. Did analysis performed include this transfer?

9. Reference: Zone F/7 and B/10 (Cont'd.)

For Zone B/10 if normal assumption is made with the tree construction then it is assumed that the tree is to be duplicated for CP-12A and CP-12B. As the tree is duplicated, a concern arises with respect to channel dependence. It is assumed that with the establishment of CP-12A and CP-12B, two channels are present and therefore independence is established. However, going down the tree it appears that the TAVG signal is single channel only and is in both CP-12A tree and CP-12B tree, therefore single failure. Determining the cutsets by hand, and using these fault trees, how are single inputs to dual channels detected. When is it to be assumed that single designated events, inputs, channels, going into two channel events are actually two channels as the TAVG may be in this case.

RESPONSE

The referenced zone has been modified to reflect the following reviewer's concern:

A) A drafting error in transfer gate "TAVG" to fault tree 1601 has been deleted. Fault tree analysis did not include this for evaluation.

B) The TAVG signal is used as the primary feedback for automatic CEA control and is also sent to SBCS for control purposes. In addition, TAVG also calculates a pressurizer level setpoint signal. Fault trees were developed for examining the TAVG signal failure to achieve their particuliar function. There exists two Reactor Regulation System (RRS) cabinets, CP-12A and CP-12B, only one is selected for service at one time. The TAVG signal is generated via three paths common to CP-12A and CP-12B; loop 1, loop 2 or loops 1 and 2. The operator selects one loop for operation via a hand select switch. Failure of a loop temperature element could result in a low TAVG signal. However, this condition would be detectable and the operator would switch RRS operation to an intact TAVG loop. Fault trees were analyzed in different select switch positions and the results were presented in Table 1 of the Reactor Regulation System Section.

A revision of Fault Tree 1600, Sheet 1 of 2, is attached.

10. Reference: Zone C/7 and C/10 on Fault Tree No. 1700, Sheet 1 of 1.
Zone A/11 on Fault Tree No. 1704, Sheet 1 of 1.

Concern: The transfers designated in the zones are identical but are to two different events. The fault tree references are correct. This error should have been detected if fault tree was closely followed. Was transfer LTRB used in analysis or the referenced tree. Fault tree 1704 does not have transfer to fault tree No. 1700.

RESPONSE

The referenced zones have been modified to reflect the following reviewer's concern:

A) A drafting error in the transfer gate of "loss of turbine trip capability" in the fault tree 1700, Sheet 1 has been corrected to "LTRIP".

B) Transfer gate "LTRIP" has been added in the fault tree 1704, Sheet 1.

C) Fault tree 1704, Sheet 1 was analyzed and input into the evaluation of the Turbine Control System Modification in the original analysis.

A modification to Fault Tree Nos. 1700 and 1704 is attached.

11. Reference: Zone H/5 on Fault Tree No. 1703, Sheet 1 of 1.

Concern: There are two transfers shown in Zone H/5 from two separate identified events. Clarification of circuitry would be helpful. Transfer SPUU is 2 out of 3 speed signals. Is it to be assumed that the 2/3 speed signals are input to one single unit which provides an output for transfer SEL SPEED or only one signal is selected from the 3 speed signals. How do 2 out of 3 low signals result in a rated speed-selected speed signal high.

RESPONSE

A) Selected Speed (Transfer gate SEL speed) is the generated output of three speed signal inputs. The speed signal inputs are compared. At least two inputs must agree and their values must lie within high and low limits.

B) The rated speed signal and the selected speed signal are inputs to a summing card. Therefore, if the rated speed is normal and the selected speed is low, the output of rated speed-selected speed will be a high variance.

12. Reference: Zone C/9 on Fault Tree No. 1800, Sheet 1 of 1.

Concern: Is it to be assumed that the tree is to be duplicated with one for Steam Generator 1 the other for Steam Generator 2 with each having separate basic events.

RESPONSE

Zone C/9 on Fault Tree No. 1800 Sheet 1 has been modified to reflect the reviewer's concern. This fault tree is a duplicate of Main Steam Atmospheric Dump Valve MS116A and the Main Steam Atmospheric Dump Valve MS116B with each having separate basic events. The fault tree was drawn as shown for convenience. A modification to Fault Tree No. 1800 is attached.

13. Reference: Zone D/4 and D/14 on Fault Tree No. 1901, Sheet 2 of 2 and Fault Tree No. 1901, Sheet 1 of 2.

Concern: There are Character designators SS and X used in the identified zones. Are these actual channel designators left out of the tabulation tables or just a designation for a type of contact or handswitch. Also Sheet 2 transfer LXuNE transfers to Sheet 1 of Fault Tree No. 1901. On

Sheet 2 the tables indicate the tree is for pump A, B, and AB. However, when you go to Sheet 1 of 1901 this tree only designates use for charging Pump A and B and not Pump AB. Where does the tree LXuNE for charging Pump AB fit in.

In going down the tree on Sheet 2 of 1901 if channel X is specified, transfer RRSHLS picks up a transfer TAVGH which is or appears to be a single channel signal. Therefore, if Channel Y is picked then TAVGH is common to both, thus candidate for single failure. Is TAVGH dual channeled?

RESPONSE

A) SS is an abbreviation for "Select Switch".
LHX is a unique relay tag designation.

B) Transfer gate "LXUNE" for Charging Pump AB goes to transfer gate "LX3NE" located at Zones 1-1 and 1-13 of the fault tree 1902, Sheet 1. (See revised Fault tree 1901, Sheet 2.)

C) There exists two Reactor Regulation System (RRS) cabinets, CP-12A and CP-12B. Only one is selected for service at one time. The TAVGH signal is generated via three paths common to CP-12A and CP-12B; loop 1, loop 2 and loops 1 and 2. The operator selects one loop for operation via a hand select switch. Failure of a loop temperature element could result in TAVG signal high. However, this condition would be detectable and the operator would switch RRS operation to an intact TAVG loop. Fault trees were analyzed in different select switch positions and the results were presented in Table 1 of the Reactor Regulation System Section.

A modification to Fault Tree No. 1901, Sheet 2 of 2, is attached.

14. Reference: Zone H/6 on Fault Tree No. 2001, Sheet 1 of 2.
Zone I/7 on Fault Tree No. 2002, Sheet 1 of 1.
Zone J/6 on Fault Tree No. 2004, Sheet 1 of 2.

Concern: Is it to be assumed that for each of the identified events described in the referenced zones there is to be an identical tree underneath with each having separate basic events.

RESPONSE

The referenced zones have been modified to reflect the reviewer's concern. The identified events presented in the referenced zones were identical trees underneath with each having separate basic events as identified by the tabulation characters. A modification to Fault Tree No. 2001, Sheet 1 of 2, Fault Tree No. 2002 and Fault Tree No. 2004, Sheet 1 of 2, is attached.

15. Reference: Zone B/5 through D/S on Fault Tree No. 2202, Sheet 1 of 1.

Concern: Following the events up the tree in the referenced zones the power identified as 3AB-DC-S goes up to the event identified as 125VDC PDP

n. Where n represents either 3AB-DC-A or 3AB-DC-B. Is it to be assumed that 3AB-DC-S is common to both 3AB-DC-A and 3AB-DC-B. Clarification would be helpful. Or does the fault tree require duplication of the tree for Channel 3AB-DC-A and 3AB-DC-B.

RESPONSE

125VDC 3AB-DC-S feeds power to the non-safety related DC distribution panels 3AB-DC-A and 3AB-DC-B. Therefore, 125VDC 3AB-DC-S is a common power supply to both distribution panels 3AB-DC-A and 3AB-DC-B.

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