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ENGINEERING INFORMATION RECORD

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Title Davis Besse Reactor Protection System Single Failure Analysis

Prepared by [signature] Date 11/15/85

Reviewed by [signature] Date 11/15/85

Remarks:

The single failure analysis is contained in pages 2 through 26 of this Engineering Information Record.

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Revised by Toledo Ediso
December, 1985

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SINGLE FAILURE ANALYSIS

FOR TOLEDO EDISON
DAVIS-BESSE UNIT 1

REACTOR PROTECTION SYSTEM FIELD CHANGES

1.0 Purpose of Analysis

The purpose of this analysis is to demonstrate that no single failure of equipment added as part of the Anticipatory Reactor Trip System (ARTS), the changeover to Rosemount RC Flow transmitters or any other changes or additions to Reactor Trip System equipment directly interfacing with the NI/RPS can prevent the Reactor Protection System (RPS) from performing its safety function.

2.0 Scope of Analysis

This Single Failure Analysis (SFA) addresses only those changes to the Reactor Trip System interfacing directly with the RPS and which are already implemented and described in the July 1985 revision to the Davis-Besse Updated Safety Analysis Report (USAR).

3.0 Methodology

This analysis uses to the extent possible the scope and format of BAW 10003 "Qualification Testing of Protection System Instrumentation". Generally, the same types of failures are analyzed. Where a change involves a significant deviation from the way the base-scope RPS was configured and interfaced with the Reactor Trip System (i.e., there is no analogous function, configuration or interface in the base-scope system) this analysis departs from the scope and format of BAW 10003 as necessary to account for the change to the system.

This Analysis follows the methodology of B&W Topical Report BAW 10003, that is, to show that the changes analyzed are effectively channelized and that no single failure will impair the performance of any RPS channel other than that channel in its own vital power division.

4.0 Guidelines for the Analysis

The following guidelines were established for the performance of this analysis:

1) Related changes will be grouped so that common analysis of several changes may be used.

2) Related information (e.g. the Davis-Besse USAR) and results of existing analyses (e.g. BAW 10003) are to be used wherever possible.

3) If meeting the Single Failure Criteria of IEEE-279 is conditional upon factors beyond the scope of this analysis, those factors will be identified. For example if meeting the criteria depends upon cables being run in certain cable trays, that fact will be noted.

5.0 Assumptions and Limitations

1) Technical data for the analysis has been obtained from the Davis-Besse USAR (through the July 1985 revision), from TED FCRs, from the drawings (supplied by TED) listed in Appendix A and from miscellaneous information provided by TED.

2) Any non-conformance to the Single Failure Criteria discovered as a result of the SFA, are identified in this report. This report does not attempt to specify or recommend corrective action.

3) Changes not yet implemented and described in the July 1985 revision to the USAR are not included in this analysis.

4) This analysis takes credit for isolation devices and capabilities as described by TED in the USAR. Verification or justification of the information in the USAR is beyond the scope of this analysis.

6.0 Classification of System Changes

For purposes of this Single Failure Analysis changes to the Reactor Trip System which interface directly with the Reactor Protection System (RPS) have been divided into two groups. The first group, "Internal Changes", comprises all changes which meet the following criteria:

1) The change affects all four RPS subsystems identically.

2) The change is wholly contained within the bounds of RPS subsystem cabinets.

3) The change does not affect the reactor trip module or inter-subsystem interfaces.

The second group, "External Changes", comprises all changes which meet the following criteria:

1) The change affects all four RPS subsystems identically.

2) The change affects, includes or interfaces with hardware external to the RPS subsystem cabinets.

3) External hardware is channelized so each RPS subsystem interfaces only with class-1E hardware within its own power division.

7.0 Analysis of Internal Changes

Those changes categorized as Internal Changes are identified in Appendix B.

B&W Topical Report BAW 10003 analyzes the base-scope RPS for single failures within the Reactor Trip Module and in the inter-subsystem interface. Single failures within subsystems are shown to be confined to the affected subsystems if suitable isolation and redundancy are provided between subsystems.

Those changes which meet the criteria of Internal Changes transcend neither subsystem physical nor electrical boundaries (by definition). Although those changes are not covered explicitly by the Single Failure Analysis of BAW 10003, they do fall within the limits of that analysis because of their confinement within single channel boundaries.

Based on the above, it is concluded that no single failure of hardware associated with the Internal Changes can prevent the RPS from performing its protective function. Also, no single failure of hardware associated with these Internal Changes can cause a spurious subsystem trip.

Therefore those changes categorized as internal changes do not prevent the RPS from meeting the single failure criteria.

8.0 Analysis of External Changes:

8.1 ARTS

The ARTS is a four channel anticipatory reactor trip system which performs a reactor trip on loss of both main feedwater pumps or on a turbine trip above a predetermined power level. The anticipatory trip on a turbine trip is inhibited when reactor power, as determined from RPS flux signals is below a specified level. Each RPS subsystem sends a flux signal to the ARTS subsystem in its own vital power division.

Each ARTS subsystem sends subsystem trip signals to, and receives trip signals from each other ARTS subsystem.

Each ARTS subsystem contains a trip combination logic which sends a trip command to the RPS subsystem in its own vital power division. The ARTS trip command (open contacts to trip) is connected in series with, and downstream of, the Reactor Trip Module at the RPS cabinets.

The analysis of the interface between the ARTS and the RPS is broken down into separate analyses of the flux signal interface and the trip command interface.

8.1.1 Analysis of the Flux Signal Interface:

The RPS Flux signal interface with ARTS is accomplished, at the RPS end, by wiring out an analog flux signal from a previously unused isolation/buffer amplifier within the flux summing amplifier module. The signal is terminated at terminal boards within the RPS subsystem cabinet. An interconnecting cable carries the signal to the associated ARTS subsystem cabinet.

Figure 1 is a simplified schematic of the interface (typical for all four vital power divisions) and identifies the points at which faults are postulated.

The flux signal interface between ARTS and the RPS is analyzed by considering the fault conditions that can be presented to the RPS by the ARTS (shorts, grounds and opens per BAW 10003) and analyzing their effects on the ability of the RPS to perform its safety function.

Section 7.2.2.1 (4.7) of the Davis-Besse USAR states the isolation capabilities of a buffer/isolation amplifier identical to the one used to isolate the flux signal sent to the ARTS.

Misperformance of the RPS subsystem is precluded if the connection between the RPS and ARTS subsystems is accomplished in a way that eliminates the possibility of fault voltages greater than those stated in the USAR appearing at the RPS flux output terminals.

Even in the event of a misperformance of a single RPS subsystem, redundancy will allow the RPS to perform its safety function.

It is concluded, therefore, that no single failure of the flux signal interface can prevent the RPS from performing its safety function. Also, no single failure of the flux signal interface within the isolation capability of the RPS buffer/isolation amplifier (as given in the USAR) can cause a spurious subsystem trip.

8.1.2 Analysis of the Trip Signal Interface

The RPS Trip signal interface with ARTS consists entirely of the use of RPS terminal points to connect the ARTS trip command (open relay contacts) in series with the RPS trip relay output contacts. No changes have been made to the RPS circuitry as a result of this change.

The trip signal interface between ARTS and the RPS is analyzed by considering the fault conditions that can be presented to the RPS by the ARTS (shorts, grounds and opens per BAW 10003) and analyzing their effects on the ability of the RPS to perform its safety function.

The analysis examines the postulated faults in the trip signal interface for all four possible combinations of RPS and ARTS subsystem trip states within the same vital power division (i.e., RPS and ARTS untripped, RPS and ARTS tripped; RPS tripped and ARTS untripped, RPS untripped and ARTS tripped).

Figure 2 is a simplified schematic of the interface (typical for all four vital power divisions) and identifies the points at which faults are postulated.

Tables 1.1 through 1.4 are the tabulated results of the analysis for each fault for each combination of RPS and ARTS trip state.

The tables are modeled after table 7.2 in BAW 10003 but contain an additional column for defining the ARTS trip state. The descriptions of column contents in BAW 10003 apply to similarly titled columns in Tables 1.1 through 1.4.

The tabulated results of the analysis show that no single failure within the ARTS to RPS trip signal interface can prevent the RPS from performing its safety function.

Single failures within the trip signal interface can cause trip commands to be sent to the undervoltage coil of a single trip breaker but will not cause a reactor trip.

8.2 Flow Transmitter Replacement

This change replaced Bailey type BY dP transmitters (used to measure RC Flow dP) with Rosemount type 1153 dP transmitters. As with the ARTS trip signal interface, only the terminal wiring at the RPS has been changed. No other hardware or wiring modification to the RPS cabinets is involved.

Figure 3 is a simplified schematic of the interface (typical for all four vital power divisions).

The Bailey transmitters provided a 0 to 10 volt dc signal proportional to dP to the RPS. The Rosemount dP transmitters provide a 4 to 20 milliamp output signal proportional to dP. The current signal is converted to a voltage signal using a Foxboro I/E converter. The converters, one for each flow dP signal, are located in TEDs Post Accident Monitoring Equipment Racks. Each of these racks is associated with a separate vital power division and is physically and electrically separated from the Post Accident Monitoring Equipment Racks associated with the other three vital power divisions.

The Rosemount Transmitters are powered from four independent vital power sources: Essential power busses Y1A, Y2A, Y3 and Y4.

The physical and electrical separation of the flow dP signals associated with each RPS subsystem is equal to the separation which existed prior to the change in transmitters.

Because of this maintained separation, any single failure is confined within the bounds of the power division in which it occurs. Therefore, no single failure within the reactor coolant flow dP strings in the RPS can prevent the RPS from performing its safety function.

9.0 Summary and Conclusions

The preceding analysis has addressed the significant changes affecting the Reactor Protection System for Davis-Besse. The changes addressed (listed in Appendix B) have been divided into "Internal" and "External changes. The analysis has shown that single failures of equipment involved in "Internal" changes are implicitly covered by the original analysis in Topical Report BAW 10003.

The analysis has shown that single failures of equipment involved in "External" changes cannot prevent the RPS from performing its safety function.

Also, single failures of equipment involved in the Flow Transmitter Replacement may cause a spurious trip signal to be sent to Reactor Trip Module in the affected channel providing one input to the 2/4 logics in each RPS Subsystem. This is consistent with a similar failure analyzed in BAW 10003. The RPS system trip logic becomes effectively 1/3.

Single failures of equipment involved in the ARTS Trip Signal Interface can result in a spurious trip command being sent to one (of four) trip breakers, but because the interface is downstream of the reactor trip module, only one subsystem is involved and the RPS system trip logic remains 2/4.

We conclude from the preceding analysis that the Davis-Besse Reactor Protection System, including modifications indicated by the documents identified in Appendix A, meets the single failure criteria of IEEE-279. 1

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as a result of 10.0 being deleted.

FIGURE 1

ARTS FLUX SIGNAL INTERFACE

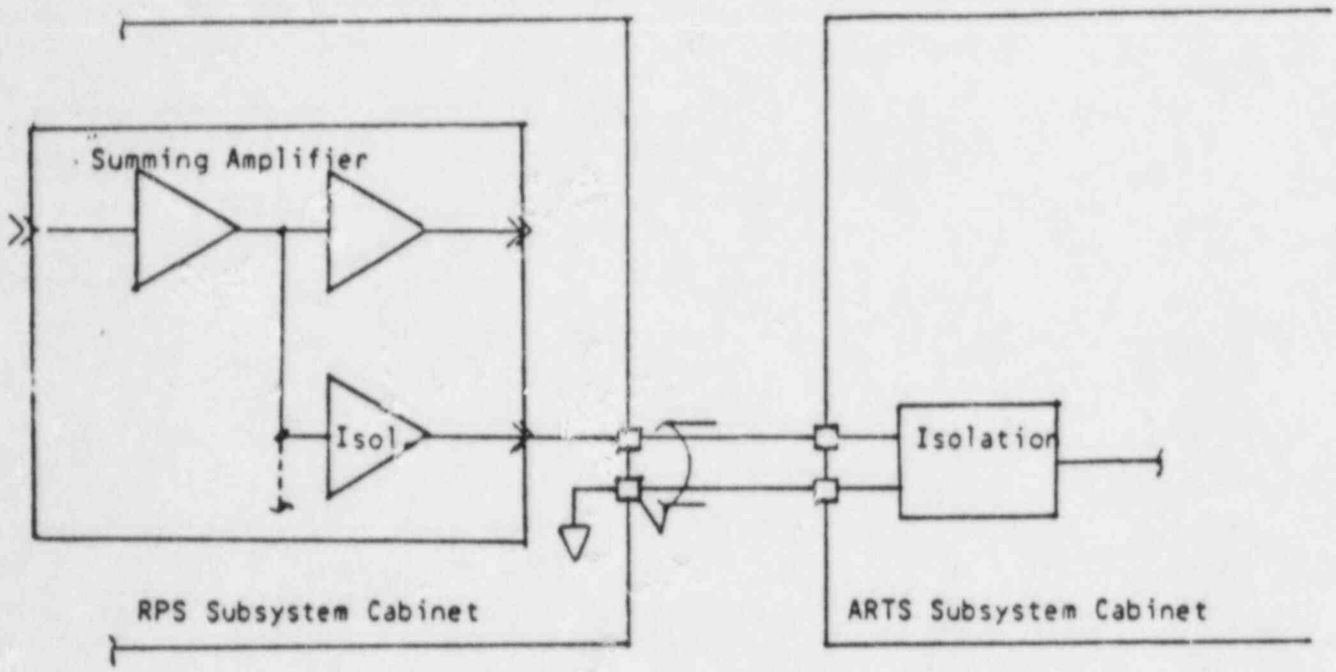

FIGURE 2

ARTS TRIP SIGNAL INTERFACE

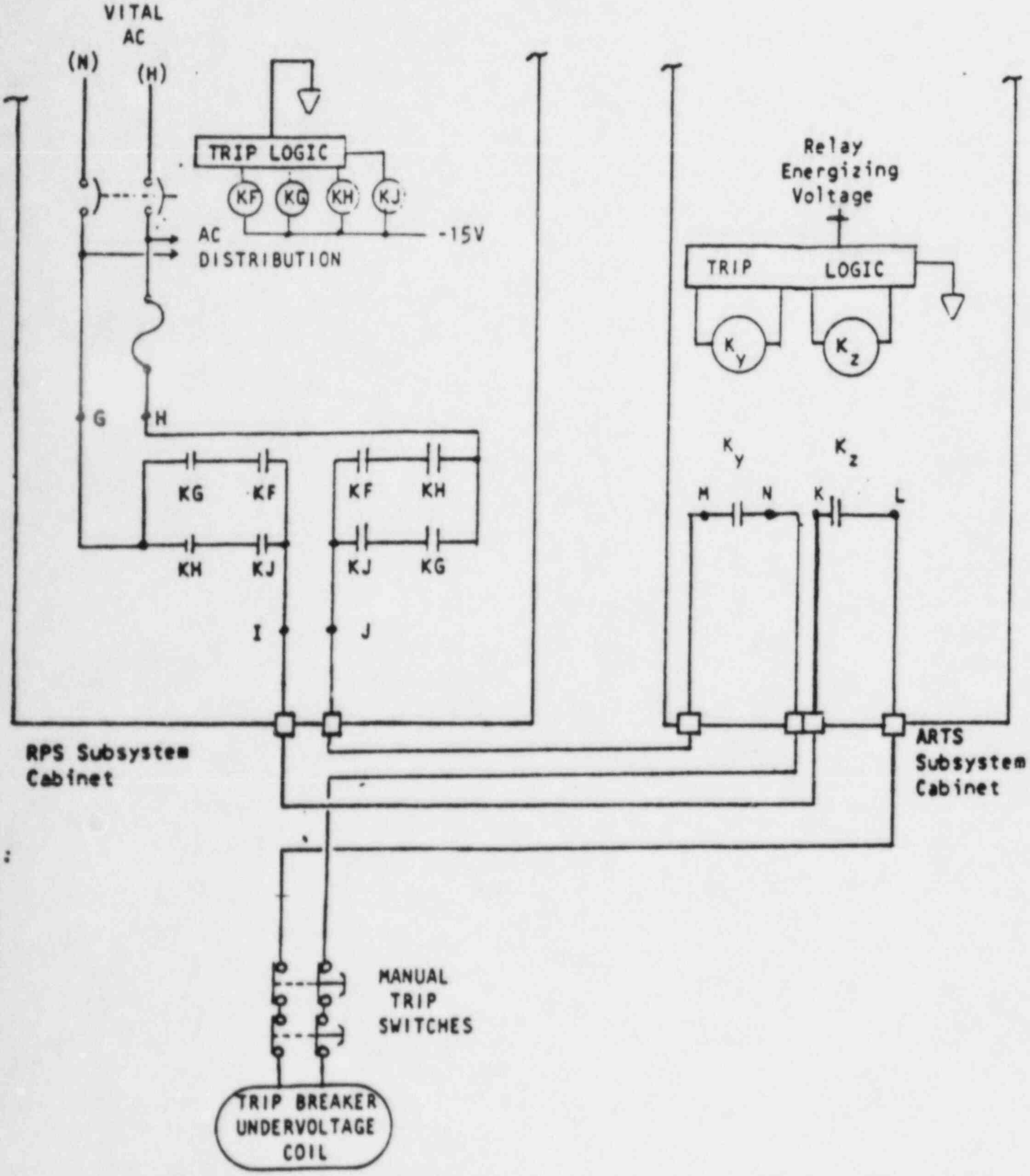

FIGURE 3

RPS INTERFACE FOR

FLOW TRANSMITTER REPLACEMENT

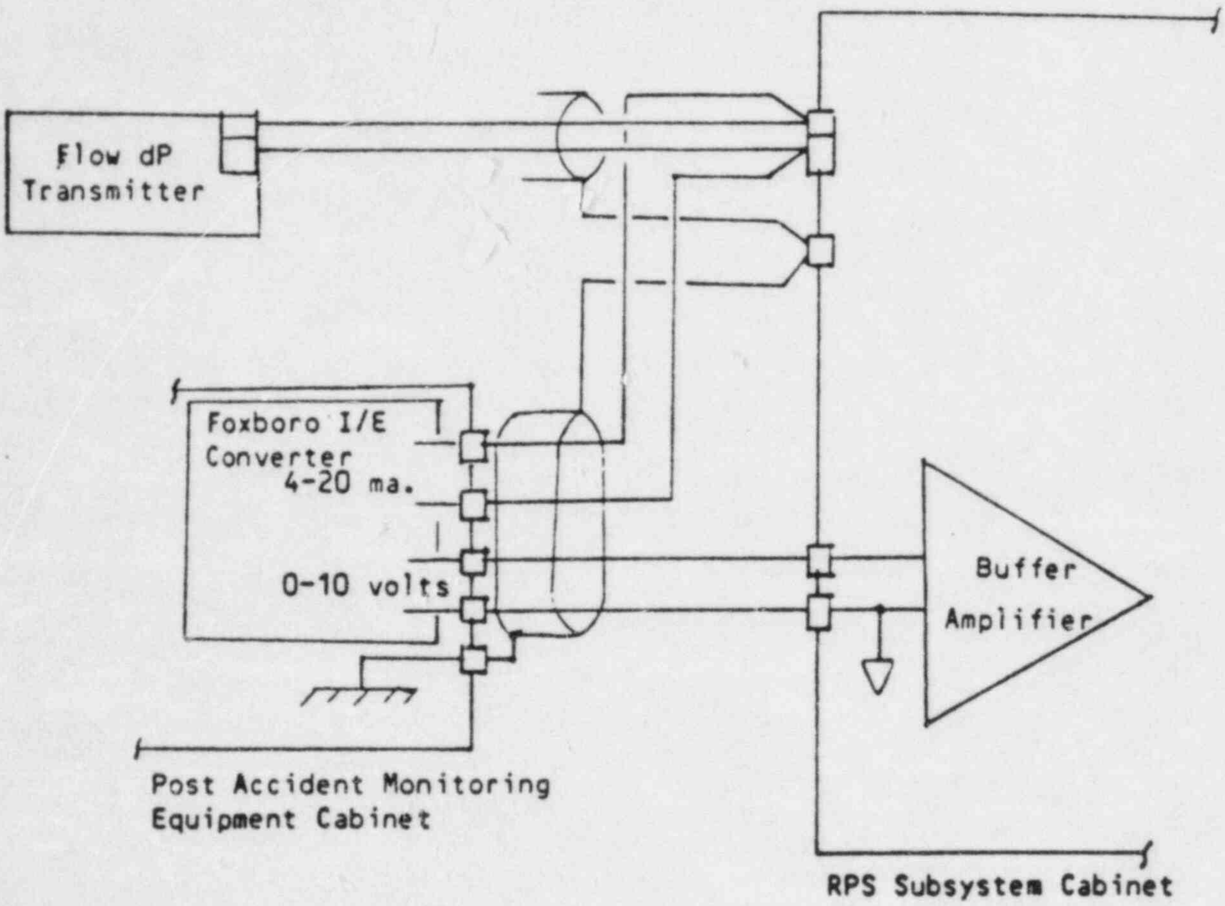

TABLE 1.1 ARTS TRIP TO RPS FAILURE MODE (ARTS AND RPS NORMAL)

ARTS SUBSYSTEM STATE	RPS SUBSYSTEM STATE	FAILURE ITEM	FAILURE MODE	DETRIMENTAL EFFECT ON SYSTEM	TESTABLE	2/4 TRIP	REMARKS
ormal	Normal	Ky or Kz Coil	Fails Energized	None	Yes	Yes (Note 1)	Does not impair RPS Trip Function
ormal	Normal	Ky or Kz Coil	Shorted	Spurious Breaker Trip Occurs	Yes	Yes (Note 2)	
ormal	Normal	Ky or Kz Coil	Open	Spurious Breaker Trip Occurs	Yes	Yes (Note 2)	
ormal	Normal	Ky or Kz Contacts	Stuck Open	Spurious Breaker Trip Occurs	Yes	Yes (Note 2)	
ormal	Normal	Ky or Kz Contacts	Stuck Closed	None	Yes	Yes (Note 1)	Does not impair RPS Trip Function
ormal	Normal	Ky Contact M or N	Short to Kz Contact K or L	Spurious Breaker Trip Occurs	Yes	(Note 2, 4)	(Note 4)
ormal	Normal	Ky Contact M or N	Short to V	Vital AC Shorted to ARTS Power Supply		(Note 5)	(Note 5)
rmal	Normal	Ky Contact M or N	Short to Ground	Spurious Breaker Trip Occurs		(Note 4)	(Note 4)
rmal	Normal	Kz Contact K or L	Short to V	ARTS Power Supply Shorted to Vital AC (Sta. Gnd)		(Note 6)	(Note 6)
rmal	Normal	Kz Contact K or L	Short to Ground	None		Yes	Station Ground Short to Instrument Ground

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TABLE 1.2 ARTS TRIP TO RPS FAILURE MODES (ARTS TRIPPED AND PRS NORMAL)

ARTS SUBSYSTEM STATE	RPS SUBSYSTEM STATE	FAILURE		DETRIMENTAL EFFECT ON SYSTEM	TESTABLE	2/4 TRIP	REMARKS
		ITEM	MODE				
Tripped	Normal	Ky or Kz Coil	Fails Energized	None	Yes	Yes (Note 1)	Redundant Relay De-Energized
Tripped	Normal	Ky or Kz Coil	Shorted	None	Yes	Yes (Note 2)	ARTS Trip Cannot Be Reset When Trip Condition Clears
Tripped	Normal	Ky or Kz Coil	Open	None	Yes	Yes (Note 2)	ARTS Trip Cannot Be Reset When Trip Condition Clears
Tripped	Normal	Ky or Kz Contacts	Stuck Open	None	Yes	Yes (Note 2)	ARTS Trip Cannot Be Reset When Trip Condition Clears
Tripped	Normal	Ky or Kz Contacts	Stuck Closed	None	Yes	Yes (Note 1)	Contacts On Redundant Relay Open
Tripped	Normal	Ky Contact M	Short to Kz Contact K	None	Yes	(Notes 2, 4)	(Note 4)
Tripped	Normal	Ky Contact M	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Tripped	Normal	Ky Contact N	Short to Kz Contact K	None	Yes	Yes	(Note 7)
Tripped	Normal	Ky Contact N	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Tripped	Normal	Ky Contact M	Short to V	Short ARTS DC Power To Vital AC		(Note 5)	(Note 5)
Tripped	Normal	Ky Contact M	Short to Ground	Short Vital AC To Ground		(Note 4)	(Note 4)
Tripped	Normal	Ky Contact N	Short to V	None		Yes	(Note 7)
Tripped	Normal	Ky Contact N	Short to Ground	None		Yes	(Note 7)
Tripped	Normal	Kz Contact K	Short to V	Short ATRS DC Supply to AC (Station) Ground		Yes	(Note 6)
Tripped	Normal	Kz Contact K	Short to Ground	None		Yes	Shorts Station Ground to ARTS P.S. Ground
Tripped	Normal	Kz Contact L	Short to V	None		Yes	(Note 7)
Tripped	Normal	Kz Con-	Short to Ground	None		Yes	(Note 7)

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TABLE 1.3 ARTS TRIP TO RPS FAILURE MODES (RPS TRIPPED AND ARTS TRIPPED)

ARTS SUBSYSTEM STATE	RPS SUBSYSTEM STATE	FAILURE		DETRIMENTAL EFFECT ON SYSTEM	TESTABLE	2/4 TRIP	REMARKS
		ITEM	MODE				
Tripped	Tripped	Ky or Kz Coil	Fails Energized	None	Yes	Yes (Note 1)	
Tripped	Tripped	Ky or Kz Coil	Shorted	None	Yes	Yes (Note 2)	ARTS Will Not Reset When Trip Condition Clears
Tripped	Tripped	Ky or Kz Coil	Open	None	Yes	Yes (Note 2)	ARTS Will Not Reset When Trip Condition Clears
Tripped	Tripped	Ky or Kz Contacts	Stuck Open	None	Yes	Yes (Note 2)	ARTS Will Not Reset When Trip Condition Clears
Tripped	Tripped	Ky or Kz Contacts	Stuck Closed	None	Yes	Yes (Note 1)	
Tripped	Tripped	Ky Contact M	Short to Kz Contact K	None	Yes	Yes	(Note 7)
Tripped	Tripped	Ky Contact M	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Tripped	Tripped	Ky Contact N	Short to Kz Contact K	None	Yes	Yes	(Note 7)
Tripped	Tripped	Ky Contact N	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Tripped	Tripped	Ky Contact M	Short to V	None		Yes	(Note 7)
Tripped	Tripped	Ky Contact M	Short to Ground	None		Yes	(Note 7)
Tripped	Tripped	Ky Contact N	Short to V	None		Yes	(Note 7)
Tripped	Tripped	Ky Contact N	Short to Ground	None		Yes	(Note 7)
Tripped	Tripped	Kz Contact K	Short to V	None		Yes	(Note 7)
Tripped	Tripped	Kz Contact K	Short to Ground	None		Yes	(Note 7)
Tripped	Tripped	Kz Contact L	Short to V	None		Yes	(Note 7)

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TABLE 1.4 ARTS TRIP TO RPS FAILURE MODE (ARTS NORMAL AND RPS TRIPPED)

ARTS SUBSYSTEM STATE	RPS SUBSYSTEM STATE	FAILURE ITEM	FAILURE MODE	DETRIMENTAL EFFECT ON SYSTEM	TESTABLE	2/4 TRIP	REMARKS
Normal	Tripped	Ky or Kz Coil	Fails Energized	None	Yes	Yes (Note 1)	Does Not Block RPS Subsystem Trip
Normal	Tripped	Ky or Kz Coil	Shorted	None	Yes	Yes (Note 2)	
Normal	Tripped	Ky or Kz Coil	Open	None	Yes	Yes (Note 2)	
Normal	Tripped	Ky or Kz Contacts	Stuck Open	None	Yes	Yes (Note 2)	
Normal	Tripped	Ky or Kz Contacts	Stuck Closed	None	Yes	Yes (Note 1)	Does Not Block RPS Subsystem Trip
Normal	Tripped	Ky Contact M	Short to Kz Contact K	None	Yes	Yes	(Note 7)
Normal	Tripped	Ky Contact M	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Normal	Tripped	Ky Contact N	Short to Kz Contact K	None	Yes	Yes	(Note 7)
Normal	Tripped	Ky Contact N	Short to Kz Contact L	None	Yes	Yes	(Note 7)
Normal	Tripped	Ky Contact M	Short to V	None		Yes	(Note 7)
Normal	Tripped	Ky Contact M	Short to Ground	None		Yes	(Note 7)
Normal	Tripped	Ky Contact M	Short to V	None		Yes	(Note 7)
Normal	Tripped	Ky Contact N	Short to Ground	None		Yes	(Note 7)
Normal	Tripped	Kz Contact K	Short to V	None		Yes	(Note 7)

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TABLE 1.4 ARTS TRIP TO RPS FAILURE MODE (ARTS NORMAL RPS TRIPPED) (Cont'd)

ARTS SUBSYSTEM STATE	RPS SUBSYSTEM STATE	FAILURE ITEM	FAILURE MODE	DETRIMENTAL EFFECT ON SYSTEM	TESTABLE	2/4 TRIP	REMARKS
Normal	Tripped	Kz Contact K	Short to Ground	None		Yes	(Note 7)
Normal	Tripped	Kz Contact L	Short to V	None		Yes	(Note 7)
Normal	Tripped	Kz Contact L	Short to Ground	None		Yes	(Note 7)

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NOTES FOR TABLES 1.1 THROUGH 1.4

1. Because this failure is downstream of the RPS subsystem 2/4 logic, trips in any two RPS subsystems will result in a reactor trip. Therefore, the RPS system logic remains 2/4. RPS system logic reverts to 2/3 if any RPS subsystem is bypassed.

2. Although this failure has the same effect as an RPS subsystem trip, two RPS subsystems must generate actual subsystem trips for a reactor trip to occur. Therefore, the RPS system logic remains 2/4. RPS system logic reverts to 2/3 if any RPS subsystem is bypassed.

3. Deleted

1

4. This failure results in a short circuit of vital AC power causing loss of voltage to the Relay Undervoltage (UV) Coil. The short circuit will either open the fuse in the RPS trip circuit or cause the AC breaker in the RPS subsystem to trip. If the fuse opens, then power to the trip breaker UV coil will be interrupted and the breaker will trip (if it has not already tripped because of the short circuit across it), leaving the RPS still in a 2/4 configuration. If the RPS sysbystem AC breaker opens, then a true RPS subsystem trip will occur, leaving the RPS in a 1/3 configuration.

5. Effects of this fault in the ARTS will be contained within one power division precluding failure of a second RPS or ARTS subsystem due to the original failure. (Note 4 may also apply if failure results in grounding of vital power.)

NOTES CONTINUED

6. ARTS power supply is shorted to ground deenergizing the output relays. Voltage to the trip breaker UV coil is interrupted. Because the failure is downstream of the ARTS 2/4 logic, the ARTS system logic remains 2/4.

7. No detrimental effects occur because RPS or ARTS subsystem has already tripped. This fault may have a detrimental effect when a tripped subsystem is reset. Refer to the appropriate table to determine if a potential detrimental effect exists.

APPENDIX A

REFERENCE DOCUMENTS

RPS SUBSYSTEM DRAWINGS: Dwgs. No. 7749-M-536....

Description	Dwg. No. Suffix for Subsystem...... A	B	C	D
RB Pressure String	71-5	72-3	73-5	74-4
Bus Bar Wiring	38-8	48-8	58-8	67-7
Subsystem Cabinet #1 Layout	19-7	21-7	23-6	25-6
Subsystem Cabinet #2 Layout	20-6	22-6	24-6	26-6
Power Range String (Sh. 1 of 2)	29-10	39-11	49-10	59-10
Power Range String (Sh. 2 of 2)	30-6	40-4	50-6	60-6
RC Pressure String	34-8	44-9	54-9	64-9
RC Temperature String	35-6	----	55-7	75-7
Trip Module/Test Trip/Intlk.	36-4	46-5	56-4	65-3
RC Pump Monitors	32-7	42-4	52-6	62-6
RC Flow String	33-4	43-4	53-4	63-4
Power Distribution	37-4	47-5	57-4	66-3
Subsystem Cabinet #1 Externals	12-11	14-10	15-8	17-9
Subsystem Cabinet #2 Externals	13-8	27-7	16-10	18-9
Source/Intermediate Range Strings	31-7	41-6	51-6	61-6

RPS SYSTEM LOGICS

Digital Logic -- Sheet 1 of 3	7749-M-536-8-3
Digital Logic -- Sheet 2 of 3	-9-3
Digital Logic -- Sheet 3 of 3	-10-3
Analog Logic	-7-5
Rod Hold & High Voltage Cutoff	-68-4
Intersubsystem Externals	-11-6

Davis-Besse Documents

Channel 1 Drawings

Post Accident/Radiation Monitoring Equipment Rack C5763B (Dwg. E-1013 Sh 1 Rev. 3)

Post Accident/Radiation Monitoring Equipment Rack C5763B (Dwg. E-1013 Sh 2 Rev. 2)

Post Accident/Radiation Monitoring Equipment Rack C5763B (Dwg. E-1013 Sh 3 Rev. 2)

Class 1E 24 Volt Power Distribution (Channel 1) (Dwg. J-114 Sh 1A Rev. 0A)

Class 1E 24 Volt Power Distribution (Channel 1) (Dwg. J-114 Sh 1B Rev. 0A)

RC Loop 2 HLG. Flow RPS Ch. 1 (FT-RC01A1) (Dqg. J-111 Sh 1 Rev. 0E)

RC Loop 1 HLG. Flow RPS Ch. 1 (FT-RC01B1) (Dwg. J-111 Sh 2 Rev. 0E)

Pen Term Box Ch 1 Out CV (Dwg. E-529)

DCN E-611A-10
DCN E-611A-11
DCN E-732A-3
DCN J-111-1
DCN J-111-2
DCN J-114-1

Channel 2 Drawings

Post Accident/Radiation Monitoring Equipment Rack C5755A (Dwg. E-1014 Sh 1 Rev. 3)

Post Accident/Radiation Monitoring Equipment Rack C5755A (Dwg. E-1014 Sh 2 Rev. 2)

Post Accident/Radiation Monitoring Equipment Rack C5755A (Dwg. E-1014 Sh 3 Rev. 2)

Class 1E 24 Volt Power Distribution (Channel 2) (Dwg. J-114 Sh 2A Rev. 0A)

Class 1E 2[illegible] Volt Power Distribution (Channel 2) (Dwg. J-114 Sh 2B Ref. 0A)

RC Loop 2 HLG. Flow RPS Ch. 2 (FT-RC01A2) (Dwg J-111 Sh 3 Ref 0E)

RC Loop 1 HLG. Flow RPS Ch. 2 (FT-RC01B2) (Dwg J-111 Sh 4 Rev 0E)

DCN E-612A-9
DCN E-612A-10
DCN E-731A-4
DCN J-114-2
DCN J-111-3
DCN J-111-4

Channel 3 Drawings

Post Accident Monitoring Equipment Rack C5760A (Dwg E-1015 Sh 1 Rev 0)

Post Accident Monitoring Equipment Rack C5760A (Dwg E-1015 Sh 2 Rev 0)

Class 1E 24 Volt Power Distribution (Channel 3) (Dwg J-114 Sh 3A Rev 0A)

RC Loop 2 HLG. Flow RPS Ch. 3 (FT-RC01A3) (Dwg J-111 Sh 5 Rev 0E)

RC Loop 1 HLG. Flow RPS Ch. 3 (FT-RC01B3) (Dwg J-111 Sh 6 Rev 0E)

Pen Term Box Ch 3/4 Out CV (Dwg. E-533)

DCB E-613A-10
DCN E-613A-11
DCN J-111-5
DCN J-111-6
DCN J-114-3
DCN E-1015-2
DCN E-1015-3

Channel 4 Drawings

Post Accident Monitoring Equipment Rack C5756G (Dwg E-1016 Sh 1 Rev 0)

Post Accident Monitoring Equipment Rack C5756G (Dwg E-1016 Sh 2 Rev 0)

Class 1E 24 Volt Power Distribution (Channel 4) (Dwg J-114 Sh 4A Rev 0A)

RC Loop 2 HLG. Flow RPS Ch. 4 (FT-RC01A4) (Dwg J-111 Sh 7 Rev 0E)

RC Loop 1 HLG. Flow RPS Ch. 4 (FT-RC01B4) (Dwg J-111 Sh 8 Rev 0E)

Pen Term Box Ch 3/4 Out CV (Dwg E-533)

DCN E-614A-11
DCN E-614A-12
DCN E-733A-2
DCN J-111-7
DCN J-111-8
DCN E-1016-2
DCN J-114-4

Other Documents

250/125V DC and Instrumentation AC One Line Diagram (Dwg E-7)

B&W TopicalReport BAW 10003 "Qualification Testing of Protection System Instrumentation".

VDCN M-536-12-9-2
VDCN M-536-14-8-2
VDCN M-536-15-6-2
VDCN M-536-17-7-2
VDCN M-536-33-4-3
VDCN M-536-36-4-1
VDCN M-536-37-4-1
VDCN M-536-43-4-3
VDCN M-536-46-4-1
VDCN M-536-47-5-1
VDCN M-536-53-4-3
VDCN M-536-56-4-1
VDCN M-536-57-4-1
VDCN M-536-63-4-3
VDCN M-536-65-3-1
VDCN M-536-66-3-1

Davis Besse Updated Safety Analysis Report (Including Revisions through July 1985).

(Note: For a complete listing of controlled documents transmitted to B&W by the Toledo Edison Co. refer to Mark A. Thayer's (TED) letter to E.J. Domaleski (B&W) dated 13 Sept 1985. The documents listed above are those primarily used as the basis for the Single Failure Analysis.)

APPENDIX B

CLASSIFICATION OF DAVIS-BESSE FCNs

FCN#	Change Description	External	Internal
82-023	Changeover to Rosemount Flow dP Transmitters	X	
83-020	Addition of ARTS	X	
83-130	Remove Capacitors on Buffer Amplifier Inputs		X
80-208	Add Isolation Resistor to Function Generators		X
82-16	Modify Linear Bridge Module Adjustments		X

RESPONSES TO THE NRC REQUEST

FOR

ADDITIONAL INFORMATION

(9 QUESTIONS)

DATED DECEMBER 5, 1985

LOG NO. 1879

QUESTION NO. 1

Identify the existing improvement efforts which contribute significantly toward supporting enhanced maintenance and safe operation and hence, will be given greater emphasis and support. How will the greater emphasis and support be accomplished? (p. 34c).

RESPONSE TO QUESTION NO. 1

The existing improvement efforts referred to on page 34c of Volume 1 of the Course of Action (COA) are those outstanding activities from the Performance Enhancement Program (PEP) and Systematic Assessment of License Performance (SALP) Improvement Program which are considered high priority. These 11 high priority items are identified in Section I of Appendix B.2.1 to the COA. Five of the eleven priority items have been completed to date. Management attention continues to focus on the longer term programmatic improvement efforts. Each of the items and its current status is discussed below:

- Prepare detailed position descriptions for all management personnel positions in the new organization. - This effort has been completed. Toledo Edison letter dated November 16, 1985 (Serial No. 1208) detailed this activity.

- Merit Review & Salary Administration - Implement a merit review system to reflect performance and maintain a salary administration program to attract and retain key experienced quality personnel. This activity has been completed.

- STA capability to assume interim EDO function - Provide training to allow Shift Technical Advisor to assist the Shift Supervisor in performing the Interim Emergency Duty Officer function. This training has been completed.

- Additional staffing in Nuclear Training - The training staff has increased from 35 in August 1985 to a present level of 47 (44 on board and 3 accepted offers). This increase of 12 exceeds the PEP goal of 10 additional staff.

- Additional staffing in Nuclear Licensing - the original PEP actions, included a commitment to increase licensing staff by five positions (two contract and three TED). This action is complete.

The remaining six items continue to receive management attention. The status of these items was presented to the NRC in Bethesda on December 9, 1985 by Joe Williams, Jr., Senior Vice President, Nuclear.

- Management by Objectives (MBO) - An integrated approach to goals, objectives and strategic planning within the Nuclear Mission. This task will be resumed after restart. MBO is envisioned to provide the basis for management of performance by integrating the detailed position descriptions with specific responsibilities. After restart, management support and focus will be redirected to expeditious implementation of MBO.

- Management Training - Establish a core of management training programs to present basic management skills. - A needs analysis for management training has been completed and a supervisor has been hired in the Corporate Management training organization. The addition of this new staff position will accelerate implementation of a training program responsive to the needs analysis.

- Configuration Management - Implementation of the program to establish a data base for equipment and systems, provide system descriptions, and ensure accurate documentation of administrative systems and procedures. Includes PEP interim actions on System Auxiliary Diagrams, Alpha Drawing Logs, Drawing Control Project, and Drawing Log. - Details of the configuration management program were presented on pages 34, 34a & 34b of Volume 1 of the Course of Action and updated by J. Williams' Jr. presentation to the NRC on December 9, 1985. To expedite this activity a management plan has been developed, a Program Manager position and organization established, and the necessary funds programmed. The progress of this program is reported weekly to upper management at the Senior Vice President, Nuclear's staff meeting. The required funding is included in the 1986 budget.

- Fire Protection - Provide cost-effective fire protection improvements and decreased regulatory exposure, including protection of employees and capital investment. - A interim Fire Protection Compliance Assurance Manager has been assigned and a two phase program developed. Phase 1, Regulatory Improvement, is expected to be completed by February 28, 1986. Phase II, Program Development, and its associated ongoing implementation activities will commence at the completion of Phase I. The required funding is included in the 1986 budget.

- Nuclear Mission Procedures (NMPs) - Provide a means to generate and maintain nuclear program procedures necessary to control inter-divisional nuclear program activities. The Nuclear Mission Procedures Development Project is well underway. A project team of 20 Toledo Edison personnel and 20 contract personnel are directly supporting the NMP effort. Division level procedures are being revised or prepared to implement the NMPs. This activity is supported by 55 personnel. The status of the Nuclear Mission Procedures is reported to upper management weekly. The required 1986 effort has been included in the 1986 budget.

- QA Awareness Program - Identify and document individual responsibilities for adherence to QA and train personnel on these roles. - The General Employee Training Module on Quality Assurance (QA) has been revised to provide a general description of Toledo Edison's Quality Assurance Program requirements and to emphasize executive managements 's commitment to quality. As stated above, Nuclear Mission Procedures are being developed to implement the QA Program requirements and to define responsibilities for inter-divisional nuclear program activities. Personnel affected by these procedures will receive training to establish their understanding of procedural requirements prior to implementing the procedures.

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QUESTION NO. 2

Provide the station administrative procedure regarding improved engineering interface and support. (p.44)

RESPONSE TO QUESTION NO. 2

Station Administrative Procedure AD 1844.14 "Request for Engineering Assistance" is attached. This procedure has been successfully implemented. Toledo Edison is also developing a Nuclear Mission Procedure (NMP-DS-206) "Request for Assistance" that contains mission wide requirements in this area. This procedure is scheduled for issuance in early 1986. After NMP-DS-206 is issued, Station Administrative Procedure AD 1844.14 will be revised (or superseded) as appropriate.