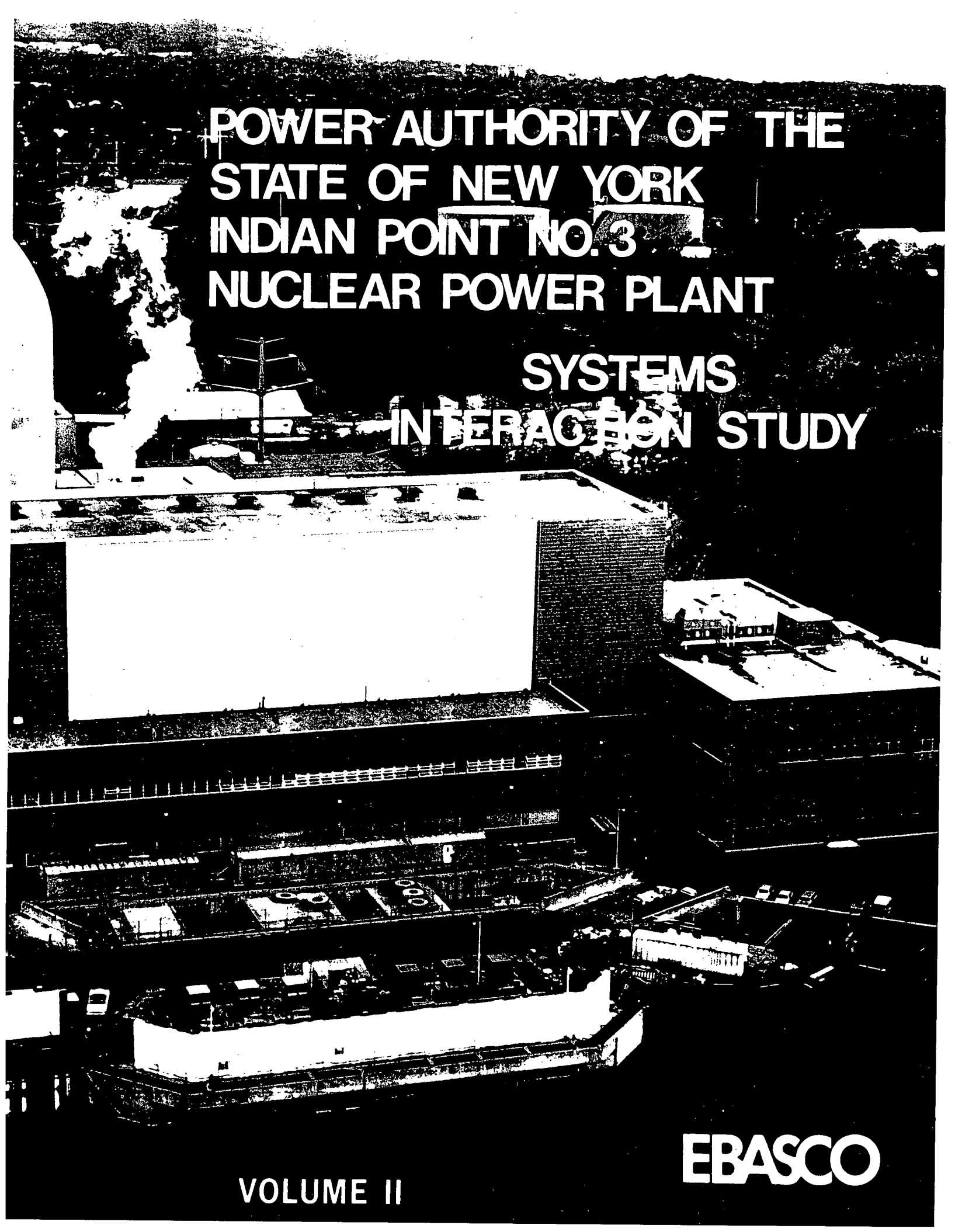

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3 NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY

EBASCO

VOLUME II

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NO. 3 NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY

VOLUME II

PRELIMINARY

Prepared for the Power Authority of the State of New York

by

EBASCO SERVICES, INCORPORATED

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT No. 3 NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY

VOLUME II

CONTENTS

SYSTEMS INTERACTION STUDY

APPENDIX A - AUXILIARY FEEDWATER SYSTEM (AFS)

APPENDIX A-1.1 INTRODUCTION

This chapter describes the work performed by Ebasco on the Indian Point No. 3 Nuclear Power Plant Auxiliary Feedwater System for systems interactions consistent with the criteria, methodology and guidelines presented in the Chapters 3 thru 6 of Volume I. Interconnected process coupled, and nonconnected spatially coupled systems interactions were investigated and the results presented in Sections A-2.1 and A-2.2 respectively.

APPENDIX A-1.2 SYSTEM BOUNDARY CONDITIONS

The Indian Point No. 3 Nuclear Power Plant Auxiliary Feedwater System was reviewed for systems interactions based on current unit installations with credit taken for specific commitments to the NRC regarding hardware and procedural modifications.

The boundary of the systems interaction study for the Indian Point No. 3 Nuclear Power Plant, Auxiliary Feedwater System is shown in Figure A-6. The turbine steam supply from the steam generators and all of the Auxiliary Feedwater System components (see Table A-1) are included in the study. The water supplies to the extent of the piping systems and valves that deliver water to the Auxiliary Feedwater System are included. Electrical power and control supplies are included to the extent presented in Figure A-1 for three electrical states, full power, loss of one bus, and no AC electric power (onsite or offsite).

This evaluation is conducted assuming the presence of an AFS actuation signal, therefore the AFS actuation signal is outside the boundary of this study. As discussed in Chapter 5, latent and dynamic operator (Human) induced failures are also outside the boundary of this study. Consistent with this, the effects of control system failures on operator actions, i.e., those failures which deprive the operator of required information for normally controlling plant conditions, or which provide confusing or incorrect information to the operator, have been specifically omitted from this study.

The effects of non-safety-grade control system failures on plant safety is excluded from this study. Justification for this exclusion is provided in the Authority's response to IE Information Notice 79-22, via IPN-79-74, dated October 9, 1979.

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SUMMARY OF COMPONENT TYPES TO BE REVIEWED FOR SYSTEMS INTERACTIONS

TABLE A-1

MECHANICAL	ELECTRICAL	INSTRUMENTATION & CONTROL	HEATING, VENTIALTING & AIR CONDITIONING	ALL OTHERS
PUMP	MOTORS	TRANSMITTERS	FANS	
1) CENTRIFUGAL	CABLES	SWITCHES (PROCESS VARIABLE)	COOLERS	
2) RECIPROCATING	CONDUITS & TRAYS	POSITION OR LIMIT SWITCHES	DUCTWORK	
VALVE	BATTERIES & CHARGERS	PNEUMATIC CONTROLERS	LOUVERS	
1) Air Operated	DIESEL GENERATOR	PNEUMATIC CONTROL VALVES	CHILLERS	
2) Motor Operated	MOTOR CONTROL CENTER & SWITCHGEAR	PNEUMATIC SOLENOIDS		
3) Hydraulic Operator	CIRCUIT BREAKERS & CONTACTS	PNEUMATIC/ELECTRICAL CONVERTERS		
4) Check	SWITCHES	LOCAL INDICATORS		
5) Manual	INVERTERS	LOCAL CONTROL SWITCHES		
6) Safety/Relief	MOTOR OPERATORS FOR VALVES	INSTRUMENT RACKS		
7) Solenoid		INSTRUMENT SENSING LINES		
FLOW ORIFICE		INSTRUMENT AIR LINES & SPECIALTIES		
RESTRICTION ORIFICE				
STEAM TURBINE				
COMPRESSORS				
PIPING				
GAS STORAGE TANKS				
TANKS (FLUID)				

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
COMPONENT POWER SUPPLY SUMMARY (REF 1)

TABLE A-3

Component	Power Supply	Primary Source (4)	Backup Source (5)	Function
A. STEAM SUPPLY TRAIN				
PCV-1139 (20-1/ABFP2) (1)	125 Volt DC Pnl. 31	Battery 31	Bus 3A	Stm. Supply to Aux. Blr. Fd. Pump 32 Turbine (N.C.)
PCV-1139 (20-2/ABFP2) (2)	125 Volt DC Pnl. 31	Battery 31	Bus 3A	Stm. Supply to Aux. Blr. Fd. Pump 32 Turbine (N.C.)
PCV-1310A (SOV-1310)(1)	125 Volt DC Pnl. 33	Battery 31	Bus 3A	Stm. Supply Isolation Valve to Aux. BFP 32 Turbine (N.O.)
PCV-1310B (SOV-1311) (1)	125 Volt DC Pnl. 34	Battery 32	Bus 3A	Stm. Supply Isolation Valve to Aux. BFP 32 Turbine (N.O.)
B. TURBINE PUMP 32 TRAIN				
Aux. Blr. Fd. Pump 32	Steam Driven	Residual Heat Generated Steam	--	--
CT-10	Hand Operated	--	--	Valve on pump 32 Suction Heater from Condensate Storage Tank (L.O.)
PCV-1188 (SOV-1288) (3)	120 Volt AC Instrument Bus 31	Battery 31	Bus 3A	Valve on alt. path from City Wtr. Sys. for Aux. Fdwtr. Pump 32 Suction (N.C.)
PCV-405A (1)	120 Volt AC Instrument Bus 31	Battery 31	Bus 5A	Aux. Blr. Fd. Pump 32 Discharge to Stm. Gen. 31 (N.C.)
PCV-405B (1)	120 Volt AC Instrument Bus 31	Battery 32	Bus 3A	Aux. Blr. Fd. Pump 32 Discharge to Stm. Gen. 32 (N.C.)
PCV-4050 (1)	120 Volt AC Instrument Bus 31	Battery 33	Bus 3A	Aux. Blr. Fd. Pump 32 Discharge to Stm. Gen. 23 (N.C.)
PCV-4050 (1)	120 Volt AC Instrument Bus 31	Battery 34	Bus 3A	Aux. Blr. Fd. Pump 32 Discharge to Stm. Gen. 24 (N.C.)
C. MOTOR-DRIVEN PUMP 31 TRAIN				
Aux. Blr. Fd. Pump 31	480 Bolt Bus 3A	Bus 3A	Dsl. 31	--
CT-27	Hand Operated	--		Valve on Pump 31 Suction Header from Condensate Storage Tank (L.O.)
PCV-1087 (SOV-1287) (3)	120 Volt AC Instrument Bus 33	Battery 33	Dsl. 31	Valve on Alt. Path from City Wtr Sys. for Aux. Fd. Pump 31 Suction (N.C.)
PCV-406A (1)	120 Volt AC Instrument Bus 33	Battery 33	Dsl. 31	Aux. Blr. Fd. Pump 31 Discharge to Stm. Gen. 31 (N.O.)
PCV-4068 (1)	120 Volt AC Instrument Bus 33	Battery 33	Dsl. 31	Aux. Blr. Fd. Pump 31 Discharge to Stm. Gen. 32 (N.O.)

(1) Valve Fails Open on Loss of Air or Electric Power.
(2) Valve Fails Open on Loss of Air and cannot be Closed Without Electric Power.
(3) Valve Fails Closed on Loss of Air or Electric Power
(4) AC Instrument Buses are powered off of corresponding DC panel.
(5) Transfer from Batteries to Bus 3A is manual. Backup to Bus 3A Diesel 31.

(N.C.) = Normally Closed
(N.O.) = Normally Open
(L.O.) = Locked Open

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
COMPONENT POWER SUPPLY SUMMARY (REF 1)

TABLE A-3 (Cont'd)

Component	Power Supply	Primary Source (4)	Backup Source (5)	Function
D. MOTOR-DRIVEN PUMP 33 TRAIN				
Aux. Blr. Fd. Pump 33	480 Volt Bus 6A	Bus 6A	Dsl. 32	--
CT-33	Hand Operated	--	--	Valve on Pump 33 Suction Header from Condensate Storage Tank (L.O.)
PCV-1189 (SQV-1289) (3)	120 Volt AC Instrument Bus 32	Battery 32	Dsl. 32	Valve on Alt. path from City Water Sys. for Aux. Fd. Pump 33 Suction (N.C.)
PCV-406C (1)	120 Volt AC Instrument Bus 32	Battery 32	Dsl. 32	Aux. Blr. Fd. Pump 33 Discharge to Stm. Gen. 33 (N.O.)
PCV-406D (1)	120 Volt AC Instrument Bus 32	Battery 32	Dsl. 32	Aux. Blr. Fd. Pump 33 Discharge to Stm. Gen. 34 (N.O.)
E. MISCELLANEOUS				
LCV-1158 (SOV-1258) (3)	125 Volt DC Dist. Pnl. 31	Battery 31	Dsl. 32	Condensate Storage Tank low-level shutoff valve (N.O.)
CT-6 (4)	Hand Operated	--		Condensate Storage Tank discharge valve (L.O.)
CT-64 (4)	Hand Operated	--		Condensate Storage Tank discharge valve (L.O.)

(1) Valve Fails Open on Loss of Air or Electric Power.
(2) Valve Fails Open on Loss of Air and cannot be Closed Without Electric Power.
(3) Valve Fails Closed on Loss of Air or Electric Power
(4) AC Instrument Buses are powered off of corresponding DC panel.
(5) Transfer from Batteries to Bus 3A is manual. Backup to Bus 3A Diesel 31.

(N.C.) = Normally Closed
(N.O.) = Normally Open
(L.O.) = Locked Open

APPENDIX A-2.1 Results on AFS of Interconnected Systems Interactions (Cont'd)

Vent and drain lines and valves, and connected lines which are small in size were not evaluated since it was assessed that failure of these components would not significantly affect the system performance.

Other events that require operation of the Auxiliary Feedwater System are:

- Loss of main feedwater transient

- Loss of main feedwater with offsite power available
- Station blackout (loss of main feedwater without offsite power available)
- Rupture of a main steam line
- Loss of all AC Power
- Loss of coolant accident

APPENDIX A-2.1.1 SUMMARY AND CONCLUSIONS

For the case presented, the acceptance criteria for evaluating component failures of the Auxiliary Feedwater System were as follows:

1 - A flow rate of 400 gpm be delivered to at least two (2) steam generators (200 gpm to each)

2 - The flow is delivered within 30 minutes of the initial demand.

Random component failures are categorized as recoverable or nonrecoverable. A recoverable random failure is defined as a failure that does not cause a system failure since the operator is assumed to have sufficient time to take successful action to recover from the failure. Recoverable failures are those that can be corrected before a specified time criteria is exceeded. Nonrecoverable random failures are failures that cause a system failure due to the inability of the operator to recover from the failure because of a time criteria.

The results presented in this section as described in Table A-2.1 show that the Auxiliary Feedwater System emergency operating mode for the loss of normal feedwater event resulting from a feedline break outside containment coincident with a loss of all offsite power is reliable. Component redundancy and recoverability of component failures made the system sound. These results are consistent with the PRA findings of the Pickard, Lowe and Garrick, Inc. Study.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions

APPENDIX A-2.2.1 Systems Interactions Induced by the Effects of a Safe Shutdown Earthquake (SSE)

GENERAL DISCUSSION

General Design Criterior 2, "Design Bases for Protection Against Natural Phenomena", of Appendix A to 10CFR Part 50, "General Design Criteria for Nuclear Power Plants", require that structures, systems, and components important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their intended safety functions.

NRC Regulatory Guide 1.29, "Seismic Design Classification", (formerly Safety Guide 29) describes an acceptable method of identifying and classifying those plant features that should be designed to withstand the effects of the SSE. Regulatory position C.1.g. of NRC 1.29 states that the Auxilary Feedwater System including components, supports and foundations shall be designated as Seismic Category I and should be designed to withstand the effects of the SSE and remain functional. In addition, regulatory position C.2 of NRC RG 1.29 states tnat those portions of structures, systems, or components whose continued function is not required but those failure could reduce the functioning of any plant feature designated Seismic Category I, to an unacceptable safety level should be designed and constructed so that the SSE would not cause such failure.

Based upon the above, a review of the seismic design classification of the structures, systems and components associated with the safe operation of the Auxiliary Feedwater System was conducted. In addition a plant walkdown of the auxiliary feed pump building and associated structures was conducted to review the effects of nonseismic structures, systems and components whose failure during an SSE could reduce the functionability of any plant features important to safety to an unacceptable level.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.1 Systems Interactions Induced by the Effects of a Safe Shutdown Earthquake (SSE) (Cont'd)

GENERAL DISCUSSION (Cont'd)

The plant walkdown activities were consistent with the methodology guidelines and evaluatioon criteria described in Chapters 5 and 6.

SUMMARY AND CONCLUSION

In general due to the lack of documentation, it was impossible to complete a comprehensive review of the seismic design classification. In those instances where documentation existed an appropriate reference was included.

Structures, systems and components that were not substantiated by seismic documentation consistent with the quality assurance requirements of Appendix B to 10CFR Part 50 were assumed to be nonseismic and were evaluated with respect to tneir effects on other Seismic Category I items.

Acceptable and unacceptable system interactions resulting from the failure of nonseismic structures, systems or components are presented in Appendix A-4.

From a review of the results of the seismic system interactions, the following items are considered to be the major contributors to the identification of adverse systems interactions,

1 - Crane/monorail structure located directly above the two (2) motor driven and the turbine driven auxiliary feedwater pumps.

2 - 4" nonseismic floor drain pipe directly above the electrical cable trays containing essential safety related equipment.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.1 Systems Interactions Induced by the Effects of a Safe Shutdown Earthquake (SSE) (Cont'd)

SUMMARY AND CONCLUSION (Cont'd)

3 - Space heaters and electrical lighting fixtures located directly above essential safety related equipment and structures.

4 - Nonseismic electrical cable trays and conduit routed directly above essential safety related equipmenmt and structures.

5 - Large nonseismic instrument rocks located within close proximity to essential safety related equipment and structures.

6 - Large roll-up door located in the shieldwall whose structural failure could affect the flow control stations of the turbine driven auxiliary feedwater pumps.

Modifications including the possible use of guard structures, protective covers, and restraining devices are expected to prevent impairment of function due to the above concerns.

SYSTEMS INTERACTION STUDY

APPENDIX A

AUXILIARY FEEDWATER SYSTEM

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.2 Pipe Failure Induced Systems Interactions

The Auxiliary Feedwater System was reviewed for potential systems interactions resulting from high energy line breaks. The Indian Point No. 3, Nuclear Power Plant, Safety Evaluation Report, Docket No. 50-286, dated September 21, 1973, Chapter 6 entitled Engineered Safety Features was used as the base document for pipe failure induced systems interactions.

Several modifications have been made to this system in order to give it additional protection in the unlikely event of high energy line breaks outside the containment. The auxiliary feedwater lines are directly connected into the feedwater system and experience the same pressure as the feedwater system. The Staff had a concern that a break in an auxiliary feedwater line within the room that houses the motor-driven and the steam turbine-driven auxiliary feedwater pumps might result in back flow from the feedwater system and could possibly flood these three pumps. Because of this concern, check valves were installed in the piping that connects the discharge side of these pumps with the normal feedwater system. These check valves are located outside of the auxiliary feedwater pump room and prevent backflow from the feedwater system into the Auxiliary Feedwater System.

Another modification made was additional protection of the electric motor-driven auxiliary feedwater pumps from a high temperature-high humidity environment. A postulated high-energy pipe break in the steam supply to the steam turbine-driven auxiliary feedwater pump might result in temperature and humidity conditions in the pump room for which the electric motor-driven pumps

APPENDIX A-2.2.2 Pipe Failure Induced Systems Interactions (Cont'd)

were untested. These motor-driven pumps are "drip-proof," but their operability at elevated temperatures and in a steam environment was not demonstrated. Consequently, two redundant valves in the steam supply line to the auxiliary feedwater turbine-driven pump were installed. These valves are outside of the room that houses the auxiliary feedwater pumps. Each valve is signaled to close automatically on high temperature in the pump room. Each valve has its own separate temperature sensor. There is control room indication of each valve's position, and an alarm will sound upon closure. Operation of these valves would limit the temperature and humidity rise in th pump room due to a break in the steam supply to the steam turbine auxiliary feedwater pump.

The consequences of pipe ruptures in the vicinity of the auxiliary feedwater pumps which might cause flooding in the pump room were also examined. The drainage capabilities of the pump room were modified to prevent water levels from reaching a depth of 14 in. off the floor from such postulated break. At the 14 in. level, water would begin to touch the bottom of the electric motor-driven auxiliary feedwater pumps. Pipe restraints on feedwater lines in the room above the auxiliary feedwater room were also installed. This was done to eliminate any concrete from the pump room roof falling onto the pumps as a result of whipping of the pipes after a postulated pipe rupture.

The Staff reviewed these modifications and found them acceptable.

In view of the design modifications that have been made to limit the consequences of pipe whip, flooding, and temperature and pressure transients in the pump room, and in view of the design criteria that were in effect at the time of the construction permit, it was concluded that the design of the Auxiliary Feedwater System, as modified, does not lead to any unacceptable systems interactions.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.3 Systems Interactions Induced by the Effects of Internally and Externally Generated Missiles

General Design Criterion 4, "Environmental and Missile Design Bases", requires that all structures, systems and components that are necessary for attaining and maintaining a safe shutdown of the reactor facility and whose failure could result in a significant release of radioactivity, be designed to withstand the effects of internally and externally generated missiles.

Internally generated missiles are components of pressurized systems such as valve bonnets and hardware retaining bolts, relief valve parts, and instrument wells: high speed rotati g machinery, such as impellers and fan blades resulting from component overspeed or failure (resulting from seisure) which are within a structure protecting systems and components necessary for safe shutdown.

Externally generated missiles are missiles generated by natural phenomena such as tornado and those components of pressurized systems and high speed rotating machinery located outside structures protecting systems and components necessary for safe plant shutdown.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.3 Systems Interactions Induced by the Effects of Internally and Externally Generated Missiles (Cont'd)

A-2.2.3.1 Internally Generated Missile System Interactions

During the walkdown phase of the system interaction study, an observation was made relative to the potential for the generation of internal missiles from pressurized systems and high speed rotating machinery and the effects on safe shutdown capabilities. It was observed that adequate separation and system redundancy existed so as to preclude damaging effects from internally generated missiles such as valve bonnents and hardware retaining bolts, relief valve parts and instrument wells. In addition it was observed that high energy lines were provided with pipe whip restraints so as to prevent impact on safety related systems and components.

The auxiliary feedwater pumps located within the auxiliary feedpump building were evaluated for missiles assoicated with overspeed failure. The motor driven auxiliary feedwater pumps maximum no-load speed was assumed to be the synchronus speed of the motor which is no more than 2 percent above the rated operating speed. Consequently, no pipe break or single failure in the suction or discharge lines of the pump would increase the pump speed over that of the no-load condition. Therefore, the generation of missiles associated with the motor driven pumps is not a credible occurance. However, an evaluation of the turbine driven auxiliary feedwater pump showed that missiles could be generated due to turbine overspeed protection failure, and that several safety related systems and components in the auxiliary feed pump building were potential targets.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.3 Systems Interactions Induced by the Effects of Internally and Externally Generated Missiles (Cont'd)

A-2.2.3.1 Internally Generated Missile System Interactions (Cont'd)

In November 1971, the NRC informed the Power Authority of the State of New York (PASNY) of the NRC's requirements for the Auxiliary Feedwater system at the Indian Point No. 3 Nuclear Power Plant. Among the long-term recommendations was the requirment to evaluate the potential for the generation of internal missiles in the Auxiliary Feedwater Pump Room and its effect on vital equipment and systems. On July 15, 1980 the NRC issued Interim Safety Evaluations of the auxiliary feedwater system. One of the open items in these reports was the stipulation that the "Licensee provide a description of the results of the (missile generation) evaluation prior to August 11, 1980 and prior to implementation of any corrective measures."

PASNY contracted EDS Nuclear Inc to evaluate the capability of the auxiliary feedwater system to withstand internally generated missiles. The evaluation has determined that the auxiliary feedwater pump turbine could be a source of a destructive missile and therefore, an analysis of auxiliary feedwater pump turbine missiles was undertaken.

The evaluation showed that missiles could be generated and that several safety related systems at different locations in the auxiliary feed pump building were potential targets. Because of these results, it was decided that protection at the missile source was the best approach.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.3 Systems Interactions Induced by the Effects of Internally and Externally Generated Missiles (Cont'd)

A-2.2.3.1 Internally Generated Missile System Interactions (Cont'd)

From a systems interaction point of view, protection at the source designed for destructive overspeed missiles is an acceptable solution. This ensures that safe shutdown equipment will not interact with a missile source as a result of disk failure at any possible speed. Although the missile shield has not yet been installed it was assumed that near term modifications will be made. Therefore, based upon the commitment to install a missile shield system no credible interaction of a missile source with safety related target equipment located in the auxiliary feed pump building were found.

A-2.2.3.2 Externally Generated Missile System Interactions

A review of the Indian Point 3 Facility Safety Analysis Report, Chapter 3.5 and the NRC (then AEC) Safety Evaluation Report, dated September 21, 1973 was conducted to determine if the structures systems and components associated with the auxiliary feedwater system were protected against the effects of externally generated missiles. A review of this type was conducted in order to preclude the evaluation of systems interactions resulting from externally generated missiles.

Our review concluded that various structures at the Indian Point 3 site have been designed and constructed to withstand the effects of tornado generated missiles. Among these structures are the primary auxiliary building, the control room, the containment building, the diesel generator building, the cable tunnels, and the waste hold-up tank pit. The shield wall of the auxiliary feedwater pump building has been designed considering the effects of externally generated missiles.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.4 Systems Interactions Induced by the Effects of Flooding

Design Criterion 2, "Design Bases for Protection Against Natural Phenomena" require that all systems and components whose failure could prevent safe shutdown of the plant or result in uncontrolled release of significant radioactivity, be designed to withstand the effects of flooding due to natural phenomena.

A review of the Indian Point 3 Facility Safety Analysis Report, and the NRC (then AEC) Safety Evaluation Report, was conducted to determine to what extent the structures, systems and components associated with the Auxiliary Feedwater System were protected against the effects of flooding due to natural phenomena.

Our review concluded that it was established that the most severe flooding condition at the site, corresponds to a water elevation of 15 ft above mean sea level (MSL). As stated in the Facility SER, this elevation is lower by three inches than the critical elevation at which water would start seeping into the lowest of the plant buildings. The staff concluded in their report that under the most extreme conditions the flood level could reach a level of 15.0 ft MSL, exclusive of wind-generated wave action. Wind-generated wave action could raise the flooding level above plant grade in the vicinity of the service water pumps.

In the event of wind-generated wave action in conjunction with extreme flooding conditions, the plant will still be protected. In this unlikely event, the plant will be shutdown in accordance with the Techincal Specifications, and the service water pump areas will be protected. Other areas, such as the diesel generator area, will not require additional protection from the wind-generated waves in that these waves rapidly dissipate once they strike land.

Consequently, the combination of the elevation of the plant structures, and the Technical Specification requirements on plant operation and service water pump protection, result in accetable conditions to protect the plant against flooding.

Based upon our review and the findings above, we concluded that no credible flooding conditions caused by natural phenomena will exist and therefore, no adverse system interactions were identified for the structures, systems and components of the Auxiliary Feedwater System.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.5 System Interactions Induced by Severe Environment (Other Than Flooding) Resulting From Natural Phenomena.

General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena", require that all systems, components and structures whose failure could prevent safe shutdown of the plant or result in uncontrolled release of significant radioactivity, be designed to withstand the resulting effects of severe environment due to natural phenomena.

A review of the Indian Point 3 Facility Safety Analysis Report, and the NRC (then AEC) Safety Evaluation Report, was conducted to determine to what extent the structures, systems and components associated with the Auxiliary Feedwater System were protected against the effects of severe environment due to natural phenomena.

Our review concluded that the effects of tornado wind loadings and depressurization was considered in the design of all Category I structures. The auxiliary feed pump building is designated as a Category I structure. Therefore, no adverse system interactions were identified for the structures, systems and components of the Auxiliary Feedwater System contained within the auxiliary feed pump building.

APPENDIX A-2.2 Results on the AFS of Nonconnected Systems Interactions (Cont'd)

APPENDIX A-2.2.6 Systems Interactions Induced by Fires

The Commission's basis criterion for fire protection is setforth in General Design Criterion 3, Appendix A to 10CRF Part 50, which states:

1 - "Structures, systems, and componets important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions."

2 - "Noncombustible and heat resistant materials shall be used wherever pratical throughout the unit, particularly in locations such as the containment and the control room."

3 - "Fire detection and protection systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety."

4 - "Fire fighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components."

The Indian Point No. 3 Fire Protection Program Report, Revision 1, dated April 1977 was reviewed to determine to what extent the structures, systems and components associated with the Auxiliary Feedwater System were protected against the effects of fires.

It was concluded in the report that the results of the fire hazards evaluation had shown that there are no areas in the plant where a design basis fire would cause the loss of the primary as well as the redundant shutdown system. Therefore, no adverse system interactions were identified due to fire induced failures of systems, components and structures of the Auxiliary Feedwater System.

APPENDIX A-3.0 Auxiliary Feedwater System Description

APPENDIX A-3.1 System Functional Description [1]

The Auxiliary Feedwater System serves as a backup system for supplying feedwater to the secondary side of the steam generators at times when the feedwater system is not available, thereby maintaining the heat sink capabilities of the steam generator. The Auxiliary Feedwater System is an Engineered Safeguards System, and is directly relied upon to prevent core damage and primary system overpressurization in the event of transients such as a loss of normal feedwater or a secondary system pipe rupture, and to provide a means for plant cooldown following any plant transient.

Following a reactor trip, decay heat is dissipated by evaporating water in the steam generators and venting the generated steam either to the condensers through the steam dump or to the atmosphere through the steam generator safety valves or the power-operated relief valves. Steam generator water inventory must be maintained at a level sufficient to ensure adequate heat transfer and continuation of the decay heat removal process. The water level is maintained under these circumstances by the Auxiliary Feedwater System which delivers an emergency water supply to the steam generators. The Auxiliary Feedwater System is capable of functioning for extended periods, allowing time either to restore normal feedwater flow or to proceed with an orderly cooldown of the plant to the reactor coolant temperature where the Residual Heat Removal System can assume the burden of decay heat removal. The Auxiliary Feedwater System flow and the emergency water supply capacity must be sufficient to remove core decay heat, reactor coolant pump heat, and sensible heat during the plant cooldown.

APPENDIX A-3.0 AUXILIARY FEEDWATER SYSTEM DESCRIPTION (Cont'd)

APPENDIX A-3.1 System Functional Description (Cont'd)

DESIGN CONDITIONS

The reactor plant conditions which impose safety-r l ted performance requirements on the design of the Auxiliary Feedwater System are as follows for Indian Point Unit No. 3 Nuclear Power Plant.

- Loss of main feedwater transient
- Station blackout (i.e., loss of main feedwater without offsite power available)
- Rupture of a Main Steam Line
- Loss of all AC Power
- Loss of Coolant Accident (LOCA)
- Cooldown

Loss of Main Feedwater Transients

The design loss of main feedwater transients are those caused by:

- Interruptions of the Main Feedwater System flow due to malfunction in the feedwater or condensate system
- Loss of offsite power or blackout with the consequential shutdown of the main feedwater system pumps, auxiliaries, and controls

Loss of main feedwater transients are characterized by a rapid reduction in steam generator water levels which results in a reactor trip, a turbine trip, and auxiliary feedwater actuation by the protection system logic. Following reactor trip from high power, the power quickly falls to decay heat levels.

DESIGN CONDITIONS (Cont'd)

Loss of Main Feedwater Transients (Cont'd)

The water levels continue to decrease, progressively uncovering the steam generator tubes as decay heat is transferred and discharged in the form of steam either through the steam dump valves to the condenser or through the steam generator safety or power-o era ed relief valves to the atmosphere. The reactor coolant temperature increases as the residual heat in excess of that dissipated tnrough the steam generators is absorbed. With increased temperature, the volume of reactor coolant expands and begins filling the pressurizer. Without the addition of sufficient auxiliary feedwater, further expansion will result in water being discharged through the pressurizer safety and relief valves. If the temperature rise and the resulting volumetric expansion of the primary coolant are permitted to continue, then (1) pressurizer safety valve capacities may be exceeded causing over-pressurization of the Reactor Coolant System and/or (2) the continuing loss of fluid from the primary coolant system may result in bulk boiling in the Reactor Coolant System and eventually in core uncovering, loss of natural circulation, and core damage. If such a situation were ever to occur, the Emergency Core Cooling System would be ineffectual because the primary coolant system pressure exceeds the shutoff head of the safety injection pumps, the nitrogen over-pressure in the accumulator tanks, and the design pressure of the Residual Heat Removal Loop. Hence, the timely introduction of sufficient auxiliary feedwater is necessary to arrest the decrease in the steam generator water levels, to reverse the rise in reactor coolant temperature, to prevent the pressurizer from filling to a water solid condition, and eventually to establish stable hot standby conditions. Subsequently, a decision may be made

to proceed with plant cooldown if the problem cannot be satisfactorily corrected. The blackout transient differs from a simple loss of main feedwater in that emergency power sources must be relied upon to operate vital equipment. The loss of power to the electric driven condenser circulating water pumps results in a loss of condenser vacuum and condenser dump valves. Hence, steam formed by decay heat is relieved through the steam generator safety valves or the power-operated relief valves. The calculated transient is similar for both the loss of main feedwater and the blackout, except that reactor coolant pump heat input is not a consideration in the blackout transient following loss of power to the reactor coolant pump bus.

The station blackout transient serves as the basis for the minimum flow (400 gpm) required for Indian Point No. 3 Nuclear Power Plant. The system is designed so that a minimum of 400 gpm is provided against the steam generator safety valve set pressure (with 3% accumulation) to prevent water relief from the pressurizer. This is accomplished, even considering the effect of the turbine driven pump throttling with an assumed single failure.

APPENDIX A-3.0 AUXILIARY FEEDWATER SYSTEM DESCRIPTION (Cont'd)

APPENDIX A-3.2 System Operating Description [2]

Auxiliary Feedwater Flow Path

The Auxiliary Feedwater System consists of two subsystems. One system utilizes a steam turbine-driven pump, with the steam capable of being supplied from No. 32 and No. 33 steam generators upstream of the isolation valves. A pressure reducing control valve reduces the pressure to the 600 psi design value of the turbine. This system is capable of supplying a total of 800 gpm to all four steam generators. The other system utilizes two motor-driven pumps each with a capacity of 400 gpm. The discharge piping is arranged so that each pump supplies two steam generators (see Figure A-2).

Water Supplies

Water supplies to the Auxiliary Feedwater System is redundant. The normal source is by gravity feed from the condensate storage tank which is sized to meet the normal operating and maintenance needs of the turbine cycle. Each auxiliary feedwater pump takes suction on the header through a check and normally open stop valve. Individual flow elements are provided on the suction to each of the two motor driven pum s (No. 31 and No. 33). Pump suction pressure is indicated in the control room by PI-1263-R, PI-1264-R and PI-1265-R for each pump. Availability of water from this source is guaranteed by LCV-1158 which closes when the quantity of water in the condensate storage tank drops to 360,000 gallons. When LCV-1158 closes, make-up to the main condensers is prevented and a sufficient quantity of water is assured to be available to remove the residual heat generated by the reactor for 24 hours at hot shutdown condition.

APPENDIX A-3.2 System Operating Description (Cont'd)

Water Supplies (Cont'd)

An alternate supply of water for the pumps is provided for emergency backup and long-term cooling from the city water system. Each pump is supplied from a header through a check and control valve which is normally closed. This valve is controlled by a switch located in the control room which will operate the solenoid, applying or removing air from the valve. Valve position is indicated in the control room.

Discharge Routing

Discharge from the pumps is routed to the steam generators. Steam generators No. 31 and No. 32 are supplied by No. 31 and No. 32 auxiliary boiler feed pumps. Steam generators No. 33 and No. 34 are supplied by No. 32 and No. 33 feed pumps. Each feedwater line is provided with a flow control valve for feedwater regulation. A common flow transmitter for each steam generator is used to indicate flow in the control room from the motor driven or turbine driven flow paths. Pump discharge pressure is provided both locally and in the control room. Recirculation lines, which are provided for pump protection are routed back to the condensate storage tank.

Motor Driven Auxiliary Feedwater Pumps

The motor driven pumps are Ingersoll-Rand Company No. 3HMTA, nine stage, horizontal split case centrifugal units, each of which supplies 400 gpm of water at a head of 1350 psi. The motor drives are furnished by Westinghouse Electric Corporation.

APPENDIX A-3.0 AUXILIARY FEEDWATER SYSTEM DESCRIPTION (Cont'd)

APPENDIX A-3.2 System Operating Description (Cont'd)

Motor Driven Auxiliary Feedwater Pumps (Cont'd)

a. Motor Driven Pump Control

Auxiliary feed pumps No. 31 and No. 33 are driven by motors supplied from 480V buses 3A and 6A respectively. Control switches exist both locally and in the control room on the Condensate and Feedwater Supervisory Panel. The local switches allow "Start and Stop" pushbutton operation of the pumps. The switches in the control room have three positions "On-Auto-Trip". The following conditions will automatically start the pumps as described.

- Automatic loss of either main boiler feed pump will start both No. 31 and No. 33.

- Low-Low steam generator level in any steam generator will start both No. 31 and No. 33.

- In the event of a unit trip which is initiated by a safety injection signal the following Auxiliary Feedwater System events will occur:

    1) Actuates the turbine driven AFW pump.
    2) The pumps will be provided with a start signal as the safeguards buses are reloaded.

APPENDIX A-3.2 System Operating Description (Cont'd)

Motor Driven Auxiliary Feedwater Pumps (Cont'd)

a. Motor Driven Pump Control (Cont'd)

- Loss of outside power without safety injection will provide both pumps with a start signal after the diesels have tied into the 480V buses. A time delay is associated with starting the pumps to allow for loading of the diesels.

Undervoltage on either bus 3A or 6A will trip the pump fed by the bus. The following indication and alarms are provided in the CCR to monitor the pumps.

- Pump on-off-auto trip lights.
- Pump lock off alarm
- Pump auto trip alarm
- Pump on local control alarm

Each motor driven pump is provided with a pressure sustaining control system to prevent the pump from "running out" on its curve. As the discharge pressure of the pump decreases below the set point of 1355, PT-406A for No. 31 pump and PT-406B f No. 33 pump will generate a signal that will override the signal from the flow controllers on the Condensate and Feedwater Supervisory Panel. The signal will operate to close the valves until the pressure is restored in the discharge line having low pressure.

APPENDIX A-3.0 AUXILIARY FEEDWATER SYSTEM DESCRIPTION (Cont'd)

APPENDIX A-3.2 System Operating Description (Cont'd)

Motor Driven Auxiliary Feedwater Pumps (Cont'd)

b. Turbine Driven Auxiliary Feedwater Pump

The full size turbine driven pump is a Worthington Corporation No. 4-WT-127, horizontal, multi-stage, centrifugal pump with a capacity of 800 gpm at 1350 psi.

Auxiliary Feedwater Turbine

a. Turbine Description

The turbine drive is a Worthington Corporation horizontal axial flow, non-condensing unit rated at 970 HP at 3570 RPM.

b. Auxiliary Turbine Steam Supply

Steam to drive the turbine is supplied from the main steam

shut ff

will close whenever the temperature in th- Pump Room reaches 120°F preset valve. These valves have been added to protect motor driven pumps from being rendered inoperable in the unlikely event of the steam line rupturing within the building.

Auxiliary Feedwater Turbine (Cont'd)

b. Auxiliary Turbine Steam Supply (Cont'd)

During turbine operation the steam supply pressure is regulated by PCV-1139. This pressure control valve maintains a 600 psig steam pressure to the turbine. Pressure controller 1176-S senses the downstream pressure and generates a signal for use by the positioner. The control signal generated by the positioner is then applied to the diaphragm of PCV-1139 through the start solenoids (3 and 4). Pressure controller 1176-S will also alarm low pressure at 550 psig in the control room. Once the pressure has been reduced the steam enters the turbine steam chest which contains the governor and turbine trip valves.

To remove moisture in the main steam supply, traps have been provided where necessary. The discharge from the traps have been routed to the main steam trap system which is directed to the drains provided on the turbine casing, steam chest and exhaust piping. The exhaust from the turbine is directed to the atmosphere.

c. Auxiliary Turbine Cooling System

The thrust bearing and turbine inboard and outboard bearings are cooled by water from the discharge of the pump.

Auxiliary Feedwater Turbine (Cont'd)

c. Auxiliary Turbine Cooling System (Cont'd)

A pressure control valve PCV-1213 maintains the water supply to the bearing at 65 psig. The pressure control valve receives its signal from PC-1213 downstream of the control valve. The return water from each bearing is tied together and returned to the condensate storage tank. Flow through each bearing and the combined return temperature are indicated locally.

d. Turbine Driven Pump Control

The turbine driven pump is a variable speed device, and the two motor driven pumps are constant speed devices. The speed of the turbine driven pump is governed by a remote pneumatic speed changer (HC-1118) that is located on the Condensate and Feedwater Supervisory Panel in the control room. The speed changeris designed to operate over an entire speed range of 0 to 100%.

Pressure Reducing Valve PCV-1113 is used as the steam shutoff and start valve for the Auxiliary Feed Pump Turbine. The mode of operation of this valve is controlled by "Trip-Auto-On" switches; one located in the control room, and one in the Auxiliary Boiler Feed Pump Building. These switches control the position of four solenoid valves mounted on the air inlet

Auxiliary Feedwater Turbine (Cont'd)

d. Turbine Driven Pump Control (Cont'd)

to the valve actuator. These solenoid valves are in their de-energized state, which allows the positioner output to open the valve. Normally the valve is maintained in stand-by with the control switches in "Auto". In this position SOV's 1 and 3 are energized, this will cut off the positioner output (SOV-3 closed) and apply full instrument air pressure to the valve actuator (SOV-1 open) holding the valve closed. The SOV's will be de-energized and the pump started by any of the following:

- Low-Low water level in any two of the four steam generators (15% of span).
- Loss of outside power (provided a S.I. signal DOES NOT exist).
- Positioning the control switch to "START".

The turbine governor valve is controlled by a governor and speed changer. The speed changer can be operated locally or from the control room by HC-1118 as shown. A trip valve has been provided to immediately shutdown the turbine on an overspeed of approximately 4516 R.P.M. Turbine speed is indicated in the control room.

APPENDIX A-3.2 System Operating Description (Cont'd)

Recirculation Flow Path and Control

An automatic pump recirculation control system is provided on each motor driven pump to recirculate the pump discharge back to the condensate storage tank at low flow. A maintained contact "Close-Auto-Open" control switch and valve position indicating lights are located in the control room on the Condensate and Feedwater Supervisory Panel for each recirculation valve. A manual operator is provided on each valve for local operation. Suction flow is measured by flow switchs FC-1135-S, FC-1135SA-S and FC-1136-S, FC-1135SB-S for pumps No. 31 and No. 32 respectively. These swtiches are provided with contacts which are interlocked as follows:

- A decrease in flow to 100 gpm actuates a low flow annunciato- in the CCR.

- A further decrease in flow to 50 gpm will de-energize solenoid valve SOV 1321 SOV1323 on control valves FCV 1121 and FCV 1123 in the recirculation lines to initiate recirculation flow back to the condensate storage tank and also energize a time-delay relay.

- The time delay interlock functions to trip the pump in the event that the flow does not increase to 100 gpm in a preset amount of time. If the flow returns to above 100 gpm in less than the preset time, the recirculation valve will close, and the trip timer is reset.

If the pump is tripped by the low flow timer, the timer circuit must be reset by selecting the pump to the trip position prior to restarting. This will

Recirculation Flow Path and Control (Cont'd)

clear the trip circuit of the auxiliary feed pump circuit breaker and reset the common pump low flow alarm so that a low flow condition on the second pump, if operating, will still be alarmed. Pump control switch manual trip action, or automatic electrical stripping action will automatically perform the above trip timer and low flow alarm reset function. Selecting the recirculation valve control switch to the "Open" or "Close" position will defeat all automatic features (except the low flow alarm) and hold the valve in that position regardless of flow through the pump.

If during the winter a prolonged shutdown of the turbine generator is experienced a means has been provided to heat the condensate storage tank. The recirculation lines back to the condensate storage tank from the two motor driven pumps provides a source of both heat and flow in sufficient quantities to protect the tank from freezing. When using the pumps in this manner the recirculation flow must be adjusted to provide a flow of 125 gpm for each pump, using the special high pressure drop valves BFD-77 and 78. The flow to the tank is extremely important in order to provide the maximum BTU input to the tank with the minimum hazard to the pumps. Only one pump is required to protect the tank from temperatures above $15^{o}F$.

The turbine driven pump is provided with a continuous recirculation system back to the condensate storage tank. An additional feature provided on the turbine driven pump is that part of recirculated water is used to cool the thrust bearing and turbine bearings.

APPENDIX A-3.2 System Operating Description (Cont'd)

Auxiliary Feedpump Flow Control

As previously described, two auxiliary feed systems exist which are independent of each other. Flow control to the steam generators is provided by eight controllers located on the Condensate and Feedwater Supervisory Panel in the control room. There are two controllers associated with each steam generator, one each for the feedwater supplies from the motor and turbine driven pumps. Which controller is used will be dependent on the operating conditions of the unit.

Flow indication is provided for each auxiliary feedwater line to each steam generator. The flow nozzle is located in the common terminal line from the steam driven and the motor driven pumps. The output from each of these transmitters is connected to flow indicators located on the Condensate and Feedwater Supervisory Panel and in the auxiliary feedwater pump building. The steam generator wide range level recorders have also been located on this panel.

Level in the steam generator is maintained by positioning the flow controller. All pneumatic instruments associated with the auxiliary pump flow controls are provided with nitrogen back-up. Three nitrogen bottles are located inside the auxiliary feed pump room which connect into the instrument air supply down stream of a check valve. A pressure regulator set at 50 psig will feed nitrogen into the instrument air supply system whenever the normal air supply pressure decreases below this setting. A pressure switch (PC-1355-S) located at the bottles will annunciate in the control room to warn the operator whenever the bottles require changing.

SYSTEMS INTERACTION STUDY
APPENDIX A
NOTES TO TABLE A-2.1

NOTE:

(1) Failure mode(s) for each type of component listed on Table 6-1 are summarized as follows:

A - Complete loss of function due to instantaneous loss of electrical power
  1) Loss of one redundant electrical division comcident with loss of all offsite power
  2) Loss of all AC power (onsite and offsite)
  3) Loss of DC power
  4) Other

B - Complete loss of function due to instantaneous loss of power (other than electrical)
  1) Loss of pneumatic power (plant air, compressed gas, etc)
  2) Loss of hydraulic power
  3) Other (explain where necessary)

C - Partial loss of function due to instantaneous loss of electrical power
  1) Loss of one redundant electrical division comcident with loss of all offsite power
  2) Loss of all AC power (onsite and offsite)
  3)
  4) Other

D - Partial loss of function due to instantaneous loss of power (other than electrical)
  1) Partial loss of pneumatic power (eg crimped air supply line)
  2) Partial loss of hydraulic power
  3) Other (explain where necessary)

E - Complete loss of function due to instantaneous mechanical failure(s)
  1) plugged component
  2) component normally open and does not close
  3) component normally closed and does not open
  4) component does not start due to mechancial interference
  5) other (explain where necessary)

NOTE:

(1) Failure mode(s) for eacn type of component listed on Table 6-1 are summarized as follows: (Cont'd)

F - Partial loss of function due to instantaneous mechanical failure(s)
1) plugged component, partial
2) component normally open and does not close completely
3) component normally closed and does not open completely
4) component does not reach full speed due to mechanical interference
5) other (explain were necessary)

G - Other failures not covered by A thru F. (describe where necessary)

(2) It has been assumed that the loss of function, either completely or partially of pressure transmitters, pressure controllers, pneumatic/electrical converters, etc associated with the instrumentation and control components of the auxiliary feedwater system is less limiting than complete or partial loss of controlled component, eg pressure or flow control valves.

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (1)) A B C D E F G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
E-1	ELECTRIC MOTOR 31 FOR AFW PUMP 31, CONNECTED TO AC BUS 3A.	①	Loss of auxiliary feedwater flow from pump no 31 to steam generators 31 and 32	① STATUS indication in control room that motor breaker is open ② Pump discharge press. indication in CR	If break is in SG 31 or 32, motor driven pump 33 will feed SGs 33 & 34, turbine driven pump 32 will feed unaffected SG 31 or 32. Operator must terminate flow from pump 32 to affected SG 31 or 32 by closing FCV 405A or FCV 405B If break is in SG 33 or 34, turbine driven pump 33 will feed unaffected SG's. Operator must terminate flow to affected SG by closing FCV 405A, B, C OR D	ACCEPTABLE ACCEPTABLE
E-2	ELECTRIC MOTOR 33 FOR AFW PUMP 33, CONNECTED TO AC BUS 6A	①	Loss of auxiliary feedwater flow from pump number 33 to steam generators 33 and 34	Same as item E-2	Similar to Item E-2	ACCEPTABLE
E-3	DC CONTROL POWER TO BUS 3A,	②	Loss of auxiliary feedwater flow from pump number 31 to steam generators 31 and 32	① low pump discharge pressure indication in control room.	Similar to Item E-2	
E-4	DC BREAKER FOR BUS 3A	②	Loss of auxiliary feedwater flow from pump number 31 to steam generators 31 and 32	① status indication in control room that breaker is open		
	DC BREAKER FOR BUS 3A	②	Loss of auxiliary feedwater flow from pump 33 to steam generators 33 and 34	② low pump discharge pressure indication in control room		
E-5	DC CONTROL POWER TO BUS 6A	②	Loss of auxiliary feedwater flow from pump 33 to steam generators 33 and 34	SAME AS ITEM E-3	SIMILIAR TO ITEM E-3	
E-6	DC BREAKER FOR BUS 6A	②	Loss of auxiliary feedwater flow from pump 33 to steam generators 33 and 34	SAMES AS ITEM E-4	SIMILIAR TO ITEM E-4	

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 1 OF 9
FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (11)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
M-1	AFW PUMP 31 (MOTOR DRIVEN)					(4)			Loss of auxiliary feedwater flow from pump 31 to steam generators 31 and 32	1) low pump discharge pressure indication in control room. (PI-1260)	Similiar to evaluation of Item E-1.	Acceptable
							(4)		Partial loss of auxiliary feedwater flow from pump 31 to steam generators 31 and 32	1) low pump discharge pressure indication in control room. (PI-1260)	Similiar to evaluation of Item E-1	Acceptable
M-2	AFW PUMP 33 (MOTOR DRIVEN)					(4)	(4)		{ Similar to effects on Item M-1	Similar to Item M-1	Similiar to evaluation of Item E-1	Acceptable
M-3	AFW PUMP 32 (TURBINE DRIVEN)					(4)			Lose auxiliary feedwater flow from pump 32 to steam generators 31, 32, 33 & 34	1) low pump discharge pressure indication in control room. (PI-1261)	1) Motor driven pumps 31 and 33 are available and are running. Operator must terminate auxiliary feedwater flow to affected steam generator.	Acceptable
M-4	TURBINE CONTROL SYSTEM FOR AFW PUMP 32 - PCV-1139		(1)			(3)			PCV-1139 normally closed, fail closed, system receives automatic start signal and valve fails to open resulting in loss of steam flow to turbine and subsequent loss of feed flow from pump No. 32 to SG 31, 32, 33, & 34	1) low pump discharge pressure indication in control room (PI-1261) 2) low steam inlet press to steam turbine (PI-1126) 3) Valve PCV-1139 position indication (closed) in CR.	Similiar to evaluation of Item M-3	Acceptable
					(1)		(4)		PCV-1139 normally closed, fail closed, system receives automatic start signal, control room operator begins to open valve, plant air is lost and valve goes fully closed resulting in loss of steam flow to turbine and subsequent loss of feed flow from pump 32 to SG 31, 32, 33 & 34	1) low steam inlet press to steam turbine (PI-1126) 2) low pump discharge pressure indication in control room (PI-1261)	Similiar to evaluation of Item M-3	Acceptable

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 2 OF 9
FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (11)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
M-5	TURBINE TRIP CONTROL SYSTEM FOR AFW PUMP 32					④			Mechanical damage to steam turbine resulting in turbine missile due to loss of overspeed protection - possible damage to turbine/pump couple system resulting in loss of feed flow from pump number 32. If no mechanical damage, turbine will trip on overspeed	1) turbine speed indication in control room. 2) mechanical vibration locally observed 3) pump discharge and suction pressure indication in control room. PI-1261 & 1264	Turbine missiles are contained by missile enclosure to be installed over turbine casing. Motor driven pumps 31 and 33 are unaffected by turbine overspeed and are running. Operator must terminate aux. feedwater flow to affected steam generator. If no mechanical damage operator must reset system locally realigning valves and set points in Aux Feedwater Building	ACCEPTABLE
M-6	CONDENSATE STORAGE TANK - LOSS OF SUCTION TO PUMPS							①	Tank failure results in loss of suction to Auxiliary feedwater pumps number 31, 33 and 32 from condensate storage tank	1) Level indication in control room (redundant indication to be installed) 2) loss of pump suction pressure in control room (PI-1265, 1263, 1264)	Operator detects tank failure and opens city water backup supply valves PCV-1188, PCV-1187, PCV-1189	Acceptable
M-7	MANUAL ISOLATION VALVES CT-6, CT-64					①			loss of suction flow to auxiliary feed water pumps number 31, 33, 32	redundant position indicators provided in control room loss of pump suction pressure in control room (PI-1265, 1263, 1264)	Operator detects plugged valves and opens city water backup supply valves, PCV-1188, 1187, & 1189. Operator can also try to manually unplug CT-6 or CT-64	Acceptable
M-8	CITY WATER SUPPLY							①	City Water Tank failure, no effect on system since primary source of water is from condensate storage tank (short term)	1) low city water press indication in control room (PI-1205)	NOT REQUIRED	ACCEPTABLE

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 3 OF 9
FIGURE A-2.1

Item No	Component Description	Failure Mode(s) (see note (1)) A	B	C	D	E	F	G	Effect on System	Method of Detection	Evaluation of Failure	Conclusion
M-9 M-10 M-11	Manual isolation gate valves CT-27, CT-30 & CT-33					①			loss of suction fluid flow to corresponding auxiliary feedwater pump number 31, 32 or 33 and subsequent loss of feed flow to SG's 31, 32, 33 & 34	1) low pump suction pressure indication in control room, PI 1263, 1264, & 1265	Alternate city water supply available for operator to remotely align the backup water supply to auxiliary feedwater pumps 31, 32 and 33. Operator must also isolate affected steam generator.	Acceptable
M-12 M-13 M-14 M-15 M-16 M-17	Check valve CT-26 Check valve CT-29 Check valve CT-32 Check valve CT-25 Check valve CT-28 Check valve CT-31					③ ③ ③ ③ ③ ③			loss of suction fluid flow from either condensate storage tank or city water backup storage tank to corresponding auxiliary feedwater pump 31, 32 or 33 and subsequent loss of feed flow to SG's 31, 32, 33 & 34	1) low pump suction pressure indication in control room, PI-1263 PI-1264, PI-1265	Since only one check valve is assumed to fail closed, operator is able to align the backup water supply to SGs 31, 32 & 33 Operator must also isolate effected steam generator	Acceptable
M-18 M-19	Check valve MS-41 Check valve MS-42					③ ③			loss of steam flow to turbine drive for auxiliary feedwater pump number 32.	Same as Item M-4	Similar to evaluation for Item M-4	Acceptable
M-20 M-21 M-22	Check valve BFD-34 Check valve BFD-31 Check valve BFD-39					③ ③ ③			loss of auxiliary feedwater flow to corresponding steam generator 31, 32, 33 or 34	1) high pump discharge pressure indication in control room	Similar to evaluations for Items E-1, E-2 and M-1	Acceptable
M-23 M-24	Check valve BFD-35 check valve BFD-37					③ ③			loss of auxiliary feedwater flow to SG 32 loss of auxiliary feedwater flow to SG 31	1) high pump discharge pressure indication in control room.	If the failure is on the same line as break, affected SG will be isolated by definition. Operator should assure isolation by closing appropriate FCV 406A OR 406B	Acceptable
M-25 M-26	Check valve BFD-40 Check valve BFD-42					③ ③			loss of auxiliary feedwater flow to SG 33 loss of auxiliary feedwater flow to SG 34	1) high pump discharge pressure indication in control room.	Similar to the evaluation performed for Items M-23 & M-24	Acceptable
M-27 M-28	Check valve BFD-47-31 Check valve BFD-47-32					③ ③			loss of auxiliary feedwater flow to SG-31 loss of auxiliary feedwater flow to SG-32	1) high pump discharge pressure indication	Similar to the evaluation performed for Items M-23,	Acceptable

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 4 OF 9
FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (1)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
M-29	Check valve BFD-47-33					(3)			loss of auxiliary feedwater flow to SG-33	in control room	M-24, M-25 & M-26. Operator should assure isolation of affected SG by closing appropriate FCV 405A, 405B, 405C or 405D.	
M-30	Check valve BFD-47-34					(3)			loss of auxiliary feedwater flow to SG-34.			
M-31	manual valve BFD-36					(1)			loss of auxiliary feedwater flow to SG-32	1) high pump discharge pressure indication in control room - no indication of which valve is failed.	Similiar to the evaluation performed for items M-23 & M-24 and M-25 & M-26	Acceptable
M-32	manual valve BFD-62-32					(1)			DITTO			
M-33	manual valve BFD-38					(1)			loss of auxiliary feedwater flow to SG-31			
M-34	manual valve BFD-62-31					(1)			DITTO			
M-35	manual valve BFD-41					(1)			loss of auxiliary feedwater flow to SG-33			
M-36	manual valve BFD-62-33					(1)			DITTO			
M-37	manual valve BFD-43					(1)			loss of auxiliary feedwater flow to SG-34			
M-38	manual valve BFD-62-34					(1)			DITTO			
M-39	manual valve MS-54					(1)			loss of steam flow to turbine drive for auxiliary feedwater pump 32	1) low steam press indication in control room - no direct indication in control room of which valve has failed.	Similiar to the evaluation of Item M-4	Acceptable
M-40	manual valve CT-49					(1)			loss of city water suction fluid flow to auxiliary feedwater pumps 31, 32 and 33	1) low city water supply pressure indication in the control room.	Similiar to the evaluation of Items M-15, M-16 and M-17	Acceptable
M-41	manual valve BFD-48-31					(1)			loss of auxiliary feedwater flow from turbine driven pump no 32 to corresponding steam generator	NONE	Similiar to the evaluation performed on Items M-27, M-28, M-29 & M-30	Acceptable
M-42	DITTO -31					(1)						
M-43	DITTO -32					(1)						
M-44	DITTO -32					(1)						
M-45	DITTO -33					(1)						
M-46	DITTO -33					(1)						
M-47	DITTO -34					(1)						
M-48	DITTO -34					(1)						

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
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FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (1)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
M-49	PCV-1187		(1)		(1)				full or partial loss of function of these valves will limit the suction flow to their respective auxiliary feedwater pump from the backup city water storage tank	1) Valve indication in control room for open/closed position. Partially open/close position not monitored. Local position indicator only	backup nitrogen gas supply is available for operation of valve if necessary. Manual operation will require jacking valve open or closed since no handwheel is provided	acceptable
M-50	SOV-1287		(1)		(1)							
M-51	PCV-1188		(1)		(1)							
M-52	SOV-1288		(1)		(1)							
M-53	PCV-1189		(1)		(1)							
M-54	SOV-1289		(1)		(1)							
M-55	LCV-1158		(1)		(1)				full or partial loss of function in the open position will jeopardize suction flow to auxiliary feedwater pump 31, 32 & 33 from the condensate storage tank	1) Valve indication in control room for open/closed position only. Partially open/close position not monitored. Local position indicator only.	redundant level switches on the condensate storage tank provide reliability to the system in regard to alarming low water level in tank. Mechanical failure of valve however will be independent of actuation signal and as such, isolation of non-essential users is not assured Operator can take corrective action - close valve manually only after he/she determines extent of damage - may not be possible	Unacceptable 1. recommend the addition of second similar valve in series with presently installed valve
M-56	SOV-1258		(1)		(1)							
M-57	Air Operated FCV-406A		(1)		(1)	(1)	(1)		loss of auxiliary feedwater flow to corresponding steam generator from pump number 31 or 33. -or- partial loss of auxiliary feedwater flow to corresponding steam generator from pump number 31 or 33	1) position indication in control room, for open/close only.	turbine driven auxiliary feedwater pump and associated control valves and appurtenances provide redundant auxiliary feedwater flow to unaffected steam generators. Operator must isolate affected steam generator by closing FCV 405A, B, C or D and opening FCV-1139 to admit steam to turbine. Turbine speed is controlled by	Acceptable
M-58	Air Operated FCV-406B		(1)		(1)	(1)	(1)					
M-59	Air Operated FCV 406C		(1)		(1)	(1)	(1)					
M-60	Air Operated FCV 406D		(1)		(1)	(1)	(1)					

Power Authority of the State of New York
INDIAN POINT NO. 3

AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 6 OF 9

FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (11)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
M-60 (CON'TD)											remote-manual operation from the control room. If loss of function is due to complete loss of compressed air to FCV-406 A, B, C & D and FCV-405, A, B, C & D, nitrogen backup is provided for valve operation.	
M-61	Air operated FCV-405A		(1)		(1)	(1)	(1)		Similar to items M-57, M-58, M-59, and M-60	1) position indication in control room for open/close position only	Similar to the evaluation of items M-57, M-58, M-59, M-60	acceptable
M-62	Air operated FCV-405B		(1)		(1)	(1)	(1)					
M-63	Air operated FCV-405C		(1)		(1)	(1)	(1)					
M-64	Air operated FCV-405D		(1)		(1)	(1)	(1)					
M-65	Air operated automatic high temperature shut-off valve PCV-1310A		(1)		(1)	(1)	(1)		These valves are normally open and will automatically close upon signal from sensing element and control circuit when temperature in aux feedpump building reaches 120°F	1) Control room alarm for high temperature in aux feedpump building 2) valve position indication in control room	These valves provide protection in the event of a high energy line break in the auxiliary feedpump building. Valves have separate temperature sensing components and each valve is redundant to the other.	acceptable
M-66	Air operated automatic high temperature shut-off valve PCV-1310B		(1)		(1)	(1)	(1)					
M-65 (Continued)	PCV-1310A		(1)		(1)	(1)	(1)				For this case 1- an additional passive high energy pipe break need not be postulated in the short term. In the long term a passive pipe break in the steam supply line to the turbine is provided with adequate redundancy to isolate steam blowdown into the room	
M-66 (Continued)	PCV-1310B		(1)		(1)	(1)	(1)					
M-67	Air operated FCV-1121		(1)		(1)	(1)	(1)		NOT ENOUGH INFORMATION ABOUT SYSTEM OPERATION TO COMPLETELY EVALUATE THESE FAILURES			
M-68	SOV-1321		(1)		(1)	(1)	(1)					
M-69	Air operated FCV-1123		(1)		(1)	(1)	(1)					
M-70	SOV-1323		(1)		(1)	(1)	(1)					
M-71	Air operated PCV-1213		(1)		(1)	(1)	(1)					

Power Authority of the State of New York
INDIAN POINT NO. 3

AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 7 OF 9
FIGURE A-2.1

ITEM NO	COMPONENT DESCRIPTION	FAILURE MODE(S) (SEE NOTE (1)) A	B	C	D	E	F	G	EFFECT ON SYSTEM	METHOD OF DETECTION	EVALUATION OF FAILURE	CONCLUSION
I-1	Valve controller on valve PCV-1310A	①②	①	①②	①				Similar to mechanical component M-65 and M-66	NONE	Similar to the evaluation of Item M-65 and M-66	
I-2	Valve controller on valve PCV-1310B	①②	①	①②	①				Similar to mechanical component M-65 and M-66	NONE	- DITTO ABOVE -	
I-3	Temp sensor on valve PCV-1310A	①②	①	①②	①				DITTO ABOVE	DITTO	- DITTO -	
I-4	Temp sensor on valve PCV-1310B	①②	①	①②	①				DITTO ABOVE	DITTO	- DITTO -	
I-5	Flow controller FC-1136	①②	①	①②	①							
I-6	Flow controller FC-1136A	①②	①	①②	①							
I-7	Flow controller FC-1135	①②	①	①②	①							
I-8	Flow controller FC-1135A	①②	①	①②	①							
I-9	PT-1265	①②	①	①②	①				SEE NOTE 2	NONE	SEE NOTE 2	
I-10	PT-1262	①②	①	①②	①				- DITTO	NONE	- DITTO -	
I-11	PT-406B	①②	①	①②	①				- DITTO -	NONE	- DITTO -	
I-12	PM-406H HC-406D	①②	①	①②	①				- DITTO -	NONE	- DITTO -	

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 8 OF 9
FIGURE A-2.1

Item No	Component Description	Failure Mode(s) (see note (1)) A	B	C	D	E	F	G	Effect on System	Method of Detection	Evaluation of Failure	Conclusion
I-13	PM-406G HC-406C	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-14	PT-1263	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-15	PT-1260	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-16	PT-406A	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-17	PM-406E HC-406A	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-18	PM-406F HC-406B	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-19	PT-1264	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-20	F 1213	①②	①	①②	①				See Note 2	None	See Note 2	
I-21	PT-1261	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-22	PT-1205	①	①	①②	①				- Ditto -	None	- Ditto -	
I-23	PC-1176	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-24	PT-1126	①②	①	①②	①				- Ditto -	None	- Ditto -	
I-25	PC-1355	①②	①	①②	①				- Ditto -	None	- Ditto -	

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AUXILIARY FEEDWATER SYSTEM
FAILURE MODES & EFFECTS ANALYSIS
SHEET 9 OF 9
FIGURE A-2.1

SYSTEMS INTERACTION STUDY
APPENDIX A
NOTES TO TABLE A-2.1

NOTE:

(1) Failure mode(s) for each type of component listed on Table 6-1 are summarized as follows:

A - Complete loss of function due to instantaneous loss of electrical power
  1) Loss of one redundant electrical division comcident with loss of all offsite power
  2) Loss of all AC power (onsite and offsite)
  3) Loss of DC power
  4) Other

B - Complete loss of function due to instantaneous loss of power (other than electrical)
  1) Loss of pneumatic power (plant air, compressed gas, etc)
  2) Loss of hydraulic power
  3) Other (explain where necessary)

C - Partial loss of function due to instantaneous loss of electrical power
  1) Loss of one redundant electrical division comcident with loss of all offsite power
  2) Loss of all AC power (onsite and offsite)
  3) Loss of DC power
  4) Other

D - Partial loss of function due to instantaneous loss of power (other than electrical)
  1) Partial loss of pneumatic power (eg crimped air supply line)
  2) Partial loss of hydraulic power
  3) Other (explain where necessary)

E - Complete loss of function due to instantaneous mechanical failure(s)
  1) plugged component
  2) component normally open and does not close
  3) component normally closed and does not open
  4) component does not start due to mechancial interference
  5) other (explain where necessary)

SYSTEMS INTERACTION STUDY
APPENDIX A
NOTES TO TABLE A-2.1 (Cont'd)

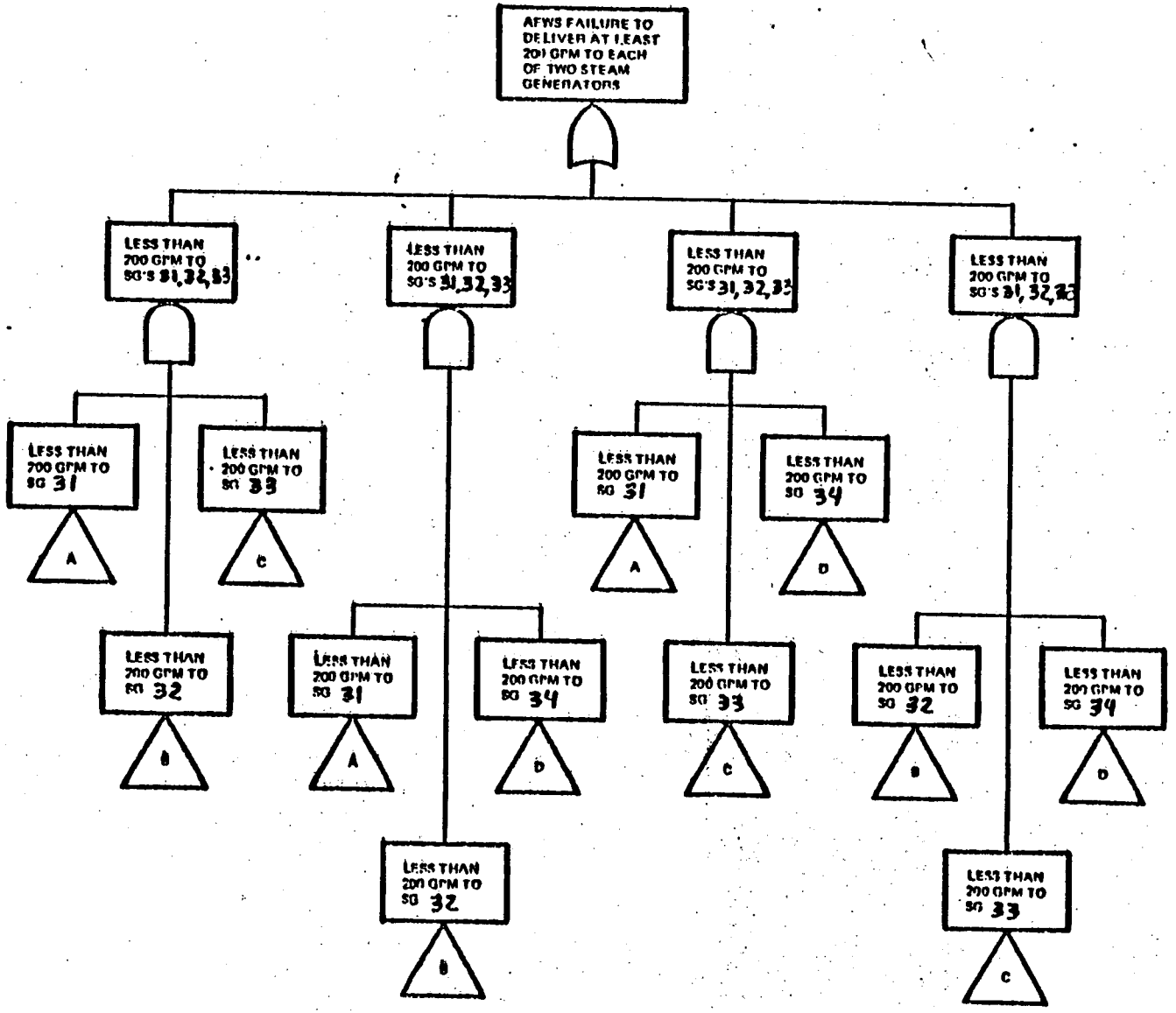
NOTE:

(1) Failure mode(s) for each type of component listed on Table 6-1 are summarized as follows: (Cont'd)

F - Partial loss of function due to instantaneous mechanical failure(s)
1) plugged component, partial
2) component normally open and does not close completely
3) component normally closed and does not open completely
4) component does not reach full speed due to mechanical interference
5) other (explain were necessary)

G - Other failures not covered by A thru F. (describe where necessary)

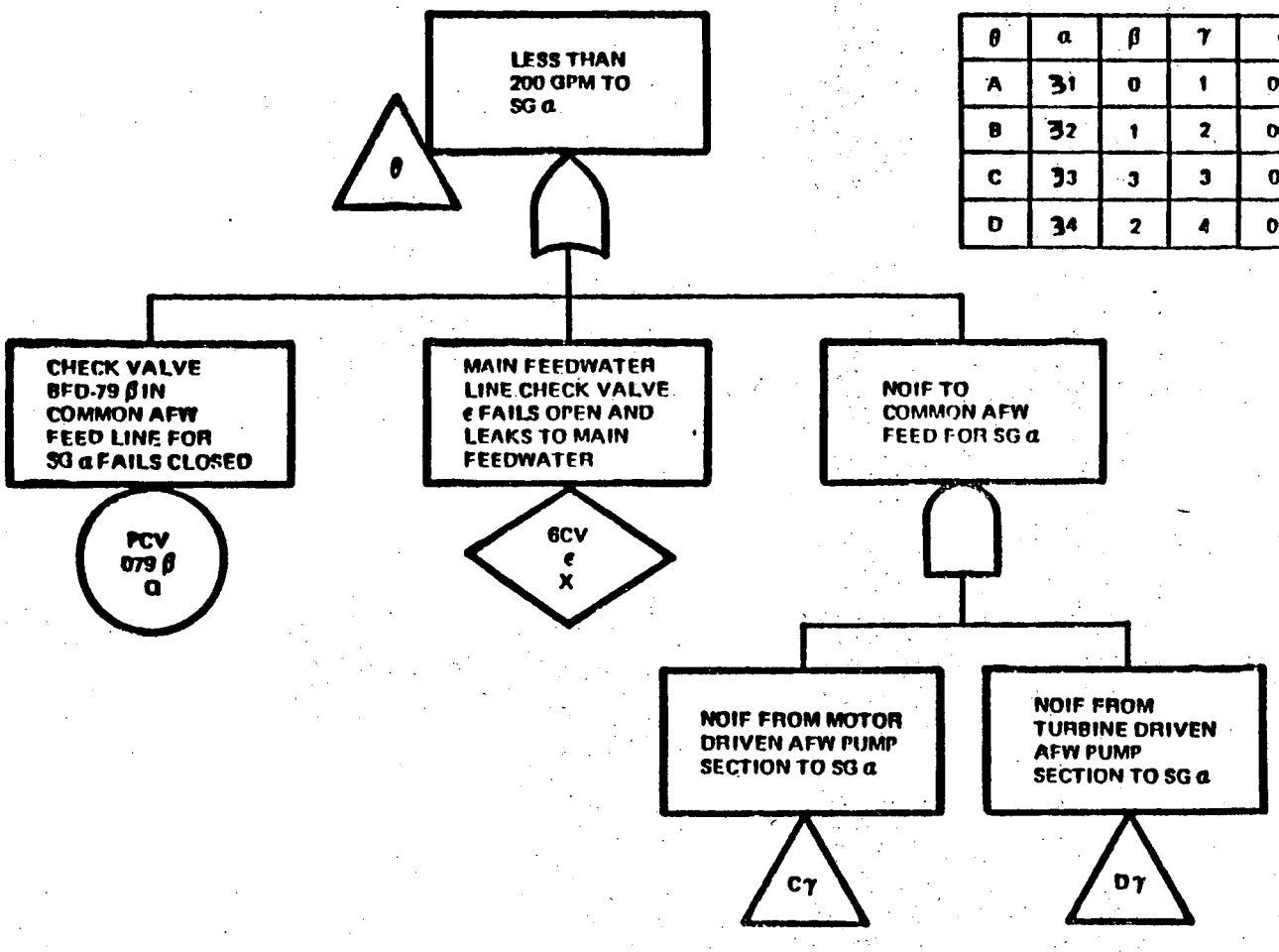
(2) It has been assumed that the loss of function, either completely or partially of pressure transmitters, pressure controllers, pneumatic/electrical converters, etc associated with the instrumentation and control components of the auxiliary feedwater system is less limiting than complete or partial loss of controlled component, eg pressure or flow control valves.



SHEET 1 OF 9

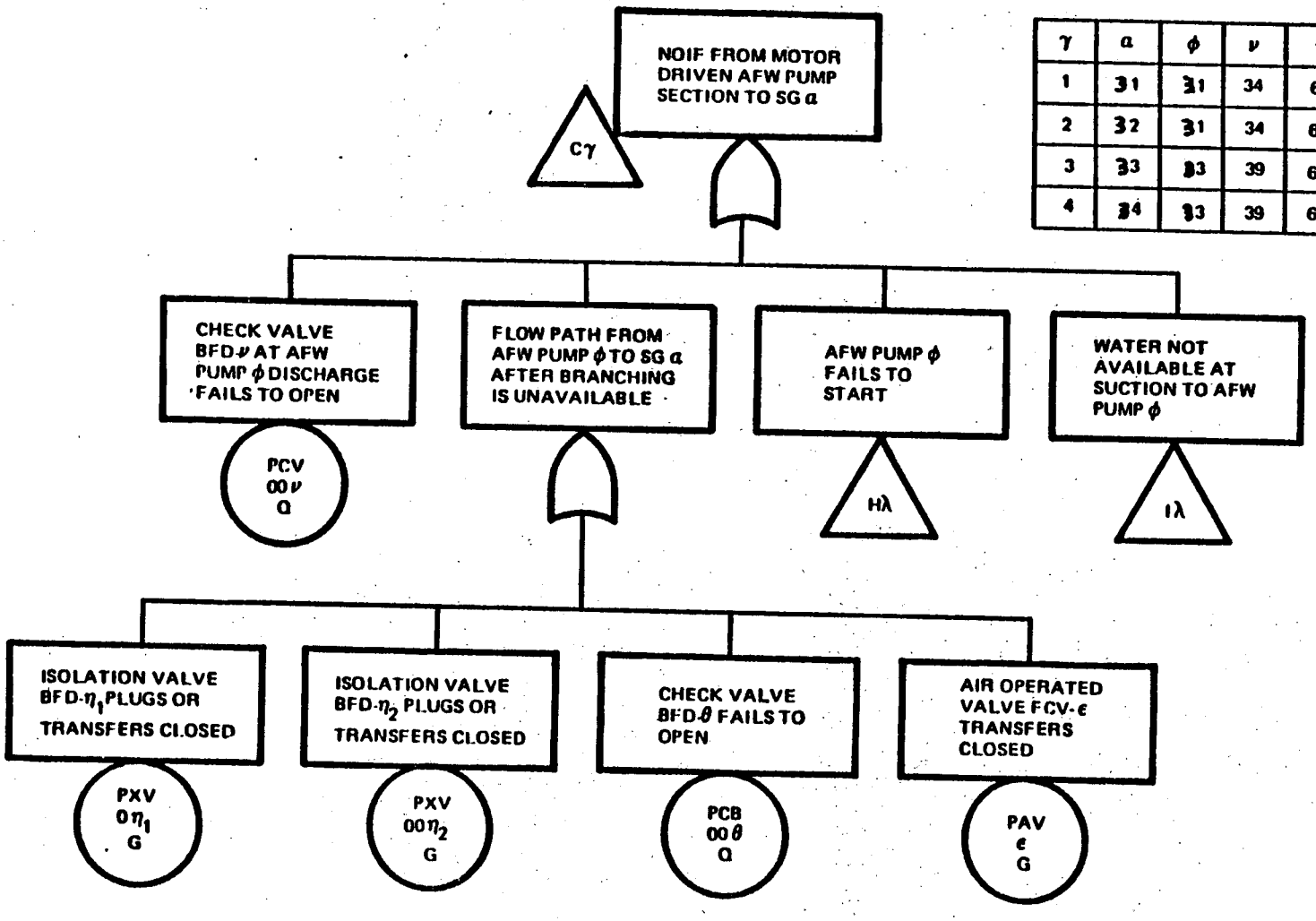
Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2



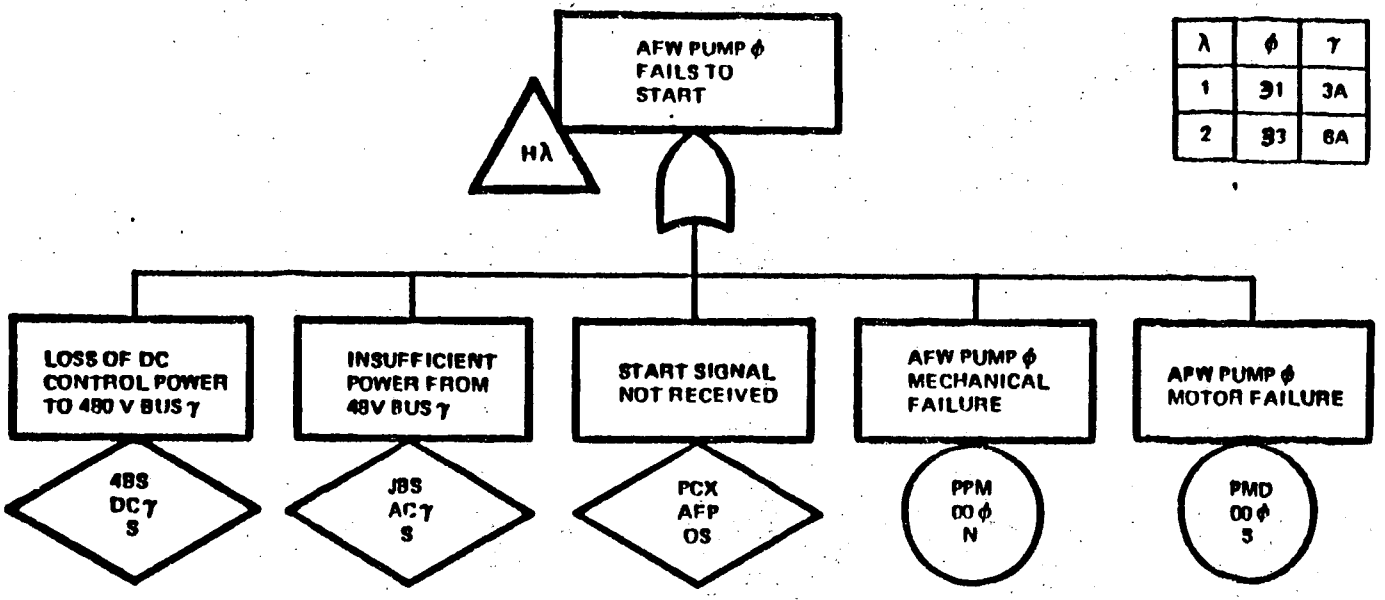
θ	α	β	γ	ε
A	31	0	1	001
B	32	1	2	002
C	33	3	3	003
D	34	2	4	004

Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2



γ	α	φ	ν	η1	η2	θ	ε	λ
1	31	31	34	62-0	38	37	406A	1
2	32	31	34	62-1	36	35	406B	1
3	33	33	39	62-2	43	42	406C	2
4	34	33	39	62-3	41	40	406D	2

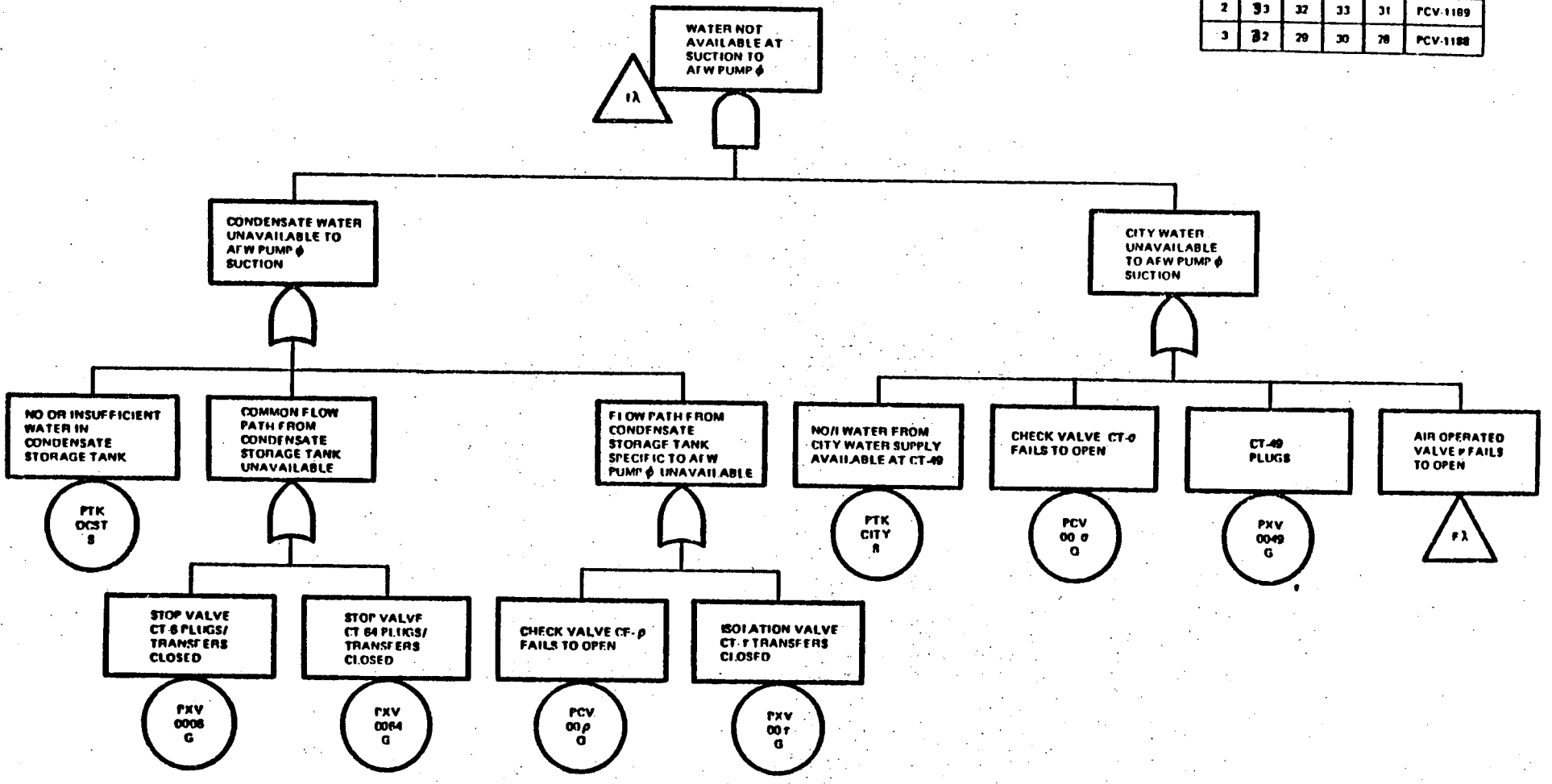
Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2



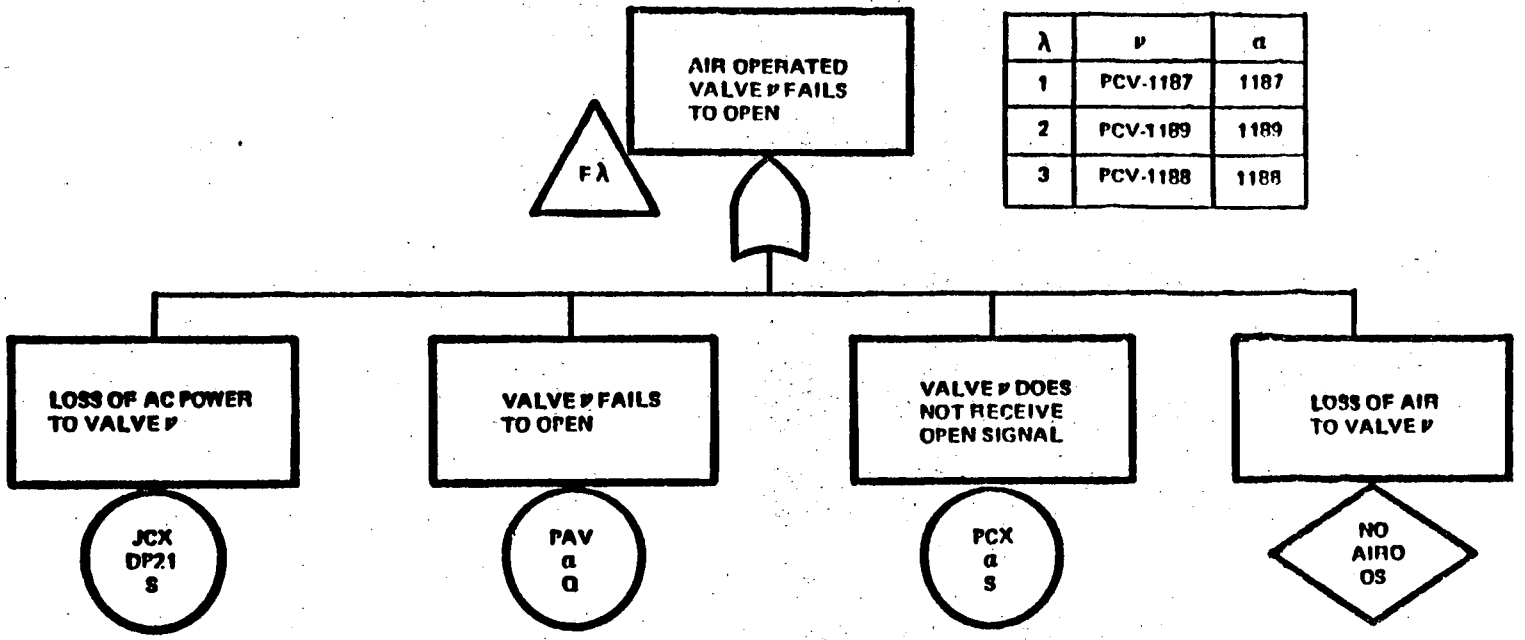
λ	ϕ	γ
1	31	3A
2	33	6A

Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2

λ	φ	ρ	γ	σ	β
1	31	26	27	25	PCV-1187
2	33	32	33	31	PCV-1189
3	32	29	30	28	PCV-1188

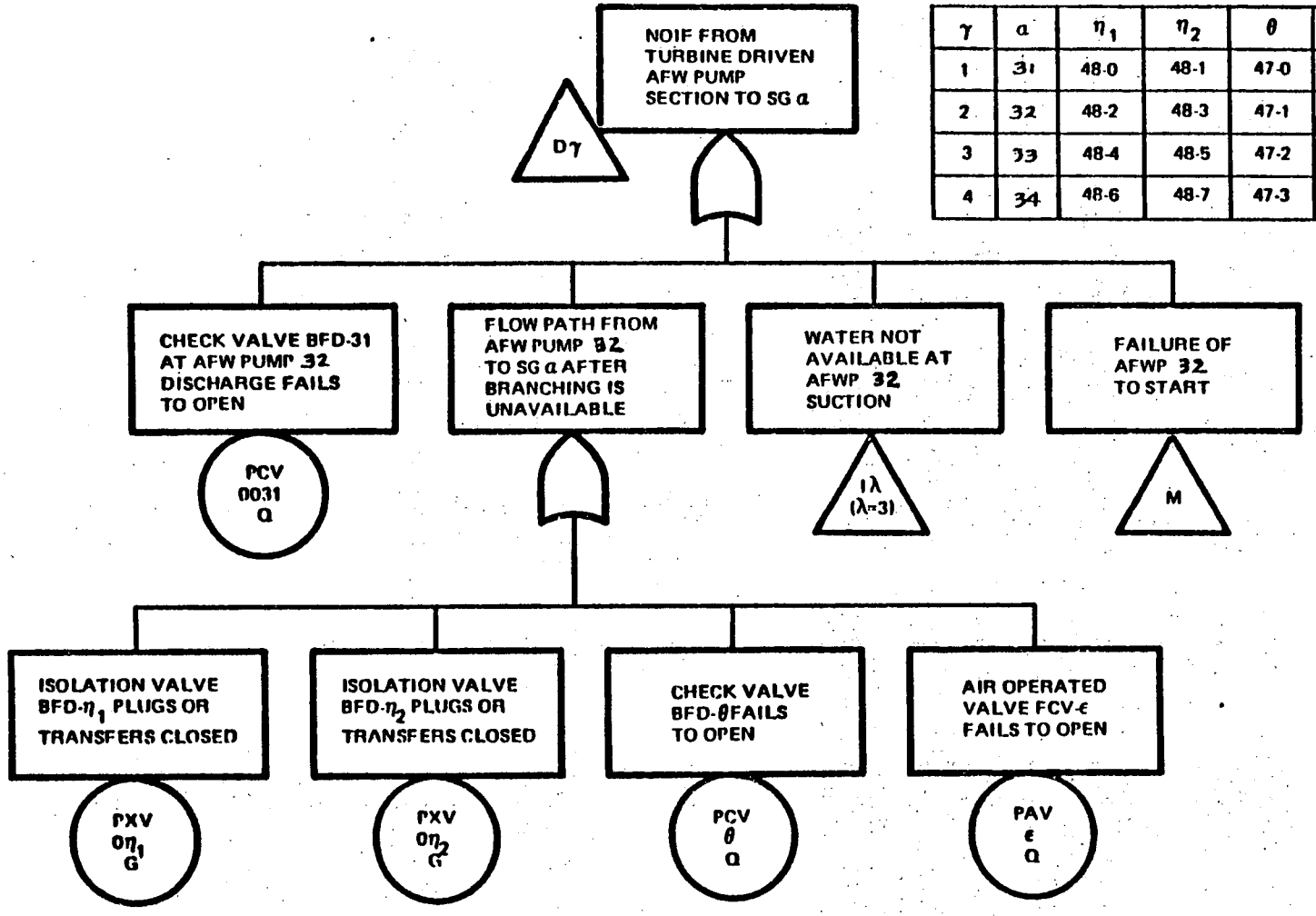


Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2



λ	ν	α
1	PCV-1187	1187
2	PCV-1189	1189
3	PCV-1188	1188

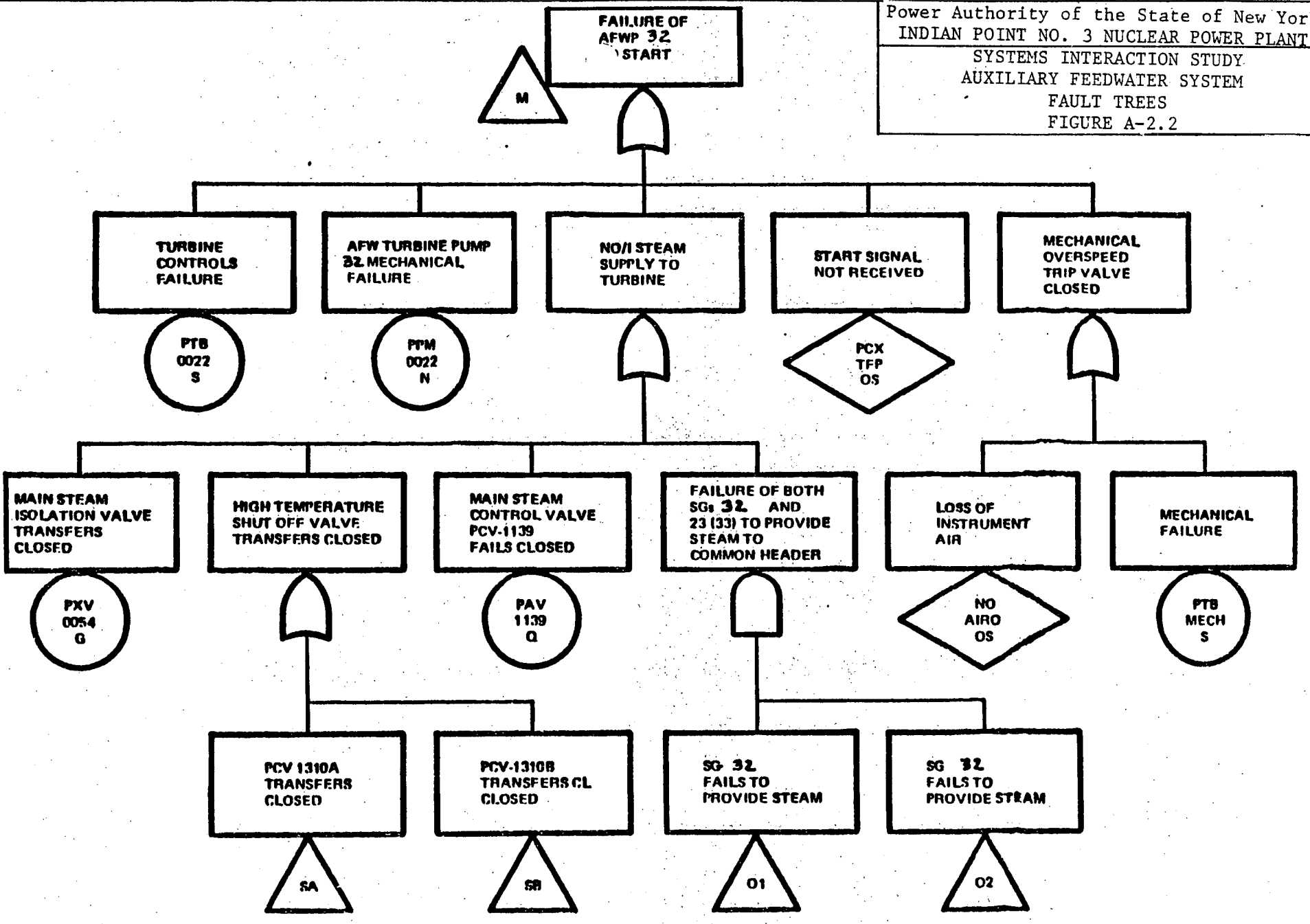
Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2

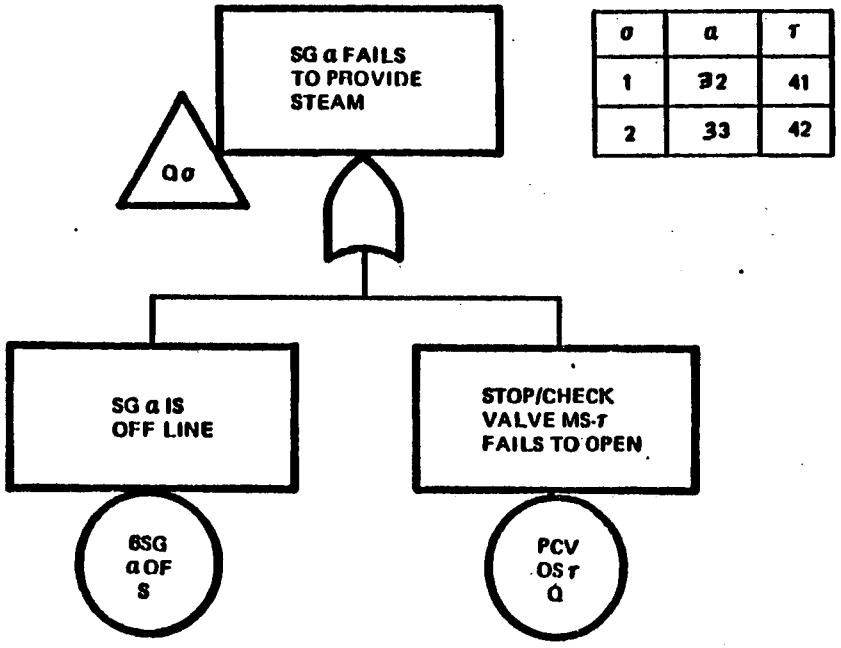


γ	α	η_1	η_2	θ	τ	δ
1	31	48-0	48-1	47-0	405A	5
2	32	48-2	48-3	47-1	405B	6
3	33	48-4	48-5	47-2	405C	7
4	34	48-6	48-7	47-3	405D	8

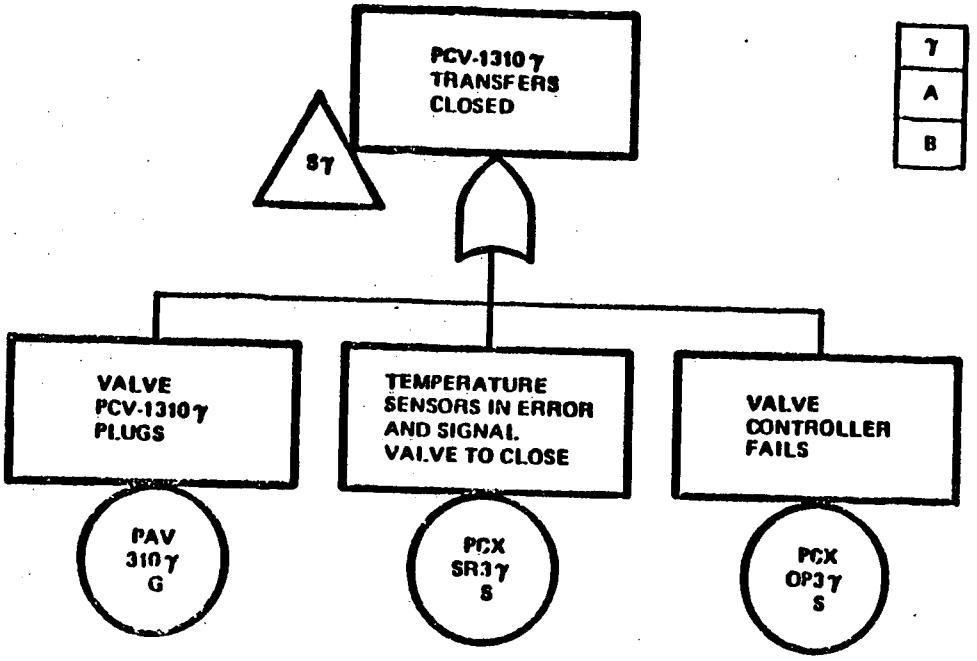
Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2

Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2





σ	α	τ
1	32	41
2	33	42



γ
A
B

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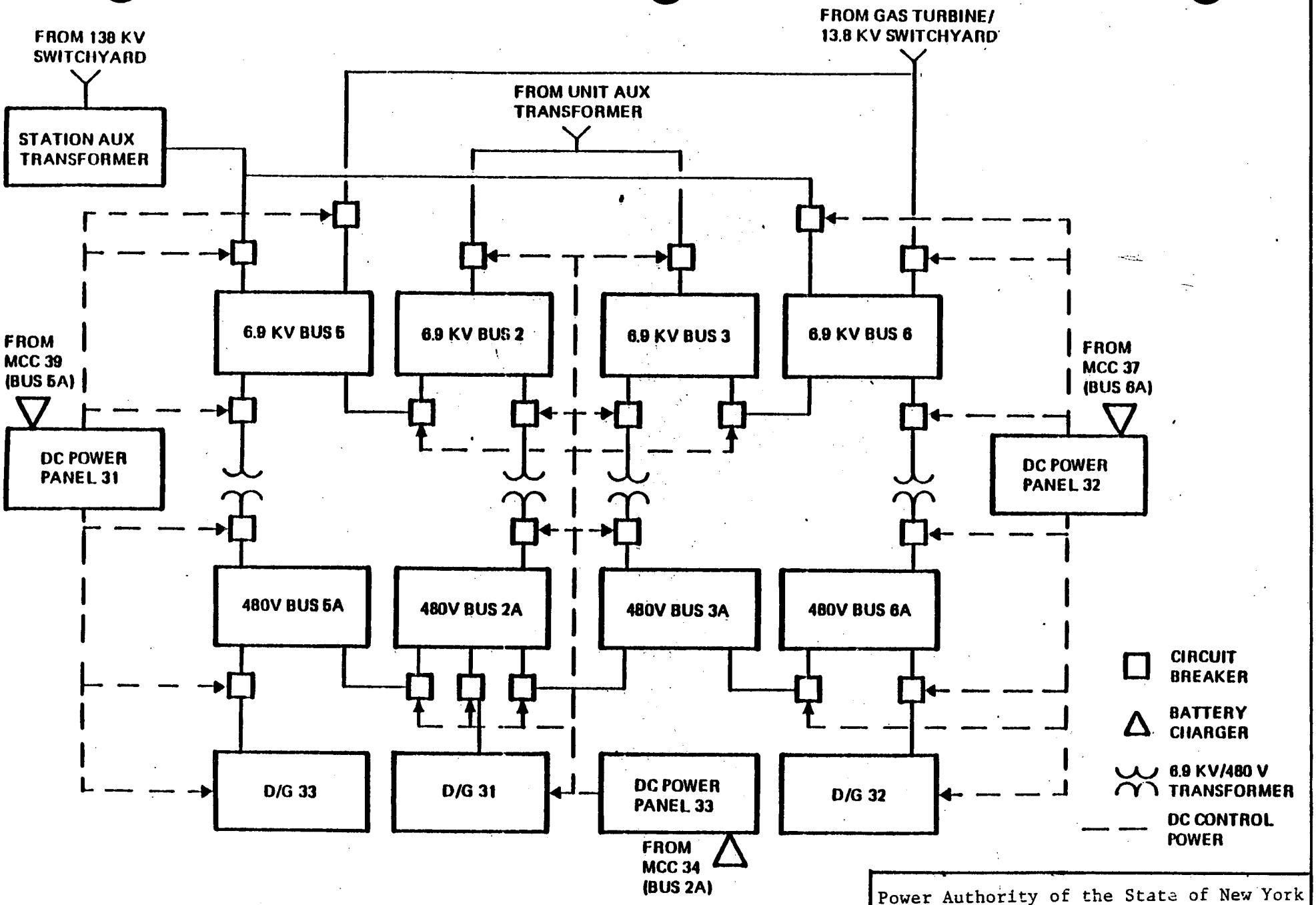
Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT

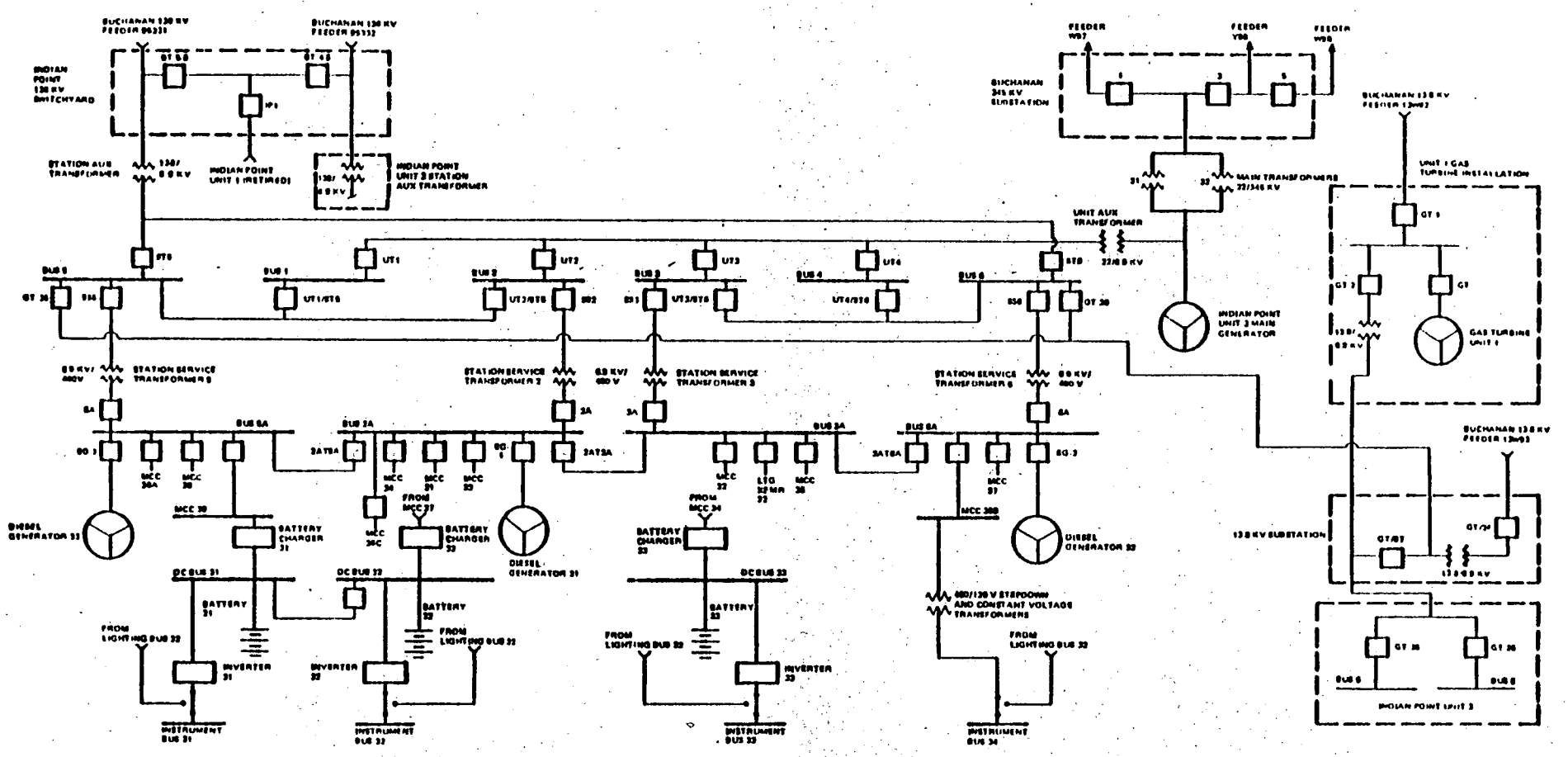
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM
FAULT TREES
FIGURE A-2.2



480 V ESSENTIAL POWER SUPPLY BLOCK DIAGRAM

Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY

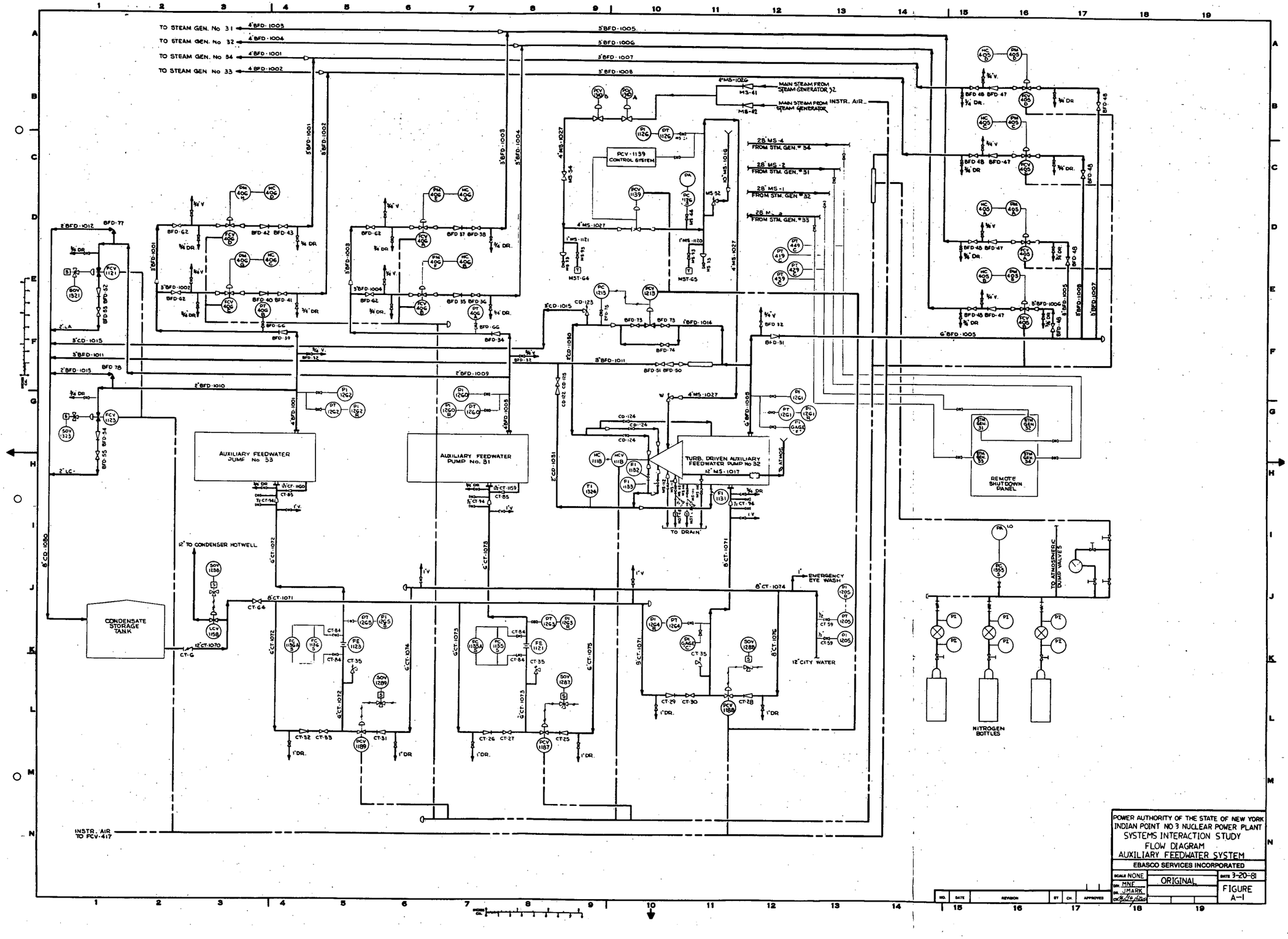
FIGURE A-2.3



Power Authority of the State of New York
INDIAN POINT NO. 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY

ELECTRIC POWER SYSTEM DIAGRAM

FIGURE A-2.4

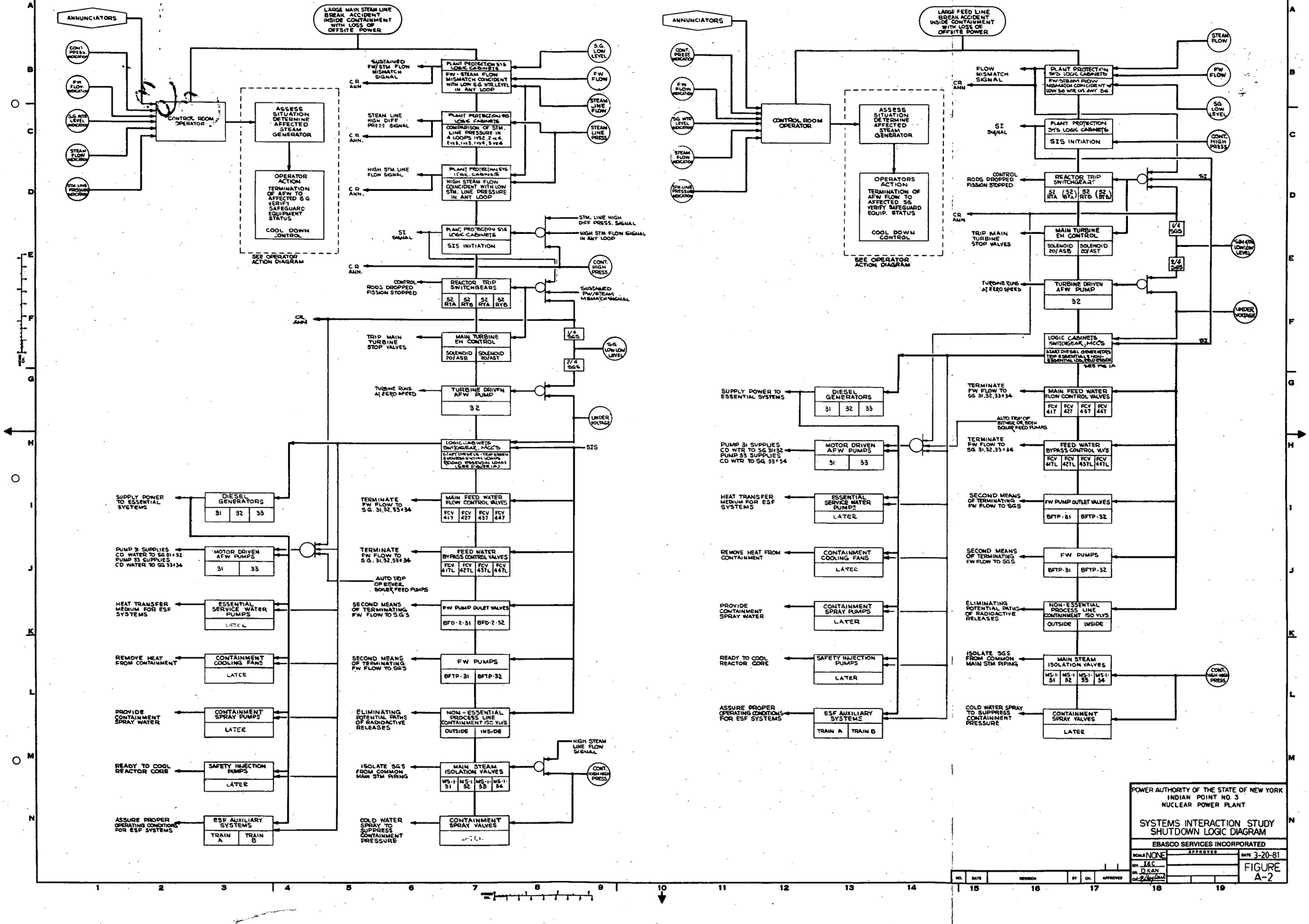


POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
FLOW DIAGRAM
AUXILIARY FEEDWATER SYSTEM
EBASCO SERVICES INCORPORATED

SCALE NONE
ORIGINAL
DATE 3-20-81
DR. MNF
DR. JMARK
CH. M. Go[illegible]

NO.	DATE	REVISION	BY	CH.	APPROVED

FIGURE A-1


LARGE MAIN STEAM LINE BREAK ACCIDENT INSIDE CONTAINMENT WITH LOSS OF OFFSITE POWER
ANNUNCIATORS
CONT. PRESS. INDICATOR
FW FLOW INDICATOR
S.G. WTR LEVEL INDICATOR
STEAM FLOW INDICATOR
STM. LINE PRESSURE INDICATOR
CONTROL ROOM OPERATOR
ASSESS SITUATION DETERMINE AFFECTED STEAM GENERATOR
OPERATOR ACTION
TERMINATION OF AFW TO AFFECTED S G
VERIFY SAFEGUARD EQUIPMENT STATUS
COOL DOWN CONTROL
SEE OPERATOR ACTION DIAGRAM
SUSTAINED FW/STM FLOW MISMATCH SIGNAL
C R ANN
PLANT PROTECTION SYS LOGIC CABINETS
FW-STEAM FLOW MISMATCH COINCIDENT WITH LOW S.G. WTR LEVEL IN ANY LOOP
S.G. LOW LEVEL
FW FLOW
STEAM LINE FLOW
STEAM LINE PRESS
STEAM LINE HIGH DIFF PRESS SIGNAL
PLANT PROTECTION SYS LOGIC CABINETS
COINCIDENCE OF STM. LINE PRESSURE IN 4 LOOPS 1 VS 2, 2 VS 4, 1 VS 3, 1 VS 4, 3 VS 4
HIGH STM. LINE FLOW SIGNAL
PLANT PROTECTION SYS LOGIC CABINETS
HIGH STEAM FLOW COINCIDENT WITH LOW STM. LINE PRESSURE IN ANY LOOP
STM. LINE HIGH DIFF PRESS. SIGNAL
HIGH STM. FLOW SIGNAL IN ANY LOOP
SI SIGNAL
PLANT PROTECTION SYS LOGIC CABINETS
SIS INITIATION
CONT. HIGH PRESS.
CONTROL RODS DROPPED FISSION STOPPED
REACTOR TRIP SWITCHGEARS
52 RTA
52 RTB
52 RTA
52 RTB
SUSTAINED FW/STEAM MISMATCH SIGNAL
TRIP MAIN TURBINE STOP VALVES
MAIN TURBINE EH CONTROL
SOLENOID 20/ASB
SOLENOID 20/AST
1/4 SGS
2/4 SGS
S-G LOW LOW LEVEL
TURBINE RUNS AT ZERO SPEED
TURBINE DRIVEN AFW PUMP
32
UNDER VOLTAGE
LOGIC CABINETS SWITCHGEAR, MCCS
SIS
SUPPLY POWER TO ESSENTIAL SYSTEMS
DIESEL GENERATORS
31
32
33
TERMINATE FW FLOW TO S.G. 31, 32, 33 & 34
MAIN FEED WATER FLOW CONTROL VALVES
FCV 417
FCV 427
FCV 437
FCV 447
PUMP 31 SUPPLIES CD WTR TO SG 31 & 32
PUMP 33 SUPPLIES CD WTR TO SG 33 & 34
MOTOR DRIVEN AFW PUMPS
31
33
AUTO TRIP OF EITHER BOILER FEED PUMPS
TERMINATE FW FLOW TO S.G. 31, 32, 33 & 34
FEED WATER BYPASS CONTROL VALVES
FCV 417L
FCV 427L
FCV 437L
FCV 447L
HEAT TRANSFER MEDIUM FOR ESF SYSTEMS
ESSENTIAL SERVICE WATER PUMPS
LATER
SECOND MEANS OF TERMINATING FW FLOW TO S.G.S
FW PUMP OUTLET VALVES
BFD-2-31
BFD-2-32
REMOVE HEAT FROM CONTAINMENT
CONTAINMENT COOLING FANS
LATER
SECOND MEANS OF TERMINATING FW FLOW TO S.G.S
FW PUMPS
BFTP-31
BFTP-32
PROVIDE CONTAINMENT SPRAY WATER
CONTAINMENT SPRAY PUMPS
LATER
ELIMINATING POTENTIAL PATHS OF RADIOACTIVE RELEASES
NON-ESSENTIAL PROCESS LINE CONTAINMENT ISO VLVS
OUTSIDE
INSIDE
READY TO COOL REACTOR CORE
SAFETY INJECTION PUMPS
LATER
ISOLATE SGS FROM COMMON MAIN STM PIPING
MAIN STEAM ISOLATION VALVES
MS-1-31
MS-1-32
MS-1-33
MS-1-34
HIGH STEAM LINE FLOW SIGNAL
CONT. HIGH HIGH PRESS.
ASSURE PROPER OPERATING CONDITIONS FOR ESF SYSTEMS
ESF AUXILIARY SYSTEMS
TRAIN A
TRAIN B
COLD WATER SPRAY TO SUPPRESS CONTAINMENT PRESSURE
CONTAINMENT SPRAY VALVES
LATER
LARGE FEED LINE BREAK ACCIDENT INSIDE CONTAINMENT WITH LOSS OF OFFSITE POWER
ANNUNCIATORS
CONT. PRESS INDICATOR
FW FLOW INDICATOR
S.G. WTR LEVEL INDICATOR
STEAM FLOW INDICATOR
STM. LINE PRESSURE INDICATOR
CONTROL ROOM OPERATOR
ASSESS SITUATION DETERMINE AFFECTED STEAM GENERATOR
OPERATORS ACTION
TERMINATION OF AFW FLOW TO AFFECTED SG
VERIFY SAFEGUARD EQUIP. STATUS
COOL DOWN CONTROL
SEE OPERATOR ACTION DIAGRAM
FLOW MISMATCH SIGNAL
C R ANN
PLANT PROTECTION SYS LOGIC CABINETS
FW-STEAM FLOW MISMATCH COINCIDENT W/ LOW SG WTR LVL IN ANY SG
STEAM FLOW
FW FLOW
SG LOW LEVEL
SI SIGNAL
PLANT PROTECTION SYS LOGIC CABINETS
SIS INITIATION
CONT. HIGH PRESS
CONTROL RODS DROPPED FISSION STOPPED
REACTOR TRIP SWITCHGEARS
52 RTA
52 RTA
52 RTB
52 RTB
TRIP MAIN TURBINE STOP VALVES
MAIN TURBINE EH CONTROL
SOLENOID 20/ASB
SOLENOID 20/AST
1/4 SGS
2/4 SGS
S-G LOW LOW LEVEL
TURBINE RUNS AT ZERO SPEED
TURBINE DRIVEN AFW PUMP
32
UNDER VOLTAGE
LOGIC CABINETS SWITCHGEAR, MCCS
SEE PG 1A
SUPPLY POWER TO ESSENTIAL SYSTEMS
DIESEL GENERATORS
31
32
33
TERMINATE FW FLOW TO SG 31, 32, 33 & 34
MAIN FEED WATER FLOW CONTROL VALVES
FCV 417
FCV 427
FCV 437
FCV 447
AUTO TRIP OF EITHER OR BOTH BOILER FEED PUMPS
PUMP 31 SUPPLIES CD WTR TO SG 31 & 32
PUMP 33 SUPPLIES CD WTR TO SG 33 & 34
MOTOR DRIVEN AFW PUMPS
31
33
TERMINATE FW FLOW TO SG 31, 32, 33 & 34
FEED WATER BYPASS CONTROL VLVS
FCV 417L
FCV 427L
FCV 437L
FCV 447L
HEAT TRANSFER MEDIUM FOR ESF SYSTEMS
ESSENTIAL SERVICE WATER PUMPS
LATER
SECOND MEANS OF TERMINATING FW FLOW TO SGS
FW PUMP OUTLET VALVES
BFTP-31
BFTP-32
REMOVE HEAT FROM CONTAINMENT
CONTAINMENT COOLING FANS
LATER
SECOND MEANS OF TERMINATING FW FLOW TO SGS
FW PUMPS
BFTP-31
BFTP-32
PROVIDE CONTAINMENT SPRAY WATER
CONTAINMENT SPRAY PUMPS
LATER
ELIMINATING POTENTIAL PATHS OF RADIOACTIVE RELEASES
NON-ESSENTIAL PROCESS LINE CONTAINMENT ISO VLVS
OUTSIDE
INSIDE
READY TO COOL REACTOR CORE
SAFETY INJECTION PUMPS
LATER
ISOLATE SGS FROM COMMON MAIN STM PIPING
MAIN STEAM ISOLATION VALVES
MS-1-31
MS-1-32
MS-1-33
MS-1-34
CONT. HIGH HIGH PRESS.
ASSURE PROPER OPERATING CONDITIONS FOR ESF SYSTEMS
ESF AUXILIARY SYSTEMS
TRAIN A
TRAIN B
COLD WATER SPRAY TO SUPPRESS CONTAINMENT PRESSURE
CONTAINMENT SPRAY VALVES
LATER
POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3
NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
SHUTDOWN LOGIC DIAGRAM
EBASCO SERVICES INCORPORATED
SCALE NONE
APPROVED
DATE 3-20-81
DSN T&C
DR D KAN
CH
FIGURE A-2
NO.
DATE
REVISION
BY
CH.
APPROVED

REACTOR FIRST TRIP OUT ALARM

FROM STEAM OR FEEDWATER LINE BREAK ASSESSMENT PLAN

VERIFY REACTOR TRIP BREAKERS
IF NOT OPEN TRIP BREAKERS

VERIFY THAT AFW FLOW CONTROL VALVES AND STEAM CONTROL VALVES ARE CLOSED
IF NOT CLOSED CLOSE VALVES

AFFECTED STEAM GENERATOR
CLOSE ALL AFW CONTROL VALVES

VERIFY THAT MAIN FEEDWATER PUMPS ARE TRIP
IF NOT TRIPPED TRIP PUMPS

RESPONSE

VALVE IN LINE FROM MOTOR DRIVEN AFW PUMP NOT CLOSED

VALVE IN LINE FROM AFW PUMP No 32 NOT CLOSED

ALL VALVES CLOSED

VERIFY AFW PUMPS 31, 32, 33 OPERATION
IF PUMPS NOT RUNNING START PUMPS

VERIFY AFW PUMP No 32 OPERATION
IF RUNNING TRIP TURBINE

VERIFY OTHER AFW PUMPS OPERATION
IF NOT RUNNING START PUMPS

VERIFY AFFECTED MOTOR DRIVEN PUMP OPERATION
IF RUNNING STOP PUMP

VERIFY SECOND MOTOR DRIVEN PUMP OPERATION
IF NOT RUNNING START PUMP

OPERATING STATUS

TWO MOTOR DRIVEN PUMPS RUNNING OR ONE MOTOR DRIVEN PUMP RUNNING

TURBINE DRIVEN PUMP RUNNING

ALL VALVES CLOSED

CLOSE AFW VALVES IN LINES FROM AFW PUMP 32 TO GOOD STEAM GENERATOR

AUX FEEDWATER INDICATORS
VERIFY AFW FLOW TO GOOD STEAM GENERATORS
AT LEAST TWO STEAM GENERATORS ARE NEEDED

VERIFY MIN. FLOW CONTROL OF AFW PUMP No 32
IF NEGATIVE TRIP TURBINE

STEAM GENERATOR LEVEL INDICATORS
AFW VALVE CONTROLLERS
ADJUST CONTROLLERS TO MAINTAIN STEAM GEN. LEVEL

STEAM LINE PRESSURE INDICATOR
ATMOSPHERIC DUMP OR CONDENSER DUMP VALVE CONTROLLERS
ADJUST CONTROLLERS TO DECREASE STEAM PRESSURE

MAIN STEAM ISOLATION VALVES POSITION

CONDENSER AVAILABILITY

VERIFY REACTOR COOLANT COOL DOWN RATE

IS STEAM PRESSURE AT 350 PSIA?

NO

YES

GO TO RHR SYSTEM

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO 3
NUCLEAR POWER PLANT
SHUTDOWN LOGIC DIAGRAM
SYSTEMS INTERACTION STUDY

EBASCO SERVICES INCORPORATED

SCALE NONE

APPROVED

DATE 3-20-81

FIGURE A-5

NO.	DATE	REVISION	BY	CK.	APPROVED

FEED LINE BREAK OUTSIDE CONTAINMENT WITH LOSS OF OFFSITE POWER

CONT. PRESS. INDICATION

FW FLOW INDICATION

SG WATER LEVEL INDICATION

CONTROL ROOM OPERATOR

ASSESS SITUATION DETERMINE AFFECTED SG

OPERATOR ACTION

SEE ACTION DIAGRAM

SUSTAINED FLOW MISMATCH SIGNAL

CR ANN.

PLANT PROTECTION SYS LOGIC CABINET

FW-STEAM FLOW MISMATCH COINCIDENT WITH LOW SG LEVEL IN ANY STM GEN

STEAM FLOW

FW FLOW

SG LOW LEVEL

CONTROL ROD DROPPED FISSION STOPPED

REACTOR TRIP SWITCHGEARS

52/RTA	52/RTB	52/RYA	52/RYB

UNDER VOLTAGE

REACTOR COOLANT PUMP ELECT BUS

TURBINE RUNS AT ZERO SPEED

TURBINE DRIVEN AFW PUMP

32

2/4 SGS

TRIP MAIN TURBINE STOP VLV'S

MAIN TURBINE EH CONTROL

SOLENOID 20/ASB	SOLENOID 20/AST

1/4 SGS

SG LOW-LOW LEVEL

SUPPLY POWER TO ESSENTIAL SYSTEMS

DIESEL GENERATORS

31	32	33

UNDER VOLTAGE

SEE FIGURE 1A

PUMP 31 SUPPLIES WATER TO SG 31 & 32
PUMP 33 SUPPLIES WATER TO SG 33 & 34

MOTOR DRIVEN AFW PUMPS

31	33

LOGIC CABINETS SWITCHGEAR & MCC'S

START EMERG DIESELS TRIP NON-ESSENTIAL LOADS, ETC

(SEE FIGURE 1A)

SI SIGNAL

EITHER OR BOTH BOILER FEED PUMPS AUTO TRIP

POVIDE SUPPORTING FUNCTIONS

ESF AUXILIARY SYSTEMS

TRAIN A	TRAIN B

EBASCO SERVICES INC.	POWER AUTHORITY OF THE STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT
DIV. MNE DR. DK DATE 3-20-9 CH. [illegible] SCALE NONE	SYSTEMS INTERACTION STUDY SHUTDOWN LOGIC
	FIGURE A-4

LOSS OF FEED WATER WITH LOSS OF OFFSITE POWER AND ONSITE POWER

CONT. PRESS. INDICATION

FW FLOW INDICATION

SG WATER LEVEL INDICATION

CONTROL ROOM OPERATOR

ASSESS SITUATION DETERMINE AFFECTED SG

OPERATOR ACTION

SEE ACTION DIAGRAM

SUSTAINED FLOW MISMATCH SIGNAL

CR ANN.

PLANT PROTECTION SYS LOGIC CABINET

FW - STEAM FLOW MISMATCH COINCIDENT WITH LOW SG LEVEL IN ANY STM GEN

STEAM FLOW

FW FLOW

SG LOW LEVEL

CONTROL ROD DROPPED FISSION STOPPED

REACTOR TRIP SWITCHGEARS

52 RTA (52 BTA) | 52 RTB (52 BTB)

UNDER VOLTAGE REACTOR COOLANT PUMP ELEC BUS

1/4 SG

2/4 SG

SG LOW-LOW LEVEL

TURBINE RUNS AT 'ZERO' SPEED

TURBINE DRIVEN AFW PUMP

32

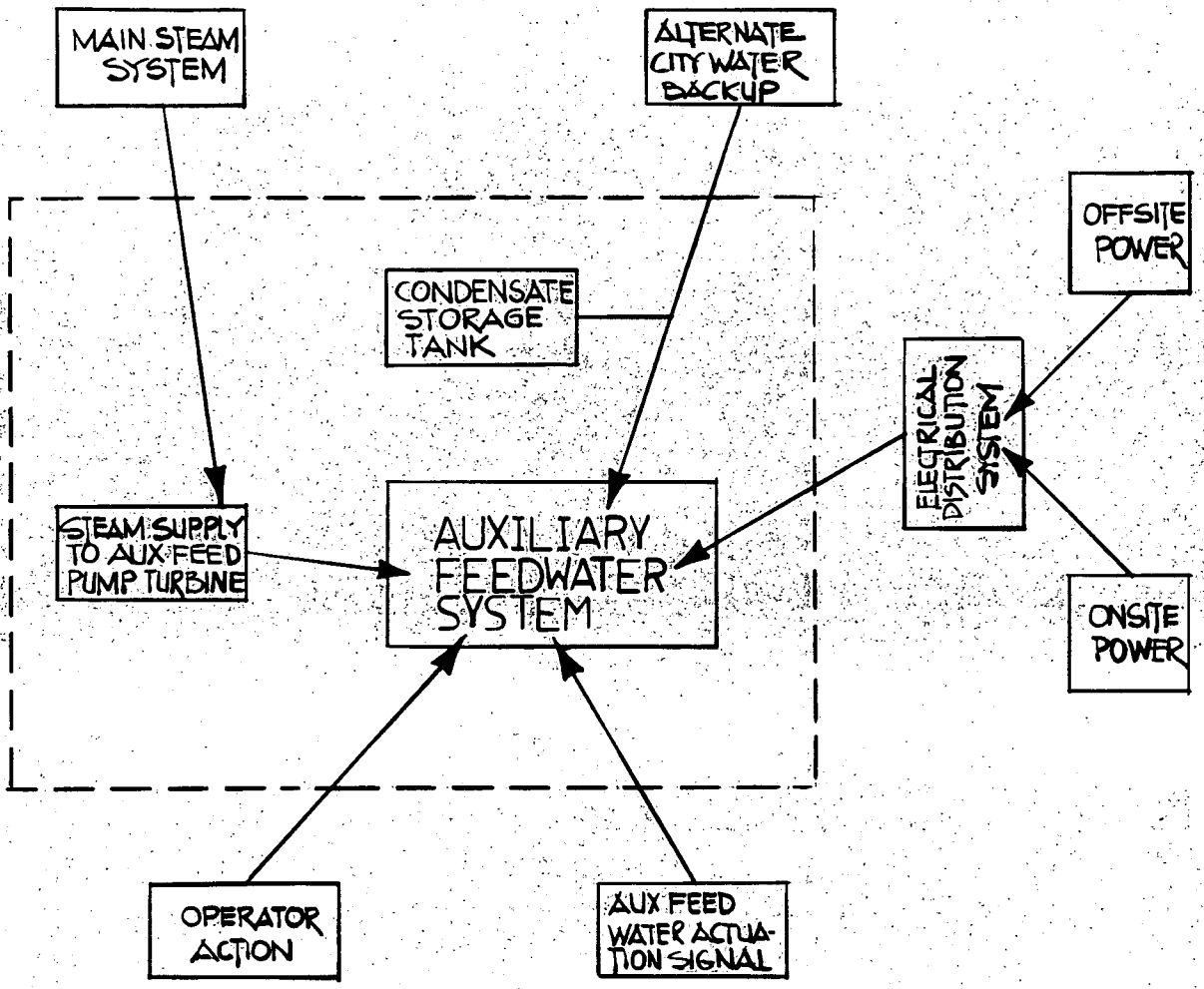
UNDER-VOLTAGE 480 V BUS 3A OR 3B

TRIP MAIN TURBINE STOP VLV'S

MAIN TURBINE EH CONTROL

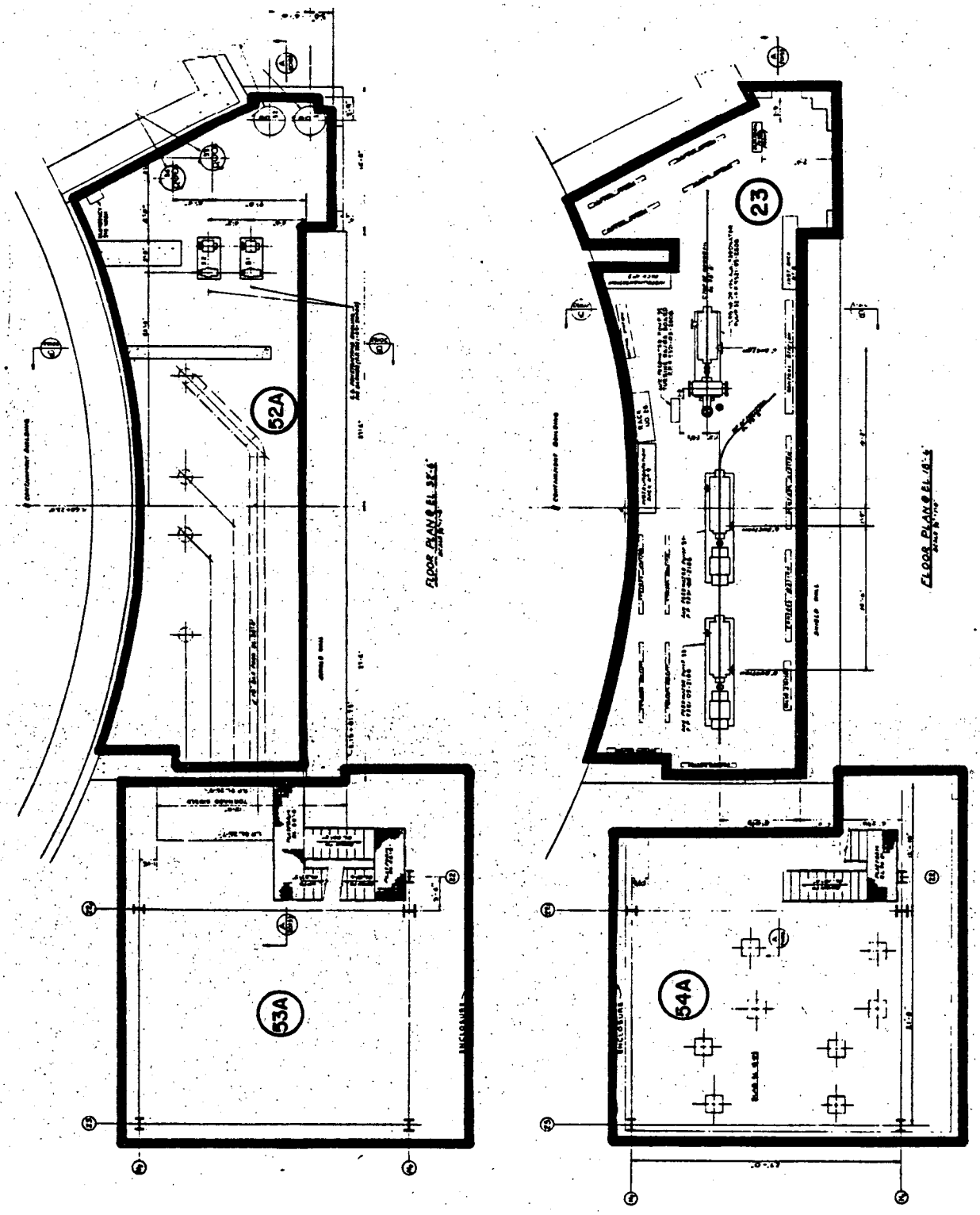
SOLENOID 20/ASB | SOLENOID 20/AST

EBASCO SERVICES INC.	POWER AUTHORITY OF THE STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	FIGURE A-5
DIV. I&C DR. DK DATE 3-20-81 CH [illegible] SCALE NONE	SYSTEMS INTERACTION STUDY SHUTDOWN LOGIC	



INCHES 0 1 2 3 4 5
CM. 0 1 2

EBASCO SERVICES INCORPORATED	POWER AUTHORITY OF THE STATE OF NEW YORK	FIGURE A-6
DIV. MNE DR. MG DATE 3-20-81 CH. LG SCALE NONE APPROVED	INDIAN POINT NO 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY AFS STUDY BOUNDARY	

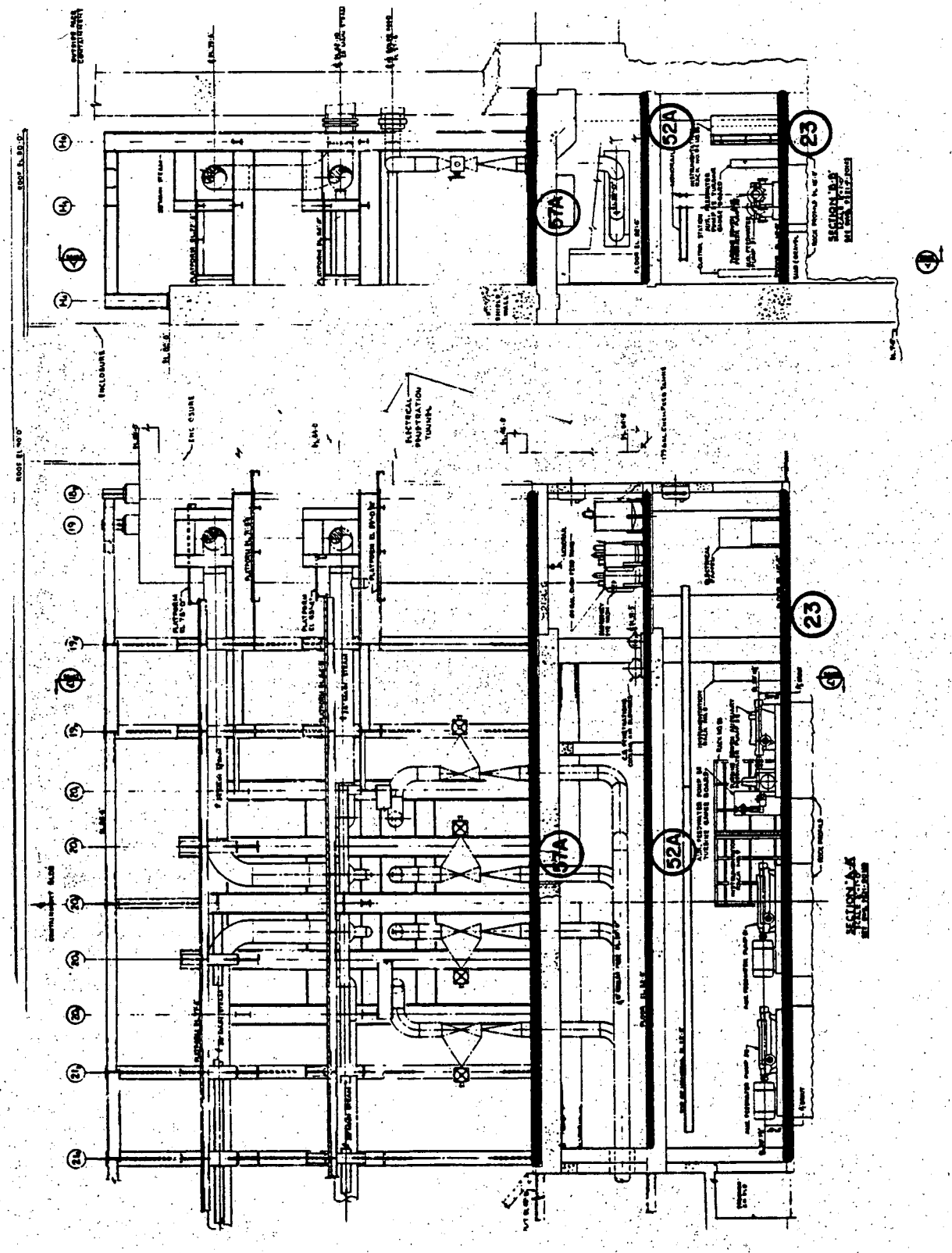


Reprinted From Figure 9-3-25
IP-3 Fire Hazards Analysis
Revision 1, April 1977

Power Authority of the State of New York
INDIAN POINT NO. 3

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM

FIRE ZONES



Reprinted From Figure 9-3-26
IP-3 Fire Hazards Analysis
Revision 1, April 1977

Power Authority of the State of New York
INDIAN POINT NO. 3

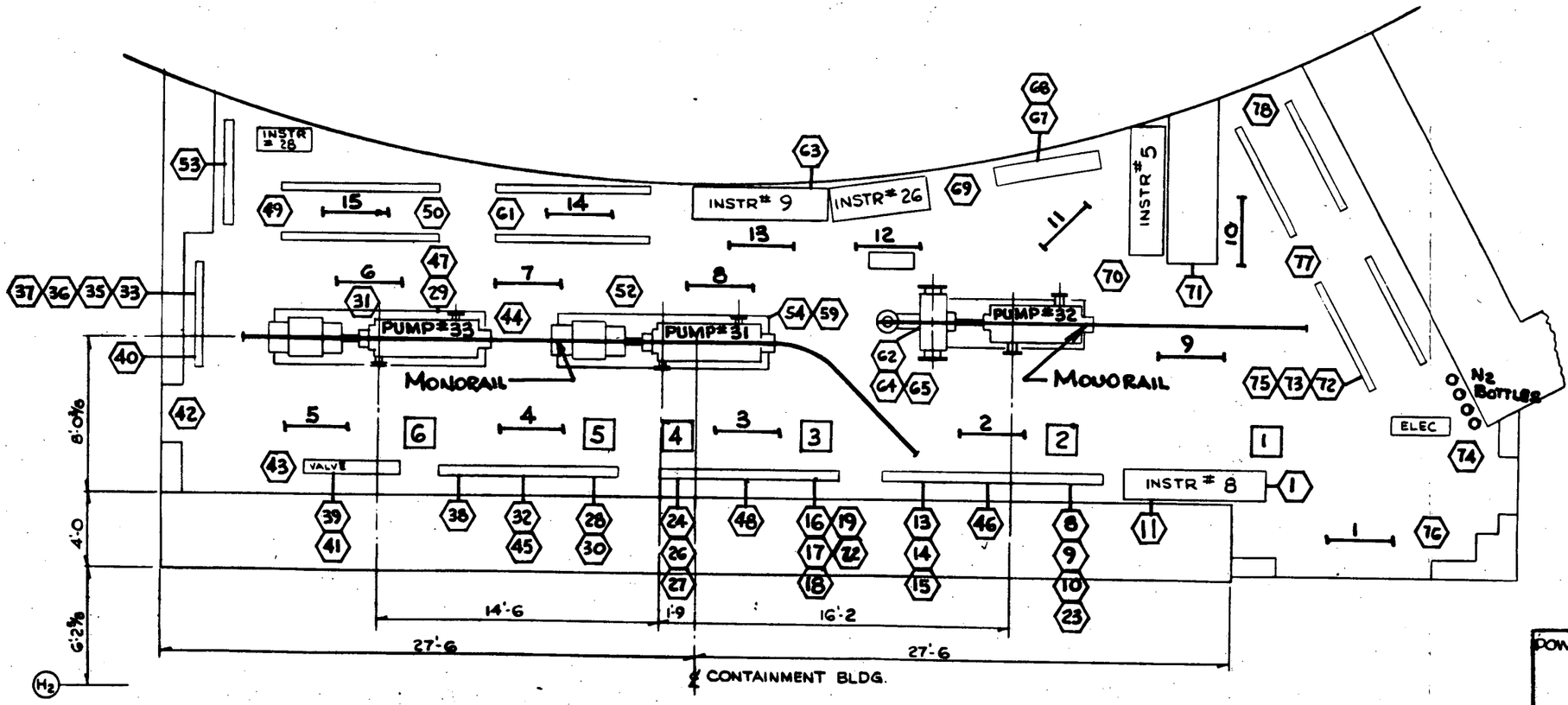
SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER SYSTEM

FIRE ZONES

(No) PICTURE NUMBER

No LIGHT FIXTURE

[No] SPACE HEATER



PLAN EL 18'-6

INCHES CM.

INCHES CM.

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER BUILDING

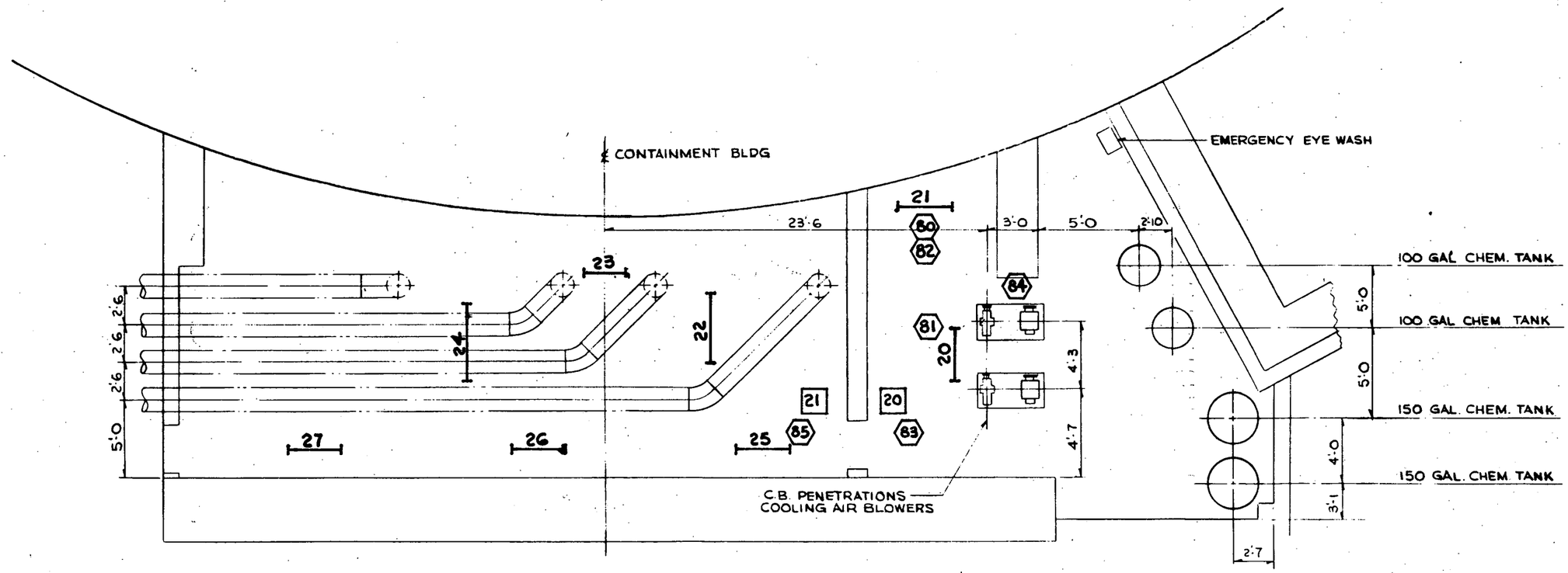
EBASCO SERVICES INCORPORATED

SCALE NONE	APPROVED	DATE 3/24/81
DIV MNE		
DR. MG		FIGURE A-TM.1
CH. [illegible]		

(No) PICTURE NUMBER

No. LIGHTING FIXTURE

[No] SPACE HEATER.



PLAN EL 32'-6

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER BUILDING

EBASCO SERVICES INCORPORATED

SCALE	APPROVED	DATE
DIV		
DR		
CH		

FIGURE A-7M.2

INCHES CM.

SOURCE

VALVES

		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
		ELEC. BOX FM-279	ELEC. BOX SX-2	EUH 311	ELEC. BOX SX-1	WALL BOX THERMAL COUPLE 321 & 322	SPACE HTR #3	LIGHT #3	SPACE HTR #4	4" DR. LINE	ELEC. BOX SX-3	SPACE HTR #6				
	8"CT-1074															
38	CT-83 (1"VENT)											38				
	6"CT-1074															
39	CT-82 (1" DR.)															
40	CT-31									26	30					
41	PCV-1189									26	30					
42	SOV-1289									26	30					
	6"CT-1075															
43	CT-8 (1" DR.)															
44	CT-25 (CHECK)			17	17	17	18	19	19							
45	PCV-1187			17	17	17	18	19	19							
46	SOV-1287															
	8"CT-1076															
47	CT-82 (1" DR.)															
48	CT-28	08	09													

TARGETS

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. V4
DIV. NUE DR. MG	APPROVED	SYSTEMS INTERACTION STUDY	
DATE 3/4/81 CH.		INTERACTION MATRIX	SHEET 9/39
SCALE None			

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-02-48-09

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Elect Box SX-2

(Target) CT-28, check valve

DESCRIPTION OF POSTULATED INTERACTION:

Elect box fails from support and hits CT-28 check valve.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass

V. Foglianti 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-03-44-17, 09-03-45-17, 09-04-44-17, 09-04-45-17

INTERACTION SKETCH NO.: 09-05-44-17, 09-05-45-17

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) EUH # 311, ELECT BOX SX-1, ELECT BOX 321 & 322, SPACE HTR #3
LIGHT FIXTURE #3, SPACE HEATER #4

(Target) CT-25 Check Valve

DESCRIPTION OF POSTULATED INTERACTION:

Sources identified fail from support and hit CT-25 check valve.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - check valve cannot be damaged by source items

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-06-44-18, 09-06-45-18

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Space heater #3
(Targ-t) CT-25 check valve
PCV-1187

DESCRIPTION OF POSTULATED INTERACTION:

Space heater #3 fails from support and hits CT-25 and PCV-1187

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - PCV-1187 can be damaged and lose functionability

W Goghari 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: ~~09-07-45-19~~, 09-07-45-19, ~~09-08-45-19~~, 09-08-45-19

INTERACTION SKETCH NO.: A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) lighting fixture #3, Space heater #4
(Target) PCV-1187

DESCRIPTION OF POSTULATED INTERACTION:
lighting fixture and space heater #4 fall from supports and hit PCV-1187

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable interaction — loss of function is credible.

V Joglarski 2/9/81
Interaction Engineer/Date

Ralph J Drago 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-09-40-26, 09-09-41-26, 09-09-42-26

INTERACTION SKETCH NO.:

AS-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" plumbing drain line

(Target) CT-31, PCV-1189 w SOV-1289

DESCRIPTION OF POSTULATED INTERACTION:

4" plumbing drain line fails from support and hits CT-31 and PCV-1189/w SOV-1289

EVALUATION & DISPOSITION OF INTERACTION:

09-09-40-26 is Acceptable - no damage
Interaction with PCV-1189 w/SOV-1289 is unacceptable - loss of function is credible

N. Gaglianti 2/9/81
Interaction Engineer/Date

Ralph J. Drago 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-10-40-30, 09-10-41-30, 09-10-42-30

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical conduit box SX-3

(Target) CT-31, PCV-1189 w/SOV-1289

DESCRIPTION OF POSTULATED INTERACTION:

Elect box fails and hits CT-31, PCV-1189 w/SOV-1289

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable - SX-3 is associated with PCV-1189 and SOV-1289

M Gaylard 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 09-11-38-38

INTERACTION SKETCH NO.: A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

SOURCE

VALVES

		01	02	03	04	05
		ELEC. BOX 232 & CONDUIT	LIGHT #4	MONO RAIL	4" CONDUIT	SPACE HTR #5
	6"CT-1073					
26	CT-82 (1" DR.)					
27	CT-26	24				
28	CT-27	24				
29	CT-35 (RELIEF)					
30	CT-84 (INSTR.)					
31	CT-84 (INSTR.)					
32	CT-59 (½ INSTR.)					
33	CT-83 (1" VENT)					
34	CT-94		48	48	48	48
35	CT-94		48	48	48	48
36	CT-98 (¾" DR.)					
	1½"CT-1159					
37	CT-85					

TARGETS

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. V3
DIV. NUE DR. MG DATE 3/4/81 CH MF SCALE NONE	APPROVED		SHEET 8/39

INCHES

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 08-01-27-24, 08-01-28-24

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Elect Conduit Box #232

(Target) CT-26, CT-27

DESCRIPTION OF POSTULATED INTERACTION:

Conduit box fails from support and hits CT-26 and CT-27

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction. Insufficient mass to cause loss of function.

N Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 08-02-34-48, 08-02-35-48

INTERACTION SKETCH NO.:

AS-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 08-03-34-48, 08-03-35-48

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 08-04-34-48, 08-04-35-48

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 08-05-34-48, 08-05-35-48

INTERACTION SKETCH NO.: A 5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

SOURCE

TARGETS

	VALVES	01 Switch Boxes & Conduit	02 Mono Rail	03 Light #5	04 4"&1½" Conduit	05
	6" CT-1072					
14	CT-82 (1" DR.)					
15	CT-32	32				
16	CT-33	32				
17	CT-35 (RELIEF)					
18	CT-84 (INSTR.)					
19	CT-84 (INSTR.)					
20	CT-83 (1" VENT)					
21	CT-94		45	45	45	
22	CT-94		45	45	45	
23	CT-98 (3/4" DR.)					
	1½" CT-1160					
24	CT-85					
	6" CT-1072					
25	CT-59 (½" INSTR.		45	45	45	

BUILDING: XFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. V2
DIV. MVE DR. MG DATE 3/24/81 CH SCALE NONE	APPROVED		SHEET 7/39

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 07-01-15-32, 07-01-16-32

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Switch Box & conduit

(Target) CT-32, CT-33

DESCRIPTION OF POSTULATED INTERACTION:

Switch box fails from support and hits CT-32 and CT-33

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass to cause loss of function

N Goglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 07-02-21-45, 07-02-22-45, 07-02-25-45

INTERACTION SKETCH NO.:
X5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

D

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 07-03-21-45, 07-03-22-45, 07-03-25-45

INTERACTION SKETCH NO.:

AS-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 07-04-21-45, 07-04-22-45, 07-04-25-45

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

SOURCE

VALVES

TARGETS

		01 Wall SW Box	02 Exide Ltg. & Box	03 PSSW for HTR EUH 310	04 Speaker	05 Elec. Box & Q 27 Conduit	06 Mono Rail	07 Light #2	08 4" Conduit	09
	~~12" CT 1070~~									
01	CT-6									
	~~8" CT 1071~~									
02	CT-64 (HDR.)				39 ✓	39 ✓				
03	CT-82 (1" DR)									
04	CT-29	13 ✓	13 ✓	13 ✓						
05	CT-30	13 ✓	13 ✓	13 ✓						
06	CT-35 (RELIEF)									
07	CT-84 (INSTR.)									
08	CT-84 (INSTR.)									
09	CT-83 (1" VENT)									
10	CT-94						46	46	46	
11	CT-94						46	46	46	
12	CT-98 (¾" DR.)									
13	CT-83 (1" VENT)									

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. NUE DR. MG

DATE 3/14/8 CH. MF

SCALE NONE

APPROVED

COUNTY OF STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. VI

SHEET 6/39

INCHES

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-01-04-13, 06-01-05-13

INTERACTION SKETCH NO.:

5A-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Wall Box

(Target) CT-29, CT-30

DESCRIPTION OF POSTULATED INTERACTION:

Wall box fails from support and hits CT-29 & CT-30

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction. Insufficient mass

N Laguardi 2/9/81
Interaction Engineer/Date

R J Drago
Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-02-04-13, 06-02-05-13

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Exide lighting Box
(Target) CT-29, CT-30

DESCRIPTION OF POSTULATED INTERACTION:
lighting box fails from wall support and hits CT-29 and CT-30

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - insufficient mass

M Goglia 2/9/81
Interaction Engineer/Date

R J Drago
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-03-04-13, 06-03-05-13

INTERACTION SKETCH NO.:
AS-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Unit Heater #310
(Target) CT-29, CT-30

DESCRIPTION OF POSTULATED INTERACTION:
Unit heater #310 fails from supports and hits CT-29, CT-30

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - no damage possible

V Goglia 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-04-02-39

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Paging Speaker
(Target) CT-64 w/ limit switches

DESCRIPTION OF POSTULATED INTERACTION:
Paging speaker fails from support and hits CT-64 w/ limit switches

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable interaction - speaker can damage limit switches which are required for status indication.

V Goglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-05-02-39

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Box Q-27
(Target) CT-64 w/ limit switches

DESCRIPTION OF POSTULATED INTERACTION:

electrical box Q-27 fails from support and hits CT-64 /w limit switches

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction. Valve status indication is necessary for safe plant operation.

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-06-10-46, 06-06-11-46

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Monorail
(Target)

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date
4/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-07-10-46, 06-07-11-46

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 06-07-10-46, 06-07-11-46

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

DESCRIPTION OF POSTULATED INTERACTION:

EVALUATION & DISPOSITION OF INTERACTION:

Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

SOURCE

TARGETS

LINE		01 ELEC. BOX SE-G	02 LIGHT #20	03 LIGHT #21	04 ELEC. PANEL	05 SPACE HTR #20	06 SPACE HTR #21	07 LIGHT FIXTURES 22, 23 & 24	08	09	10
101	4" BFD-1001	80/82	81		84	83	85	85			
102	4" BFD-1002	80/82	81		84	83	85	85			
103	4" BFD-1003	80/82	81	82				85			
104	4" BFD-1004	80/82	81	82				85			
105	4" MS-1027	80/82		82							
106	10" MS-1016	80/82		82							
107	12" MS-1017	80/82	81								

BUILDING: AUXILIARY FEEDPUMP BUILDING

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED			POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. LS
DIV. MNE DR. MG	APPROVED			SHEET 5/22
DATE 3/4/81 CH. MF				
SCALE NONE				

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-01-101-80/82, 05-01-102-80/82, 05-01-103-80/82, 05-01-104-80/82, 05-01-105-80/82, 05-01-106-80/82, 05-01-107-80/82

INTERACTION SKETCH NO.: ~~52A~~ A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Conduit Box 52-6

(Targets) 4" BFD-1001, 1002, 1003, 1004
4" MS-1027
10" MS-1016
12" MS-1017

DESCRIPTION OF POSTULATED INTERACTION:

Conduit box fails from support and hits various pipes.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient size and mass to damage targets

W. Gogliardi
Interaction Engineer/Date

RJ Drago
Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-02-101, 05-02-102, 05-02-103, 05-02-104,

INTERACTION SKETCH NO.: 05-02-107-81

A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture #20

(Target) 4" BFD-1001, 1002, 1003, 1004

12" MS-1017

DESCRIPTION OF POSTULATED INTERACTION:

light fixture fails from support and hits 4" BFD-1001, 1002, 1003, 1004 and 12" MS-1017

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/12/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-03-103-B2, 05-03-104-B2, 05-03-105-B2, 05-03-106 B2

INTERACTION SKETCH NO.:

A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Lighting fixture #21

(Target) 4" BFD-1003, 1004

4" MS-1007, 10" MS-1016

DESCRIPTION OF POSTULATED INTERACTION:

Lighting fixture fails from support and hits 4" BFD-1003 and 4" BFD-1004, and 4" MS-1007, 10" MS-1016

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction on sufficient mass

M Gaeta 2/9/91
Interaction Engineer/Date

Reviewer/Date
2/10/91

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-04-101-84, 05-04-102-84

INTERACTION SKETCH NO.:
A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Electrical Lighting Panel
(Target) 4"BFD-1001
4"BFD-1002

DESCRIPTION OF POSTULATED INTERACTION:
Lighting panel fall from support and hits 4"BFD-1001 and 4"BFD-1002

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - insufficient mass

M Gagliardi 2/9/81
Interaction Engineer/Date

R J Drago
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-05-101-83, 05-05-102-83

INTERACTION SKETCH NO.: A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Space Heater #20
(Target) 4"BFD-1001
4"BFD-1002

DESCRIPTION OF POSTULATED INTERACTION:
Space heater #20 falls from support and hits 4"BFD-1001 and 4"BFD-1002

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable interaction - space heater #20 can cause loss of function of lines.

N Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-06-101-85, 05-06-102-85

INTERACTION SKETCH NO.: A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Space Heater #21

(Target) 4" BFD-1001

4" BFD-1002

DESCRIPTION OF POSTULATED INTERACTION:

Space heater #21 fails from support and hits 4" BFD-1001 & 1002

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - loss of function credible

M Gagliardi 2/9/81
Interaction Engineer/Date

R J Drago 4/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 52A

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 05-07-101-85, 05-07-102-85, 05-07-103-85

INTERACTION SKETCH NO.: 05-07-104-85

A5-2

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) lighting fixtures 22, 23, 24
(Targets) 4" BFD-1001, 1002, 1003, 1004

DESCRIPTION OF POSTULATED INTERACTION:
light fixtures fail from supports and hits 4" BFD-1001, 1002, 1003, 1004

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interactions - insufficient mass

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

SOURCE

LINE

TARGETS

		01 4" Conduit	02 Light #4	03 Light #15	04 Light #8	05 5" Conduit	06 3" Conduit	07 Light #14	08 Wall Lighting & Conduit	09 Conduits From Rack 9126
06	6" CT-1073	48	48							
13	3" BFD-1001			49/50						
14	3" BFD-1002			49/50						
15	4" BFD-1003				54/59	54/59	54/59			
16	3" BFD-1003							61	61	63
17	3" BFD-1004							61	61	

BUILDING: Auxiliary Feed Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT NO. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. L 4
DIV. NUE DR. 36 DATE 3/24/81 CH. SCALE NONE	APPROVED		SHEET 4/39

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-01-06-48

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" Electrical conduit

(Target) 6" CT-1073

DESCRIPTION OF POSTULATED INTERACTION:

4" electrical conduit fails from support and hits 6" CT-1073

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, elect conduit is of insufficient size and mass to damage 6" CT-1073

M Gagliardi 2/9/81
Interaction Engineer/Date

R J Drag
Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-02-06-48

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture #4

(Target) 6"CT-1073

DESCRIPTION OF POSTULATED INTERACTION:

lighting fixture # 4 fails from support and hits 6"CT-1073

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - lighting fixture is of insufficient size and mass to damage 6"CT-1073

M Joglekar 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/12/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-03-13-49/50, 04-03-14-49/50

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture #15

Target) 3" BFD-1001
3" BFD-1002

DESCRIPTION OF POSTULATED INTERACTION:

lighting fixture #15 fails from support and hits 3" BFD-1001 and 3" BFD-1002

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - Insufficient mass to damage 3" BFD-1001 & 1002

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-04-15-54/59

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Lighting fixture #8
(Target) 4" BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:
Light fixture #8 fails from support and hits 4" BFD-1003

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - insufficient mass

M Gorlewski 2/9/81
Interaction Engineer/Date

R J Longo
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-05-15-54/59

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) 5" Elect Conduit
(Target) 4" BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:
5" electrical conduit fails from supports and hits 4" BFD-1003

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable interaction. 5" conduit can cause loss of function of 4" BFD-1003

M Goglia 2/9/89
Interaction Engineer/Date

Reviewer/Date
2/10/89

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-06-15-54/59

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 3" electrical conduit

(Target) 4" BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:

3" electrical conduit fails from support and hits 4" BFD-1003

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient size and mass to damage 4" BFD-1003

M Gagliardi 2/9/81
Interaction Engineer/Date

RJ Dongo
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-07-16-61, 04-07-17-61

INTERACTION SKETCH NO.: A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture # 14
(Target) 3" BFD-1003
3" BFD-1004

DESCRIPTION OF POSTULATED INTERACTION:

light fixture fails from supports and hits 3" BFD-1003 and 3" BFD-1004

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient size and mass

[signature] 2/9/81
Interaction Engineer/Date

[signature] 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-08-16-61, 04-08-17-61

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Wall lighting fixture and conduit

(Target) 3" BFD-1003

3" BFD-1004

DESCRIPTION OF POSTULATED INTERACTION:

Wall lighting fixture fails from support and hits 3" BFD-1003 and 3" BFD-1004

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass

W. Joglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump BLG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 04-09-16-63

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Conduits, Small < 2"

(Target) 3" BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:

Electrical conduit fails from support and hits 3" BFD-1003

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass

N Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

SOURCE

LINE

		01 ELEC. BOX SX-7	02 VENTILATION LOUVERS	03 3" CONDUIT	04 SECURITY ALARM BOX & CONDUIT	05 MONO RAIL	06 LIGHT #2	07 4" CONDUIT	08	09	10
31	2" CD-1031										
32	4" MS-1027			62		62 64 65	C4 / G5	C4 / G5			
33	1" MS-1120										
34	1" MS-1121										
35	10" MS-1016										
36	12" MS-1017										
37	2" LA (LINE)	36	40								
38	2" LC (LINE)		40	42	42						

TARGETS

BUILDING: Auxiliary Feed Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. L3 SHEET 3/39
DIV. MNE DR. MG DATE 3/24/81 CH. SD SCALE NONE	APPROVED		

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-01-37-36

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical box SX-7

(Target) 2"LA pump recirc line

DESCRIPTION OF POSTULATED INTERACTION:

electrical box SX-7 fails from support and hits 2"LA pump recirc line.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - elect box cannot damage 2"LA pump recirc line

[signature] 2/9/81
Interaction Engineer/Date

[signature] 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-02-37-40, 03-02-38-40

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Ventilation Louvers
(Target) 2" LA Recirc Line
2" LC Recirc Line

DESCRIPTION OF POSTULATED INTERACTION:
Ventilation louvers fail from support structure and hits 2" LA & LC recirculation lines.

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction, adequate isolation provisions exists

N. Gonardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-03-32-62, 03-03-38-42

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 3" Electrical Conduit

(Target) 4" MS-1027

2" LC recirculation line

DESCRIPTION OF POSTULATED INTERACTION:

3" electrical conduit fails from support and hits 4" MS-1027 line and 2" LC recirculation line.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, conduit is of insufficient size and mass to damage target

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-04-38-42

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Electrical conduit box
(Target) 2" LC Recirculation line

DESCRIPTION OF POSTULATED INTERACTION:
Electrical conduit box fails from support and hits 2" LC Recirculation line.

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction. conduit box is of insufficient mass to damage 2" recirculation line

Interaction Engineer/Date 2/9/81

Reviewer/Date 2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-05-32-62/64/65

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Monorail

(Target) 4" MS-1027

DESCRIPTION OF POSTULATED INTERACTION:

Mono rail fails from support and hits 4" MS-1027

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - loss of steam supply to turbine.

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 03-06-32-64/65

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture #2
(Target) 4" MS-1027

DESCRIPTION OF POSTULATED INTERACTION:

lighting fixture #2 fails from support and hits 4" MS-1027 steam supply line

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction. lighting fixture cannot damage 4" MS-1027 steam supply due to insufficient mass

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: Z3

LOCATION WITHIN FIRE ZONE: N/A

INTERACTION NO.: 03-07-32-64/65

INTERACTION SKETCH NO.:

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" Elect Conduit

(Target) 4" MS-1027

DESCRIPTION OF POSTULATED INTERACTION:

electrical conduit fails from support and hits 4" MS-1027 steam supply line.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - conduit is of insufficient mass to damage steam supply line.

[signature] 2/9/81
Interaction Engineer/Date

[signature] 2/10/81
Reviewer/Date

Ebasco Services Incorporated

SOURCE

LINE

		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
		2" CONDUIT	MONO RAIL	LIGHT #6	1½" CONDUIT	ELEC. BOX SX-7	VENTILATION LOUVERS	LIGHT #7	3" CONDUIT	MONO RAIL	LIGHT #8	4" DR. LINE	ELEC. BOX SX-6	LIGHT #11	LIGHT #12	3" CONDUIT	CONDUITS (SMALL)	SPEAKER	CONDUIT BOX	NITROGEN BOTTLES	SPACE HTR #1	ROLL-UP DOOR	TELEPHONE STA.	4" DR. LINE	CONDUITS FROM RACK 9 & 26	
16	3"BFD-1003																									
17	3"BFD-1004																								63	
18	6"BFD-1005													70	70	70/71	71									
19	3"BFD-1005																	72	73	74	75	76	77			
20	3"BFD-1006																	72	73	74	75	76	77			
21	3"BFD-1007																							78		
22	3"BFD-1008																							78		
23	2"BFD-1009						40		52	52	52	53	53													
24	2"BFD-1010	29	31	31	33	36	40	44	44	44																
25	3"BFD-1011																									
26	2"BFD-1012				37																					
27	2"BFD-1013				35/37																					
28	1"BFD-1014																									
29	3"CD-1015																									
30	2"CD-1030																									

TARGETS

BUILDING: AUXILIARY FEED PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NOT APPLICABLE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT	MATRIX No. L2
DIV. MNE DR. MG DATE 3/24/81 CH. M SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 2/39

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-01-24-29

INTERACTION SKETCH NO.:

5-1, Photo 29

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 2" ELECTRICAL CONDUIT

(Target) 2" BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:

2" ELECT CONDUIT FAILS FROM SUPPORT AND HITS

2" BFD-1010

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction Criteria

M Gagliardi
Interaction Engineer/Date

Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFWPumpBuild

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-02-24-31

INTERACTION SKETCH NO.:

5-1, Photo 31

IDENTIFICATION OF INTERACTION COMPONENTS:

Source - Monorail

Target - 2" BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:

Monorail fails from support and hits 2"BFD-1010 causing rupture of the line,

Monorail also hits 2"BFD 1009 causing rupture of the line (see L-2 sheet 9)

EVALUATION & DISPOSITION OF INTERACTION: Unacceptable

Monorail failure and subsequent rupture of lines 2BFD-1010 and 1009 results in loss of function of motor driven pumps No 31 and 33. Coincident with a single failure of the turbine driven pump, results in complete loss of auxiliary feedwater supply to all steam generators.

N J Pagliardi 2/9/81
Interaction Engineer/Date

R J Drago
Reviewer/Date
2/10/81

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-03-24-31

INTERACTION SKETCH NO.:
5-1, photo 31

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) lighting fixture #6
(Target) 2"BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:
Lighting fixture fails from support and hits 2"BFD-1010

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - lighting fixture not capable of damaging 2"BFD-1010 line

M Goghardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Buildng

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: UA

INTERACTION NO.: 02-04-24-33, 02-04-26-37, 02-04-27-35/37

INTERACTION SKETCH NO.:
5-1, photo 33

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) 1½" Electrical Conduit
(Target) 2" BFD-1010
(Target) 2" BFD-1012
(Target) 2" BFD-1013

DESCRIPTION OF POSTULATED INTERACTION:
1½" Electrical conduit fails from support and hits 2" BFD-1010, 2" BFD-1012, and 2" BFD-1013

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interactions - conduit cannot damage pipe due to insufficient mass of conduit.

N. Gagliardi 2/9/81
Interaction Engineer/Date

R. J. Prong
Reviewer/Date
4/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-05-24-36

INTERACTION SKETCH NO.:
5-1, Photo 36

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Electrical Box SX-7

(Target) 2" BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:
Electrical Box SX-7 falls from support and hits 2" BFD-1010.

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - electrical box is of insufficient size and mass to damage 2" BFD-1010

M Gaglardi 2/9/81
Interaction Engineer/Date

R J Drago 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-06-23-40, 02-06-24-40

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Ventilation louvers
(Target) 2"BFD-1009
(Target 2"BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:

Ventilation Louver fails from support and hits 2"BFD-1009 and 2"BFD-1010

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction.
See L-2 sheet 2 for evaluation.

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-07-24-44

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Lighting fixture #7

(Target) 2" BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:

Lighting fixture #7 fails from support and hits 2" BFD-1010

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction

See L-2 sheet 3 for evaluation

M Joglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-08-23-52, 02-08-24-44

INTERACTION SKETCH NO.:
5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) 3" Conduit
(Target) 2" BFD-1009
2" BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:
3" electrical conduit fails from support and hits 2" BFD-1009 and 2" BFD-1010

EVALUATION & DISPOSITION OF INTERACTION: Unacceptable Interaction
3" Conduit hits BFD-1009, and BFD-1010 causing a rupture in both lines, resulting in loss of flow from pumps 31 and 33. Coincident single failure of turbine driven pump results in total loss of aux feed flow to steam generators violating acceptance criteria.

N. Gogliuzzi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-09-23-52, 02-09-24-44

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

Source) Monorail

Target) 2"BFD-1009

2"BFD-1010

DESCRIPTION OF POSTULATED INTERACTION:

Monorail fails from support and hits 2"BFD-1009 and 2"BFD-1010

EVALUATION & DISPOSITION OF INTERACTION: Unacceptable interaction

Interaction results in total loss of auxiliary feedwater flow to steam generators when assumed coincident single failure is Turbine driven pump failure to start.

M. Gogliardi 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-10-23-52

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Lighting fixture #8

(Target) 2"BFD-1009

DESCRIPTION OF POSTULATED INTERACTION:

Lighting fixture fails from support and hits 2"BFD-1009

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction.

See L-2 Sheet 7

W Goglardi 2/9/81
Interaction Engineer/Date

RJ Drago
Reviewer/Date 2/10/81

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-11-23-53

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" plumbing drain line

(Target) 2" BFD-1009

DESCRIPTION OF POSTULATED INTERACTION:

drain line fails and hits 2" BFD-1009

EVALUATION & DISPOSITION OF INTERACTION: Acceptable interaction
drain line failure causes rupture of line 2" BFD-1009 resulting in loss of function of motor driven pump No. 31. pumps 32 and 33 are available for operation.

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-12-23-53

INTERACTION SKETCH NO.:

5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Box SX-6

(Target) 2"BFD-1009

DESCRIPTION OF POSTULATED INTERACTION:

electrical box # SX-6 fails from support and hits 2"BFD-1009

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - elect box is of insufficient size and mass to damage 2"BFD-1009

N Goyland 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-13-18-70

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) lighting fixture # 11

(Target) 6" BFD-1005

DESCRIPTION OF POSTULATED INTERACTION:

lighting fixture #11 falls and hits 6" BFD-1005

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction. - lighting fixture is of insufficient size and mass to damage 6" BFD-1005

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-14-18-70

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) lighting fixture #12
(Target) 6"BFD-1005

DESCRIPTION OF POSTULATED INTERACTION:
lighting fixture #12 fails from its support and hits 6"BFD-1005

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction
See evaluation sheet 13

M. Joglekar
Interaction Engineer/Date

R J Drago
Reviewer/Date
2/10/81

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-15-18-70/71

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 3" Electrical conduit

(Target) 6" BFD-1005

DESCRIPTION OF POSTULATED INTERACTION:

3" Electrical conduit fails from support and hits 6" BFD-1005

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - electrical conduit is of insufficient size and mass to damage 6" BFD-1005

[signature] 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-16-18-71

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Small (<2") electrical conduits

Target) 6"BFD-1005

DESCRIPTION OF POSTULATED INTERACTION:

Small electrical conduits fail from support and hits 6"BFD-1005

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - conduits are of insufficient size and mass to damage 6"BFD-1005

N Goglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-17-19-72, 02-17-20-72

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Paging speaker
Target) 3"BFD-1005
3"BFD-1006

DESCRIPTION OF POSTULATED INTERACTION:

Paging speaker fails and hits 3"BFD-1005 and 3"BFD-1006

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Paging speaker can cause loss of function of aux feed pump 32. Coincident with the single failure of one motor driven pump, the other motor driven pump is available for feed flow to 2 steam generators.

N. Gagliardi 2/9/81
Interaction Engineer/Date

[signature]
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-18-19-73, 02-18-20-73

INTERACTION SKETCH NO.:

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Conduit Box

(Target) 3" BFD-1005

3" BFD-1006

DESCRIPTION OF POSTULATED INTERACTION:

Conduit Box fails from support and hits 3" BFD-1005 and 3" BFD-1006

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Conduit box is of insufficient size and mass to damage 3" BFD-1005 and 3" BFD-1006

M Pagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-19-19-74, 02-19-20-74

INTERACTION SKETCH NO.:
A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Nitrogen Gas Bottles
(Target) 3"BFD-1005
3"BFD-1006

DESCRIPTION OF POSTULATED INTERACTION:
Nitrogen gas bottles fail from supports and hits 3"BFD-1005 and 3"BFD-1006

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - no damage credible

W Pogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-20-19-75, 02-20-20-75

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Space Heater #1

(Target) 3"BFD-1005
3"BFD-1006

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater #1 fails from support and hits 3"BFD-1005 and 3"BFD-1006

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - Heater can cause loss of function of 3"BFD-1005 and 3"BFD-1006

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: UA

INTERACTION NO.: 02-22-19-77, 02-22-20-77

INTERACTION SKETCH NO.:

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Communication Center
(Target) 3"BFD-1005
3"BFD-1006

DESCRIPTION OF POSTULATED INTERACTION:
Communication center fails from support structure and hits 3"BFD-1005 and 3"BFD-1006

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable interaction - Communication center can cause loss of function of 3"BFD 1005 and 1006

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N/A

INTERACTION NO.: 02-23-21-78, 02-23-22-78

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" plumbing drain line

(Target) 3"BFD-1007

3"BFD-1008

DESCRIPTION OF POSTULATED INTERACTION:

4" plumbing line fails from support and hits 3"BFD-1007 and 3"BFD-1008

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction, 4" line can damage 3" BFD-1007 and 3"BFD-1008 causing loss of function.

M Gaglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 02-24-17-63

INTERACTION SKETCH NO.:

A5-1

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Small electrical conduits from rack 9826

(Target) 3"BFD-1004

DESCRIPTION OF POSTULATED INTERACTION:

Electrical conduit fails from support and hits 3"BFD-1004

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - conduits are of insufficient size and mass to cause damage.

W Boghardt 2/6/81
Interaction Engineer/Date

R J Long
Reviewer/Date
2/10/81

Ebasco Services Incorporated

SOURCE

LINE No.		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
		4" DR. LINE	ELEC. BOX FM-279	ELEC. BOX SX-2	SPACE HTR #2	LIGHT #2	WALL SW BOX	EXIDE LTG. & BOX	PSSW FOR HTR EUH 310	MONO RAIL	2" STA. AIR	EUH 311	ELEC. BOX SX-1	WALL BOX (THERMAL COUPLE) 321 & 322	SPACE HTR #3	LIGHT #3	SPACE HTR #4	2" CONDUIT	2" STA. AIR	ELEC. BOX 232 & CONDUIT	4" DR. LINE	SPACE HTR #5	2" CONDUIT	SWITCH BOXES & CONDUIT	SPACE HTR. #6	SPEAKER	ELEC. BOX & Q27 CONDUIT	PUMP #33 POWER 4" CONDUIT	ELEC. BOX & SX-5 CONDUIT	LIGHT #7	3" CONDUIT	MONO RAIL	LIGHT #5	1½" & 4" CONDUIT
01	12" CT-1070																											41/43	41/43					
02	8" CT-1071 (HDR)							1			16				18	19	19	34	34			28			38	39								
03	8" CT-1071					46	13	13	13	46																								46
04	6" CT-1072																							32								45	45	45
05	1½" CT-1160																																	
06	6" CT-1073									48		17	17	17	18	19	19			24	27	48												
07	1½" CT-1159																																	
08	8" CT-1074 (HDR)	01			10					14/15	16				18	19	19	22	22			28											
09	6" CT-1074																				26				38								
10	6" CT-1075										16	16/17	16/17	17	18	19	19																
11	8" CT-1076		08	09														23	23														
12	4" BFD-1001									47														44/47	44	44							
13	3" BFD-1001																																	
14	3" BFD-1002																																	
15	4" BFD-1003									59													29								59	54		

TARGETS

BUILDING: AUXILIARY FEEDWATER PUMP BUILDING

FIRE ZONE: 23 ELEVATION 18'-6

LOCATION: NOT APPLICABLE - SEE KEY PLAN
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT	MATRIX No. L1
DIV. NUE DR. MG	APPROVED		
DATE 3/24/81 CH		SYSTEMS INTERACTION STUDY	SHEET 1/39
SCALE NONE		INTERACTION MATRIX	

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-33-03-46, 01-33-04-45, 01-33-12-47

INTERACTION SKETCH NO.:

5-1, Photo 46, 45 & 47

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 1½" & 4" Conduit

(Target) 8"CT-1071
6"CT-1072
4"BFD-1001

DESCRIPTION OF POSTULATED INTERACTION:

Conduits fail from supports and hits 8"CT-1071, 6"CT-1072 and 4"BFD-1001

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Criteria ____

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-32-04-45

INTERACTION SKETCH NO.:

5-1, Photo 45

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Lighting Fixture #5

(Target) 6"CT-1072

DESCRIPTION OF POSTULATED INTERACTION:

Lighting Fixture #5 fails from support and hits 6"CT-1072 Supply to pump #33

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass to damage piping

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-31-04-45, 01-31-12-44, 01-31-15-54

INTERACTION SKETCH NO.:
5-1, PHOTO 45, 44 & 54

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Mono Rail

(Target) 6"CT-1072
4"BFD-1001
4"BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:

Mono Rail fails from Supports and hits 6"CT-1072, 4"BFD 1001, 4"BFD 1003

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Lose Suction and discharge flow.

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-30-12-44, 01-30-15-59

INTERACTION SKETCH NO.:

5-1, Photo 44 & 59

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 3" Electrical Conduit

(Targets) 4" BFD-1001
4" BFD-1003

DESCRIPTION OF POSTULATED INTERACTION:

3" electrical conduit hits 4" BFD-1001 and 4" BFD-1003

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction. Criteria ____

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-29-12-44/47

INTERACTION SKETCH NO.:

5-1, Photo 44 & 47

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Electrical Lighting Fixture

(Target) 4" BFD-1001

DESCRIPTION OF POSTULATED INTERACTION:

Electrical light fixture fails and hits 4" BFD-1001

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass to damage piping

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-27-01-41/43, 01-28-01-41/43

INTERACTION SKETCH NO.:

5-1, Photo 41 & 43

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" Conduit to Pump #33 & Electrical Box SX-5 w/conduit

(Target) 12" CT-1070

DESCRIPTION OF POSTULATED INTERACTION:

4" Conduit fails alongwith electrical box SX-5 and hits 12" CT-1070

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass to damage the piping.

M Cagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-25-02-39

INTERACTION SKETCH NO.:

5-1, PH07039

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Large Paging Speaker

(Target) 8"CT-1071 (HDR)

DESCRIPTION OF POSTULATED INTERACTION:

Speaker fails from its support and hits 8"CT-1071

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction - insufficient mass to damage the piping.

M Gagliardi 2/9/81
Interaction Engineer/Date

RJ Bonazza
Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-24-02-38, 01-24-09-38

INTERACTION SKETCH NO.:

5-1, PHOTO 38

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Space Heater #38

(Target) 8"CT-1071 (HDR)

6"CT-1074

DESCRIPTION OF POSTULATED INTERACTION:

Space heater #38 falls from its support and hits 8"CT-1071 and 6"CT-1074

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, Insufficient Mass to damage the pipping.

M Gaglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-22-15-29

INTERACTION SKETCH NO.:

5-1, PHOTO #29

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 2" Electrical Conduit

(Target) 4" BFD-1003, Discharge Line From Pump #31 to Steam Generators 31 & 32

DESCRIPTION OF POSTULATED INTERACTION:

2" Electrical Conduit fails from support and hits 4" BFD-1003 discharge line from Pump #31

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interation, Criteria

W/Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-23-04-32

INTERACTION SKETCH NO.:
5-1, PHOTO 32

IDENTIFICATION OF INTERACTION COMPONENTS:
(SOURCE) ELECTRICAL SWITCH BOX & CONDUIT (WALL MOUNTED)
(TARGET) 6"CT-1072, SUPPLY LINE TO PUMP #33

DESCRIPTION OF POSTULATED INTERACTION:
Electrical Box Fails from its wall support and hits 6"CT-1072 Supply line to pump #33

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable Interaction- Wall Box has insufficient mass to damage piping.

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-21-02-28, 01-21-06-48, 01-21-08-28,

INTERACTION SKETCH NO.:
5-1, PHOTO 28, 48,

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) SPACE HEATER #5

(TARGET) 8" CT-1071 (HDR)
6" CT-1073
8" CT-1074 (HDR)

DESCRIPTION OF POSTULATED INTERACTION:

SPACE HEATER #5 FAILS FROM SUPPORTS AND HITS 8" CT-1071, 6" CT-1073, 8" CT-1074

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, Insufficient Mass to damage piping.

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-20-06-27, 01-20-09-26

INTERACTION SKETCH NO.:

5-1, PHOTO 27 & 26

IDENTIFICATION OF INTERACTION COMPONENTS:

Source) 4" FLOOR DRAIN LINE

(Target) 6" CT-1073,

6" CT-1074

DESCRIPTION OF POSTULATED INTERACTION:

4" Floor Drain Line Fails and hits 6" CT-1073 and 6" CT-1074

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, By Criteria

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-19-06-24

INTERACTION SKETCH NO.:
5-1, PHOTO 24

IDENTIFICATION OF INTERACTION COMPONENTS:
(SOURCE) ELECT BOX 232 & CONDUIT
(TARGET) 6" CT-1073

DESCRIPTION OF POSTULATED INTERACTION:
Elect Box fails from wall support and hits
6" CT-1073

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable Interaction, insufficient mass

M Gagliardi
Interaction Engineer/Date

Reviewer/Date
2/10/12

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-18-02-34, 01-18-08-22, 01-18-11-23

INTERACTION SKETCH NO.:

5-1, PHOTO

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) 2" STATION AIR

(TARGET) 8"CT-1071,
8"CT-1074
8"CT-1076

DESCRIPTION OF POSTULATED INTERACTION:

2" STATION AIR LINE FAILS AND HITS 8"CT-1071, 8"CT-1074, 8"CT-1076

EVALUATION & DISPOSITION OF INTERACTION:

ACCEPTABLE INTERACTION - BY CRITERIA

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-17-02-34, 01-17-08-22, 01-17-11-23

INTERACTION SKETCH NO.:

5-1, PHOTO 34, 22, 23

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) 2" ELECT CONDUIT

(TARGET) 8"CT-1071
8"CT-1074
8"CT-1076

DESCRIPTION OF POSTULATED INTERACTION:

2" Elect Conduit Fails from Support and hits 8"CT-1071, 8"CT-1074, 8"CT-1076

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - By Criteria

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-16-02-19, 01-16-06-19, 01-16-08-19, 01-16-10-19

INTERACTION SKETCH NO.:

5-1, PHOTO 19

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) SPACE HEATER # 4

(TARGET) 8"CT-1071 6"CT-1075
6"CT-1073
8"CT-1074

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater Falls from Support and hits 8CT-1071, 6CT-1073, 8CT-1074, 6CT-1075

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, Insufficient Mass.

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-15-02-19, 01-15-06-19, 01-15-08-19, 01-15-10-19

INTERACTION SKETCH NO.:

5-1, PHOTO 19

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) LIGHTING FIXTURE #3

(TARGET) 8" CT-1071, 6" CT-1075
6" CT-1073,
8" CT-1074,

DESCRIPTION OF POSTULATED INTERACTION:

Lighting fixture fails from support and hits lines
8CT-1071, 6CT-1073, 8CT-1074, 6CT-1075

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, insufficient Mass

M Gogleark 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-14-10-18

INTERACTION SKETCH NO.:

5-1, PHOTO 18

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Space Heater #3

Target) 6" CT-1075

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater #3 fails and hits line 6" CT-1075

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Insufficient mass

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-14-08-18

INTERACTION SKETCH NO.:
5-1, Photo 18

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Space Heater #3
(Target) 8"CT-1074

DESCRIPTION OF POSTULATED INTERACTION:
Space Heater #3 fails and hits Line 8"CT-1074

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable Interaction, Insufficient Mass

M Gaglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-14-06-18

INTERACTION SKETCH NO.:

5-1, PHOTO 18

IDENTIFICATION OF INTERACTION COMPONENTS:

Source) SPACE HEATER # 3

(target) 6" CT-1073

DESCRIPTION OF POSTULATED INTERACTION:

Space heater fails and hits line 6" CT-1073

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction: Insufficient Mass

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-14-02-18

INTERACTION SKETCH NO.:
5-1, Photo 18

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) SPACE HTR # 3

(Target) 8" CT-1071 (header)

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater falls from support and hits 8" CT-1071 header

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, Insufficient mass

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 4/10/14

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-13-10-17

INTERACTION SKETCH NO.:
5-1, photo 17

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Wall Boxes #321 & 322

(Target) 6" CT-1075, City Water Supply to Pump No. 31

DESCRIPTION OF POSTULATED INTERACTION:

Wall Boxes fail and hit 6" CT-1075

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, insufficient mass

M Gagliardi 2/9/81
Interaction Engineer/Date

N Drago 2/10/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-13-06-17

INTERACTION SKETCH NO.:

FIG 5-1, PHOTO 17

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) THERMAL COUPLE WALL BOX 321 & 322

(target) 6" CT-1073, Normal Supply to AFW Pump No. 31

DESCRIPTION OF POSTULATED INTERACTION:

Wall Boxes fail and hit 6" CT-1073 line

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - insufficient mass

M Goglard 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP/BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-12-10-16/17

INTERACTION SKETCH NO.:

FIG 5-1, PHOTO 16 & 17

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) ELECT BOX #SX-1

(Target) 6"CT-1075, SUPPLY FROM CITY WATER SUPPLY TO PUMP NO. 31

DESCRIPTION OF POSTULATED INTERACTION:

Elect Box fails from support and hits 6"CT-1075

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction, Insufficient mass.

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-12-06-17

INTERACTION SKETCH NO.:
FIGURE 5-1, Photo 1)

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) ELECTRICAL BOX # SX-1

(Target) 6" CT-1073, Normal Water Supply to AFW Pump No 31

DESCRIPTION OF POSTULATED INTERACTION:

Electrical BOX # SX-1 fails from supports and hits 6" CT-1073 Line.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Insufficient Mass

M Gagliardi
Interaction Engineer/Date

Reviewer/Date
2/12/01

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-11-10-16/17

INTERACTION SKETCH NO.:

FIGURE 5-1, PHOTOS 16 & 17

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Elect Unit Heater #311

(Target) 6"CT-1075, Supply line from City Water Backup Service

DESCRIPTION OF POSTULATED INTERACTION:

Unit heater #311 hits 6"CT-1075 line

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction

Criteria - Insufficient mass

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2.10.81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N/A

INTERACTION NO.: 01-11-06-17

INTERACTION SKETCH NO.:
F-165-1, PHOTO 17

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Elect Unit Heater #311
(Target) 6" CT-1073, Normal Water Supply To Pump No. 31

DESCRIPTION OF POSTULATED INTERACTION:
Electrical Unit Heater #311 fails and Hits
6" CT-1073, Normal Water Supply to Pump No. 31

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable interaction - Insufficient mass of unit
Heater to damage 6" CT-1073

M Gogliachi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-10-10-16

INTERACTION SKETCH NO.:
FIG 5-1, PHOTO 16

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) 2" STATION AIR LINE
(Target) 6" CT-1075, CITY WATER SUPPLY LINE TO PUMP NO. 31

DESCRIPTION OF POSTULATED INTERACTION:
2" STATION AIR LINE HITS 6" CT-1075, CITY WATER SUPPLY LINE TO PUMP NO. 31

EVALUATION & DISPOSITION OF INTERACTION:
Acceptable Interaction Criteria.

M Goyhardt 2/9/01
Interaction Engineer/Date

Reviewer/Date 2/10/01

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-10-08-16

INTERACTION SKETCH NO.:

FIGURE 5-1, PHOTO 16

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) 2" STATION AIR LINE

(TARGET) 8" CT-1074, CITY WATER SUPPLY HEADER

DESCRIPTION OF POSTULATED INTERACTION:

2" STATION AIR LINE HITS 8" CT-1074 CITY WATER SUPPLY HEADER.

EVALUATION & DISPOSITION OF INTERACTION:

ACCEPTABLE INTERACTION - CRITERIA -

M Bagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-10-02-16

INTERACTION SKETCH NO.:
FIG 5-1, PHOTO 16

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) 2" STATION AIR LINE
(Target) 8" CT-1071, SUPPLY LINE FROM COND STORAGE TANK

DESCRIPTION OF POSTULATED INTERACTION:
2" STATION AIR LINE HITS 8" CT-1071 SUPPLY LINE

EVALUATION & DISPOSITION OF INTERACTION:
ACCEPTABLE INTERACTION
CRITERIA—

M Goghadi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-09-15-59

INTERACTION SKETCH NO.:
FIGURE 5-1, PHOTO 59

IDENTIFICATION OF INTERACTION COMPONENTS:
(Source) Mono Rail
(Target) 4"BFD-1003, Feed Supply from Pump 31 to Steam Generators № 31 & 32

DESCRIPTION OF POSTULATED INTERACTION:
Mono Rail fails and damages 4"BFD-1003 feed supply from pump № 31 to Steam generators № 31 & 32

EVALUATION & DISPOSITION OF INTERACTION:
Unacceptable Interaction - Similar to Interaction 01-09-12-47, sheet 13. SEE FOR DETAILS

M Gogliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

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POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-09-12-47

INTERACTION SKETCH NO.:

FIG 5-1, PHOTO 47

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) AFW Pump MONO RAIL

(Target) 4" BFD-1001 Feed supply from Pump No 33 to Steam Generators No 33 & 34

DESCRIPTION OF POSTULATED INTERACTION:

Mono Rail fails and damages 4" BFD-1001 feed supply from Pump No 33 to Steam Generators No 33 & 34.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Lose flow to SG's # 33 & 34 and with common mode failure of loss of suction to Turb Driven Pump & Motor Driven Pump 31, NO AFW to Stm generators

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-09-08-14/15

INTERACTION SKETCH NO.:
FIGURE 5-1, PHOTO 14 & 15

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) AFW PUMP MONO RAIL

(TARGET) 8"CT-1074 SUPPLY HEADER FROM CITY WATER SUPPLY

DESCRIPTION OF POSTULATED INTERACTION:

Mono rail fails during seismic event and damages 8"CT-1074 Supply header from City Water Supply.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - see sheet 11 for reasons

M Goglardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-09-06-48

INTERACTION SKETCH NO.:

Figure 5-1, Photo 48

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Mono Rail

(Target) 6" CT-1073 - Supply Line From Cond Storage Tank Header to AFW Pump No 31

DESCRIPTION OF POSTULATED INTERACTION:

Mono Rail fails during seismic event and damages 6" CT-1073 Supply Line to AFW Pump No 31

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction - Loss of Suction flow to AFW Pump No 31 - Common mode failure - also damages 8" CT-1074 Header causing loss of suction flow to AFW Pumps No 32 & 33

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-09-03-46

INTERACTION SKETCH NO.:

FIGURE 5-1, PHOTO 46

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) AFW Pump Mono Rail

(Target) 8"CT-1071 AFW Pump SUPPLY LINE FROM HEADER

DESCRIPTION OF POSTULATED INTERACTION:

Mono Rail fails during seismic Event and hits 8"CT-1071 Supply line from header

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Mono rail is of sufficient mass to damage the supply line CT-1071. Assuming a concurrent single failure of FCV1188, No Suction flow to the turbine driven AFW pump is afforded.

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-08-03-13

INTERACTION SKETCH NO.:

FIGURE 5-1 PHOTO 13

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) PULL SWITCH BOX FOR ELECT UNIT HEATER # EUH 310

(Target) 8" CT-1071 AFW PUMP SUPPLY LINE FROM HEADER

DESCRIPTION OF POSTULATED INTERACTION:

PULL SWITCH BOX FAILS FROM ITS SUPPORT AND HITS 8" CT-1071 AFW PUMP SUPPLY LINE

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, pull switch box does not have sufficient mass to damage the pipe line CT-1071

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-07-03-13

INTERACTION SKETCH NO.:

FIGURE 5-1, PHOTO 13

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) EXIDE EMERG LIGHT FIXTURE

(TARGET) 8" AFW PUMP SUPPLY FROM HEADER CT-1071

DESCRIPTION OF POSTULATED INTERACTION:

Exide emergency lighting fixture fails from it's wall support and hits 8" AFW Pump Supply line from header CT-1071

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction; Exide emergency lighting fixture does not have sufficient mass to damage the pipe line CT-1071

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: Aux Feed Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-07-02-01

INTERACTION SKETCH NO.:

Figure 5-1, Photo # 01

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Exide Emerg Light Fixture

(Target) 8" AFW Pump Supply Header From Condensate Storage Tank, Line # CT-1071

DESCRIPTION OF POSTULATED INTERACTION:

Exide emergency lighting fixture fails from it's wall support and hits 8" AFW Pump Supply header #CT-1071

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, Exide emergency lighting fixture does not have sufficient mass to damage the line. CT-1071

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: Aux Feed Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-06-03-13

INTERACTION SKETCH NO.:
Fig 5-1, Photo #13

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Elect Switch Box Wall Mounted

(Target) 8" Supply To Turb Drive AFW Pump No 32
Line # CT-1071

DESCRIPTION OF POSTULATED INTERACTION:

Elect Switch Box Fails and Hits Line CT-1071

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable interaction, Insufficient mass of wall mounted Switch Box to damage line # CT-1071

M Gogliardi 2/9/81
Interaction Engineer/Date

N J Drago
Reviewer/Date
2/10/81

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INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: Auxiliary Feed Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-05-03-46

INTERACTION SKETCH NO.:
Figure 5-1, Photo #6

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) Lighting Fixture #2

(Target) 8"CT-1071 Line - Condensate Storage Tank Supply to AFW Pump Suction

DESCRIPTION OF POSTULATED INTERACTION:

Light Fix #2 hits 8" Line CT-1071

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Light fixture #2 has insufficient mass to damage Line CT-1071

M Gagliardi 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AUX FEED PUMP BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-04-08-10

INTERACTION SKETCH NO.:
FIGURE 5-1, PHOTO #10

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) SPACE HEATER #2

(TARGET) 8" CITY WATER SUPPLY HEADER # CT-1074

DESCRIPTION OF POSTULATED INTERACTION:

SPACE HEATER #2 FALLS OFF IT'S SUPPORT AND HITS CITY WATER SUPPLY HEADER # CT-1074

EVALUATION & DISPOSITION OF INTERACTION:

ACCEPTABLE INTERACTION; MASS OF SPACE HEATER #2 IS INSUFFICIENT TO DAMAGE CITY WATER SUPPLY HEADER # CT-1074

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date 2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AUXILIARY FEED DUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-03-11-09

INTERACTION SKETCH NO.:
FIG 5-1, PHOTO # 09

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) ELECTRICAL BOX SX-2

(TARGET) 8" CITY WATER SUPPLY LINE # CT-1076

DESCRIPTION OF POSTULATED INTERACTION:

ELECTRICAL BOX SX-2 FAILS & HITS 8" CITY WATER SUPPLY LINE # CT-1076

EVALUATION & DISPOSITION OF INTERACTION:

ACCEPTABLE INTERACTION, MASS OF ELECT BOX SX-2 NOT SUFFICIENT TO DAMAGE CITY WATER LINE # CT-1076

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AUX FEED PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-02-11-08

INTERACTION SKETCH NO.:

FIGURE 5-1, PHOTO # 08

IDENTIFICATION OF INTERACTION COMPONENTS:

(SOURCE) ELECTRICAL BOX FM-279 SUPPORTED OFF WALL

(TARGET) 8" LINE CT-1076 CITY WATER SUPPLY LINE TO VALVE PCV1188

DESCRIPTION OF POSTULATED INTERACTION:

ELECT BOX FM-279 FAILS & HITS 8" CT-1076 CITY WATER SUPPLY LINE

EVALUATION & DISPOSITION OF INTERACTION:

ACCEPTABLE INTERACTION,
MASS OF ELECT BOX NOT SUFFIENT TO DAMAGE CITY WATER SUPPLY LINE

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AUXILIARY FEED PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 01-01-08-01

INTERACTION SKETCH NO.:
FIGURE 5-1, PHOTO #01

IDENTIFICATION OF INTERACTION COMPONENTS:
NON-SEISMIC 4" FLOOR DRAIN PIPE (SOURCE)
8" LINE CT-1074 CITY WATER SUPPLY HEADER (TARGET)

DESCRIPTION OF POSTULATED INTERACTION:
4" DRAIN PIPE FAILS AND HITS 8" CT-1074 CITY WATER SUPPLY HEADER

EVALUATION & DISPOSITION OF INTERACTION:
ACCEPTABLE INTERACTION - CRITERIA 4.

M GAGLIARDI 2/9/81
Interaction Engineer/Date

Reviewer/Date
2/10/81

Ebasco Services Incorporated

SOURCE

VALVE

			01	02	03	04	05
			ELEC. BOX SZ-G	LIGHT # 21	LIGHT #20		
101	BFD-64	3/4" INSTR	80/82	82			
102	BFD-64	3/4" INSTR.	80/82	82			
103	BFD-68	GEN. 31					
104	BFD-64	3/4" INSTR.	80/82	82			
105	BFD-64	3/4" INSTR.	80/82	82			
106	BFD-67	GEN. 32					
107	BFD-64	3/4" INSTR.	80/82		81		
108	BFD-64	3/4" INSTR.	80/82		81		
109	BFD-70	GEN 34					
110	BFD-64	3/4" INSTR.	80/82		81		
111	BFD-64	3/4" INSTR.	80/82		81		
112	BFD-69	GEN. 33					

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED			POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT
DIV. MNE	DR. MG	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX
DATE 3/24/81	CH. MC		
SCALE NONE			

MATRIX No. V1S

SHEET 20/24

INCHES 0 1 2

SOURCE

VALVES

	TARGETS	01 PUMP# 33 4" CONDUIT	02 ELEC. BOX # SX-5 CONDUIT	03 MONO RAIL	04 4" CONDUIT	05
	12" CT-1070					
154	LCV-1158	41/43	41/43			
155	SOV-1258	41/43	41/43			
	4" MS-1027					
156	TURB. CONTROL VA WEST.			CA/GS	CA/GS	

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. V14
DIV. MJE DR. MG DATE 3/24/81 CH. MJ SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 14/37

SOURCE

VALVES

TARGETS

		01 LIGHT # 12	02 ELEC. BOX YG7	03 ELEC. BOXES	04	05
	4" MS-1027					
143	MS-54					
144	MS-33 (3/4" DR.)					
145	PCV-1139	67/68	67/68			
146	MS-33 (3/4" DR.)					
147	MS-52					
148	MS-44 (1" INSTR.)					
149	MS-51 (3/4" INSTR.)					
	1" MS-1120					
150	MS-93					
151	MST-65			69		
	1" MS-1121					
152	MS-93					
153	MST-64					

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. V13
DIV. MUE DR. MG DATE 3/24/81 CH. M SCALE UDUE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 18/39

SOURCE

VALVES

No TARGETS Hit

TARGETS

	3" BFD-1011
133	BFD-50
134	BFD-51
	1" BFD-1014
135	BFD-73
136	BFD-74 (BY-PASS)
137	PCV-1213
138	BFD-73
139	BFD-75 (¾" INSTR.)
140	CD-123
	2" CD-1031
141	CD-122
142	CD-125

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED

DIV. MVE DR. MG
DATE 3/4/81 CH. M
SCALE NONE

APPROVED

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. V12

SHEET 17/39

SOURCE

VALVES

TARGETS

		01	02	03	04	05
		1½" CONDUIT	ELEC. BOX SX-7	VENTILATION LOUVERS	4" DR. LINE	ELEC. BOX SX-6
	2" BFD-1009					
121	BFD-77				53	53
122	BFD-65 (¾" DR.)				53	53
123	FCV-1121				53	53
124	SOV-1321				53	53
125	BFD-52					
126	BFD-53					
	2" BFD-1010					
127	BFD-78	35				
128	BFD-65 (¾" DR.)					
129	FCV-1123	37	36	40		
130	SOV-1323	37	36	40		
131	BFD-54			40		
132	BFD-55			40		

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. NUE DR. NGT

DATE 3/24/81 CH. M

SCALE 1" = NONE

APPROVED

POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NO. 3

NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY

INTERACTION MATRIX

MATRIX No. VII

SHEET 16/39

SOURCE

VALVES

TARGETS

		01	02	03	04	05
		4" DR. LINE				
	3" BFD-1007					
109	BFD-49 (3/4" V.)	78				
110	BFD-47	78				
111	BFD-65 (3/4" DR.)	78				
	3" BFD-1008					
112	BFD-48	78				
113	BFD-65 (3/4" DR.)	78				
114	FCV-405C	78				
115	BFD-47	78				
116	BFD-49 (3/4" V.)	78				
117	BFD-48	78				
118	BFD-65 (3/4" DR.)	78				
	C" BFD-1005					
119	BFD-61 (3/4" INSTR.)					
120	BFD-61 (3/4" INSTR.)					

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. NUE DR. APPROVED

DATE 3/4/81 CH

SCALE DONE

STATE OF NEW YORK
POINT No. 3
NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
[illegible] MATRIX

MATRIX No. V10

SHEET 15/99

SOURCE

VALVES

TARGETS

		01	02	03	04	05	06	07	08	09	10
		SPEAKER	CONDUIT BOX	SPACE HTR #1	ROLL-UP DOOR	TELEPHONE STA.	4" DR. LINE				
	3" BFD-1005										
97	BFD-65 (3/4" DR.)	72	73	75	76						
	3" BFD-1006										
98	BFD-48	72	73	75	76	77					
99	BFD-65 (3/4 DR.)	72	73	75	76	77					
100	FCV-405 B	72	73	75	76	77					
101	BFD-47	72	73	75	76	77					
102	BFD-49 (3/4" V)	72	73	75	76	77					
103	BFD-48	72	73	75	76	77					
104	BFD-65 (3/4" DR.)	72	73	75	76	77					
	3" BFD-1007										
105	BFD-48						78				
106	BFD-65 (3/4" DR)						78				
107	FCV-405 D						78				
108	BFD-47						78				

BUILDING: AFW BLDG

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT NO. 3 NUCLEAR POWER PLANT	MATRIX No. V9
DIV. NPE DR. MG DATE 3/4/81 CH. M SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 14/39

SOURCE

VALVES

		01	02	03	04	05
		LIGHT #14	SPEAKER	CONDUIT BOX	SPACE HTR #1	ROLL-UP DOOR
	3" BFD-1004					
85	FCV-406B	61				
86	BFD-35	61				
87	BFD-36	61				
88	BFD-65 (3/4" DR.)	61				
	6" BFD-1005					
89	BFD-32 (3/4" V)					
90	BFD-31					
	3" BFD-1005					
91	BFD-48		72	73	75	76
92	BFD-65 (3/4" DR.)		72	73	75	76
93	FCV-405B		72	73	75	76
94	BFD-47		72	73	75	76
95	BFD-49 (3/4" V.)		72	73	75	76
96	BFD-48		72	73	75	76

TARGETS

BUILDING: AFW BLDG

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED	POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. V8
DIV. MVE DR. MG DATE 2/24/81 CH. M SCALE NONE APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 13/39

SOURCE

VALVES

TARGETS		01 2" Conduit	02 Light #8	03 Mono Rail	04 5" Conduit	05 3" Conduit	06 Light #14	07 Wall Lighting & Conduit	08	09	10
	4" BFD-1003										
73	BFD-34	29	59	59	59	59					
74	BFD-66 (INSTR.)	29	59	59	59	59					
	3" BFD-1003										
75	BFD-62						G1	G1			
76	BFD-44 (3/4" V.)						G1	G1			
77	BFD-65 (3/4" DR)						G1	G1			
78	FCV-406A						G1	G1			
79	BFD-37						G1	G1			
80	BFD-38						G1	G1			
81	BFD-65 (3/4" DR.)						G1	G1			
	3" BFD-1004										
82	BFD-62						G1				
83	BFD-44 (3/4" V.)						G1				
84	BFD-65 (3/4" DR)						G1				

BUILDING: AFW BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT	MATRIX No. V7
DIV. MNE DR. MG	APPROVED	SYSTEMS INTERACTION STUDY	SHEET 12/89
DATE 3/24/81 CH.		INTERACTION MATRIX	
SCALE NONE			

INCHES 0 1 2 3 4 5

SOURCE

VALVES

		01 Light #15	02 Light #8	03 Mono Rail	04 5" Conduit	05 4" Conduit
	3"-BFD-1001					
G1	BFD-43	49				
G2	BFD-G5 (3/4" DR)	49				
	3" BFD-1002					
G3	BFD-G2	49				
G4	BFD-44 (3/4" V)	49				
G5	BFD-G5 (3/4" DR)	49				
G6	FCV-406 C	49				
G7	BFD-40	49				
G8	BFD-41	49				
G9	BFD-G5 (3/4" DR)	49				
	4" BFD-1003					
70	BFD-G1 (INSTR.)		59	59	59	59
71	BFD-G1 (INSTR.)		59	59	59	59
72	BFD-32 (3/4" V)		59	59	59	59

TARGETS

INCHES CM.

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. NUE DR. MG

DATE 3/24/81 CH. M

SCALE NONE

APPROVED

[illegible] NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY

MATRIX No. VG

SHEET 11/39

INCHES

SOURCE

TARGETS

	VALVES	01 ELEC. BOX FM-279	02 ELEC. BOX SX-2	03 LIGHT #2	04 LIGHT #7	05 3" CONDUIT	06 MONO RAIL	07 INSTR. TUBING	08 LIGHT #15	09 SPACE HTR #2	10
	8"CT-1076										
49	PCV-1188	08	09	11						10	
50	SOV-1288	08	09	11						10	
	4"BFD-1001										
51	BFD-32 (3/4" DR.)				47	47	47	47			
52	BFD-39				44	44	44				
53	BFD-66 (INSTR.)				44/47	44/47	44/47	47			
54	BFD-61 (INSTR.)				44/47	44/47	44/47	47			
55	BFD-61 (INSTR)				44/47	44/47	44/47	47			
	3"BFD-1001										
56	BFD-62								49		
57	BFD-44 (3/4"V)								49		
58	BFD-65 (3/4" DR)								49		
59	FCV-406D								49		
60	BFD-42								49		

BUILDING: AFW PUMP BLDG

FIRE ZONE: 23

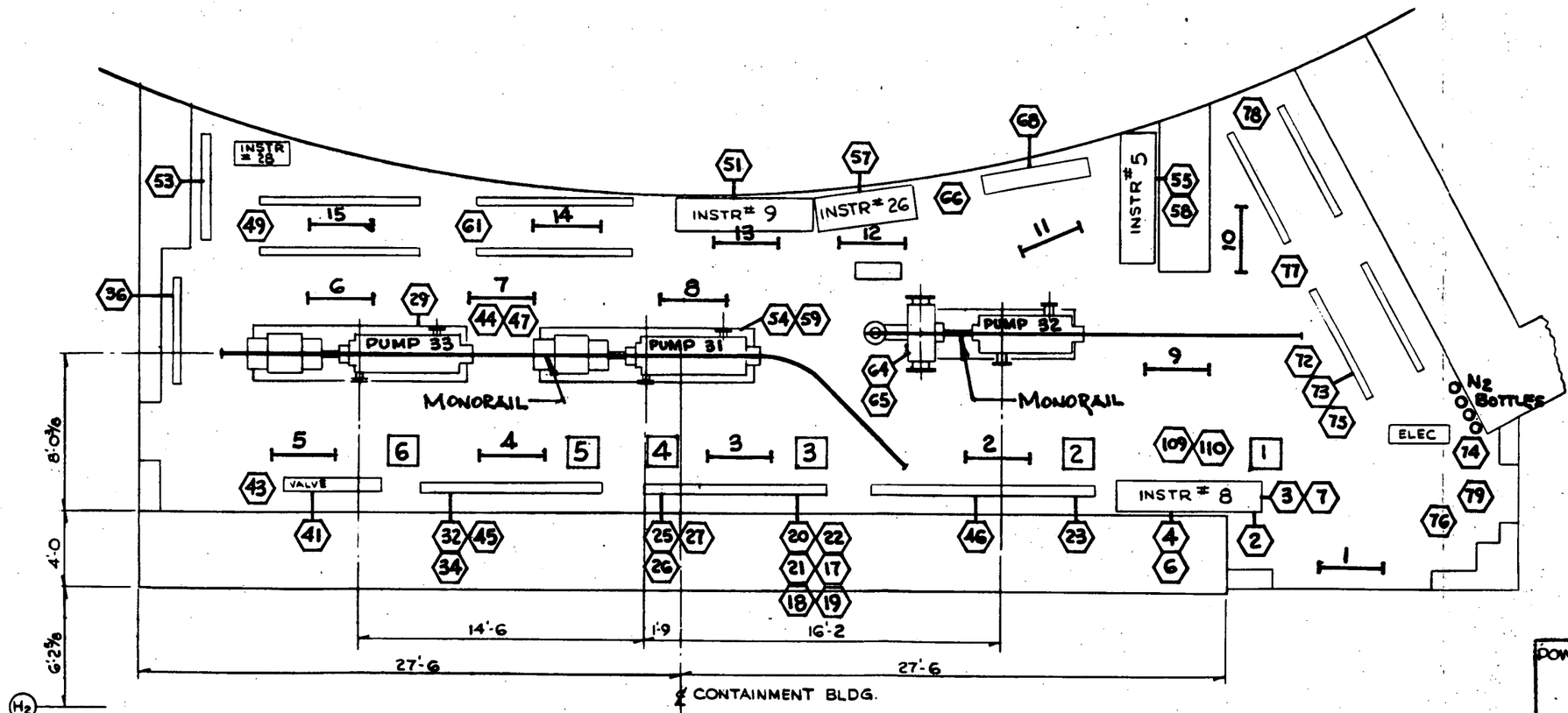
LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED
DIV. NYE DR. MG APPROVED
DATE 3/4/81 CH. M
SCALE NONE

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. V5

SHEET 10/39



PLAN EL 18'-6

(No.) PICTURE NUMBER

No. LIGHTING FIXTURE

No. SPACE HEATER

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER BUILDING

EBASCO SERVICES INCORPORATED

SCALE NONE	APPROVED	DATE 3-24-81
DIV J&C		FIGURE A-7I
DR. DS		
CH JM		

SOURCE

INSTR.

		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
		Conduit For Box 321 & 322	2" Conduit	2" STA. Air	Elec. Box 232 & Conduit	Light #3	Space Htr #4	4" Dr. Line	Switch Boxes & Conduit	Mono Rail	Light #5	4 & 1½" Conduit	Light #2			
	8" CT-1071															
01	SENSING LINE OF PT-1264									8,9,46		8,9,46	8,9,46			
02	PI-1264									8,9,46		8,9,46	8,9,46			
	6" CT-1072															
03	FE-1123															
04	FC-1136-S		34	34					32							
05	FC-1136A-S		34	34					32							
06	PT-1265									45	45	45				
07	PI-1265									45	45	45				
	6" CT-1073															
08	FE-1121	20/21	22	22												
09	FC-1135-S				24	25	25	27								
10	FC-1135A-S							26								
11	SENSING LINE OF PT-1263															
12	PI-1263															

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK	MATRIX No. 11
DIV. I&C DR DK	APPROVED	INDIAN POINT No. 3 NUCLEAR POWER PLANT	
DATE 3-24-81 CH		SYSTEMS INTERACTION STUDY	SHEET 21/39
SCALE None		INTERACTION MATRIX	

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 01-09-11-12, 02-09-11-12, Matrix No I-1

INTERACTION SKETCH NO.: 5-3, Photo 46 for sources, Photo 8 & 9 for targets

IDENTIFICATION OF INTERACTION COMPONENTS:
Targets: PT-1264 sensing line & PI-1264
Sources: Mono Rail, 4" & 1/2" Conduits, Light # 2

DESCRIPTION OF POSTULATED INTERACTION:
Seismically induced failures of the sources can cause damages to PT-1264 and its instrument tubing thereby resulting in water spillage and a loss of AFW Pump 32 suction pressure indication in the control room (for NPSH protection)

EVALUATION & DISPOSITION OF INTERACTION:
Interaction is unacceptable.
Review seismic documentation. If the sources are not seismically supported, provide seismic supports.

[signature] 2/11/81
Interaction Engineer/Date

[signature] 2/20/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 04-02-03-08, 05-02-03-08, Matrix No I-1

INTERACTION SKETCH NO.: 5-3, Photo No. 32, 34

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: FC-1136-S & FC-1136A-S (Flow switches to monitor AFW Pump 33 inlet flow)
Sources: 2" conduit, 2" station air pipe, switch boxes and conduits

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause damages to the targets and their sensing lines thereby resulting in water spillage and a loss of Pump 33 suction flow alarm in the control room.

EVALUATION & DISPOSITION OF INTERACTION:

The loss of suction flow alarm is not critical, However, the water spillage can cause damages to other components in the area. Therefore, the sources should be seismically supported.

D Kanchanas 2-11-81
Interaction Engineer/Date

C Gayhardi 2/20/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 06-09-010-011, 07-09-010-11; Matrix No. I-1

INTERACTION SKETCH NO.: 5-3, Photo 45

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: PT-1265 sensing line & PI-1265 (for measurement of Pump 33 suction pressure)

Sources: Monorail, Light #5, 4" and ½" conduits

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause damages to PT-1265 and its instrument tubing thereby resulting in water spillage and a loss of AFW Pump 33 suction pressure indication in the control room.

EVALUATION & DISPOSITION OF INTERACTION:

Interaction is unacceptable

Review seismic documentation. If the sources are not seismically supported, provide seismic supports.

D Kanchanas 2/11/81
Interaction Engineer/Date

N Gagliardi 2/20/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 09-04-05-06-07, 10-07 Matrix No I-1

INTERACTION SKETCH NO.: 5-3, photo No. 24, 25, 26, 27

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: FC-1135-S, FC-1135A-S (Flow switches to monitor AFW Pump 31 suction flow)

Sources: Elec. box 232 and conduit, Light #3, space heater #9, 4" drain line

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause damages to the targets and their sensing lines thereby resulting in water spillage and a loss of Pump 31 suction flow alarm in the control room.

EVALUATION & DISPOSITION OF INTERACTION:

The loss of suction flow alarm is not critical, However, the water spillage can cause damages to other components in the area. Therefore, seismic documentation review should be conducted. If the sources are not seismically supported, provide seismic supports.

D Kanchanas 2/11/81
Interaction Engineer/Date

M Gagliardi 2/20/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 15-01-02-03-04-05-07-08, 16-01-02-03-04-05-06-07
Matrix No. I-2

INTERACTION SKETCH NO.: 5-3, Photo No. 17, 18, 19, 22

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: PCV-1187 Valve Station (including valve, solenoid, instrument air lines, electrical wires and terminal box)

Sources: Electrical box SX-1, space heater #3, Light #3, space heater #4, 2" conduit, 2" station air pipe.

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause: 1) a loss of function of city water supply valve PCV-1187 of AFW Pump 31 and 2) instrument air piping rupture.

EVALUATION & DISPOSITION OF INTERACTION:

The rupture of instrument air piping is a common mode failure in the entire instrument air piping in the pump room. Such failure will cause pneumatically operated valves in the room to be inoperable.
The loss of function of PCV-1187 will require manual operation to open the valve. However, PCV-1187 does not have a hand operator.
Interaction is unacceptable. Review seismic documentation and provide seismic supports for the sources if they are not seismically supported.

D Kanchanat 2/11/81
Interaction Engineer/Date

Reviewer/Date 2/20/81

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 17-07-08-13, 18-07-08-13, Matrix No. I2

INTERACTION SKETCH NO.: 5-3, Photo No. 12 & 23

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: PCV-1188 Valve Station (including valve, solenoid, instrument air lines, electrical wires and terminal box)

Sources: 2" conduit, 2" station air pipe, Light # 2.

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause: 1) a loss of function of the city supply valve PCV-1188 of AFW Pump 32 and 2) instrument air piping rupture.

EVALUATION & DISPOSITION OF INTERACTION:

The rupture of instrument air piping is a common mode failure in the entire instrument air piping in the pump room. Such failure will cause pneumatically operated valves in the room to be inoperable. The loss of function of PCV-1188 will require manual operation to open the valve. However, PCV-1188 does not have a hand operator. Interaction is unacceptable. Review seismic documentation and provide seismic supports for the sources if they are not so supported.

D Kanchanaga 2/11/81
Interaction Engineer/Date

[signature] 2/20/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: 19-09-10-11-12, 20-09-10-11-12, 21-09-10-11-12, 22-09-10-11-12, Matrix No. I-2

INTERACTION SKETCH NO.: 5-3, Photo No. 44, 47

IDENTIFICATION OF INTERACTION COMPONENTS:

Targets: PT-406B, PI-1262, PT-1262, PT-1262R

Sources: Light # 7, 3" conduit, Monorail, instrument tubings between Rack #28 & Rack #5

DESCRIPTION OF POSTULATED INTERACTION:

Seismically induced failures of the sources can cause damages to the targets thereby resulting in water spillage and loss of functions the pressure transmitters which sense outlet pressure of AFW Pump 31.

Seismically induced failure of instrument lines between Rack #28 and Rack #5 is aggravated by the fact that Rack #28 is not anchored

EVALUATION & DISPOSITION OF INTERACTION:

Interaction is unacceptable.

Review seismic documentation and provide seismic supports for the sources if they are not so supported.

Danai Kanchanaroj 2/11/81
Interaction Engineer/Date

[signature] 2/20/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: generic.

INTERACTION SKETCH NO.: 5-3, Photo No. 53
Event Analysis Figure No. EA-1

IDENTIFICATION OF INTERACTION COMPONENTS:
Instrument Rack #28 contains flow transmitters which share the same sensing tubings as those of flow transmitters that generate signals for the control room indication of main feedwater flow and for the steam-feedwater flow mismatch plant protection function.

DESCRIPTION OF POSTULATED INTERACTION:
Rack #28 is not secured. It is not supported from the floor or wall. Therefore, a seismically induced movement of this rack will cause sensing line ruptures, damages to FCV-1121 and FCV-406D resulting in the losses of valve functions, steam-feedwater flow mismatch protection and important information to the control room operator.

EVALUATION & DISPOSITION OF INTERACTION:
Interactions are unacceptable.
Corrective actions:
- Review seismic qualification of Rack #28. If not qualified, modify the rack.
- Provide anchor bolts for the rack
- Perform seismic review for the sensing tubings and supports. Seismically support the tubings if required.

D Kanchanagan 2-9-81 — Interaction Engineer/Date
[signature] 2/10/81 — Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: generic

INTERACTION SKETCH NO.: Composite Piping and Instrument Air Tubing Flow Diagram No. (later), Event Analysis Diagram No EA-2

IDENTIFICATION OF INTERACTION COMPONENTS:
Instrument tubings and N_2 Backup cylinders.

DESCRIPTION OF POSTULATED INTERACTION:
A rupture in instrument air tubing circuit can cause the AFW flow control/shutoff valves, steam pressure control valve and turbine control valve to be inoperable because of a loss of instrument air or N_2 backup pressure in the tubing circuit.

EVALUATION & DISPOSITION OF INTERACTION:
Interaction can prevent a timely termination of AFW to a faulted steam generator. It can cause all three trains of the AFW system to be inoperable from the control room. Independence of the tubing circuit contradicts the separation criteria of the electrical circuits that operate instrument air solenoids etc.
Instrument air piping should be modified to three train circuits, each of which is provided with a N_2 backup cylinder

D Kandhmas 2-11-81
Interaction Engineer/Date

Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: N.A.

INTERACTION NO.: generic

INTERACTION SKETCH NO.: Photo No. (later)

IDENTIFICATION OF INTERACTION COMPONENTS:
Volume tanks of the AFW turbine steam supply pressure control valve, PCV-1139.

DESCRIPTION OF POSTULATED INTERACTION:
These tanks must be seismically supported.
The existing supports are questionable.

EVALUATION & DISPOSITION OF INTERACTION:

Review seismic documentation of the tanks and their supports.
If found unacceptable, provide new supports.

D Kanchanas 2/9/81
Interaction Engineer/Date

Reviewer/Date

Ebasco Services Incorporated

SOURCE

INSTR.

		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
		EUH 311 ELEC. BOX	SX-1 WALL BOX THERMAL COUPLE	321 & 322	SPACE HTR #3	LIGHT #3	SPACE HTR #4	2" CONDUIT	2" STA. AIR	LIGHT #7	3" CONDUIT	MONO RAIL	INSTR. TUBING	LIGHT #2		
	6" CT-1074															
13	PCV-1189															
14	SOV-1289															
	6" CT-1075															
15	PCV-1187	17	17	17	18	19	19	22	22							
16	SOV-1287	17	17	17	18	19	19	22	22							
	8" CT-1076															
17	PCV-1188							23	23					12		
18	SOV-1288							23	23					12		
	4" BFD-1001															
19	PT-406B									44/47	44/47	44/47	47			
20	PI-1262									44/47	44/47	44/47	47			
21	PT-1262									44/47	44/47	44/47	47			
22	PT-1262R									44/47	44/47	44/47	47			

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT NO 3 NUCLEAR POWER PLANT
DIV I&C DR DM DATE 3/24/81 CH SCALE None	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX

MATRIX No. I2

SHEET 22/39

SOURCE

INSTR.

	TARGETS	01 2" CONDUIT	02 LIGHT #15	03 LIGHT #8	04 MONO RAIL	05 4" CONDUIT	06 3" CONDUIT	07	08	09	10
	3" BFD-1001										
23	FCV-406D		49								
24	PM-406H		49								
25	HC-406D		49								
	3" BFD-1002										
26	FCV-406C		49								
27	PM-406G		49								
28	HC-406C		49								
	4" BFD-1003										
29	PI-1260			54/59	54/59	54/59	54/59				
30	PT-1260			54/59	54/59	54/59	54/59				
31	PI-1260R			54/59	54/59	54/59	54/59				
32	PT-406A	29									

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED
DIV. I.C DR. DG
DATE 3/24/80 CH. MJ
SCALE None
APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. I3
SHEET 23/39

SOURCE

INSTR

		01	02	03	04	05	06	07	08	09	10
		LIGHT #14	WALL LIGHTING & CONDUIT	SPEAKER	CONDUIT BOX	SPACE HTR #1	ROLL-UP DOOR	TELEPHONE STA.			
	3"BFD-1003										
33	FCV-406A	61	61								
34	PM-406E	61	61								
35	HC-406A	61	61								
	3"BFD-1004										
36	FCV-406B	61									
37	PM-406F	61									
38	HC-406B	61									
	3"BFD-1005										
39	FCV-405A			72	73	75	76	77			
40	PM-405A			72	73	75	76	77			
41	HC-405A			72	73	75	76	77			
	3"BFD-1006										
42	FCV-405B			72	73	75	76	77			
43	PM-405B			72	73	75	76	77			

TARGETS

INCHES CM.

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. I&C DR. DM

DATE 3/24/78 CH MJ

SCALE None

APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. I4

SHEET 24/39

SOURCE

INSTR.

		01	02	03	04	05	06	07	08	09	10
		SPEAKER	CONDUIT BOX	SPACE HTR #1	ROLL-UP DOOR	TELEPHONE STA.	4" DR. LINE				
	8" BFD-1006										
44	HC-405B	72	73	75	76	77					
	3" BFD-1007										
45	FCV-405D						78				
46	PM-405D						78				
47	HC-405D						78				
	3" BFD-1008										
48	FCV-405C						78				
49	PM-405C						78				
50	HC-405C						78				
	6" BFD-1005										
51	PI-1261										
52	PT-1261										
53	PI-1261R										
54	PI-GAGE "F"										

TARGETS

BUILDING: AFW

FIRE ZONE: 83

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. I5
DIV. S&C DR. DK DATE 3/4/81 CH. MJ SCALE None	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 25/39

INCHES 0 1 2

SOURCE

INSTR.

		01	02	03	04	05	06	07	08	09	10
		4" DR. LINE	ELEC. BOX SX-6	WALL BOX & CONDUITS	LIGHT # 12	ELEC. BOX YG7	ELEC. BOX SX-7	LIGHT # 11			
	2" BFD-1009										
55	FCV-1121	53	53								
56	SOV-1321	53	53								
	2" BFD-1010										
57	FCV-1123						36				
58	SOV-1323						36				
	1" BFD-1014										
59	PCV-1213										
60	PC-1213										
	2" CD-1031										
61	TI-1324										
	4" MS-1027										
62	PCV-1139				67/68	67/68		58			
63	PC-1176			66							
64	PT-1126			66							

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION: WITHIN FIRE ZONE N/A

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF THE STATE OF NEW YORK	MATRIX No. IG
DIV. I&C DR. DKJ	APPROVED	INDIAN POINT No 3 NUCLEAR POWER PLANT	
DATE 2/4/81 CH. RJ		SYSTEMS INTERACTION STUDY	SHEET 26/39
SCALE NONE		INTERACTION MATRIX	

SOURCE

INSTR.

TARGETS

		01 PUMP #33 POWER 4" CONDUIT	02 ELEC. BOX & SX-5 CONDUIT	03 NITROGEN BOTTLES	04 SPACE HTR #1	05 ROLL-UP DOOR	06 DOOR & CONDUIT	07 MONO RAIL	08 LIGHT #2	09 4" CONDUIT	10 INSTR. LINES FROM RACK #5
	12"CT-1070										
65	LCV-1158	41/43	41/43								
66	SOV-1258	41/43	41/43								
67	REMOTE SHUTDOWN PANEL			74	75	76	79				
68	TURB. CONTROL PANEL							64/65	64/65	64/65	64/65

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. I7
DIV. T&C DR. DKG DATE 2/6/81 CH. [illegible] SCALE NONE	APPROVED		SHEET 27/39

SOURCE

TARGETS

	INSTR.	01 LIGHT # 11	02 LIGHT # 12	03	04	05
69	PT-419C GEN. 31					
70	PT-429C GEN. 32					
71	PT-439C GEN 33					
72	PT-449C GEN 34					
73	RACK 5	55	58			
	FT-418A					
	FT-428A					
	FT-438A					
	FT-448A					
	FT-418B					
	FT-428B					
	FT-438B					
	FT-448B					

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED			POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. I8 SHEET 28/39
DIV. I&C DR. DK DATE 3/4/81 CH. [illegible] SCALE NONE	APPROVED			

SOURCE

INSTR.

		01	02	03	04	05
		4" DR. LINE	SPACE HTR. #1	2" CONDUIT	LIGHT #1	LIGHT #9
74	RACK 8	02	03	004 006 009	07	110
	PT-1126					
	PT-1163					
	PT-1164					
	PT-1165					
	PT-1166					
	PT-1205					
	PT-1260					
	PT-1261					
	PT-1262					
	PT-1263					
	PT-1264					
	PT-1265					

TARGETS

INCHES
CM.

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT NO. 3 NUCLEAR POWER PLANT	MATRIX No. I9
DIV. I&C DR. DK DATE 3/2/70 CH. [illegible] SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 9/39

SOURCE

INSTR.

		01	02	03	04	05
		LIGHT # 13				
75	RACK 9	51				
	PT-419A					
	PT-429A					
	PT-439A					
	PT-449A					
	PT-419B					
	PT-429B					
	PT-439B					
	PT-449B					
	PT-419C					
	PT-429C					
	PT-439C					
	PT-449C					

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT NO. 3 NUCLEAR POWER PLANT	MATRIX No. I10
DIV. I&C DR. DK DATE 2/4/81 CHK SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 30/39

SOURCE

INSTR.		01	02	03	04	05
		LIGHT # 12				
76	RACK 26	57				
	FT-1200					
	FT-1201					
	FT-1202					
	FT-1203					
	PT-1181					
	PT-1182					
	PT-1183					
	PT-1184					
77	RACK 28					
	FT-418L					
	FT-428L					
	FT-438L					
	FT-448L					

TARGETS

BUILDING: AFW

FIRE ZONE: 23

LOCATION: WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED
DIV. I&C DR. DK
DATE 3/24/81 CH. [illegible]
SCALE None
APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. II
SHEET 31/39

SOURCE

INSTR.

		01	02	03	04	05
		ELEC. BOX S2-G	LIGHT #21			
101	FE-1200 GEN. 31					
102	FT-1200					
103	FI-1200					
104	FE-1201 GEN. 32					
105	FT-1201					
106	FI-1201					
107	FE-1203 GEN 34					
108	FT-1203					
109	FI-1203					
110	FE-1202 GEN 33					
111	FT-1202					
112	FI-1202					
	4" MS-1027					
113	PCV-1310B	80	82			
114	SOV-1311	80	82			

TARGETS

INCHES CM. 0

BUILDING: AFW

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INCHES 0

EBASCO SERVICES INCORPORATED

DIV. I&C DR. DG

DATE 3/24/81 CH. [illegible]

SCALE None

APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

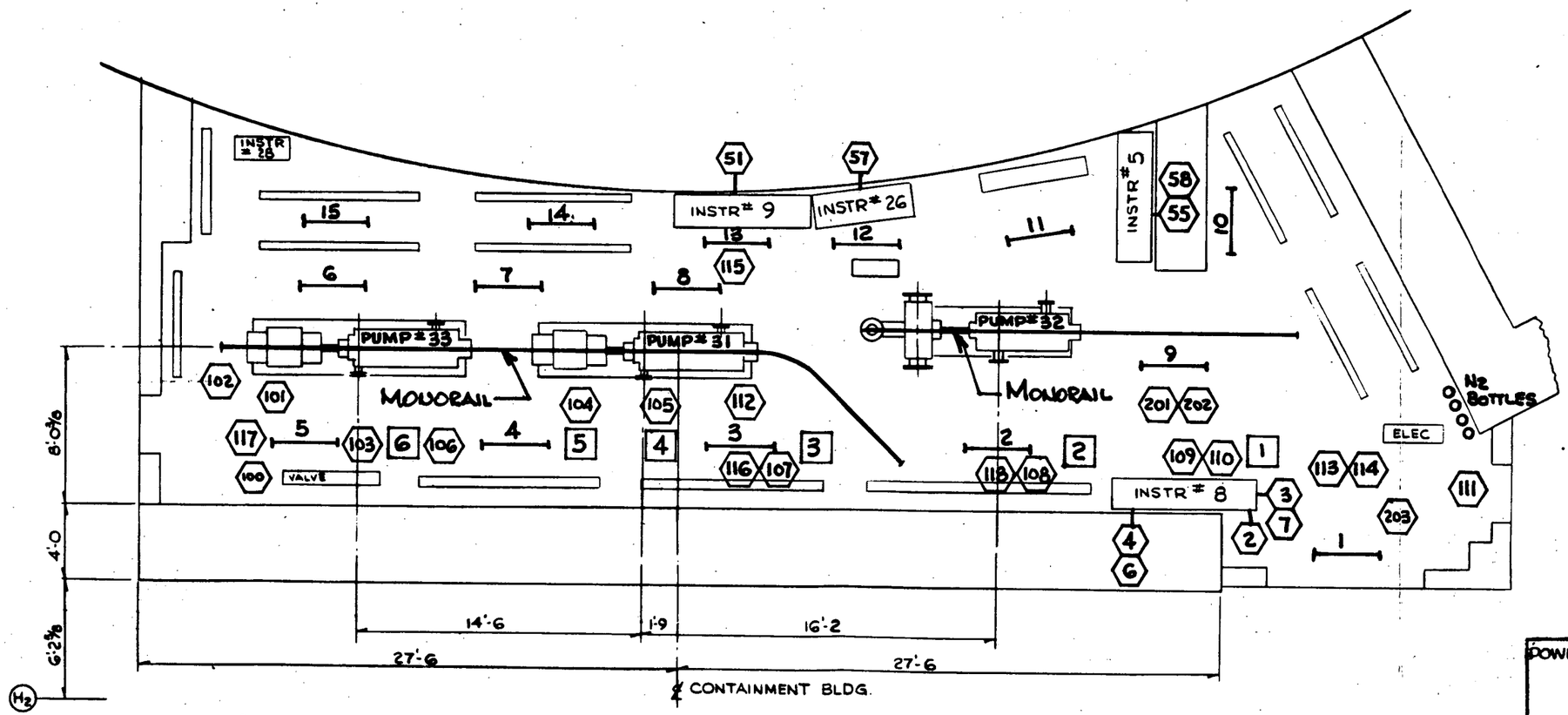
MATRIX No. I12

SHEET 32/34

(No) PICTURE NUMBER

No. LIGHTING FIXTURE

No SPACE HEATER



PLAN EL 18'-6

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
AUXILIARY FEEDWATER BUILDING

EBASCO SERVICES INCORPORATED

SCALE None	APPROVED	DATE 3-24-81
DIV ELEC		FIGURE
DR. GD		A-7E
CH.		

ELECTRICAL

SOURCE

	TARGETS	01 Conduit 755	02 Conduit 7551	03 2" Conduit	04 Light #5	05 5" Conduit	06 Mono Rail	07 1" Conduit	08 Light #6	09 3" Conduit	10 Speaker	11 Instr. Air	12 Space Htr #6	13 4" Dr. Line	14 2" Sta. Air	15 Space Htr #5	16 Light #4	17 Disc Switch EUH	18 Light #3	19 SX-3	20 Space Htr #4	21 Pull Box & other Small Conduit	22 1" Conduit	23 Pull Box EUH-	24 EUH- 3" Conduit	25 Elec Box Q-26	26 From Q-26 1½" Conduit	27 From Q-26 2½" Conduit	28 From Q-26 3" Conduit	29 1½" Conduit From Rack 9 & 26	30 1½" Conduit From SX-1	31 2½" Conduit From X-32	32 Power Supply to EUH #3 & 4	33 2" Conduit SX-2
01	TRAY- I			117										112										114	114					115	116	116	117	118
02	TRAY- II													113/202								113/202	113/202			113/201	113/201	113/201	113/201	115	116			118
03	TRAY- III													112										114	114					115	116	116	117	118
04	TRAY- IV																										113/201	113/201	113/201	115	116			
05	SX-5 LCV-5 & Conduit	100	100	100																														
06	Conduit 755			101	101	101	101	101	101	101																								
07	Conduit 7551			101	101	101	101	101	101	101																								
08	Motor # 33			102		102	102	102	102	102																								
09	Conduit CT-64			103	103			103			103	103	103																					
10	SX-3 FCV-1189 & Conduit			104				104						104	104	104	104																	
11	X232 Junction Box													105					105	105	105													
12	Conduit FC-1135													105					105	105	105													
13	Conduit FC-1135A													105					105	105	105													
14	Conduit FC-1136													106		106					106													
15	Conduit FC-1136A													106		106					106													
15A	Motor # 31						X																											

BUILDING: Auxiliary Feedwater Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF THE STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT	MATRIX No. E1
DIV. ELEC DR. GDP	APPROVED	SYSTEM INTERACTION STUDY	SHEET 33/39
DATE 3/24/81 CH. [illegible]		INTERACTION MATRIX	
SCALE None			

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE:

INTERACTION NO.: 33-01-05-100, 33-02-05-100

INTERACTION SKETCH NO. Fig 5-4, photo 100

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 4" Conduits 755 & 7551 for AFW pump motor #33

(Target) conduit box #SX-5

DESCRIPTION OF POSTULATED INTERACTION:

Conduits fail from supports and hit Box #SX-5 which are required for the operation of LCV-5

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable interaction

G C Pan 2-10-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-03-01-117, 33-03-05-100, 33-03-06-101

INTERACTION SKETCH NO.: 33-03-07-101 & 33-03-08-102
Fig 5-4, photo # 117, 100, 101 & 102

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 2" Conduit near ceiling

(Targets) Tray I, Conduit box #SX-5, power conduits 755 & 755I and AFW pump motor # 33

DESCRIPTION OF POSTULATED INTERACTION:

2" conduit fails from supports and hits targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 2" conduit described does not have sufficient mass to damage any target identified

G C Pan 2-10-81
Interaction Engineer/Date

V Gaylardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-03-09-103, 33-03-10-104

INTERACTION SKETCH NO. Fig 5-4, photo 103, 104

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 2" conduit near ceiling

(Targets) Conduit for CT-64
Conduit box SX-3 for PCV-1189

DESCRIPTION OF POSTULATED INTERACTION:

2" Conduit fails from supports and hits targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 2" conduit does not have sufficient mass to damage the targets

G C Pan 2-10-81
Interaction Engineer/Date

N Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-04-06-101, 33-04-07-101

INTERACTION SKETCH NO. fig 5-4, photo 101

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): FLU LTG FIX #5

(Targets): AFW Pump motor #33 Feeder Conduits #755 & #7551

DESCRIPTION OF POSTULATED INTERACTION:

Lighting Fixture #5 fails from supports and hits Conduits 755 & 7551.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - lighting fixture does not have sufficient mass to damage the 4" conduits identified.

G C Pan 2-10-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-04-09-103

INTERACTION SKETCH NO. fig 5-4, photo 103

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): Lighting Fix #5

(Target): Conduit for CT-64

DESCRIPTION OF POSTULATED INTERACTION:

Lighting Fixture #5 fails from supports and hits Conduit feeding CT-64

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Lighting fixture does not have sufficient mass to cause any unacceptable damage to the conduit.

G C Pan
Interaction Engineer/Date

M Gaylard 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-05-06-101, 33-05-07-101, 33-05-08-102

INTERACTION SKETCH NO.: Fig 5-4, photo 101, 102

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): 5" conduit over the targets

(Targets): 4" Conduit, 755
4" Conduit 7551
Terminal box for AFW motor #33

DESCRIPTION OF POSTULATED INTERACTION:

5" Conduit fails from supports and hits targets directly below

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - AFW pump motor #33 feeder Conduits 755 & 7551 and motor #33 terminal box may be damaged

G C Pan 2-10-81
Interaction Engineer/Date

M Gaylard 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-06-06-101, 33-06-07-101, 33-06-08-101

INTERACTION SKETCH NO. 795-4, photo 101, 102

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): Overhead Mono Rail

(Target): Motor #31
Motor #33
Feeder Conduits #755 & 7551 for motor #33

DESCRIPTION OF POSTULATED INTERACTION:

Mono rail - falls from supports and hits motor #33, its feeder conduits 755 & 7551 and motor #31.

Both motors are 400 HP, 440 Volt with open drippproof enclosure.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Targets may be damaged by the failure of the Mono rail support. Motor terminal boxes, which are made of fabricated steel plates, are deemed to be the most susceptible.

G C Pan 2-11-81
Interaction Engineer/Date

C J Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-07-06-101, 33-07-07-101, 33-07-08-102
33-07-09-103, 33-07-10-104

INTERACTION SKETCH NO.:
Fig 5-4, photo 101, 102, 103, 104

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): 1" Overhead Conduit

(Targets): Motor #31, Motor #33
Conduits 755 & 7551
Conduit to CT-64
Box SX-3

DESCRIPTION OF POSTULATED INTERACTION:
Conduits falls from supports and hits targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 1" conduit does not have sufficient mass to cause damage.

G C Pan 2-11-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-08-06-101, 33-08-07-101, 33-08-08-102
33-09-06-101, 33-09-07-101, 33-09-08-102

INTERACTION SKETCH NO.: Fig 5-4, photo 101, 102

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): Lighting Fixture #6, 3" overhead conduits

(Targets): Motor #31
Motor #33
Feeder Conduits 755 & 7551

DESCRIPTION OF POSTULATED INTERACTION:

Conduits or lighting fixture falls from their supports and hit target

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interactions: a. lighting fixture does not have sufficient mass
b. Conduits is located behind seismically supported heavy piping

G C Ran 2-11-81
Interaction Engineer/Date

N Zaghardi 2/27/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-10-09-103, 33-11-09-103, 33-12-10-103

INTERACTION SKETCH NO.: Fig 5-4, photo 103

IDENTIFICATION OF INTERACTION COMPONENTS:

(Sources); paging speaker
Instrument Air Tubing
Space heater Unit no. 6

Target : Conduit to CT-64

DESCRIPTION OF POSTULATED INTERACTION:

Speaker, Instrument Tubing and space heater Unit fall from their suppot and hit the conduit.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - a. Speaker and Tubing do not have sufficent mass to cause unacceptable damage to the target.
b. Space heater is located approx 4'-0" from the wall and is unlikely to damage the conduit which is supported 1" off the wall.

G C Pan 2-11-81
Interaction Engineer/Date

M Daglaudi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-13-10-104, 33-13-11-105, 33-13-12-105
33-13-13-105, 33-13-14-106, 33-13-15-106

INTERACTION SKETCH NO.: Fig 5-4, photo 104, 105, 106

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 4" Drain Line

Targets: Box # SX-3, Box # X282,
Conduits for FC-1135, FC-1135A, FC-1136 & FC-1136A

DESCRIPTION OF POSTULATED INTERACTION:

Drain line fail from its supports and hit target identified.

EVALUATION & DISPOSITION OF INTERACTION:

Interaction is deemed "not credible" due to the locations of the targets which are all mounted against the wall. The Source, however, may cause unacceptable damage to the Instrument which are identified separately.

G C Pan 2-11-81
Interaction Engineer/Date

[signature] 2/27/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-14-10-104, 33-15-10-104, 33-16-10-104
33-15-14-106, 33-15-15-106

INTERACTION SKETCH NO.: Fig 5-4, Photo 104, 106

IDENTIFICATION OF INTERACTION COMPONENTS:

Sources: 2" station Air line
Space Heaten #5
Lighting Fixture #4

Target: Box SX-3 and associated Conduits
Conduits to FC-1136 and FC-1136A

DESCRIPTION OF POSTULATED INTERACTION:

Sources fail from support and hit the target.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction: Conduit and box are located no more than 1" from the wall. No unacceptable damage is deemed likly.

G C Pan 2-11-81
Interaction Engineer/Date

M Gagliano 2/27/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-17-11-105, 33-17-12-105, 33-17-13-105
33-18-11-105, 33-18-12-105, 33-18-13-105

INTERACTION SKETCH NO.:
Fig. 5-4, photo 105

IDENTIFICATION OF INTERACTION COMPONENTS:

(Sources): Electric Unit Heater Disconnect Switch
Lighting Fixture #3

(Targets): Box # x 23 z.
Conduits FC-1135, & FC1135A

DESCRIPTION OF POSTULATED INTERACTION:
Sources fall from suppat and hit targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Sources identified do not have sufficient mass to cause any unacceptable damage to the target.

G C Pan 2-11-81
Interaction Engineer/Date

M Gagliardi 2/27/81
Reviewer/Date

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-19-14-106, 33-19-15-106

INTERACTION SKETCH NO.: Fig 5-4, photo 106

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: Box # SX-3

Targets: Conduits to FC-1136 & FC-1136A

DESCRIPTION OF POSTULATED INTERACTION:

Box falls from its support and hits conduits

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - SX-3 box does not have sufficient to cause any unacceptable damage

G C Pan 2-11-81
Interaction Engineer/Date

M Pagliaro 2/23/81
Reviewer/Date

Ebasco Services Incorporated

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-20-11-105, 33-20-12-105, 33-20-13-105

INTERACTION SKETCH NO.: Fig 5-4, Photo 105

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: Space Heater #4

Target: Box # X 232 and conduits to trays
Conduits to FC-1135 & FC-1135A

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater #4 falls from its support and hits target

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Damage to box # X 232 and conduits will disable the operation of FC-1135 and FC-1135A

GC Fan 2-11-81
Interaction Engineer/Date

M Giuliani 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-25-02-113/201, 33-27-02-113/201, 33-27-02-113/201
33-28-02-113/201, 33-26-04-113/201, 33-27-04-113/201

INTERACTION SKETCH NO.: 33-28-04-113/201

IDENTIFICATION OF INTERACTION COMPONENTS:

Sources: Conduix Box Q-26 and 3-associated Conduits 1½", 2½" & 3"

Target: Cable Trays II & IV.

DESCRIPTION OF POSTULATED INTERACTION:

Conduits and Box fail from their support and hit adjacent Trays II & IV.

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction – Conduits and box do not have sufficient mass to cause any unacceptable damage

GC Pan 2-11-81
Interaction Engineer/Date

N Sofuado 2/23/81
Reviewer/Date

Ebasco Services Incorporated

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-29-01-115, 33-29-02-115, 33-29-03-115
33-29-04-115

INTERACTION SKETCH NO.: Fig 5-4, photo 115

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 1½" conduits from Instrument Racks #9 & #26

Targets: Cable Tray I, II, III & IV

DESCRIPTION OF POSTULATED INTERACTION:

Conduits fail from their support and hit Cable Trays

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 1½" conduits running mostly perpendicular to the trays with conduit length ranging from approx. 8'-0" to 15'-0" will not have sufficient mass to cause any unacceptable damage to the trays.

G C Pan 2-11-81
Interaction Engineer/Date

M Gagliardi 2/27/81
Reviewer/Date

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-30-01-116, 33-30-02-116, 33-30-03-116

INTERACTION SKETCH NO.: 33-30-04-116
Fig 5-4, photo 116

IDENTIFICATION OF INTERACTION COMPONENTS:

Source : 1½" conduit from SX-1

Targets : Trays I, II, III & IV

DESCRIPTION OF POSTULATED INTERACTION:

Conduit fails from support and hits trays

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 1½" Conduit does not have sufficient mass to cause any unacceptable damage.

G C Pan 2-11-81
Interaction Engineer/Date

M Gagliardo 2/23/81
Reviewer/Date

Ebasco Services Incorporated

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-31-01-116, 33-31-03-116

INTERACTION SKETCH NO.: Fig 5-4, photo 116

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source) 2½" Conduit from X-32

(Target) Cable Tray I & III

DESCRIPTION OF POSTULATED INTERACTION:

2½" Conduit fails from its support and hits Cable Tray I & III

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction

G C Pon 2-11-81
Interaction Engineer/Date

Reviewer/Date 2/23/81

E1

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-32-01-117, 33-32-03-117

INTERACTION SKETCH NO.: Fig 5-4, photo 117

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): power. feeder conduit for space Heater #3 & 4

(Target): Tray I & III.

DESCRIPTION OF POSTULATED INTERACTION:

Conduit fail from their support and hit tray

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction: Simutaneous failure of many small conduits from their support is deem likely to damage the cable trays below.

G C Pan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

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SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-33-01-118, 33-33-02-118, 33-33-03-118

INTERACTION SKETCH NO.: Fig 5-4, photo 118

IDENTIFICATION OF INTERACTION COMPONENTS:

(Source): 2" conduit from SX-2

(Target): Tray I, II, III

DESCRIPTION OF POSTULATED INTERACTION:

Conduit fails from its support and hit cable Tray

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - 2" conduit does not have sufficient mass to cause any unacceptable damage to the tray support or cable.

C Pan 2-12-81
Interaction Engineer/Date

M Guglielmi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-23-01-114, 33-23-03-114
33-24-01-114, 33-24-03-114

INTERACTION SKETCH NO.: Fig 5-4, photo 114

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: Electric Unit Space Heater (EUH) power supply 3" conduit and associated pull box

Target: Tray I & III

DESCRIPTION OF POSTULATED INTERACTION:

3" Conduit and box fail from supports and hit cable tray

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction: This is a case where, in our judgement, an unacceptable interaction is unlikely, due to the short length of the exposed conduit, but possible. More precise evaluation is required to classify the interaction as "acceptable".

G C Pan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-21-02-113/202 , 33-22-02-113/202

INTERACTION SKETCH NO.: Fig 5-4, photo 113, 202

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: Pull box and other small conduit (1½", 1" etc)
4" Conduit parallel to Cable Tray

Target: Tray II

DESCRIPTION OF POSTULATED INTERACTION:

Simultaneous failure of Conduit and Box support to enable many conduits and box to hit Cable Tray II

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction: Sufficient numbers of conduit and box may fail and hit Tray II to cause an unacceptable damage.

G C Pan 2-12-81
Interaction Engineer/Date

M Gerard 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 33-13-01-112, 33-13-02-113/202, 33-13-03-112

INTERACTION SKETCH NO.: Fig 5-4, photo 112, 113, 202

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 4" Drain Line

Target: Tray I, II, III.

DESCRIPTION OF POSTULATED INTERACTION:

4" Drain line fails from supports and hit Cable Tray I, II, III directly below;

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction

GC Pan 2-12-81
Interaction Engineer/Date

M Laguardi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

SOURCE

ELECTRICAL

TARGETS

		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
		2" STA. AIR	1" INSTR. AIR	2" CONDUIT	1" CONDUIT	EUH-311 P.S.	FN-279	SPACE HTR #2	4" DR. LINE	ROLL-UP DOOR	HANGING INCAN. LTG. FIXTURE	TRAY I	TRAY II	TRAY III	TRAY IV	N_2 BOTTLES
16	BOX 321 AABE	107	107	107	107											
17	BOX 322 AABF	107	107	107	107											
18	SX-1 PCV-1187 & CONDUIT	107	107	107	107	107										
19	SX-2 PCV-1188 & CONDUIT	108	108	108			108	108								
20	VENTILATION FANS								111	111						
21	AFW PUMPS LOCAL CONT PNL									X	203	203		203		74

BUILDING: AUXILIARY FEEDWATER PUMP BUILDING

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. E2 SHEET 34/39
DIV. ELEC DR. GD DATE 3/24/81 CH. [illegible] SCALE None	APPROVED		

E2

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-01-16-107, 34-01-17-107

INTERACTION SKETCH NO.: Fig 5-4, photo 107,

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 2" station Air line

Target: Box 321 (AABE), Box 322 (AABF)

DESCRIPTION OF POSTULATED INTERACTION:

2" station Air fails from its support and hits the targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - Boxes are mounted against the wall, unacceptable damage is deemed unlikely.

G C Pan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

E2

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-01-18-107, 34-01-19-108

INTERACTION SKETCH NO.: Fig 5-4, photo 107, 108

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 2" station Air line

Target: SX-1 and Conduit to PCV-1187
SX-2 and Conduit to PCV-1188

DESCRIPTION OF POSTULATED INTERACTION:

2" Station Air fails from its support and hits the targets

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction: a. Damage to wall mounted boxes SX-1 or SX-2 is unlikely
b. Flexible conduits to PCV-1187 and PCV-1188 are very susepectible to most falling objects

G C Pan 2-12-81
Interaction Engineer/Date

G Gaglardi 2/23/81
Reviewer/Date

E2

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-02-16-107, 34-02-17-107, 34-03-16-107
34-03-17-107, 34-04-16-107; 34-04-17-107

INTERACTION SKETCH NO.: Fig 5-4, photo 107

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 1" Instrument Air
2" and 1" conduit

Target: Conduit Boxes 321 (AABE) & 322 (AABF)

DESCRIPTION OF POSTULATED INTERACTION:

Instrument Air piping and conduits fail from their supports and hit the Targets

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - a. Air piping and conduits described do not appear to have sufficient mass to cause any unacceptable damage
b. Boxes are of steel plates type and mounted directly against the wall

G C Pan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-02-18-107, 34-02-19-108, 34-03-18-107, 34-03-19-108
34-04-18-107, 34-05-18-107

INTERACTION SKETCH NO.: Fig 5-4, photo 107, 108

IDENTIFICATION OF INTERACTION COMPONENTS:

Sources: 1" Instrument Air, 2" Conduit, 1" Conduit, Space Heater DS and Heater Disconnect Switch

Targets: Box SX-1 and conduit to PCV-1187
Box SX-2 and Conduit to PCV-1188

DESCRIPTION OF POSTULATED INTERACTION:

Instrument Air piping, electrical conduits fail from their support and hit the targets identified.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - a. Boxes SX-1 and SX-2 are unlikely to be damaged. Boxes are wall mounted.
b. Flexible conduits for PCV-1187 & PCV-1188 are very suseptible to any falling objects.

G C Pan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-06-19-108

INTERACTION SKETCH NO.: Fig 5-4, Photo 108

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: Conduit box FM-279

Target: Box SX-2 and associated conduits including 1-1½" rigid and 3-¾" flexible conduits

DESCRIPTION OF POSTULATED INTERACTION:

Conduit box FM-279 fails from its support and hits SX-2 and its associated conduits

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - a. Wall mounted rigid conduit and box is unlikely to be damaged

b. Flexible conduit may be damaged when struck by box FM-279

G C Pau 2-12-81
Interaction Engineer/Date

M Gaglianeli 2/23/81
Reviewer/Date

Ebasco Services Incorporated

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW Pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-07-19-108

INTERACTION SKETCH NO.: Fig 5-4, photo 108

IDENTIFICATION OF INTERACTION COMPONENTS:

Source : Electrical Unit Space Heater # 2

Target : Box SX-2 and its associated conduits

DESCRIPTION OF POSTULATED INTERACTION:

Space Heater # 2 fails from its support and hit the target

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction: Unit heater with a motor driven fan has sufficient mass to cause an unacceptable damage.

G C Pan 2-12-81
Interaction Engineer/Date

M Graham 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-08-20-111

INTERACTION SKETCH NO.: Fig 5-4, Photo 111

IDENTIFICATION OF INTERACTION COMPONENTS:

Source: 4" Drain Line

Target: Ventilation Fan

DESCRIPTION OF POSTULATED INTERACTION:

4" Drain line falls from its support and hit Ventilation fan directly below.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction

G C Pan 2-12-81
Interaction Engineer/Date

M Gaglardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-09-20-111

INTERACTION SKETCH NO.: Fig 5-4, photo 111

IDENTIFICATION OF INTERACTION COMPONENTS:

Source : Roll-up Door

Target : Ventilation Fans

DESCRIPTION OF POSTULATED INTERACTION:

Roller-up door damaged due to external missile and hit ventilation fans

EVALUATION & DISPOSITION OF INTERACTION:

Acceptable Interaction - The location of the ventilation fan units makes the damage very unlikely. However, the failure of the Roller-up door will cause excessive damage to other indoor equipment which shall be evaluated separately.

G C Fan 2-12-81
Interaction Engineer/Date

M Gagliardi 2/23/81
Reviewer/Date

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT 3 NUCLEAR POWER PLANT
SYSTEMS INTERACTION STUDY
EXTERNALLY INDUCED SYSTEMS INTERACTION
INTERACTION DOCUMENTATION SHEET

BUILDING: AFW pump Building

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

INTERACTION NO.: 34-09-21-X, 34-10-21-203, 34-11-21-203, 34-13-21-203
34-15-21-74

INTERACTION SKETCH NO.: Fig 5-4, photo 203

IDENTIFICATION OF INTERACTION COMPONENTS:

Sources: Roll-up door, Hanging INCANDECENT LTG, TRAY I, TRAY III, N_2 Bottles

Target: AFW pump Local control panel

DESCRIPTION OF POSTULATED INTERACTION:

Failure of the support or restraint for the sources will enable one or more of the soupres to hit the target.

EVALUATION & DISPOSITION OF INTERACTION:

Unacceptable Interaction - Control panel can not withstand the force caused by any flying or falling objects. Unacceptable Control wiring short circuit, instrument false indication are very possible when struck by the sources identified.

G C Pan 2-11-81
Interaction Engineer/Date

M Jaluadi 2/23/81
Reviewer/Date

Ebasco Services Incorporated

SOURCE

TARGETS

		01	02	03	04	05
	ELECTRICAL	LIGHT # 11	LIGHT # 12			
22	RACK # 5	55	58			
	FROM TRAY I					
	FT-418A					
	FT-428A					
	FT-438A					
	FT-448A					
	FROM TRAY II					
	FT-418B					
	FT-428B					
	FT-438B					
	FT-448B					

INCHES CM.

BUILDING: XFW Pump Bldg

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. ELEC DR. GPG

DATE 3/24/81 CH. MG

SCALE None

APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. E3

SHEET 35/39

SOURCE

TARGETS

ELECTRICAL		01	02	03	04	05
		2" CONDUIT	LIGHT #1	4" DR. LINE	SPACE HTR #1	LIGHT #9
23	RACK # 8	04 06 109	07	02	03	110
	FROM TRAY I					
	PT-1262, PT-1163 PT-1265					
	FROM TRAY II					
	PT-1261, PT-1126 PT-1264, PT-1164					
	FROM TRAY III					
	PT-1260, PT-1165 PT-1263, PT-1205					
	FROM TRAY IV					
	PT-1166					

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No. 3 NUCLEAR POWER PLANT SYSTEMS INTERACTION STUDY INTERACTION MATRIX	MATRIX No. E4
DIV. ELEC DR. GPG DATE 3/24/81 CH. MJ SCALE NONE	APPROVED		SHEET 36/39

SOURCE

ELECTRICAL

TARGETS

		01	02	03	04	05
		LIGHT # 13				
24	RACK # 9	51				
	FROM TRAY I					
	PT-419A, PT-429A					
	PT-439A, PT-449A					
	FROM TRAY II					
	PT-419B, PT-429B					
	PT-439B, PT-449B					
	FROM TRAY III					
	PT-429C					
	PT-439C					
	FROM TRAY IV					
	PT-419C					
	PT-449C					

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION: NA
WITHIN FIRE ZONE

EBASCO SERVICES INCORPORATED		POWER AUTHORITY OF STATE OF NEW YORK INDIAN POINT No 3 NUCLEAR POWER PLANT	MATRIX No. ES
DIV. ELECT. DR. GDV DATE 3/24/81 CH. MJ SCALE NONE	APPROVED	SYSTEMS INTERACTION STUDY INTERACTION MATRIX	SHEET 37/39

SOURCE

ELECTRICAL

TARGETS

		01	02	03	04	05
		LIGHT # 12				
25	RACK # 26	57				
	FROM TRAY I To Box 4					
	FT-1200					
	PT-1181					
	FROM TRAY II To Box 3					
	FT-1201					
	PT-1182					
	FROM TRAY III To Box 2					
	FT-1202					
	PT-1183					
	FROM TRAY IV To Box 1					
	FT-1203					
	PT-1184					

BUILDING: AFW Pump Bldg

FIRE ZONE: 23

LOCATION: WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. ELEC DR GP

DATE 2/4/82 CH

SCALE NONE

APPROVED

POWER AUTHORITY OF STATE OF NEW YORK
INDIAN POINT No. 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

MATRIX No. E6

SHEET 38/39

SOURCE

ELECTRICAL

		01	02	03	04	05																										
26	RACK * 28																															
	FROM TRAY																															
	FT-418L																															
	FT-428L																															
	FT-438L																															
	FT-448L																															

TARGETS

BUILDING: AFW Pump BLDG

FIRE ZONE: 23

LOCATION WITHIN FIRE ZONE: NA

EBASCO SERVICES INCORPORATED

DIV. ELECT DR GM

DATE 3/4/81 CH MG

SCALE NONE

APPROVED

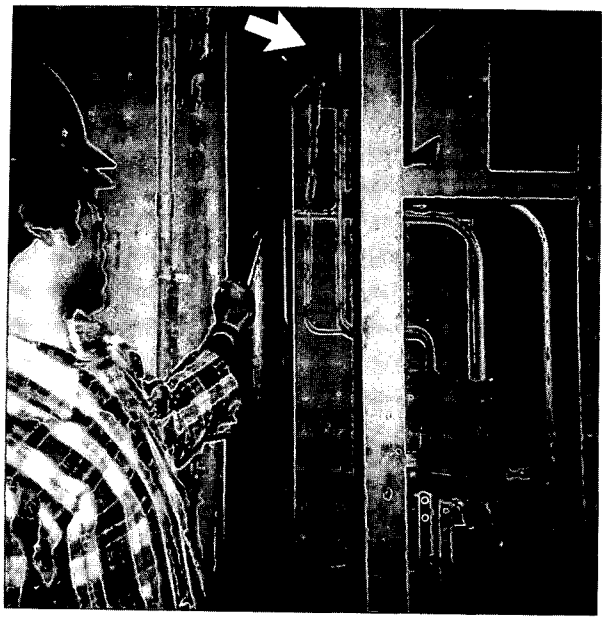
POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3
NUCLEAR POWER PLANT

SYSTEMS INTERACTION STUDY
INTERACTION MATRIX

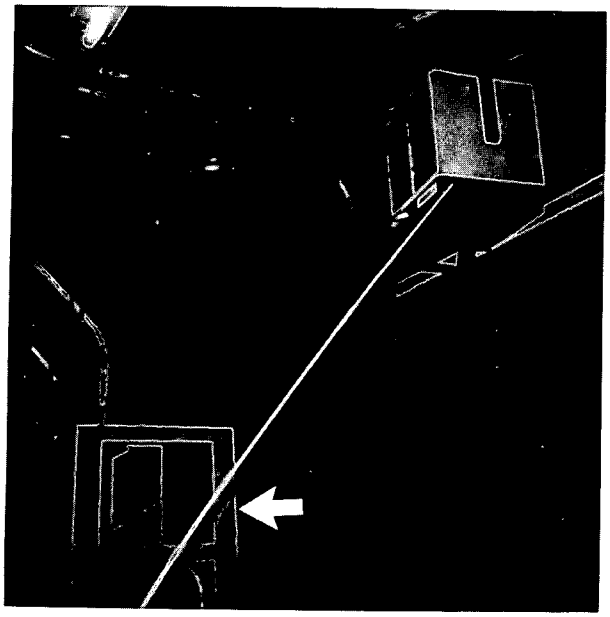
MATRIX No. E7

SHEET 39/39

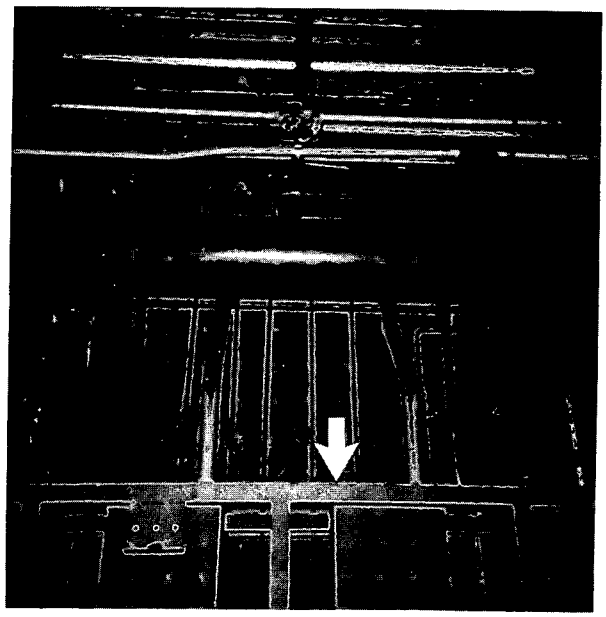
PICTURE 1



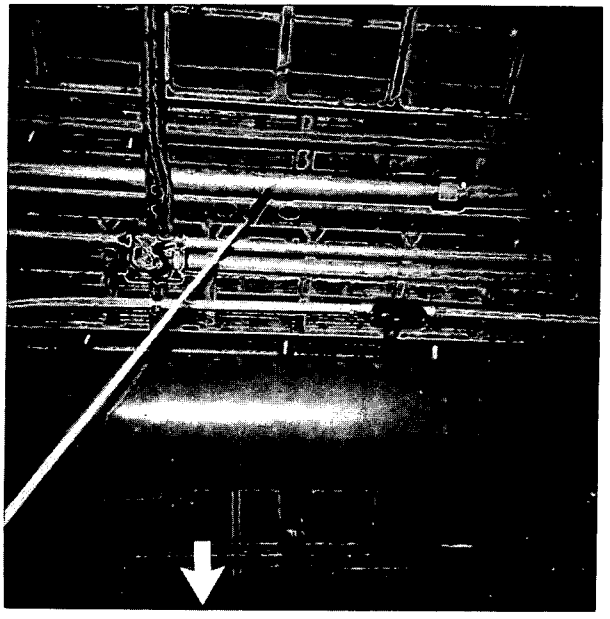
PICTURE 2



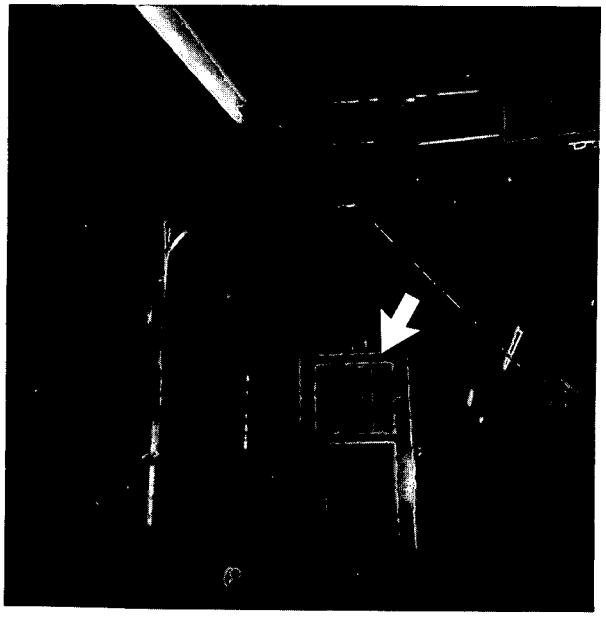
PICTURE 3



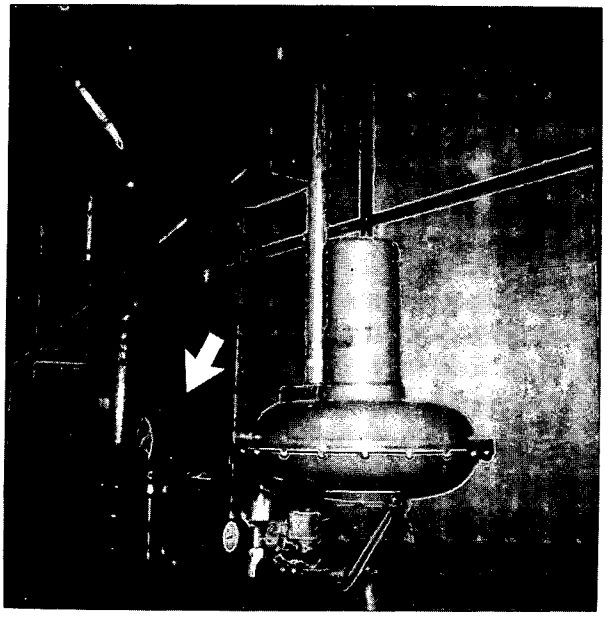
PICTURE 4



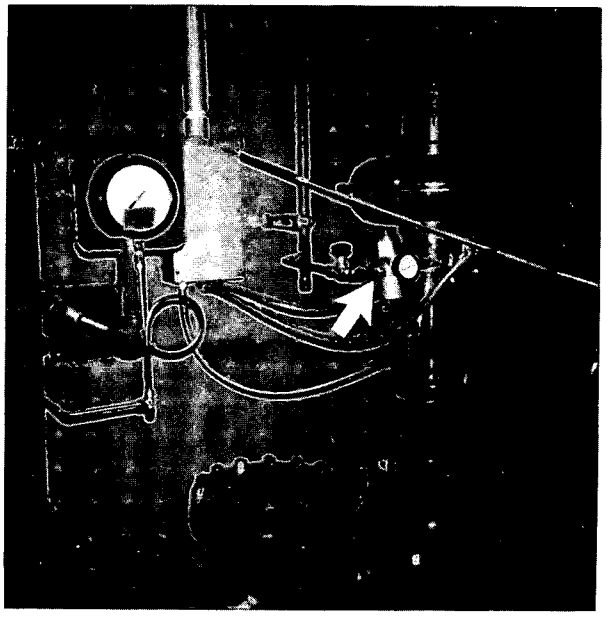
PICTURE 6



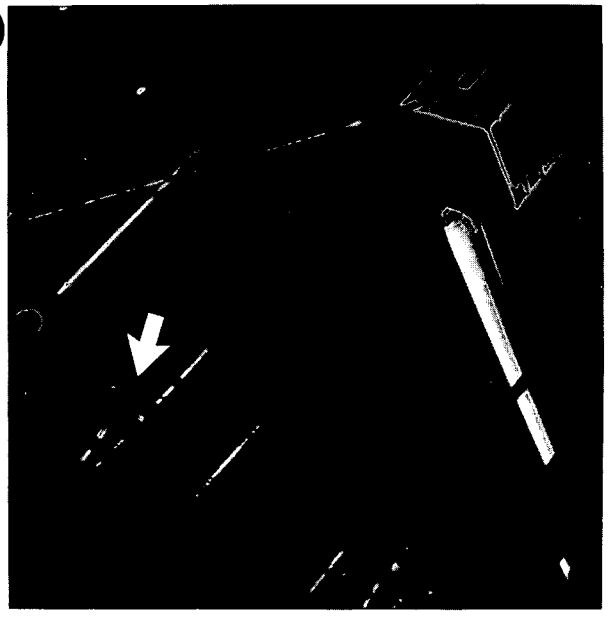
PICTURE 7



PICTURE 8

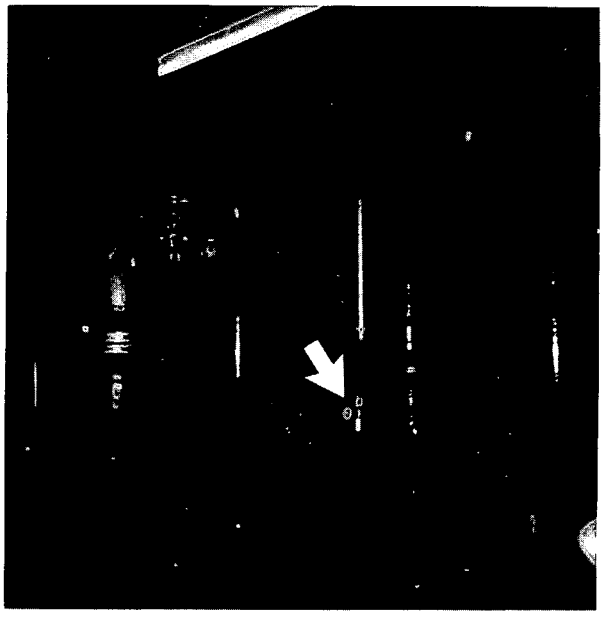


PICTURE 9

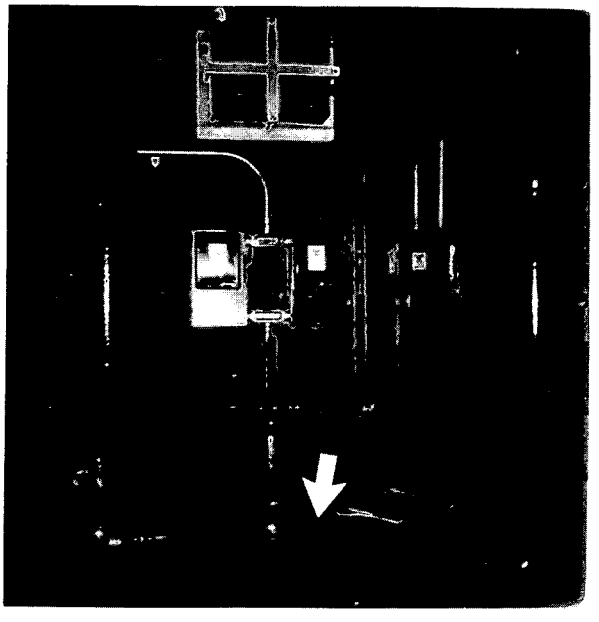


PICTURE 10

PICTURE 11

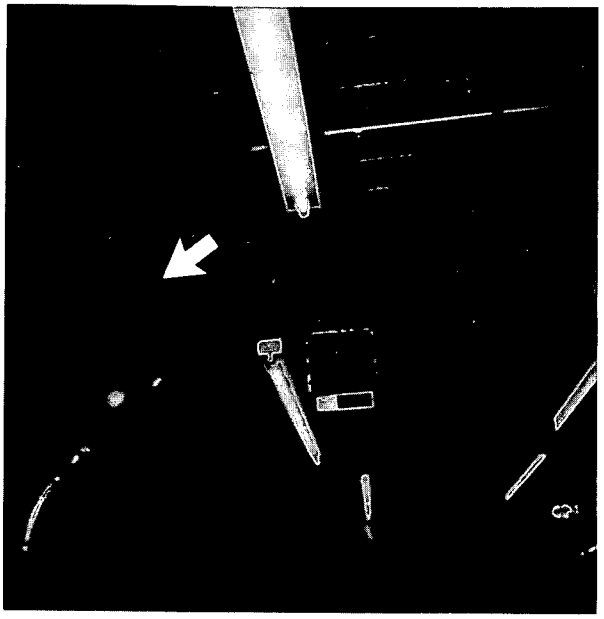


PICTURE 12

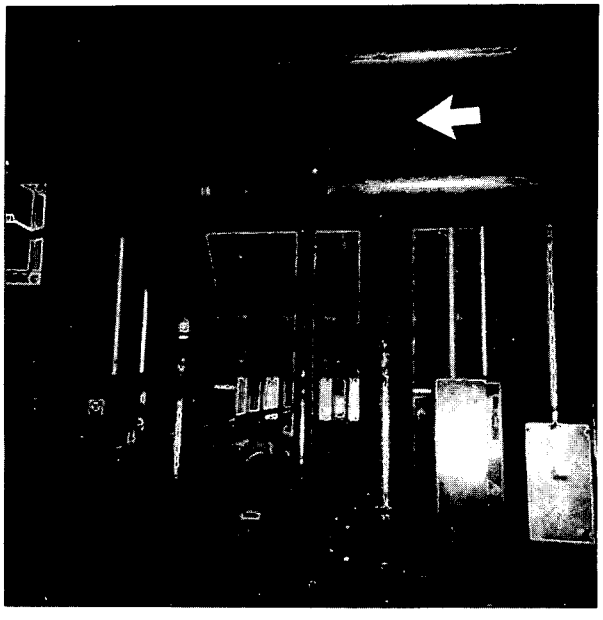


PICTURE 13

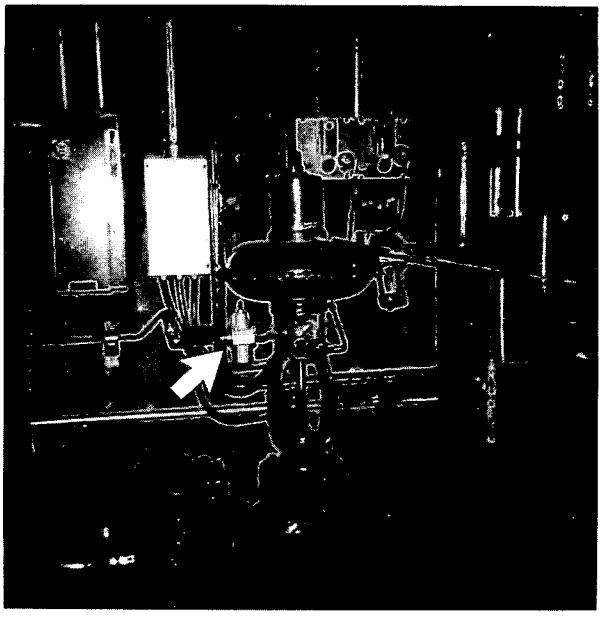
PICTURE 14



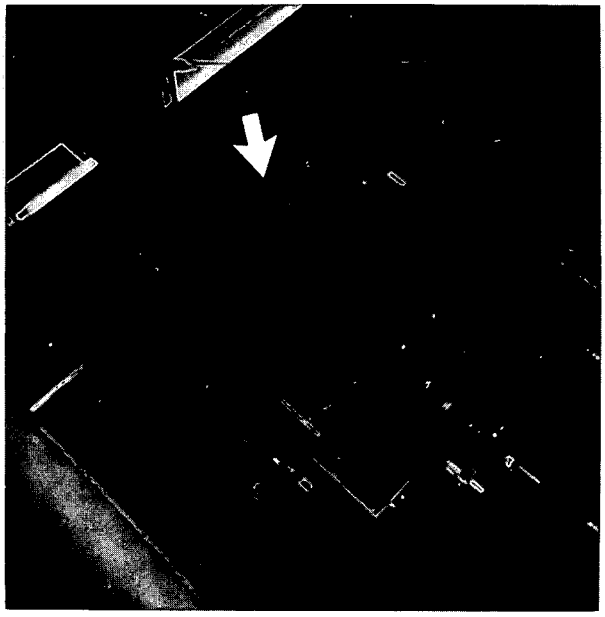
PICTURE 15



PICTURE 16



PICTURE 17



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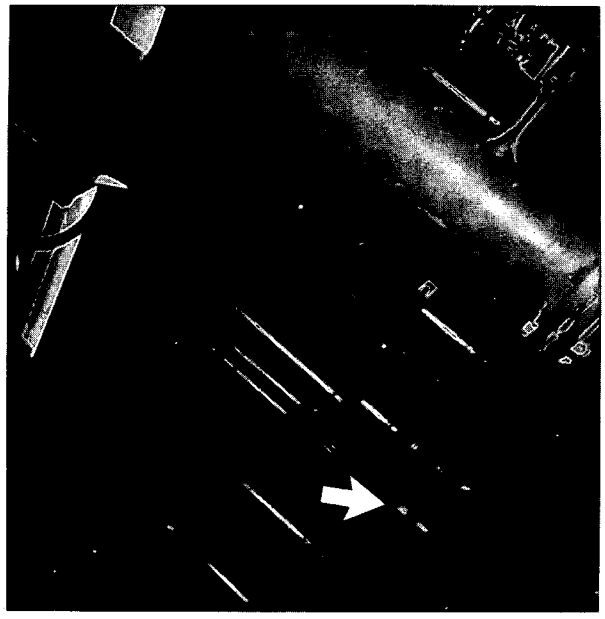

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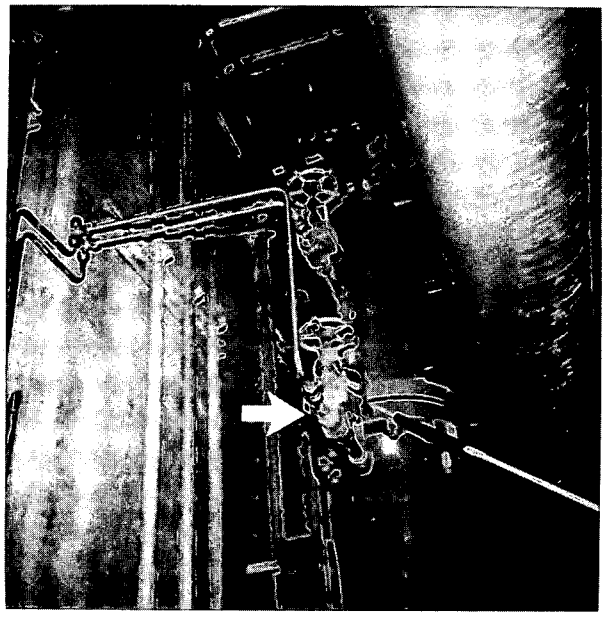

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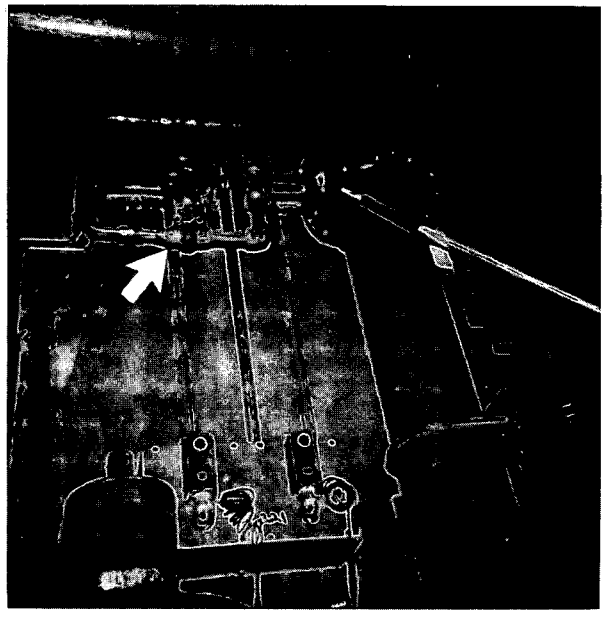

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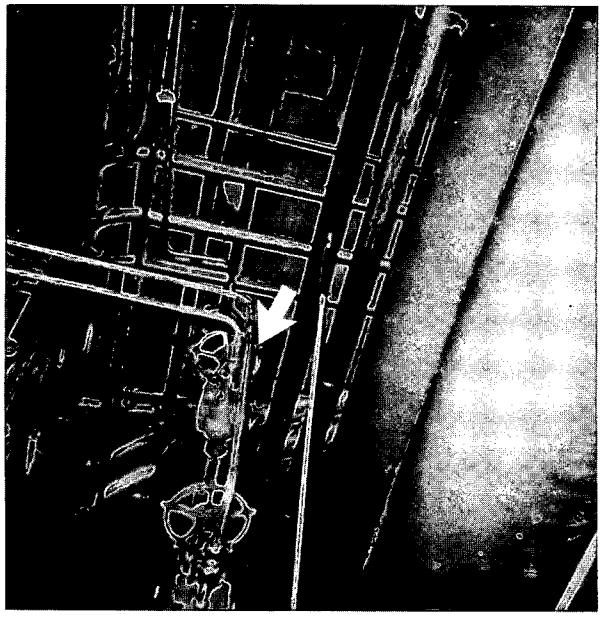

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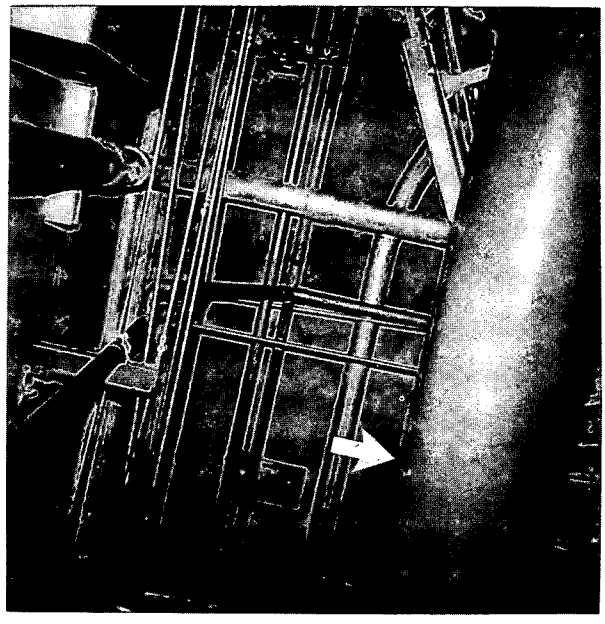

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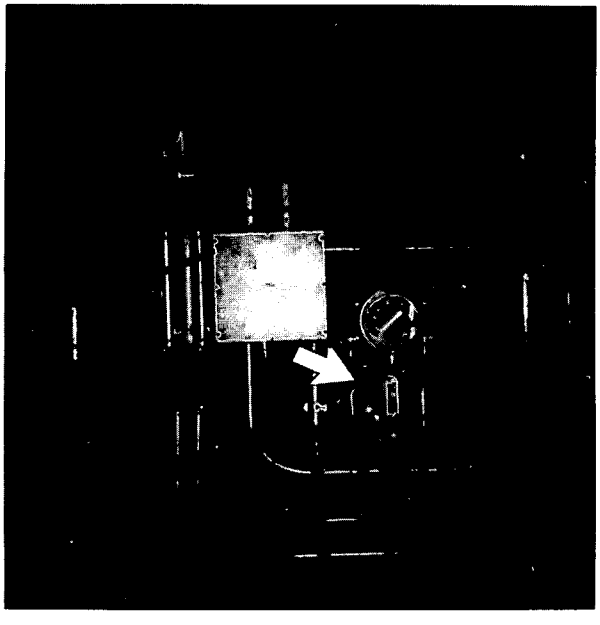

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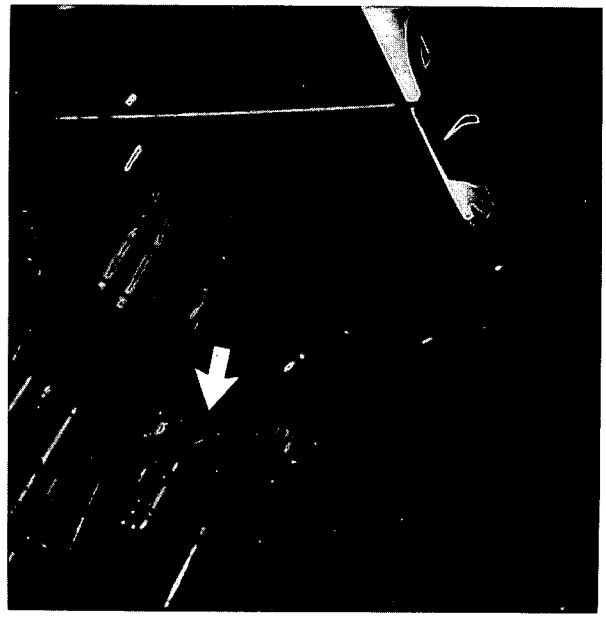

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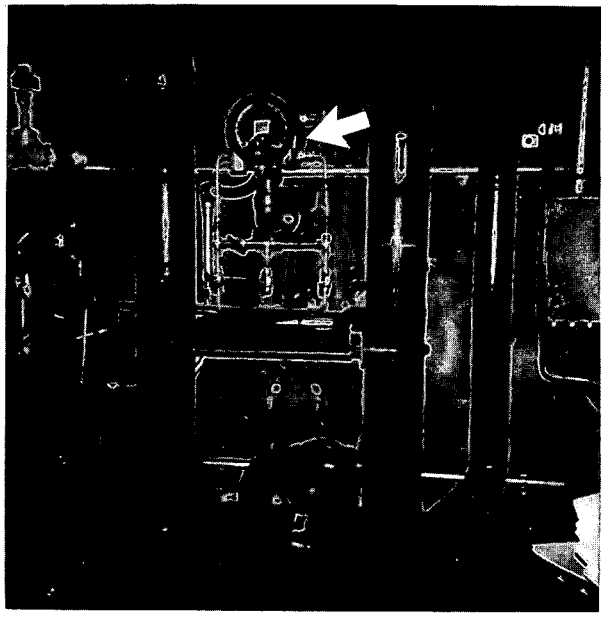

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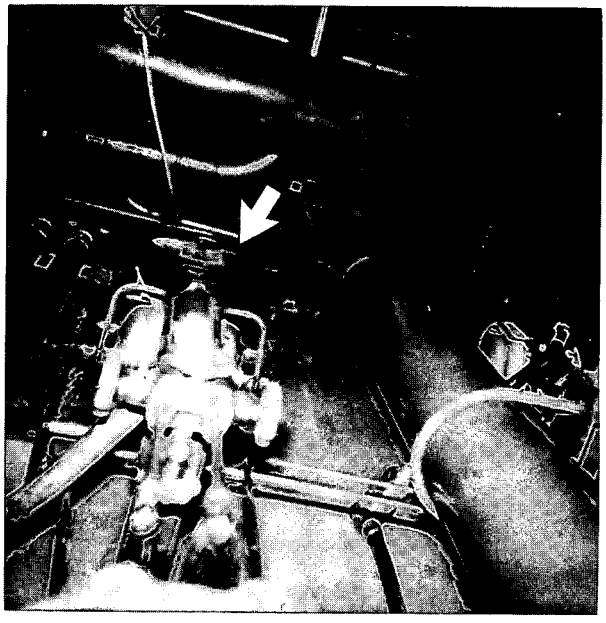

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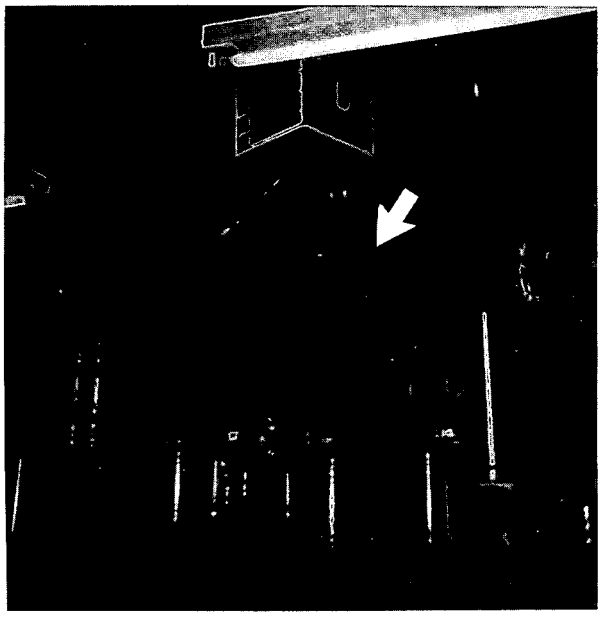

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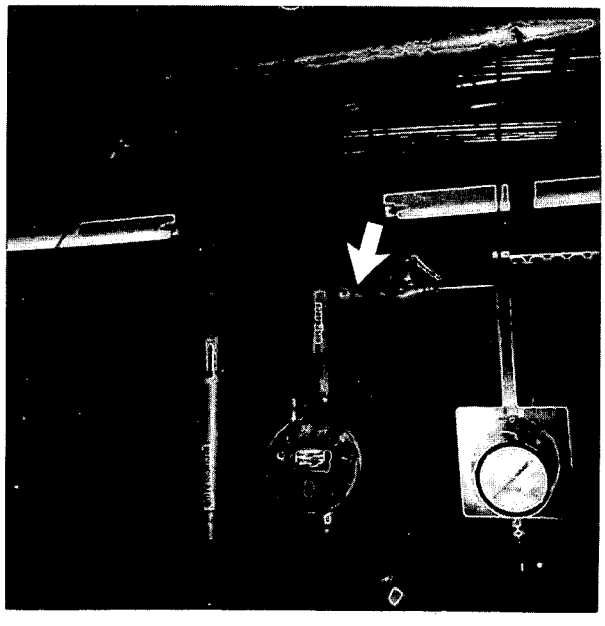

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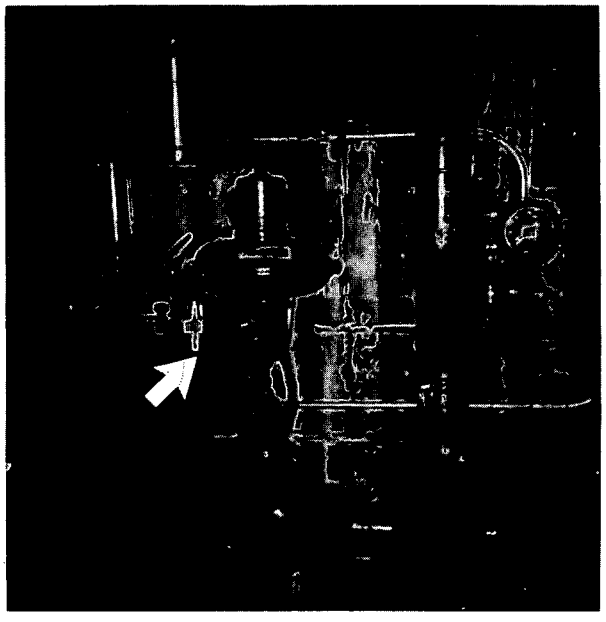

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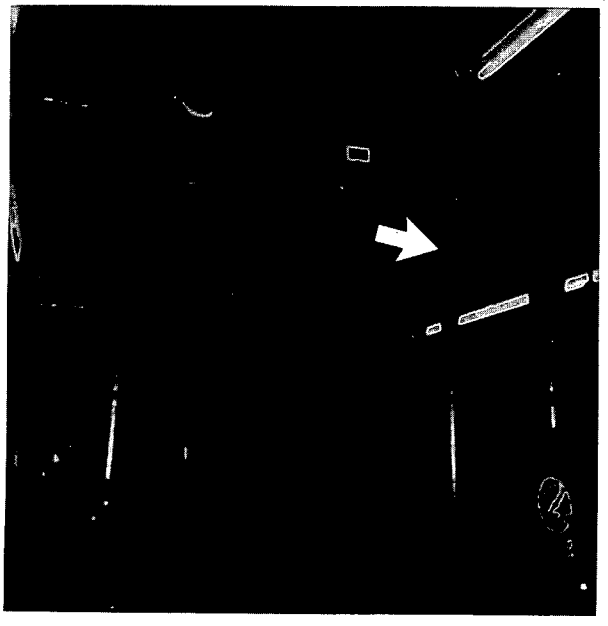

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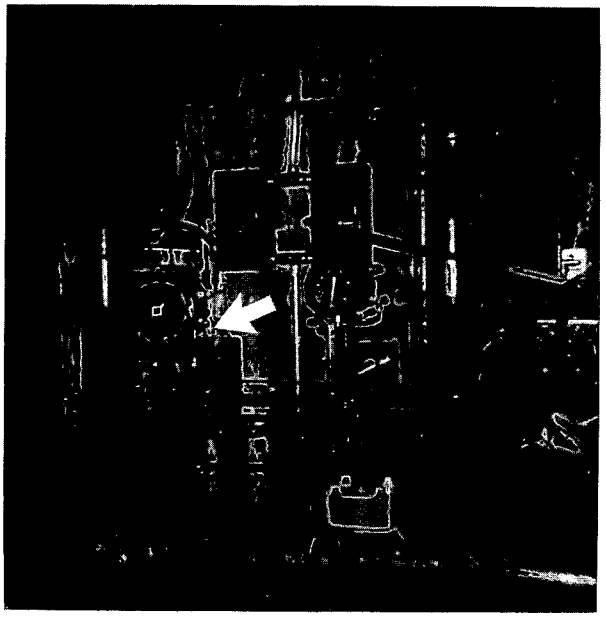

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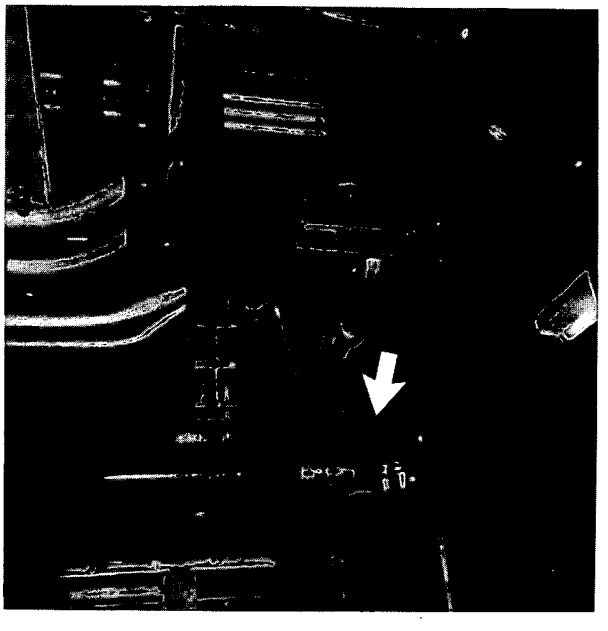

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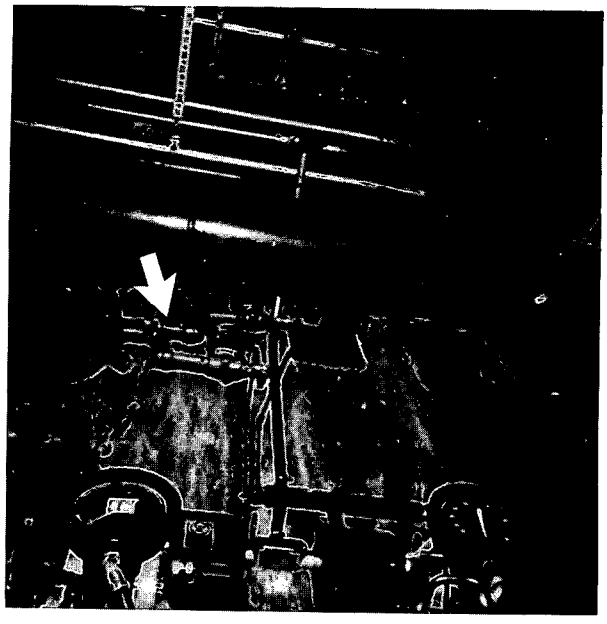

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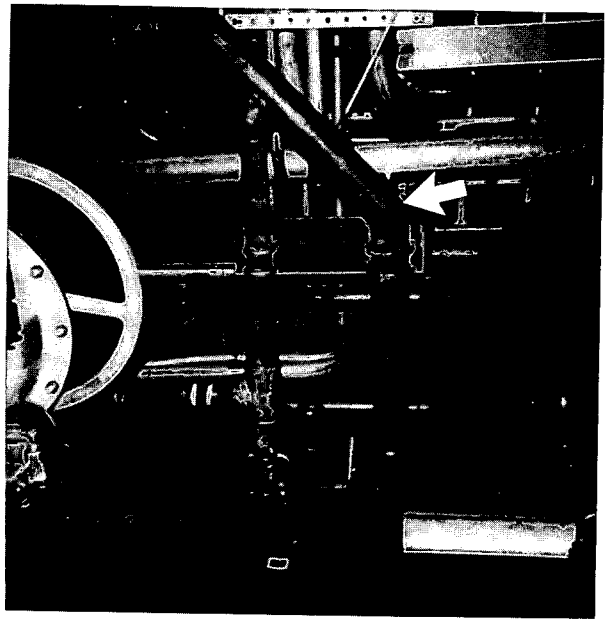

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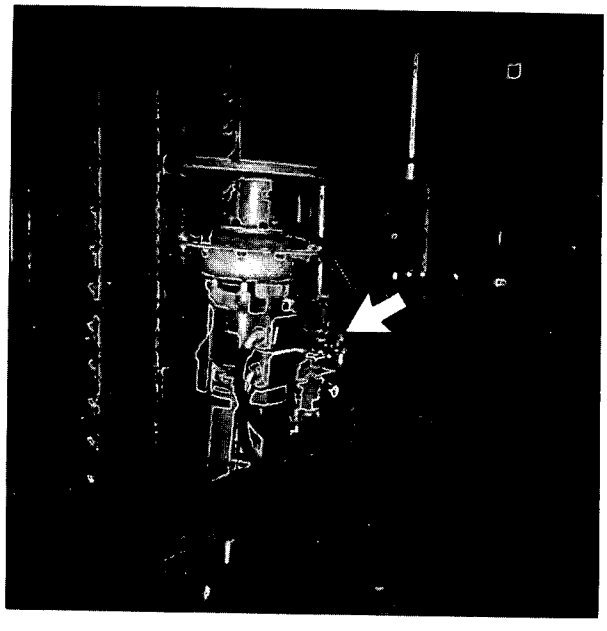

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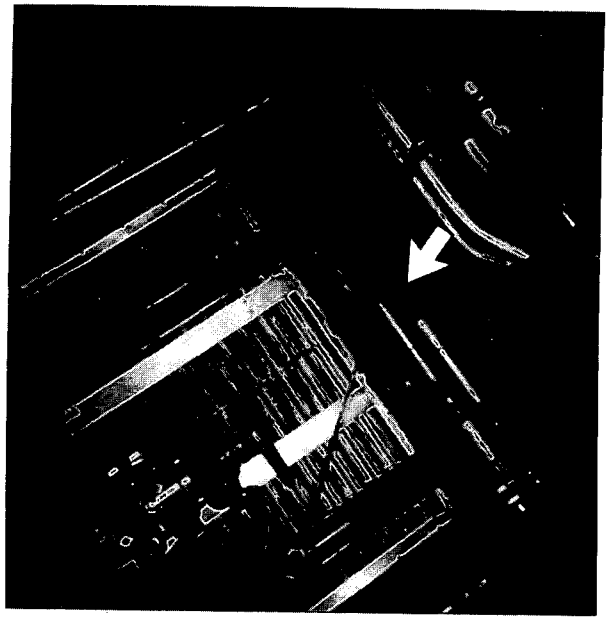

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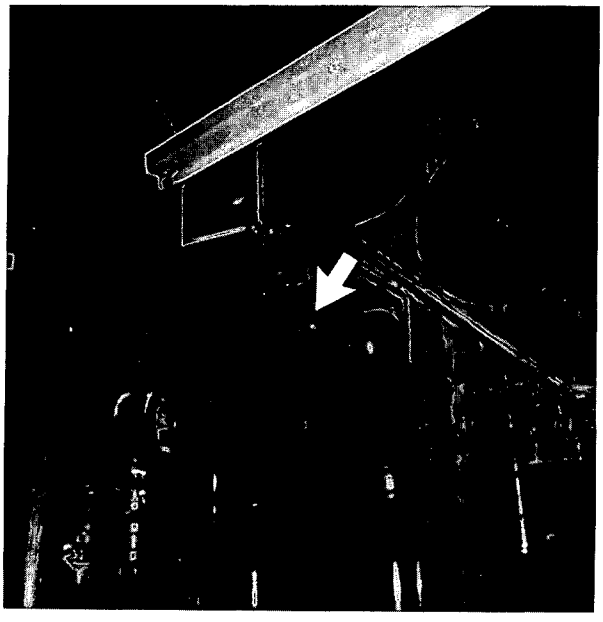

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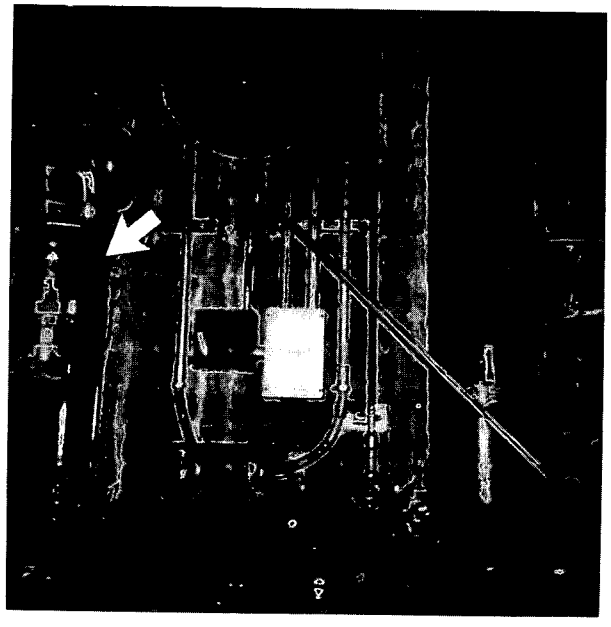

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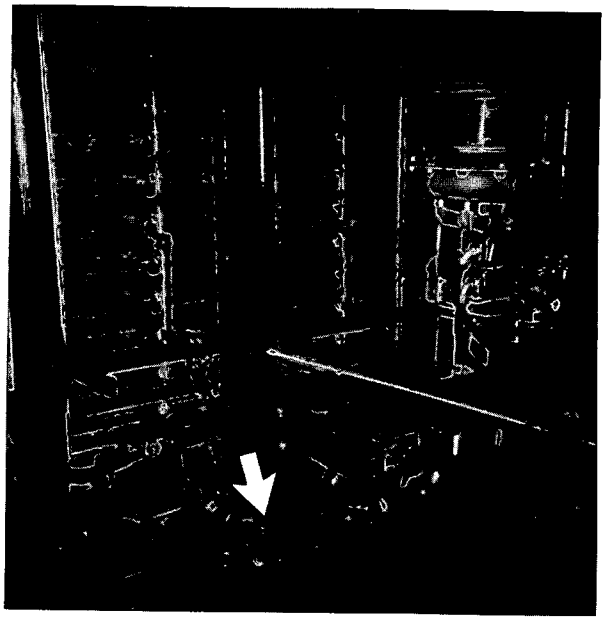

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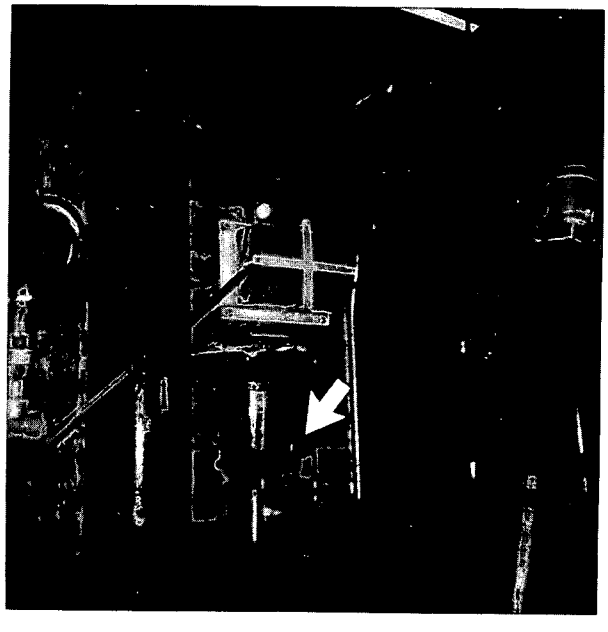

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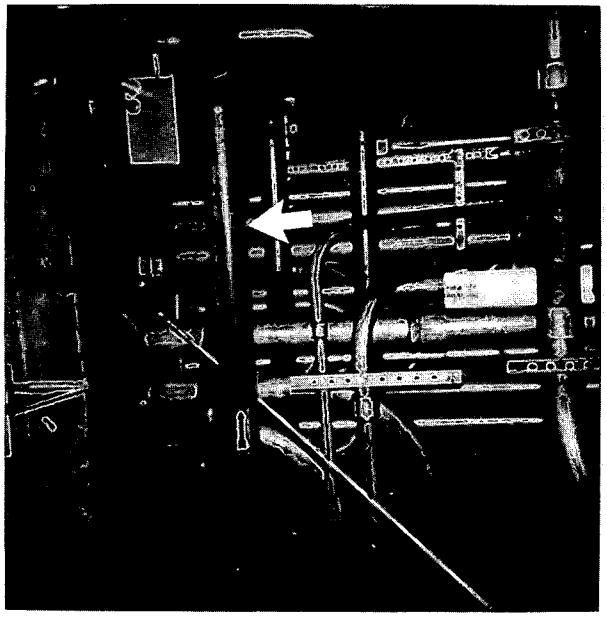

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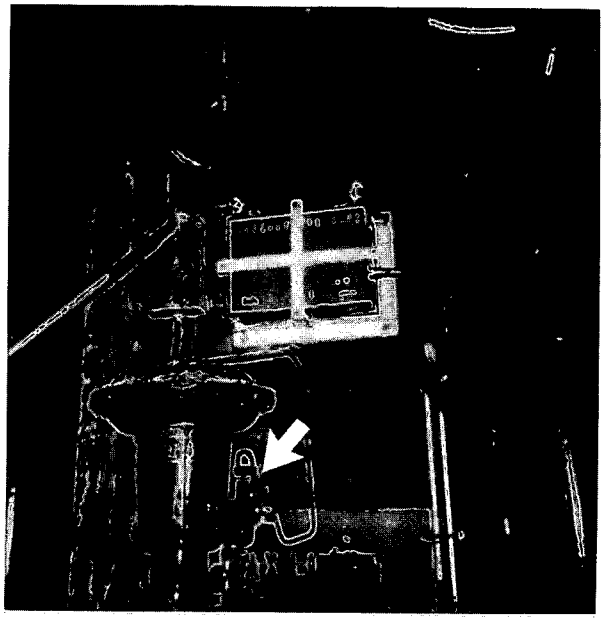

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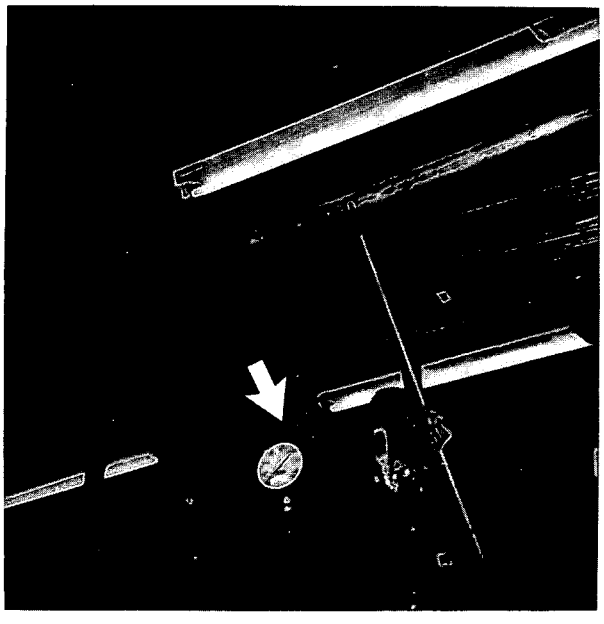

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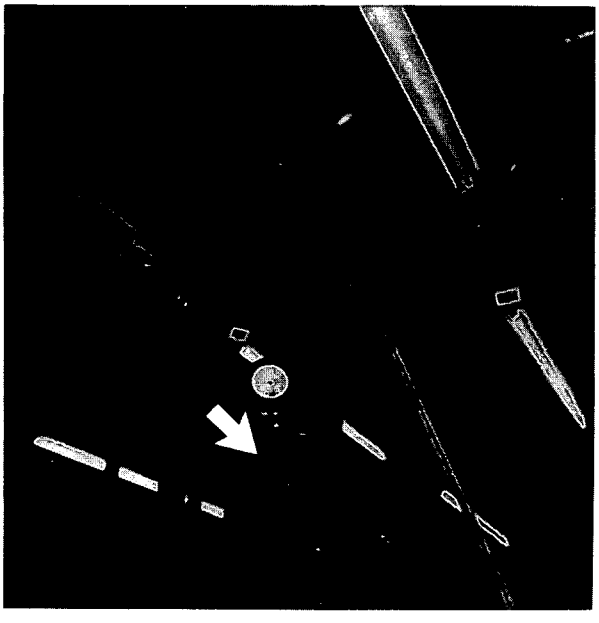
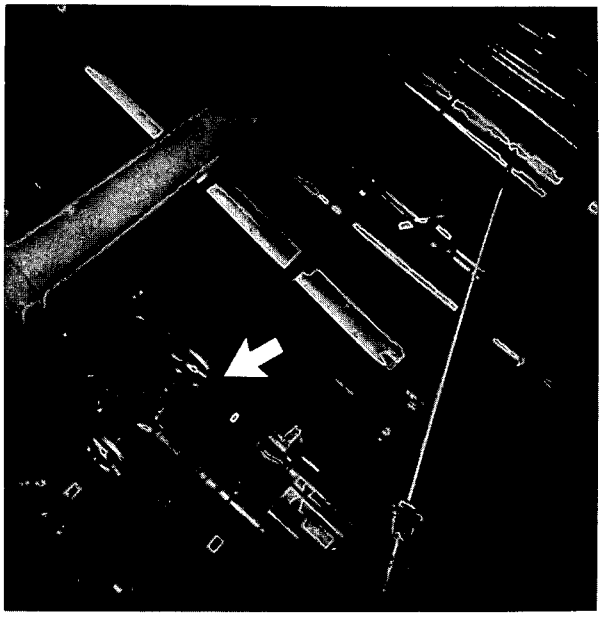


PICTURE 45

PICTURE 46



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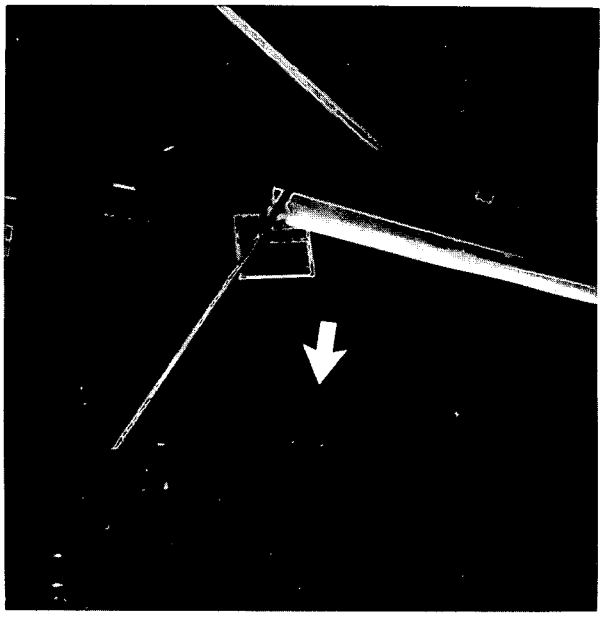

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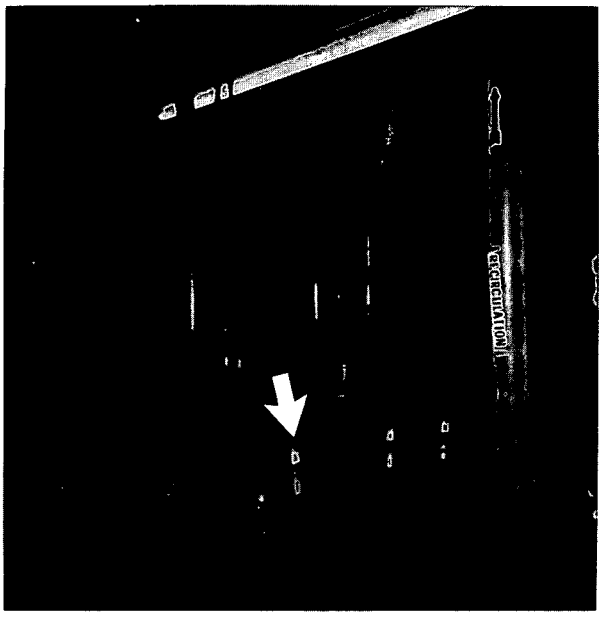

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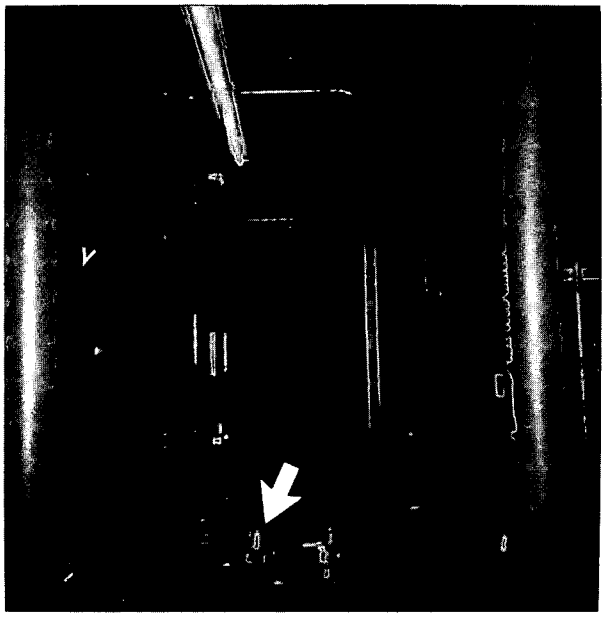

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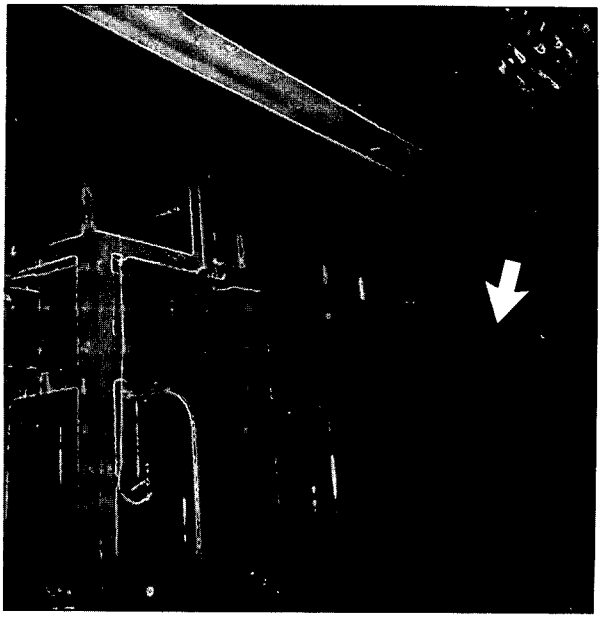

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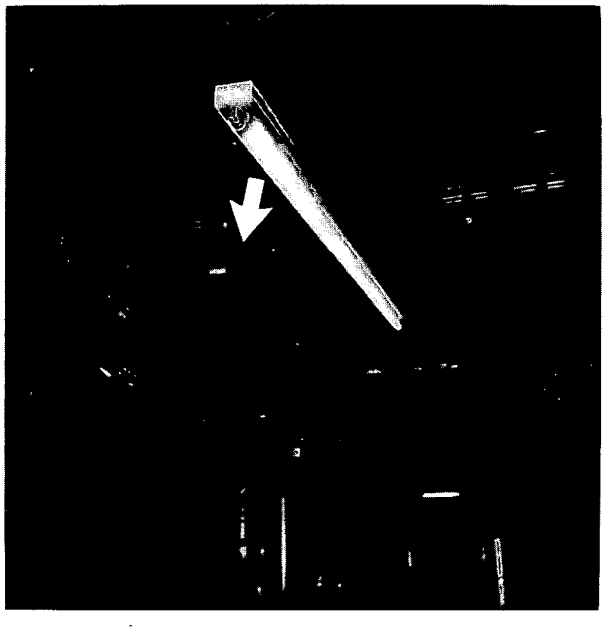

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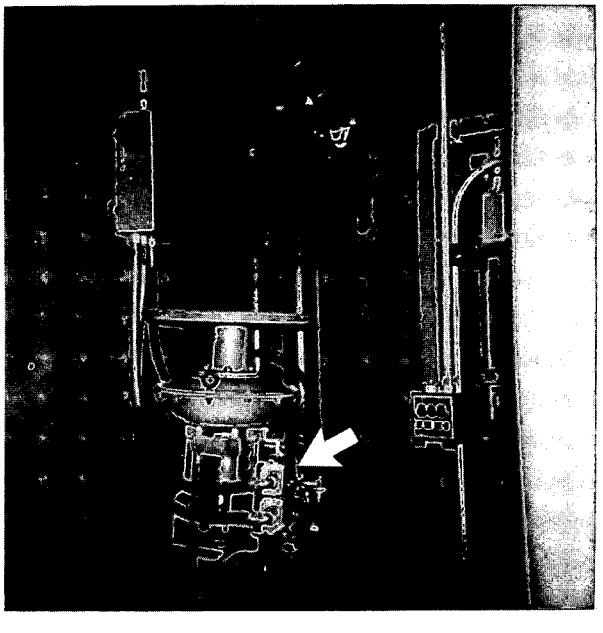

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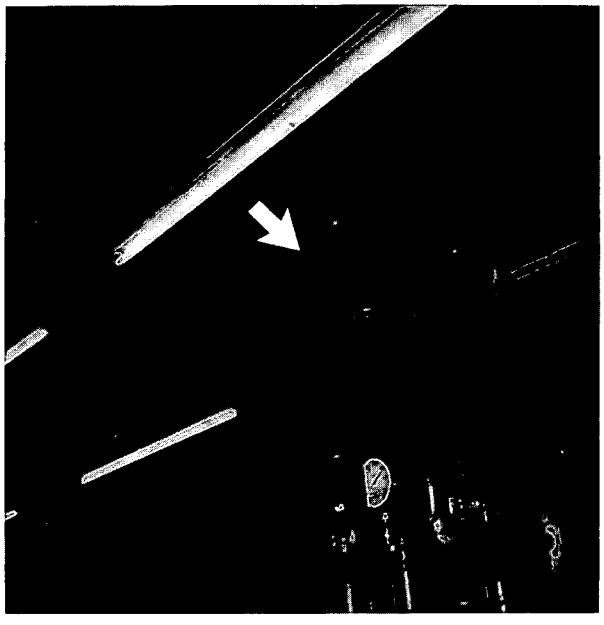

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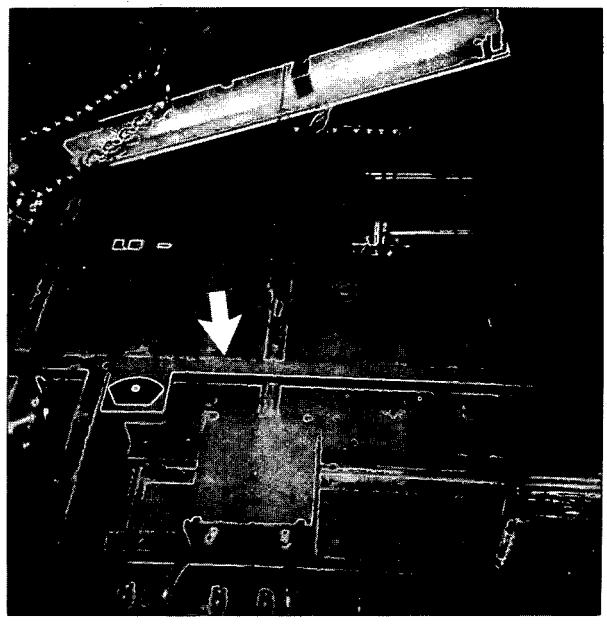

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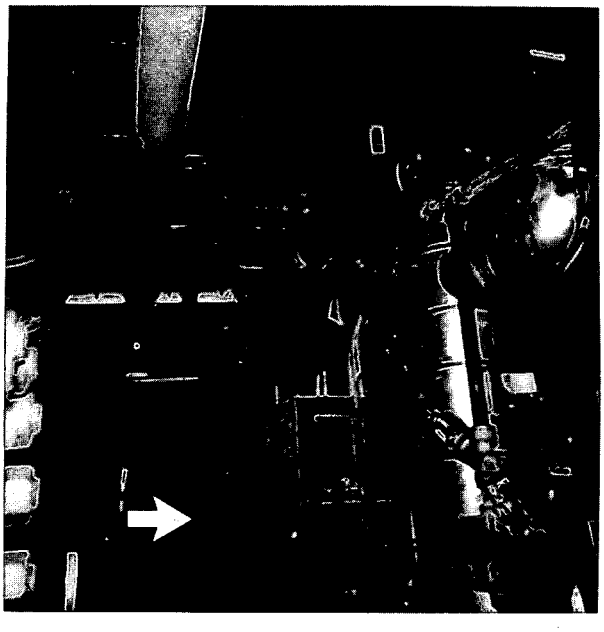
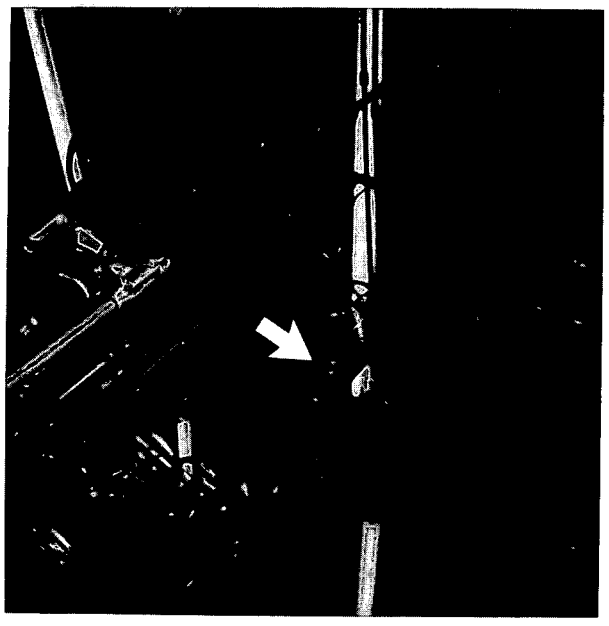


PICTURE 57

PICTURE 58



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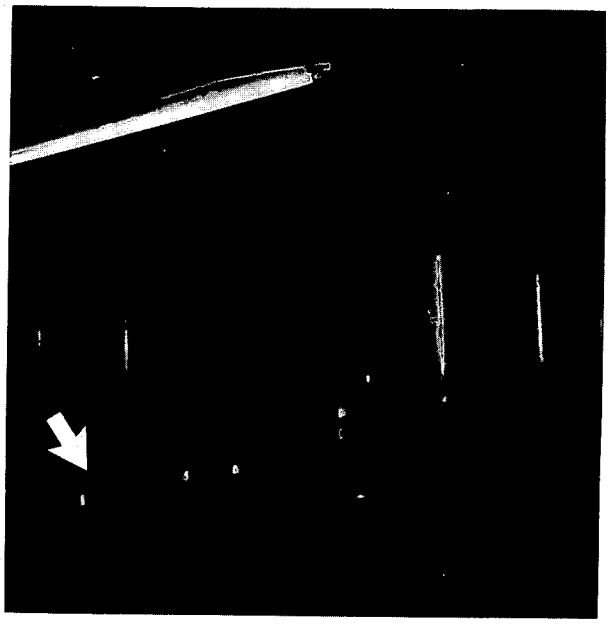

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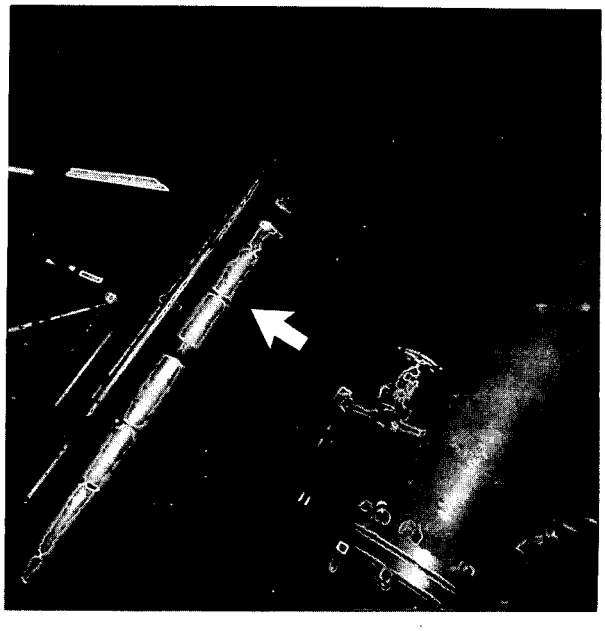

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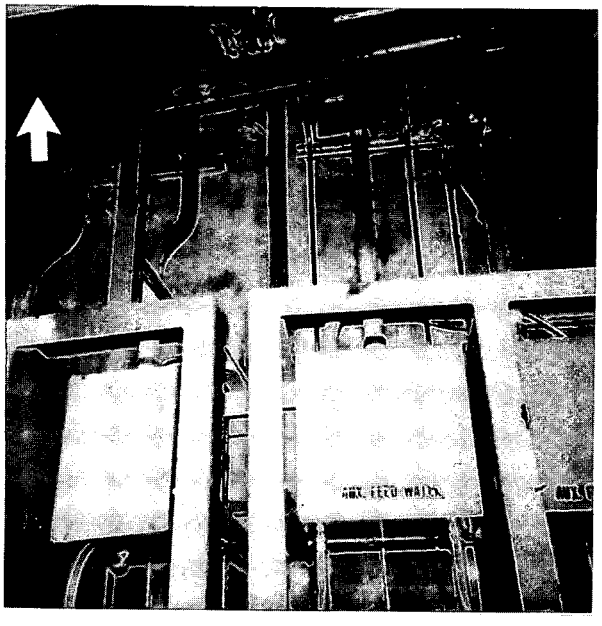

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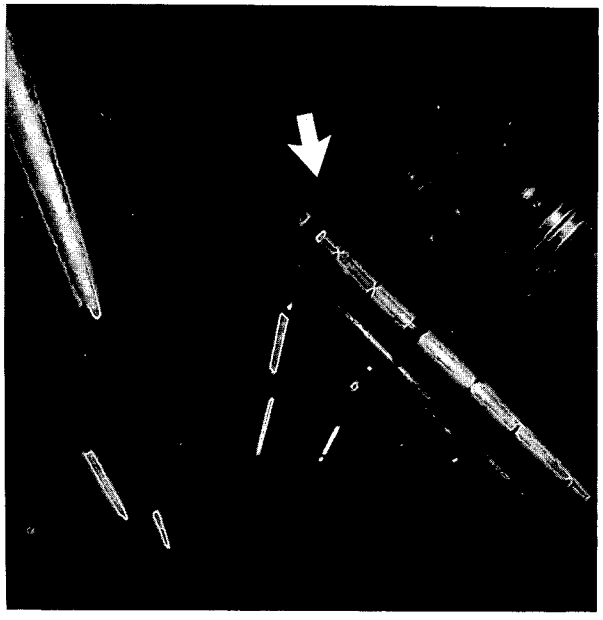

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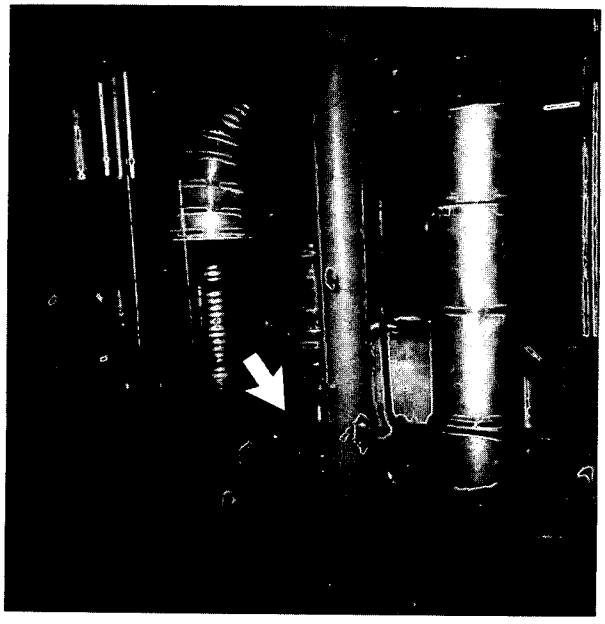

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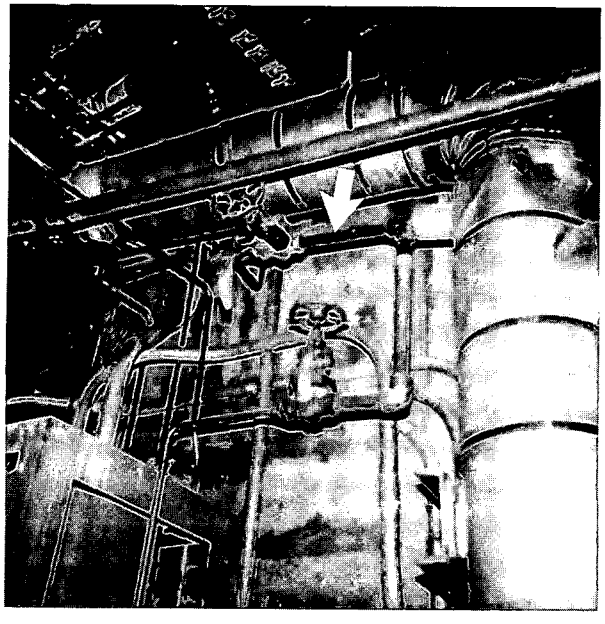

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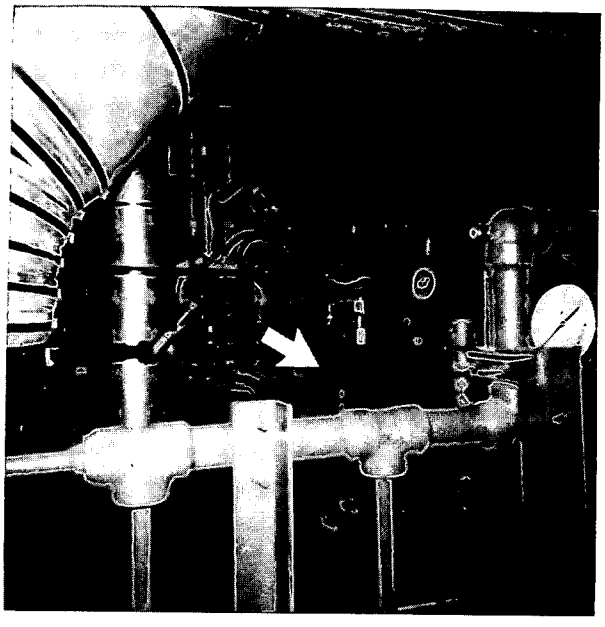

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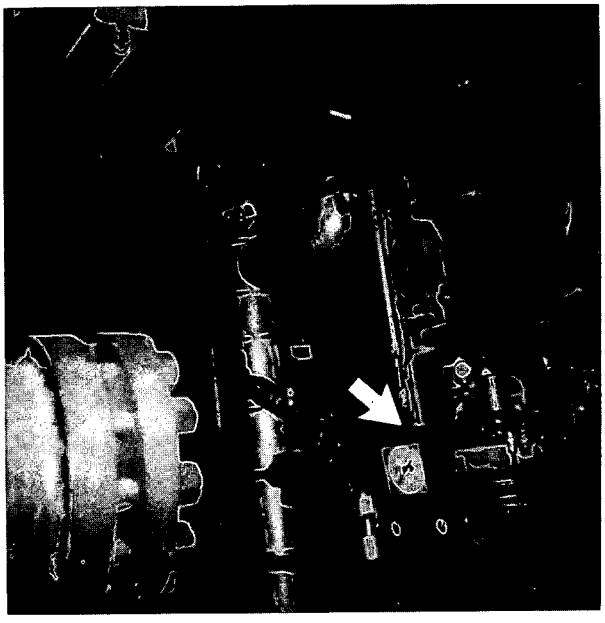

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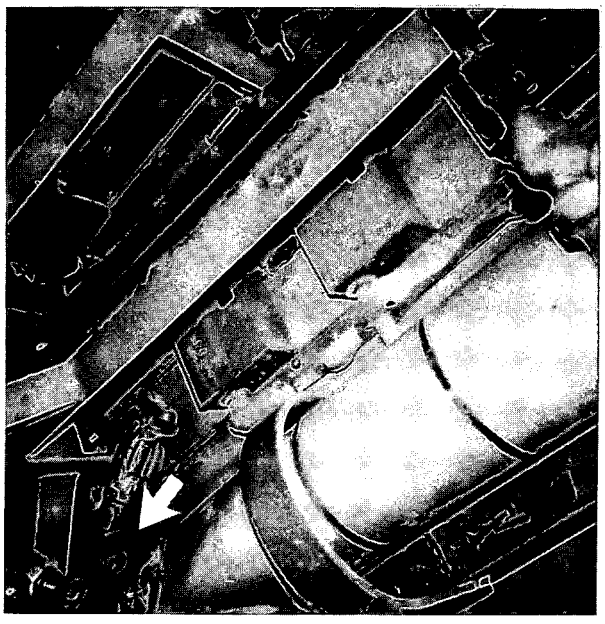

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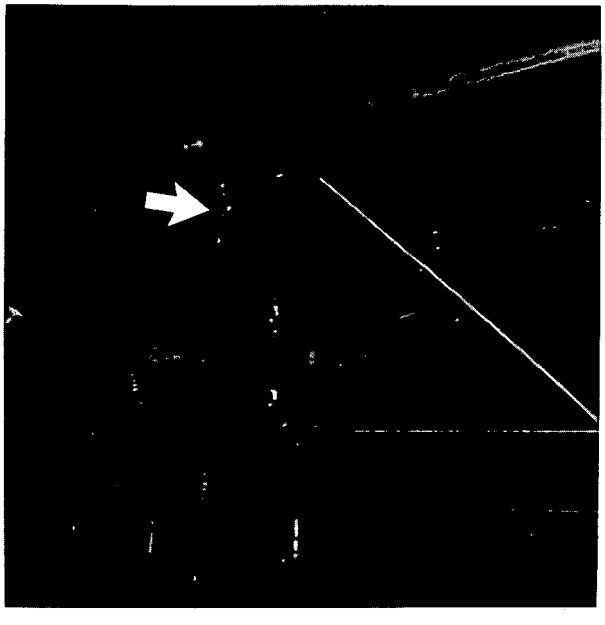

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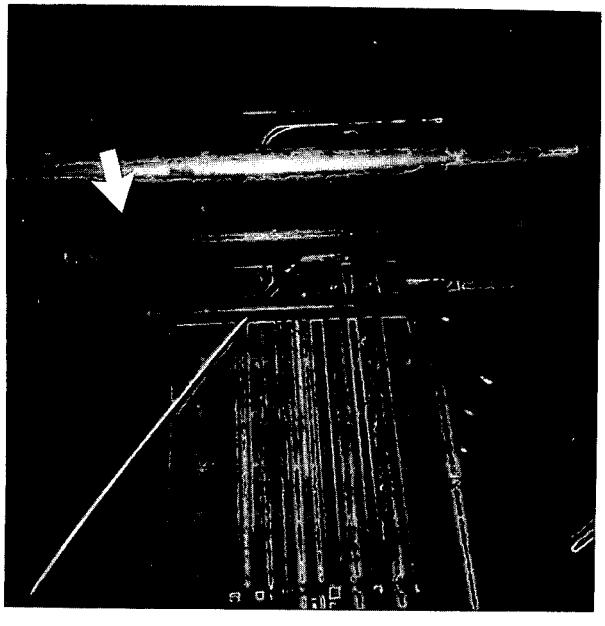

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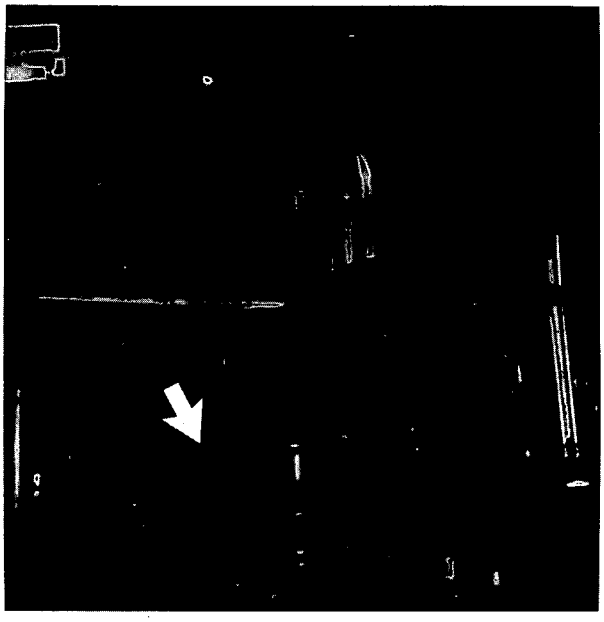

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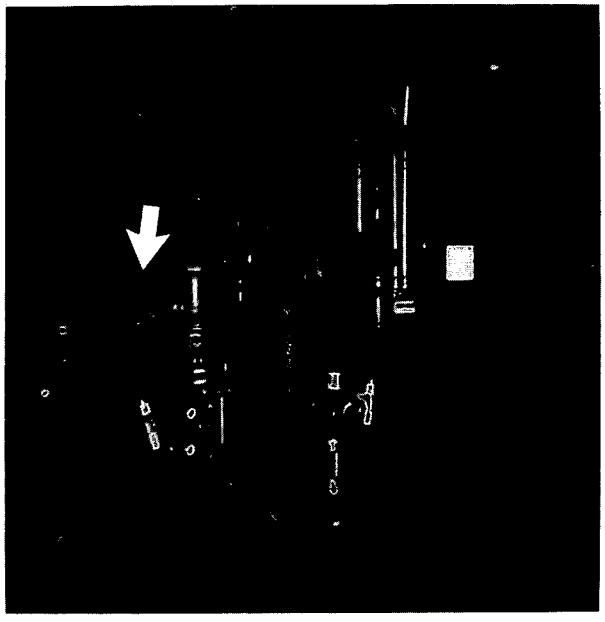

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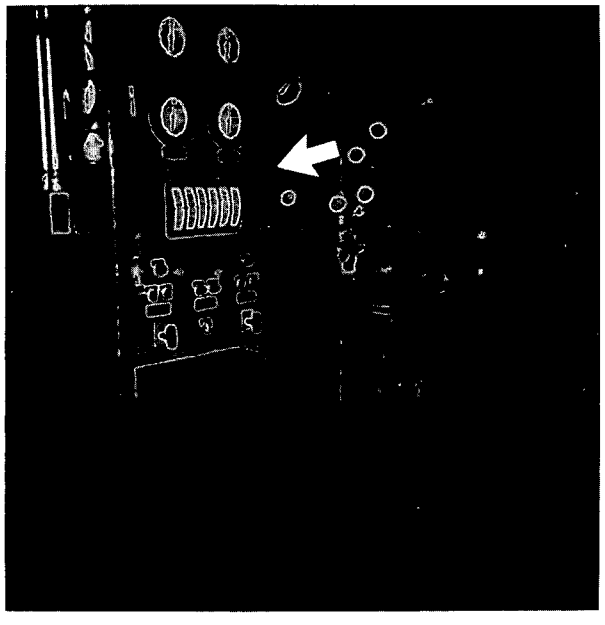

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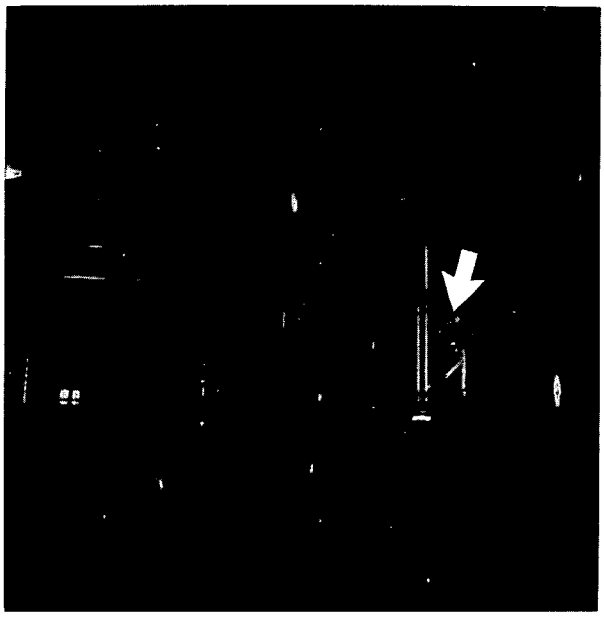

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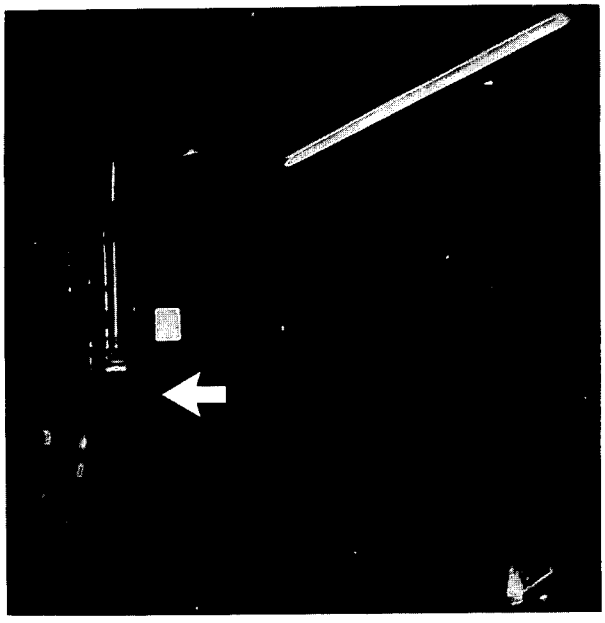

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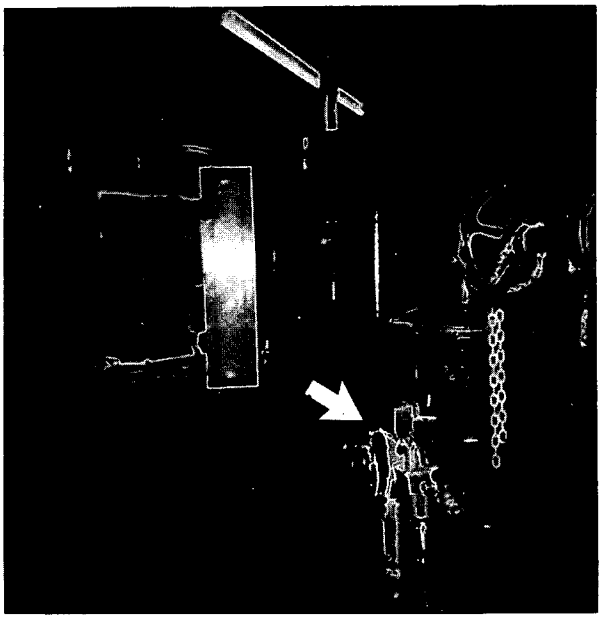

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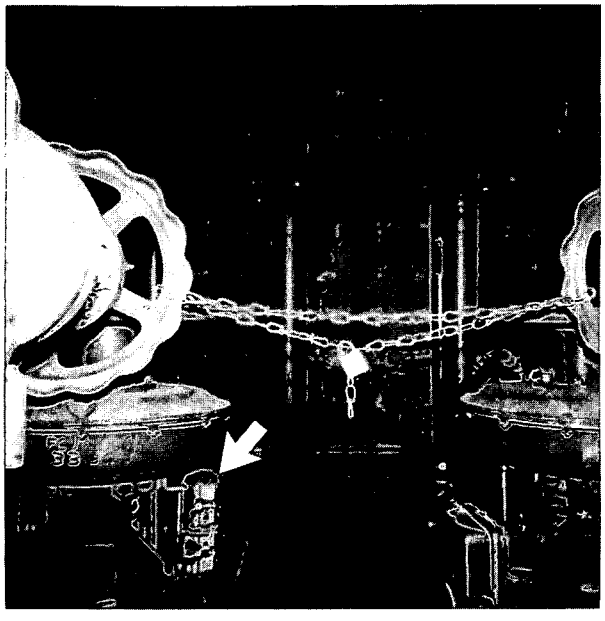

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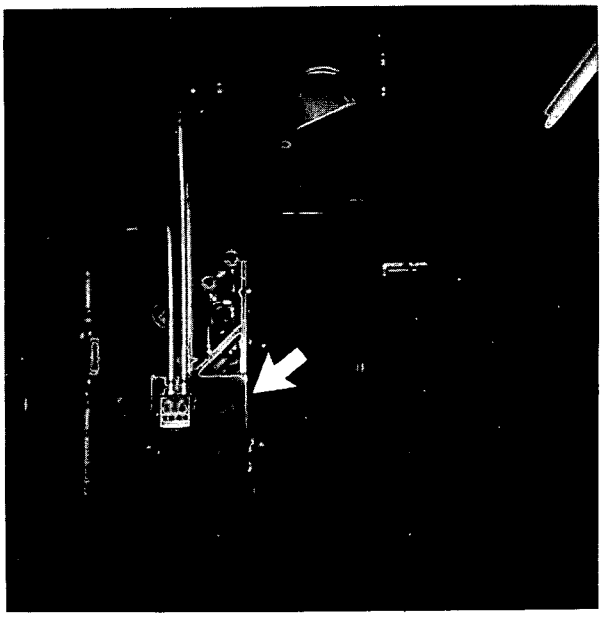
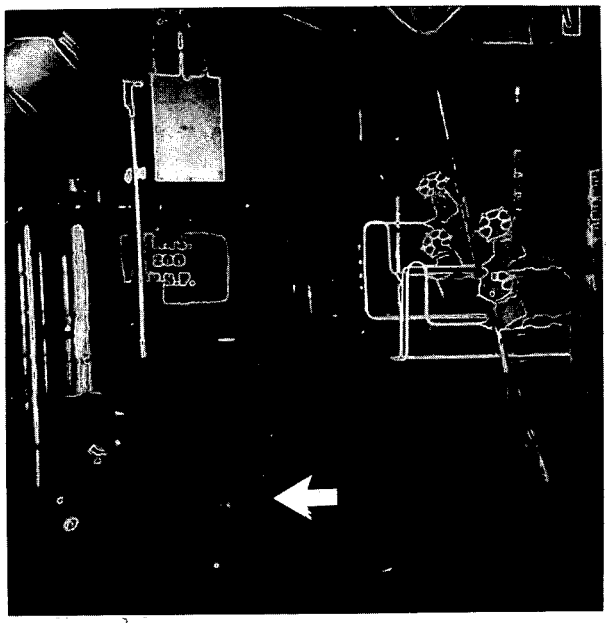


PICTURE 79



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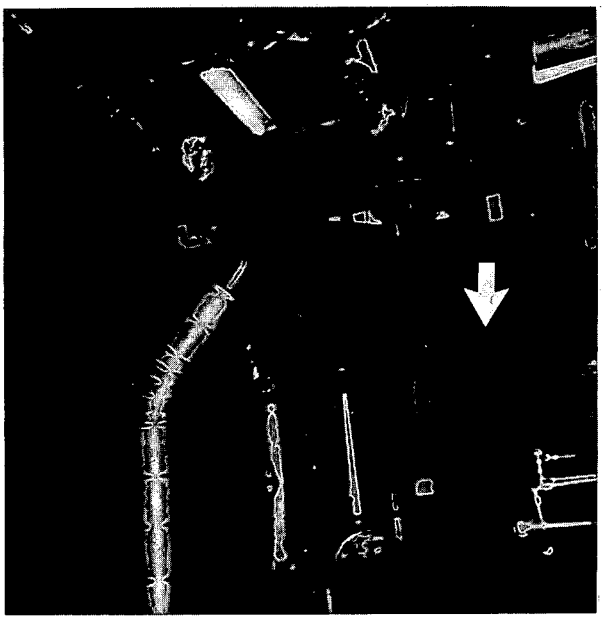

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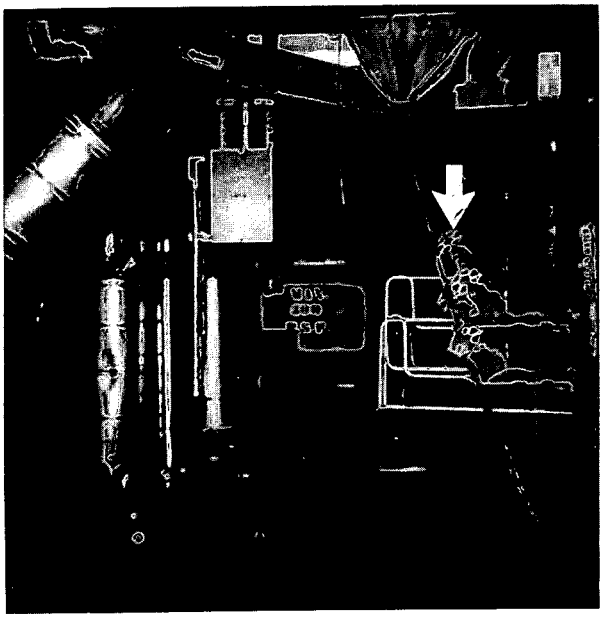

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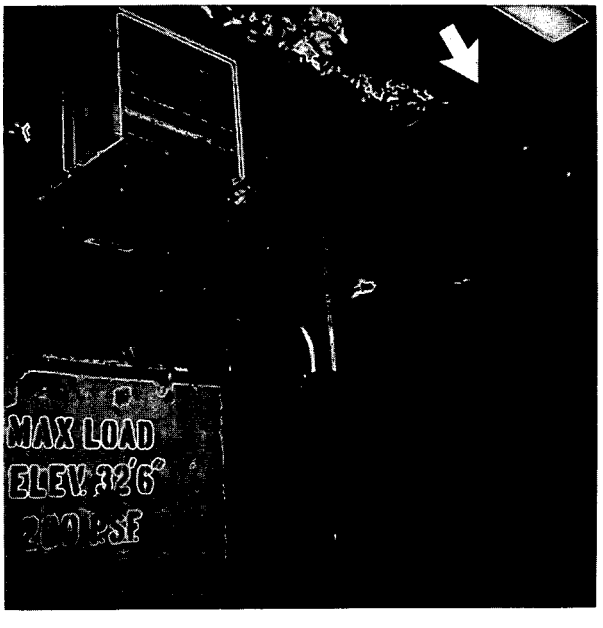

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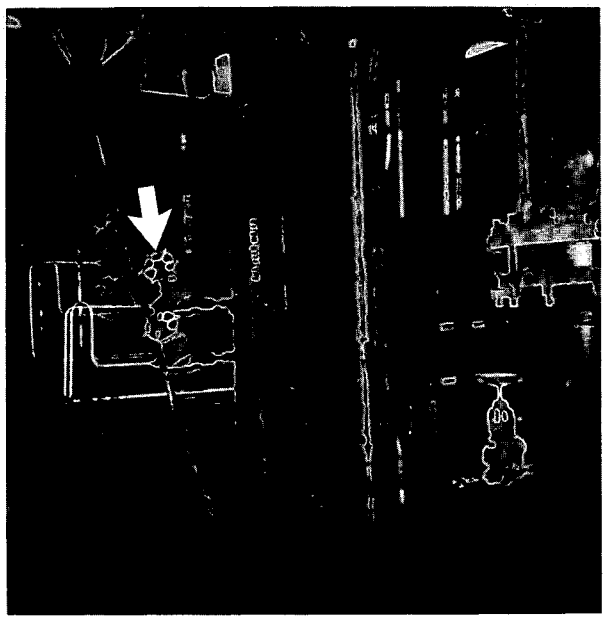

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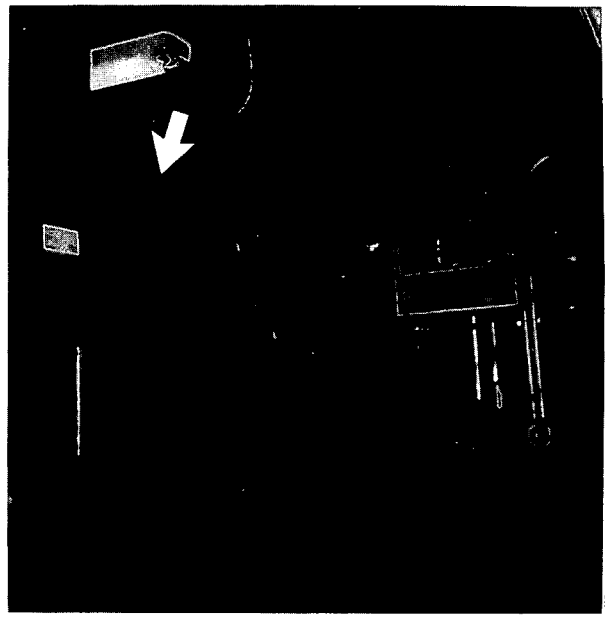

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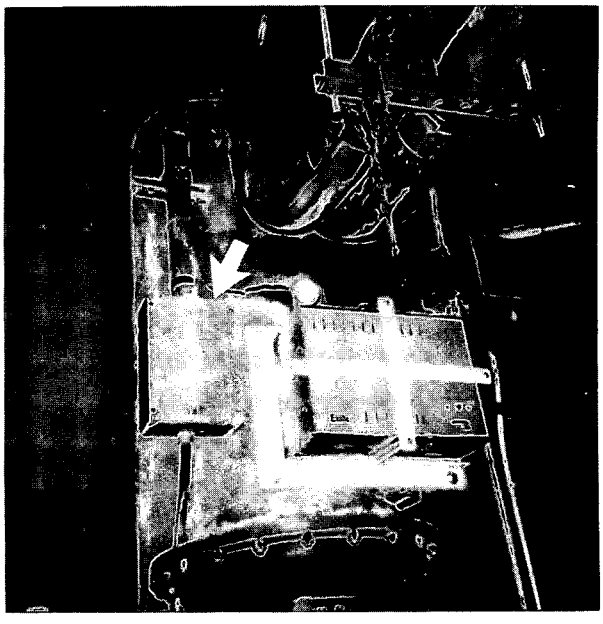

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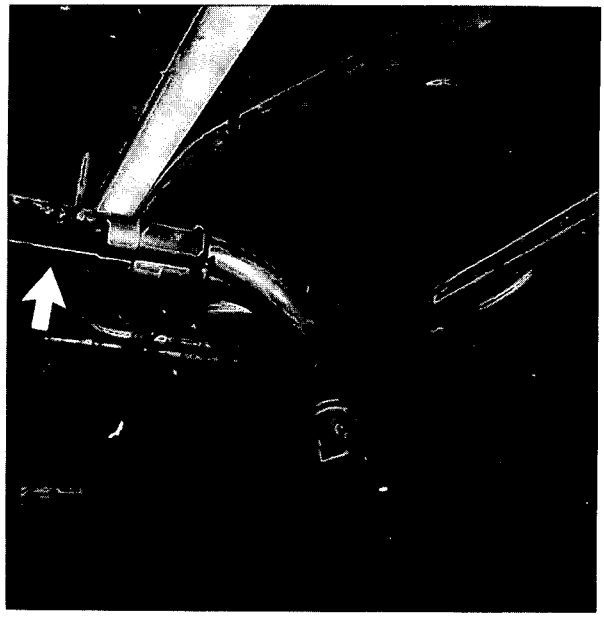

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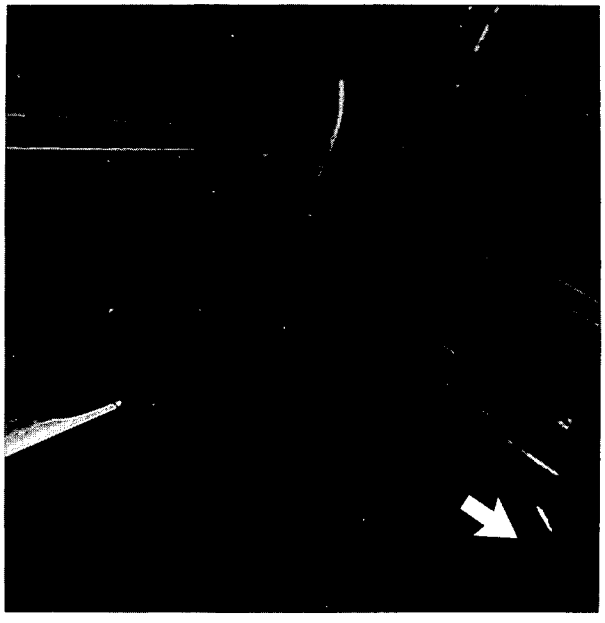

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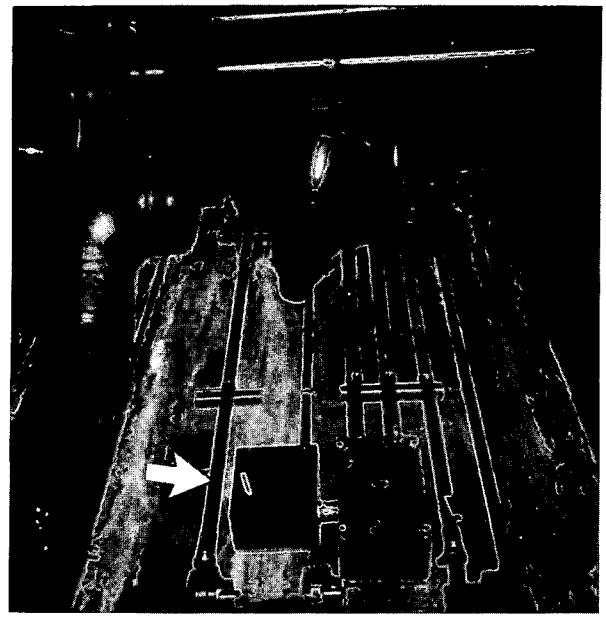

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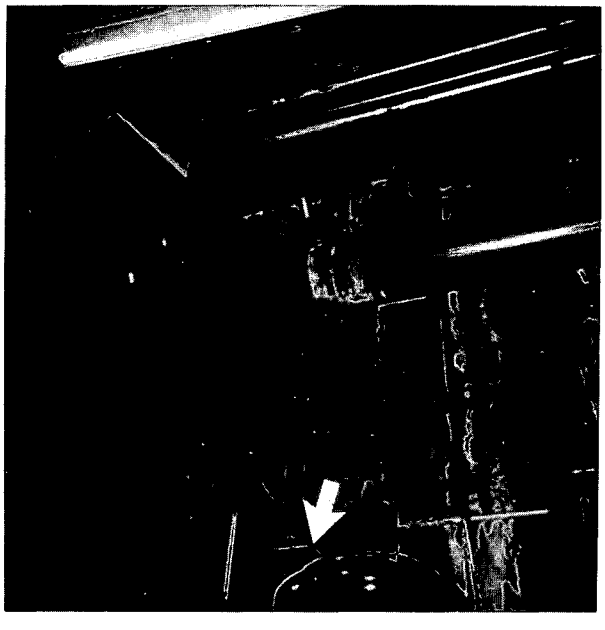

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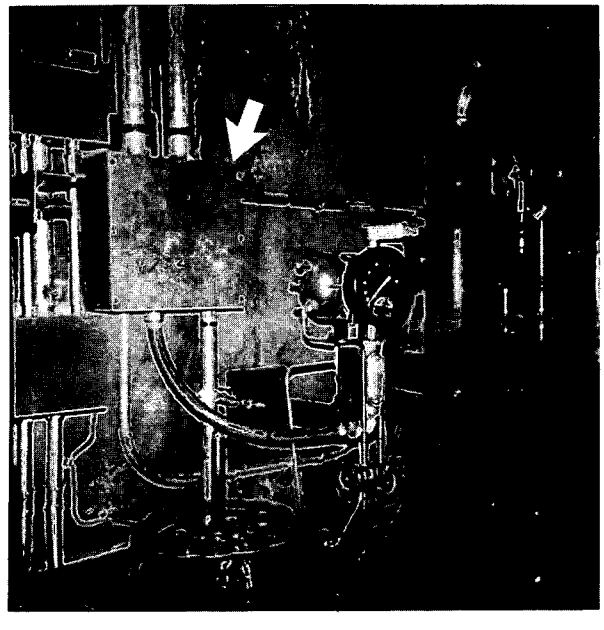

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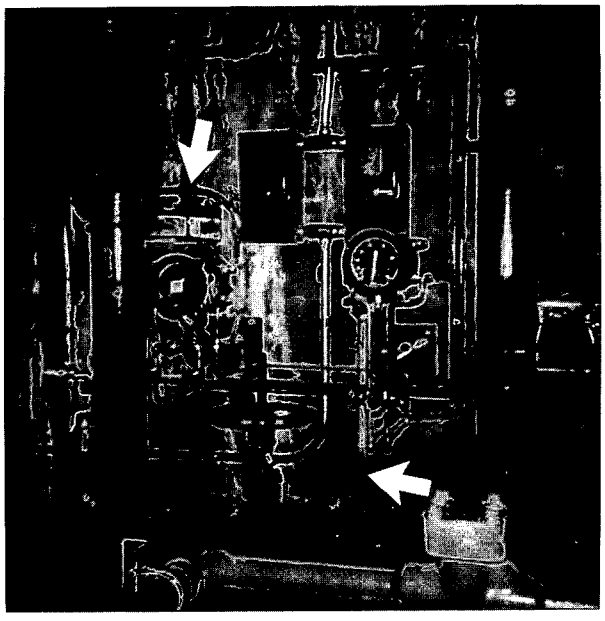

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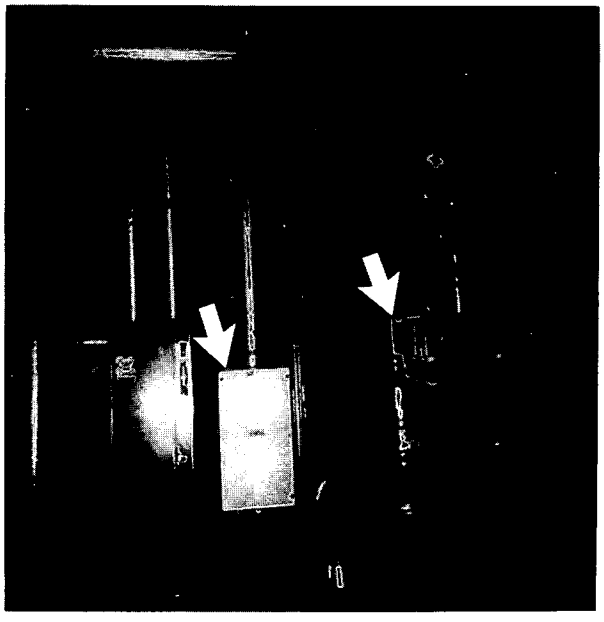

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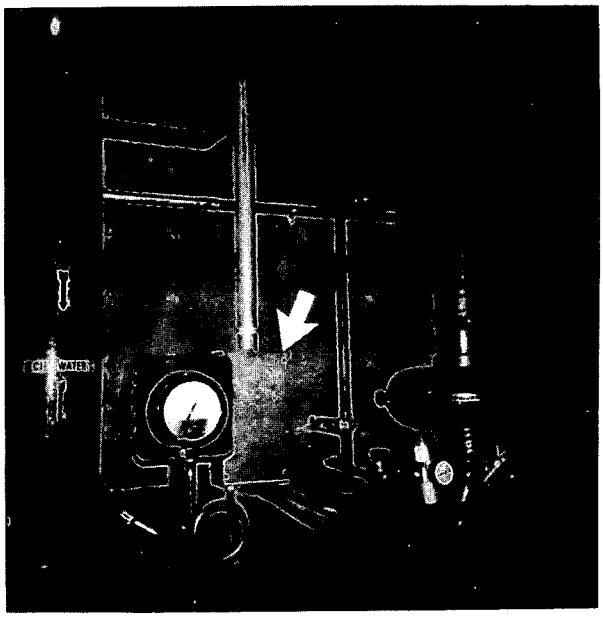

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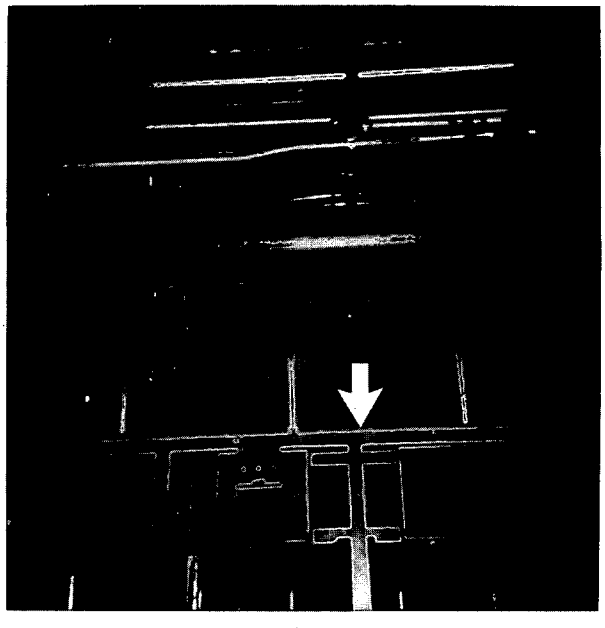

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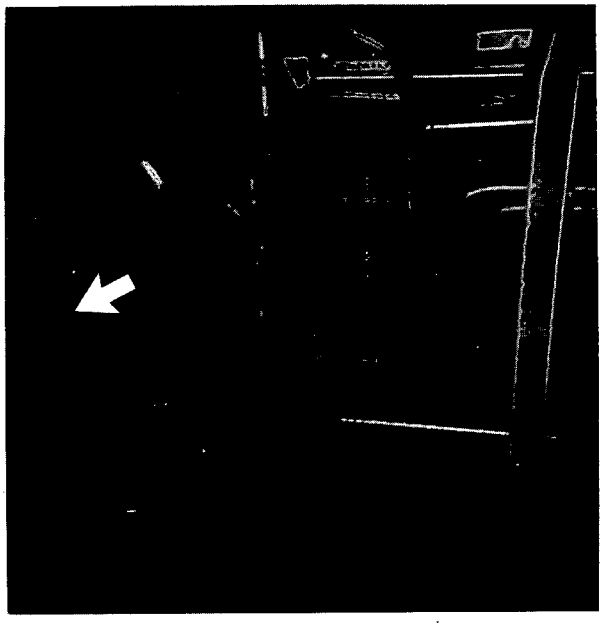
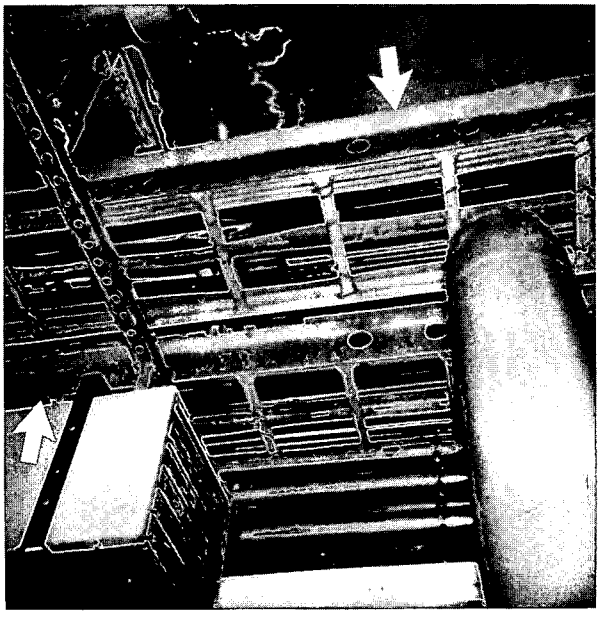


PICTURE 110

PICTURE 111



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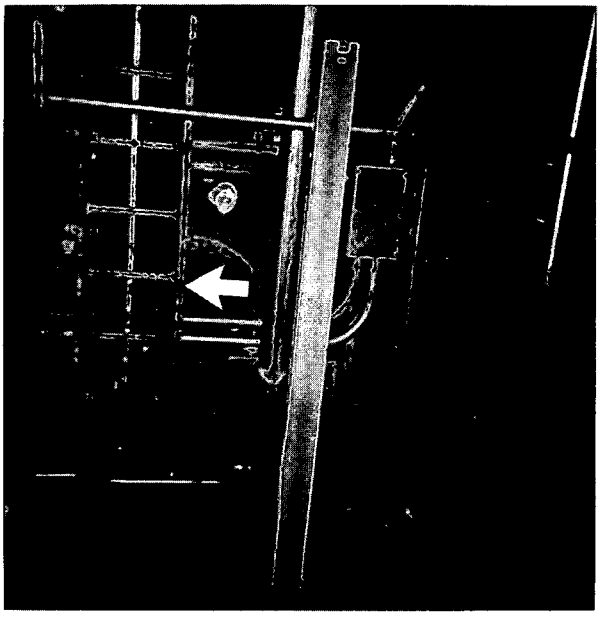
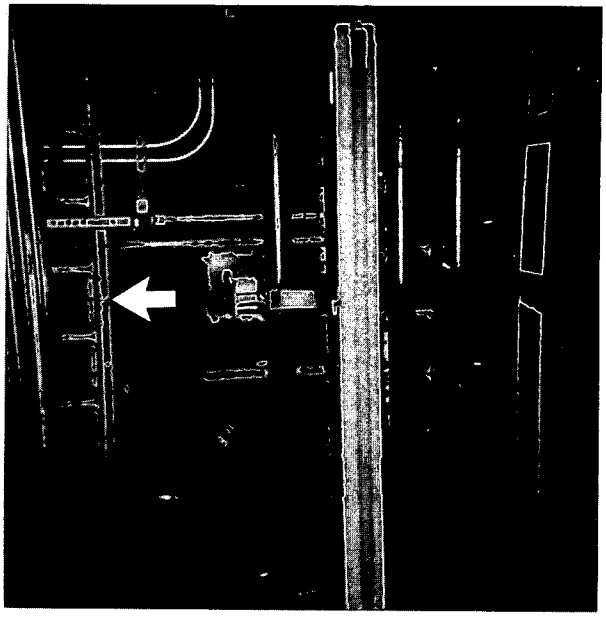


PICTURE 113

PICTURE 114



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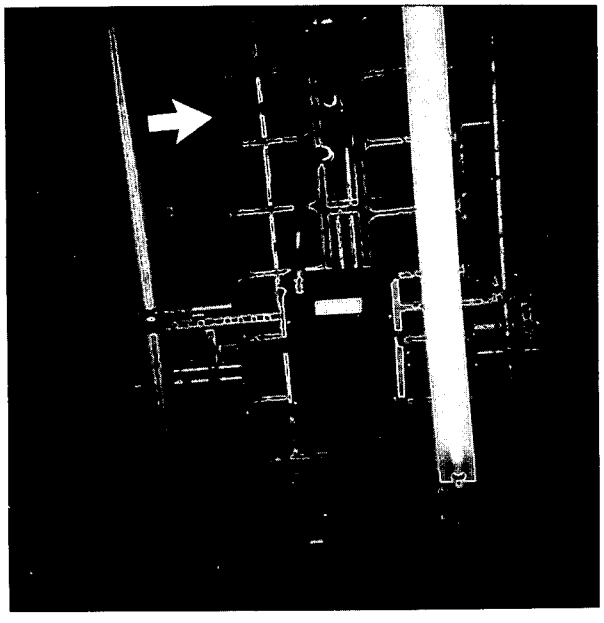

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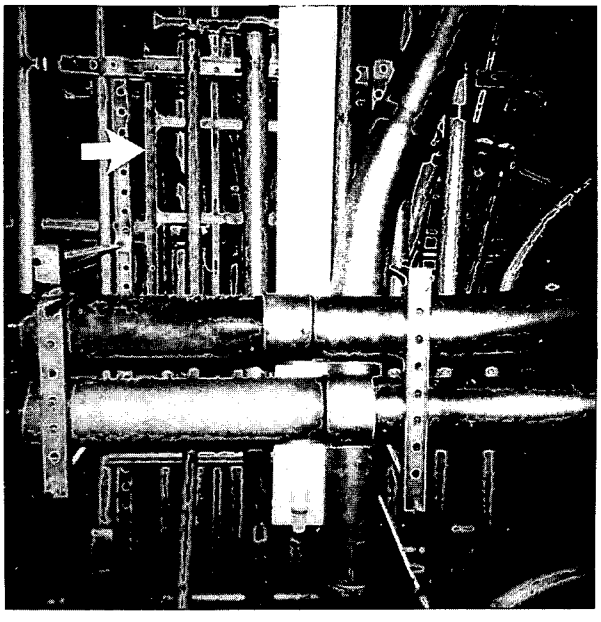

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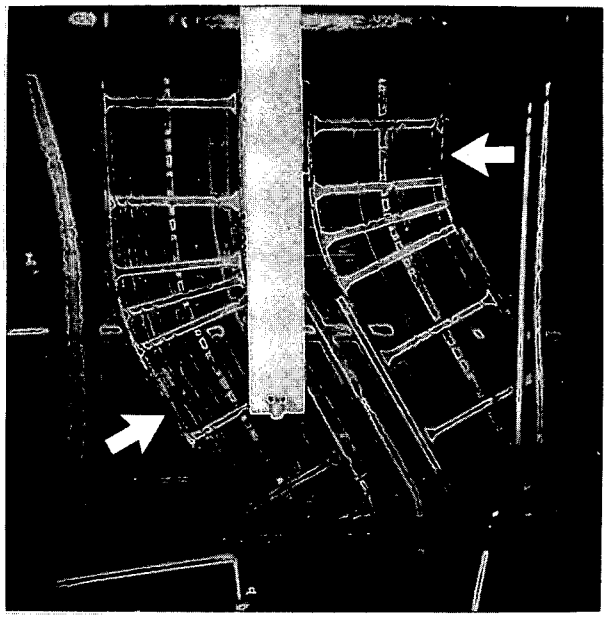

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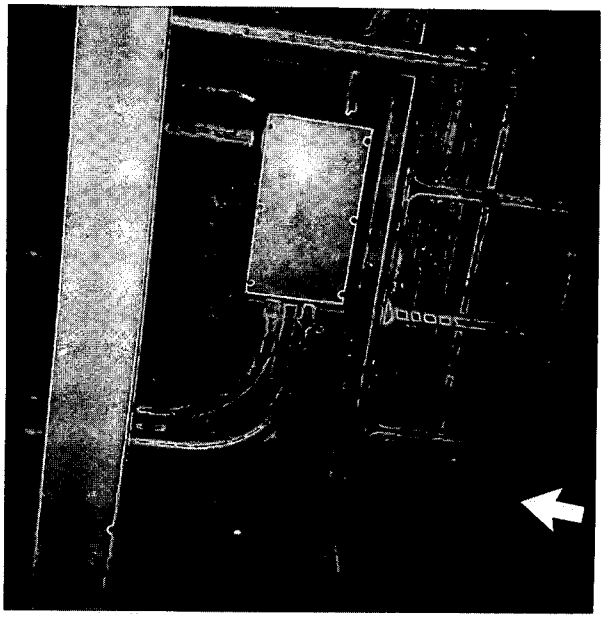

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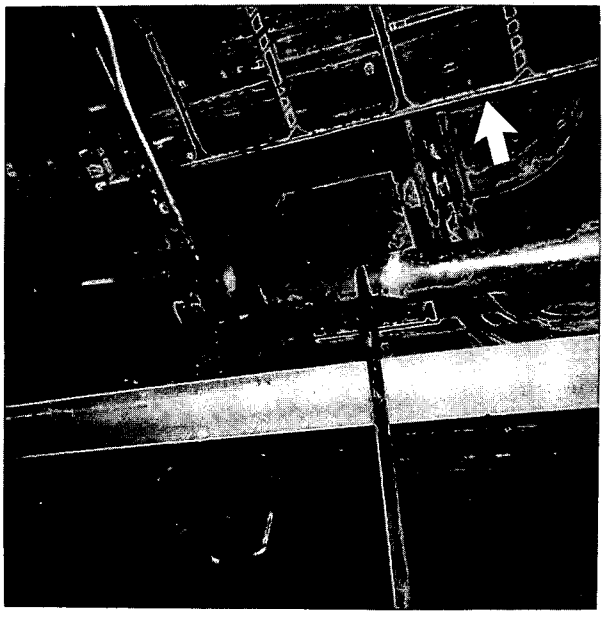

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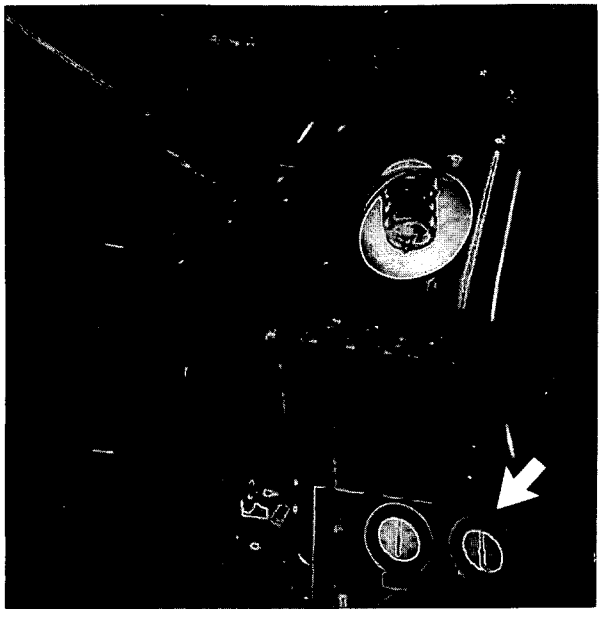

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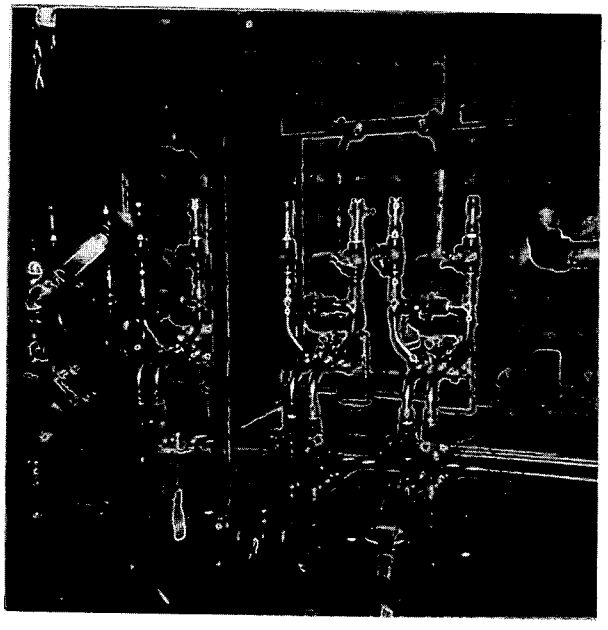

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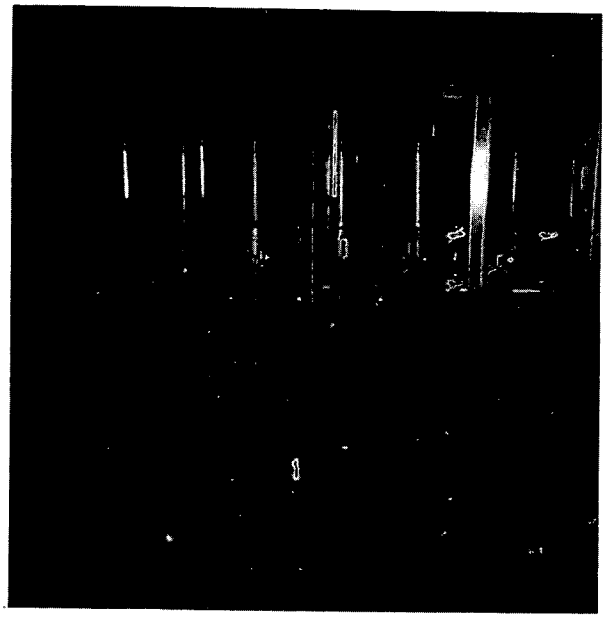

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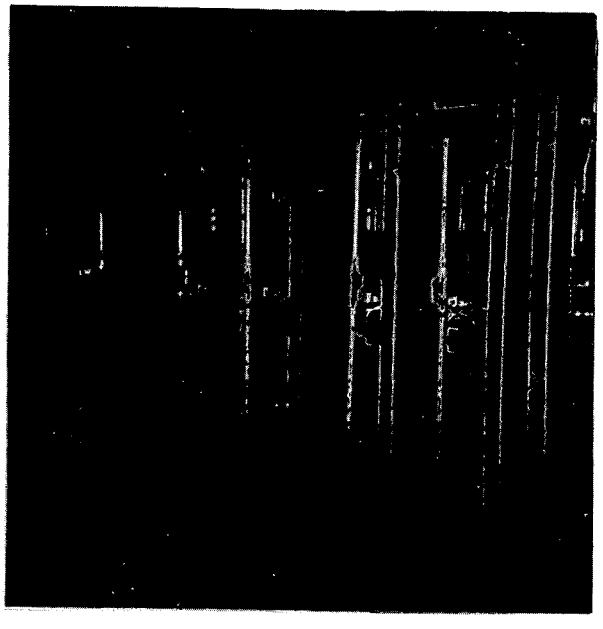

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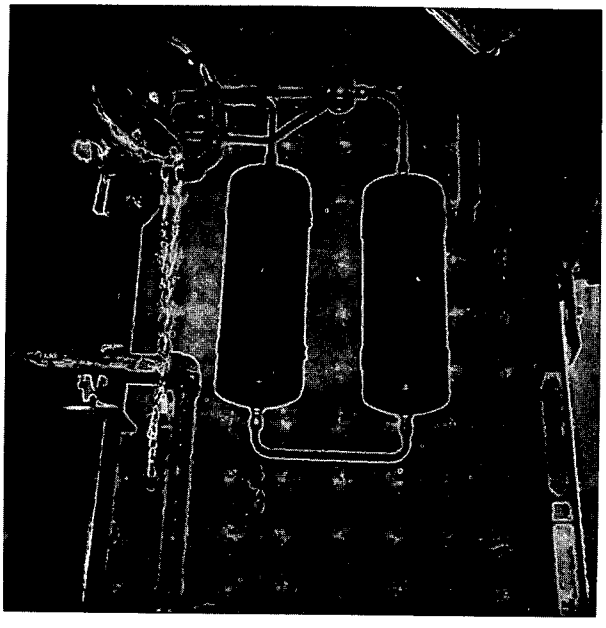

VOLUME TANKS OF PCV-1139