UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF THE
SECRETARY

April 9, 1984

MEMORANDUM FOR: William J. Dircks, Executive Director for Operations

FROM: Samuel J. Chilk, Secretary

SUBJECT: REQUEST FOR SCHEDULE EXTENSION FOR STAFF ACTION ON THE UNION OF CONCERNED SCIENTISTS 2.206 PETITION ON TMI-1 EMERGENCY FEEDWATER

By memorandum dated March 22, 1984 you informed the Commission that the Director's Decision on the UCS 2.206 petition regarding Emergency Feedwater would not be completed by the prescribed March 23 deadline.

The Commission requests that you complete action by April 20, 1984 on the four areas addressed in the petition that are not affected by the licensee's subsequent submittals concerning environmental qualification.

Additionally, the Commission requests that you complete action on the remaining portion of the petition and issue a final decision as soon as possible, but not later than May 30, 1984.

cc: Chairman Palladino
Commissioner Gilinsky
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
OGC
OPE

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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OFFICE OF THE SECRETARY

IN RESPONSE, PLEASE REFER TO: M840130C

Ref: EDO-13998

February 3, 1984

ACTION - GCunningham, ELD
HDenton, NRR

Cys: Dircks
Roe
Rehm
Stello
Murley
DeYoung

MEMORANDUM FOR: Herzel H.E. Plaine, General Counsel

FROM: Samuel J. Chilk, Secretary

SUBJECT: STAFF REQUIREMENTS - AFFIRMATION/DISCUSSION AND VOTE, 4:30 P.M., THURSDAY, JANUARY 26, 1984, COMMISSIONERS' CONFERENCE ROOM, D.C. OFFICE (OPEN TO PUBLIC ATTENDANCE)

I. SECY-83-406/406A - Review of ALAB-729 -- In the Matter of Metropoltian Edison Company and Review of ALAB-744 (Denying Request to Reconsider Whether Issue of Environmental Qualification of Electrical Equipment is Within Restart Proceeding)

The Commission, by a vote of 4-1 (Commissioner Roberts disapproving), approved an Order taking review of ALABs 729 and 744.

(Subsequently, on January 27, 1984 the Secretary signed the Order.)

Additionally, the Commission subsequently agreed to direct staff to complete action on a January 23, 1984 2.206 petition filed by UCS as soon as possible (60 days as an outside limit). The Commission also requested that staff include the issues raised by UCS when staff briefs the Commission prior to TMI-1 restart.

By copy of this memorandum, EDO staff is directed to complete the above action.

[redacted] (ELD/NRR) (SECY Suspense: 3/23/84)

cc: Chairman Palladino
Commissioner Gilinsky
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
Commission Staff Offices
EDO
PDR - Advance
DCS - 016 Phillips

DUPE OF
8402160603

Rec'd Off. EDO
Date. 2-9-84
Time. 2:00

4/27/84

AGENDA

TMI-1

EMERGENCY FEEDWATER SYSTEM

I. INTRODUCTION

II. ORIGINAL SYSTEM CONFIGURATION

III. MODIFICATIONS FOR RESTART

- A. HARDWARE CHANGES
- B. PROCEDURE CHANGES

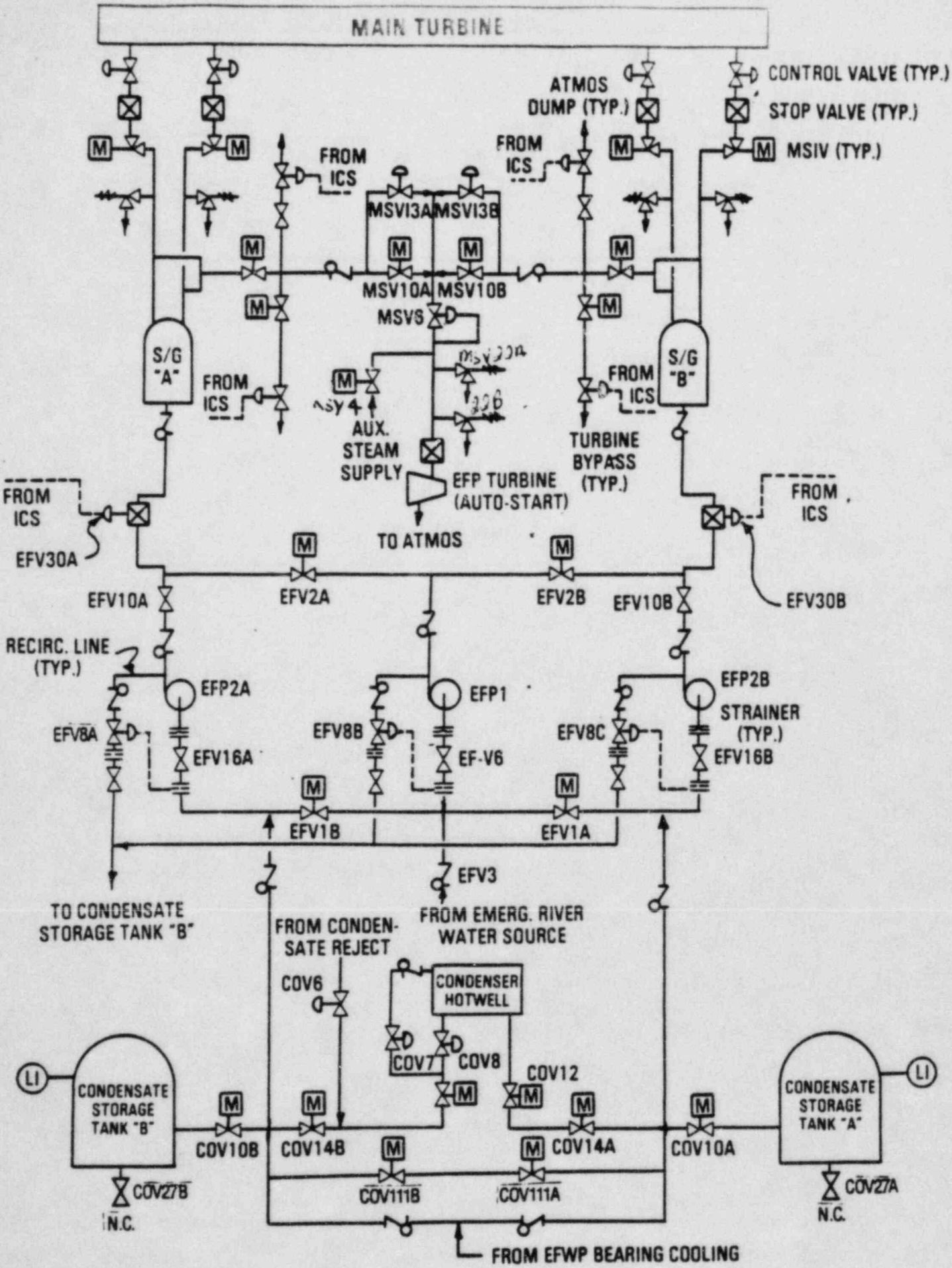
IV. MAIN STEAM LINE RUPTURE DETECTION SYSTEM (MSLRDS)

V. SEISMIC AND SINGLE FAILURE PROOF FEATURES

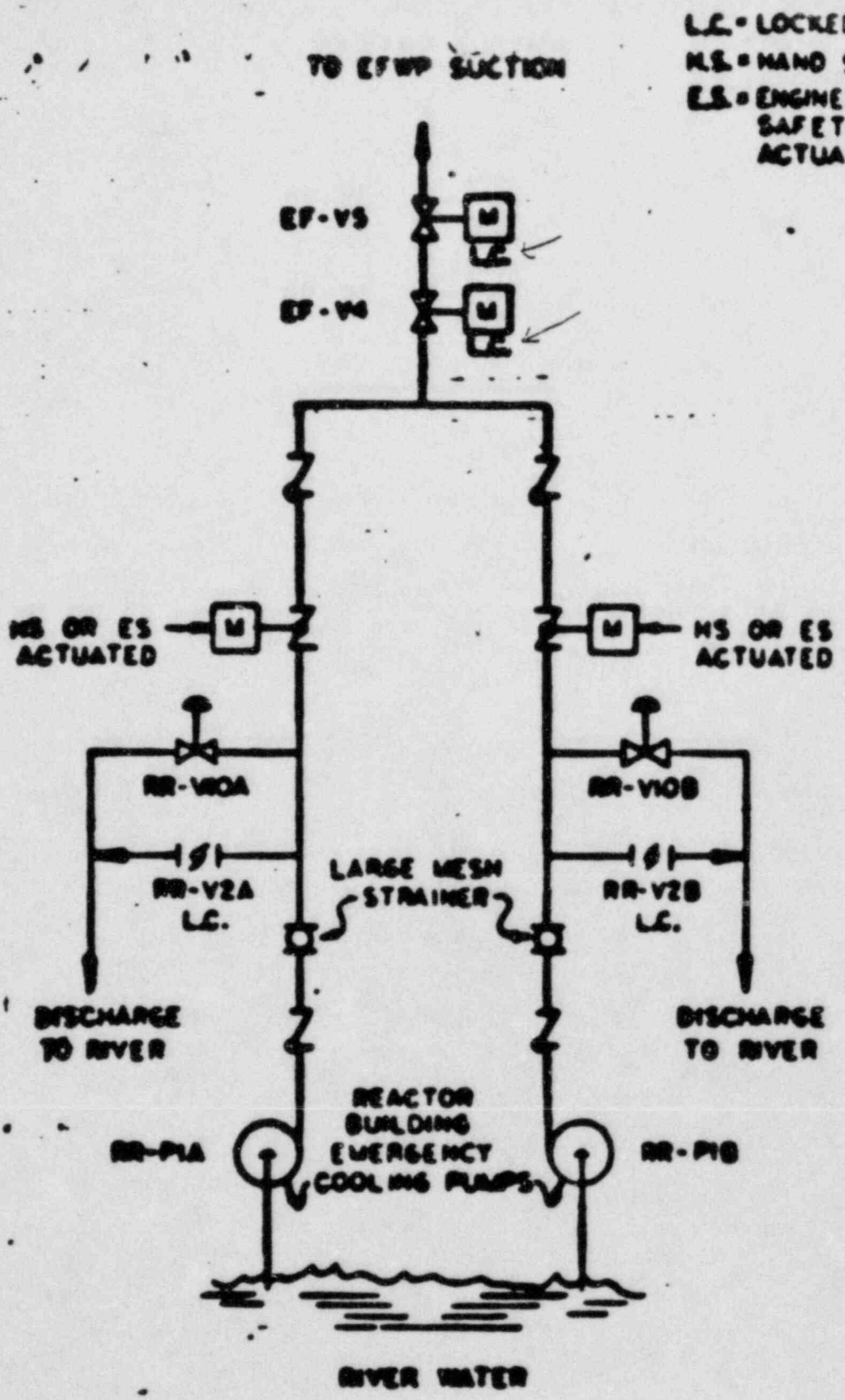
VI. ENVIRONMENTAL QUALIFICATION

VII. LONG TERM MODIFICATIONS

- A. DESCRIPTION
- B. SCHEDULE



(FIG. 1) TMI-1 EFW SYSTEM BEFORE RESTART MODIFICATION



(FIG. 4) RIVER WATER SUPPLY TO EFWS - TMI-1

ORIGINAL SYSTEM CONFIGURATION

I. MECHANICAL

A. TWO TRAINS SUPPLIED BY ONE TURBINE DRIVEN PUMP AND TWO MOTOR DRIVEN PUMPS.

B. PUMPS CAN FEED EITHER OR BOTH OTSGs.

C. WATER SOURCES COMMON TO ALL PUMPS:

1. TWO CONDENSATE STORAGE TANKS use 250K gal, TS limit 150K

2. CONDENSER HOTWELL

3. RIVER WATER BACKUP

D. ONE FLOW CONTROL VALVE PER TRAIN

II. POWER

A. EFW MOTOR DRIVEN PUMPS AND VALVES FED FROM DIESEL GENERATOR BACKED BUSSES (need to be manually loaded from Bkr to Bkr in the event of ESFAS)

B. STEAM SUPPLY VALVES FOR TURBINE DRIVEN PUMP DC POWERED
AC pwr not required to start sys.

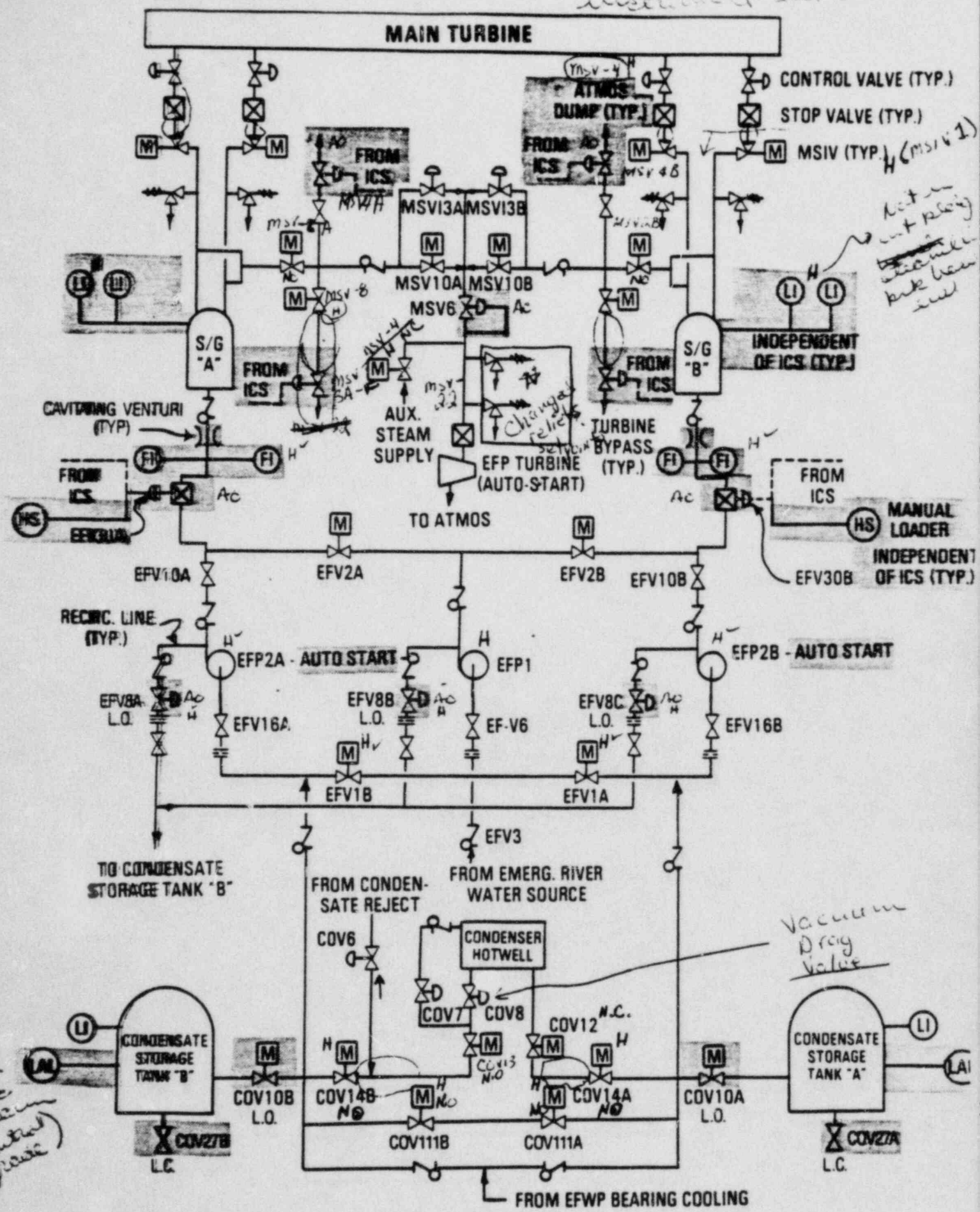
III. INSTRUMENTATION & CONTROL

A. TURBINE DRIVEN PUMP START ON LOSS OF MAIN FEEDWATER PUMPS OR FOUR RCP'S

B. MOTOR DRIVEN PUMPS MANUAL START

C. FLOW CONTROL VALVE CLOSED BY MSLRDS, POSITION CONTROLLED BY ICS, FAILED "AS-IS" OR 1/2 OPEN

D. CST LEVEL, OTSG PRESSURE AND LEVEL, PUMP DISCHARGE PRESSURE INDICATED IN CONTROL ROOM

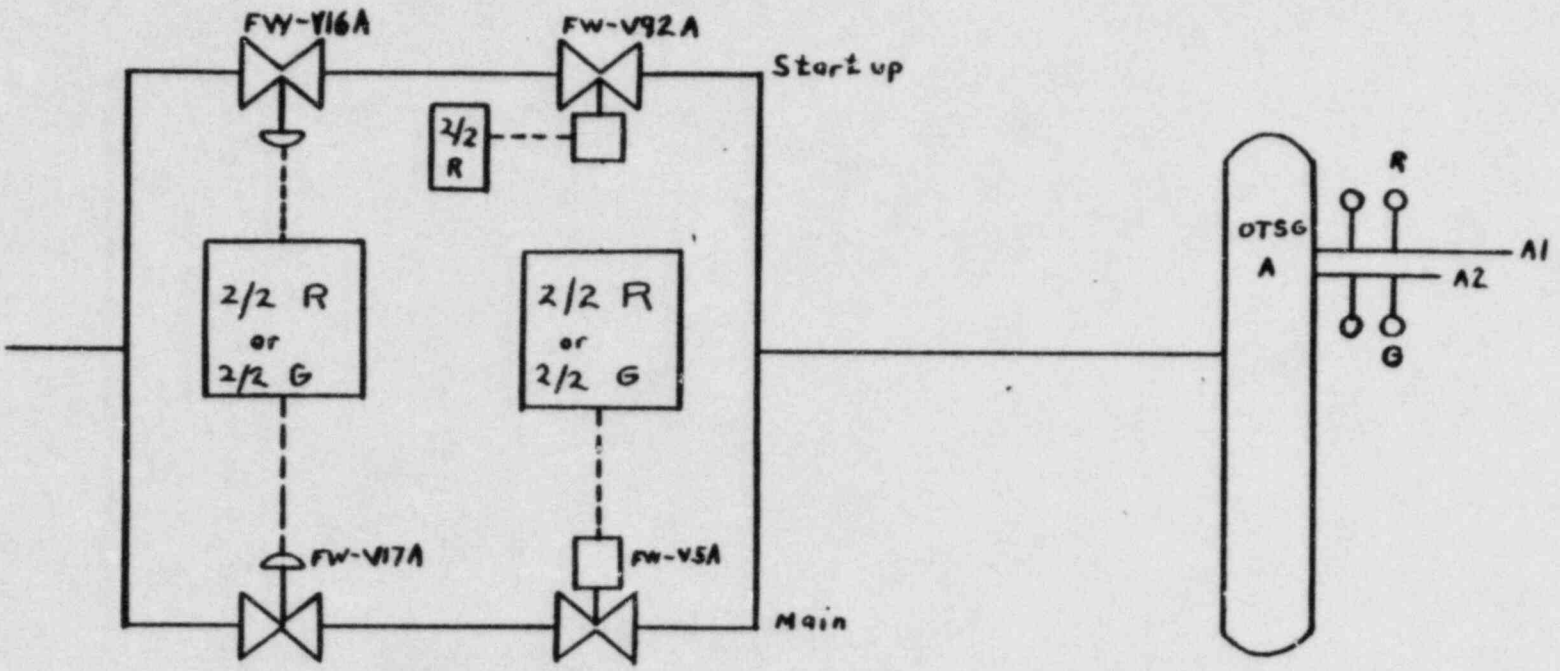


(FIG. 2) TMI-1 EFW SYSTEM AS MODIFIED FOR RESTART

MODIFICATIONS FOR RESTART

- o SAFETY GRADE EFW FLOW INDICATION IN THE CONTROL ROOM
- o SAFETY GRADE AUTO START OF ALL PUMPS
- o SAFETY GRADE OTSG LEVEL INDICATION IN THE CONTROL ROOM INDEPENDENT OF THE ICS
- o SAFETY GRADE TWO HOUR INSTRUMENT AIR SUPPLY FOR VALVES
- o BACKUP INSTRUMENT AIR COMPRESSOR SYSTEM FOR VALVES
- o CONTROL GRADE LOW-LOW LEVEL ALARMS FOR CONDENSATE STORAGE TANKS
- o FLOW CONTROL VALVES FAIL OPEN ON LOSS OF INSTRUMENT AIR
- o FLOW CONTROL INDEPENDENT OF ICS (VALVE MANUAL LOADER STATIONS)
- o DELETED ELECTRICAL POWER SUPPLY CROSS CONNECT TO MOTOR DRIVEN PUMPS
- o INSTALLED CAVITATING VENTURIS
- o PUMP RECIRCULATION VALVES LOCKED OPEN
- o CONDENSATE STORAGE TANK (CST) OUTLET VALVES LOCKED OPEN
- o MODIFIED STEAM LINE RUPTURE RESTRAINT
- o MODIFIED TURBINE STEAM SUPPLY CONTROL & RELIEF VALVES
- ● SEISMIC SUPPORT OF PUMP RECIRCULATION LINES
- ● SEISMIC SUPPORT OF VENT STACKS FOR SAFETY VALVES ON TURBINE STEAM SUPPLY
- ● INCREASE INTERMEDIATE BUILDING FLOODABLE VOLUME (ALLIGATOR PIT & TENDON ACCESS GALLERY)
- o UPGRADE FLOW CONTROL VALVE CIRCUITRY WITH EQ COMPONENTS (IP AND E/I CONVERTERS)
- o DELETED EFW PUMP SUCTION STRAINERS
- o DELETED MAIN STEAM LINE RUPTURE DETECTION SYSTEM LATCH SIGNAL TO FLOW CONTROL VALVES

(New items)



STEAM LINE RUPTURE DETECTION SYSTEM

MAIN STEAM LINE BREAK

+ REFERENCED ANALYSIS TMI-2 FW REG VALVE FAILURE
  + WORST CASE SINGLE FAILURE OF COMPONENT
  + LICENSED BY STAFF IN 1978. PROVIDED ACCEPTABLE RESULTS FOR CONTAINMENT RESPONSE

+ TMI-2 ANALYSIS BOUNDS RESPONSE FOR TMI-1 TO SAME EVENT
  - ADDED SLRDS SIGNAL TO BLOCK VALVES AT CYCLE 5 RELOAD OUTAGE AND INCREASED SPEED OF BLOCK VALVES TO 30 SECONDS

+ SLRDS DESIGN
  + NO SINGLE COMPONENT FAILURE PREVENTS ACTUATION
  + CLASS IE POWER SUPPLY
  + 2/4 (SELECTIVE) ACTUATION LOGIC
  + DOES NOT HAVE COMPLETE ELECTRICAL SEPARATION OUTSIDE CONTAINMENT
  - CABLE TRAY ROUTING

SEISMIC FEATURES

- MAJORITY OF SYSTEM ALWAYS WAS SEISMIC
- RESTART SEISMIC MODIFICATIONS
  - PUMP RECIRCULATION LINES SUPPORT
  - VALVE VENT STACKS SUPPORT
  - LOCKED OPEN PUMP RECIRCULATION VALVES
  - LOCKED OPEN CST OUTLET VALVES
- PROCEDURE CHANGES FOR SEISMIC EVENT RESPONSE
  - CST ALARM RESPONSE PROCEDURES (J-1-4 & J-2-4)
  - SEISMIC THRESHOLD ALARM RESPONSE PROCEDURE (PRF-1-2)
  - EARTHQUAKE PROCEDURE (1202-30)

FAILURE PROOF FEATURES

1. PROCEDURE 1210-10 DISPATCHES OPERATOR TO FLOW CONTROL VALVES ON EFW INITIATION
2. BACKUP AIR SUPPLIES
3. FLOW CONTROL INDEPENDENT OF ICS
4. DELETED MSLRDS TO FLOW CONTROL VALVES
5. MULTIPLE PUMPS
6. MULTIPLE SOURCES OF WATER
7. REDUNDANT FLOW INDICATION
8. AUTO INITIATION OF ALL PUMPS

EFW COMPONENTS REQUIRING QUALIFICATION TO RULE 10CFR50.49

FT-791	FLOW TRANSMITTER (FOXBORO)
FT-779	FLOW TRANSMITTER (FOXBORO)
FT-782	FLOW TRANSMITTER (FOXBORO)
FT-788	FLOW TRANSMITTER (FOXBORO)
EF-P2A	PUMP MOTOR (WESTINGHOUSE)
EF-P2B	PUMP MOTOR (WESTINGHOUSE)
EF-V-1A	VALVE MOTOR OPERATOR (LIMITORQUE)
EF-V-1B	VALVE MOTOR OPERATOR (LIMITORQUE)
EF-V-2A	VALVE MOTOR OPERATOR (LIMITORQUE)
EF-V-2B	VALVE MOTOR OPERATOR (LIMITORQUE)
*SP-V-5A	I/P CONVERTER (CONOFLOW)
*SP-V-5B	I/P CONVERTER (CONOFLOW)
	TERMINAL BLOCK (STATES)
	INSTRUMENT CABLE (ANACONDA)
	POWER CABLE (KERITE)
	CONTROL CABLE (KERITE)
	INSTRUMENT CABLE (BOSTON INSULATED WIRE)

*WILL BE INSTALLED BY JUNE 1, 1984

EFW LONG TERM UPGRADE MODIFICATIONS

MECHANICAL/STRUCTURAL

- ADD REDUNDANT SAFETY GRADE EFW CONTROL AND BLOCK VALVES

EFW HEAT SINK PROTECTION SYSTEM

- PROVIDE SAFETY GRADE EFW INITIATION ON 4 PSIG CONTAINMENT ISOLATION SIGNAL — new modification, replaces earlier steam/feed mismatch initiation
- PROVIDE SAFETY GRADE OTSG LEVEL INSTRUMENTATION AND SIGNALS FOR MFW OTSG HIGH WATER LEVEL ISOLATION AND OTSG LOW WATER LEVEL INITIATION OF THE EFW SYSTEM
- PROVIDE A SAFETY GRADE AUTOMATIC CONTROL SYSTEM INDEPENDENT OF THE ICS THAT PERMITS THE EFW SYSTEM TO CONTROL OTSG LEVEL WITHOUT INTERACTION WITH THE MFW SYSTEM
- PROVIDE SAFETY GRADE MAIN STEAM RUPTURE DETECTION AND MFW ISOLATION SYSTEMS
- ADD SAFETY GRADE LEVEL INDICATION AND LOW-LOW LEVEL ALARM IN THE CONTROL ROOM FOR EACH CONDENSATE STORAGE TANK

EFW LONG TERM EP&I MODIFICATIONS

- PROVIDE A SAFETY GRADE POWER SUPPLY TO VALVES CO-V111A/B AND UPGRADE THE CABLE ROUTING FOR POWER SUPPLY TO VALVES CO-V14A/B TO SEISMIC CLASS I CRITERIA
- PROVIDE AN OVERSPEED TRIP ALARM IN THE MAIN CONTROL ROOM FOR THE TURBINE DRIVEN EFW PUMP (EF-P-1)

EFW LONG TERM MODIFICATIONS SCHEDULE

	Release Engineering for Construction	Receive Long Lead Equipment	Turnover
1. MECHANICAL/STRUCTURAL - REDUNDANT CONTROL AND BLOCK VALVES	COMPLETE	6/ 1/84 ②	12/31/84 ①
2. HEAT SINK PROTECTION SYSTEM	8/ 6/84	9/14/84 ③	12/31/84 ①
3. EP&I MODIFICATIONS	7/10/84	N/A	12/31/84 ①

① OR FIRST REFUELING AFTER RESTART IF RESTART DURING 1984.

② EFW CONTROL AND BLOCK VALVES (EF-V30 A/B/C/D)

③ FOXBORO ELECTRICAL CABINETS

TMI-1 EQ MASTER LIST DEVELOPMENT

- Determine systems required to achieve safe shutdown following postulated accidents (HELB/LOCA)

- Determine components and associated peripheral equipment within the systems required to achieve safe shutdown

  Hot shutdown per TMI-1 T.S.

- Utilized safety sequence analysis to develop the base list of systems and components

Advantages

- Documentable work
- Based upon achievement of defined safety functions
- Readily identifies support systems
- Endorsed in SRP Section 15.

SAFETY SEQUENCE ANALYSIS (SSA)

- A SYSTEMATIC APPROACH TO NUCLEAR POWER PLANT DESIGN REVIEW STRUCTURED TO SHOW THE OVERALL PLANT RESPONSE TO NORMAL AND OFF-NORMAL CONDITIONS IN A DOCUMENTABLE, DIAGRAMMATIC FORMAT

BASIC ELEMENTS OF SSA

- SAFETY SEQUENCE DIAGRAM (SSD)
- SYSTEM AUXILIARY DIAGRAM (SAD)
- SAFE SHUTDOWN LOGIC DIAGRAM (SSLD)

SAFETY SEQUENCE DIAGRAM DEVELOPMENT

- o IDENTIFY COMPLETE SET OF PLANT SAFETY FUNCTIONS REQUIRED TO ACHIEVE HOT ~~AND COLD~~ SHUTDOWN

- o GROUP PLANT INITIATING EVENTS OR CONDITIONS TO BE DIAGRAMMED

- o IDENTIFY THE SYSTEMS REQUIRED TO SUCCESSFULLY ACHIEVE THE SAFETY FUNCTIONS REQUIRED

- o DEVELOP LOGICAL SEQUENCE OF SYSTEM RESPONSES FROM AN INITIALLY DEFINED PLANT CONDITION (INHERENT COMPLETENESS CHECK)

- o IDENTIFY SYSTEM INITIATING SIGNALS, SETPOINTS AND REQUIRED MONITORING WITH TRACEABLE DOCUMENTATION

- o ACCOUNT FOR ANY MANUAL ACTIONS REQUIRED

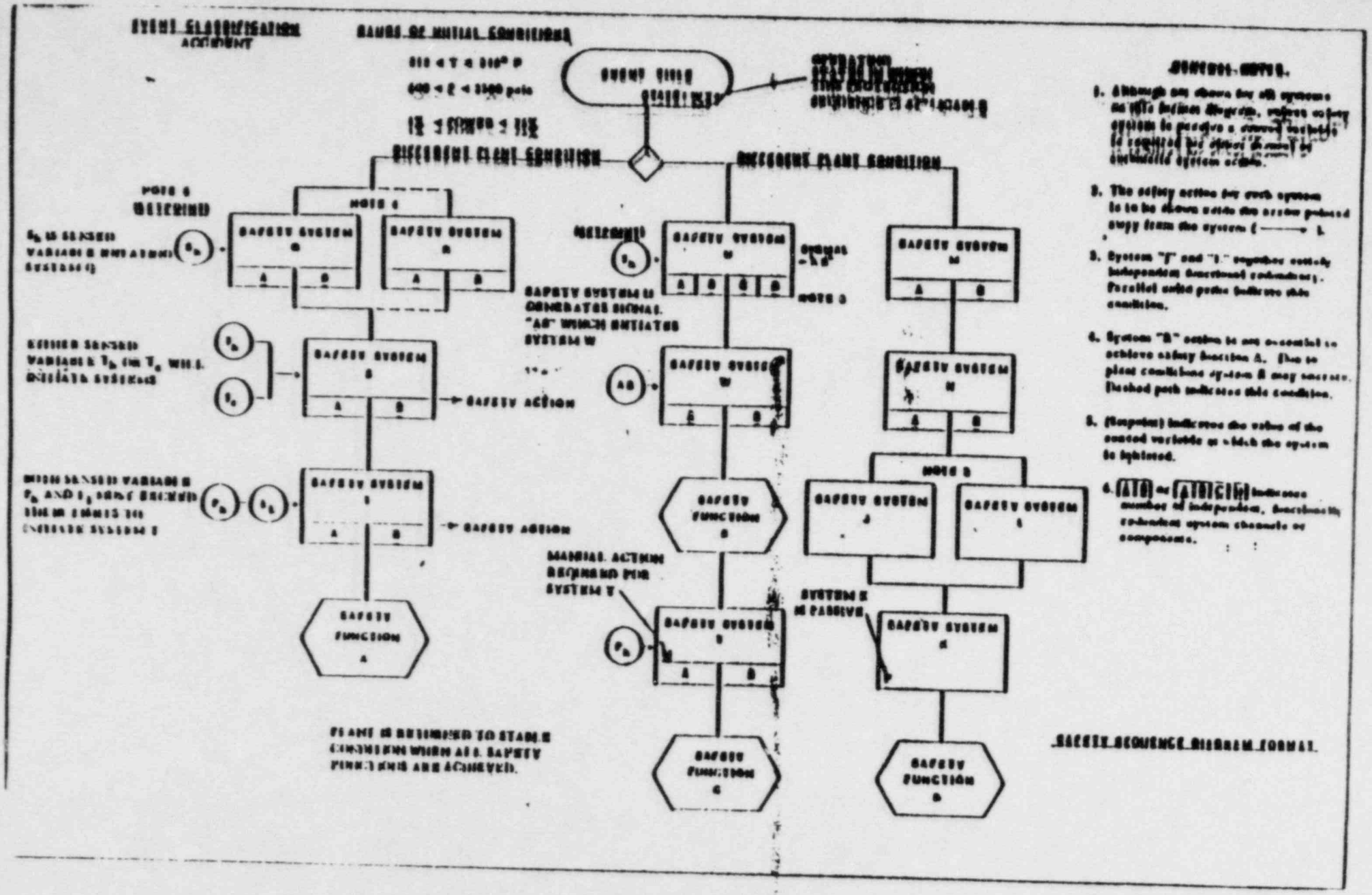
IDENTIFICATION OF SAFETY FUNCTIONS

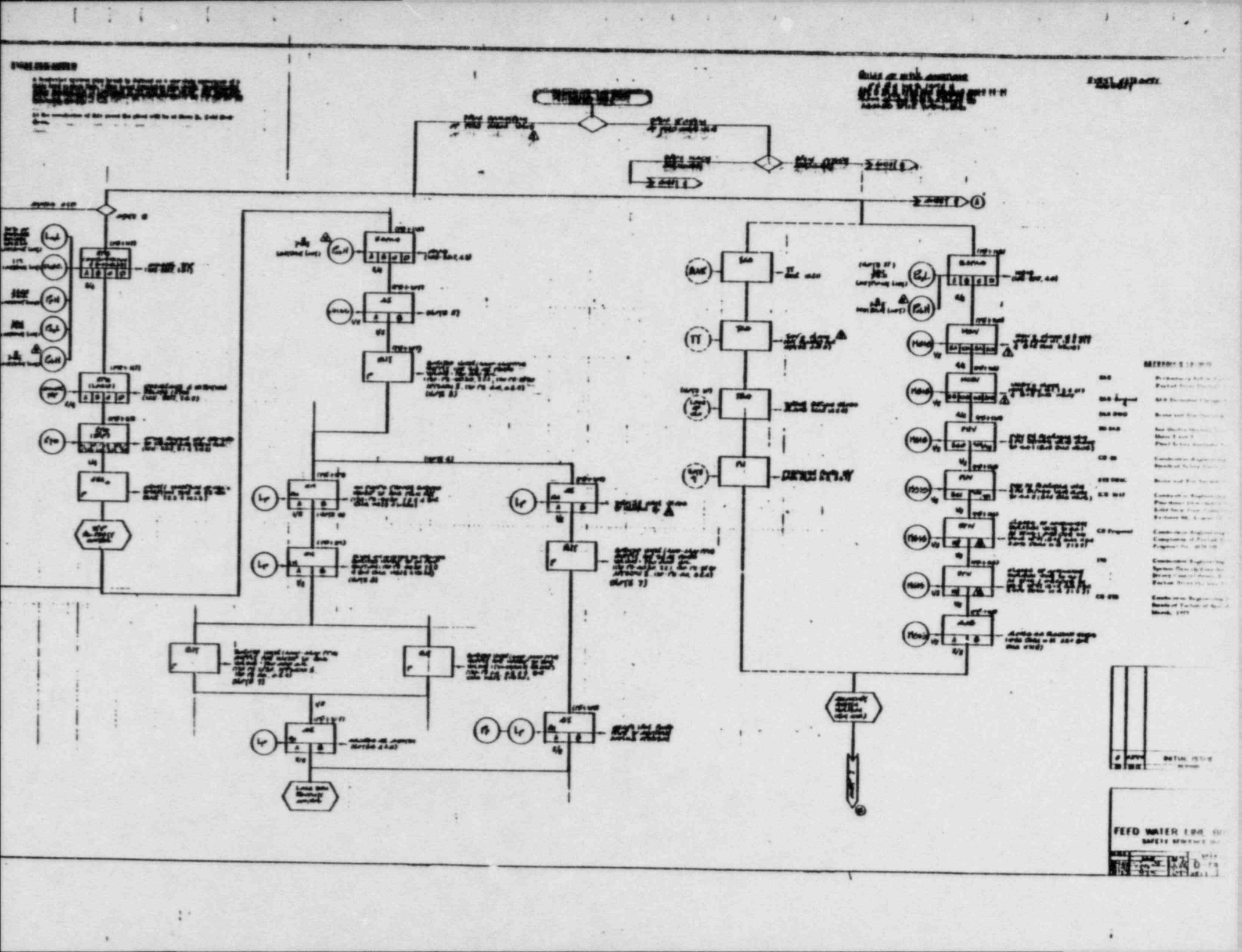
- List of Generic Nuclear Safety Functions initiated in 1973 when methodology was pioneered; updated for B&W ATOC Program in 1979, continuously reviewed by Impell and CPU to present

- Identify a complete set of plant safety functions

  Inputs: ANSI 51.1
  10CFR50 GDC
  FSAR Chapter 15 and Supporting Documents
  Tech Specs

Safety Function *	Functional Description
Trip Reactivity Control	Rapid insertion of negative reactivity into the core to produce subcritically immediately following an evaluated event.
Transient Reactivity Control	Insertion of negative reactivity into the core sufficient to compensate for cooldown of the reactor coolant system.
Long Term Reactivity Control	Establishment of a sufficient boron concentration in the core such that the reactor is maintained subcritical following the event.
Emergency Core Cooling - Injection Phase	Provision of coolant to the reactor core immediately following an accident and prior to the time that manual action can be taken.
Emergency Core Cooling- Recirculation Phase	Provision of coolant to the reactor core some time after the accident has occurred and at a time when manual action can be taken and in such a way that the core coolant is recirculated back into the primary system after it leaks out.
Reactor Heat Removal	Cooling of the core by other than injection of coolant directly to the core.
Pressure Control - Primary System	Maintenance of primary system pressure within allowable pressure limits and ensuring that the primary steam bubble remains in the pressurizer.
Pressure Control - Secondary System	Maintenance of secondary system pressure within allowable pressure limits.
Pressure Control - Containment	Maintenance of containment pressure within allowable pressure limits when containment is required.
Temperature Control - Containment	Maintenance of containment temperature within allowable temperature limits when containment is required.


EVENT CLASSIFICATION
ACCIDENT
BASES OF INITIAL CONDITIONS
EVENT TITLE
DIFFERENT PLANT CONDITION
DIFFERENT PLANT CONDITION
NOTE 6
DETERMINED
NOTE 6
SAFETY SYSTEM A
SAFETY SYSTEM B
SAFETY SYSTEM B
SAFETY ACTION
SAFETY SYSTEM I
SAFETY ACTION
SAFETY FUNCTION A
SAFETY SYSTEM W
SAFETY SYSTEM W
SAFETY FUNCTION B
SAFETY SYSTEM M
SAFETY SYSTEM M
NOTE 5
SAFETY SYSTEM J
SAFETY SYSTEM L
SAFETY SYSTEM K
SAFETY FUNCTION D
SAFETY SYSTEM U
SAFETY FUNCTION C
SAFETY SEQUENCE DIAGRAM FORMAT

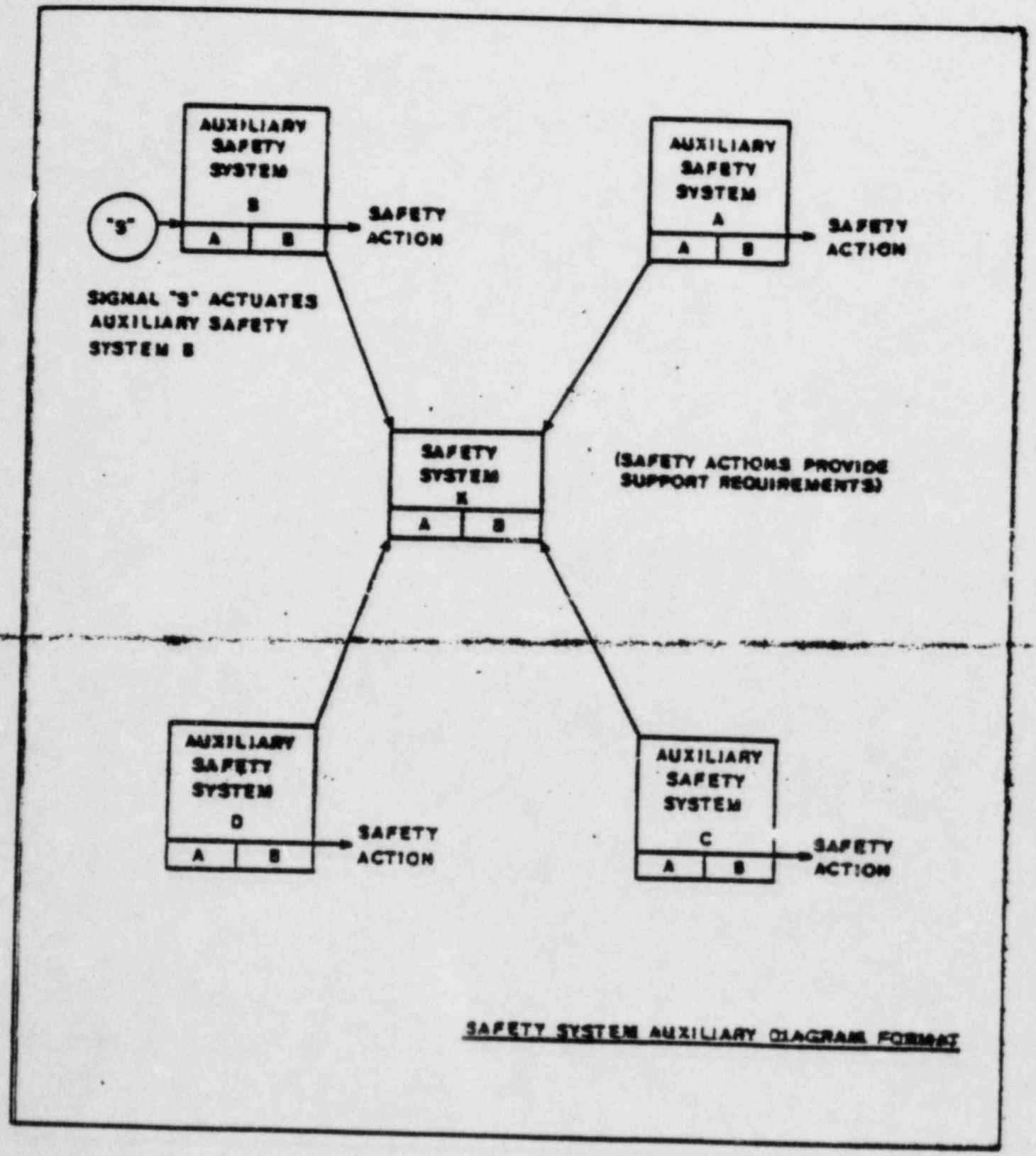


SYSTEM AUXILIARY DIAGRAM

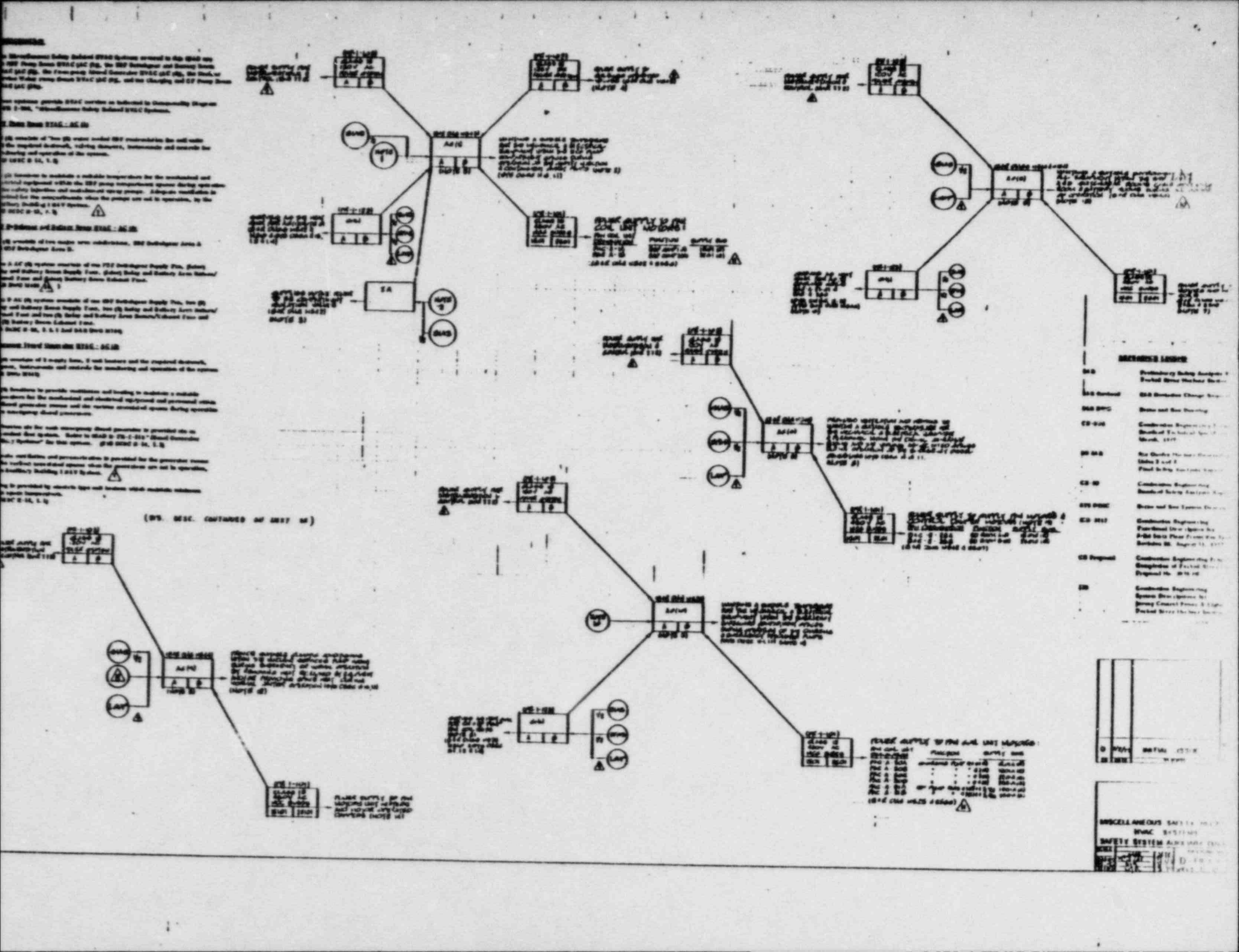
(SECONDARY ELEMENT OF SSA)

OBJECTIVE: TO EVALUATE ALL SYSTEMS WHICH SUPPORT THE OPERATION OF MAJOR SAFETY SYSTEMS IN DIAGRAMMATIC FORMAT. EXAMPLES INCLUDE HVAC, CCW, ELECTRIC POWER, ETC.

ACCOMPLISHING THE OBJECTIVE: ALL SUPPORT SYSTEMS DOCUMENTED AS INPUTS TO THE PRIME SAFETY SYSTEM ON DISTINCT DIAGRAMS.



SAFETY SYSTEM AUXILIARY DIAGRAM FORMAT



SYSTEM SHUTDOWN LOGIC DIAGRAM

(THIRD ELEMENT OF SSA)

OBJECTIVE:	TO EVALUATE ALL (SAFETY AND NON-SAFETY) SYSTEMS WHICH ARE REQUIRED TO ACHIEVE A PLANT SHUTDOWN FROM AN INITIAL FULL POWER CONDITION
ACCOMPLISHING THE OBJECTIVE:	USE SAME FORMAT AND METHODOLOGY AS FOR SAFETY SEQUENCE ANALYSIS

APPLICATION OF SSA TO TMI-1 EQ PROGRAM

- o INITIAL SET OF SAFETY SYSTEMS REQUIRED TO FUNCTION AFTER HELB/LOCA WAS GENERATED BASED UPON SSA FOR THE B&W ATOG PROGRAM

INITIATING EVENTS

LOCA's in bounded envelope

- o LOSS OF MAIN FEEDWATER
- o STEAM GENERATOR TUBE RUPTURE
- o EXCESS FEEDWATER
- o LOSS OF AC
- o STEAM LINE BREAK

General list initiating events.

AUXILIARY DIAGRAMS (TMI-1 specific)

- o HIGH PRESSURE INJECTION
- • EMERGENCY FEEDWATER
- o LOW PRESSURE INJECTION
- o TURBINE CONTROL
- o REACTOR COOLANT PRESSURE CONTROL
- o CONTAINMENT SPRAY
- o CHEMICAL ADDITION
- o CONTAINMENT ISOLATION
- • TURBINE BYPASS AND ATMOSPHERIC DUMP

[illegible]? MSIVs? S/G level?

(ATOG TRANSIENTS SELECTED WITH B&W/BWOG TO EXERCISE ESSENTIALLY EVERY SAFETY RELATED COMPONENT OR ACTIVITY WHICH IS CONTEMPLATED TO OCCUR SUBSEQUENT TO A POSTULATED ACCIDENT)

- o SSA SERVED AS INITIAL SOURCE OF DOCUMENTATION FOR COMPILATION OF MASTER LIST SYSTEMS AND MAJOR COMPONENTS

→ These diagrams resulted in 30 systems. These 30 systems were reviewed and eliminated from the list if (1) the system was not in a harsh environment, or (2) the system is not req'd to func