SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT ☐ 6201 S Street, P.O. Box 15830, Sacramento, CA 95813; (916) 452-3211
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

RJR 85-321

July 12, 1985

DIRECTOR OF NUCLEAR REACTOR REGULATION
ATTENTION HUGH L THOMPSON JR DIRECTOR
DIVISION OF LICENSING
U S NUCLEAR REGULATORY COMMISSION
WASHINGTON D C 20555

DOCKET 50-312
RANCHO SECO NUCLEAR GENERATING STATION
UNIT NO 1
ADDITIONAL INFORMATION ON ALTERNATIVE SHUTDOWN CAPABILITY FOR COMPUTER AND CONTROL ROOM

The District submitted additional information to its response to Generic Letter 81-12 (i.e. Alternative Shutdown Capability for Computer and Control Room) on April 5, 1985. Subsequently, telephone conversations on May 6, 13, and 20, 1985 and a meeting with your staff on June 18, 1985 raised various questions which the District addresses in Attachment 1. Because of the various discussions referenced above and because of the completion of a number of plant modifications, the District is providing a completely revised response to Generic Letter 81-12 (Attachment 2). The entire response is being resubmitted and supercedes the District's earlier responses. To facilitate the NRC review, all revisions to the April 5, 1985 submittal have been indicated by revision bar lines. If you have any additional questions contact Larry Young at Rancho Seco.

R. J. RODRIGUEZ
ASSISTANT GENERAL MANAGER,
NUCLEAR

Attachments

A006
1/10

ATTACHMENT 1

NRC QUESTIONS ON DISTRICT'S
81-12 RESPONSE OF APRIL 5, 1985

1. NRC QUESTION

What is the basis for sizing the nitrogen supply required for shutdown?

RESPONSE

The nitrogen supply was based on the maximum air volume needed to operate the Atmospheric Dump Valves (ADV) for a period of 100 hours (average time required for cooldown). The two valve positions and transducers required 1.6 SCFM which results in a total air volume needed for 100 hours of 9,600 SCF. The nitrogen bottles used to supply air are in 6 packs of 255 SCF cylinders at normal pressure of 2200 psi. This results in the need for 42 bottles onsite for the 100 hour cooldown.

2. NRC QUESTION

Is there any service or instrument air piping in the Control Room or TSC that could be damaged by a fire in those rooms and affect the ability to safely shutdown?

RESPONSE

Service or instrument air piping to the Control Room, TSC or other plant areas are isolated in the hot shutdown procedure, so that the fire in these areas will not affect the availability of service air needed for shutdown. This isolation ensures that the part of the service air system needed for hot shutdown is isolated from a breached air line in any location, as well. This is accomplished by manual local isolation valves near the area of service air needs.

3. NRC QUESTION

How long until the switchgear room needs cooling from the portable fans?

RESPONSE

Excessive room temperature occurs at 1 hour 15 mimutes after loss of offsite power. This calculation is based on an initial room temperature of 80°F, on outside temperature of 115°F, and a heat load assuming all equipment normally operating. Based on this conservative heat load calculation, it would take 1 hour 15 minutes to heat up to 122°F, which is the allowed maximum temperature for the equipment in the room.

The time for portable fan installation is 1/2 hour. Therefore, plenty of time is available for the fan installation prior to overheating and potential equipment damage.

4. NRC QUESTION

On page II-23, Table 2-1, LT-20504A is listed but it appears to be left off figure SK-J-500?

RESPONSE

OTSG wide range level transmitters LT-20501, LT-20502, LT-20501A and LT-20502A only are required for safe shutdown. Therefore, OTSG operating range level transmitters LT-20504A and 20503B and have been deleted from Table II-1 and Figure SK-J-500. Revised Figure SK-J-500 is attached.

5. NRC QUESTION

Figure SK-ICR-14 indicates an instrument which appears to read out in TSC? Please clarify.

RESPONSE

Figure SK-ICR-14 has been revised to show which instruments read out in the TSC and is attached.

6. NRC QUESTION

Figure SK-ISD-8 is missing the summary statement that appears on the other figures? Please clarify.

RESPONSE

Figure SK-IDS-8 has been revised to contain a summary statement and is attached.

7. NRC QUESTION

On Figure SK-ISD-8, there appears to be a "typo" because PI-21050A is in the figure but title references loop "B"? Please clarify.

RESPONSE

Figure SK-ISD-8 correct. PI-21050A was incorrectly shown in loop "A" on Figure SK-J-500 and it has been corrected. Also PI-21031 was incorrectly shown in loop "B" on Figure SK-J-500 and it has been corrected. Figure SK-J-500 is attached.

8. NRC QUESTION

On Figure SK-ISD-9 there appears to be a "typo" because H2SD is in the figure by H2SP is in the summary note? Please clarify.

RESPONSE

Figure SK-ISD-9 summary statement revised to show H2SD instead of H2SP. The updated figure is attached.

9. NRC QUESTION

Figures SK-ISD-12 and SK-ISD-13 refer to TE-21031C and TT-21031C and TE-21032C and TT-21032C, while figure SK-J-500 refers to TE-21031C and TT-21031A and TE-21032C and TT-21032B. Please clarify.

RESPONSE

Figure SK-J-500 has been revised to change TT-21031A to TT-21031C and TT-21032B to TT-21032C. Also interface with NNI cabinets has been deleted as this was incorrect. The updated figure is attached.

10. NRC QUESTION

Please clarify the requirements for the HPI pump lube oil coolers.

RESPONSE

Figure SK-M-544 has been revised to show HPI pump lube oil coolers and is attached.

11. NRC QUESTION

As shown on USAR Figure 10.2-4, can HV-20610 open to spurious signal and result in steam generator blowdown?

RESPONSE

HV-20609 (Steam Generator A) and HV-20610 (Steam Generator B) are inside containment and are in series with HV-20611 which is outside containment. After Control Room evaluation, Train B buses (power HV-20611) will be denergized which will shut off power to HV-20611. The hot shutdown procedure will require physical verification that this valve is closed. If the valve is open, it will be manually closed.

12. NRC QUESTION

Is the letdown system needed for shutdown?

RESPONSE

NO, the letdown system is not needed for shutdown. The primary system is bottled up in the proposed shutdown scheme and the cooling of the RCS provides enough contraction volume to maintain RCP seal cooling through RCP seal injection.

13. NRC QUESTION

With a Control Room fire are the Diesel Generators manually started? How does loss of air affect the starting capability on loss of off site power?

RESPONSE

As long as the Control Room interface does not disable the diesel generator controls, the diesel generator GEA will be automatically started even with a fire in the Control Room and loss of off site power. The under voltage start sensing system is located outside the Control Room. If the diesel controls are lost before isolating the Control Room interface, the diesel generator will be required to be manually operated after isolating from the Control Room.

The loss of air does not affect the starting capability of the diesel generators on the loss of offsite power. As stated in USAR Section 8.3.2.1, "Each diesel has its own separate air starting system. There are two complete air starting systems consisting of an air compressor with all automatic controls and alarms for a complete unit, two air motors, and three air receivers with a combined storage capacity sufficient for five starts without compressor operation..." No other equipment on the diesel generator relies on plant air to run the diesels so the loss of plant air does not affect diesel operation.

14. NRC QUESTION

On the letdown system, if you have a fault in the motor operated valve and are depending upon the pneumatic valve, will it close and hold?

RESPONSE

Yes, the solenoid will fail safe closed and remain closed upon loss of air for whatever reason.

15. NRC QUESTION

Explain the makeup/HPI process in detail concerning the recirculation path to the makeup tanks. Also explain how the Reactor Coolant Pump (RCP) seals are cooled?

RESPONSE

The Makeup/High Pressure Injection System performs three functions:

1) inventory control including reactor coolant system pressure control.

2) reactor coolant pump seal injection, and

3) reactivity control through boron addition.

These functions are accomplished by aligning the BWST as the suction source and aligning an injection path to the RCS and RC pump seals.

The "A" electrical power train is dedicated to the shutdown panel. Therefore, following an Appendix R Event, the BWST suction source and injection path must be aligned from outside the Control Room. An operator is dispatched to the 480 volt switchgear area to position the isolation switch for the valves that are controlled from the shutdown panel. Once these switches are positioned, the BWST Isolation Valve SFV-25003 (SK-M-522) and the Makeup Tank Outlet Valve SFV-23508 (SK-M-521) are open to provide RCS inventory and pressure control.

The operator dispatched to the 480 switchgear area de-energizes the "A" powered Makeup Recirculation Valve SFV-23645 (SK-M-521) and the operator in the 4160 switchgear area de-energizes the second Make-up Recirculation Valve 5FV-23646 (SK-M-521) by de-energizing 4B bus. An auxiliary operator is dispatched to the lower level Auxiliary Building to verify valve positions. The two de-energized makeup recirculation valves are verified to be open. This establishes a recirculation path through the makeup tank. This path will be used until RC pump seal injection and the alternate recirculation path are established.

The RC pump seal injection path is established by an operator at lower level (-20 foot) in the Auxiliary Building. The operator at the 480 switchgear area has de-energized the RC Pump Seal Injection Valve SFV-23616 (SK-M-521). Once all equipment is de-energized by that operator, the operator proceeds to the (-20 foot) level of the Auxiliary Building to re-establish RC Pump Seal Injection and align the alternate recirculation path. The operator equalized the pneumatic pressure on control valve PV-23606 (SK-M-521) and positions the valve manually to achieve the desired flow as read on the local flow indicator. The operator verifies SFV-23616 is open. This re-establishes RC pump seal injection. The time frame for this to be accomplished per the walkdown conducted during validation of the C.13A Procedure is approximately 45 minutes following Control Room evacuation. In accordance with the walkdown, the same operator will establish the alternate recirculation path at approximately the 100 minute mark.

The alternate recirculation path is established to prevent heatup of the Makeup Tank V-235 (SK-M-521A) during extended operation of the makeup/HPI pump. The heatup is due to a loss of cooling water to the seal return coolers as would occur with a loss of offsite power. The alternate recirculation path goes through the Recirculation Valves SFV-23645 and SFV-23446. The flow would normally go to the Makeup Tank, but by opening PLS-049 manual valve (SK-M-521A), the flow is directed to BWST thru Decay Heat Removal System line 26102. The check valves DHS-003 and DHS-004 prevent the flow from going back to the makeup/HPI pump suction. The flow is directed through the decay heat pump, through the decay heat cooler, through the cross connect, and to the BWST by opening DHS-033. The operator must verify the following valve positions:

Devise	Name of Device	Action
PLS-049	MU/DH Cross Connect	Verify Open
SFV-26040	DH Cooler Outlet Valve	Verify Open
HV-26038	DH Cooler Bypass	Verify Closed
HV-26047	Cross Tie to BWST	Verify Open
HV-26046	Cross Tie to BWST	Verify Closed
DHS-033	Common Cross Tie to BWST	Verify Open
HV-26008	LPI to HPI	Verify Closed
SFV-29108	RB Spray Isolation	Verify Closed
SFV-29107	RB Spray Isolation	Verify Closed
HV-23004	Letdown 3-Way Valve	Position to Flash Tank
PLS-044	MU Tank Inlet	Verify Closed
CBS-003	RB Spray Pump Suction	Closed
CBS-004	RB Spray Pump Suction	Closed

Once this lineup is complete, the operator at the shutdown panel will close the Makeup Tank Outlet Valve SFV-23508. For the duration of the event, the Makeup System can be operated continuously without de-energizing the Makeup/HPI Pump and without fear of pump damage due to low flow. The alignment requires an operator to manually close the RC pump seal injection line twice per hour once the RCS temperature is below 400°F. To this point, the RCS temperature control is maintained by continuous RC pump seal injection and by opening SFV-23811 from the shutdown panel as required to stay within the plant pressure temperature limits. Below 400°F, the RC pump seals will be batch fed twice per hour by manually controlling PV-23606. This operation will continue until decay heat initiation occurs at approximately 290°F.

Reactivity Control is achieved by using borated water from the BWST. If the plant is more than 130 effective full power days into the fuel cycle additional boron is required from a concentrated source of borated water.

16 NRC QUESTION

Provide a description of auxiliary feedwater pump operation including valves.

RESPONSE

The Auxiliary Feedwater System through the Main Steam Safety Valves and Atmospheric Dump Valves (ADV) performs three functions during an Appendix R event. These functions are:

1) furnish an emergency feedwater supply to the stream generators,

2) remove heat from the Reactor Coolant System so natural circulation may be established, and

3) reject heat from the secondary system to the atmosphere.

These functions are accomplished by aligning the Condensate Storage Tank T-358 (SK-M-532) as the suction supply to the motor driven Auxiliary Feedwater Pump P-319 (SK-M-532). The dual drive AFW Pump P-318 (SK-M-532) will be de-energized electrically by the operator at the 4160 volt switchgear area, and the turbine will be tripped locally by an operator dispatched to the AFW pump area at grade level. The motor driven pump will be isolated from the Control Room by an isolation switch located in the 4160 volt switchgear area and will be operated from the motor switchgear. AFW Pump P-319 will provide emergency feedwater to the "B" Steam Generator through the AFW Bypass Valve SFV-20578 (SK-M-532), which is isolated from the Control Room interface by an isolation switch and controlled from the shutdown panel. To control the flow to the "B" Steam Generator, the pneumatic AFW Control Valve FV-20528 (SK-M-532) must be closed. The operator that was dispatched to the AFW Pump area will equalize the air pressure on the Control Valve FV-20528 and verify the valve is closed.

The "A" Steam Generator auxiliary feedwater flow was stopped initially to prevent an uncontrolled overcooling of the RCS. This was accomplished by de-energizing and tripping the dual drive AFW Pump P-318 and by closing the AFW Cross Connect Valve HV-31827, which is isolated from the Control Room interface and controlled from the shutdown panel. Once the operator at the AFW control valve complex has positioned the valves for the "B" Steam Generator, the operator will proceed to the "A" AFW control valve complex. At the "A" control valve complex, the operator will equalize the air pressure on the pneumatic valve FV-20527 (SK-M-532) and verify the valve is open. The operator will then return to the AFW pump area and verify the AFW Cross Connect Valve HV-31826 (SK-M-532) is open by manually positioning the valve as required. Valve HV-31826 was de-energized by the operator at the 480 volt switchgear area. Once the Cross Connect Valve HV-31826 and the AFW Control Valve FV-20527 are verified open, the operator at the shutdown panel can control the "A" Steam Generator level from the shutdown panel by controlling the second AFW Cross Connect Valve HV31827 for the "A" Steam Generator. This provides controlled AFW flow to both steam generators from the shutdown panel. Natural circulation heat removal will be established with AFW supplied from the Condensate Storage Tank T-358. The Atomspheric Dump Valves PV-20571 A, B, and C and PV-20562 A, B and C and the Condenser Dump Valves PV-20561, PV-20563, and PV-20564, and PV-20566 (SK-M-530) are pneumatically controlled valves. With a loss of air pressure due to the loss of offsite power, these valves will fail closed due to the check valve and local accumulator system mounted on each valve. This assures these valves are closed until manual control over the Atmospheric Dump Valves PV-20571 A, B, and C and PV-20562 A, B, and C can be established.

With AFW flow established, steam generators refilling, and the atmospheric dump valves and condenser dump valves de-energized and closed, heat is being removed from the Steam Generataors and exhausted to the atmosphere through the main steam safety valves.

The plant will be controlled by using the valves SFV-20578 and HV-31827 to control steam generator level. If the condensate storage tank is expended prior to initiating the Decay Heat System, a gravity system is available from the reservoir to provide a backup auxiliary feedwater supply.

Final cooldown of the plant is accomplished by achieving control over the atmospheric dump valves by activating the manual loader station from the ADV's. This loader station will control the ADV's in order to reduce the secondary side pressure and maintain the plant in a continuous controlled cooldown mode.

ATTACHMENT 2

SACRAMENTO MUNICIPAL UTILITY DISTRICT

RESPONSE TO

CLARIFICATION OF

GENERIC LETTER 81-12

DATE: JULY 1985

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SECTION I

INTRODUCTION

This document contains the Sacramento Municipal Utility District's response to the clarification of Generic Letter 81-12. It is written in an NRC request - District response format.

Section II provides the additional information on the alternative shutdown methods requested in Attachment 1 of the clarification letter.

Section III provides the details of the District's associated circuit analysis requested in Attachment 2 of the clarification letter.

Section IV discusses all high-low pressure interface as required by the second part of Attachment 2 of the clarification letter.

Supplementary tables and drawings are attached to provide all the information needed to review the District's alternative shutdown method for a fire in the Control Room.

SECTION II

RESPONSE TO

ATTACHMENT 1 OF

CLARIFICATION TO

GENERIC LETTER 81-12

NRC REQUEST

1. Identify those areas of the plant that will not meet the requirements of Section III.G.2 of Appendix R and, thus alternative shutdown will be provided or an exemption from the requirements of Section III.G.2 of Appendix R will be provided. Additionally, provide a statement that all other areas of the plant are or will be in compliance with Section III.G.2 of Appendix R.

DISTRICT RESPONSE

The following areas of the plant do not meet the requirements of Section III.G.2 of Appendix R and, thus, alternative shutdown will be provided:

- Fire Area 1 - Control/Computer Room
- Fire Area RT1 - Control/Computer Room Corridor
- Fire Area 74 - Auxiliary Building Roof

The following areas of the plant do not meet the requirements of Section III.G.2 of Appendix R and exemption requests have been provided:

- Fire Area 47 - Corridor to Elevation 47

  An exemption request for Fire Area 47 was submitted on March 17, 1981. It involves a lack of an automatic fire suppression system in the area. The District provided additional information for the exemption for Fire Area 47 on May 28, 1982. The exemption was granted by the NRC on January 10, 1983.

- Fire Area 49 - West Containment Valve Area

  An exemption request for Fire Area 49 was submitted on March 17, 1981. It involves a lack of an automatic fire suppression system in the area. The District provided additional information for the exemption for Fire Area 49 on May 28, 1982. The exemption was granted by the NRC on January 10, 1983.

- Fire Area 48 - Train "A" HPI Pump Room

  An exemption request for Fire Area 48 was submitted on March 17, 1981. It involves a lack of an automatic fire suppression system in the area and the lack of a one-hour barrier. The District provided additional information for the exemption for Fire Area 48 on May 28, 1982. The exemption was granted by the NRC on January 10, 1983.

- Fire Area 58 - Makeup Pump Room

  An exemption request for Fire Area 58 was submitted on March 17, 1981. It involves a lack of an automatic fire suppression system in the area and the lack of a one-hour fire barrier. The District provided additional information for the exemption for Fire Area 58 on May 28, 1982. The exemption was granted by the NRC on January 10, 1983.

- Fire Area 69 - Auxiliary Feedwater Pumps

  An exemption request for Fire Area 69 regarding the Auxiliary Feedwater Pumps was submitted on February 28, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves a lack of separation in an outdoor situation where a radiant energy shield, and fire suppression and detection are proposed.

- Fire Area 69 - Auxiliary Feedwater Valves

  An exemption request for Fire Area 69 regarding the Auxiliary Feedwater Valves was submitted on February 28, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. The redundant valves in an outdoor situation lack suppression and detection but have a fire break installed in an intervening cable tray.

- Fire Area 68 - Cables Inside Containment, Electrical Penetration Area

  An exemption request for Fire Area 68 was submitted on February 28, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. Intervening combustibles require a cable tray fire break to be installed which is not listed as an option under Appendix R.

- Fire Area RG1 - Auxiliary Building Electrical Penetration Area

  An exemption request for Fire Area RG1 was submitted on February 28, 1985. An exemption request for Fire Area 34 was submitted on July 24, 1984. Based on the Appendix R Re-evaluation that request requires modifications.

- Fire Area RB1 - Auxiliary Building Mechanical Penetration Area

  An exemption request for Fire Area RB1 was submitted on February 28, 1985. Exemptions for Fire Area 49, West Containment Valve Area, and Fire Area 58, Makeup Pump Room, were granted on January 10, 1983. As a result of the Appendix R Re-evaluation, Fire Area 49, 50, 51, 52, 58, and 60 were incorporated into one fire area, RB1. A new exemption request resulted for the fire boundary of RB1. The previous approved exemption for F.A. 49 required wrapping a cable tray through F.A. 49 which contains circuits for the makeup pump. This wrapping is no longer necessary as the makeup pump room is part of the new F.A. RB1 and this exemption negates the need for the previously approved exemption.

- 72-Hour Cold Shutdown

  An exemption request for 72-hour cold shutdown was submitted on February 28, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. For a loss of offsite power, it is not possible to achieve cold shutdown in 72 hours.

- NSRW Pumps

  An exemption request for the NSRW Pumps was submitted on February 28, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves lack of detection and suppression for an outdoor installation with over 400' of separation.

- Fire Area 91 - NSEB Roof

  An exemption request for the NSEB Roof was submitted on April 4, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves lack of detection and suppression for redundant essential HVAC units.

- Fire Area 69 - Nuclear Service Yard Area

  An exemption request for the NSW Pumps was submitted on May 24, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves the lack of detection and suppression for an outdoor installation with approximately 55' of separation.

. Fire Area 74 - Auxiliary Building Roof

An exemption request for the Nuclear Service Cooling Water Surge Tank Level Switches was submitted on May 24, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves the lack of detection and suppression for an outdoor installation with approximately 40' of separation.

The following area of the plant does not meet the requirements of Section III.G.3 of Appendix R and an exemption request has been provided:

. Fire Area 74 - Auxiliary Building Roof

An exemption request for the Auxiliary Building Roof was submitted on May 24, 1985. This is a new exemption which resulted from the Appendix R Re-evaluation. It involves a lack of detection and suppression for redundant essential HVAC units.

The following area of the plant does not meet the requirements of Section III.G.3 of Appendix R, but an exemption request is not required:

. Fire Area 1 - Control/Computer Room

The staff's denial of a previously requested exemption (January 10, 1983) for this area stated that, "with the alternate shutdown capability installed, a suppression system is not required in the area."

. Fire Area RT1 - Control/Computer Room Corridor

Fire detection in the corridor has been installed and a suppression system already exists.

The District has embarked on an Appendix R Re-evaluation program. This program, to date, has resulted in the identification of 1) revisions to previously submitted exemptions, 2) additional exemption requests, 3) plant modifications, and 4) this revision to the Response to Generic Letter 81-12. Fire areas requiring plant modifications for compliance with Appendix R are provided with the necessary compensatory measures if the modifications are not complete at this time. The District has ensured Rancho Seco's compliance with Appendix R, III.G, either by analysis, modification, exemption request or by putting suitable compensatory measures into place until resolution of the concern is reached.

NRC REQUEST

For each of those fire areas of the plant requiring an alternative shutdown system(s) provide a complete set of responses to the following requests for each fire area:

DISTRICT RESPONSE

The responses provided are developed for Fire Area 1 - Control/Computer Room. For Fire Area RT1 - Control/Computer Room and Fire Area 74 - Auxiliary Building Roof, a fire will disable the redundant essential HVAC units and result in evacuation of the Control Room. Fire Area RT1 does not contain any other redundant equipment required for safe shutdown and the responses developed for Fire Area 1 are applicable. Fire Area 74 contains the redundant Nuclear Service Cooling Water Surge Tank Level Switches (see May 24, 1985 exemption request). For the fire in Fire Area 74 or Fire Area 1, the method for handling the Nuclear Service Cooling Water Surge Tank instrumentation is the same and the responses developed for Fire Area 1 are applicable.

a. List the system(s) or portions thereof used to provide the shutdown capability with the loss of offsite power.

DISTRICT RESPONSE

The systems used to reach cold shutdown with a loss of offsite power are the following:

1. PLS (Purification and Letdown System) and SIM (Seal Injection and Makeup System).

2. DHS (Decay Heat System) and CFS (Core Flood System).

3. RCS Reactor Coolant System).

4. FWS (Feedwater System - AFW and Main FW Pump Train).

5. NRW (Nuclear Raw Water System).

6. NSW (Nuclear Service Water System).

7. EGS (Emergency Generating System).

8. HVS (Heating Ventilation and Air Conditioning System).

9. SAS (Service Air System).

10. EDS (Electrical Distribution System).

11. Selected Instrumentation.

NRC REQUEST

b. For those systems identified in "1a" for which alternative or dedicated shutdown capability must be provided, list the equipment and components of the normal shutdown system in the fire area and identify the functions of the circuits of the normal shutdown system in the fire area (power to what equipment, control of what components and instrumentation). Describe the system(s) or portions thereof used to provide the alternative shutdown capability for the fire area and provide a table that lists the equipment and components of the altenative shutdown system for the fire area.

For each alternative system, identify the function of the new circuits being provided. Identify the location (fire zone) of the alternative shutdown equipment and/or circuits that bypass the fire area and verify that the alternative shutdown equipment and/or circuits are separated from the fire area in accordance with Section III.G.2.

DISTRICT RESPONSE

A fire in the Control Room is assumed to destroy the controls and instrument indications for equipment of both trains of the systems listed above in "1a". The alternative shutdown capability consists of an alternative method of controlling Train A components of the systems listed in "1a" and an alternative set of instrumentation to monitor the necessary plant parameters. Table II-1 lists all the components, circuitry and circuitry function for the Train A equipment of the systems listed above in"1a" and located in the Control Room and which require alternate shutdown capability. Information is provided on Train B valves when in series with a Train A valve on a required flow path.

The alternative shutdown capability does not require any new systems. Existing plant equipment is isolated from the Control Room, pumps are controlled from the switchgear, and controls are provided to throttle valves on the existing shutdown panel. The existing instrumentation on the shutdown panel is supplemented to monitor all parameters necessary to achieve and maintain natural circulation. Table II-2 shows the components added to the existing control circuits and instrument loops, and the new instrumentation added. New isolation switches are installed on the switchgear and MCC compartments. Switchgear loads already have local controls, but the controls for the MCC loads are installed on the existing shutdown panel located in the West Switchgear Room on the grade elevation, which is separated from the Control Room in accordance with Section III.G.2.

NRC REQUEST

e. Verify that the licensee procedures have been or will be developed which describe the tasks to be performed to effect the shutdown method. Provide a summary of these procedures outlining operator actions.

DISTRICT RESPONSE

The District has developed procedures for performing shutdown in the event of a fire in the Control Room. The procedures encompass shutdown with and without offsite power.

The procedures have been finalized and approved, and operator training has been conducted.

The methodology used in the procedures was patterned after the Abnormal Transient Operating Guidelines (ATOG) for a loss of offsite power. The objectives of the procedure were to prevent overcooling of the RCS, establish inventory control, and establish primary to secondary heat transfer. The major operator actions are:

1. De-energize the EMOV.

2. Gain control over the AFW and HPI valves controlled from the shutdown panel.

3. Establish AFW to "B" OTSG.

4. Initially isolate AFW to "A" OTSG. Then re-establish feed to "A" OTSG.

5. Re-establish plant air.

6. Assure main steam isolation.

7. Isolate and start the Diesel Generator as required.

Once these steps are performed, HPI and RC Pump Seal Injection will be established. This will assure control over the plant

The plant will be stabilized in a hot shutdown condition before being taken to cold shutdown. All system contraction will be made up from the BWST. With slight variations in the normal shutdown process, a one percent delta k/k shutdown margin will be maintained through the entire cooldown process.

The following is an outline of the Appendix R Hot and Cold Shutdown Procedures:

This procedure is in place for the first 130 Effective Full Power Days following startup from the 1985 Refueling Outage. Then a boric acid repair procedure is required.

On the decision to evacuate the Control Room, the operators will perform the following:

a. Trip the Reactor/Turbine (confirm all rods in), verify throttle and governor valves are closed.
b. Trip both Main Feedwater Pumps.
c. Evacuate the Control Room
d. Proceed to the 4160 West Switchgear Room area.

2. The shift supervisor will take action required to receive additional assistance, restrict damage due to the casualty, and classify the event.

3. The Senior Control Room Operator (SCRO) shall direct operator 1 to proceed to the 480 Volt West Switchgear Room to perform required tasks. The SCRO will proceed to the 4160 West Switchgear Room, will announce the fire, will direct the shutdown of the plant and act as the central point for communications with all operators.

4. The Control Room Operator (CRO) will proceed to the 4160 Volt West Switchgear Room. The CRO will isolate the 4160 volt equipment needed to operate the event and de-energize the remaining 4160 volt equipment.

5. Operator 1 will de-energize the EMOV, isolate the motor operated valves controlled from the Shutdown Panel, de-energize the 480 volt equipment, line up RCP seal injection and the alternate recirculation path.

6. Operator 2 will re-establish plant air, position the AFW valves, trip the AFW pump turbine and position the makeup system valves.

7. Operator 3 will isolate the emergency diesel and position the main steam valves.

8. These actions will result in the reactor being in hot shutdown and once stabilized at hot shutdown, the cooldown will begin.

9. Cooldown will be achieved by control of RCS temperature (by controlling Atmospheric Dump Valves) to maintain RCS temperature versus RCS pressure within the normal cooldown limits.

10 The Decay Heat Removal System will be initiated at a primary pressure below 255 psig, and RCS temperature below 290^{o}F.

11. When the primary system tempeature is below 200^{o}F, the plant will be in cold safe shutdown condition.

NRC REQUEST

f. Verify that the manpower required to perform the shutdown functions using the procedures of (e) as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications.

DISTRICT RESPONSE

The District's current commitment requires 9 operations personnel on shift for a reactor mode other than cold shutdown (R. J. Rodriguez letter to M. D. Schuster - NRC Region V, dated October 19, 1984). The Appendix R Hot Shutdown Procedure requires 5 operations personnel to perform the shutdown functions. The fire brigade requires 5 members. For a fire which requires evacuation of the Control Room, operations will respond with 3 personnel for the fire brigade. The additional fire brigade members, for the case of Control Room evacuation, will be provided by non-operations personnel. The Shift Supervisor will assume the position and responsibilities of Emergency Coordinator. For the limiting scenario of hot shutdown and control room evacuation, there is sufficient manpower available to perform all required functions.

NRC REQUEST

g. Provide a commitment to perform adequate acceptance test of the alternative shutdown capability. Modify existing surveillance procedures. These tests should verify that: equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position, and that equipment operates from the Control Room but cannot be operated at the local control station when the transfer isolation switch is in the "remote" position.

DISTRICT RESPONSE

The District's switch has two positions, one is "normal" and the other is "isolate Control Room". The "normal" position indicates that control is available from the Control Room and the local control station, not alternative shutdown panel. The "isolate Control Room" position allows control only from the local station and the alternative shutdown panel with the Control Room isolated. The overall safety of the plant would be jeopardized by isolating the Control Room for all local control operations that are required for other safety concerns independent of Appendix R. Adequate acceptance testing of the Control Room isolation switches and local controls providing alternate shutdown capability will be performed when the switches are initially installed. Testing will consist of verifying that with the isolation switch placed in the

"isolate" position, the equipment cannot be operated from the Control Room but can be operated from the local control station. With the switch in "normal" position, it will be verified that equipment operates from the Control Room. However, operation from the local station will be possible, but not from the alternative shutdown panel.

Existing surveillance procedures will be modified or new surveillance procedures will be written, as required, to include the new equipment.

NRC REQUEST

h. Provide Technical Specification of the surveillance requirements and limiting conditions for operation for that equipment not already covered by existing Technical Specifications. For example, if new isolation and control switches are added to a shutdown system, the existing Technical Specification surveillance requirements should be supplemented to verify system/equipment functions from the alternate shutdown station at testing intervals consistent with the guidelines of Regulatory Guide 1.22 and IEE 338. Credit may be taken for other existing tests using group overlap test concepts.

DISTRICT RESPONSE

The existing Technical Specifications adequately address the surveillance requirements and limiting conditions for operations for required equipment. The testing of isolation and control switches will be addressed in existing and/or new surveillance procedures. These surveillance procedures will be written and approved before the first testing interval following the declaration of the system operability.

NRC REQUEST

i. For new equipment comprising the alternative shutdown capability, verify that the systems available are adequate to perform the necessary shutdown function. The functions required should be based on previous analyses, if possible (e.g., in the FSAR), such as a loss of normal ac power or shutdown on Group 1 isolation (BWR). The equipment required for the alternative capability should be the same or equivalent to that relied on in the above analysis.

DISTRICT RESPONSE

The equipment required for the alternative shutdown capability is the same or equivalent to that relied upon in the original Safety Analysis. The alternative shutdown panel modifications include adding indication and control of existing systems and isolation only.

NRC REQUEST

j. Verify that repair procedures for cold shutdown systems are developed and material for repairs is maintained on site. Provide a summary of these procedures and a list of the material needed for repairs.

DISTRICT RESPONSE

The District has developed the necessary repair procedures for cold shutdown equipment. The following is a summary of each repair procedure:

. Temporary Atmospheric Dump Valve (ADV) Nitrogen System

The atmospheric dump valves (ADV's) are used to control the cooldown process from hot shutdown to cold shutdown following a fire in the Control Room. If the plant air system is lost, temporary air supply to manually operate the ADV's must be provided. A procedure has been written for the hookup of a temporary nitrogen bank to the plant air system to operate the ADV's.

. Decay Heat System Return Temperature Monitoring During Loss of Non-Nuclear Instrumentation

A fire in the Control Room could destroy the Non-Nuclear Instrumentation (NNI) cabinets, causing a loss of all remote Decay Heat System (DHS) indications. A procedure has been written to provide DHS return temperature indication at RTD TE-26043, DHS cooler "A" outlet, using a volt-ohmeter and a calibration curve.

. Portable Source Range Neutron Flux Indicator

A fire in the Control Room could destroy the nuclear instrumentation cabinets which supply the source range neutron count rate to indication located at the emergency shutdown panel. A portable source range neutron flux indicator is provided for temporary connection to one of the installed source range detector cable at the penetration into the reactor building. The portable indicator includes a high voltage power supply module, a count rate amplifier module, a source range test module and a low voltage power supply. A procedure has been written for proper connection, operation and disconnection of the portable source range neutron flux indicator.

- Loss of Switchgear Ventilation

  A loss of offsite power or an impairment of the existing HVAC system may cause an unacceptable heat build-up in safe shutdown switchgear. A procedure has been written to provide a method of ventilating the switchgear rooms by dissipating the heat generated by the switchgear via portable fans and flexible ducting.

- Sound-Powered Phone Repair

  A fire in the Control Room could damage the sound-powered phone system. A procedure has been written to perform a circuit isolation of damaged phone lines and return the sound-powered phone system to operation.

- Emergency Repair of Atmospheric Dump Valve (ADV) Air Hoses After a Fire

  A fire at the ADVs could destroy the air hoses connected to the ADV positioner. A procedure has been written to replace the damaged hoses and return the ADVs to operation.

These procedures, except for boric acid repair procedure which will be finalized and approved before reaching 130 Effective Full Power Days following the start-up from the 1985 refueling outage, have been finalized and approved, and information has been given to appropriate personnel.

A separate Inventory Control system has been developed which includes a list of all material required for making necessary repairs and methods to ensure the material will be maintained on site. The Inventory Control system has been finalized and approved.

TABLE II-1

LIST OF EQUIPMENT AND INSTRUMENTATION

REQUIRING ALTERNATIVE SHUTDOWN CAPABILITY

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
PLS & SIM (PURIFICATION AND LETDOWN SYSTEM, SEAL INJECTION AND MAKEUP SYSTEM)				
P-238A (3) HPI Pump "A"	SK-E-203 Sh. 4 SK-M-521	Ammeter	1P1A04A	Ammeter circuit
		Ammeter	1P1A04B	Ammeter circuit
		BLPB1-Start BLPB3-Stop	1P1A04D	PB control & light indication circuit
		BLPB2-Start BLPB4-Stop	1P1A04H	PB control & light indication circuit
			1P1A04J	SF actuation circuit
P-238A LOP (7) HPI PUmp "A" Lube Oil Pump	SK-E-203 Sh. 37 SK-M-526	BLPB1-Start BLPB2-Stop	1M1A102F	PB control & light indication circuit
SFV-23811 (2) Loop A Injection Valve	SK-E-203 Sh. 50G SK-M-521	BLPB1-Close BLPB2-Open	1D1C08C	PB Control & light indication circuit
			1D1C08D	SF actuation circuit
			1D1C08E	SF actuation circuit
			1D1C08F	SF actuation circuit
SFV-23809 (1) Loop A Injection Valve	E-203 Sh. 50E SK-M-521	BLPB1-Close BLPB2-Open	1D1C05C	PB control & light Indication circuit
			1D1C05D	SF actuation circuit
			1D1C05E	SF actuation circuit
			1D1C05F	SF actuation circuit
SFV-23812 (1) Loop B Injection Valve	E-203 Sh. 50H SK-M-521	BLPB1-Close BLPB2-Open	1D1D05C	PB control & light indication circuit
			1D1D05D	SF actuation circuit
			1D1D05E	SF actuation circuit
			1D1D05F	SF actuation circuit
SFV-23810 (1) Loop B Injection Valve	E-203 Sh. 50F SK-M-521	BLPB1-Close BLPB2-Open	1D1D03C	PB control & light indication circuit
			1D1D05D	SF actuation circuit
			1D1D05E	SF actuation circuit
			1D1D05F	SF actuation circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
P-236 (3) Make-Up Pump	SK-E-203 Sh. 2 SK-M-521	Ammeter	1P1A02C	Ammeter circuit
		BLPB1-Start BLPB2-Stop	1P1A02E	PB control & light indication circuit
			1P1A02H	SF actuation circuit
SFV-22023 (5) Letdown Isolation Valve	E-203 Sh. 48 SK-M-521	BLPB1-Open BLPB2-Close	1M1A133A	PB control and indication circuit
			1M1A136B	SF actuation circuit
(SFV-22009) (1) Letdown Isolation Valve	E-203 Sh. 62 SK-M-521	BLPB1-Open BLPB2-Close	1R1C220DB	PB control and indication circuit
			1R1C220DD	SF actuation circuit
			1R1C220DF	Valve indication ckt
			1R1C220DE	Valve control circuit
			101B01A	Valve power circuit
			1R1C220DK	Auto close circuit
		BLPB1-Open BLPB2-Close	1R1C220DM	PB control and indication circuit on HIRC panel
SFV-24004 (5) RCP Seal Return Valve	E-203 Sh. 69 SK-M-521	BLPB3-Open BLPB4-Close	1M1A136B	PB control and indication circuit
			1M1A136C	SF actuation circuit
(SFV-24013) (1) RCP Seal Return Valve	E-203 Sh. 63 SK-M-521	BLPB1-Close BLPB2-Open	1R1C240A	PB control and indication circuit
			1R1C240B	SF actuation circuit
			1R1C240C	Valve control circuit
			1R1C240D	Light indication ckt
			1R1C240G	Valve auto close ckt
			1R1C240H	Valve auto close ckt
			1R1C240I	Valve auto close blocking circuit
SFV-23604 (1) RC System MU Isolation MOV	E-203 Sh. 49 SK-M-521	BLPB1-Close BLPB2-Open	1D1C03C	PB control and light indication ckt
			1D1C03D	SF actuation circuit
			1D1C03E	SF actuation circuit
			1D1C03F	SF actuation circuit
HV-23004 (1) Letdown to MU or Flash Tank Valve	E-203 Sh. 61 SK-M-521	BLPB1-Bleed BLPB2-Normal	1M2D430A	PB control and indication circuit
			1M2D430C	Valve actuation signal circuit
SFV-23508 (2) Make-Up Tank Isolation Valve	SK-E-203 Sh. 97 SK-M-521	PB-Open PB-Close	1M1A172A	PB control & light indication circuit
			1M1A172D	SF actuation circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
SFV-23645 (1) HPI/MU Pump Recirc. Valve	E-203 Sh. 52B SK-M-521	BLPB1-Open BLPB2-Close	1M1A121A 1M1A121D	PB control & light indication circuit SF actuation circuit
(SFV-23646) (1) HPI/MU Pump Recirc. Valve	E-203 Sh. 52B SK-M-521	BLPB1-Open BLPB2-Close	1M1B141A 1M1B141B	PB control & light indication circuit SF actuation circuit
SFV-25003 (2) HPI/DH Pump "A" Suction from BWST	SK-3-203 Sh. 68 SK-M-522	BLPB1-Open BLPB2-Close BLPB3,4,5,6	1M1A137A 1M1A137D 1M1A137E	PB control & light indication circuit Light indication circuit SF actuation circuit
PV-23606 (1) Seal Injection Flow Control Valve	SK-M-521		1R2C236X1	Valve solenoid actuation circuit
SFV-23616 (1) Seal to RC Pump	E-203 Sh. 54 SK-M-521	BLPB1-Open BLPB2-Close	1M1B143A 1M1B143G 1M1B143H	PB control & light indication circuit Valve auto actuation signal circuit RC pump under power signal circuit
DHS (DECAY HEAT SYSTEM)				
P-261A (3) Decay-Heat Pump	SK-E-203 Sh. 3 SK-M-522	Ammeter	1P1A05A 1P1A05B 1P1A05C	Ammeter circuit PB control & light indication circuit SF actuation circuit
SFV-26039 (1) DH Cooler E-260 Outlet Valve	E-203 Sh. 81 SK-M-522 BLPB1-Open	BLPB2-Open BLPB1-Close 1M1A106E BLPB2-Close	1M1A106B 1M1A106C	PB control & light indication circuit PB control & light indication circuit SF actuation circuit
HV-26037 (1) DH Cooler E-260A Bypass Valve	E-203 Sh. 80 SK-M-522	BLPB1-Open BLPB2-Close	1M1A107A	PB control & light indication circuit
SFV-26005 (4) LP Injection to Loop "A" Valve	E-203 Sh. 50A SK-M-522	BLPB1-Close BLPB2-Open	1M1A138A 1M1A138B	PB control & light indication circuit SF actuation circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
HV-20001 (1,4) RCS to DH System Valve	E-203 Sh. 60D SK-M-522	BLPB1-Open BLPB2-Close	1M1A171A	PB control & light indication circuit
			1M1A171F	High RC pressure ann. circuit
(HV-20002) (1,4) RCS to DH System Valve	E-203 Sh. 60E SK-M-522	BLPB1-Open BLPB2-Close	1M1B107A	PB control & light indication circuit
			1M1B107F	High RC pressure ann circuit
HV-20005 (1) DH Pump Suction From RCS Valve	E-203 Sh. 118 SK-M-522	BLPB1-Open BLPB2-Close	1M1A134D	PB control & light indication circuit
HV-26513 (1,4) Core Flood Tank Isolation Valve	E-203 Sh. 50F SK-M-522	BLPB1-Open BLPB2-Close	1M2D228A	PB control circuit
		Valve Test PB	1M2D228D	Valve status test circuit
		BLPB1 BLPB2	1M2D228E	Light indication circuit
HV-26514 (1,4) Core Flood Tank Isolation Valve	E-203 Sh. 50F SK-M-522	BLPB1-Open BLPB2-Close	1M2D229A	PB control circuit
		Valve Test PB	1M2D229D	Valve stat. test circuit
		BLPB1 BLPB2	1M2D229E	Light indication circuit
HV-26007 (1) DHR to HP Injec- tion Pump MOV	E-203 Sh. 53B SK-M-522	BLPB1-Open BLPB2-Close	1M1A139A	PB control and light indication circuit
HV-26046 (1) DH Cross Tie Valve "A"	E-203 Sh. 53A SK-M-522	BLPB1-Open BLPB2-Close	1M1A164A	PB control and light indication circuit
(HV-26047) (1) DH Cross Tie Valve "B"	E-203 Sh. 53A SK-M-522	BLPB1-Open BLPB2-Close	1M1B165A	PB control and light indication circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
RCS (REACTOR COOLANT SYSTEM)				
PSV-21511 (1) Pressurizer Relief Valve	E-203 Sh. 65 SK-M-520 Sh. 1	Switch 86/DSS	1R2C215VE 1R2C215VF 1R2C215VB	Valve open/close and indication circuit Valve low setpoint circuit Valve auto control circuit
(HV-21505) Pressure Relief Block Valve	E-203 Sh. 58D SK-M-520 Sh. 1	BLPB1-Open BLPB2-Close	1M1B182A	PB control and light indication circuit
SFV-70001 (5) Pressurizer Liquid Sample Injection Valve	E-203 Sh. 48C SK-M-520 Sh. 1	BLPB1-Open BLPB2-Close	1M1A157A 1M1A157B	PB control and indication circuit SF actuation circuit
(SFV-70002) (5) Pressurizer Liquid Sample Isolation Valve	E-203 Sh. 84F SK-M-520 Sh. 1	BLPB1-Open BLPB2-Close	1R1C700A 1R1C700B 1R1C700C 1R1C700D	PB control and indication circuit SF actuation circuit Valve solenoid energizing circuit Valve indication ckt This valve is also in series with valve SFV-70001 & circuits having interface with Control Room already listed above
SFV-70003 (5)	E-203 Sh. 48C SK-M-520 Sh. 1	BLPB1-Open BLPB2-Close	1M1A158A 1M1A158B	PB control and indication circuit SF actuation circuit
(SFV-70002) (5) Pressurizer Liquid Sample Isolation Valve				This valve is also in series with valve SFV-70001 & circuits having interface with Control Room already listed above

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
FWS (FEEDWATER SYSTEM--AFW PUMP TRAIN)				
P-319 (3) Aux Fdwtr Pump (Motor-Driven)	SK-E-205 Sh. 1 SK-M-532	Ammeter	1P1A06A 1P1A06D	Ammeter circuit Pump start signal circuit
		BLPB2-Start BLPB3-Stop	1P1A06J	PB control & light indication circuit
		BLPB1-Auto	1P1A06K	Pump auto start PB control & light indication circuit
		BLPB1-Start BLPB2-Stop	1PA106R	PB control & indication circuit
			1P1A06S	SF actuation circuit
SFV-20578 (2) AFW Control Valve By-pass	SK-E-203 Sh. 50C SK-M-532	BLPB1-Close BLPB2-Open	1M1A122B	PB control & light indication circuit
			1M1A122C	SF actuation circuit
SFV-20577 (1) AFW Control Valve By-pass	SK-E-203 Sh. 50C SK-M-532	BLPB1-Close	1M1B160F	PB control and light indication circuit
		BLPB2-Open	1M1B160G	SF actuation circuit
HV-31827 (2) AFW Cross Tie Isolation MOV	SK-E-205 Sh. 20F SK-M-532	BLPB1-Open BLPB2-Close	1M1A108A	PB control & light indication circuit
(HV-31826) (1) AFW Cross Tie Isolation MOV	SK-E-205 Sh. 20F SK-M-532	BLPB1-Open BLPB2-Close	1M1B159A	PB control & light indication circuit
FV-20528 (1) AFW Control Valve	E-205 Sh. 29 SK-M-532	BLPB1-Auto BLPB2-Open	1I1F205AB	PB control and light indication circuit
			1O1A01A	Control cabinet H4SDA5 power circuit
FV-20527 (1) AFW Control Valve	E-205 Sh. 29A SK-M-532	BLPT1-Auto BLPB2-Open	1I1F205BB	Valve actuation and indication circuit
			1I1F205BF	PB control and light indication circuit
PV-20571A (2,1) PV-20571B (2,1) PV-20571C (2,1) Atmospheric Steam Dump SGE-205A	E-342 Sh. 12 & 4 SK-M-530		1I2U0165B	Modulated signal from ICS cabinet H4IC to signal cnvtr PY-20571
			1I2U1016C	Valve control circuit ICS cabinet H4IC

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
PV-20562A (2,1) PV-20562B (2,1) PV-20562C (2,1) Atmospheric Stm Dump SG E-205B	E-342 Sh. 12 & 14 SK-M-530		1I2U1061C	Valve control circuit to ICS cabinet H4IC
			1I2U0165A	Modulated signal from ICS cabinet H4IC to signal cnvtr PY-20562
PV-20561 (2,1) PV-20563 (2,1) Condenser Dump Valves SGE-205A	E-342 Sh. 12 & 14 SK-M-530		1I2U1062B	Modulated signal from ICS cabinet H4IC to signal converter PY-20561/PY-20563
			1I2U1061C	Valve control circuit to ICS cabinet H4IC
PV-20564 (2,1) PV-20566 (2,1) Condenser Dump Valves SGE-205B	E-342 Sh. 12 & 14 SK-M-530		1I2U1061C	Valve control circuit to ICS cabinet H4IC
			1I2U1062D	Modulated signal from ICS cabinet H4IC to signal converter PY-20564/PY20566
TV1 (1) Turbine Throttle Valve-1	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
		PB-T1	1T2T10C	Throttle valve-1 actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure
			102E30A	Valve power supply circuit
TV2 (1) Turbine Throttle Valve-2	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
	E-201 Sh. 19	PB-T2	1T2T10D	Throttle valve-2 actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure.

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
TV-3 (1) Turbine Throttle Valve-3	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
		PB-T3	1T2T10C	Throttle valve-3 actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure
TV-4 (1) Turbine Throttle Valve-4	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
	E-201 Sh. 19	PB-T4	1T2T10D	Throttle valve-4 actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure
GV1 (1) Turbine Governor Valve-1	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure ckt
		PB-G1	1T2T10C	Governor valve-1 actuation circuit
GV2 (1) Turbine Governor Valve-2	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure ckt
	E-201 Sh. 19	PB-G2	1T2T10D	Governor valve-2 actuation circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
GV3 (1) Turbine Governor Valve-3	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure ckt
		PB-G3	1T2T10C	Governor valve-3 actuation circuit
GV4 (1) Turbine Governor Valve-4	E-201 Sh. 18	PB-Trip seal-in reset	1T2T10A	Turbine trip seal-in on reactor trip ckt
			1T2T10B	Turbine trip on reactor trip valve actuation circuit
			1T2T10J	Turbine trip on low E-H oil pressure ckt
		PB-G4	1T2T10D	Governor valve-4 actuation circuit
HV-20560 (1) Main steam to FP Turbine Header	E-205 Sh. 20A SK-M-530	BLPB1-Open BLPB2-Close	1M1A160A	Valve open/close and indication circuit
HV-20565 (1, 16) Main steam to FP Turbine Header MOV	E-205 Sh. 20A SK-M-530	BLPB1-Open BLPB2-Close	1M1B136A	Valve open/close and indication circuit
HV-20569 (1) Steam to Aux FP Turbine Header MOV	E-205 Sh. 20C SK-M-530	BLPB1-Open BLPB2-Close	1M1A161A	Valve open/close and indication circuit
HV-20596 (1, 16) Steam to Aux FP Turbine MOV	E-205 Sh. 20C SK-M-530	BLPB1-Open BLPB2-Close	1M1B137A	Valve open/close and indication circuit
HV-20597 (1) Main steam to Re-heater MOV	E-205 Sh. 20E SK-M-530	BLPB1-Open BLPB2-Close	1M1A162A	Valve open/close and indication circuit
HV-20598 (1, 16) Main steam to Re-heater MOV	E-205 Sh. 20E SK-M-530	BLPB1-Open BLPB2-Close	1M1B138A	Valve open/close and indication circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
HV-32243 (1, 16) Pegging Steam to 2nd & 4th Htrs.	E-205 Sh. 30 SK-M-530	BLPB1-Open BLPB2-Close	1M1B154A	Valve open/close and indication circuit
HV-20611 (1, 16) Steam Gen "A" and "B" Blowdown Isolation Valve	E-205 Sh. 30 SK-M-532	BLPB1-Open BLPB2-Close	1M1B173A	Valve open/close and indication circuit
NRW (NUCLEAR WATER SYSTEM)				
P-472A (3) NS Raw Water Pump "A"	SK-E-203 Sh. 42 SK-M-544	Ammeter	1P1A07A	Ammeter circuit
		BLPB1-Start BLPB2-Stop	1P1A07B	PB control & light indication circuit
			1P1A07C	SF actuation circuit
NSW (NUCLEAR SERVICE WATER SYSTEM)				
P-482A (6) NS Cooling Water Pump "A"	E-203 Sh. 43 SK-M-544	BLPB1-Start BLPB2-Stop	1N1A18A	PB control & light indication circuit
			1N1A18C	SF actuation circuit
SFV-26017 (1) NS Cooling Water to DH Cooler 260A	E-203 Sh. 50 SK-M-544	BLPB2-Open BLPB1-Close	1M1A140A	PB control & light indication circuit
			1M1A140C	SF actuation circuit
SFV-26019 (1) NS Cooling Water to DH Cooler 260A Outlet Valve	E-203 Sh. 50B SK-M-544	BLPB2-Open BLPB1-Close	1M1A141A	PB control & light indication circuit
			1M1A141C	SF actuation circuit
SFV-50005 (1) Cooling Water to R. B. Emergency Clng. Unit A-500A	E-203 Sh. 50J SK-M-544	BLPB1-Close BLPB2-Open	1M1A147A	PB control & light indication circuit
			1M1A147B	SF actuation circuit
SFV-50009 (1) C. W. to RB Emerg Clng. Unit A-500A	E-203 Sh. 50K SK-M-544	BLPB1-Close BLPB2-Open	1M1A149A	PB control & light indication circuit
			1M1A149B	SF actuation circuit
SFV-50007 (1) Cleaning Water to R.B. Emerg. Clng. Unit A-500C	E-203 Sh. 50J SK-M-544	BLPB1-Close BLPB2-Open	1M1A148A	PB control & light indication circuit
			1M1A148B	SF actuation circuit

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
SFV-50011 (1) Cleaning Water to R.B. Emerg. Clng. Unit A-500C	E-203 Sh. 50K SK-M-544	BLPB1-Close BLPB2-Open	1M1A150A 1M1A150B	PB control & light indication circuit SF actuation circuit
EGS (EMERGENCY GENERATING SYSTEM)				
H2DGA Diesel Generator Control Panel	SK-E-87 Sh. 1 SK-E-87 Sh. 4 SK-M-552	BLPB1-Stop BLPB2-Start BLPB5-Raise BLPB6-Lower BLPB4-Lower BLPB3-Raise BLPB2-Start BLPB1-Stop	1G1Q886AC 1G1Q886AA 1G1Q886CK 1G1Q886CR 1G1Q886AW 1G1Q886AU 1G1Q886AV 1G1Q886AX	Shutdown circuit PB start control circuit PB control circuit for volt adjustment PB governor control circuit Manual start stop of engine circuit Shutdown circuit Manual initiating contact from CR to start diesel engine SF initiation circuit to start diesel engine
H2DEA Diesel Engine Control Panel	SK-E-87 Sh. 1 E-208 Sh. 20 SK-M-552	G & W lights	1G1Q886AO 1P1A00F	Diesel running status circuit CO2 discharge in D/G room control circuit
P-888A (12) Diesel Fuel Oil Transfer Pump	SK-E-204 Sh. 11A SK-M-552		1M1A113C	CO2 Trip Block Contact for P-888A in H4SDA5 cabinet
P-888B Diesel Fuel Oil Transfer Pump	E-204 Sh. 11B SK-M-582		1M1A114D	CO2 Trip Block Contact for P-888B in H4SDA5 Cabinet
HVS (HEATING VENTILATING AND AIR CONDITIONING SYSTEM)				
A-544A (6) D/G Room Exhaust Fan	E-204 Sh. 8 SK-M-552		1N1A13G	SF initiated trip block contact in H4SDA5 Cab.

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
A-544B (6) D/G Room Supply Fan	E-204 Sh. 8A SK-M-552		1N1A17G	SF initiated trip block contact in H4SDA5 Cab.
A-500A (6) RB Emerg. Clr	E-203 Sh. 6 SK-M-544	BLPB1-Start BLPB2-Stop	1N1A10A 1N1A10C	PB control & light induction circuit SF actuation circuit
A-500C (6) RB Emerg. Clr	E-203 Sh. 6 SK-M-544	BLPB1-Start BLPB2-Stop	1N1A14A 1N1A14C	PB control & light induction circuit SF actuation circuit
EDS (ELECTRICAL DISTRIBUTION SYS)				
S4A08 (3) 4160 NS Bus D/G Supply Brkr	SK-E-204 Sh. 1	WH, TD/W PS, TD/VAR V WH, TD/W TD/VAR WM VAR A BLPB1-Close BLPB2-Trip	1P1A08B 1P1A08V 1P1A08C 1P1A08T 1P1A08U 1P1A08Q 1P1A08R 1P1A08S 1P1A08W	PT metering circuit Voltmeter circuit Metering circuit Metering circuit Metering circuit SFA breaker trip blocking circuit Breaker trip blocking contact circuit from H4SDA5 Ammeter circuit PB control & indication circuit
S4A09 (3) STN Service XFMR 4160V Supply Breaker	SK-E-208 Sh. 10	 Ammeter BLPB1-Close BLPB2-Trip	1P1A09F 1P1A09G 1P1A90H	Breaker trip blocking contact in SF Cabinet H4SDA5 Ammeter circuit PB control & indication circuit
S3A05 (6) 480V Bus S3A Supply Breaker	SK-E-208 Sh. 13A		1N1A05C 1N1A05D	Breaker trip blocking contact in SF Cabinet H4SDA5 SF actuation signal contact in SF Cabinet H4SDA5 for closing breaker on SF actuation

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
		BLPB1-Close BLPB2-Trip Voltmeter	1N1A05E 1N1A05F	PB control & light indication circuit Voltmeter PT circuit
SELECTED INSTRUMENTATION PER SK-J-500				
OTSG "A" Level Wide Range (15)				
LT-20501	SK-ICR-1	Indicator	1R2Y205KB	See SK-ICR-1
LT-20501A (13)	SK-ISD-1	Indicator	1Y3X205A2	See SK-ISD-1
OTSG "B" Level Wide Range (15)				
LT-20502	SK-ICR-2	Indicator	1R2Y205KA	See SK-ICR-2
LT-20502A (13)	SK-ISD-2	Indicator	1Y3X205B2	See SK-ISD-2
Pressurizer Level (15)				
LT-21503A	SK-ICR-5	Recorder	1R2C215D3	See SK-ICR-5
LT-21503B (13)	SK-ISD-3	Recorder	1R2C215F2	See SK-ISD-3
LT-21503C	SK-ICR-6	Record/Indicator	1R2C215C3	See SK-ICR-6
LT-21503D (13)	SK-ISD-4	Indicator	1Y3X215A2	See SK-ISD-4
Make-Up Tank Level (15)				
LT-23502A	SK-ICR-7	Recorder	1R2C235L3	See SK-ICR-7
LT-23502B	SK-ICR-7	Recorder	1R2C235L2	See SK-ICR-7
LT-23502C (13)	SK-ISD-5	Indicator	1Y3X235A2	See SK-ISD-5
OTSG "A" Pressure Wide Range (15)				
PT-20519A	SK-ICR-8	Indicator	1R2Y205PM	See SK-ICR-8
PT-20519B	SK-ICR-8	Indicator	1R2Y205PE	See SK-ICR-8
PT-20543A	SK-ICR-11	Recorder	1R2Y205PF	See SK-ICR-11
PT-20543C (13)	SK-ISD-6	Indicator	1Y3X205C2	See SK-ISD-6

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
OTSG "B" Pressure Wide Range (15)				
PT-20520A	SK-ICR-9	Indicator	1R2Y205PD	See SK-ICR-9
PT-20520B	SK-ICR-9	Indicator	1R2Y205PL	See SK-ICR-9
PT-20543B	SK-ICR-11	Recorder	1R2Y205PC	See SK-ICR-11
PT-20543D (13)	SK-ISD-7	Indicator	1Y3X205D2	See SK-ISD-7
RCS Pressure Wide Range (9,15)				
PT-21042	SK-ICR-12	Indicator	1R1S04B1C	See SK-ICR-12
PT-21043	SK-ICR-12	Indicator	1R1S04C1A	See SK-ICR-12
PT-21092	SK-ICR-13	Recorder	1R1S04A1C	See SK-ICR-13
PT-21099	SK-ICR-13	Indicator	1R1S04B6A	See SK-ISD-13
RCS Temperature Cold Leg "A" (15)				
TE-21023A	SK-ICR-14	Indicator	1R2C210A3	See SK-ICR-14
TE-21023B	SK-ICR-14	Indicator	1R2C210M1	See SK-ICR-14
TE-21025C (13)	SK-ISD-11	Indicator	1Y3X210A2	See SK-ISD-11
RCS Temperature Cold Leg "B" (15)				
TE-21024A	SK-ICR-15	Indicator	1R2C210B3	See SK-ICR-15
TE-21024B	SK-ICR-15	Indicator	1R2C210K1	See SK-ICR-15
TE-21024C (13)	SK-ISD-10	Indicator	1Y3X210B2	See SK-ISD-10
RCS Temperature Hot Leg "A" (10, 15)				
TE-21029	SK-ICR-16	Indicator	1R1PDT1C	See SK-ICR-16
TE-21033	SK-ICR-16	Indicator	1R1PCT1C	See SK-ICR-16
RCS Temperature Hot Leg "B" (11, 15)				
TE-21030	SK-ICR-16	Indicator	1R2PBT1C	See SK-ICR-16
TE-21034	SK-ICR-16	Indicator	1R1PAT1C	See SK-ICR-16

TABLE II-1

System/Equipment	Schematic/P&IDs or LOOP Diagram	Component In Control Room	Circuit In Control Room	Function of Circuit
Source Range Indication (15)				
XE-00005 (8)	SK-ICR-10	Indicator	1R2IR1HA 1R2IR1LA 1R2IR1SA	See SK-ICR-10
XE-00006	SK-ICR-10	Indicator	1R2IR2HA 1R2IR2LA 1R2IR2SA	See SK-ICR-10

TABLE II-1

NOTES FOR TABLE II-1

(1) Manual operator action required.

(2) Alternate control available at the emergency shutdown panel H2SD in 4160V West Switchgear Room.

(3) Alternate controls available at the Switchgear S4A in 4160V West Switchgear Room.

(4) Breaker is racked out during normal operations.

(5) System is isolated using other valves.

(6) Alternate controls available at Switchgear S3A in 480V West Switchgear Room.

(7) Alternate control is available at MCC S2A1 in 480V West Switchgear Room.

(8) Portable source range indication monitor is provided.

(9) RCS wide range pressure (PT-21050 and PT-21051) indication is available at emergency shutdown panel H2SD.

(10) RCS hot leg "A" temperature (TE-21031C) indication is available at Emergency Shutdown Panel H2SD.

(11) RCS hot leg "B" temperature (TE-21032C) indication is available at Emergency Shutdown Panel H2SD.

(12) Alternate controls available at D/G control panel H2DGA in D/G "A" Room.

(13) Alternate indication available at Emergency Shutdown Panel H2SD.

(14) This table lists channel "A" equipment only except where channel "B" equipment is also required to be operated.

(15) Only one indication for the listed function is required.

(16) Equipment is of channel "B" and required for main steam line isolation.

TABLE II-2

NEW COMPONENTS TO BE ADDED TO PROVIDE ALTERNATE SHUTDOWN CAPABILITY

EQUIPMENT AFFECTED	COMPONENTS TO BE ADDED
HPI Pump P-238A	Isolation switch
Make-Up Pump P-236	Isolation switch
HPI PUmp A Lube Oil Pump P-238A LOP	Isolation switch (already exists)
HPI Loop A Injection Valve SFV-23811	Isolation switch Control switch Indicating lights
Make-Up Tank Isolation Valve SFV-23508	Isolation switch Control switch Indicating lights
HPI/DH Pump A Suction from BWST SFV-25003	Isolation switch Control switch Indicating lights
Nuclear Service Raw Water Pump P-472A	Isolation switch
Aux. Feedwater Pump P-319	Isolation switch
Aux. Feedwater Cross Tie Isolation MOV HV-31827	Isolation switch Control switch Indicating lights
Aux. Feedwater Bypass Valve SFV-20578	Isolation switch Control switch Indicating lights
Diesel Generator GEA Controls	Isolation switch
D/G GEA Breaker S4A08	Isolation switch (already exists)
Station Service XFMR Breaker S4A09	Isolation switch
480 V Switchgear S3A Bus Supply Breaker S3A05	Isolation switch
Decay Heat Removal Pump P-261A	Isolation switch
Diesel Generator Fuel Oil Transfer Pump P-888A	Isolation switch
RCP Seal Water Control Valve PV-23606	Hand wheel for local control

TABLE II-2

EQUIPMENT AFFECTED	COMPONENTS TO BE ADDED
Steam Generator Wide Range Level	
LT-20501A	Signal isolator
LT-20502A	Signal isolator
Steam Generator Wide Range Pressure	
PT-20543C	Signal isolator
PT-20543D	Signal isolator
RCS Cold Leg Wide Range Temperature	
TE-21025C	Signal isolator
TE-21024C	Signal isolator
Pressurizer Level	
LT-21503D	Signal isolator
LT-21503B	New loop
Make-Up Tank Level LT-23502C	Signal isolator
RCS Hot Leg Wide Range Temperature	Relocate TT and TY from NNI Cabinet
TE-21031C	to West Switchgear Room
TE-21032C	Signal isolator
RCS Wide Range Pressure	
PT-21051	New Loop
PT-21050	New Loop
Source Range Neutron Flux XE-00005	Portable Indicator on Penetration H7RP 67
FI-23606A	Local indicator for total RCP seal flow

SECTION III

RESPONSE

TO

SAFE SHUTDOWN CAPABILITY - ASSOCIATED CIRCUITS

ATTACHMENT 2

TO CLARIFICATION TO GENERIC LETTER 81-12

The District has used the fire area approach in addressing associated circuits. Our response for the Control Room alternative shutdown method is listed below:

NRC Request

1a. Provide a table that lists all the power cables in the fire area that connect to the same power supply of the alternative or dedicated shutdown method, and the function of each power cable listed (i.e. power for RHR pump).

DISTRICT RESPONSE

Table III-1 provides the information requested.

NRC REQUEST

1b. Provide a table that lists all the cables in the fire area that were considered for possible spurious operation which would adversely affect shutdown and the function of each cable listed.

DISTRICT RESPONSE

Table III-2 provides the information requested.

NRC REQUEST

1c. Provide a table that lists all the cables in the fire area that share a common enclosure with circuits of the alternative or dedicated shutdown systems and the function of each cable listed.

DISTRICT RESPONSE

The guidance provided in Attachment 2 to the clarification letter for Generic Letter 81-12 indicates that common enclosure associated circuits of concern are those that have "a common enclosure with the shutdown cables (redundant and alternative) and:

1. Are not electrically isolated by acceptable isolation devices and

2. Will allow propagation of the fire into the common enclosure".

The District has analyzed all circuits in the plant to determine if it is possible to have a common enclosure associated circuit of concern. The results of the analysis indicate that after making modifications to the routing of only two circuits in the plant, there will not be any common enclosure circuits that satisfy the definition quoted above. The methodology used divided all the circuits in the plant into different categories and then verified that either:

1. They are adequately protected by exiting circuit breakers or fuses as determined by analysis, or

2. if they are not adequately protected, that the cables run in dedicated conduits to limit propagation of fire, or

3. the circuits do not have sufficient energy to start a fire.

NRC REQUEST

1d. Show that fire-induced failures (hot shorts, open circuits or shorts to ground) of each of the cables listed in a, b, and c will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

DISTRICT RESPONSE

A. The District has verified that all common power supply source case of associated circuits have:

   1. Interrupting time overcurrent trip characteristics that cause the interrupting device to interrupt the fault current prior to initiation of a trip of any upsteam device which will cause a loss of the common power source.

   2. Power source that has the necessary fault current for sufficient time to ensure the proper coordination without loss of function of the shutdown loads.

B. For circuits of equipment whose spurious operation would affect the capability to safely shutdown, the District will electrically isolate this equipment by opening their power supply breakers and manually aligning the valves in the required position once the Control Room is evacuated. Sufficient instrumentation exists at the shutdown panel to detect spurious operation.

C. The District has identified two common enclosure associated circuits of concern that can propagate the fire outside of the fire area or do not have electrical protection. After routing these circuits separately in rigid steel conduits, there will not be any common enclosure circuits of concern.

The above work has been done in the 1985 outage.

NRC REQUEST

1e. For cable listed in a, b, and c where new electrical isolation has been provided or modification to existing electrical isolation has been made, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

DISTRICT RESPONSE

The circuits identified in Table III-1 have been analyzed and are found to be protected with properly coordinated breakers. No new electrical isolation devices or mdofiications to existing isolation devices are required.

The isolation of the cables identified in "1b" (Table III-2) will be accomplished by opening existing supply breakers or disconnect switches located outside the Control Room. This method will completely de-energize the control circuit preventing further spurious operation. To accomplish this, no new electrical isolation devices or modifications to existing electrical isolation equipment are required.

The District has identified two cables in "1c" that were re-routed in separated rigid steel conduits in the 1985 outage.

TABLE III-1

POWER CIRCUITS IN THE CONTROL ROOM THAT HAVE THE SAME POWER SOURCE

AS ALTERNATIVE SHUTDOWN EUQIPMENT

POWER CIRCUIT	EQUIPMENT SUPPLIED	POWER SOURCE
111A02A	Safety Features Cab. H2SFA	120VAC Panel S1A
111A09A	SF Analog Cab. H4SAA1	120VAC Panel S1A
111A10A	RPS Cab. H4PR1A	120VAC Panel S1A
111A11B	SF Digital Cab. H4SDA	120VAC Panel S1A
111A12A	Under Power Panel H4UP1	120VAC Panel S1A
101A01A	SF Digital Cab. H4SDA5	125VDC Panel S0A
101A02B	Under Power Panel H4UP1	125VDC Panel S0A
101A03A	SF Digital Cab. H4SDA5	125VDC Panel S0A
111C07B	ICS Cab. H4IC	120VAC Panel S1C
111C09A	SF Analog Cab. H4SAC3	120VAC Panel S1C
111C10A	RPS Cab. H4PR1C	120VAC Panel S1C
111C12A	RCP Under Power Panel H4UP	120VAC Panel S1C
101C02A	Reactor Under Power Panel H4UP3	125VDC Panel S0C
101C01A	Control Room Lighting Panel HBL	125VDC Panel S0C

120VAC and 125VDC ALTERNATIVE SHUTDOWN POWER SUPPLY SOURCES:

S1A	Supplying power for instruments
S1C	Supplying power for instrumednts
S0A	Supplying power for switchgear control
S0C	For SFV-23811

TABLE III-2

CABLES CONSIDERED FOR SPURIOUS OPERATIONS

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
PLS & SIM (PURIFICATION LETDOWN SYSTEM AND SEAL INJECTION MAKE-UP SYSTEM) SYSTEM			
SFV-23809 (RCS LOOP "A" HPI Valve)	E-203 Sh. 50E SK-M-521	1D1C05C 1D1C05D 1D1C05E 1D1C05F	Valve open/close indication circuit SF actuation circuit SF actuation circuit SF actuation circuit
SFV-23810 (RCS LOOP "B" HPI Valve)	E-203 Sh. 50F SK-M-521	1D1D03C 1D1D03D 1D1D03E 1D1D03F	Valve open/close indication circuit SF actuation circuit SF actuation circuit SF actuation circuit
SFV-23811 (RCS LOOP "A" HPI Valve)	SK-E203 Sh. 50G SK-M-521	1D1C08C 1D1C08D 1D1C08E 1D1C08F	Valve open/close indication circuit SF actuation circuit SF actuation circuit SF actuation circuit
SFV-23812 (RCS LOOP "B" HPI Valve)	E203 Sh. 50H SK-M-521	1D1D05C 1D1D05D 1D1D05E 1D1D05F	Valve open/close indication circuit SF actuation circuit SF actuation circuit SF actuation circuit
LV-21503 (Make-Up Control Valve)	SK-M-521	1R2C215XA	Valve actuation circuit
PV-23606 (Seal Injection Flow Control Valve)	SK-M-521	1R2C236X1	Valve solenoid actuation circuit
SFV-23645 (HPI/MU Recirc. Valve)	E-203 Sh. 52B SM-M-521	1M1A121A 1M1A121D	Valve open/close indication circuit SF actuation circuit
SFV-23646 (HPI/MU Recirc. Valve)	E-203 Sh. 52B SK-M-521	1M1B141A 1M1B141B	Valve open/close indication circuit SF actuation circuit
SFV-23508 (MU Tank Isol. Valve)	SK-E-203 Sh. 97 SK-M-521	1M1A172A IM1A172D	Valve open/close indication circuit SF actuation circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
SFV-22009 (RCS Letdown Isol. Valve)	E-203 Sh. 62 SK-M-521	1R1C220DA 1R1C220DB 1R1C220DC 1R1C220DD	Valve open/close indication circuit Valve open/close indication circuit SF actuation circuit SF actuation circuit
SFV-22023 (RCS Letdown Isol. Valve)	E-203 Sh. 48 SK-M-521	1M1A133A 1M1A133D	Valve open/close indication circuit SF actuation circuit
FV-23004B 3-Way Letdown Bleed Valve	E-203 Sh. 61 SK-M-521	1M2D430A 1M2D430C	Valve actuation circuit Valve actuation circuit
HV-23504 (MU Tank Vent Valve)	E-203 Sh. 75 SK-M-521	1R1C235CH 1R1C235CD	Valve open/close indication circuit Valve actuation circuit
HV-23004 (Letdown/Bleed Valve)	E-203 Sh. 61 SK-M-521	1M2D430A 1M2D430B	Valve open/close indication circuit Valve control circuit
P-236 (MU Pump)	SK-E-203 Sh. 2 SK-M-521	1P1A02C 1P1A02E 1P1A02H 1P1B08A 1P1B08B 1P1B08D 1P1B08E 1P1B08J	Ammeter indication circuit Pump start/stop indication circuit SF actuation circuit Ammeter indication circuit Ammeter indication circuit Pump start/stop indication circuit SF actuation circuit Pump start/stop indication circuit
P-238B (HPI Pump)	SK-E203 Sh.4 SK-M-521	1P1B07A 1PAB07B 1P1B07C 1P1B07E 1P1B07K	Ammeter indication circuit Ammeter indication circuit Pump start/stop indication circuit SF actuation circuit Pump start/stop indication circuit
SFV-25004 (BWST Outlet Valve)	E-203 Sh. 68A SK-M-522	1M1B146A 1M1B146B 1M1B146D	Valve open/close indication circuit SF actuation circuit Light indication circuit
SFV-25003 (BWST Outlet Valve)	SK-E203 Sh. 68 SK-M-522	1M1A137A 1M1A137D 1M1A137E	Valve open/close indication circuit Light indication circuit SF actuation circuit
SFV-23616 (RCP Seal Water Supply Valve)	E-203 Sh. 54 SK-M-521	1M1B143G 1M1B143H 1M1B143A	RCP seal control circuit RCP interlock circuit Valve open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
FV-24019 (RCP Seal Return Isolation Valve)	E-203 Sh. 78 SK-M-521	1M2D218A 1M2D218C	Valve open/close indication circuit RCP seal flow signal circuit
FV-24020 (RCP Seal Return Isolation Valve)	E-203 Sh. 78 SK-M-521	1M2C436A 1M2C436C	Valve open/close indication circuit RCP seal flow signal circuit
FV-24021 (RCP Seal Return Isolation Valve)	E-203 Sh. 78 SK-M-521	1M2D327A 1M2D327C	Valve open/close indication circuit RCP seal flow signal circuit
FV-24022 (RCP Seal Return Isolation Valve)	E-203 Sh. 78 SK-M-521	1M2D431A 1M2D431C	Valve open/close indication circuit RCP seal flow signal circuit
FV-24004 (RCP Seal Water Return Valve)	E-203 Sh. 69 SK-M-521	1M1A136B 1M1A136C	Valve open/close indication circuit SF actuation circuit
SFV-24013 (RCP Seal Water Return Valve)	E-203 Sh. 63 SK-M-521	1R1C240A 1R1C240B 1R1C240I 1R1C240G 1R1C240H 1R1C240D 1R1C240C	Valve open/close indication circuit SF actuation circuit SF actuation circuit SF actuation circuit SF actuation circuit SF actuation circuit SF actuation circuit
SFV-23604 (RCS MU Isolation MOV)	E-203 Sh. 49 SK-M-521	1D1C03D 1D1C03E 1D1C03F 1D1C03C	SF actuation circuit SF actuation circuit SF actuation circuit Valve open/close indication circuit
HV-23801 (ECCS Long Term Cooling MOV)	E-293 Sh. 60C SK-M-521	1M1B179A 1M1B179D	Valve open/close indication circuit Valve indication power circuit
HV-23802 (ECCS Long Term Cooling MOV)	E-203 Sh. 60B SK-M-521	1M1B180A	Open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
DHS & CFS (DECAY HEAT SYSTEM AND CORE FLOOD SYSTEM)			
SFV-26005 (DH System Isolation Valve)	E-203 Sh. 50A SK-M-522	1M1A138A 1M1A138B	Valve open/close indication circuit SF actuation circuit
SFV-26006 (DH System Isolation Valve)	E-203 Sh. 50A SK-M-522	1M1B147A 1M1B147B	Valve open/close indication circuit SF actuation circuit
HV-26037 (DH Cooler Bypass Valve)	E-203 Sh. 80 SK-M-522	1M1A107A	Valve open/close indication circuit
HV-26038 (DH Cooler Bypass Valve)	E-203 Sh. 80 SK-M-522	1M1B142A	Valve open/close indication circuit
HV-26011 (LP Spray Isolation Valve)	E-203 Sh. 58 SK-M-522	1M2D225A	Valve open/close indication circuit
SFV-26039 (DH Clr. Dischrg Valve)	E-203 Sh. 81 SK-M-522	1M1A106B 1M1A106C	Valve open/close indication circuit SF actuation circuit
SFV-26040 (DH Clr. Dischrg Valve)	E-203 Sh. 81A SK-M-522	1M1B163B 1M1B163C 1M1B163F	Valve open/close indication circuit SF actuation circuit Valve open/close indication circuit
HV-20005 (DH System Isolation Valve)	E-203 Sh. 118 SK-M-522	1M1A134D	Valve open/close indication circuit
HV-20006 (DH System Isolation Valve)	E-203 Sh. 119 SK-M-522	1M1B144D	Valve open/close indication circuit
HV-26007 (HPI Cross Connect Valve)	E-203 Sh. 53B SK-M-522	1M1A139A	Valve open/close indication circuit
HV-26008 (HPI Cross Connect Valve)	E-203 Sh. 53B SK-M-522	1M1B148A	Valve open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
HV-26046 (DH Cross Connect Valve)	E-203 Sh. 53A SK-M-522	1M1A164A	Valve open/close indication circuit
HV-26047 (DH Cross Connect Valve)	E-203 Sh. 53A SK-M-522	1M1B165A	Valve open/close indication circuit
HV-26513 (CF Tank "A" To RCS)	E-203 Sh. 50F SK-M-522	1M2D228A 1M2D228D 1M2D228E	Valve open/close indication circuit Valve status test circuit Valve status indication circuit
HV-26514 (CF Tank "B" to RCS)	E-203 Sh. 50F SK-M-522	1M2D229A	Valve open/close indication circuit
HV-20003 (DH Pump to Sump Valve)	E-203 Sh. 60A SK-M-522	1M1A179A	Valve open/close indication circuit
P-261A (DH Removal Pump "A")	SK-E-203 Sh. 3 SK-M-522	1P1A05B 1P1A05C 1P1A05A	Pump start/stop indication circuit SF actuation circuit Ammeter circuit
P-261B (DH Removal Pump "B")	E-203 Sh. 3 SK-M-522	1P1B09B 1P1B09C 1P1B09A	Pump start/stop indication circuit SF actuation circuit Ammeter circuit
P-251 (LPI HDR Warming Pump)	E-203 Sh. 17 SK-M-522	1M2E101A	Pump start/stop indication circuit
RCS (REACTOR COOLANT SYSTEM)			
HV-21505 (Pressurizer Relief Stop Valve)	E-203 Sh. 58D SK-M-520 Sh. 1	1M1B182A	Open/close indication circuit
PSV-21511 EMOV	E-203 Sh. 65 SK-M-520 Sh. 1	1R2C215VB 1R2C215VE	RPS pressure signal circuit Control indication circuit
HV-21516 (Pressurizer Liquid Sample Valve)	E-203 Sh. 38 SK-M-520 Sh. 1	1M2D212A	Open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
SFV-70001 (RC Sample Clr. Isolation Valve)	E-203 Sh. 48C SK-M-520 Sh. 1	1M1A157A 1M1A157B	Open/close indication circuit SF actuation circuit
SFV-70002 (RC Sample Clr. Isolation Valve)	E-203 Sh. 48F SK-M-520 Sh. 1	1R1C700A 1R1C700B 1R1C700C 1R1C700D	Open/close indication circuit SF actuation circuit Valve energize circuit Valve indication circuit
P-210A (RC Pump "A")	E-203 Sh. 1 SK-M-520 Sh. 1	1Q2A03B 1Q2A03C 1Q2A03D 1Q2A03E 1Q2A03F 1Q2A03J 1Q2A03K 1Q2A03L	Ammeter circuit Reactor trip circuit Pump start/stop indication circuit Pump start block circuit Pump control circuit Pump control circuit Reactor trip circuit Reactor trip circuit
P-210B (RC Pump "B")	E-203 Sh. 1A SK-M-520 Sh. 2	1Q2B03B 1Q2B03C 1Q2B03D 1Q2B03E 1Q2B03F 1Q2B03J 1Q2B03K 1Q2B03L	Ammeter circuit Reactor trip circuit Pump start/stop indication circuit Pump start block circuit Pump control circuit Pump control circuit Reactor trip circuit Reactor trip circuit
P-210C (RC Pump "C")	E-203 Sh. 1B SK-M-520 Sh. 20	1Q2A02B 1Q2A02C 1Q2A02D 1Q2A02E 1Q2A02F 1Q2A02J 1Q2A02K 1Q2A02L	Ammeter circuit Reactor trip circuit Pump start/stop indication circuit Pump start block circuit Pump control circuit Pump control circuit Reactor trip circuit Reactor trip circuit
P-210D (RC Pump "D")	E-203 Sh. 1C SK-M-520 Sh. 1	1Q2B02B 1Q2B02C 1Q2B02D 1Q2B02E 1Q2B02F 1Q2B02J 1Q2B02K 1Q2B02L	Ammeter circuit Reactor trip circuit Pump start/stop indication circuit Pump start block circuit Pump control circuit Pump control circuit Reactor trip circuit Reactor trip circuit
HV-21922 (Pressurizer Relief Tank Valve)	E-203 Sh. 58 SK-M-520 Sh. 1	1M2C326A	Open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
HV-21908 (Pressurizer Relief Tank Valve)	E-203 Sh. 58 SK-M-520 Sh. 1	1M2D216A	Open/close indication circuit
HV-21909 (Pressurizer Relief Tank Valve)	E-203 Sh. 58 SK-M-520 Sh. 1	1M2D217A	Open/close indication circuit
V215L-13, 14, 15 (Emergency Przr. Heaters)	E-203 Sh. 45C SK-M-520 Sh. 1	1M2A201B 1M2A201C 1M2A201D	Pressurizer heater control circuit Pressurizer heater control circuit Pressurizer heater control circuit
V215L-16, 17, 18 (Emergency Przr. Heaters)	E-203 Sh. 45C SK-M-520 Sh. 1	1M2A202A	Pressurizer heater control circuit
V215L-19, 20, 21 (Emergency Przr. Heaters)	E-203 Sh. 45C SK-M-520 Sh. 1	1M2A203A	Pressurizer heater control circuit
V215L-10, 11, 12 (Emergency Przr. Heaters)	E-203 Sh. 46C SK-M-520 Sh. 1	1M2B201B 1M2B201C 1M2B201D	Pressurizer heater control circuit Pressurizer heater control circuit Pressurizer heater control circuit
V215L-13, 14, 15 (Emergency Przr. Heaters)	E-203 Sh. 46C SK-M-520 Sh. 1	1M2B202A	Pressurizer heater control circuit
V215L-16, 17, 18 (Emergency Przr. Heaters)	E-203 Sh. 46C SK-M-520 Sh. 1	1M2B203A	Pressurizer heater control circuit
FWS (FEEDWATER SYSTEM--AFW PUMP TRAIN)			
P-319 (Emergency FW Pump)	SK-E-205 Sh. 1 SK-M-532	1P1A06A 1P1A06D 1P1A06J 1P1A06K 1P1A06R 1P1A06S	Ammeter circuit Pump start signal circuit Pump stop signal circuit Pump auto start circuit Pump start/stop indication circuit SF actuation circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
P-318 (Emergency FW Pump)	SK-E-205 Sh. 27 SK-M-532	1P1B10A 1P1B10H 1P1B10J 1P1B10K	Ammeter circuit Pump start signal circuit Pump stop signal circuit Pump indication circuit
SFV-20577 (AFW Control Valve Bypass)	E-203 Sh. 50C SK-M-532	1M1B160F	Valve open/close indication circuit
SFV-20578 (AFW Control Valve Bypass)	E-203 Sh. 50C SK-M-532	1M1A122B 1M1A122C	Valve open/close indication circuit SF actuation circuit
SFV-20527 (FW to OTSG E205A)	E-205 Sh. 29 SK-M-532	1I1F205B 1I1F205E	Valve actuation signal circuit Valve open/close indication circuit
SFV-20528 (FW to OTSG E205B)	E-205 Sh. 29 SK-M-532	1I1F205AA 1I1F205AB	Valve open/close indication circuit Valve actuation signal circuit
HV-31826 (AFW Cross-Tie Isolation MOV)	E-205 Sh. 26 SK-M-532	1M1B159A	Valve open/close indication circuit
HV-31827 (AFW Cross-Tie Isolation MOV)	E-205 Sh. 26 SK-M-532	1M1A108A	Valve open/close indication circuit
PV-20571A, B, C (Atmospheric Dump Valves)	E-342 Sh. 12 & 4 SK-M-530	1I2U0165B 1I2U1061C	ICS control circuit ICS control circuit
PV-20562A, B, C (Atmospheric Dump Valves)	E-342 Sh. 12 & 4 SK-M-530	1I2U0165A	ICS control circuit
HV-20569 (Steam to Emergency FP Turbine)	E-205 Sh. 20C SK-M-530	1M1A161C	Open/close indication circuit
HV-20596 (MS valve to FP Turbine)	E-205 Sh. 20C SK-M-530	1M1B137C	Open/close indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
PV-20561 & PV-20563 (Turbine Bypass Valves)	E-342 Sh. 12 & 4 SK-M-530	1I2U1062B 1I2U1061C	ICS control circuit ICS control circuit
PV-20564 & PV-20566 (Turbine Bypass Valves)	E-342 Sh. 12 & 4 SK-M-530	1I2U1062D	ICS control circuit
HV-32243 (Peg. Steam to 2nd & 4th Heater)	E-205 Sh. 30 SK-M-530	1M1B154A	Open/close indication circuit
HV-20597 (MS to Reheater MOV)	E-205 Sh. 20E SK-M-530	1M1A162A	Open/close indication circuit
HV-20598 (MS to Reheater MOV)	E-205 Sh. 20E SK-M-530	1M1B138A	Open/close indication circuit
TV1 (Turbine Throttle Valve-1)	E-201 Sh. 18	1T2T10A 1T2T10B 1T2T10C 1T2T10J 1O2E30A	Turbine trip seal-in on reactor trip circuit Turbine trip on reactor trip valve actuation circuit Throttle valve-1 actuation circuit Turbine trip on low EH oil pressure Valve power supply circuit
TV2 (Turbine Throttle Valve-2)	E-201 Sh. 18	1T2T10A 1T2T10B 1T2T10D 1T2T10J	Turbine trip seal-in on reactor trip circuit Turbine trip on reactor trip valve actuation circuit Throttle valve-2 actuation circuit Turbine trip on low EH oil pressure
TV3 (Turbine Throttle Valve-3)	E-201 Sh. 19	1T2T10A 1T2T10B 1T2T10C 1T2T10J	Turbine trip seal-in on reactor trip circuit Turbine trip on reactor trip valve actuation circuit Throttle valve-3 actuation circuit Turbine trip on low EH oil pressure

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
TV4 (Turbine Throttle Valve-4)	E-201 Sh. 19	1T2T10A	Turbine trip seal-in on reactor trip circuit
		1T2T10B	Turbine trip on reactor trip valve actuation circuit
		1T2T10B	Throttle valve-4 actuation circuit
		1T2T10J	Turbine trip on low EH oil pressure
NRW (NUCLEAR RAW WATER SYSTEM)			
P-472A (NS Raw Water Pump "A")	SK-E-203 Sh. 42 SK-M-544	1P1A07A 1P1A07B 1P1A07C	Ammeter circuit Open/close indication circuit SF actuation circuit
P-472B (NS Raw Water Pump "B")	SK-E-203 Sh. 42 SK-M-544	1P1B06A 1P1B06B 1P1B06C	Ammeter circuit Open/close indication circuit SF actuation circuit
NSW (NUCLEAR SERVICE WATER SYSTEM)			
P-482A (NSCW Pump "A")	E-203 Sh. 43 SK-M-544	1N1A18A 1N1A18C	Pump start/stop indication circuit SF actuation circuit
P-482B (NSCW Pump "B")	E-203 Sh. 43 SK-M-544	1N1B18A 1N1B18C 1N1B18E	Pump start/stop indication circuit SF actuation circuit Ammeter circuit
SFV-50005 (RB Clr. Isolation Valve)	E-203 Sh. 50J SK-M-544	1M1A147A 1M1B147B	Open/close indication circuit SF actuation circuit
SFV-50006 (RB Clr. Isolation Valve)	E-203 Sh. 50L SK-M-544	1M1B155A 1M1B155B	Open/close indication circuit SF actuation circuit
SFV-50007 (RB Clr. Isolation Valve)	E-203 Sh. 50J SK-M-544	1M1A148A 1M1A148B	Open/close indication circuit SF actuation circuit
SFV-50008 (RB Clr. Isolation Valve)	E-203 Sh. 50L SK-M-544	1M1B156A 1M1B156B	Open/close indication circuit SF actuation circuit
SFV-50009 (RB Clr. Isolation Valve)	E-203 Sh. 50K SK-M-544	1M1A149A 1M1A149B	Open/close indication circuit SF actuation circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
SFV-50010 (RB Clr. Isolation Valve)	E-203 Sh. 50M SK-M-544	1M1B157A 1M1B157B	Open/close indication circuit SF actuation circuit
SFV-50011 (RB Clr. Isolation Valve)	E-203 Sh. 50K SK-M-544	1M1A150A 1M1A150B	Open/close indication circuit SF actuation circuit
SFV-50012 (RB Clr. Isolation Valve)	E-203 Sh. 50M SK-M-544	1M1B158A 1M1B158B	Open/close indication circuit SF actuation circuit
SFV-26016 (DH Clr. Isolation Valve)	E-203 Sh. 50 SK-M-544	1M1B149A 1M1B149C	Open/close indication circuit SF actuation circuit
SFV-26017 (DH Clr. Isolation Valve)	E-203 Sh. 50 SK-M-544	1M1A140A 1M1A140C	Open/close indication circuit SF actuation circuit
SFV-26018 (DH Clr. Isolation Valve)	E-203 Sh. 50 SK-M-544	1M1B150A 1M1B150C	Open/close indication circuit SF actuation circuit
SFV-26019 (DH Clr. Isolation Valve)	E-203 Sh. 50B SK-M-544	1M1A141A 1M1A141C	Open/close indication circuit SF actuation circuit
EGS (EMERGENCY GENERATING SYSTEM)			
P-888A (Fuel Oil Transfer Pump)	SK-E-204 Sh. 11A SK-M-552	1M1A113B	Pump start signal circuit
P-888B (Fuel Oil Transfer Pump)	SK-E-204 Sh. 11B SK-M-552	1M1A114D	Pump start signal circuit
P-888C (Fuel Oil Transfer Pump)	SK-E-204 Sh. 11C SK-M-582	1M1B114C	Pump start signal circuit
P-888D (Fuel Oil Transfer Pump)	SK-E-204 Sh. 11D SK-M-582	1M1B115E	Pump start signal circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
CBS (CONTAINMENT BUILDING SPRAY SYSTEM)			
P-291A (RB Spray Pump "A")	E-203 Sh. 5 SK-M-524	1N1A09A 1N1A90C 1N1A09D	Pump start/stop indication circuit SF actuation circuit Ammeter circuit
P-291B (RB Spray Pump "B")	E-203 Sh. 5A SK-M-524	1N1B09A 1N1B90C 1N1B09D	Pump start/stop indication circuit SF actuation circuit Ammeter circuit
SFV-29107 (RB Spray Pump Discharge MOV)	E-203 Sh. 55 SK-M-524	1M1A144A 1M1A144B	Valve open/close indication circuit SF actuation circuit
SFV-29108 (RB Spray Pump Discharge MOV)	E-203 Sh. 55A SK-M-524	1M1B153A 1M1B153B	Valve open/close indication circuit SF actuation circuit
FWS (FEEDWATER SYSTEM MAIN FEED-WATER TRAIN)			
FV-20529 (FW to SG Stop Valve)	E-205 Sh. 18 SH-M-532	1M1A131A 1M1A131B 1M1A131D 1M1A131E	Open/close indication circuit Valve control circuit Valve test circuit Valve test circuit
FV-20530 (FW to SG Stop Valve)	E-205 Sh. 18 SH-M-532	1M1B139A 1M1B139B 1M1B139D 1M1B139E	Open/close indication circuit Valve control circuit Valve test circuit Valve test circuit
FV-20575 (MS Failure FW Valve)	E-205 Sh. 24A SK-M-532	1I2F206AA	Valve open/close indication circuit
FV-20576 (MS Failure FW Valve)	E-205 Sh. 24A SK-M-532	1I2F206BA	Valve open/close indication circuit
P-317A (Main FW Pump "A")	E-201 Sh. 31	1I2T307AB	MFWP turbine trip/reset indication

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
P-317B (Main FW Pump "B")	E-201 Sh. 31	1I2T307BB	MFWP turbine trip/reset indication
HVS (HEATING VENTILATION AND AIR CONDITIONING SYSTEM)			
A-500A (RB Emergency Clr.)	E-203 Sh. 6 SK-M-544	1N1A10A 1N1A10C	Fan start/stop indication circuit SF actuation circuit
A-500B (RB Emergency Clr.)	E-203 Sh. 6 SK-M-544	1N1B10A 1N1B10C	Fan start/stop indication circuit SF actuation circuit
A-500C (RB Emergency Clr.)	E-203 Sh. 6 SK-M-544	1N1A14A 1N1A14C	Fan start/stop indication circuit SF actuation circuit
A-500D (RB Emergency Clr.)	E-203 Sh. 6 SK-M-544	1N1B14A 1N1B14C	Fan start/stop indication circuit SF actuation circuit
A-544A (D/G Room Vent Supply Fan)	E-204 Sh. 8 SK-M-552	1N1A13G	Trip block signal circuit
A-544B (D/G Room Vent Exhaust Fan)	E-204 Sh. 8A SK-M-552	1N1A17G	Trip block signal circuit
A-544C (D/G Room Vent Supply Fan	E-204 Sh. 8B SK-M-582	1N1B06G	Trip block signal circuit
A-544D (D/G Room Vent Exhaust Fan)	E-204 Sh. 8C SK-M-582	1N1B17G	Trip block signal circuit
EDS (ELECTRICAL DISTRIBUTION SYSTEM)			
S4A01 (SU Transformer #1 Supply Brkr)	E-208 Sh. 9	1P1A01J 1P1401K 1P1A01H	Close/trip indication circuit Voltage indication circuit Ammeter circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
S4A10 (SU Transformer #2 Supply Brkr)	E-208 Sh. 8A	1P1A10G	Close/trip indication circuit
		1P1A10E	Voltage indication circuit
		1P1A10F	Ammeter circuit
S4A08 (D/G Supply Breaker)	E-204 Sh. 1	1P1A08B	[illegible] recording circuit
		1P1A08C	[illegible]d recording circuit
		1P1A08Q	Bus sequence circuit
		1P1A08R	Bus sequence circuit
		1P1A08W	Close trip indication circuit
S4B01 (SU Transformer #2 Supply Brkr)	E-208 Sh. 8	1P1B01F	Trip block signal circuit
		1P1B01G	Voltage indication circuit
		1P1B014	Ammeter circuit
		1P1B01J	Breaker close/trip indication circuit
S4B04 (SU Transformer #1 Supply Brkr)	E-208 Sh. 9	1P1B04F	Trip block signal circuit
		1P1B04G	Ammeter circuit
		1P1B04H	Breaker close/trip indication circuit
		1P1B04J	Voltage indication circuit
S4B11 (D/G Supply Brkr)	E-204 Sh. 2	1P1B11B	Bus sequencing circuit
		1P1B11C	WH recording circuit
		1P1B11Q	Trip block signal circuit
		1P1B11V	Breaker close/trip indication circuit
S4A203 (SU Transformer #2 Supply Brkr)	E-208 Sh. 52	1P1A203A	Voltage indication circuit
		1P2A203A	Ammeter circuit
		1P1A203C	Breaker close/trip indication circuit
S4A207 (SU Transformer #1 Supply Brkr)	E-208 Sh. 54	1P2A207A	Ammeter circuit
		1P1A207B	Voltage indication circuit
		1P1A207C	Breaker close/trip indication circuit
S4A202 (D/G Supply Brkr)	E-204 Sh. 19	1P1A202F	Voltage indication circuit
		1P1A202H	Breaker close/trip indication circuit
		1P2A202A	Metering ct circuit
		1P2A202B	Metering ct circuit
		1P2A202C	Metering ct circuit
		1P2A202F	Metering ct circuit
		1P2A202D	Bus sync pt circuit
		1P2A202E	Bus sync pt circuit
SB4203 (SU Transformer #2 Supply Brkr)	E-208 Sh. 53	1P1B203A	Voltage indication circuit
		1P2B203A	Ammeter indication circuit
		1P1B203C	Breaker close/trip indication circuit

TABLE III-2

System/Equipment	Schematic/P&IDs or LOOP Diagram	Cable	Function
S4B207 (SU Transformer #1 Supply Brkr)	E-28 Sh. 55	1P2B207A	Ammeter circuit
		1P1B207B	Voltage indication circuit
		1P1B207C	Breaker close/trip indication circuit
S4B202 (D/G Supply Brkr)	E-204 Sh. 20	1P1B202F	Voltage indication circuit
		1P1B202H	Breaker close/trip indication circuit
		1P1B202A	Metering ct circuit
		1P1B202B	Metering ct circuit
		1P1B202C	Metering ct circuit
		1P1B202F	Metering ct circuit
		1P2B202D	Bus sync pt circuit
		1P2B202E	Bus sync pt circuit

SECTION IV

RESPONSE TO HIGH-LOW PRESSURE

INTERFACE QUESTIONS FROM ATTACHMENT 2

TO CLARIFICATION LETTER TO GENERIC LETTER 81-12

NRC REQUEST

a. Identify each high-low pressure interface that used redundant electrically controlled devices (such as two series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

DISTRICT RESPONSE

The District has identified the following sets of series valve to isolate or preclude the rupture of the primary coolant boundary at a high-low pressure interface.

1. Pressurizer relief valve and block valve

   PSV-21511 (non-1E)
   HV-21505 (CH B)

2. Pressurizer vent valves

   HV-21515 (non-1E)
   HV-21517 (non-1E)

3. RCS Sample Lines

   a. Pressurizer Liquid Sample

      HV-21516 (non-1E)
      SFV-70001 (CH-A)
      SFV-70002 (CH-B)

   b. RCS Liquid Sample

      HV-21514 (non-1E)
      SFV-70001 (CH-A)
      SFV-70002 (CH-B)

   c. Pressurizer Vent Gas Sample

      HV-21515 (non-1E)
      SFV-70003 (CH-A)
      SFV-70002 (CH-B)

4. RCS and Pressurizer High Point Vents

   a. HV-20533 (CH-A) SG-A vent
      HV-20579 (CH-A) SG-A vent

b. HV-20534 (CH-B) SG-B vent
HV-20580 (CH-B) SG-B vent

c. HV-21528 (CH-B) Pressurizer high point vent
HV-21522 (CH-B) Pressurizer high point vent

5. RCS to Decay Heat Line

HV-20001 (CH-A)
HV-20002 (CH-B)

6. Letdown System

SFV-22023 (CH-A)
SFV-22009 (CH-B)

7. RCP Seal Return Line

SFV-24004 (CH-B)
SFV-24013 (CH-A)

NRC REQUEST

b. For each set of redundant valves identified in (a), verify the redundant cabling (power and control) have adequate physical separation as required by Section III.G.2 of Appendix R.

DISTRICT RESPONSE

Circuits for the redundant valves listed in (a) do not satisfy the requirement of section III.G.2 of Appendix R in the fire areas shown below:

1. PSV-21511 and HV-21505

Fire areas 36, 32, 20, 17, 19, and 1

2. HV-21515 and HV-21517

Fire areas RG1, 36, 31, 18, 17, RM1, 28, 19, 20, 32, and 1
Circuits for these valves have the same routing.

3. a. HV-21516, SFV-70001, SFV-70002

Fire areas 20 and 1

b. HV-21514, SFV-70001, SFV-70002

Fire area 20

c. HV-21515, SFV-70003, SFV-70002

Fire areas 1 and 20

4. HV-20533 and HV-20579, HV-20534 and HV-20580, HV-21528 and HV-21522

   Both the series valves in all three different vent lines belong to the same channel. The respective valve location and their circuit routings are the same.

5. HV-20001 and HV-20002

   Fire areas RG1, 36, 20, and 1

6. SFV-22023 and SFV-22009

   Fire areas 17 and 1

7. SFV-24004 and SFV-24013

   Fire areas 20, 1, 17, and 31

NRC REQUEST

c. For each case where adequate separation is not provided, show that fire induced failures (hot shorts, open circuits, or short to ground) of the cables will not cause mal-operative result in a LOCA.

DISTRICT RESPONSE

The District has analyzed the effects of potential cable failures on the operation of the valves and listed these cables by common fire areas.

1. PSV-21511 and HV-21505

   Fire areas 32 and 19 contain:

1R2C215VA (PSV-21511)	Open or short in conductors causes the valve to stay in close position. Hot short to 125 V DC cable from SOE panel can open the valve.
121B182A (HV-21505) 1M1B182B (HV-21505)	Open or short in the conductors causes the valve to stay as is (normally OPEN).

   Fire area 20 contains:

1R2C216VA (PSV-21511)	Open or short in conductors causes the valve to stay in close position. Hot short to 125 V DC cable from SOE panel can open the valve.
1R2C215VB (PSV-21511)	Short or hot short in conductors can open the valve.
1R2C215VF (PSV-21511)	Short or hot short can open the valve.
1M1B182A (HV-21505)	Short or hot short can cause the valve to stay open.
1M1B182B (HV-21505) 121B1B2A (HV-21505)	Open, short, or hot short will cause the valve to stay as is (normally OPEN).

Fire area 36 contains:

1R2C215VA (PSV-21511)	Open or short drives the valve to close position. Hot short to 125 V DC cable from SOE panel can open the valve.
1R2C215VE (PSV-21511)	Short or hot short can open the valve.
121B182A (HV-21505) } 1M1B182B }	Open, short, or hot short will cause the valve to stay as is (normally OPEN).

Fire areas 1 and 17 contain:

1R2C215VB (PSV-21511)	Short or hot short in circuit can open the valve.
1R2C215VE (PSV-21511)	Short or hot short can open the valve.
1R2C215VF (PSV-21511)	Short or hot short can open the valve.
1M1B182A (HV-21505)	Open, short, or hot short can cause the valve to stay open.

Fire in areas 32, 19, 20, 36, 17, or the Control Room (area 1) can potentially cause the EMOV and its block valve to both open at the same time. This event can be precluded for fire in areas 32, 19, 20, 36, and the CR by tripping the 125 V DC power supply breaker SOE02 located in the 480 V West Switchgear Room. This will de-energize the solenoid on PSV-21511 allowing the valve to fail close.

In fire area 17, block valve HV-21505 has one circuit only (1M1B182). This circuit has been insulated. So fire in area 17 will damage this circuit and block valve HV-21505 can be closed from the Control Room.

2. HV-21515 and HV-21517

Fire areas RG1, 36, 31, 18, 17, RM1, and 28 contain control and power circuits from both valves. Pressurizer vent valves HV-21515 and HV-21517 are 480 V motor operated normally closed valves.

During the normal plant operation, the supply breakers for these normally closed valves will be racked out. So power and control circuits of these valves would be de-energized during normal operation. Therefore, open, short, or hot short in the circuits of these valves due to fire in any of the areas will not affect the closed status of the valves.

3. a. HV-21516, SFV-70001, SFV-70002

Fire area 20 and 1 contains the circuits from all three valves. During normal plant operation, the supply breaker for the normally closed valve HV-21516 will be racked out. Pressurizer liquid sample valve HV-21516 is 480 V motor operated normally closed valve. So, power and control circuits of this valve would be de-energized during normal plant operation. Therefore, open, short, or hot short in the circuits of this valve due to fire in this area will not affect the closed status of the valve and at least one valve in the liquid sample line would remain closed all the time.

3. b. HV-21514, SFV-70001, SFV-70002

Fire area 20 contains the circuits from all three valves. During normal

plant operation, the supply breaker for the normally closed valve HV-21514 will be racked out. This valve is motor operated normally closed valve. So power and control circuits of this valve would be de-energized during normal plant operation. Therefore, open, short, or hot short in the circuits of this valve due to fire in this area will not affect close status of the valve and at least one valve in liquid sample line would remain close all the time.

3. c. HV-21515, SFV-70002, and SFV-70003

Fire area 1 and 20 contains the circuits from all the three valves. During normal plant operation, the supply breaker for the HV-21515 will be racked out. This valve is a motor operated normally closed valve. So power and control circuits of this valve would be de-energized during normal plant operation. Therefore, open, short, or hot short in the circuits of this valve due to fire in any of the above areas will not affect the close status of the valve and at least one valve of this line would remain close all the time.

4. RCS and Pressurizer High Point Vent Valves HV-20533 and HV-20579, HV-20534 and HV-20580, HV-21528 and HV-21522.

During normal plant operation, the supply breakers for all these normally closed valves (HV-20533, HV-20579, HV-20534, HV-20580, HV-21528, and HV-20522) will be racked out. So the fire in any area will not affect the close status of the valve.

5. HV-20001 and 20002

Fire areas 34, 36, 20, and Control Room (AREA 1) contains circuits for both valves. During normal plant operation supply breakers for both valves will be racked out. These valves are 480 V motor operated normally closed valves. So, power and control circuits of these valves would be de-energized during normal plant operation. Therefore, open, short, or hot short in the circuits of these valves due to fire in any of the above areas will not affect closed status of the valve and high/low pressure interface would not be affected due to fire in any of the above areas.

6. SFV-22023 and SFV-22009

Fire area 17 contains:

121A133A (SFV-22023)	Open, short, or hot short has no effect on valve status.
1M1A133A (SFV-22023)	Short or hot short will open the valve.
1M1A133C (SFV-22023)	Open, short, or hot short has no effect on valve status.
1M1A133B (SFV-22023)	Short or hot short will cause the valve to stay close. Circuits are in insulated conduits and would not be affected by the fire in the area.
1R2C220DM (SFV-22009)	} Circuits are in insulated conduits and would not
1R1C220DN (SFV-22009)	} be affected by the fire in the area.

Fire area 1 contains.

1M1A133A	(SFV-22023)	Short or hot short will open the valve.
1M1A133B	(SFV-22023)	Short or hot short will cause the valve to stay close.
1R1C220DB	(SFV-22009)	Short or hot short can open the valve.
1R1C220DD	(SFV-22009)	Short or hot short can cause the valve to stay close.
1R1C220DE	(SFV-22009)	Open or short will cause the valve to stay close. Hot short can open the valve.
1R1C220DF	(SFV-22009)	Open, short, or hot short has no effect on valve status.
1R1C220DK	(SFV-22009)	Short or hot short will cause the valve to stay close.
1R1C220DM	(SFV-22009)	} Circuits are in insulated conduits and would not
1R1C220DN	(SFV-22009)	} be affected by the fire in the area.
101B01A	(SFV-22009)	Open or short causes the valve to stay close. Hot short does not affect valve status.

So, fire in area 1 (CR) only can cause the letdown line to stay open as all circuits of valve SFV-22009 are insulated in fire area 17. This event can be precluded by opening the breaker 72-B01 in 125 V DC panel SOB de-energizing the solenoid allowing SFV-22009 to fail close. This valve is located outside the containment and can also be closed manually in case it is not possible to de-energize the solenoid.

7. SFV-24004 and SFV-24013

Fire area 20 contains:

1M1A136C	(SFV-24004)	Open circuit has no effect. Short or hot short circuit causes the valve to stay close.
1R1C240C	(SFV-24013)	Open or short in circuit causes the valve to stay close. Hot short can open the valve.
1R1C240D	(SFV-24013)	Open, short, or hot short affects valve indication only.
1R1C240H	(SFV-24013)	Open or short does not affect valve status. Hot short circuit causes valve to stay close.
1R1C240I	(SFV-24013)	Short or hot short circuit cause the valve to stay close. Open circuit does not affect the valve status.

Fire area 1 contains:

1M1A136B	(SFV-24004)	Short or hot short circuit causes the valve to stay close. Open circuit has no effect.
1M1A136C	(SFV-24004)	Short or hot short circuit causes the valve to stay close. Open circuit has no effect.
1R1C240C	(SFV-24013)	Open or short in circuit causes the valve to stay close. Hot short can open the valve.
1R1C240D	(SFV-24013)	Open, short, or hot short in circuit will affect valve indications only.
1R1C240H	(SFV-24013)	Open or short does not affect valve status. Hot

short circuits causes the valves to stay close.

1R1C240I	(SFV-24013)	Short or hot circuit will cause the valve to stay close. Open circuit does not affect valve status.
1R1C240G	(SFV-24013)	Short or hot short in the circuit causes the valve to stay close. Open circuit does not affect valve status.
1R1C240A	(SFV-24013)	Short or hot short in the circuit can open the valve. Open circuit does not affect the valve status.
1R1C240B	(SFV-24013)	Short or hot short in the circuit causes the valve to stay close. Open circuit does not affect valve status.

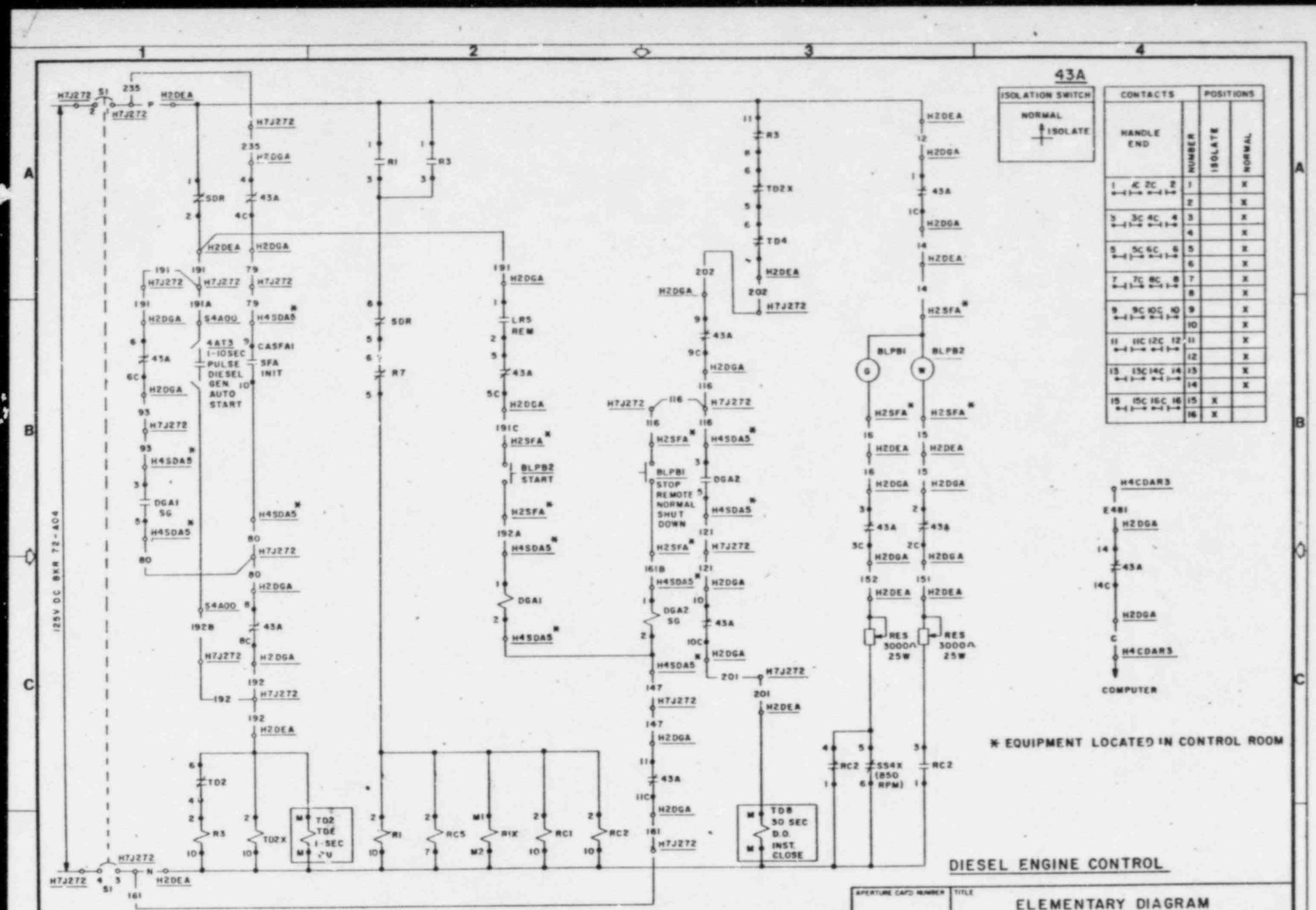
Fire area 17 contains:

1R1C240H	(SFV-24013)	Open or short in the circuit does not affect valve status. Hot short causes the valve to stay close.
1M1A136B	(SFV-24004)	Short or hot short circuit causes the valve to stay close. Open circuit has no effect.
1M1A136C	(SFV-24004)	Short or hot short causes the valve to stay close. Open circuit has no effect.
1M1A136D	(SFV-24004)	Open, short, or hot short does not affect valve status.
121A136A	(SFV-24004)	Open, short, or hot short does not affect valve status.

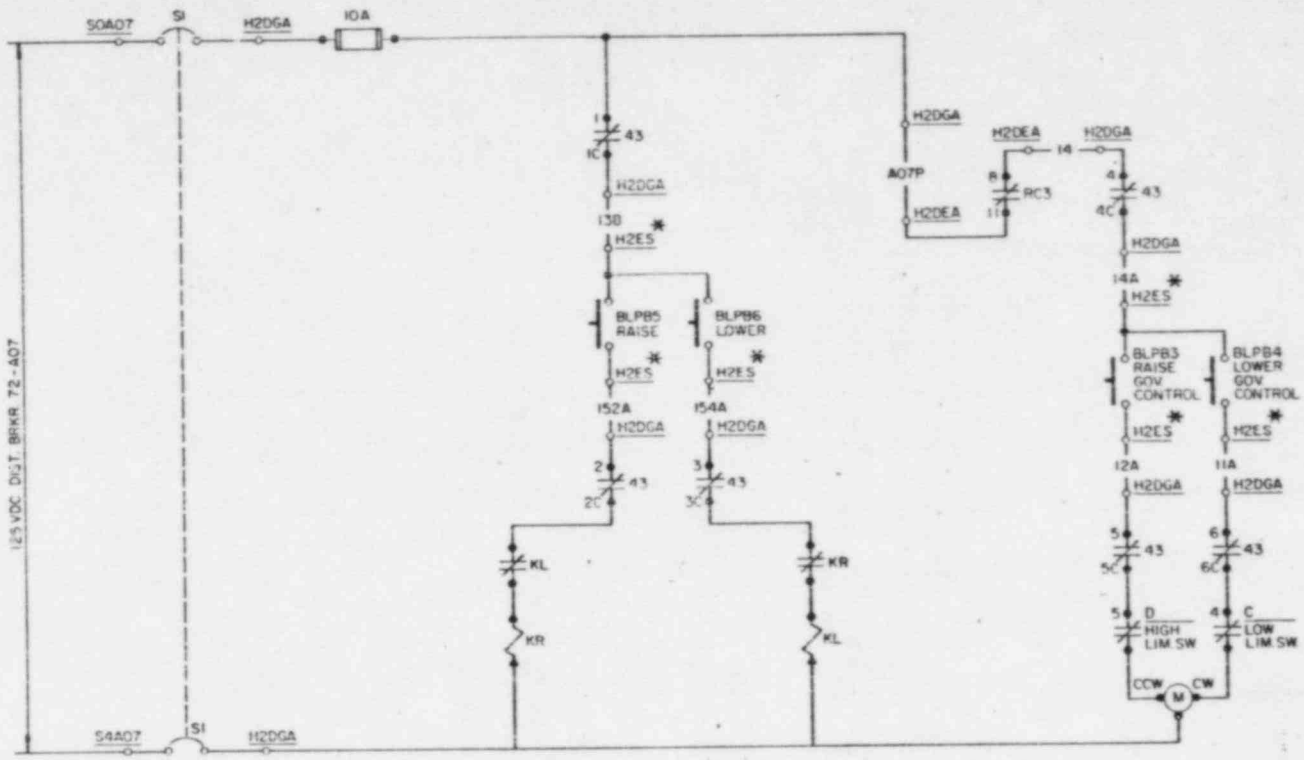
Fire area 31 contains:

1R1C240I	(SFV-24013)	Short or hot short circuit causes the valve to stay close. Open circuit does not affect valve status.
1R1C240J	(SFV-24013)	Short or hot short circuit causes the valve to stay close. Open circuit does not affect valve status.
1R1C240K	(SFV-24013)	Short or hot short circuit causes the valve to stay close. Open circuit does not affect valve status.
1R1C240L	(SFV-24013)	Short or hot short circuit causes the valve to stay close. Open circuit does not affect valve status.
1M1A136D	(SFV-24004)	Open, short, or hot short does not affect valve status.
121A136A	(SFV-24004)	Open, short, or hot short does not affect valve status.

So fire in areas 20, 1, or 17 does not open both the valves.



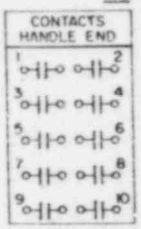
APERTURE CARD NUMBER	TITLE: ELEMENTARY DIAGRAM APPENDIX R ANALYSIS SHOWING CONTROL ROOM INTERFACE
DR. BY: BWO	DATE: 2/85
LOCATION	RANCHO SECO NUCLEAR GENERATING STA., UNIT 1
SMUD — SACRAMENTO MUNICIPAL UTILITY DISTRICT	SK-E-87, SH. 1



43

CONTACT NUMBER	POSITION NORMAL	POSITION ISOLATED
1	X	
2	X	
3	X	
4	X	
5	X	
6	X	
7		X
8		X
9	X	
10	X	

CONTACTS HANDLE END



*EQUIPMENT LOCATED IN CONTROL ROOM

DIESEL GENERATOR CONTROL

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR. NUC. ENG. DEPT.	MANAGER	FILM

APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

SCALE: NTS
DWG. SIZE: C
DR. BY: L WARREN
DATE: 10/83
CHKD. BY:
DATE:
LOCATION: RANCHO SECO NUCLEAR GENERATING STATION, UNIT NO. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR MGR. | RELEASE DATE

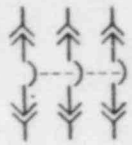
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

SUPV. NO.
W.O. NO.
MICROFILM

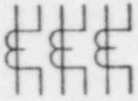
DWG. NO. SK-E-87, Sh. 4
SHT. NO. OF SHTS.

REVISION 0

G-003

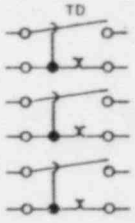


3 POLE CIRCUIT BREAKER
(DRAW OUT TYPE)

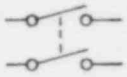


CURRENT TRANSFORMER

POTENTIAL TRANSFORMER



TEST DISCONNECT SWITCH



2 POLE SINGLE THROW SWITCH

RELAY COIL

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

62 TIME DELAY
TDE ENERGIZE RELAY

62 TIME DELAY
TDC CLOSING CONTACT

62 TIME DELAY
TDD DE-ENERGIZE RELAY

62 TIME DELAY
TDO OPENING CONTACT

FUSE

ADJUSTABLE CONTACT RESISTOR

MOMENTARY PUSHBUTTON
(CIRCUIT CLOSING)

MOMENTARY PUSHBUTTON
(CIRCUIT OPENING)

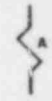
JUNCTION POINT

INDICATING LIGHT * R-RED
G-GREEN
W-WHITE

INDICATING LIGHT WITH INTERNAL
RESISTANCE

SEPARABLE CONNECTORS

SINGLE THROW SWITCH



AMPERE INDICATION

MECHANICAL TORQUE SWITCH

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR.	MANAGER NUC. ENG. DEPT.	FILM

APERTURE CARD NUMBER

TITLE

LEGEND FOR
ELECTRICAL EQUIPMENT
APPENDIX R ANALYSIS

SZ NTS | DWG. SIZE C

DR. BY G.F.B. | DATE 11-4-83

CHKD. BY | DATE

LOCATION
RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR MGR. | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

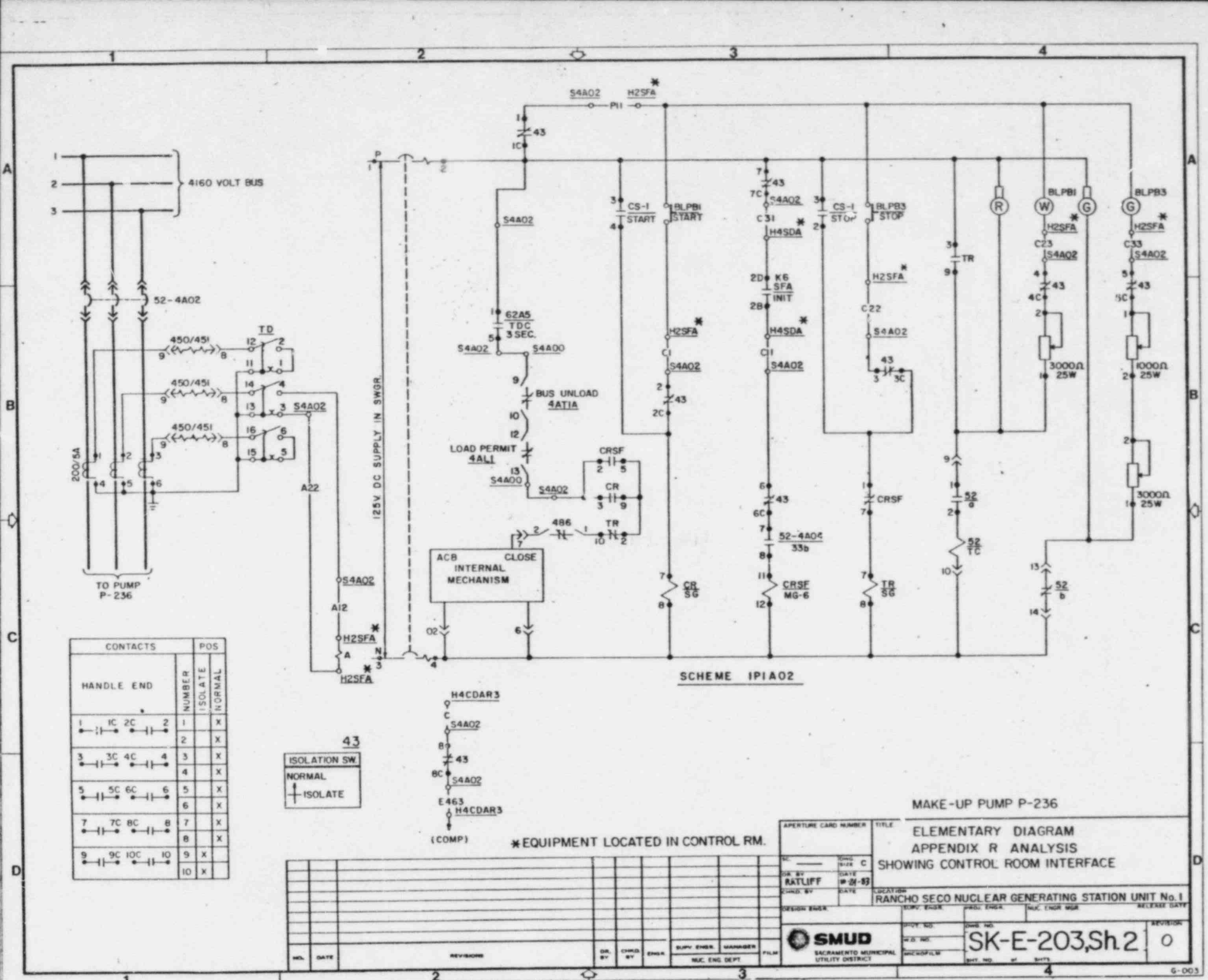
DEPT. NO. | W.O. NO. | MICROFILM

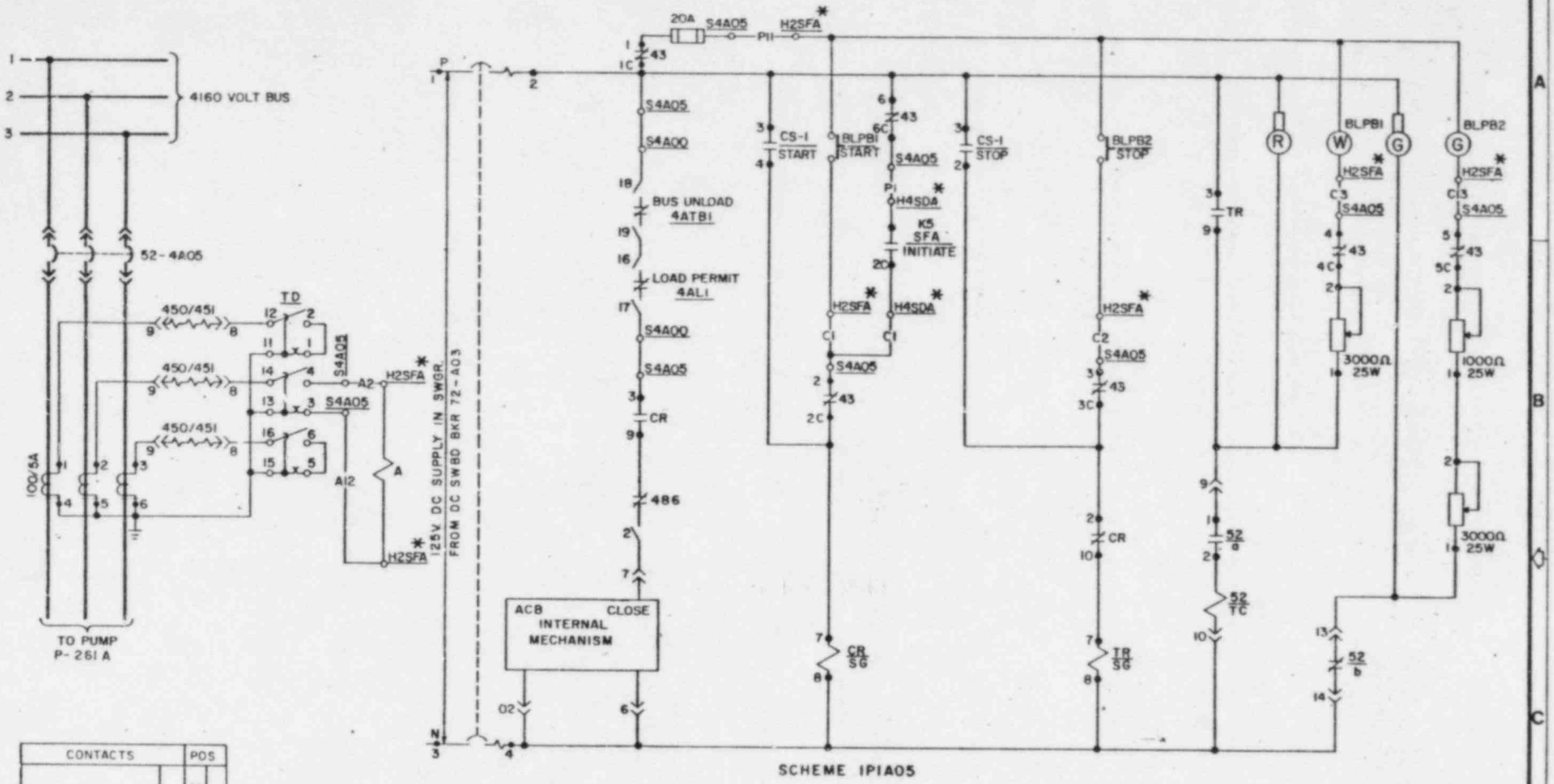
DWG. NO. SK-E-200

REVISION 0

DEPT. NO. | SHT. NO. | OF | SHTS.

6-003


4160 VOLT BUS
52-4A02
TD
450/451
200/5A
TO PUMP P-236
A22
A12
125V DC SUPPLY IN SWGR.
S4A02
H2SFA
62A5 TDC 3 SEC.
BUS UNLOAD 4ATIA
LOAD PERMIT 4ALI
486
TR
CRSF
CR
ACB CLOSE INTERNAL MECHANISM
CS-1 START
CS-1 STOP
BLPBI START
BLPB3 STOP
H4SDA
K6 SFA INIT
52-4A04 33b
CRSE MG-6
CR SG
TR SG
BLPBI
BLPB3
3000Ω 25W
1000Ω 25W
52 a
52 TC
52 b
SCHEME IPIA02
H4CDAR3
E463
(COMP)
43
ISOLATION SW.
NORMAL
ISOLATE
CONTACTS
HANDLE END
NUMBER
ISOLATE
NORMAL
*EQUIPMENT LOCATED IN CONTROL RM.
MAKE-UP PUMP P-236
ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE
RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SK-E-203,Sh.2
REVISION 0
DR. BY RATLIFF
DATE 10-21-83
REVISIONS
G-003



SCHEME IPIA05

CONTACTS		POS	
HANDLE END	NUMBER	ISOLATE	NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9	X	
	10	X	

43

ISOLATION SW.
NORMAL
ISOLATE

H4CDAR3
C
S4A05
B
43
BC
S4A05
E489
H4CDAR3
COMPUTER

*EQUIPMENT LOCATED IN CONTROL ROOM

DECAY HEAT REMOVAL PUMP P-261A

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR. / MANAGER, NUC. ENG. DEPT	FILM

APERTURE CARD NUMBER

DR. BY RATLIFF DATE 9-28-83

CHKD. BY DATE

DESIGN ENGR.

TITLE
ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

LOCATION
RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1

SIZE C

ELEC. ENGR. PROJ. ENGR. NUC. ENGR. MGR. RELEASE DATE

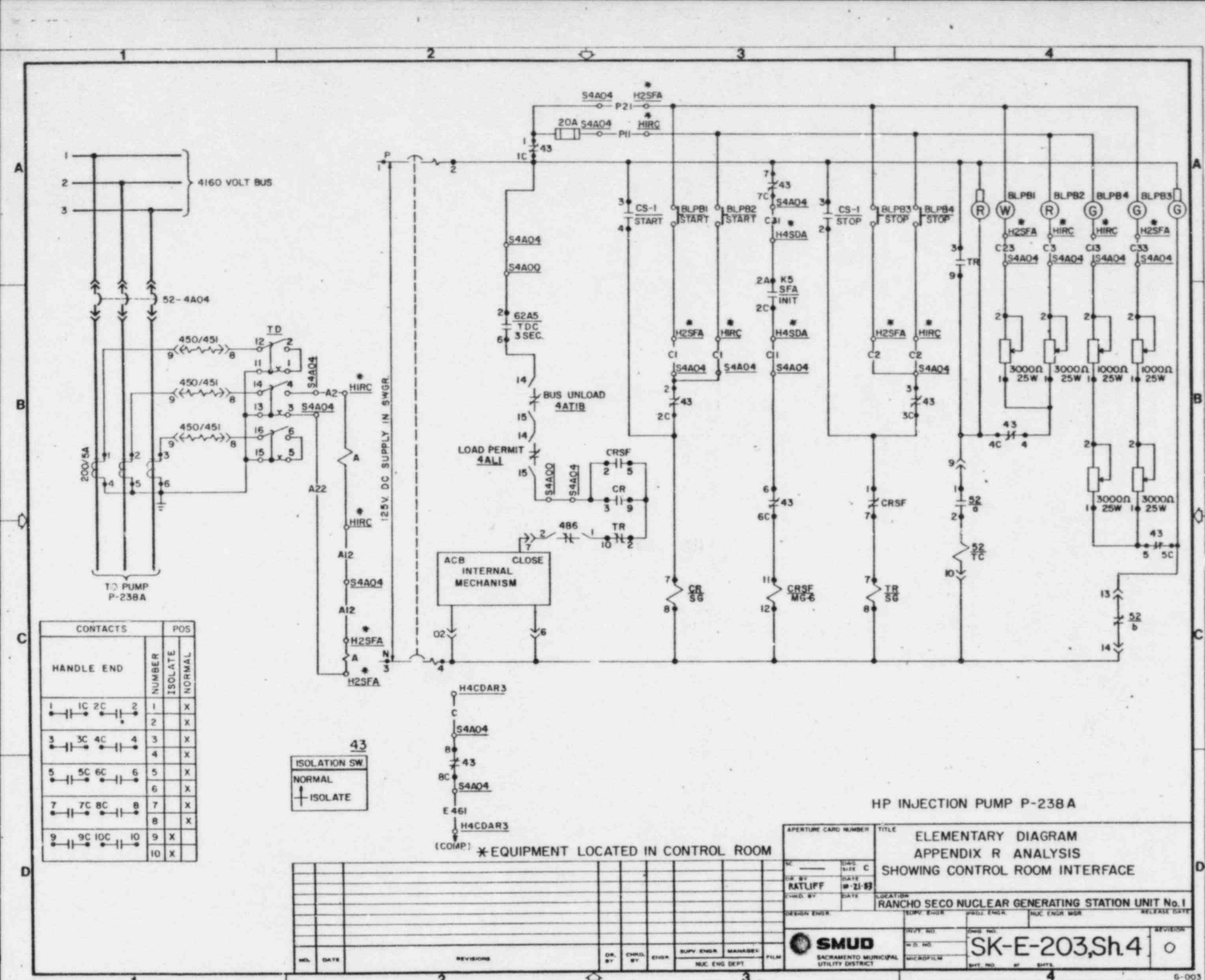
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO. SK-E-203,Sh.3

REVISION 0

SHT. NO. OF SHTS.

G-003



CONTACTS	NUMBER	POS ISOLATE	POS NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9	X	
	10	X	

43
ISOLATION SW.
NORMAL
ISOLATE

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR. NUC. ENG. DEPT.	MANAGER	FILM

APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

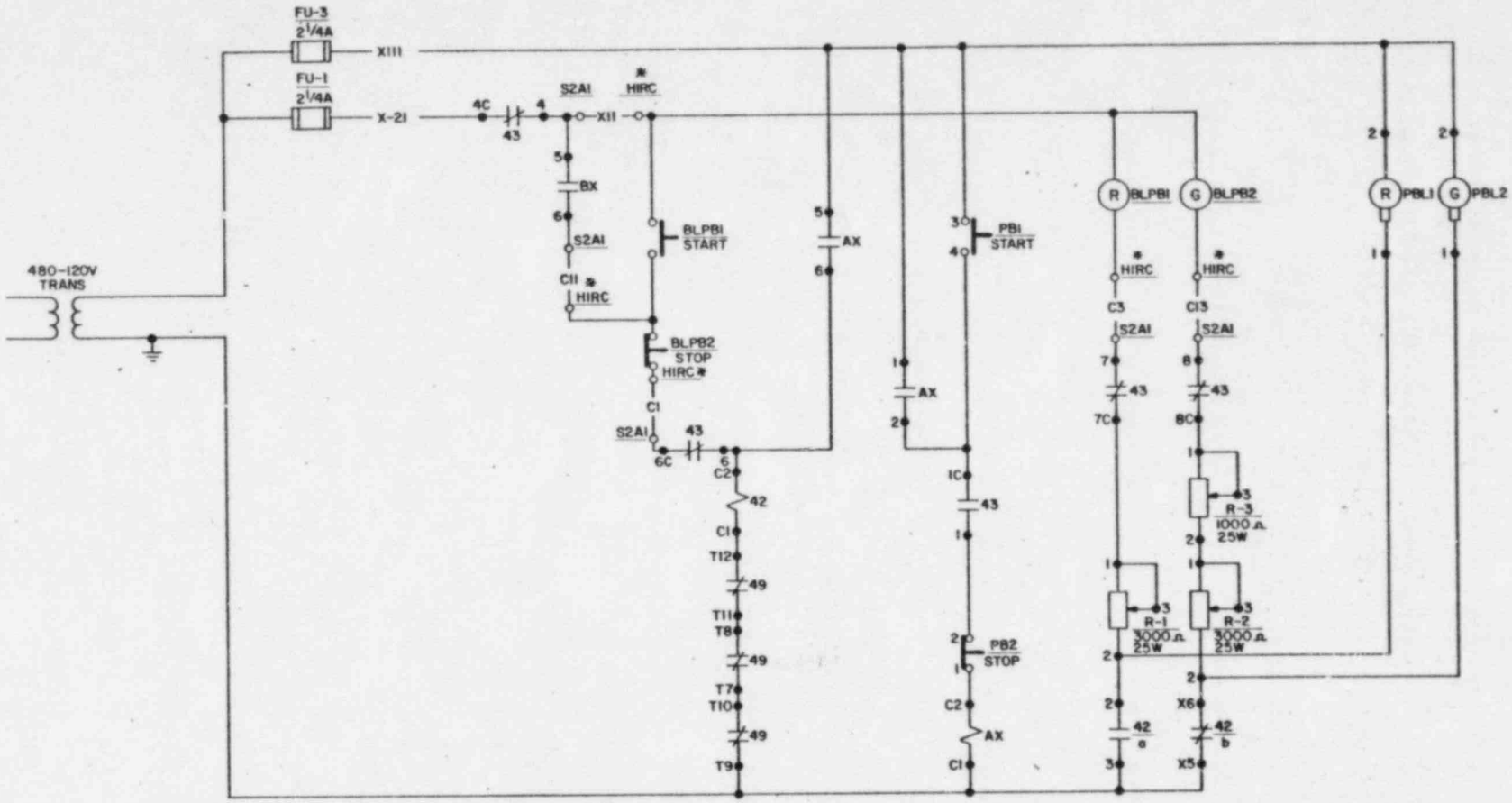
DR. BY: RATLIFF
DATE: 10-21-83
CHKD. BY
DATE
DESIGN ENGR.
SUPV. ENGR.
PROJ. ENGR.
NUC. ENGR. MGR.
RELEASE DATE

LOCATION: RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO. SK-E-203,Sh.4
REVISION 0

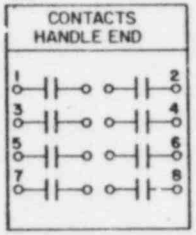
G-003



* EQUIPMENT LOCATED IN CONTROL ROOM

43

CONTACTS HANDLE END



ISOLATION SWITCH
GE TYPE SBM
43-2AI02

CONTACT NUMBER	POSITION ISOLATE	NORMAL
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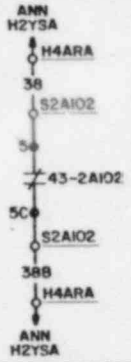
2	X	
3	X	
4		X
5		X
6		X
7		X
8		X



HP INJECTION PUMP P-238A L.O. PUMP

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR	MANAGER	FILM
						NUC. ENG. DEPT.		

APERTURE CARD NUMBER

TITLE

ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

SIZE C

DR. BY J. STANGL DATE 10/83

CHKD. BY DATE

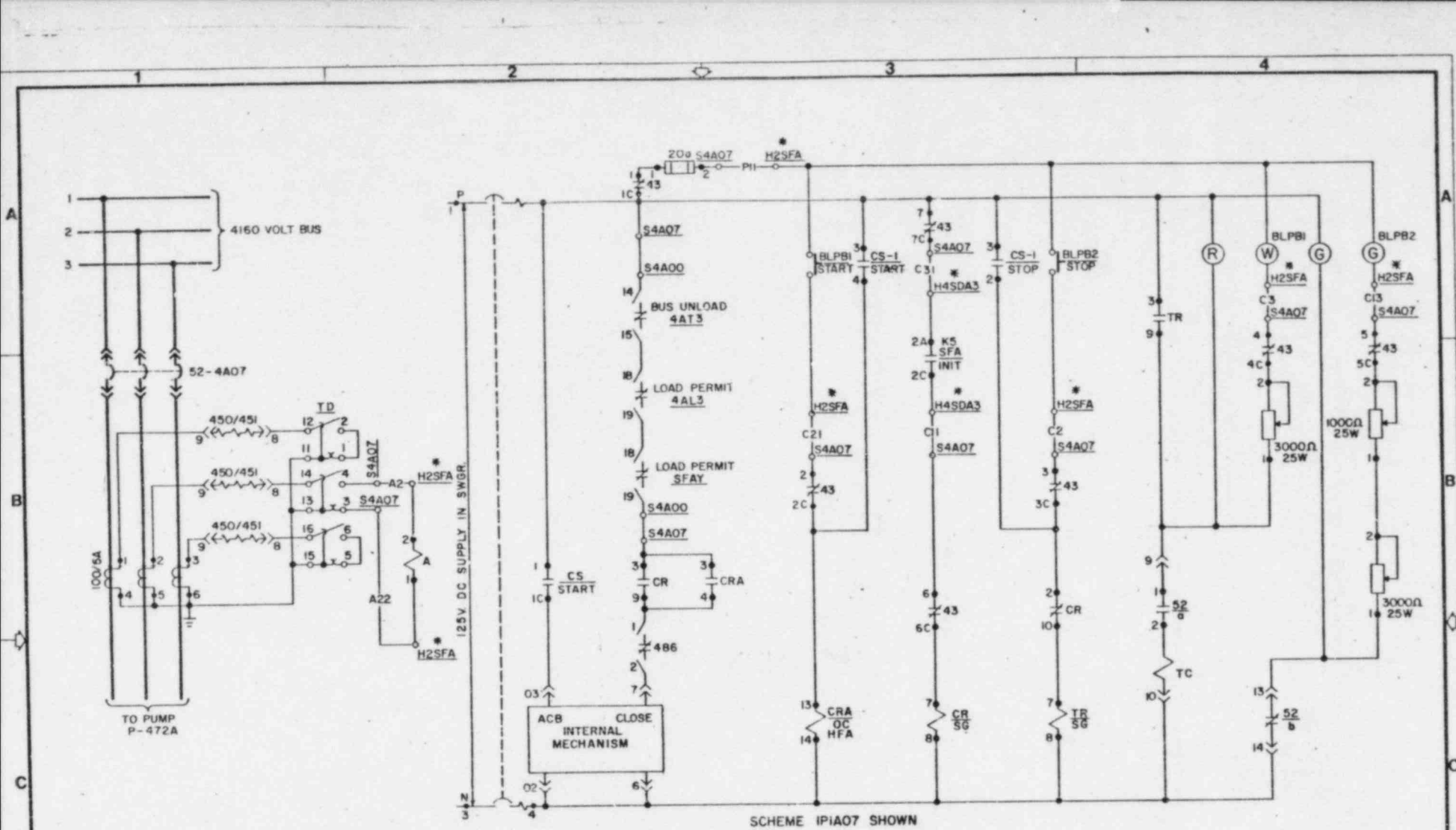
LOCATION
RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

DESIGN ENGR.	SUPV. ENGR.	PROJ. ENGR.	NUC. ENGR MGR.	RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

CONT. NO.	DWG. NO.	REVISION
A.D. NO.	SK-E-203,SH.37	O
MICROFILM	SHT. NO. OF SHTS.	

G-003



CONTACTS HANDLE END	NUMBER	POS ISOLATE	POS NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9	X	
	10	X	

43

ISOLATION SW.
NORMAL
ISOLATE

H4CDAR3
C
S4A07
8
43
8C
S4A07
E473
(COMP)

*EQUIPMENT LOCATED IN CONTROL ROOM

NUCLEAR SERVICE RAW WATER PUMPS P-472 A,B

APERTURE CARD NUMBER

TITLE
ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

SIZE C | DWG NO. | DATE
DR. BY RATLIFF | DATE 10-2583
CHKD. BY | DATE

LOCATION
RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

GOVT. NO. | W.O. NO. | MICROFILM

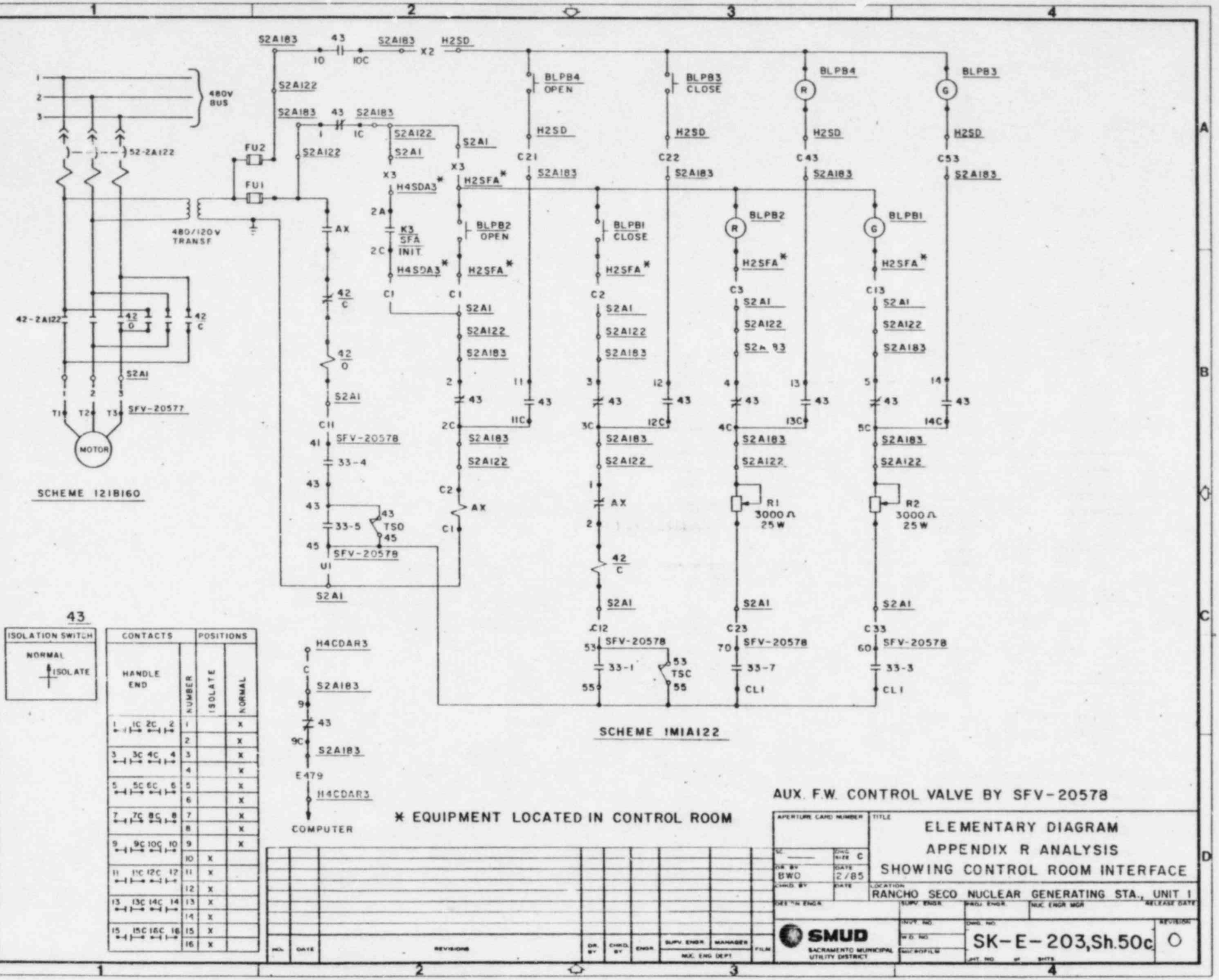
DWG. NO. SK-E-203,Sh42

REVISION 0

SHT. NO. | OF SHTS.

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR. / NUC. ENG. DEPT.	MANAGER	FILM

G-003



1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9		X
	10	X	
11 11C 12C 12	11	X	
	12	X	
13 13C 14C 14	13	X	
	14	X	
15 15C 16C 16	15	X	
	16	X	

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR / NUC. ENG DEPT.	MANAGER

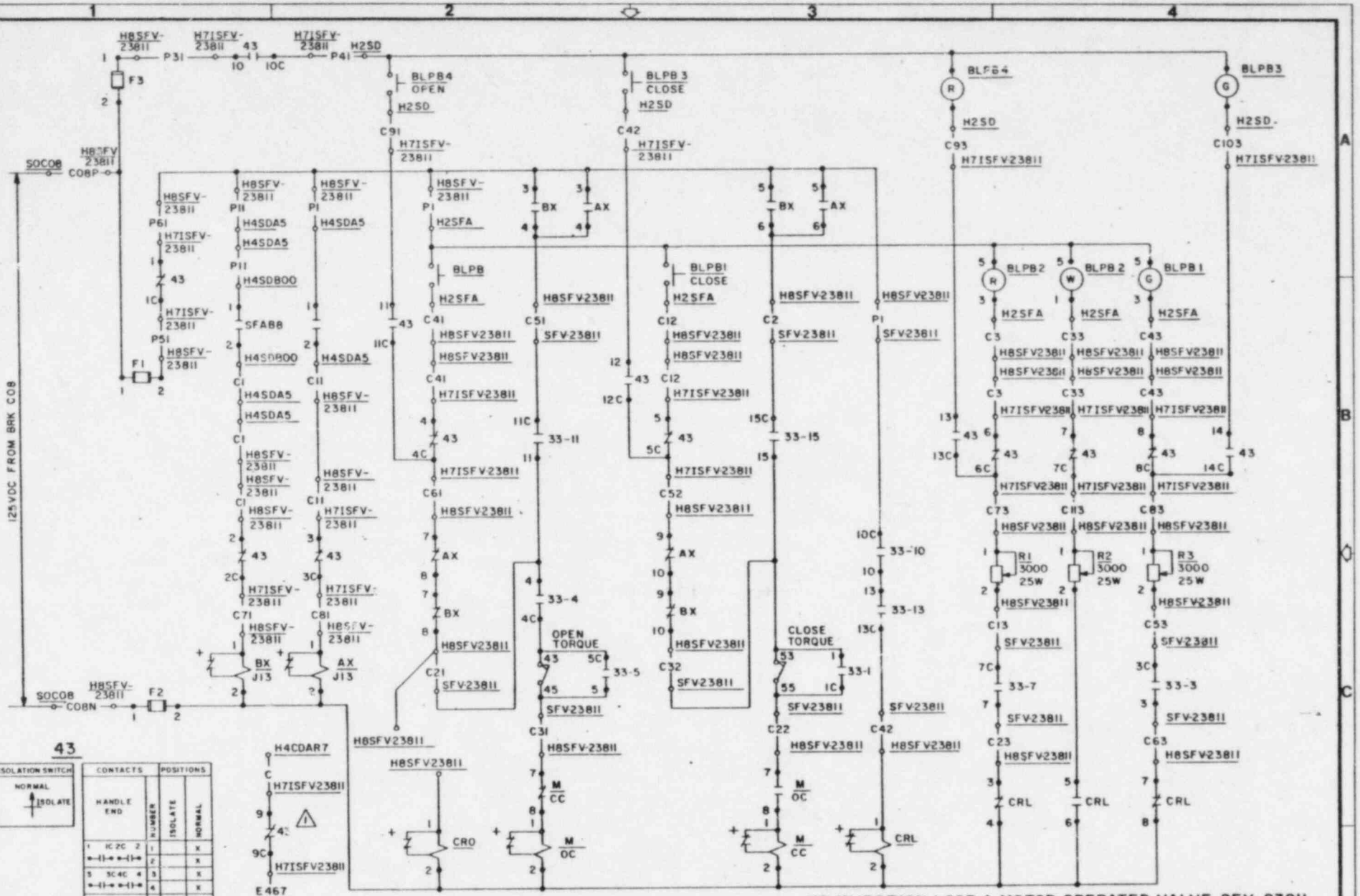
APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

DR. BY: BWO
DATE: 2/85
LOCATION: RANCHO SECO NUCLEAR GENERATING STA., UNIT 1

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO.: SK-E-203,Sh.50c
REVISION: 0

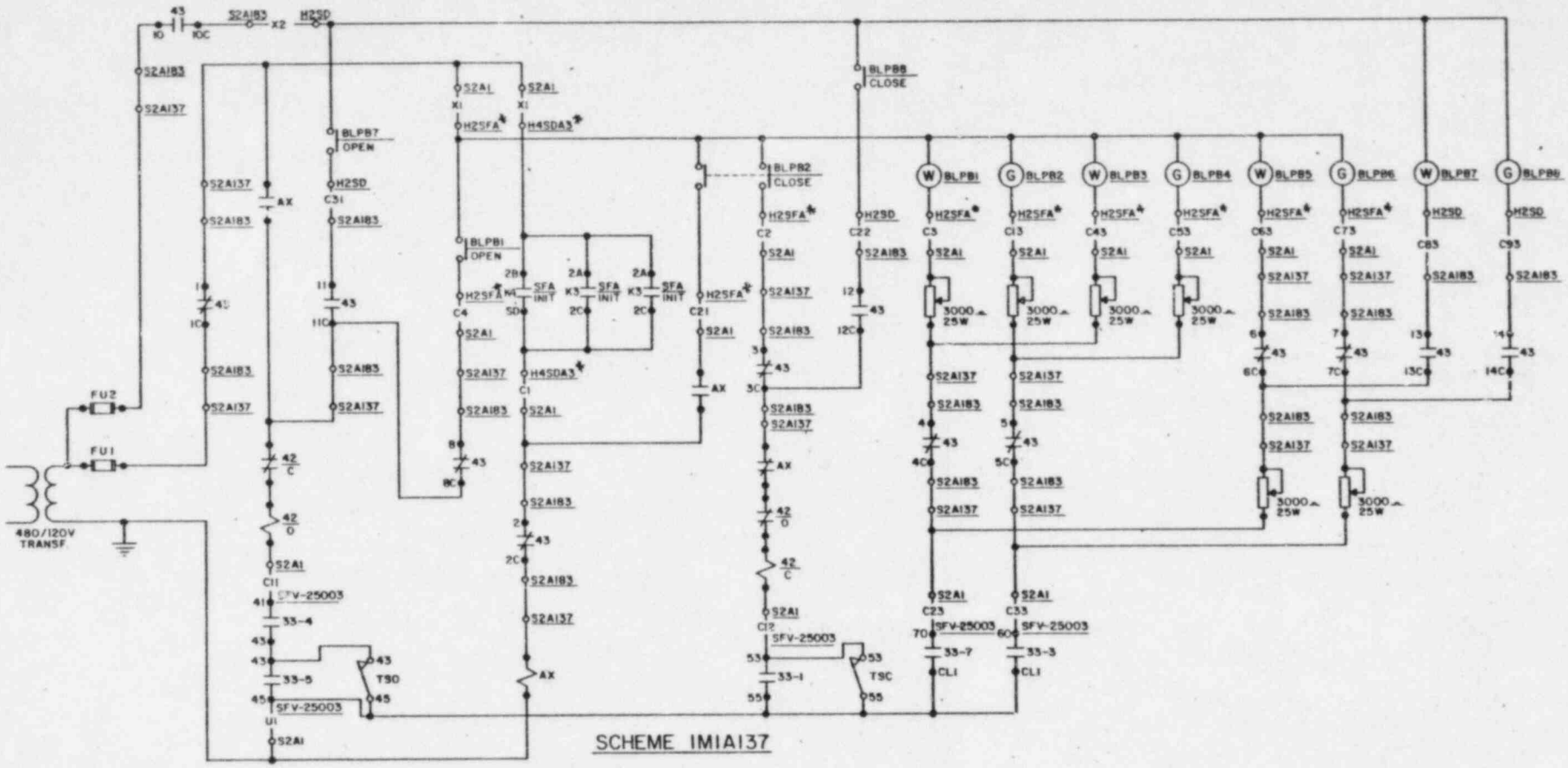


* EQUIPMENT LOCATED IN CONTROL ROOM

HP INJECTION LOOP A MOTOR OPERATED VALVE SFV-23811

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR.	MANAGER NUC. ENG DEPT.	FILM

APERTURE CARD NUMBER	
DR. BY: BWO	DWG SIZE: C
CHKD. BY	DATE: 1-85
DESIGN ENGR.	SUPV. ENGR.
PROJ. ENGR.	NUC. ENGR MGR.
RELEASE DATE	
TITLE	ELEMENTARY DIAGRAM APPENDIX R ANALYSIS SHOWING CONTROL ROOM INTERFACE
CO. STATION	RANCHO SECO NUCLEAR GENERATING STA., UNIT 1
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT	
INVT. NO.	
W.O. NO.	
MICROFILM	
DWG. NO.	SK-E-203,Sh.50G
REVISION	1
SHT. NO.	



43 ISOLATION SWITCH	CONTACTS	POSITIONS	
NORMAL / ISOLATE	HANDLE END	NUMBER	ISOLATE	NORMAL
		1		X
		2		X
		3		X
		4		X
		5		X
		6		X
		7		X
		8		X
		9		X
		10	X	
		11	X	
		12	X	
		13	X	
		14	X	
		15	X	
		16	X	

H4CDAR3 C S2AI83 9C 43 9C S2AI83 E471 H4CDAR3 COMP

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR.	MANAGER	FILM
						NUC. ENG. DEPT.		

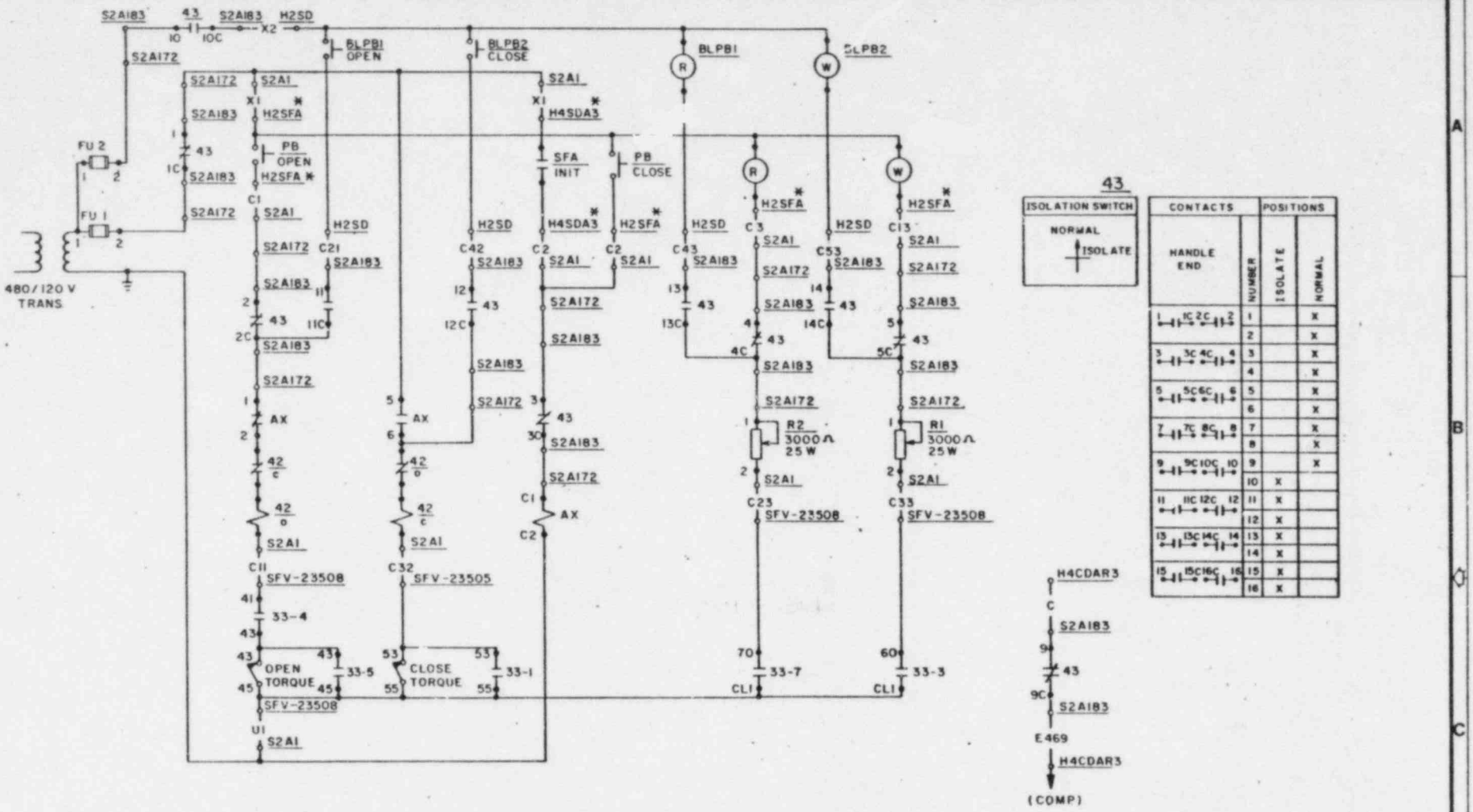
APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

SC. — DWG. SIZE C
DR. BY A. STANGL DATE 1-85
CHKD. BY DATE
LOCATION: RANCHO SECO NUCLEAR GENERATING STA., UNIT I
DESIGN ENGR. SUPV. ENGR. CHKD. ENGR. NUC. ENGR MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INDEX NO. DWG. NO. SK-E-203,SH.68 REVISION 0
W.O. NO.
MICROFILM SHT. NO. OF SHTS.



43

ISOLATION SWITCH

NORMAL

ISOLATE

CONTACTS HANDLE END	NUMBER	POSITIONS ISOLATE	NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9		X
	10	X	
11 11C 12C 12	11	X	
	12	X	
13 13C 14C 14	13	X	
	14	X	
15 15C 16C 16	15	X	
	16	X	

M.U. TANK ISOLATION VALVE SFV-23508 "A" SCHEME

* EQUIPMENT LOCATED IN CONTROL ROOM

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR	MANAGER NUC. ENG. DEPT.	FILM

APERTURE CARD NUMBER

DR. BY BWO

CHKD. BY

SIZE C

DATE 1-29-85

DATE

TITLE

ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

LOCATION RANCHO SECO NUCLEAR GENERATING STA., UNIT 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR MGR. | RELEASE DATE

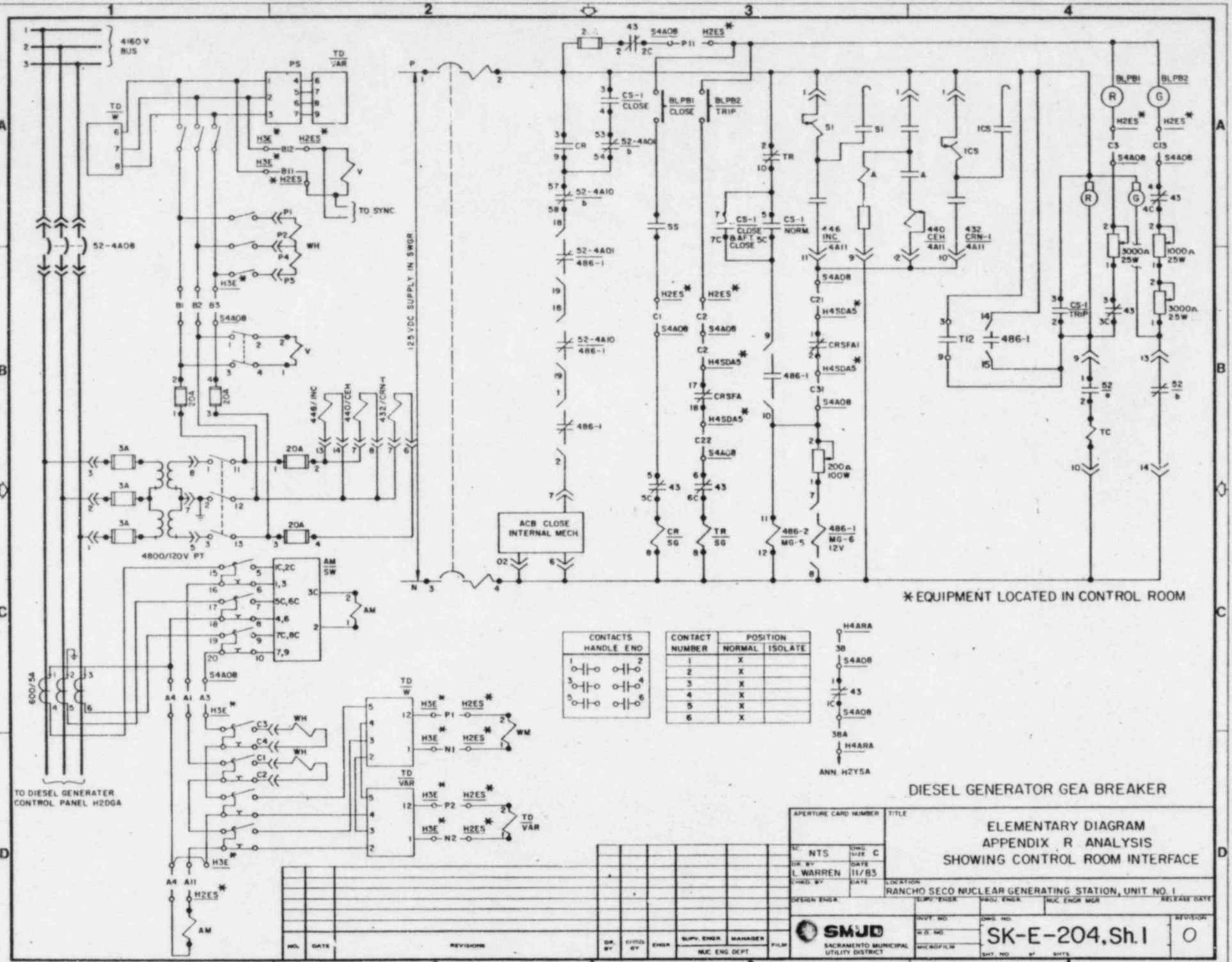
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

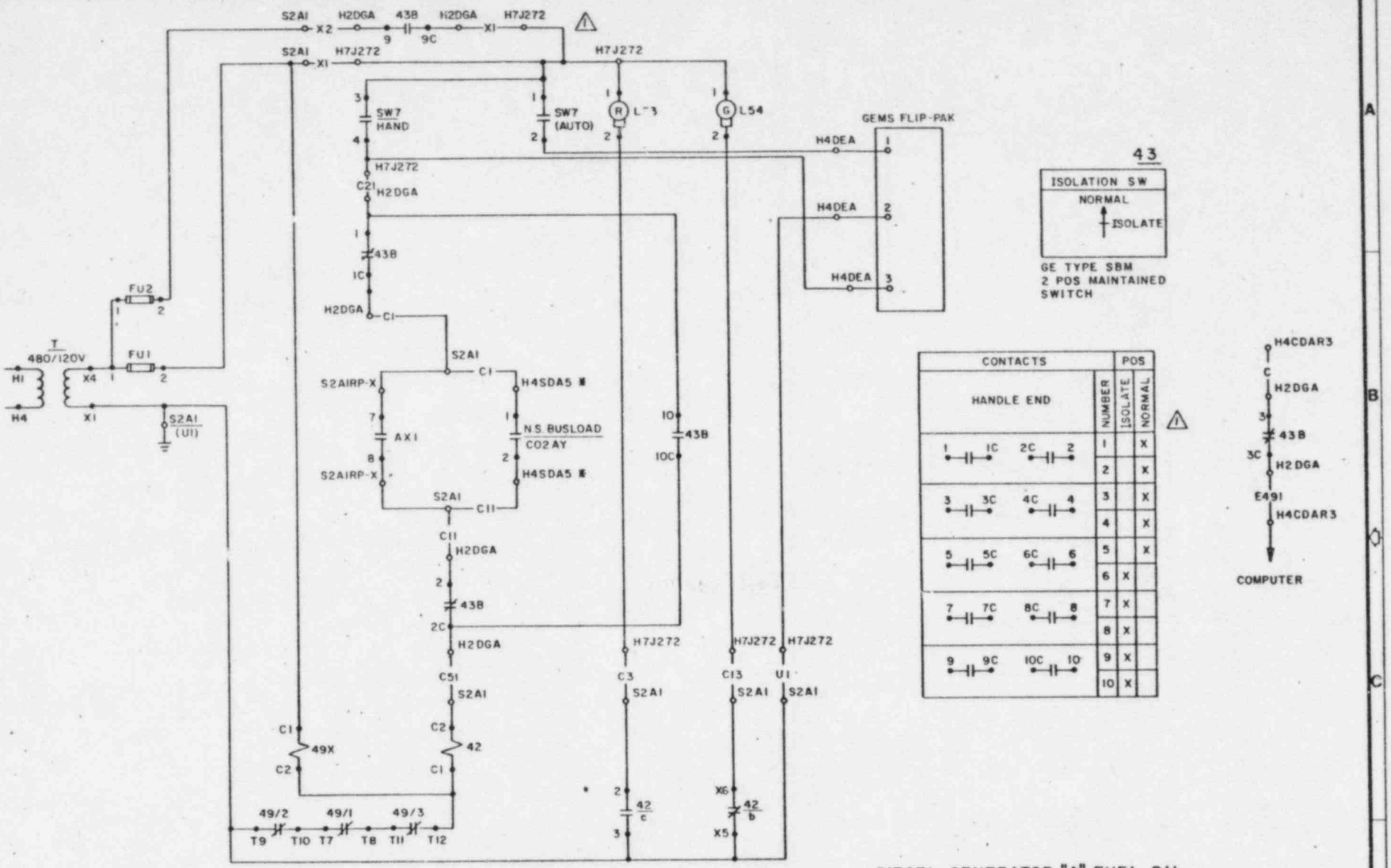
PROJ. NO. | W.O. NO. | MICROFILM

DWG. NO. SK-E-203, Sh.97

REVISION 0

SHT. NO. OF SHTS.


4160 V BUS
52-4A08
TO SYNC.
WH
125 VDC SUPPLY IN SWGR
ACB CLOSE INTERNAL MECH
52-4A01 486-1
52-4A10 486-1
486-1
CS-1 CLOSE
BLPB1 CLOSE
BLPB2 TRIP
CR SG
TR SG
CS-1 CLOSE & AFT CLOSE
CS-1 NORM
446 INC 4A11
440 CEH 4A11
432 CRN-1 4A11
486-2 MG-5
486-1 MG-6 12V
200Ω 100W
CS-1 TRIP
T12
TC
3000Ω 25W
1000Ω 25W
4800/120V PT
600/5A
TO DIESEL GENERATER CONTROL PANEL H20GA
AM SW
AM
TD W
TD VAR
WM
ANN H2YSA
* EQUIPMENT LOCATED IN CONTROL ROOM
CONTACTS HANDLE END
CONTACT NUMBER
POSITION NORMAL ISOLATE
DIESEL GENERATOR GEA BREAKER
ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE
RANCHO SECO NUCLEAR GENERATING STATION, UNIT NO. 1
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SK-E-204, Sh. 1
REVISION 0
G-003



SCHEME IMIAII3

* EQUIPMENT IN CONTROL ROOM

DIESEL GENERATOR "A" FUEL OIL TRANSFER PUMP P-888A

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR.	MANAGER	FILM
1	5/21/85		BNB	[illegible]		NUC. ENG DEPT.		

APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM APPENDIX "R" ANALYSIS SHOWING CONTROL ROOM INTERFACE

DWG SIZE: C

DRAFT BY: WO

DATE: 1-17-85

CHKD. BY

DATE

LOCATION: RANCHO SECO NUCLEAR GENERATING STA., UNIT I

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR MGR. | RELEASE DATE

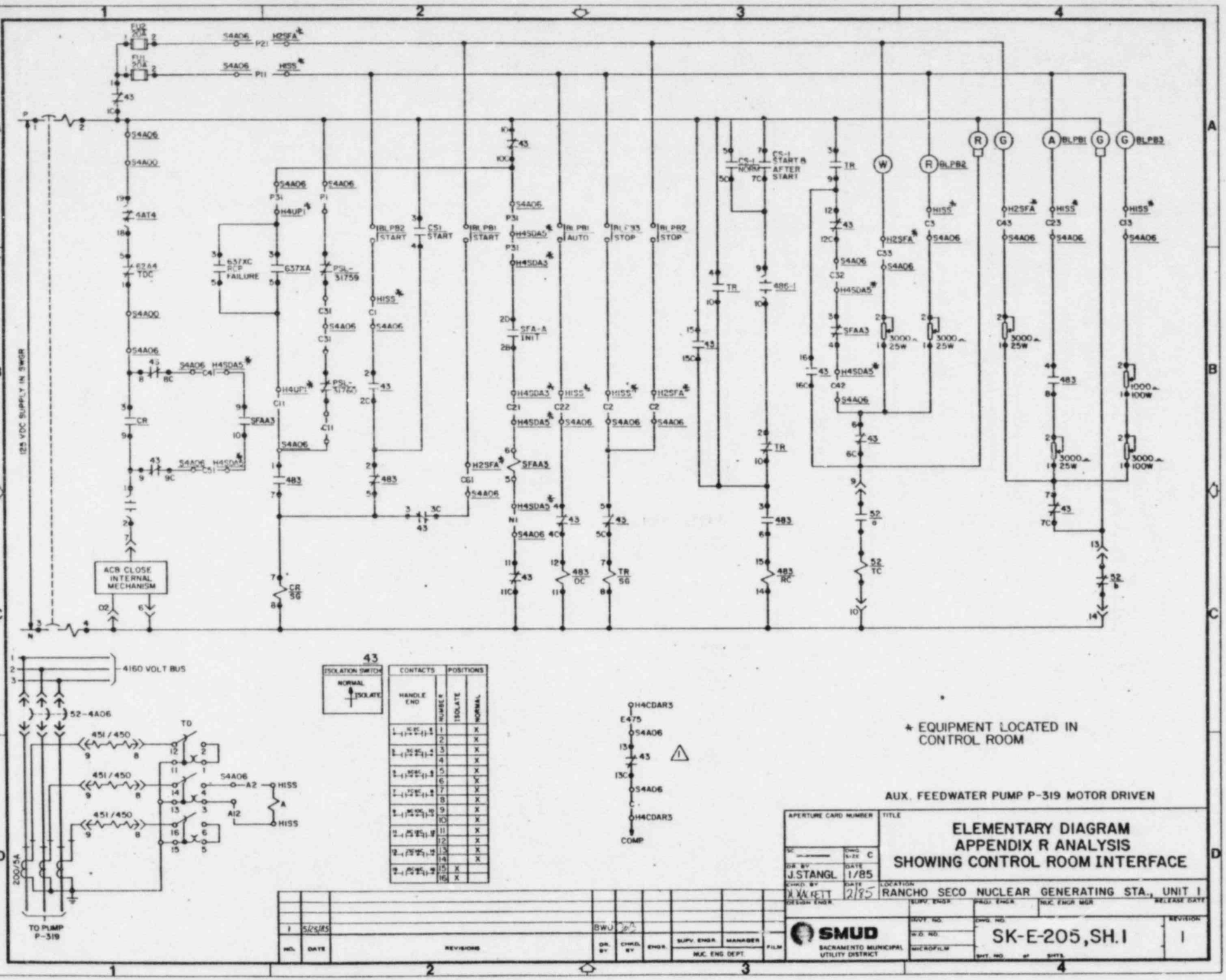
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

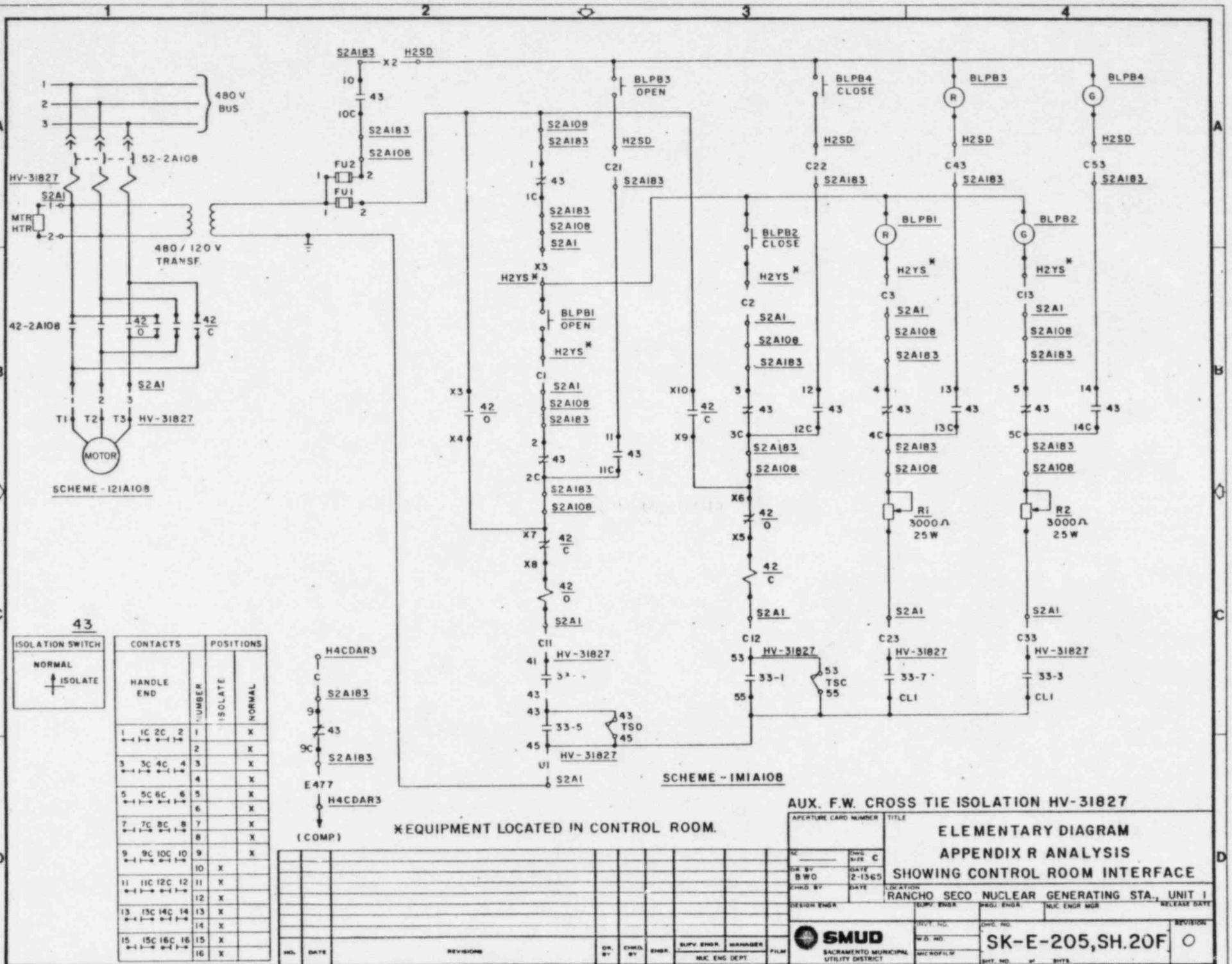
INDEX NO. | W.O. NO. | MICROFILM

DWG. NO. SK-E-204, SH. IIA

REVISION 1

SHT. NO. | OF SHTS.


125 VDC SUPPLY IN SWGR
ACB CLOSE INTERNAL MECHANISM
4160 VOLT BUS
52-4A06
TO PUMP P-319
43
ISOLATION SWITCH
NORMAL
ISOLATE
CONTACTS
POSITIONS
HANDLE END
NUMBER
ISOLATE
NORMAL
* EQUIPMENT LOCATED IN CONTROL ROOM
AUX. FEEDWATER PUMP P-319 MOTOR DRIVEN
APERTURE CARD NUMBER
TITLE
ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE
DR BY J.STANGL 1/85
DESIGN ENGR
LOCATION RANCHO SECO NUCLEAR GENERATING STA., UNIT 1
SUPV. ENGR
PROJ. ENGR
NUC. ENGR MGR
RELEASE DATE
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
DWG. NO. SK-E-205,SH.1
REVISION 1
1 5/25/85 BWJ
REVISIONS
DR. BY
CHKD. BY
ENGR.
SUPV. ENGR.
MANAGER
NUC. ENG. DEPT.
FILM



43

ISOLATION SWITCH	
NORMAL	
ISOLATE	

CONTACTS HANDLE END	NUMBER	POSITIONS ISOLATE	NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9		X
	10	X	
11 11C 12C 12	11	X	
	12	X	
13 13C 14C 14	13	X	
	14	X	
15 15C 16C 16	15	X	
	16	X	

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR. NUC. ENG. DEPT.	MANAGER	FILM

AUX. F.W. CROSS TIE ISOLATION HV-31827

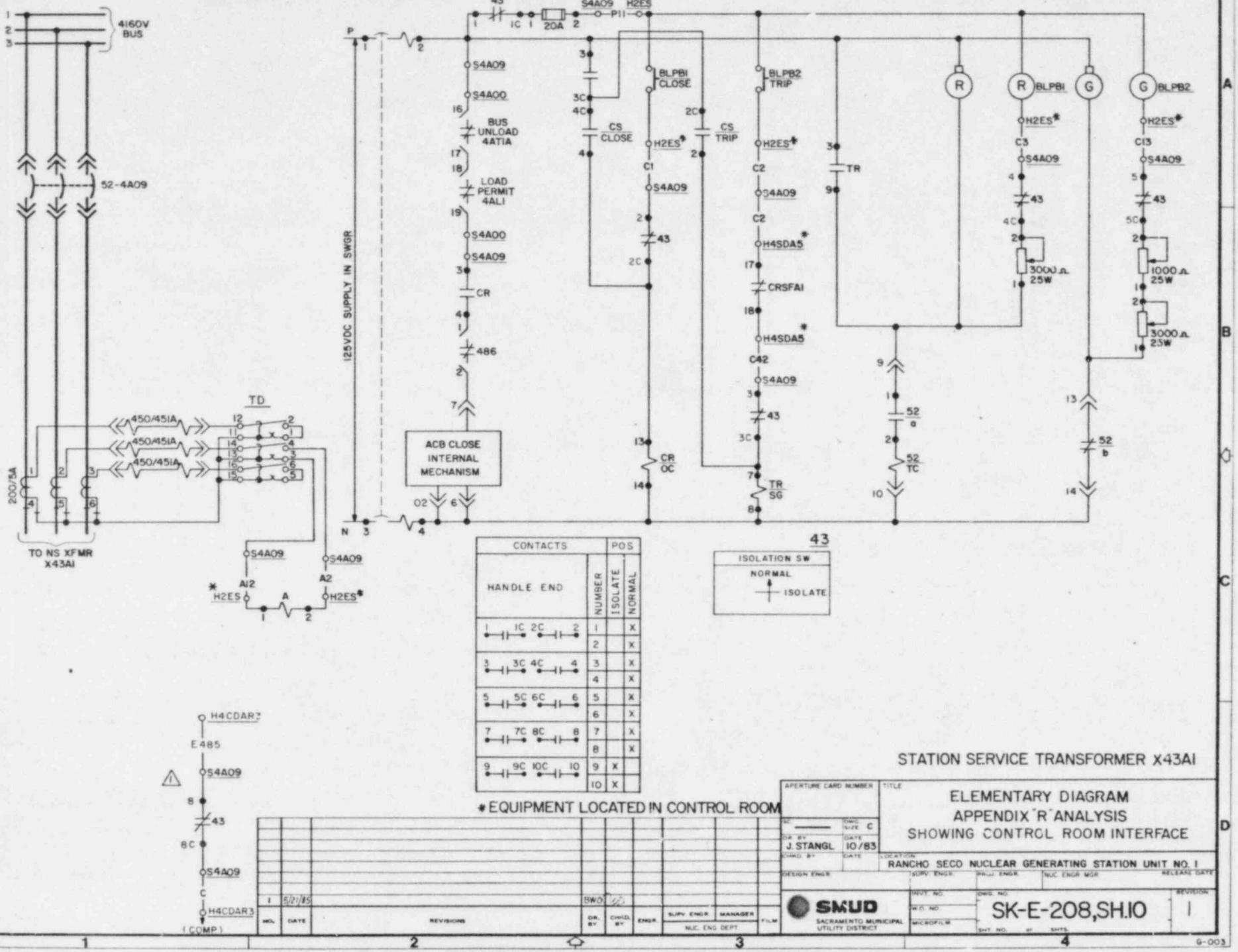
APERTURE CARD NUMBER	TITLE
	ELEMENTARY DIAGRAM APPENDIX R ANALYSIS SHOWING CONTROL ROOM INTERFACE
DR. BY: BWO	DATE: 2-1365
CHKD. BY	DATE
LOCATION: RANCHO SECO NUCLEAR GENERATING STA., UNIT 1	
DESIGN ENGR.	SUPV. ENGR. / PROJ. ENGR. / NUC. ENGR MGR. / RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO. SK-E-205, SH. 20F

REVISION 0

SHT. NO. / SHTS



CONTACTS		POS	
HANDLE END	NUMBER	ISOLATE	NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9	X	
	10	X	

43
ISOLATION SW
NORMAL
ISOLATE

* EQUIPMENT LOCATED IN CONTROL ROOM

STATION SERVICE TRANSFORMER X43AI

								SUPV. ENGR.	MANAGER
								NUC. ENG. DEPT.	
1	5/21/85	REVISIONS	SWO						FILM
NO.	DATE		DR. BY	CHKD. BY	ENGR.				

APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX 'R' ANALYSIS
SHOWING CONTROL ROOM INTERFACE

DR. BY: J. STANGL — DATE: 10/83 — SIZE: C
CHKD. BY — DATE
DESIGN ENGR. — SUPV. ENGR. — PROJ. ENGR. — NUC. ENGR MGR. — RELEASE DATE

LOCATION: RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

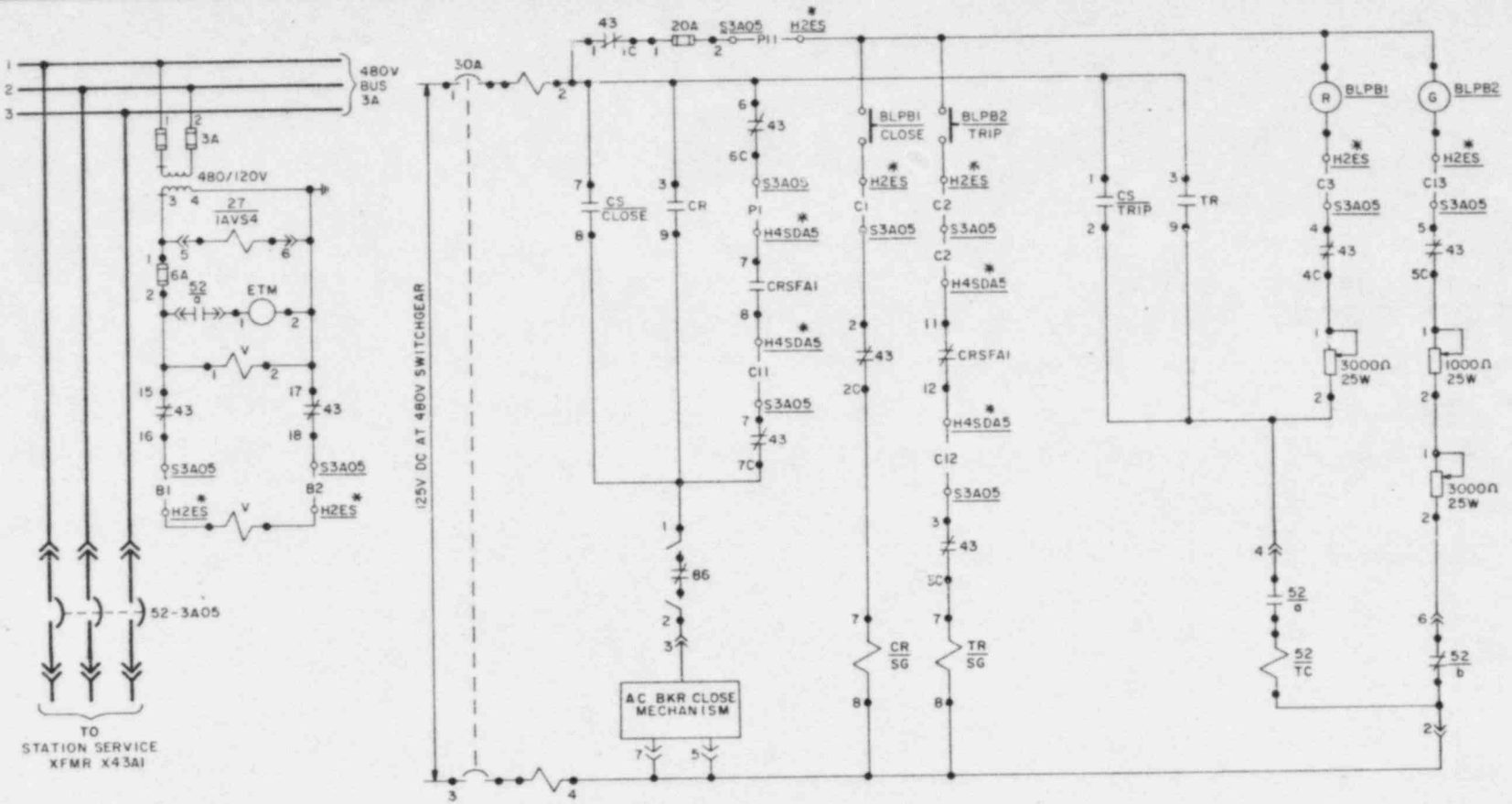
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO. — W.O. NO. — MICROFILM

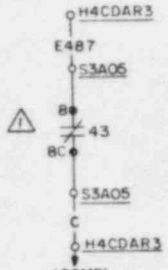
DWG. NO. SK-E-208,SH.10 — REVISION 1

SHT. NO. — OF — SHTS.

9-003



CONTACTS		POS.	
HANDLE END	NUMBER	ISOLATE	NORMAL
1 1C 2C 2	1		X
	2		X
3 3C 4C 4	3		X
	4		X
5 5C 6C 6	5		X
	6		X
7 7C 8C 8	7		X
	8		X
9 9C 10C 10	9	X	
	10	X	



✱ EQUIPMENT LOCATED IN CONTROL ROOM

480V SWGR 3A BUS SUPPLY

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR.	MANAGER
1	5/21/85	BWO 11				NUC. ENG. DEPT.	

APERTURE CARD NUMBER

TITLE: ELEMENTARY DIAGRAM
APPENDIX R ANALYSIS
SHOWING CONTROL ROOM INTERFACE

DR. BY: HJH DATE: 10/83
CHKD. BY: DATE:
DESIGN ENGR.: SUPV. ENGR.: PROJ. ENGR.: NUC. ENGR. MGR.: RELEASE DATE:

LOCATION: RANCHO SECO NUCLEAR GEN. STATION, UNIT NO 1

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVOY. NO.: W.O. NO.: MICROFILM:

DWG. NO.: SK-E-208, Sh. 13A

REVISION: 1

SHT. NO. OF SHTS.

G-003

SHEET NO.	TITLE
SK-I-1	SHEET INDEX
SK-I-2	LEGEND

SHEET NO.	DEVICE NO.	SYSTEM
SK-ICR-1	LT-20501	STEAM GEN. LEVEL WIDE RANGE, TRAIN A
-2	LT-20502	" " " " " " B
-5	LT-21503A	PRESSURIZER LEVEL
-6	LT-21503C	" "
-7	LT-23502	MAKE-UP TANK LEVEL
-8	PT-20519	STEAM GEN. WIDE RANGE PRESSURE
-9	PT-20520	" " " " "
-10	XE-00005&6	SOURCE RANGE NEUTRON FLUX
-11	PT-20543	STEAM GEN. WIDE RANGE PRESSURE
-12	PT-21042/ PT-21043	RCS PRESSURE WIDE RANGE
-13	PT-21092/ PT-21099	RCS PRESSURE WIDE RANGE
-14	TE-21023A/ TE-21023B	RCS COLD LEG WATER TEMP.
-15	TE-21024A/ TE-21024B	RCS COLD LEG WATER TEMP.
SK-ICR-16	TE-21029/ TE-21030/ TE-21033/ TE-21034	RCS TEMP. WIDE RANGE TO T-SAT METER

SHEET NO.	DEVICE NO.	SYSTEM
SK-ISD-1	LT-20501A	STEAM GEN. E-205A, WIDE RANGE
-2	LT-20502A	" " E-205B, " "
-3	LT-21503B	PRESSURIZER LEVEL, TRAIN 'A'
-4	LT-21503D	" "
-5	LT-23502C	MAKE-UP TANK LEVEL
-6	PT-20543C	STEAM GEN. E-205A, WIDE RANGE
-7	PT-20543D	" " E-205B, " "
-8	PT-21050	RCS PRESSURE LOOP 21050A
-9	PT-21051	RCS PRESSURE LOOP 21051A
-10	TE-21024C	RCS TEMP. COLD LEG 'B'
-11	TE-21025C	" " " " 'A'
-12	TE-21031A	RCS TEMP. T_H WIDE RANGE LOOP 'A'
-13	TE-21032B	" " " " " " 'B'
SK-ISD-14	XE-00005	PORTABLE SOURCE RANGE NEUTRON FLUX

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
2	6-21-85	CS	LKW			
1	2-18-85	RK	LKW			

APERTURE CARD NO.

TITLE: SHEET INDEX
APPENDIX R ANALYSIS

SC. —— DWG. SIZE A

DR. BY J. STANGL DATE 11/83

CHKD. BY LKW DATE 11/83

LOCATION: RANCHO SECO NUCLEAR GENERATING STATION UNIT NO.1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | ENGR. MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO. | W.O. NO. | MICROFILM

DWG. NO. SK-I-1

REV. 2

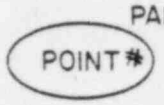
SHT. NO. of SHTS.

SYMBOLS

1. INSTRUMENT

PLANT LOCATION
(RB) REACTOR BLDG

4. COMPUTER

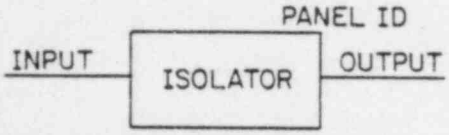


2. INDICATION

PLANT LOCATION
(EOF) EMERGENCY OPERATIONS FACILITY
(E.SWGR) EAST SWITCHGEAR ROOM
(TSC) TECHNICAL SUPPORT CENTER
(W.SWGR) WEST SWITCHGEAR ROOM

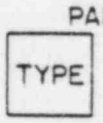
5. DISPLAY

3. ISOLATION



NOTE:
OPEN OR SHORT ON THE OUTPUT
HAS NO EFFECT ON THE INPUT.

6. PLANT INPUTS



7. DEVICE IDENTIFICATION

XX - XXXX

- NUMERICAL IDENTIFIER
- E ELEMENT
  T TRANSMITTER
  R RECORDER
  I INDICATOR
  Y RELAY, BLIND
  S SWITCH
- T TEMPERATURE
  P PRESSURE
  L LEVEL
  H HAND

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM

APERTURE CARD NO.

TITLE

LEGEND
APPENDIX R ANALYSIS

SC. —— DWG. SIZE A

DR. BY J.STANGL DATE 11/83

CHKD. BY DATE

DESIGN ENGR.

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT NO. 1

SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

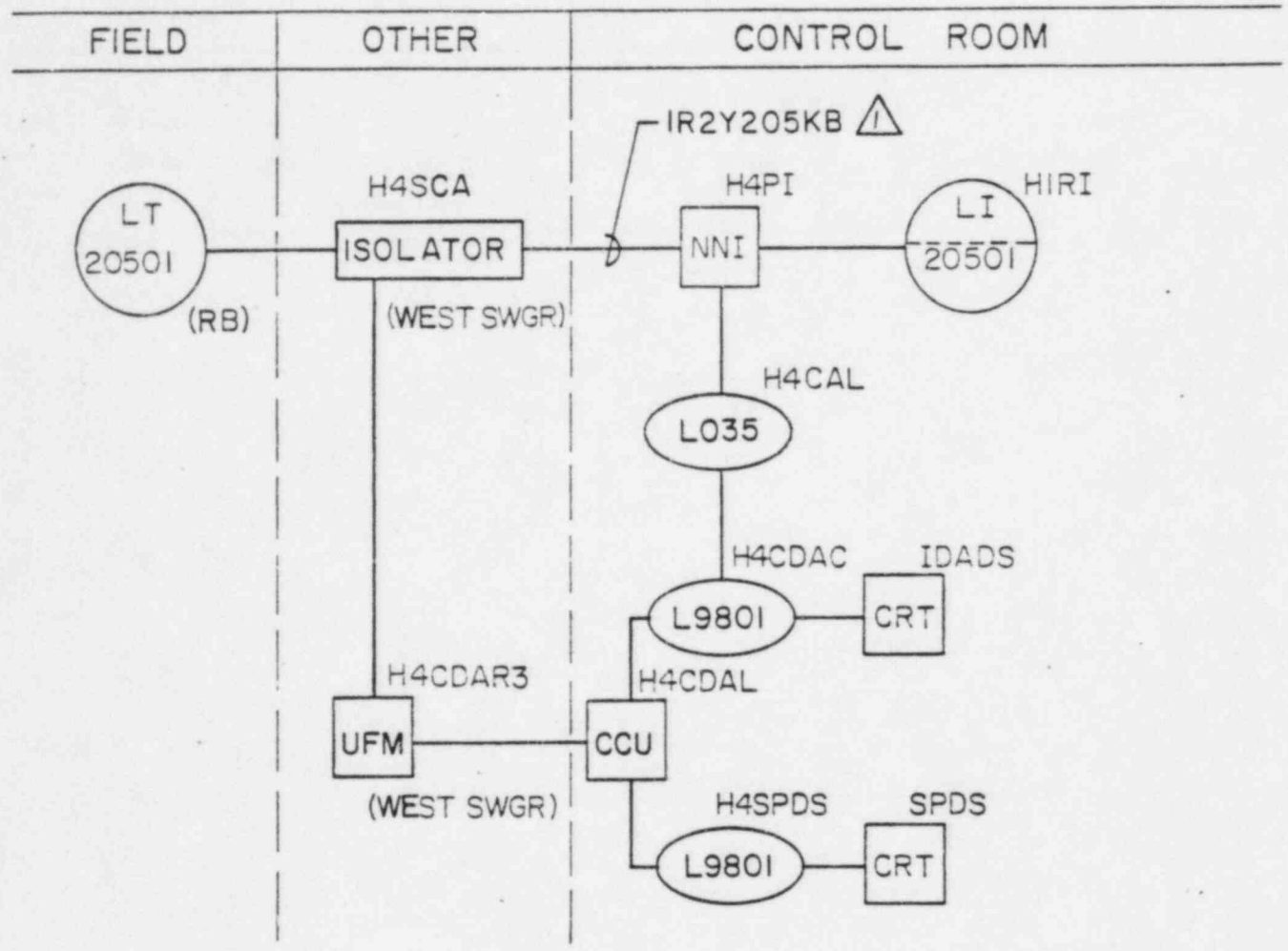
W.O. NO.

MICROFILM

DWG. NO. SK-I-2

REV. O

SHT. NO. of SHTS.



WIDE RANGE STEAM GENERATOR LEVEL
LOOP 20501 TRAIN-A

1	2-19-85	BWO	LKW			
NO.	DATE	DR BY	CHKD. BY	ENGR.	SUPV. ENGR.	FILM

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. ——— DWG. SIZE A

DR. BY RATLIFF DATE 11-7-83

CHKD. BY DATE

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

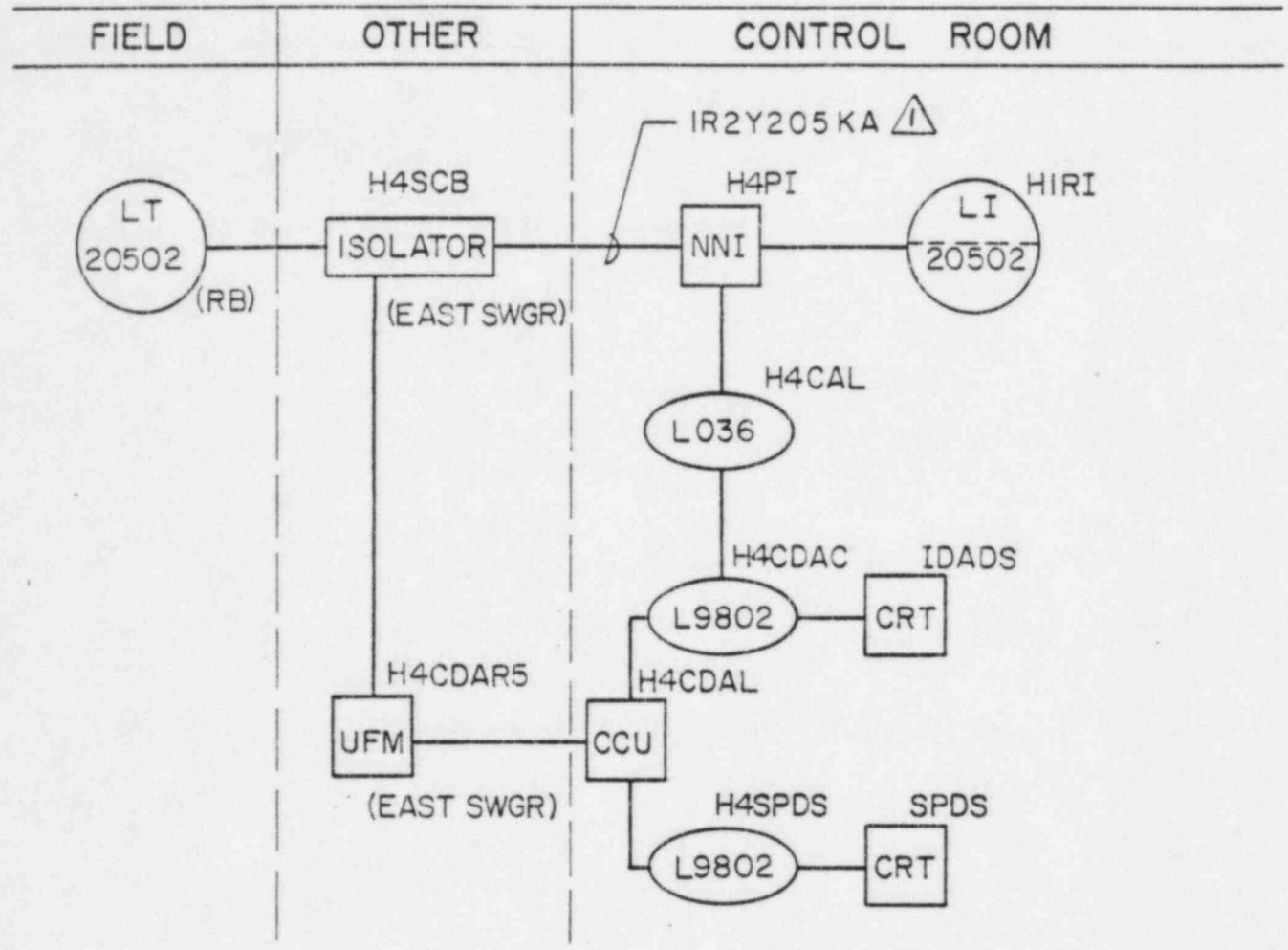
DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO.
SK-ICR-1
SHT. NO. of SHTS.

REV.
1



WIDE RANGE STEAM GENERATOR LEVEL
LOOP 20502 TRAIN-B

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

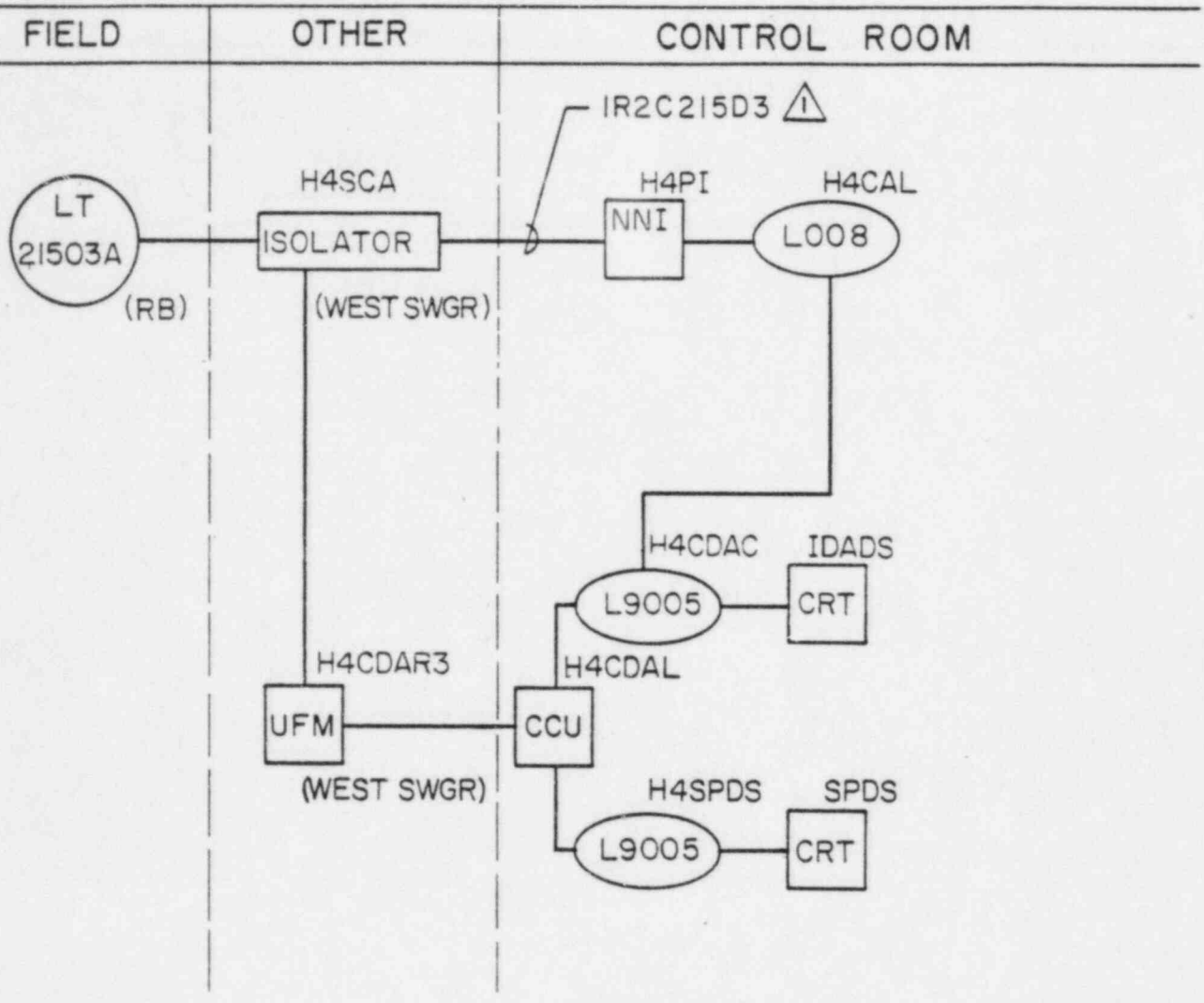
SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 11-7-83
CHKD. BY DATE
DESIGN ENGR.
LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-2
SHT. NO. of SHTS.

REV. 1



PRESSURIZER LEVEL LOOP 21503A

NO.	DATE	DR BY	CHKD. BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APERT CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. ____ DWG. SIZE A

DR. BY RATLIFF DATE 11-4-83

CHKD. BY DATE

DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

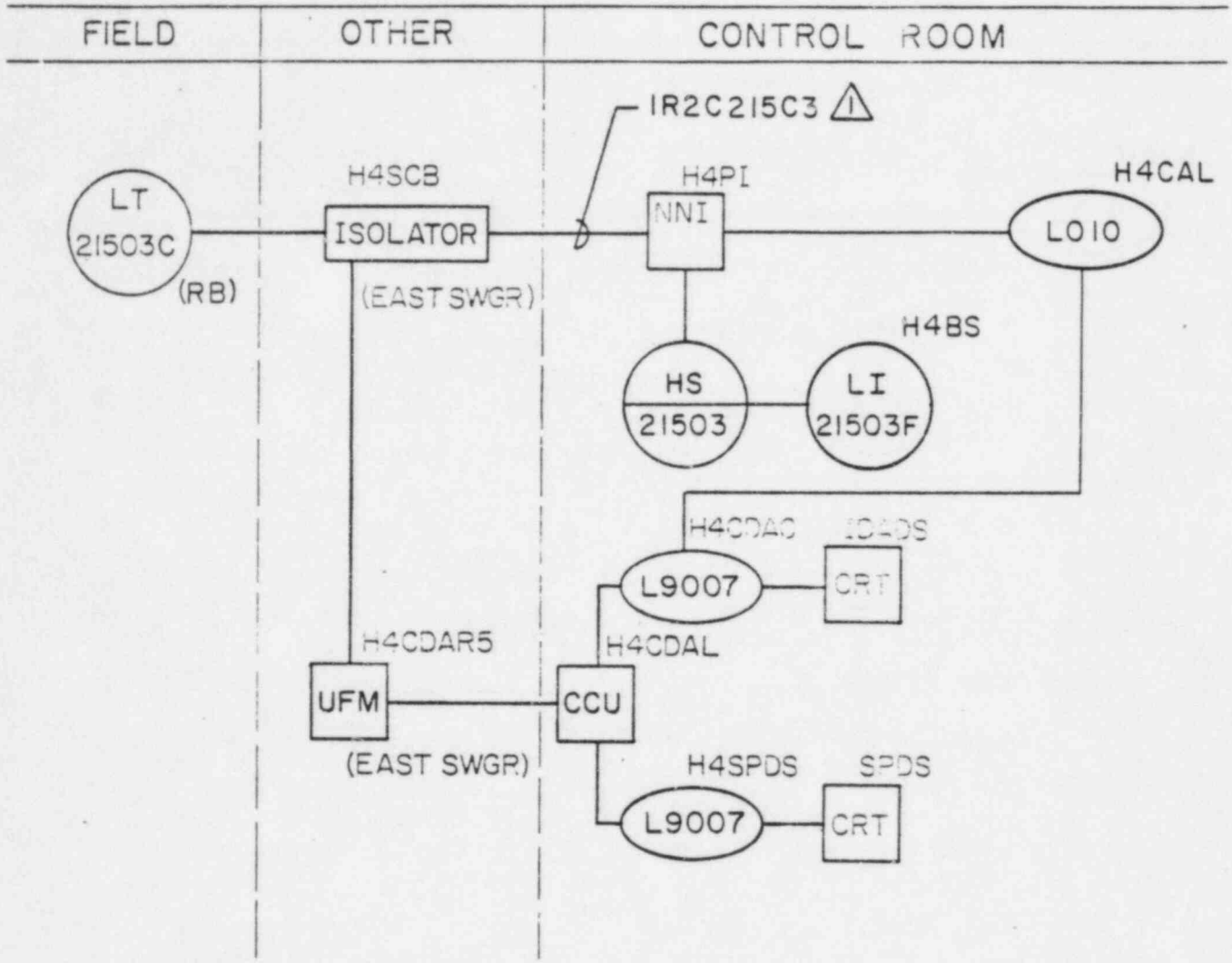
LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO. DWG. NO. REV.

W.O. NO. SK-ICR-5 1

MICROFILM SHT. NO. of SHTS.



PRESSURIZER LEVEL LOOP 21503C

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 11-4-83
CHKD. BY DATE
DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

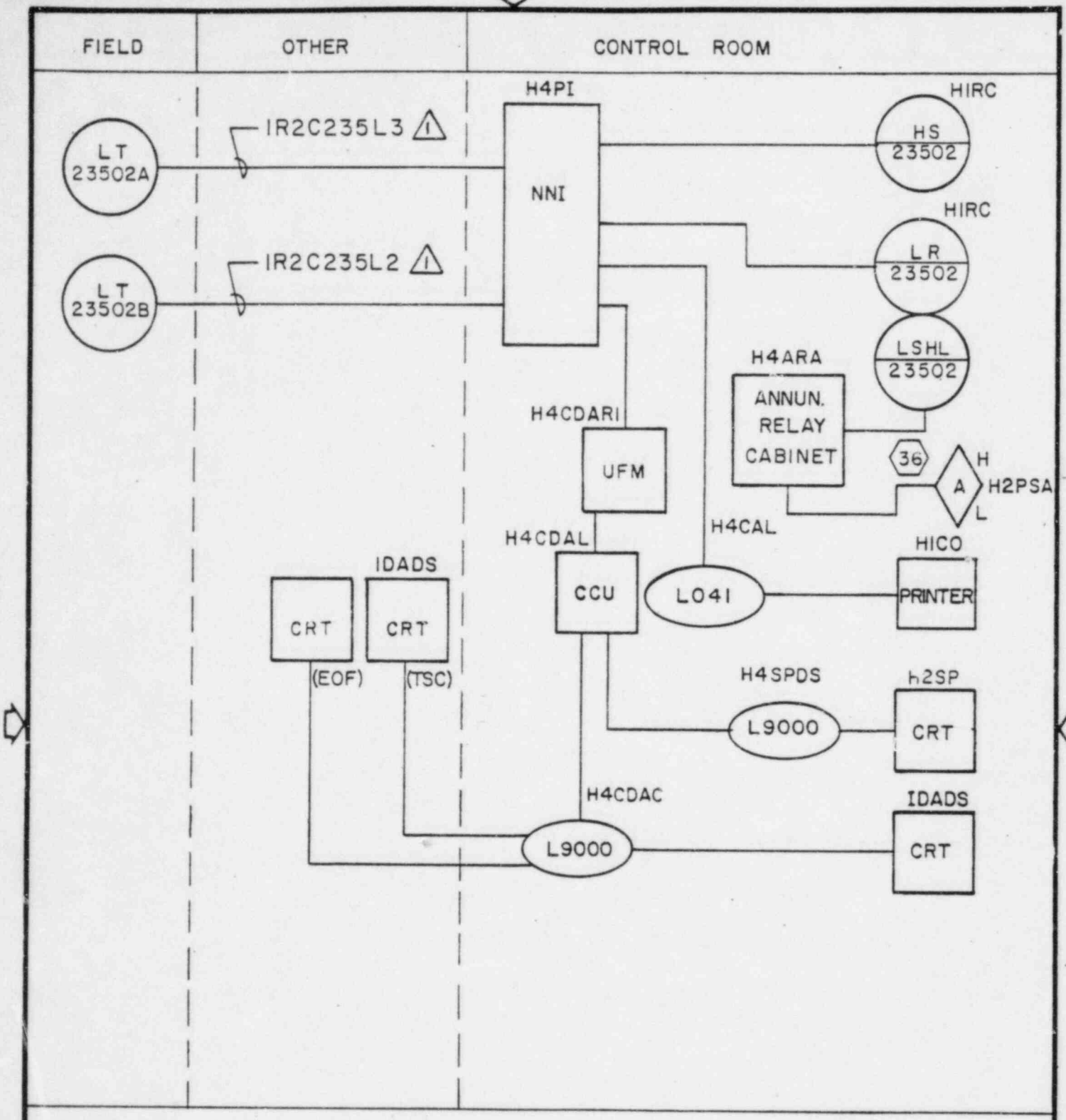
LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-6
SHT. NO. of SHTS.

REV. 1



MAKE-UP TANK LEVEL

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APER. CARD NO.

LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. NTS	DWG. SIZE A
DR. BY G.F.B.	DATE 11-4-83
CHKD. BY	DATE
DESIGN ENGR.	SUPV. ENGR. / PROJ. ENGR. / ENGR. MGR. / RELEASE DATE

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

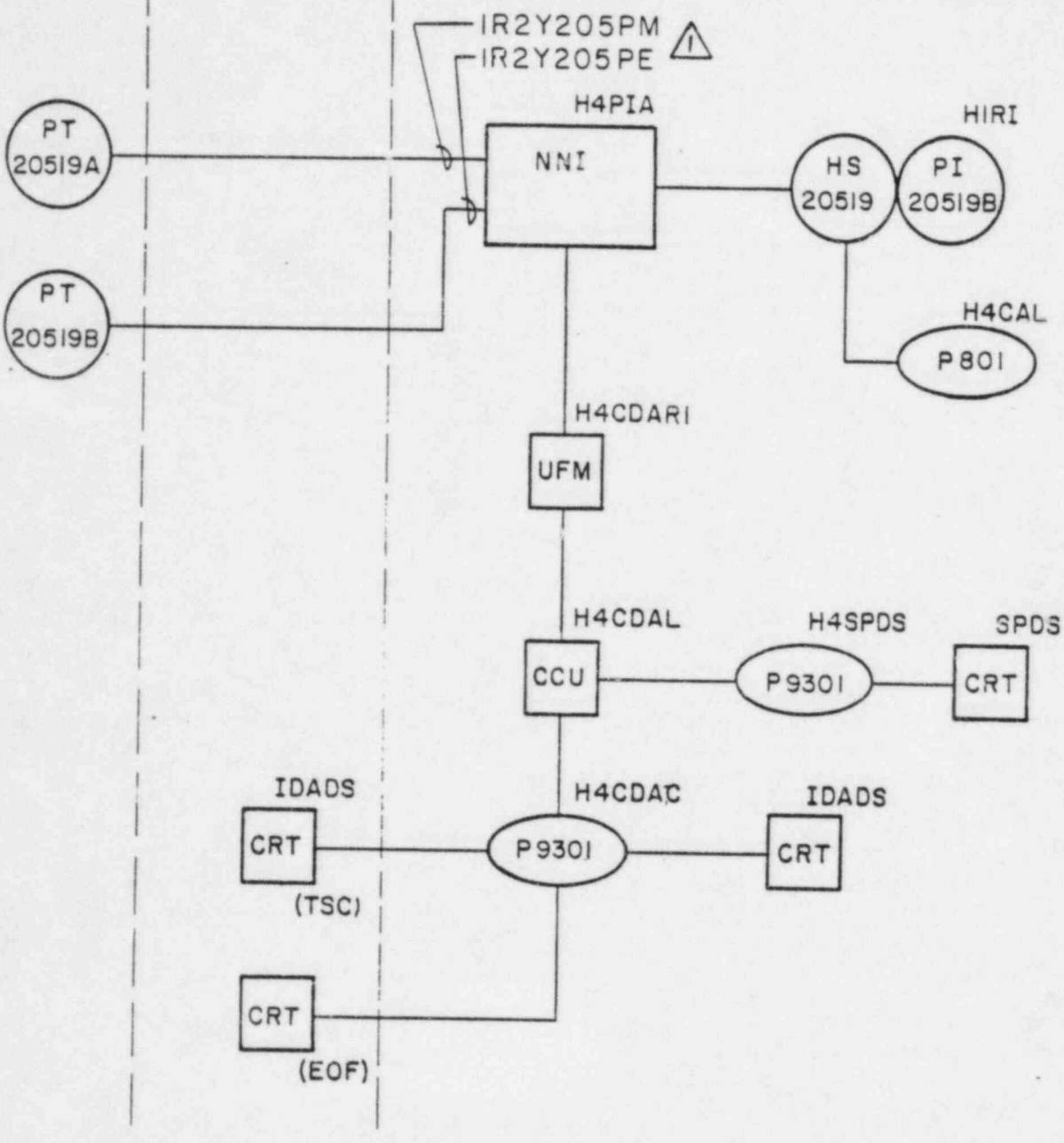
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-7

SHT. NO. of SHTS.

REV. 1



STEAM GENERATOR A WIDE RANGE PRESSURE LOOP

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APERT CARD No.

TITLE LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —— DWG. SIZE A
DR. BY RATLIFF DATE 11-9-83
CHKD. BY DATE
DESIGN ENGR.

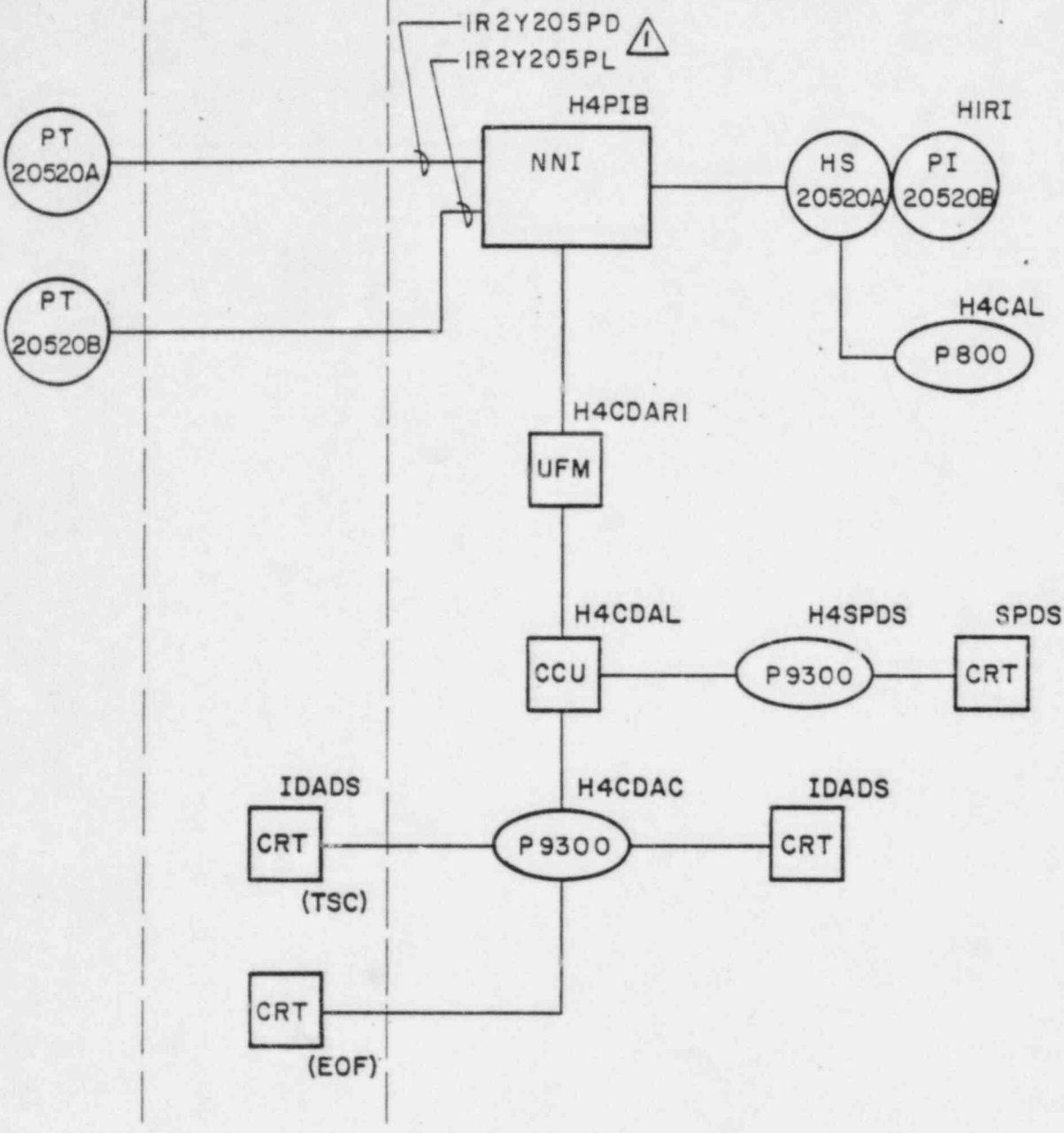
LOCATION RANCHO SECO GENERATION STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-8
SHT. NO. of SHTS.

REV. 1



STEAM GENERATOR B WIDE RANGE PRESSURE LOOP 20520

1	2-19-85	BWO	LKW			
NO.	DATE	DR BY	CHKD. BY	ENGR.	SUPV. ENGR.	FILM

APERT CARD No.

TITLE LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —— DWG. SIZE A

DR. BY RATLIFF DATE 11-9-83

CHKD. BY DATE

LOCATION RANCHO SECO GENERATION STATION UNIT No. 1

DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

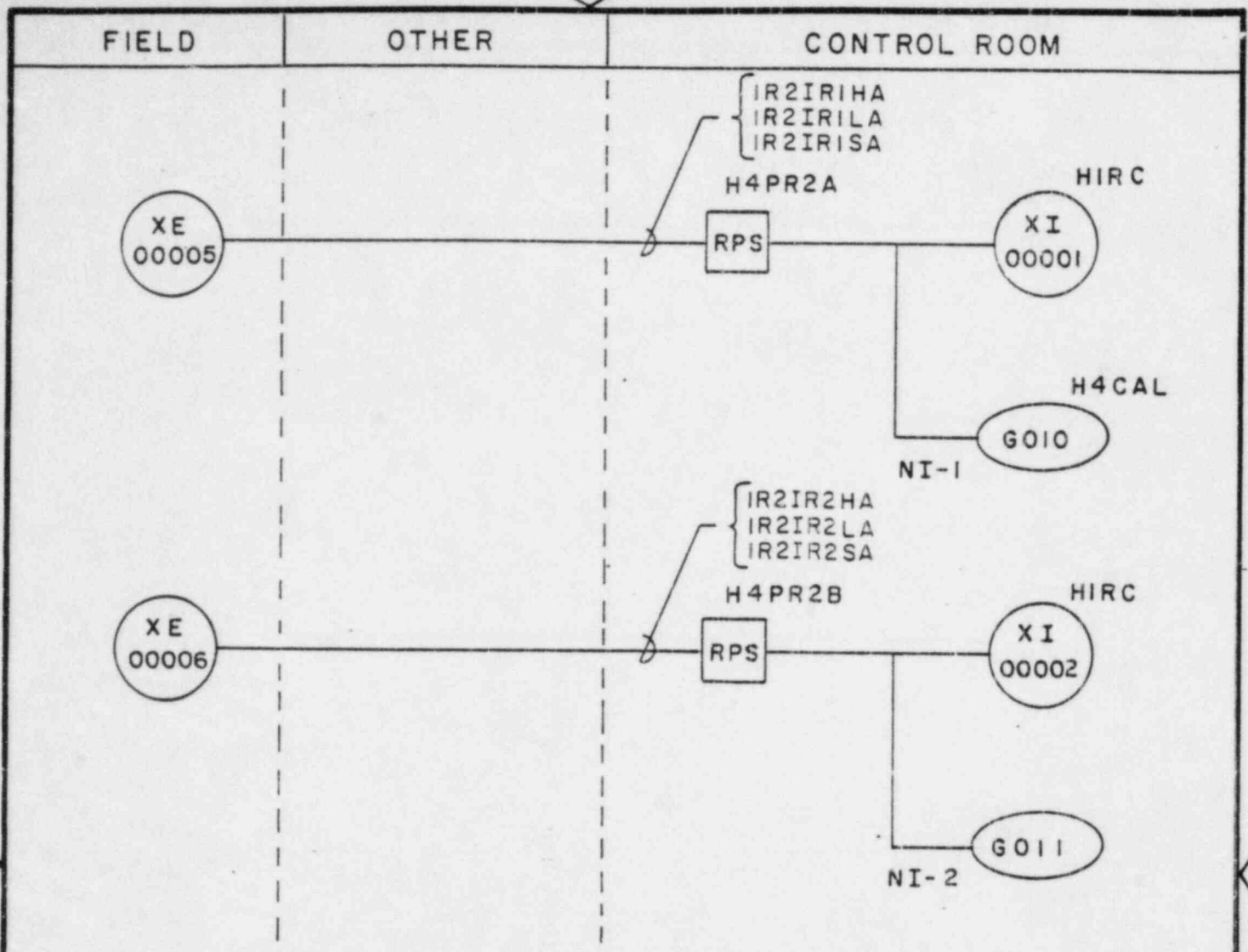
W.O. NO.

MICROFILM

DWG. NO. SK-ICR-9

SHT. NO. SHTS.

REV. 1



SOURCE RANGE NEUTRON FLUX INDICATION

NO.	DATE	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR.	MANAGER		FILM
					GEN. ENG. DEPT.			

APERT. CARD NO.

TITLE

LOOP DIAGRAM APPENDIX R ANALYSIS CONTROL ROOM DISPLAY

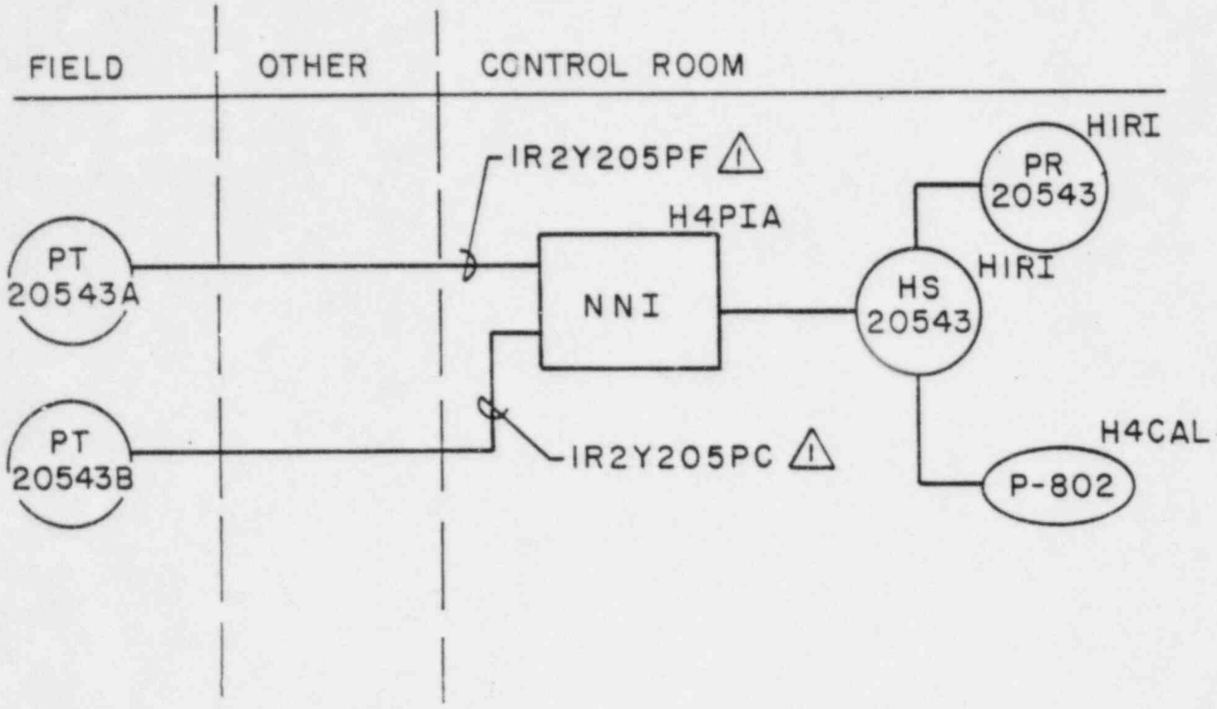
SC. ____	DWG. SIZE A
DR. BY BWO	DATE 2-85
CHK'. BY	DATE

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No 1

DESIGN ENGR.	SUPV. ENGR.	PROJ. ENGR.	GEN. ENGR. MGR.	RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.	DWG. NO.	REV.
W.O. NO.	SK-ICR-10	0
MICROFILM	SHT. NO. of SHTS.	



STEAM GEN. WIDE RANGE
PRESSURE LOOP 20543

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-25-85	BWO				

APER CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —— DWG. SIZE A
DR. BY RK DATE 2/85
CHKD. BY LKW DATE 2-18-85
DESIGN ENGR.

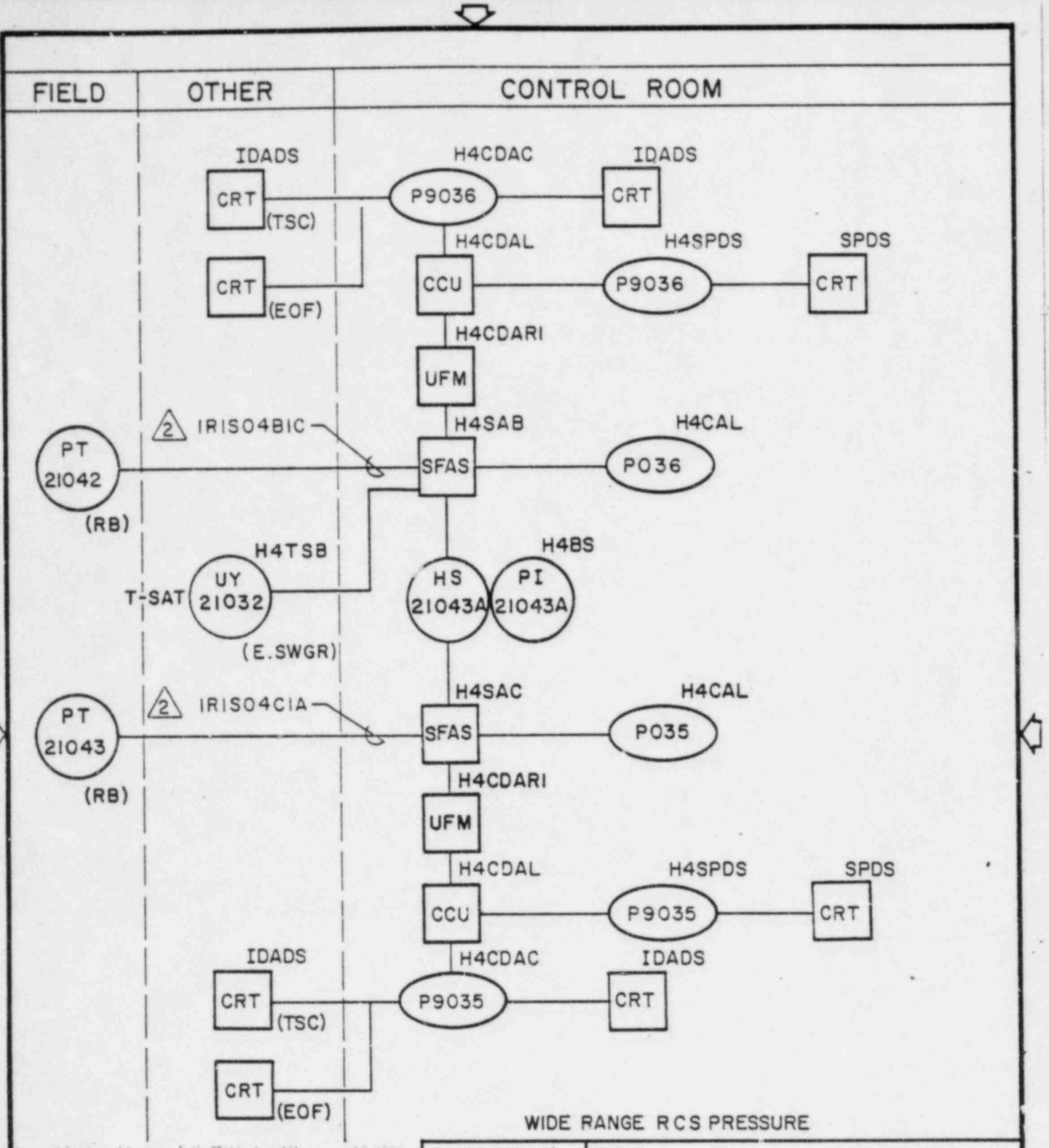
LOCATION
RANCHO SECO NUCLEAR GEN STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-11
SHT. NO. of SHTS.

REV. 1



WIDE RANGE RCS PRESSURE

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
2	2-19-85	BWO	V			
1	1-19-84	RK	V			

APERT CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —	DWG. SIZE A
DR. BY RATLIFF	DATE 11-9-83
CHKD. BY	DATE
DESIGN ENGR.	SUPV. ENGR. / PROJ. ENGR. / ENGR. MGR. / RELEASE DATE

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

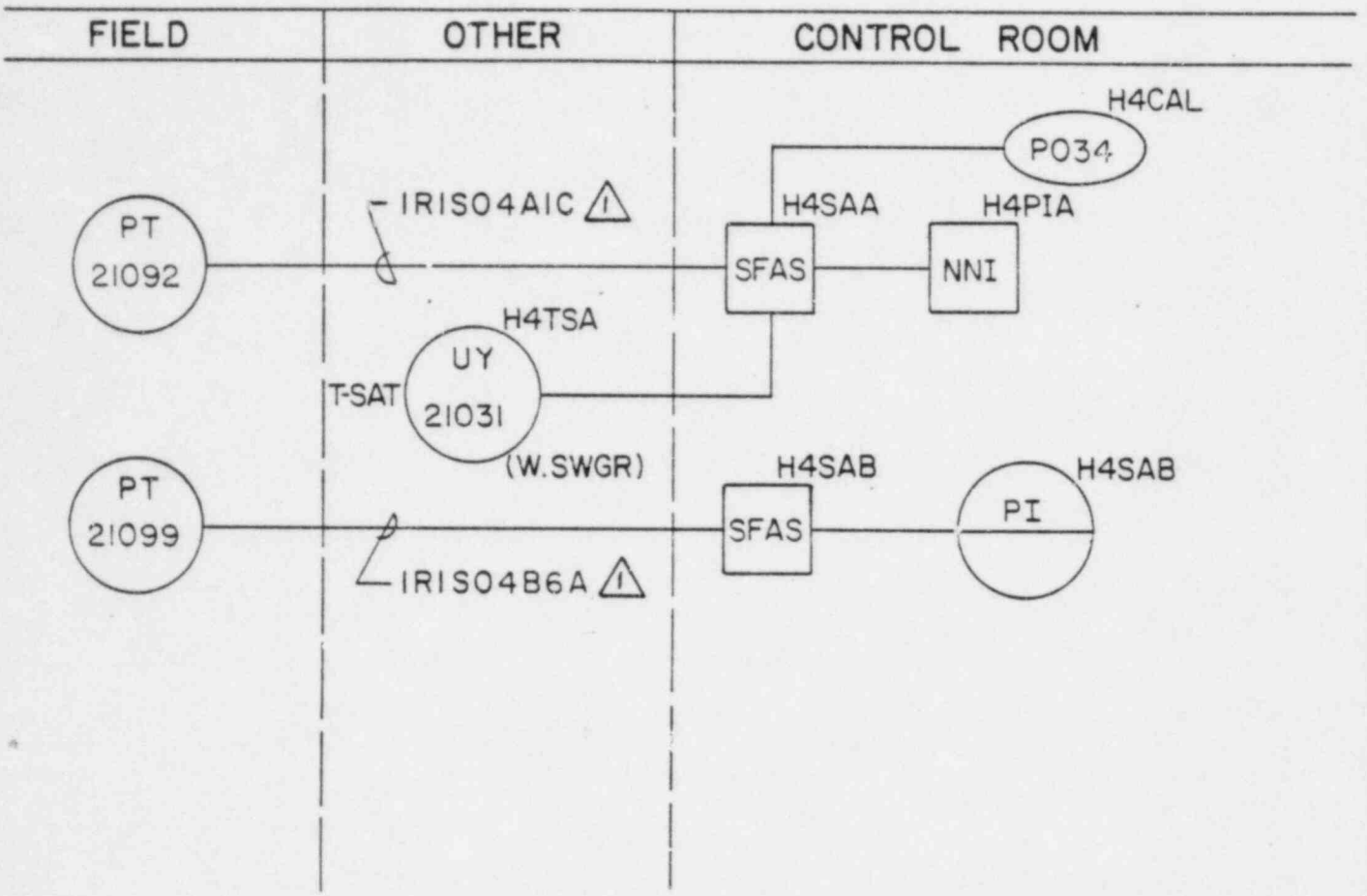
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ICR-12

REV. 2

SHT. NO. of SHTS.



WIDE RANGE RCS PRESSURE

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2-19-85	BWO	LKW			

APERTURE CARD NO.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —— DWG. SIZE A

DR. BY J. STANGL DATE 11/83

CHKD. BY DATE

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT NO. 1

DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

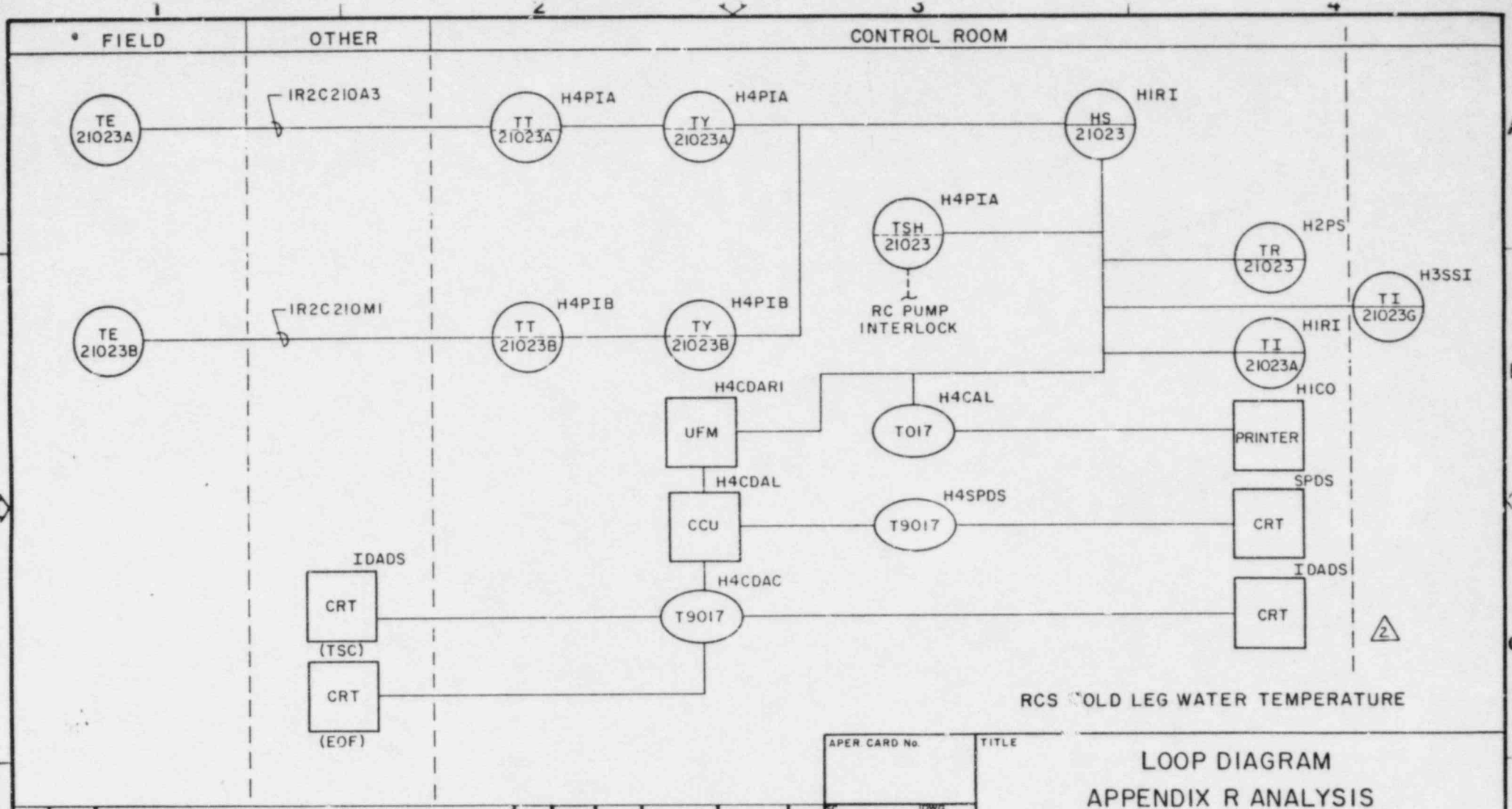
W.O. NO.

MICROFILM

DWG. NO. SK-ICR-13

REV. 1

SHT. NO. of SHTS.



APER. CARD No.	TITLE
	LOOP DIAGRAM APPENDIX R ANALYSIS CONTROL ROOM DISPLAY

SC. — DWG. SIZE B
DR. BY HJH DATE 11/83
CHKD. BY DATE

LOCATION: RANCHO SECO NUCLEAR GEN. STATION, UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | GEN. ENGR. MGR. | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

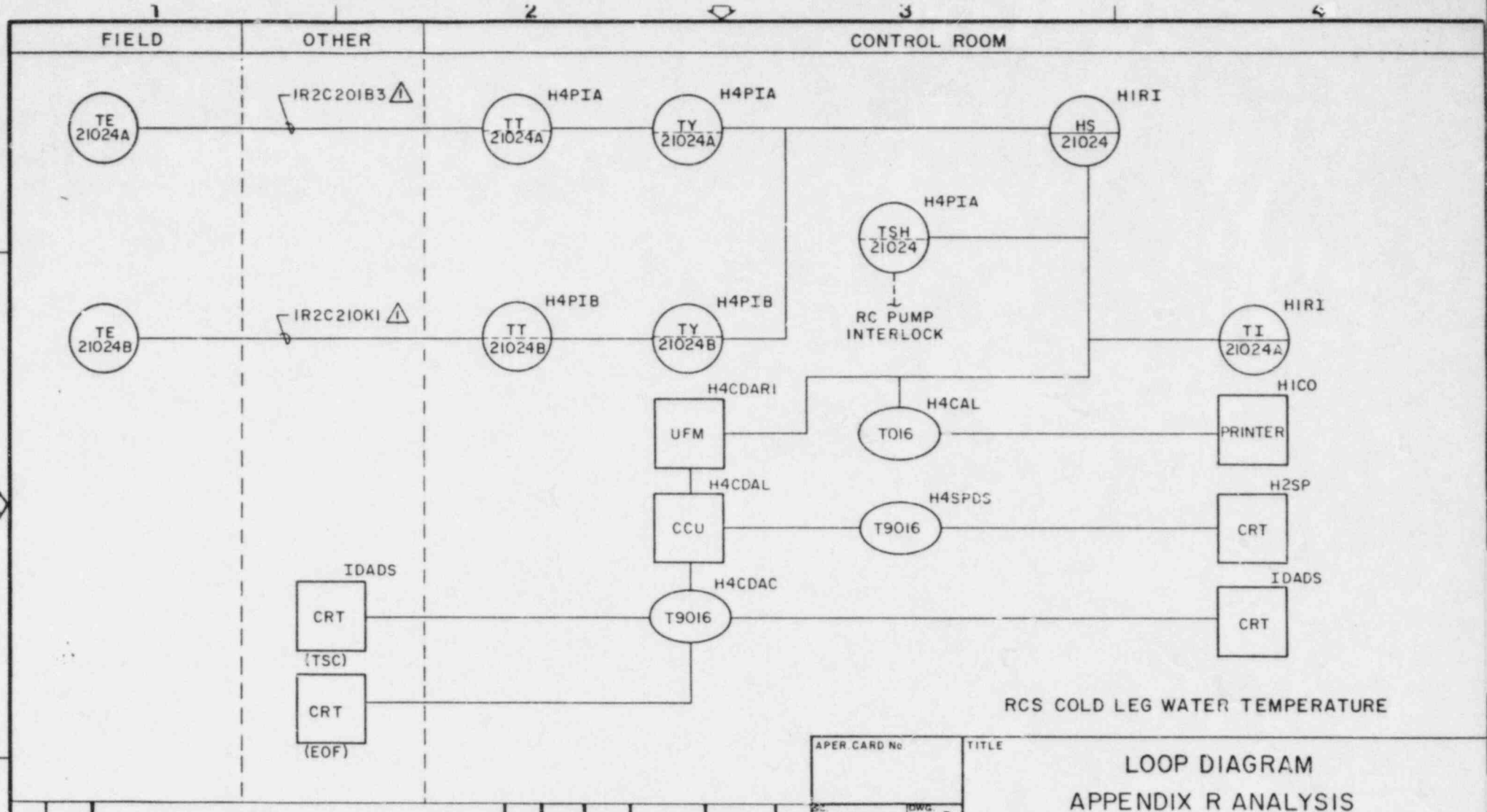
INVT. NO. | W.O. NO. | MICROFILM

DWG. NO. SK-ICR-14 | REVISION 2

SHT. NO. of SHTS.

NO.	DATE	REVISIONS	DR BY	CHKD BY	ENG'R	SUPV. ENGR.	MANAGER	FILM
2	5-25-85		BWO	[illegible]		GEN. ENG. DEPT.		
1	2-19-85		BWO	LSW				

G-0



NO.	DATE	REVISIONS	DR BY	CHCKD BY	ENG'R	SUPV. ENGR. / GEN. ENG. DEPT.	MANAGER	FILM
1	2-19-85		BWO	LKW				

APER. CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

DWG. SIZE B

DR. BY HJH

DATE 11/83

CHKD. BY

DATE

LOCATION
RANCHO SECO NUCLEAR GEN. STATION, UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | GEN. ENGR. MGR. | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

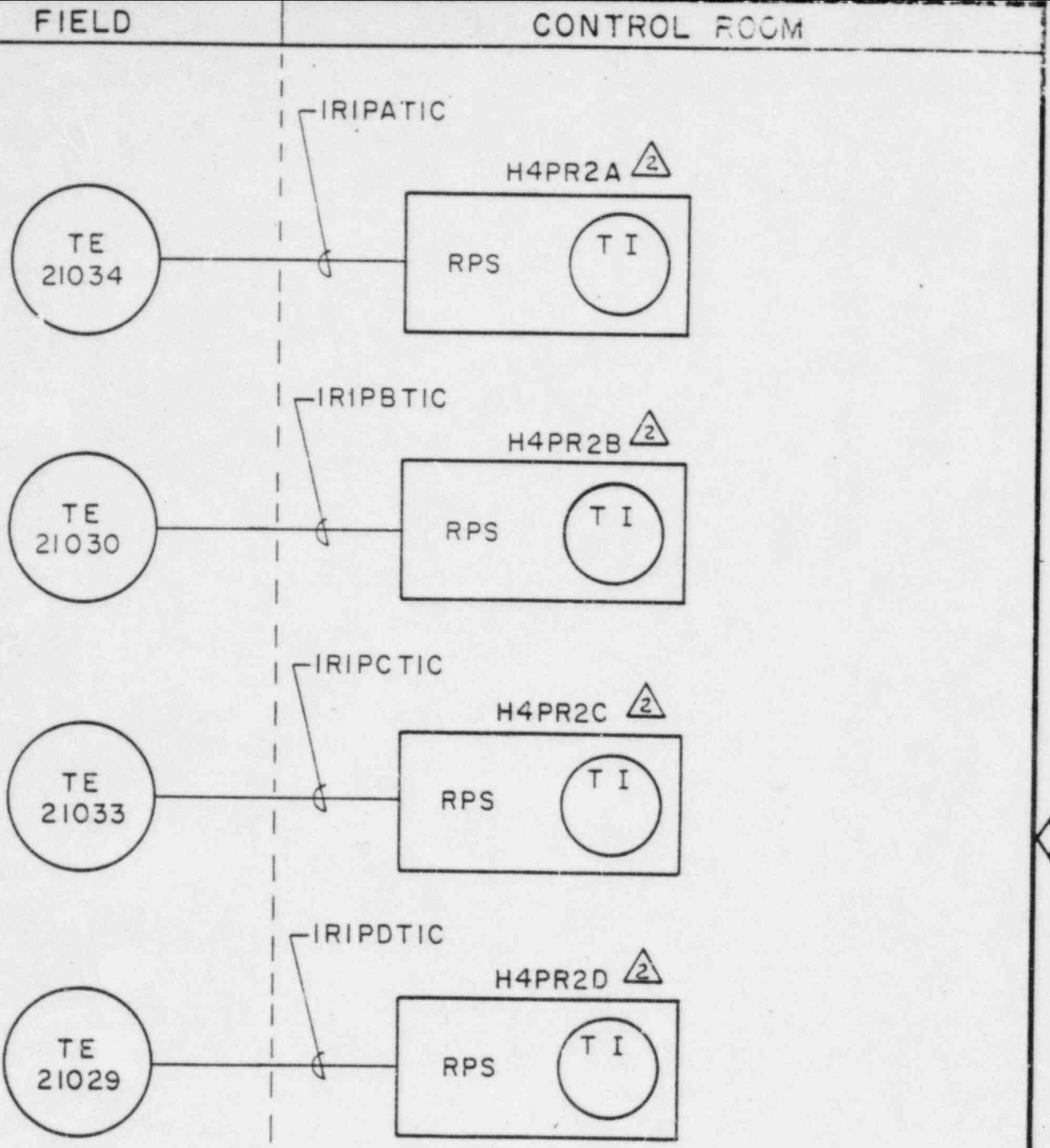
W.O. NO.

MICROFILM

DWG. NO. SK-ICR-15

SHT. NO. of SHTS.

REVISION 1



WIDE RANGE RCS TEMPERATURE
RPS CABINETS

NO.	DATE	DR BY	CHKD. BY	ENGR.	SUPV. ENGR.	FILM
2	6-27-85	CWO				
1	2-19-85	BWO	LKW			

APER. CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
CONTROL ROOM DISPLAY

SC. —— DWG. SIZE A
DR. BY HJH DATE 11/83
CHKD. BY DATE
DESIGN ENGR.

LOCATION
RANCHO SECO NUCLEAR GEN. STATION, UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

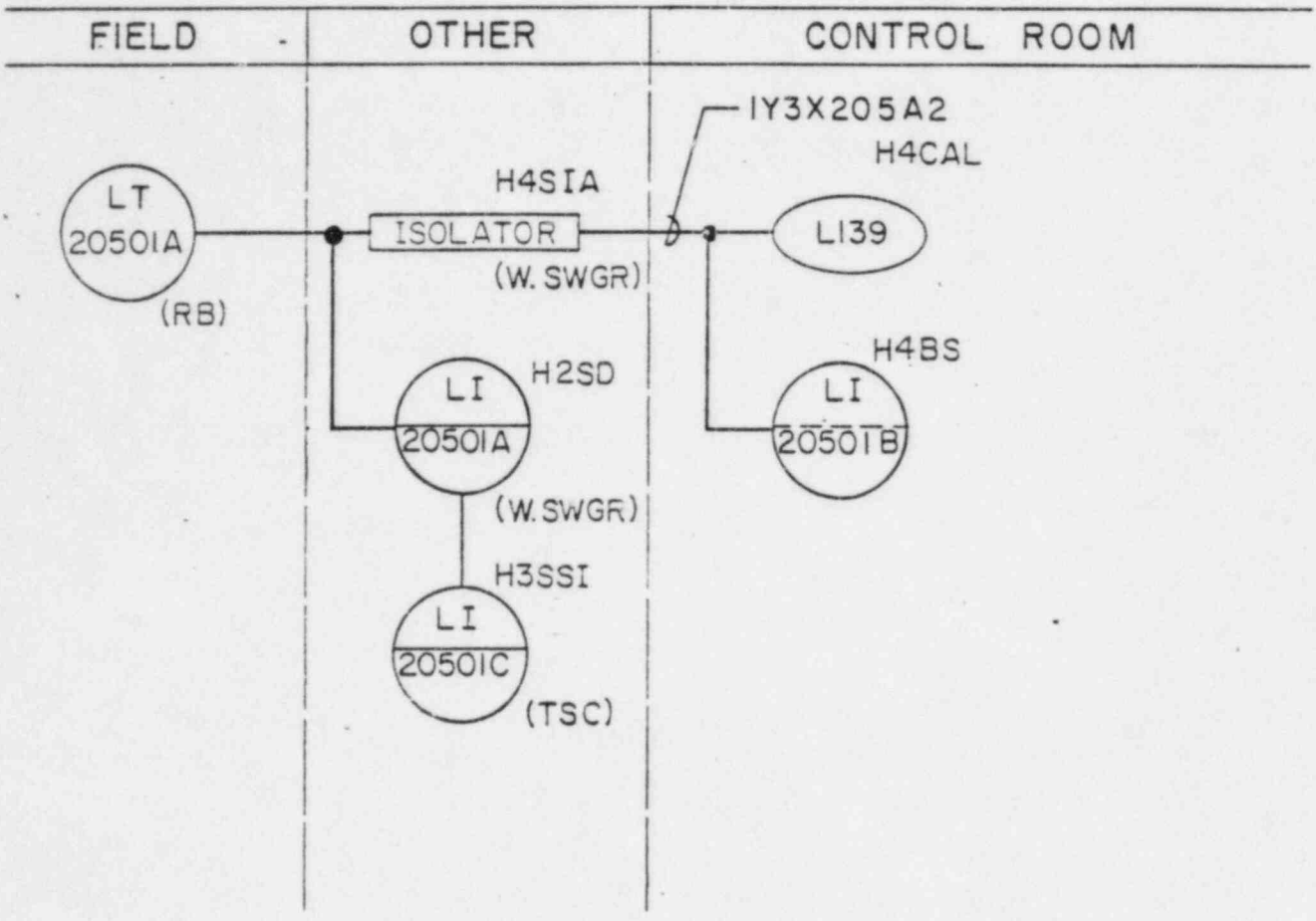
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO.
SK-ICR-16

REV.
2

SHT. NO. of SHTS.



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF LI-20501A IN H2SD.

△3

STEAM GENERATOR E-205A WIDE RANGE LEVEL LOOP 20501A

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/25/85	BWO	[illegible]			
2	2/15/85	BWO	LKW			
1	11/27/84	JR	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

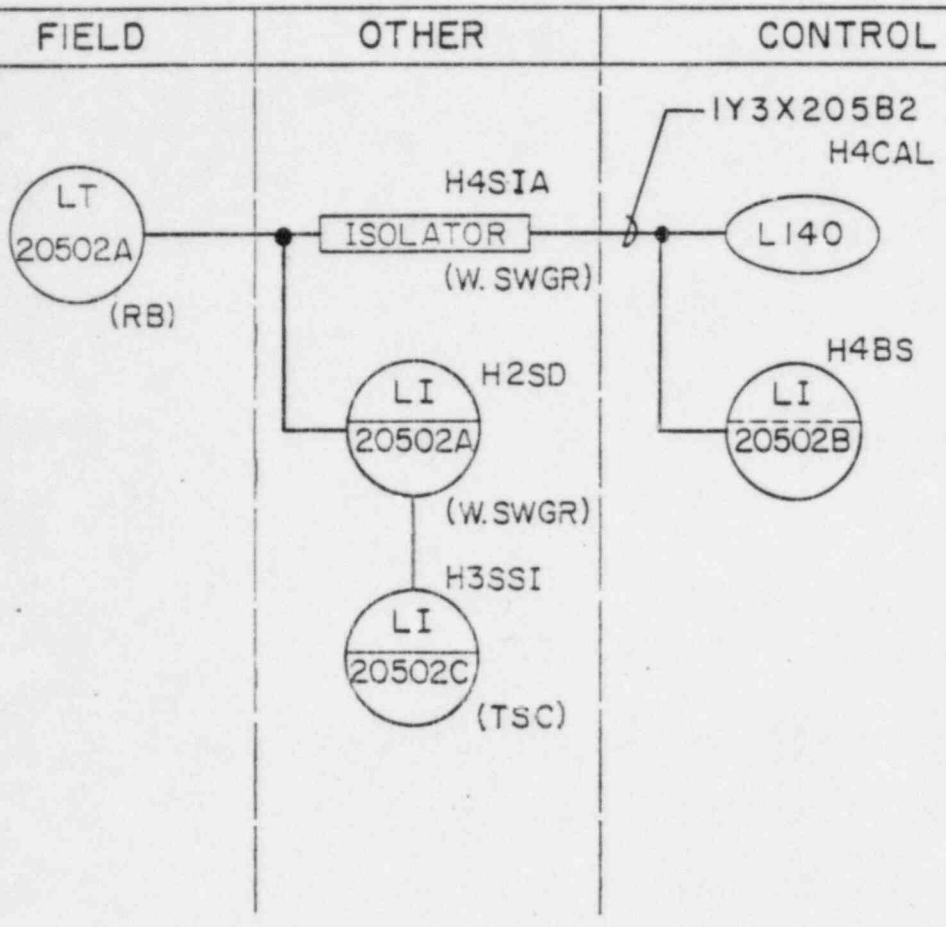
SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
LOCATION RANCHO SECO NUCLEAR GEN STATION UNIT No. 1
DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-1
SHT. NO. of SHTS.

REV. 3



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF LI-20502A IN H2SD. ③

STEAM GENERATOR E-205B WIDE RANGE LEVEL LOOP 20502A

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/25/85	BWO	[illegible]			
2	2/15/85	BWO	LKW			
1	11/27/84	JR	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
DESIGN ENGR.

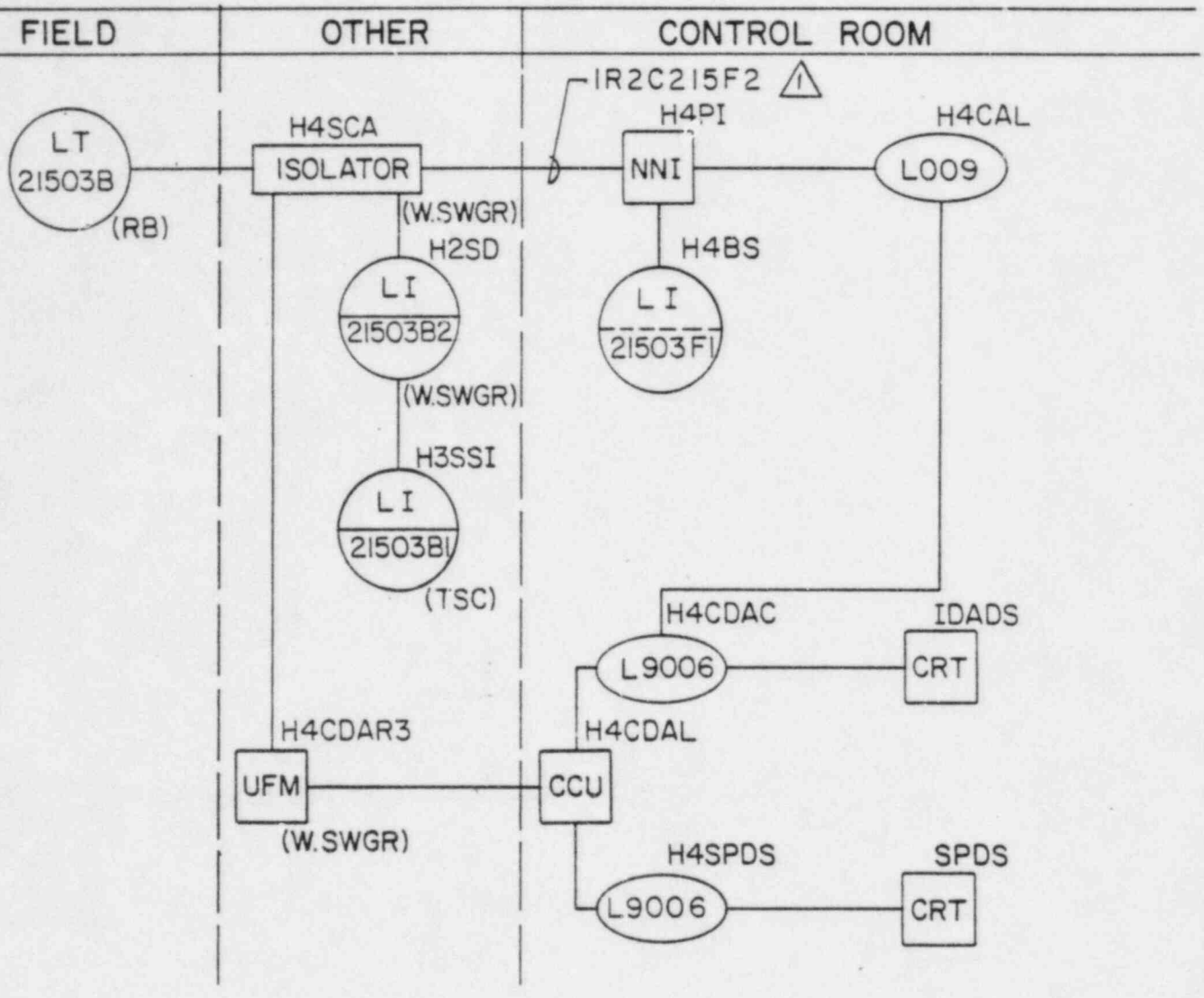
LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-2
SHT. NO. of SHTS.

REV. 3



FIRE LOSS IN THE CONTROL ROOM WILL NOT EFFECT OPERATION OF THIS LOOP ON H2SD

PRESSURIZER LEVEL LOOP 21503B, TRAIN A

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
1	2/15/85	BWO	LKW			

APERTURE CARD NO.

TITLE

LOOP DIAGRAM APPENDIX R ANALYSIS ALT. SHUTDOWN PANEL

SC. ——— DWG. SIZE A

DR. BY J.STANGL DATE 11/83

CHKD. BY DATE

DESIGN ENGR.

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT NO. 1

SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

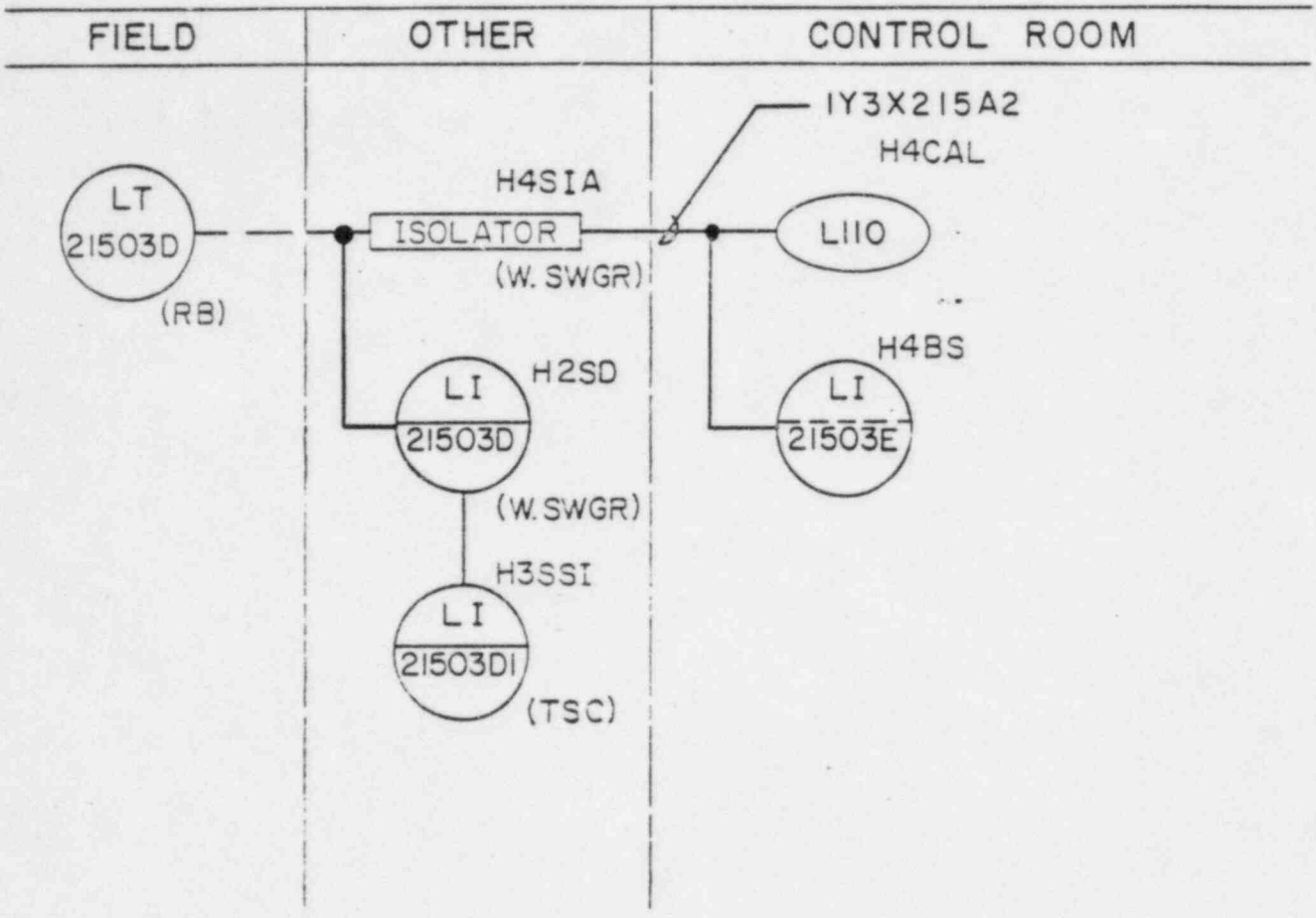
W.O. NO.

MICROFILM

DWG. NO. SK-ISD-3

REV. 1

SHT. NO. of SHTS.



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF LI-21503D IN H2SD. △3

PRESSURIZER LEVEL LOOP 21503D

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/21/85	BWO	[illegible]			
2	2/15/85	BWO	LKW			
1	11/27/84	JR	LKW			

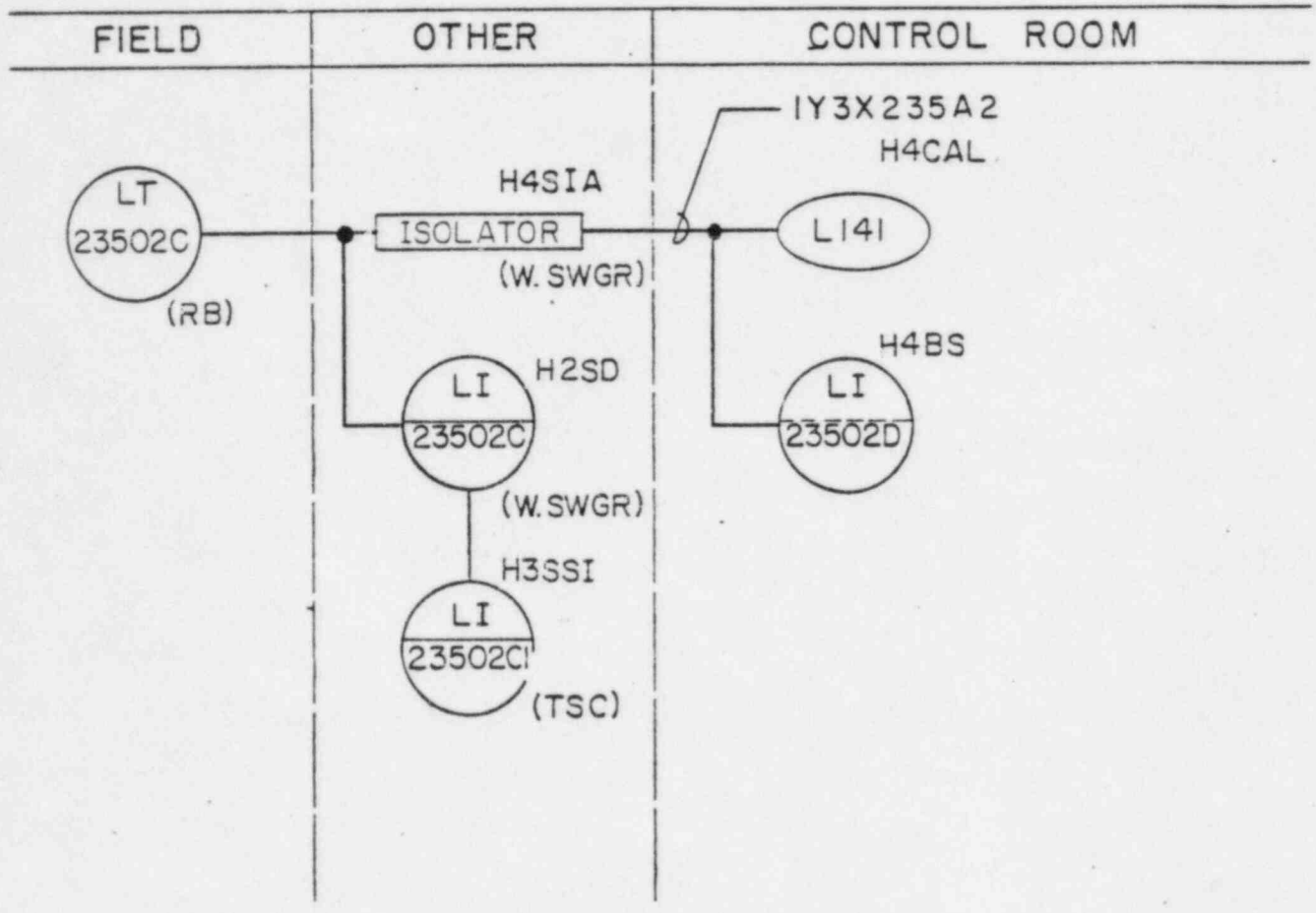
APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. ——— DWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
DESIGN ENGR.
LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM
DWG. NO. SK-ISD-4
SHT. NO. of SHTS.
REV. 3



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF LI-23502C IN H2SD. △3

MAKE-UP TANK LEVEL LOOP 23502C

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/21/85	BWO	[illegible]			
2	2/15/85	BWO	LKW			
1	1/27/84	JR	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

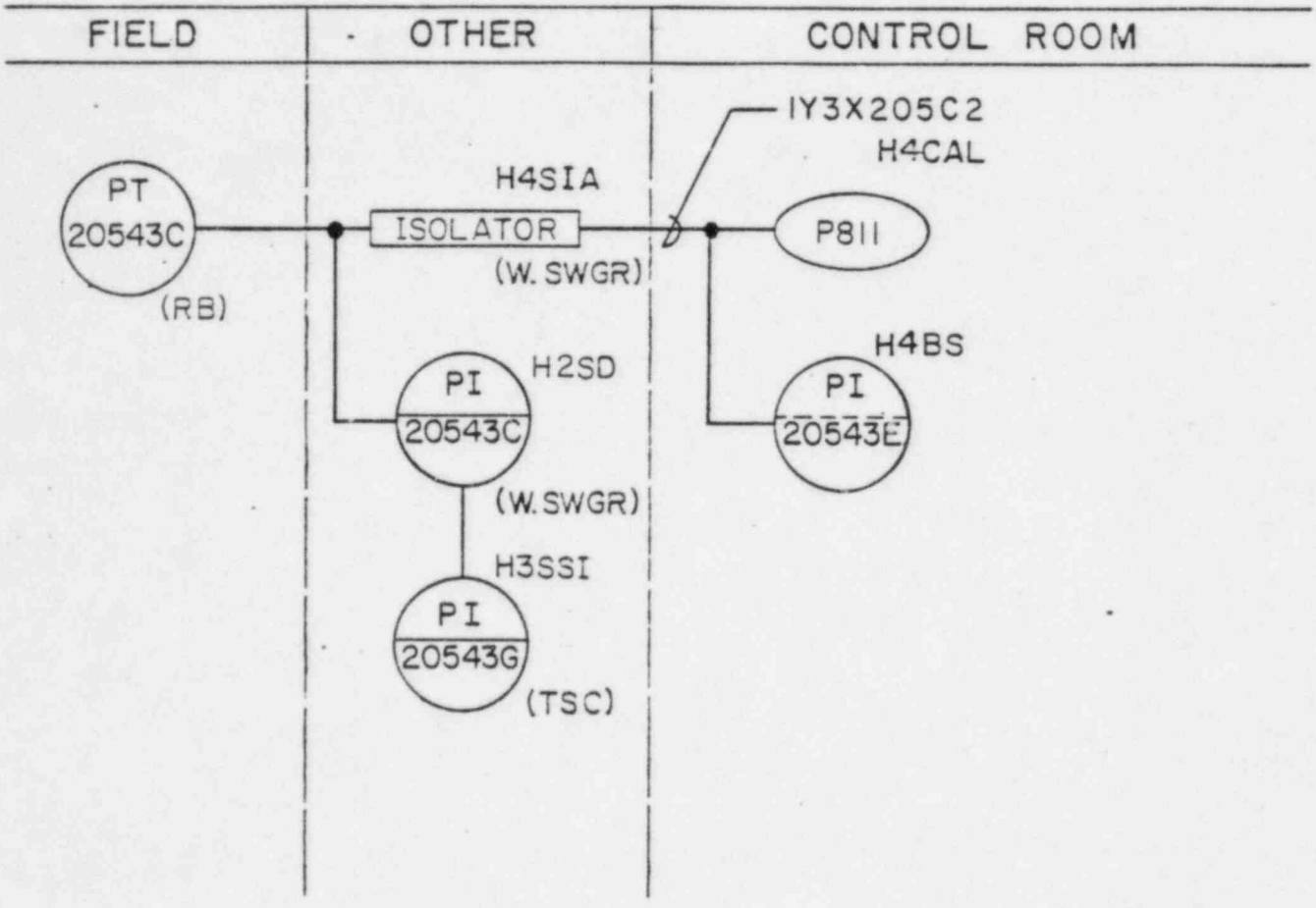
SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-5
SHT. NO. of SHTS.

REV. 3



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF PI-20543C IN H2SD. △3

STEAM GENERATOR E-205A WIDE RANGE PRESSURE LOOP 20543C

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/25/85	BWO	WB			
2	2/15/84	BWO	LKW			
1	11/27/84	JR	LKW			

APERT CARD No.

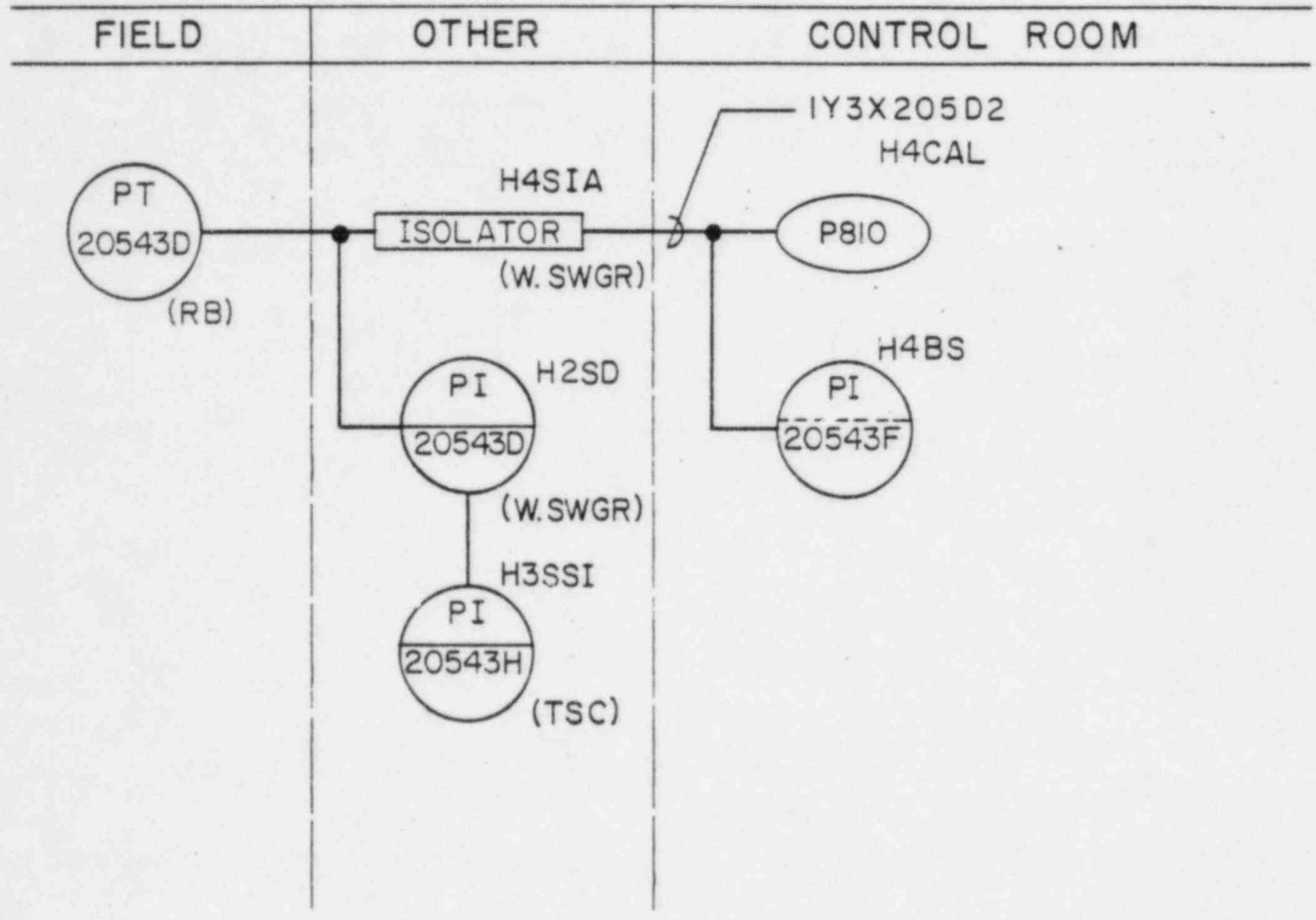
TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. —— SWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
DESIGN ENGR.

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO. SWG. NO. REV.
W.O. NO. SK-ISD-6 3
MICROFILM
SHT. NO. of SHTS.



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF PI-20543D IN H2SD. 3

STEAM GENERATOR E-205B WIDE RANGE PRESSURE LOOP 20543D

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/21/85	BWO	[illegible]			
2	2/15/85	BWO	LKW			
1	11/27/84	JR	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. ——— DWG. SIZE A
DR. BY RATLIFF DATE 10/3/83
CHKD. BY DATE
DESIGN ENGR.

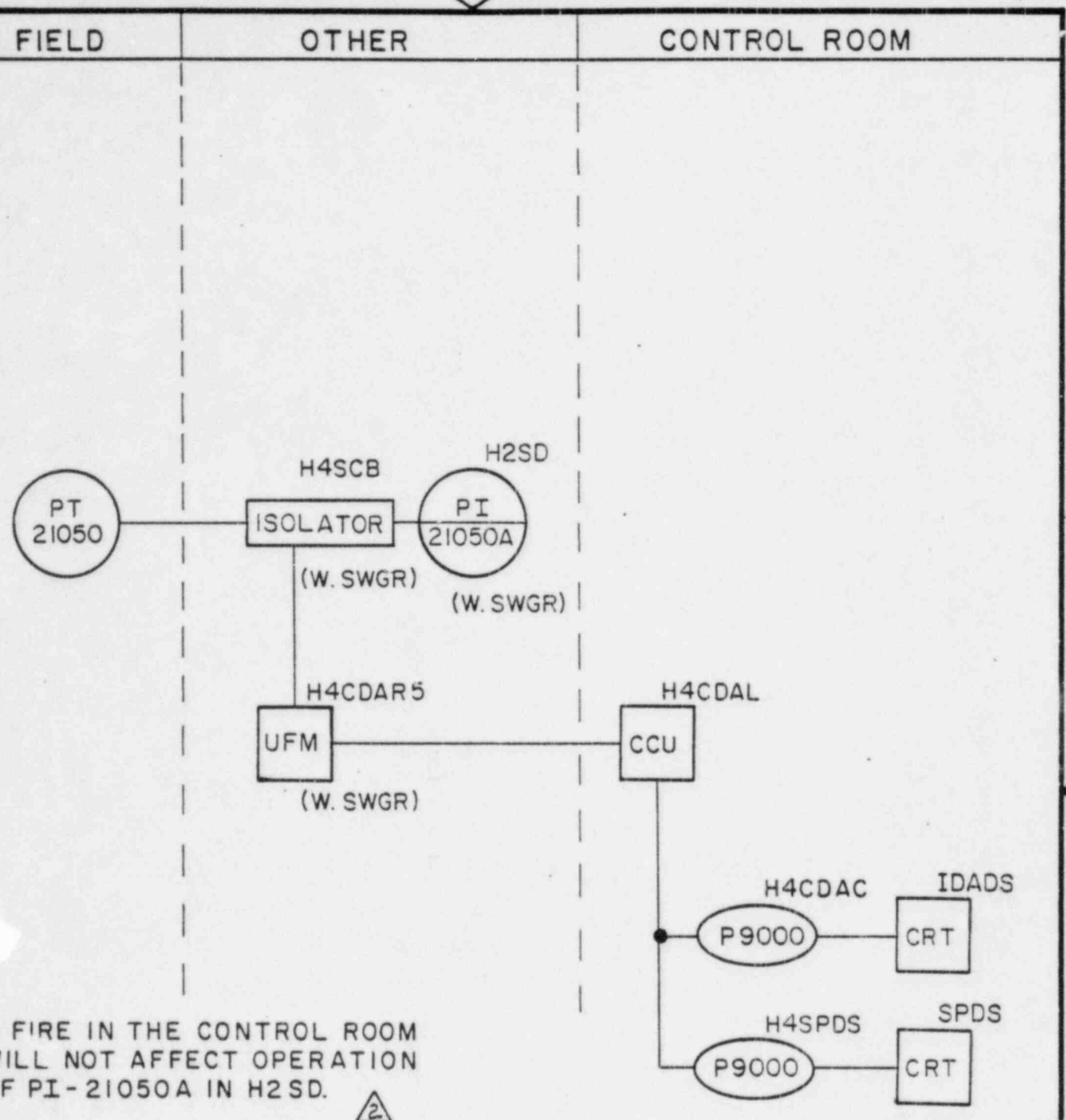
LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-7
SHT. NO. of SHTS.

REV. 3



RCS PRESSURE LOOP 21050 "B"

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
2	5-25-85	BWO	[illegible]			
1	1-31-84	JRS	LKW			

APER. CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. — DWG. SIZE A

DR. BY HJH DATE 11/83

CHKD. BY DATE

LOCATION RANCHO SECO NUCLEAR GEN. STA. UNIT I

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | ENGR. MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

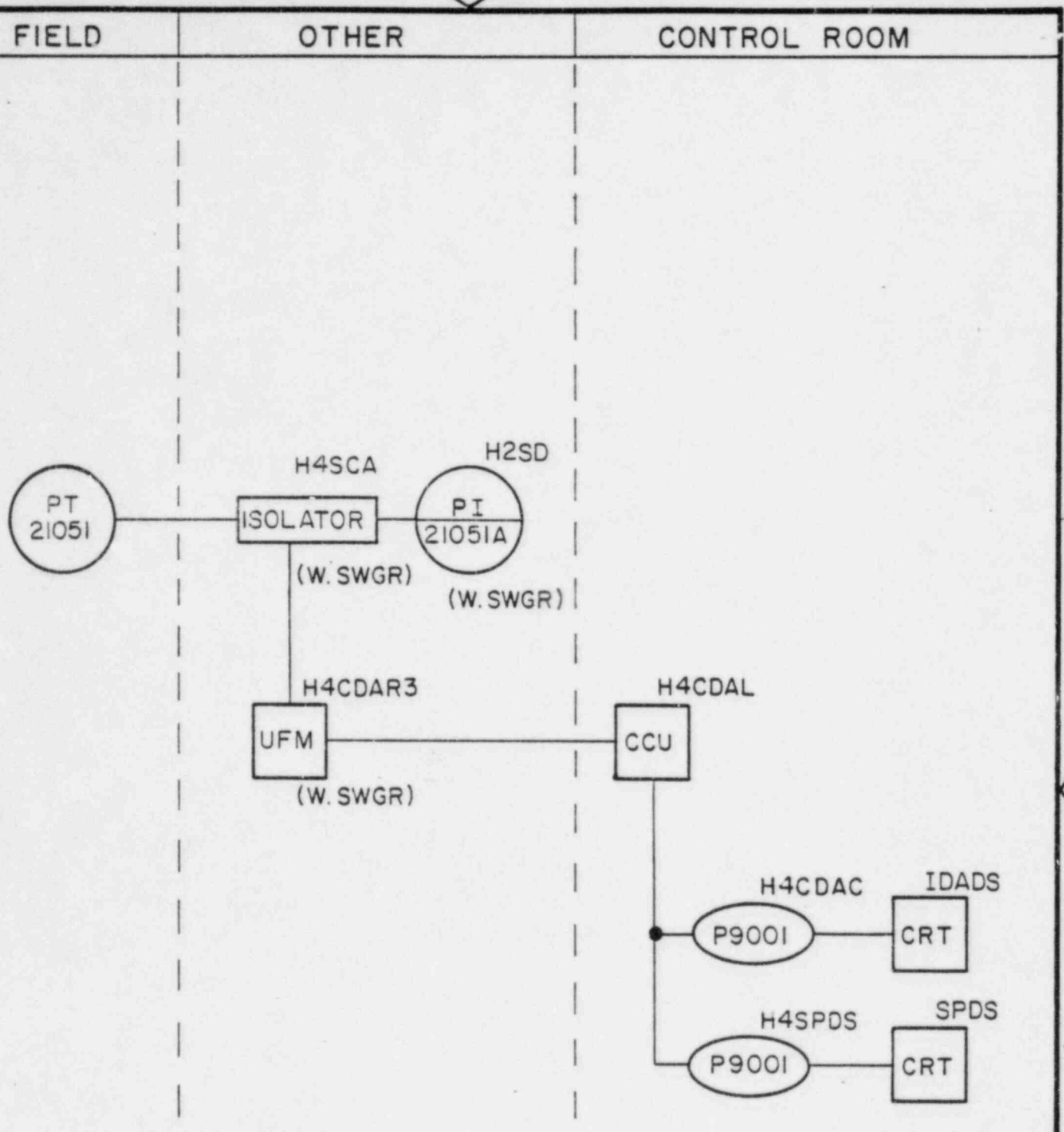
W.O. NO.

MICROFILM

DWG. NO. SK-ISD-8

REV. 2

SHT. NO. of SHTS.



FIRE LOSS IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF THIS LOOP ON H2SD. (2)

RCS PRESSURE LOOP 21051 "A"

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
2	5-25-85	BWO	CAB			
1	1-31-84	JRS	LKW			

APER. CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. —— DWG. SIZE A

DR. BY HJH DATE 11/83

CHKD. BY DATE

LOCATION RANCHO SECO NUCLEAR GEN. STA., UNIT 1

DESIGN ENGR. SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

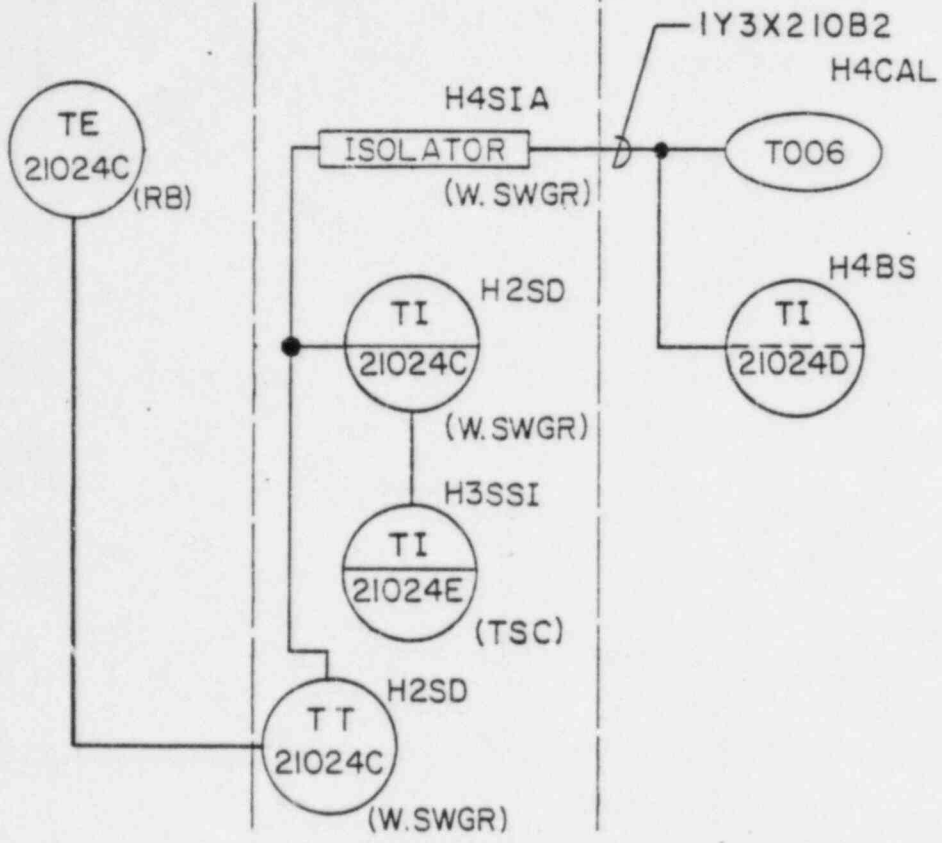
W.O. NO.

MICROFILM

DWG. NO. SK-ISD-9

REV. 2

SHT. NO. of SHTS.



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF TI-21024C IN H2SD. ③

RCS TEMPERATURE COLD LEG C LOOP 21024C

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5-21-85	BWO	[illegible]			
2	2-15-85	BWO	LKW			
⚠1	1-19-84	RK	LKW			

APERT CARD No.

TITLE

LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. —— DWG. SIZE A

DR. BY RATLIFF DATE 10/3/83

CHKD. BY DATE

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No.1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | ENGR. MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.

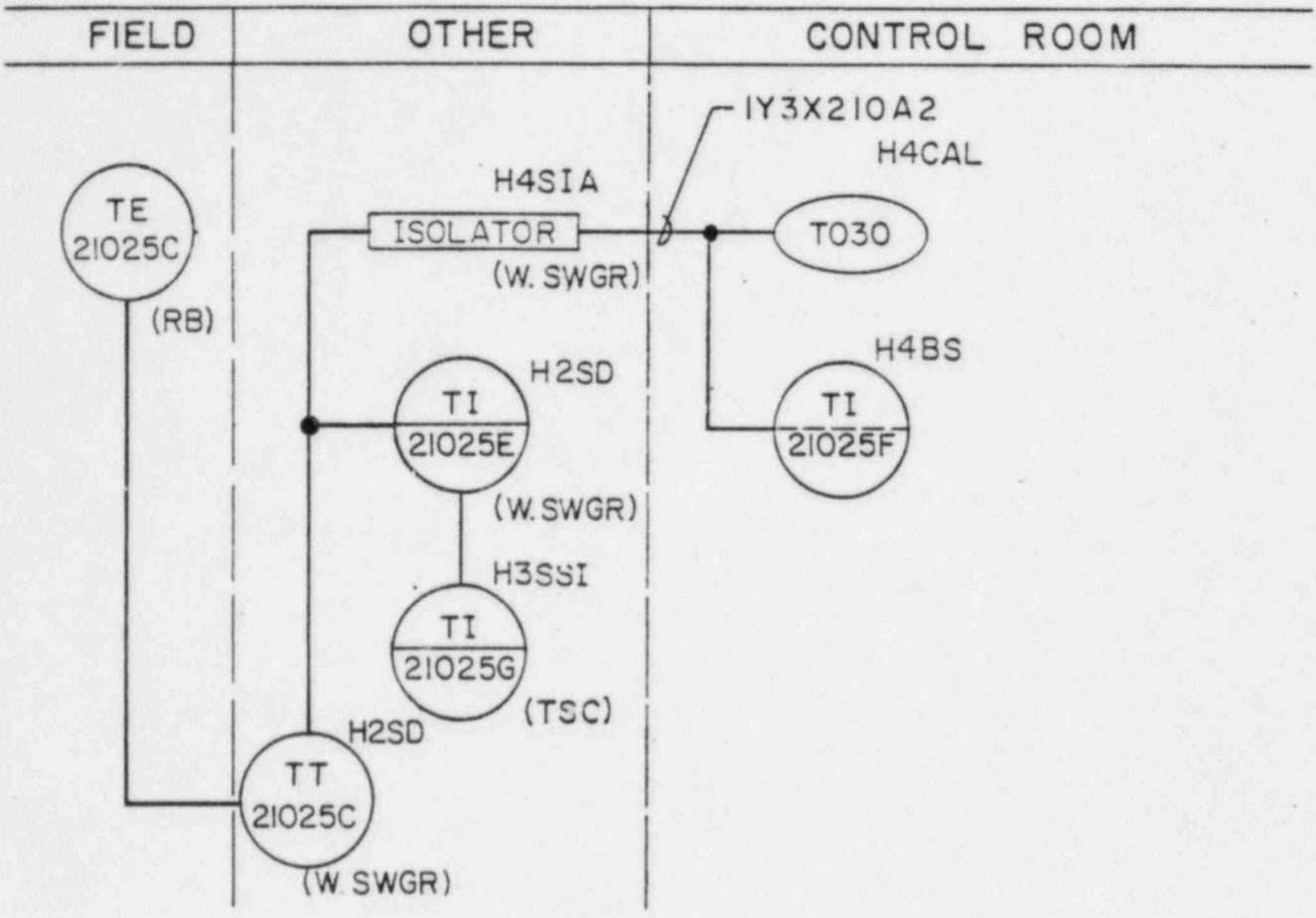
W.O. NO.

MICROFILM

DWG. NO. SK-ISD-10

REV. 3

SHT. NO. of SHTS.



A FIRE IN THE CONTROL ROOM WILL NOT AFFECT OPERATION OF TI-21025E IN H2SD. △3

RCS TEMPERATURE COLD LEG A LOOP 21025C

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	5/25/85	BWO	[illegible]			
2	2/15/85	BWO	[illegible]			
1	11/27/84	JR	LKW			

APERT CARD No.

TITLE
LOOP DIAGRAM
APPENDIX R ANALYSIS
ALT. SHUTDOWN PANEL

SC. ____ DWG. SIZE A
DR. BY RATLIFF DATE 11/3/83
CHKD. BY DATE
DESIGN ENGR.

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

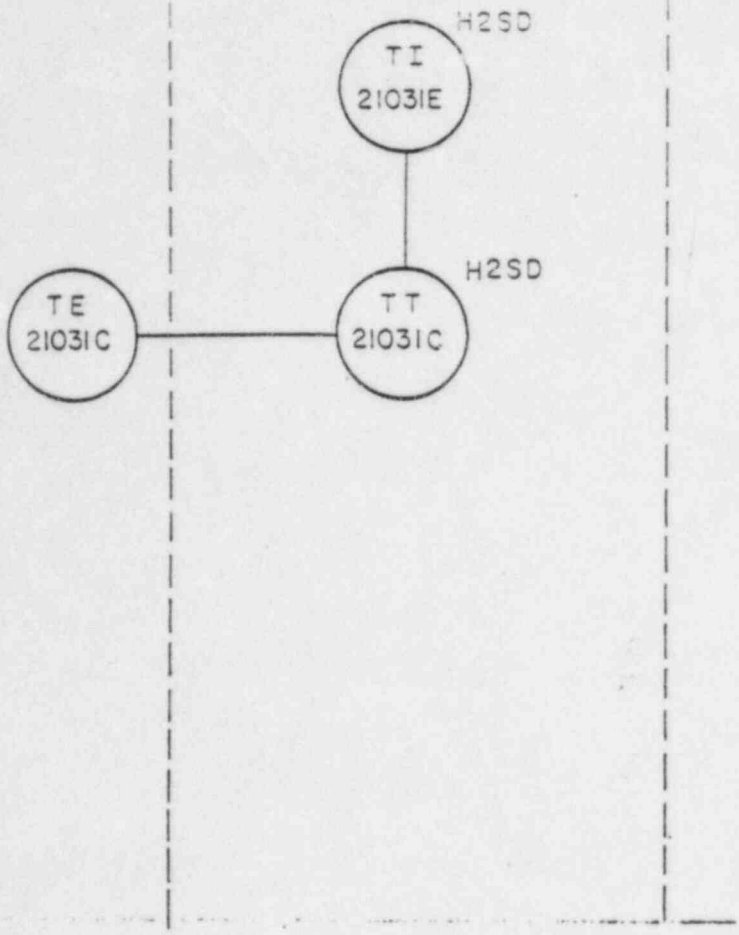
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-11
SHT. NO. 2 SHTS.

REV. 3

FIELD | OTHER | CONTROL ROOM



FIRE LOSS OF CONTROL ROOM INDICATION WILL NOT AFFECT OPERATION OF H2SD INDICATOR TI 21031E.

LOOP A
WIDE RANGE RCS TEMPERATURE T_H

NO.	DATE	DR BY	CHKD. BY	ENGR.	SUPV. ENGR.	FILM
3	4-2-84	C.L.M				
2	2-13-84	C.L.M	LKW			
1	1-20-84	RK	LKW			

APER. CARD NO.

SC. NTS DWG. SIZE A
DR. BY GFB DATE 11-7-83
CHKD. BY DATE
DESIGN ENGR.

LOOP DIAGRAM APPENDIX R ANALYSIS ALT. SHUTDOWN PANEL

LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT NO. 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

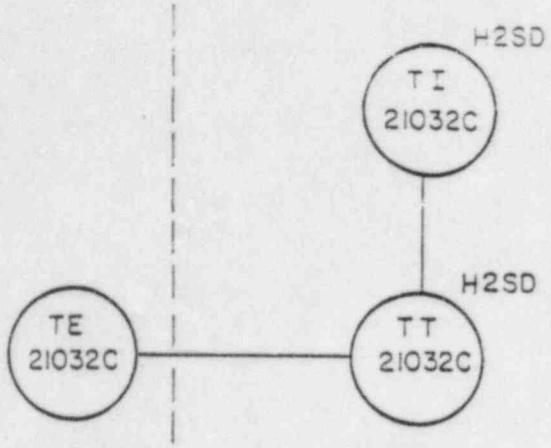
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-12
SHT. NO. of SHTS.

REV. 3

FIELD | CT-ER | CONTROL ROOM



FIRE LOSS OF CONTROL ROOM INDICATION WILL NOT AFFECT OPERATION OF H2SD INDICATOR TI 21032C.

LOOP B
WIDE RANGE RCS TEMPERATURE T_H

NO.	DATE	DR BY	CHKD BY	ENGR.	SUPV. ENGR.	FILM
3	4-2-84	C.L.M.	LKW			
2	2-13-84	C.L.M.	LKW			
1	1-20-84	RK	LKW			

APER. CARD NO.

SC. NTS DWG. SIZE A
DR. BY GFB DATE 11-7-83
CHKD. BY DATE
DESIGN ENGR.

LOOP DIAGRAM APPENDIX R ANALYSIS ALT. SHUTDOWN PANEL

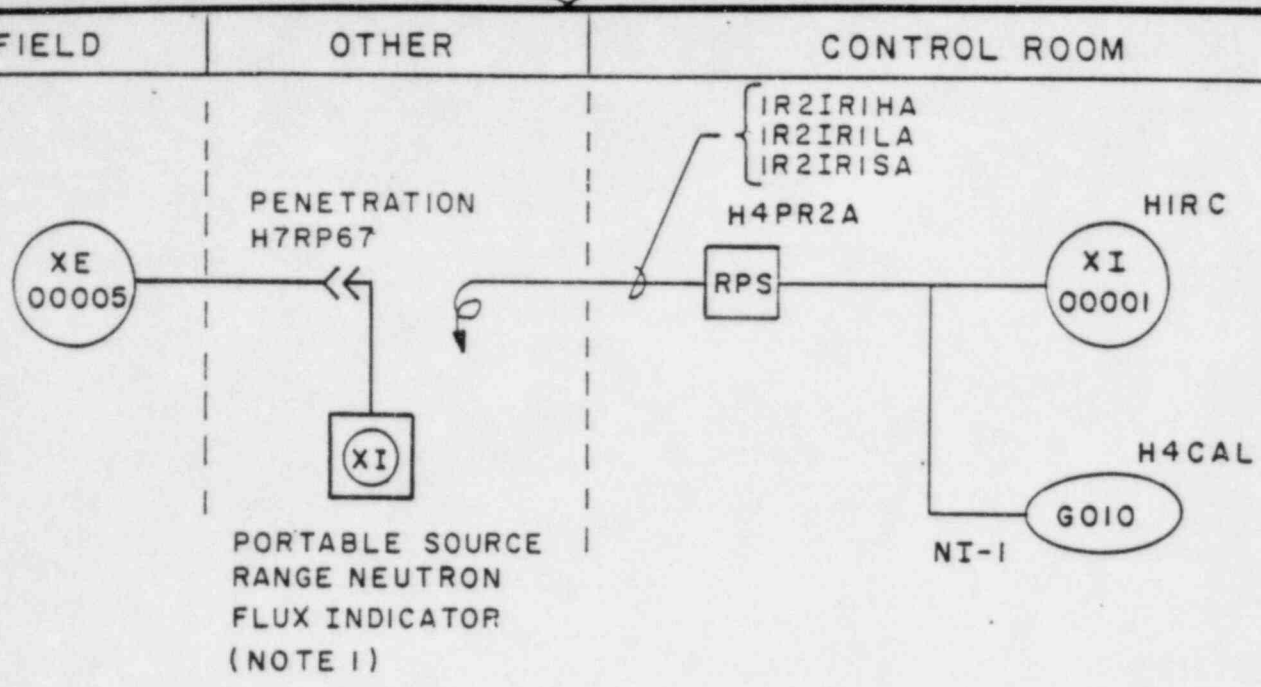
LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT NO 1
SUPV. ENGR. PROJ. ENGR. ENGR. MGR. RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO. SK-ISD-13
SHT. NO. of SHTS.

REV. 3



NOTE:

1. PORTABLE INDICATOR INCLUDES POWER SUPPLIES AND TEST MODULE. POWER SUPPLIED BY SHUTDOWN PANEL H2SD

SOURCE RANGE NEUTRON FLUX INDICATION

APERT. CARD NO.	TITLE
	LOOP DIAGRAM APPENDIX R ANALYSIS LOCAL DISPLAY

SC. ____	DWG. SIZE A
DR. BY BWO	DATE 2-85
CHKD. BY	DATE

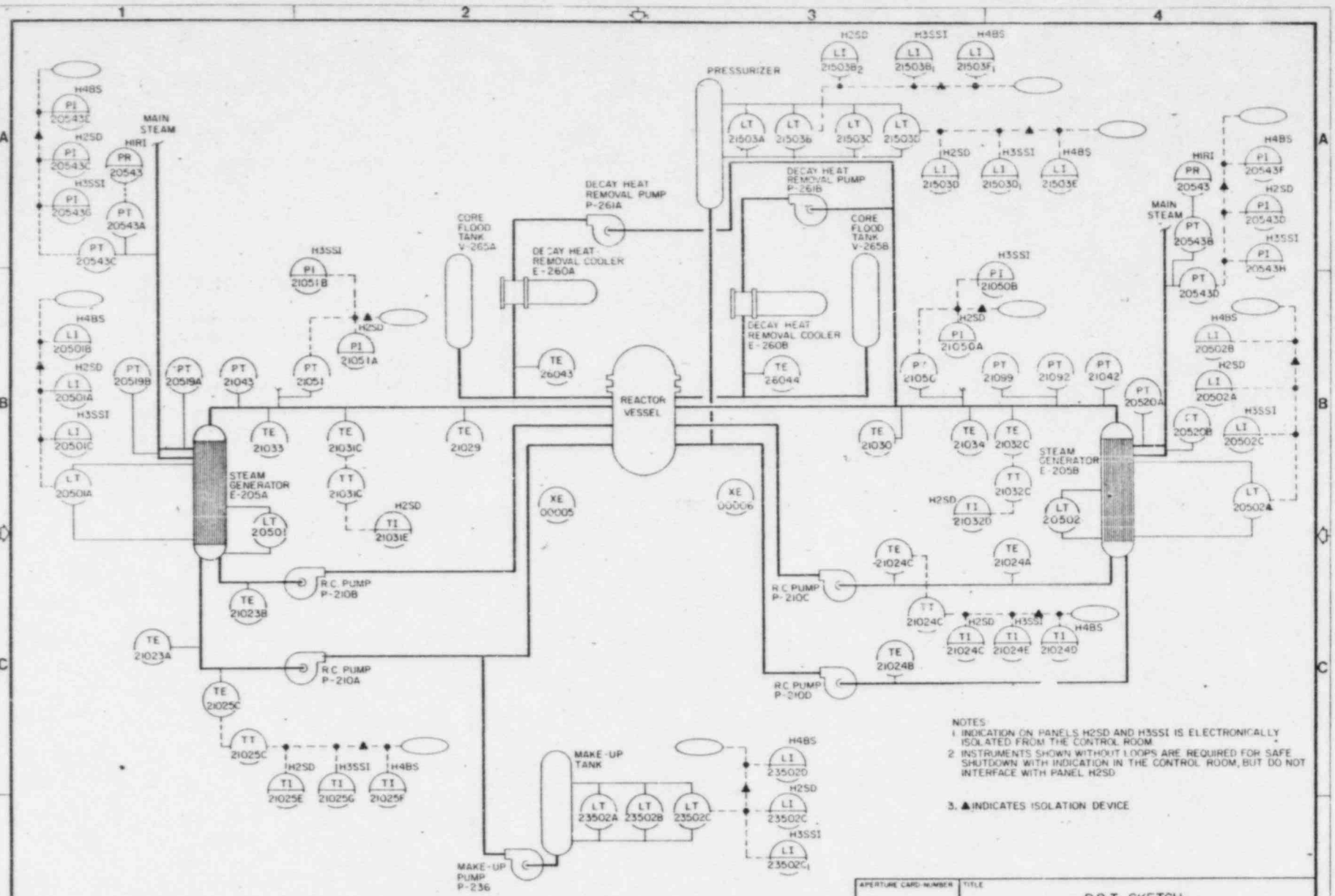
LOCATION
RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | GEN. ENGR. MGR. | RELEASE DATE

NO.	DATE	DR. BY	CHKD. BY	ENGR.	SUPV. ENGR. / GEN. ENG. DEPT.	MANAGER	FILM

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.	DWG. NO.	REV.
W.O. NO.	SK-ISD-14	0
MICROFILM	SHT. NO. of SHTS.	


PRESSURIZER
MAIN STEAM
CORE FLOOD TANK V-265A
CORE FLOOD TANK V-265B
DECAY HEAT REMOVAL PUMP P-261A
DECAY HEAT REMOVAL PUMP P-261B
DECAY HEAT REMOVAL COOLER E-260A
DECAY HEAT REMOVAL COOLER E-260B
REACTOR VESSEL
STEAM GENERATOR E-205A
STEAM GENERATOR E-205B
R.C. PUMP P-210B
R.C. PUMP P-210A
R.C. PUMP P-210C
R.C. PUMP P-210D
MAKE-UP TANK
MAKE-UP PUMP P-236
H2SD
H3SSI
H4BS
H1R1
NOTES
1. INDICATION ON PANELS H2SD AND H3SSI IS ELECTRONICALLY ISOLATED FROM THE CONTROL ROOM.
2. INSTRUMENTS SHOWN WITHOUT LOOPS ARE REQUIRED FOR SAFE SHUTDOWN WITH INDICATION IN THE CONTROL ROOM, BUT DO NOT INTERFACE WITH PANEL H2SD.
3. ▲ INDICATES ISOLATION DEVICE.
P&I SKETCH
APPENDIX R ANALYSIS
SAFE SHUTDOWN INSTRUMENTATION
RANCHO SECO NUCLEAR GENERATING STATION, UNIT NO. 1
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SK-J-500
3
11-84 REV. STM GENS

VALVE SYMBOLS


GATE NORMALLY OPEN


STEAM LEAK OFF


GATE NORMALLY CLOSED

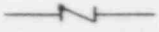
LOCKED OPEN

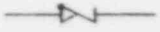
LOCKED CLOSED


GLOBE NORMALLY OPEN


GLOBE NORMALLY CLOSED


BALL VALVE


CHECK VALVE


STOP CHECK VALVE


BUTTERFLY OR DAMPER


STOP CHECK ANGLE

VALVE ACTUATORS

ROTARY MOTOR ACTUATOR


SOLENOID ACTUATOR


PNEUMATIC ACTUATOR

SIGNAL LINES

ELECTRICAL SIGNAL

PNEUMATIC SIGNAL

INSTRUMENTS


LOCAL INSTRUMENT

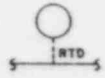
PANEL MOUNTED INSTRUMENT

CABINET MOUNTED INSTRUMENT


DIGITAL DATA SYSTEM COMPUTER

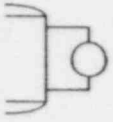
TEMPERATURE


THERMOCOUPLE



RESISTANCE TEMPERATURE DETECTOR

LEVEL


GAGE GLASS, FLOAT OR DISPLACEMENT TYPE LEVEL INSTRUMENT

NO.	DATE	REVISIONS	BY	CHKD BY	ENGR	SUPV ENGR NUC ENG DEPT	MANAGER	FILM
1	6-85		BWC					

APERTURE CARD NUMBER

TITLE: LEGEND FOR PIPING & INSTRUMENT SKETCH APPENDIX R ANALYSIS

DR. BY: J. STANGL DATE: 11/83

CHKD. BY: DATE:

DESIGN ENGR: SUPV. ENGR: PROJ. ENGR: NUC. ENGR MGR: RELEASE DATE:

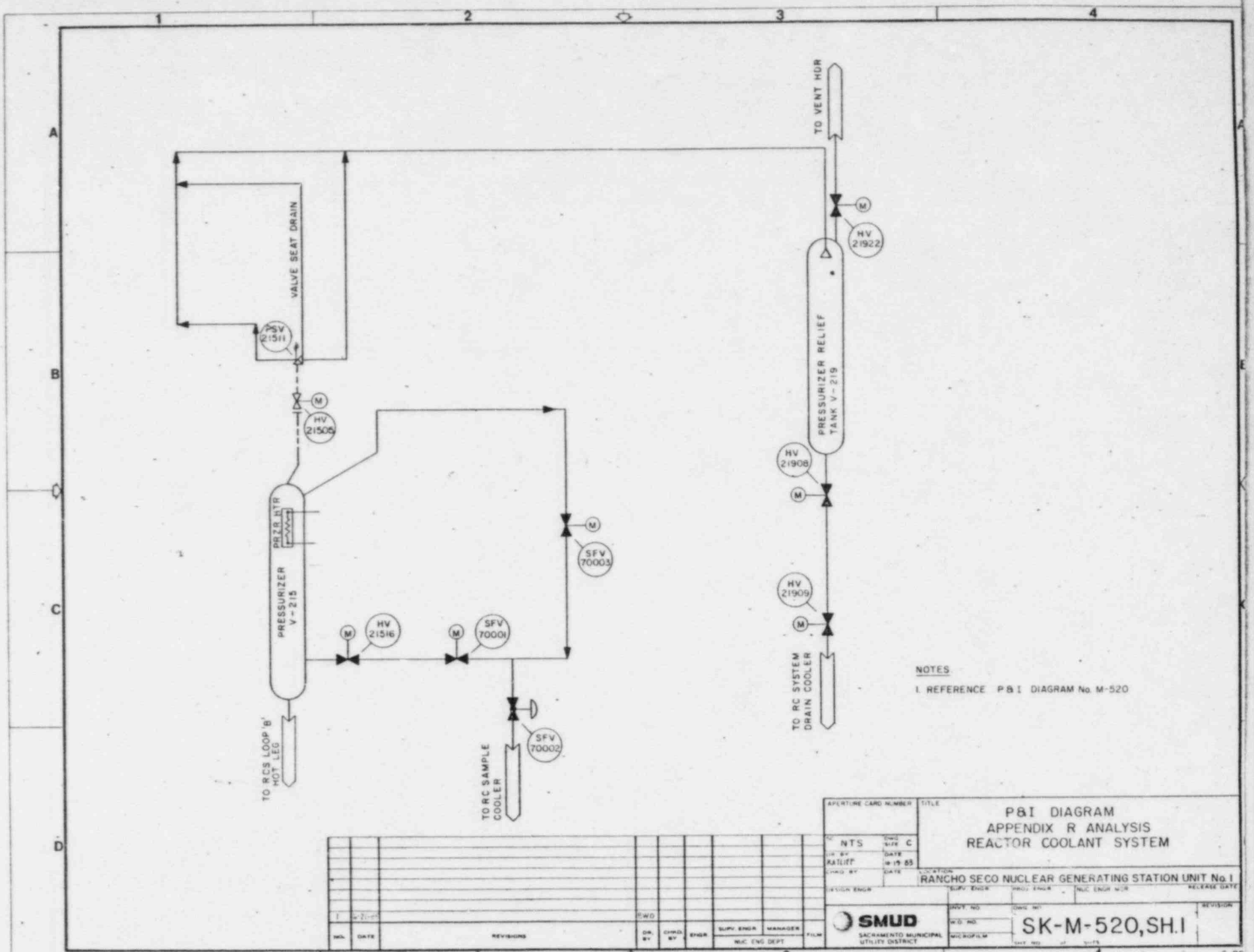
LOCATION: RANCHO SECO NUCLEAR GENERATING STATION UNIT NO. 1

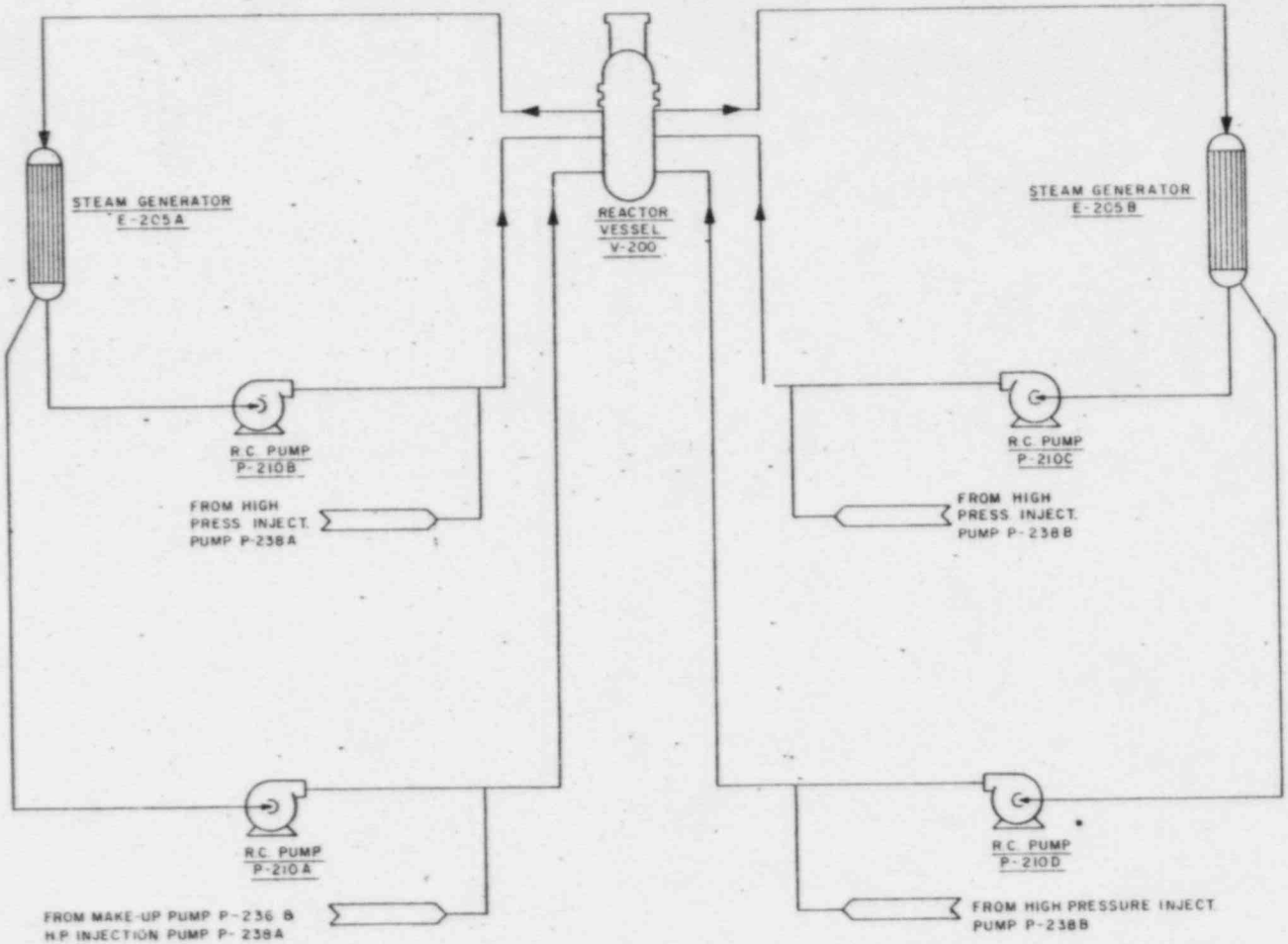
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO. SK-M-500

REVISION: 1

G-003


TO VENT HDR
HV 21922
PRESSURIZER RELIEF TANK V-219
VALVE SEAT DRAIN
PSV 21511
HV 21506
PRESSURIZER V-215
PRZR HTR
HV 21908
HV 21909
SFV 70003
HV 21516
SFV 70001
SFV 70002
TO RCS LOOP 'B' HOT LEG
TO RC SAMPLE COOLER
TO RC SYSTEM DRAIN COOLER
NOTES
1. REFERENCE P&I DIAGRAM No. M-520
P&I DIAGRAM
APPENDIX R ANALYSIS
REACTOR COOLANT SYSTEM
RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SK-M-520,SH.1
REVISIONS



NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR NUC. ENG. DEPT.	MANAGER	FILM
1	6-21-85		BWO	GW				

APERTURE CARD NUMBER

TITLE

P&I DIAGRAM
APPENDIX "R" ANALYSIS
REACTOR COOLANT SYSTEM

SIZE C | DWG NO. | REV

DR. BY BWO | DATE 1-18-85

CHKD. BY GW | DATE 2-85 | LOCATION RANCHO SECO NUCLEAR GENERATING STA., UNIT I

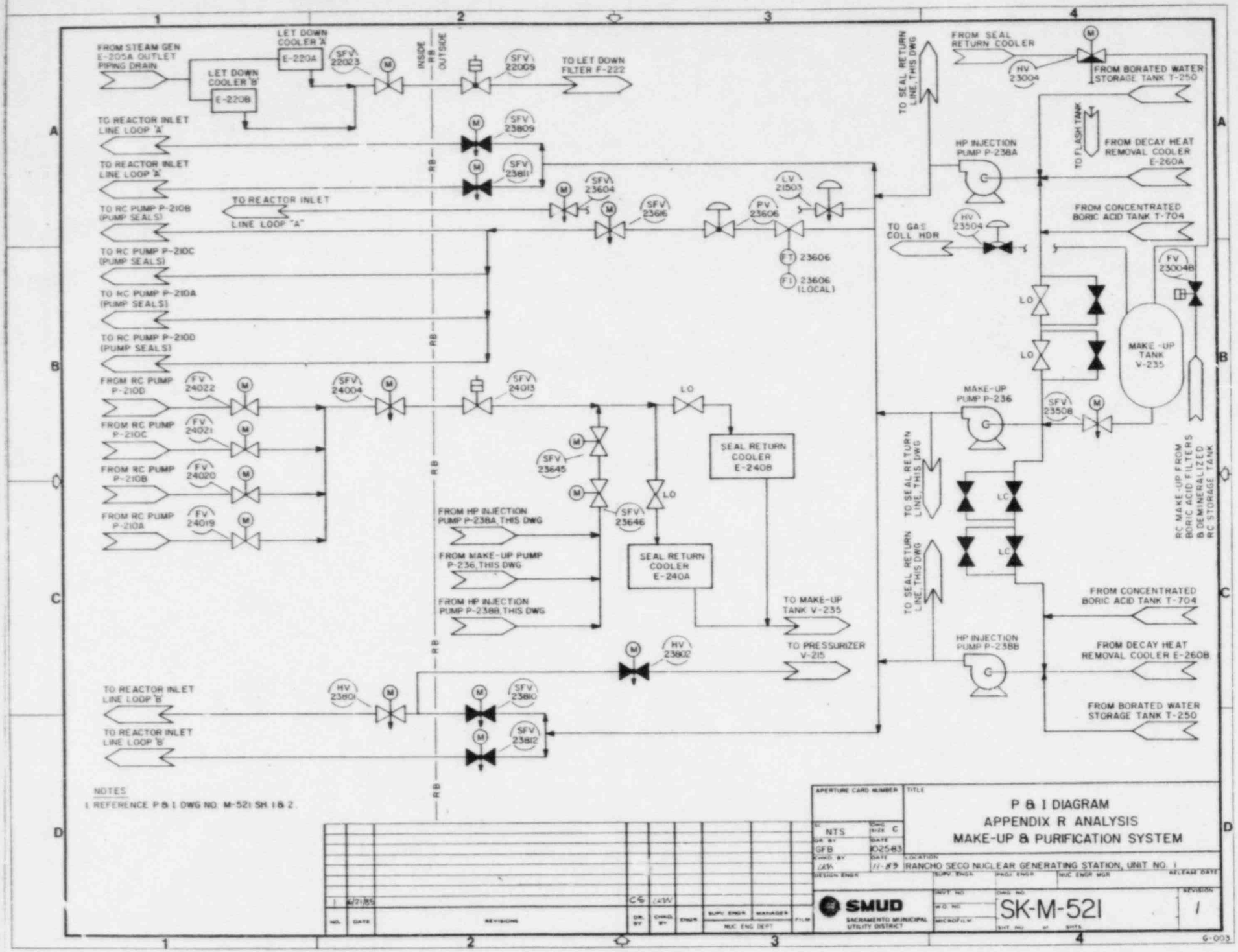
DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR. MGR. | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

DRWG. NO. | W.O. NO. | MICROFILM

DWG. NO. SK-M-520,SH.2 | REVISION 1

SHT. NO. | OF SHTS



NOTES:
1. REFERENCE P & I DWG NO. M-521 SH. 1 & 2.

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR	MANAGER	FILM
1	6/21/85		CS	CAW		NUC ENG DEPT		

APERTURE CARD NUMBER

TITLE: P & I DIAGRAM
APPENDIX R ANALYSIS
MAKE-UP & PURIFICATION SYSTEM

SCALE: NTS	DWG. SIZE: C
DRAWN BY: GFB	DATE: 10-25-83
CHKD. BY: CAW	DATE: 11-83
LOCATION: RANCHO SECO NUCLEAR GENERATING STATION, UNIT NO. 1	

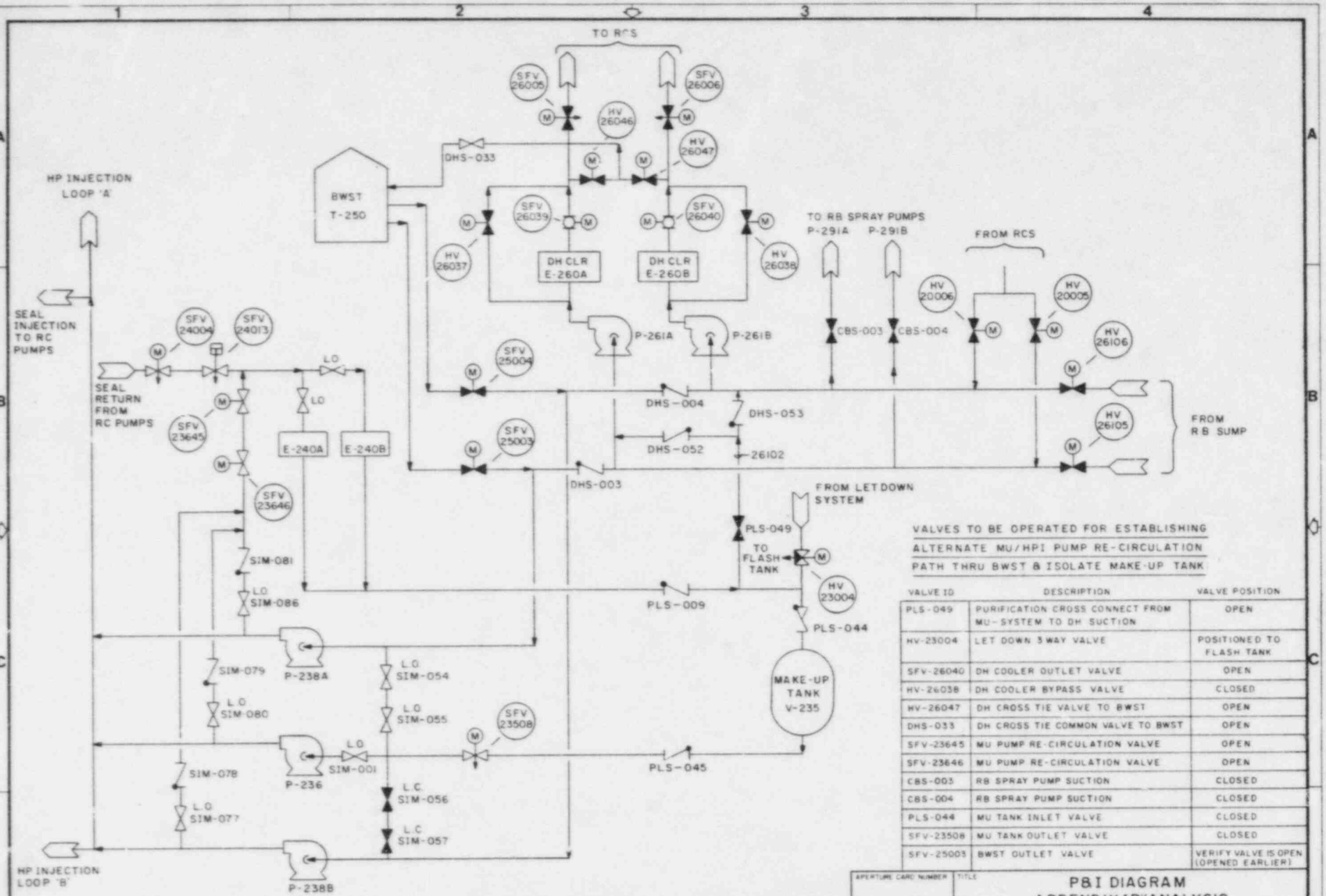
DESIGN ENGR | SUPV. ENGR | PROJ. ENGR | NUC ENGR MGR | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

AUTH. NO. | DWG. NO. SK-M-521 | REVISION 1

W.O. NO. | MICROFILM | SHT. NO. | OF SHTS

G-003



VALVES TO BE OPERATED FOR ESTABLISHING ALTERNATE MU/HPI PUMP RE-CIRCULATION PATH THRU BWST & ISOLATE MAKE-UP TANK

VALVE ID	DESCRIPTION	VALVE POSITION
PLS-049	PURIFICATION CROSS CONNECT FROM MU-SYSTEM TO DH SUCTION	OPEN
HV-23004	LET DOWN 3 WAY VALVE	POSITIONED TO FLASH TANK
SFV-26040	DH COOLER OUTLET VALVE	OPEN
HV-26038	DH COOLER BYPASS VALVE	CLOSED
HV-26047	DH CROSS TIE VALVE TO BWST	OPEN
DHS-033	DH CROSS TIE COMMON VALVE TO BWST	OPEN
SFV-23645	MU PUMP RE-CIRCULATION VALVE	OPEN
SFV-23646	MU PUMP RE-CIRCULATION VALVE	OPEN
CBS-003	RB SPRAY PUMP SUCTION	CLOSED
CBS-004	RB SPRAY PUMP SUCTION	CLOSED
PLS-044	MU TANK INLET VALVE	CLOSED
SFV-23508	MU TANK OUTLET VALVE	CLOSED
SFV-25003	BWST OUTLET VALVE	VERIFY VALVE IS OPEN (OPENED EARLIER)

APERTURE CARD NUMBER

TITLE

P&I DIAGRAM APPENDIX "R" ANALYSIS MAKE-UP ALTERNATE RE-CIRCULATION PATH

DR. BY: BWO DATE: 6/85

LOCATION: RANCHO SECO NUCLEAR GENERATING STA., UNIT 1

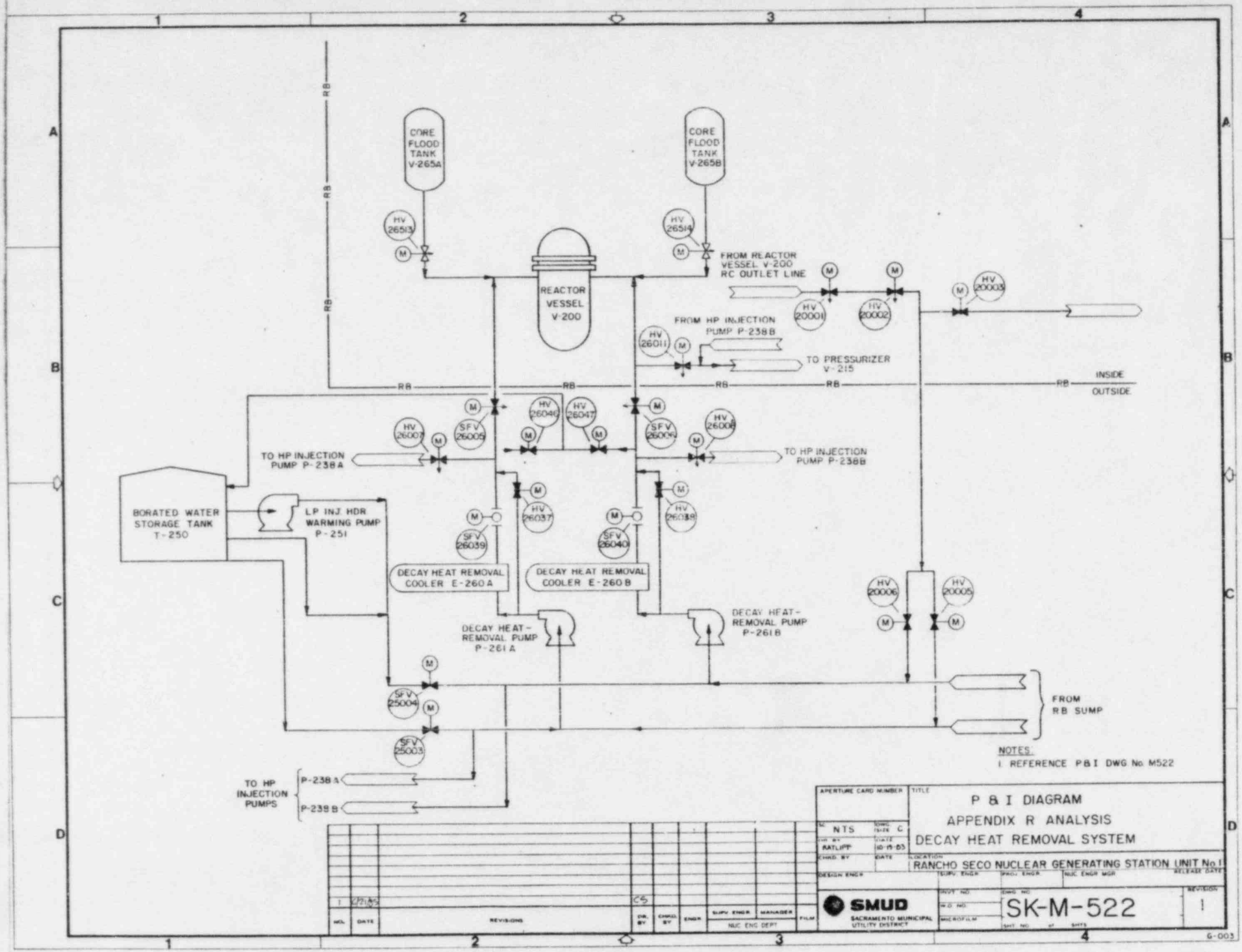
DESIGN ENGR | SUPV. ENGR | PROJ. ENGR | NUC. ENGR MGR | RELEASE DATE

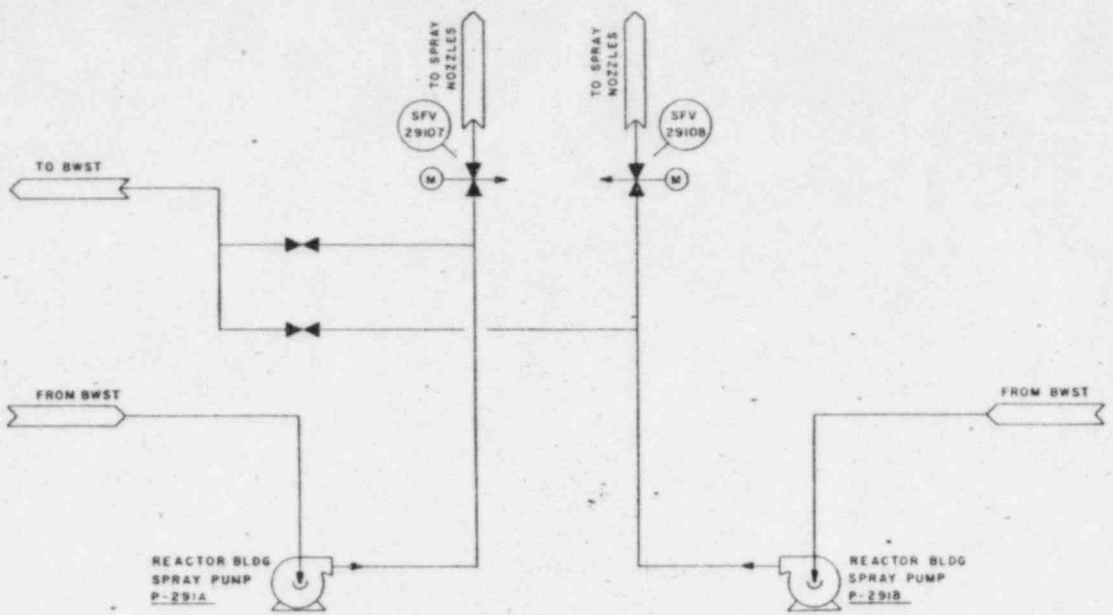
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

MOD. NO. | DWG. NO. SK-M-521A | REVISION

W.O. NO. | MICROFILM | SHT. NO. | OF | SHTS

NO. | DATE | REVISIONS | DR. BY | CHKD. BY | ENGR | SUPV. ENGR | MANAGER | NUC. ENG. DEPT. | FILM


CORE FLOOD TANK V-265A
CORE FLOOD TANK V-265B
HV 26513
HV 26514
REACTOR VESSEL V-200
FROM REACTOR VESSEL V-200 RC OUTLET LINE
HV 20001
HV 20002
HV 20003
FROM HP INJECTION PUMP P-238B
HV 26011
TO PRESSURIZER V-215
RB
INSIDE
OUTSIDE
HV 26007
SFV 26005
HV 26046
HV 26047
SFV 26009
HV 26008
TO HP INJECTION PUMP P-238A
TO HP INJECTION PUMP P-238B
BORATED WATER STORAGE TANK T-250
LP INJ HDR WARMING PUMP P-251
HV 26037
HV 26038
SFV 26039
SFV 26040
DECAY HEAT REMOVAL COOLER E-260A
DECAY HEAT REMOVAL COOLER E-260B
DECAY HEAT-REMOVAL PUMP P-261A
DECAY HEAT-REMOVAL PUMP P-261B
HV 20006
HV 20005
SFV 25004
SFV 25003
FROM RB SUMP
TO HP INJECTION PUMPS
P-238A
P-238B
NOTES:
1. REFERENCE P&I DWG No. M522
P & I DIAGRAM
APPENDIX R ANALYSIS
DECAY HEAT REMOVAL SYSTEM
RANCHO SECO NUCLEAR GENERATING STATION UNIT No. 1
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
SK-M-522
REVISIONS
G-003



NO.	DATE	REVISIONS	DR BY	CHKD BY	ENGR	SUPV ENGR	MANAGER	FILM
1	5-21-85		DM	DW		NUC ENG DEPT		

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

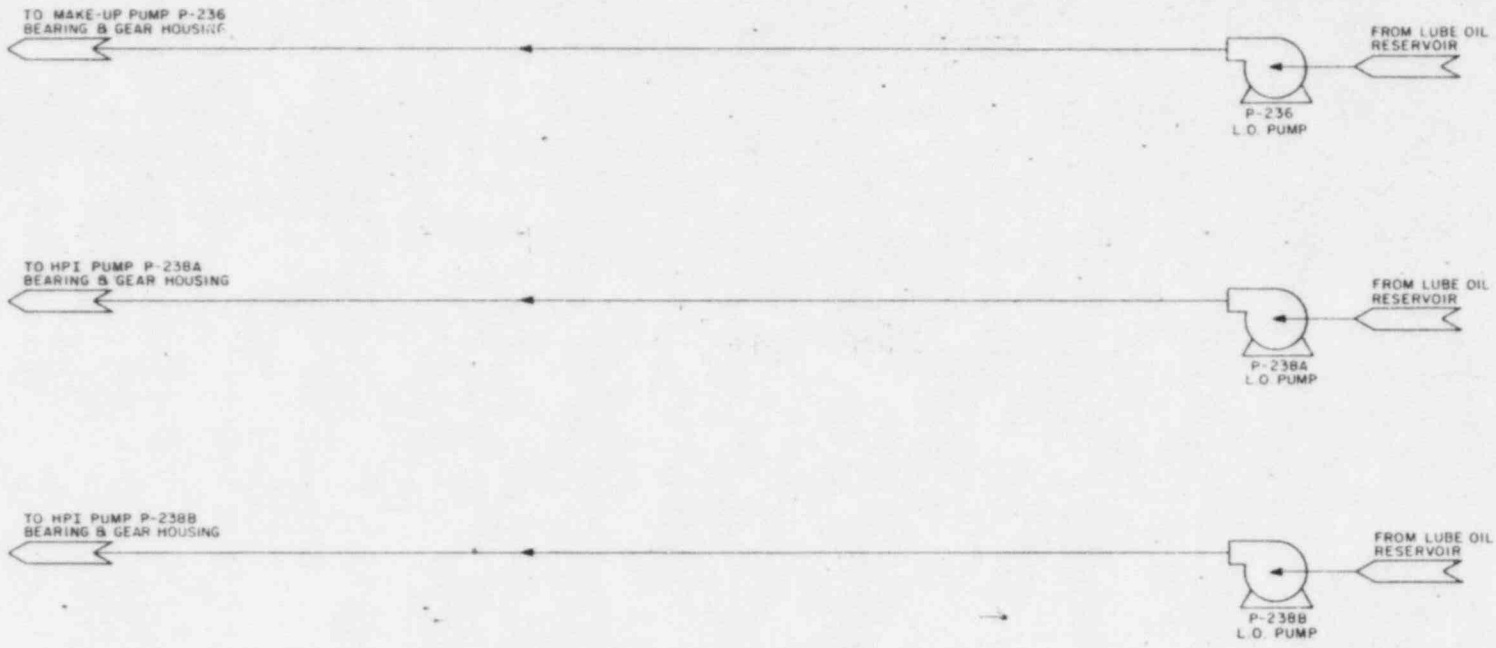
APERTURE CARD NUMBER

TITLE
P&I DIAGRAM
APPENDIX R ANALYSIS
REACTOR BLDG SPRAY SYSTEM

SIZE C
DR BY BWO
DATE 2-85
CHKD BY DW
DATE 2-85
LOCATION RANCHO SECO NUCLEAR GENERATING STA., UNIT 1

DESIGN ENGR | SUPV ENGR | PROJ ENGR | NUC ENGR MGR | RELEASE DATE

DWG NO. SK-M-524
REVISION 1



NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR	MANAGER
1	2/7/85		GS			NUC ENG DEPT	

APERTURE CARD NUMBER

TITLE: P&I SKETCH
APPENDIX R ANALYSIS
MAKE-UP & HPI
PRESSURE SWITCHES

SC: NTS SHEET SIZE: C
DR. BY: HJH DATE: 11/83
CHKD. BY: DATE:

LOCATION: RANCHO SECO NUCLEAR GENERATING STATION, UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC ENGR MGR. | RELEASE DATE

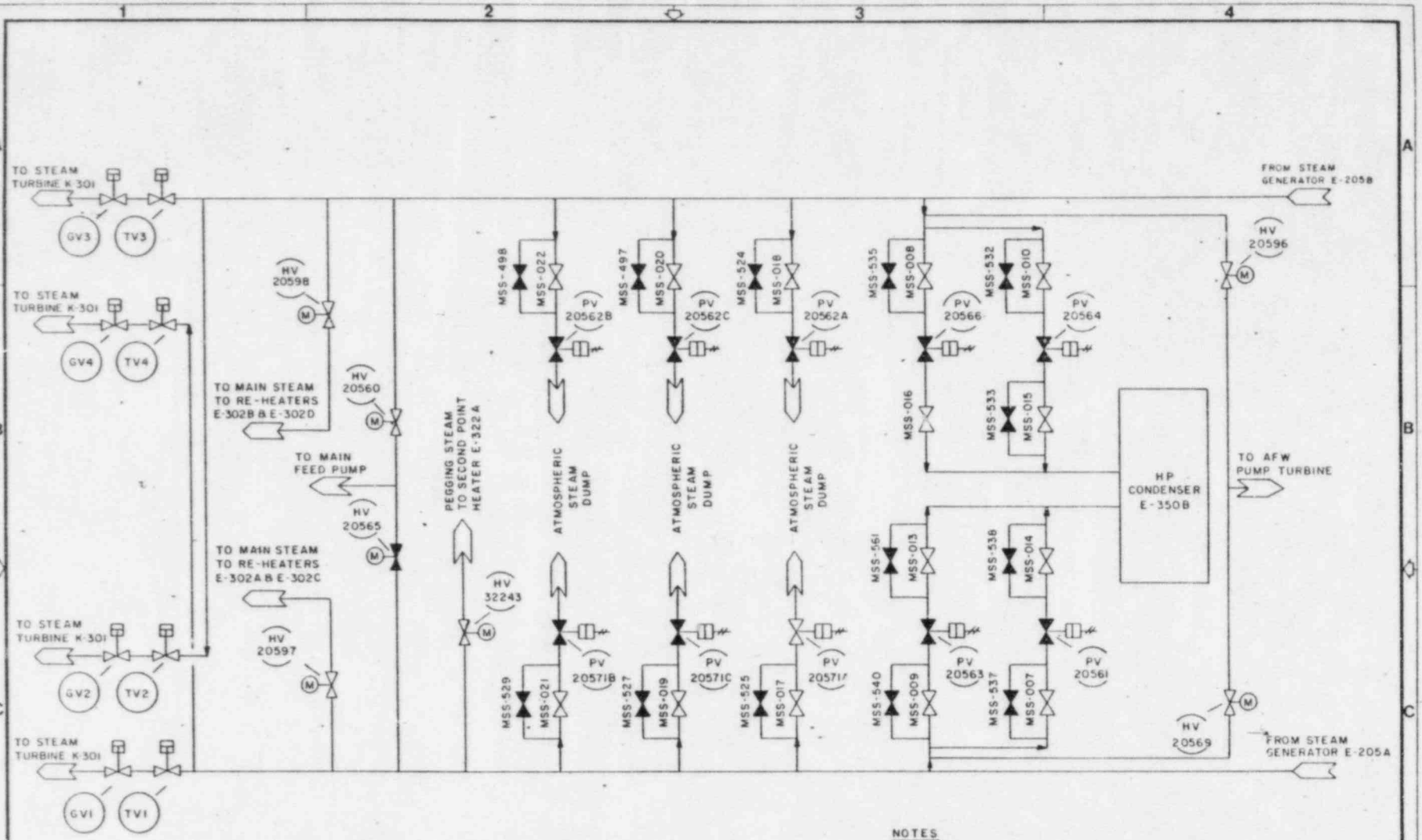
SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT. NO.
W.O. NO.
MICROFILM

DWG. NO.: SK-M-526
SHT. NO. OF SHTS.

REVISION: 1

G-003



NOTES

1. REFERENCE P&I DWG NO. M-530, SH 2 & 3

NO.	DATE	REVISIONS	DR BY	CHKD BY	ENGR	SUPV ENGR	MANAGER	FILM
1	6-21-85		BWO	CAW		NUC ENG DEPT		

APERTURE CARD NUMBER

SIZE C

DR BY BWO — DATE 6/85

CHKD BY CAW — DATE 6-85

DESIGN ENGR — SUPV ENGR — PROJ ENGR — NUC ENGR MGR — RELEASE DATE

TITLE

P&I SKETCH
APPENDIX R ANALYSIS
ATMOSPHERIC STEAM DUMP
& TURBINE BYPASS

LOCATION RANCHO SECO NUCLEAR GENERATING STA., UNIT 1

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

INVT NO

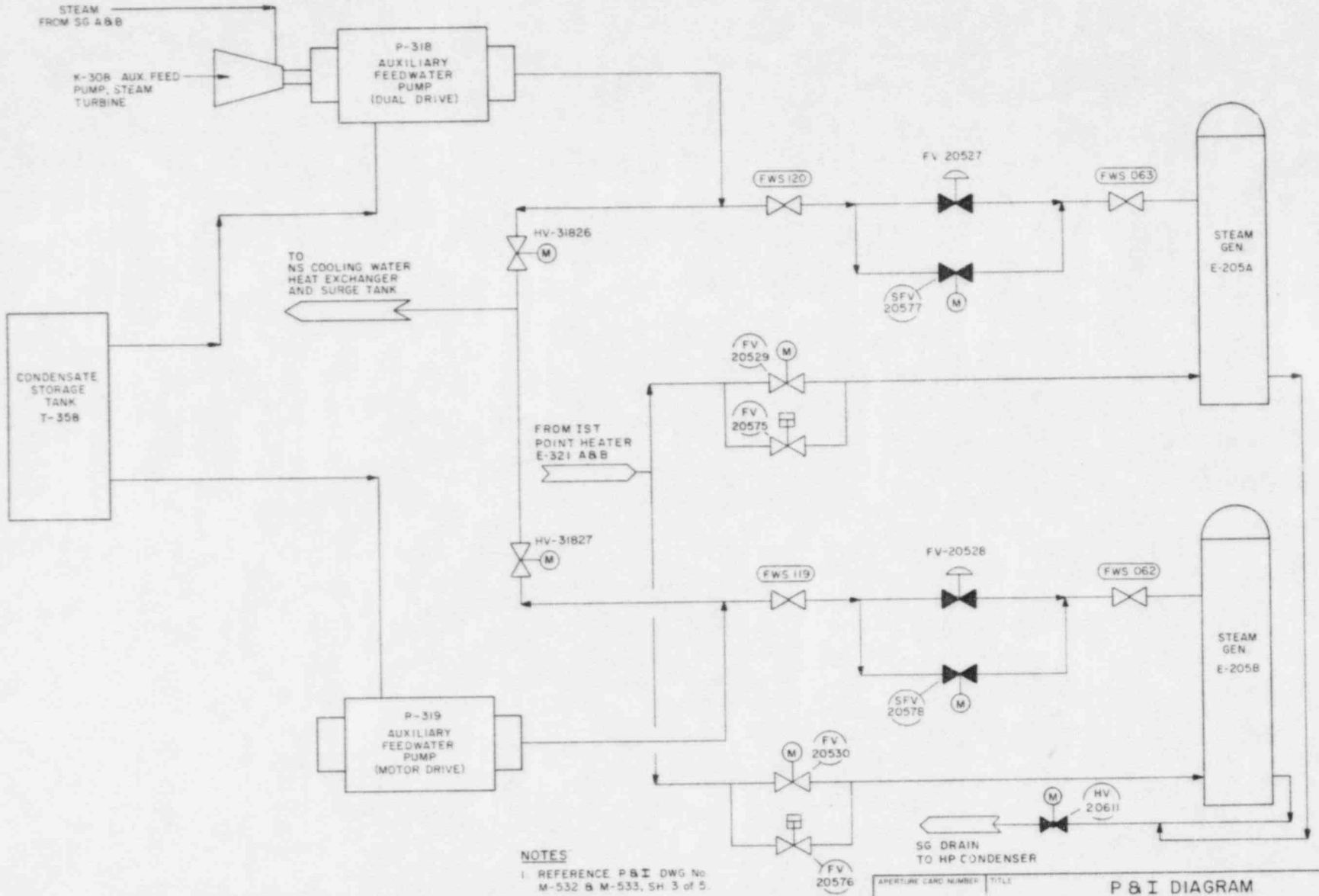
W.O. NO

MICROFILM

DWG NO SK-M-530

REVISION 1

SHT NO ___ OF ___ SHTS



NOTES

1. REFERENCE P&I DWG No. M-532 & M-533, SH. 3 of 5.

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR	MANAGER
1	2-85		DM	KW		NUC. ENG. DEPT	

APERTURE CARD NUMBER

TITLE: P&I DIAGRAM APPENDIX R ANALYSIS AUXILIARY FEEDWATER SYSTEM

SIZE C

DR. BY HJH DATE 10/83

CHKD. BY KW DATE 10-83

LOCATION RANCHO SECO NUCLEAR GEN. STA — UNIT No. 1

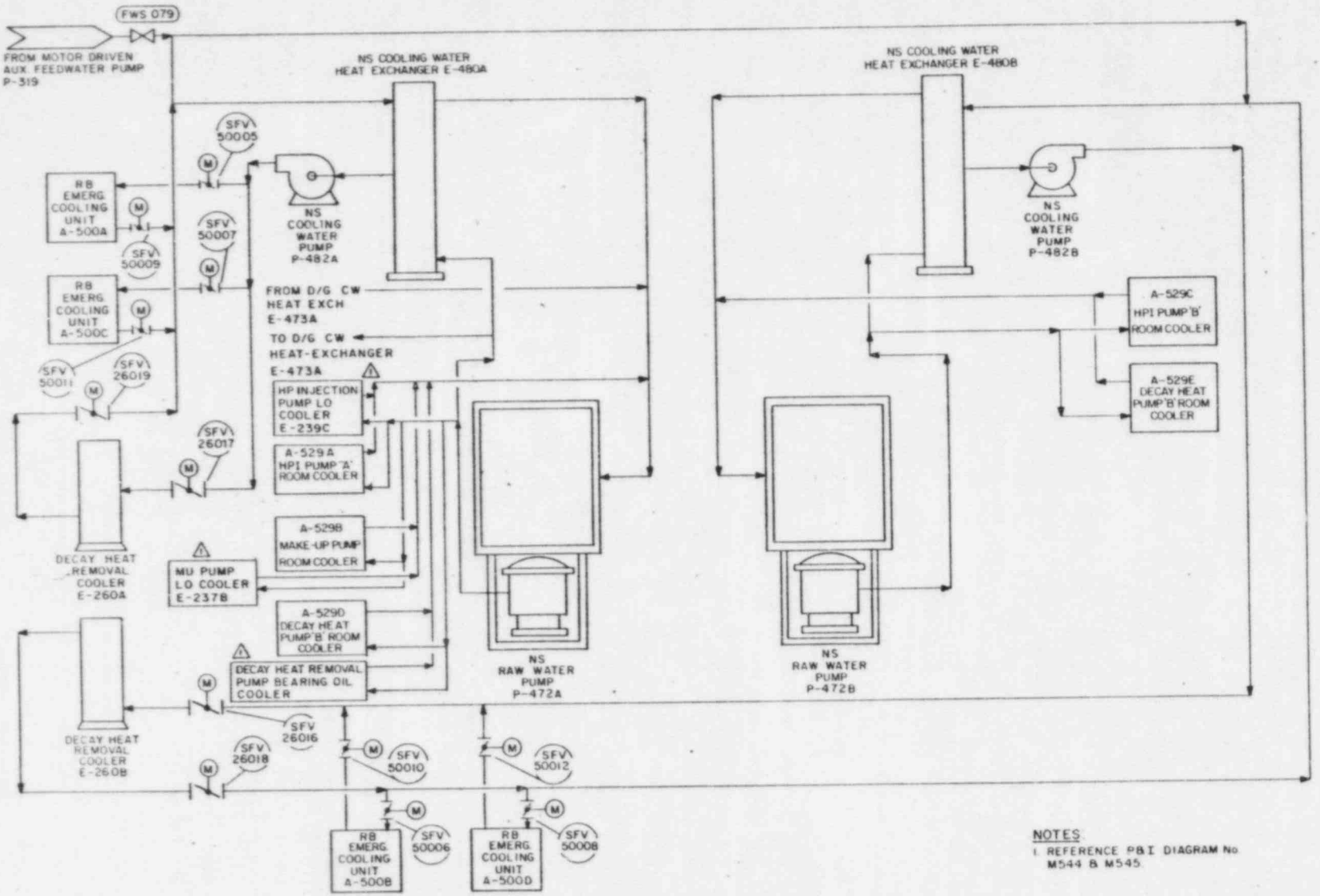
DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR. MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

ENGR. NO. | DWG. NO. SK-M-532 | REVISION 1

W.O. NO. | MICROFILM | SHT. NO. | OF | SHTS.

G-003



NOTES

1. REFERENCE P&I DIAGRAM No. M544 & M545.

REV.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR	MANAGER
1	5-25-83		BWB	[illegible]		NUC. ENG. DEPT.	

APERTURE CARD NUMBER

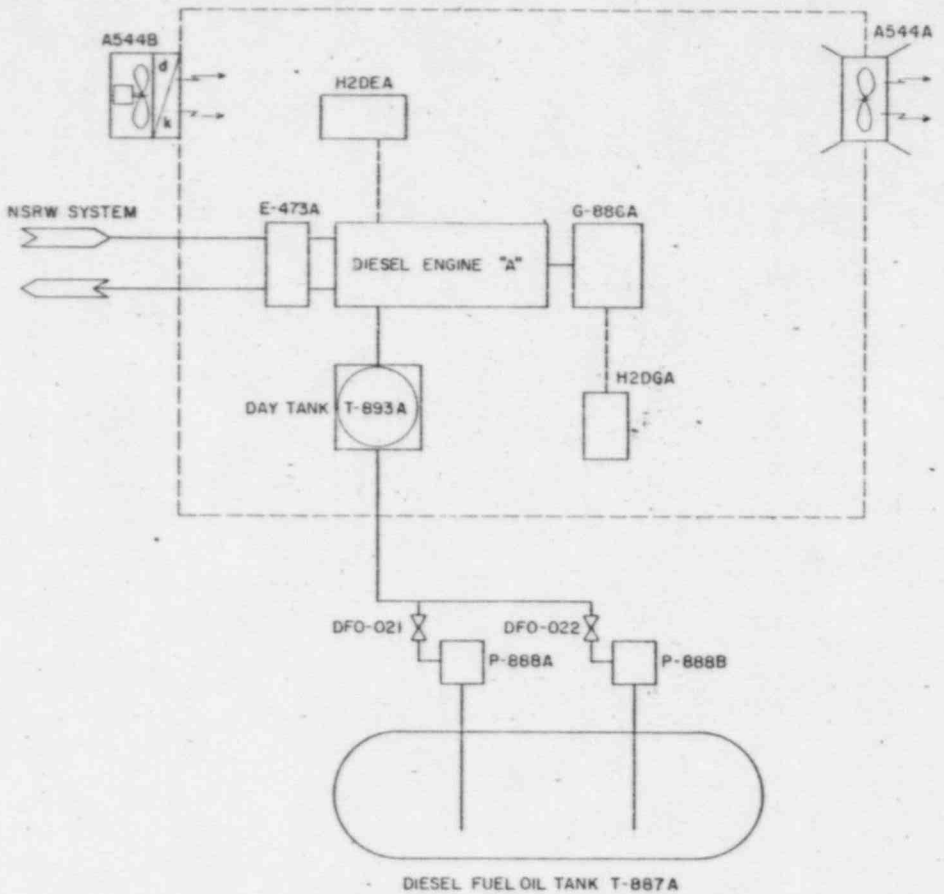
TITLE: P&I SKETCH
APPENDIX R ANALYSIS
N.S. COOLING WATER
SYSTEM

SCALE: NTS | DWG SIZE: C
DR BY: HJH | DATE: 10/83
CHKD BY | DATE
LOCATION: RANCHO SECO NUCLEAR GEN. STA.—UNIT No. 1
DESIGN ENGR | SUPV. ENGR | PROJ. ENGR | NUC. ENGR MGR | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

DWG. NO. SK-M-544
REVISION 1
SHT. NO. [illegible] SHTS.
MICROFILM
W.O. NO.

G-003



NOTES

1. REFERENCE P&I DIAGRAM No. M-552

1	12-83	REVISIONS	DM	GW		SUPV. ENGR. MANAGER NUC. ENG. DEPT.	FILM		
NO.	DATE		DR. BY	CHKD. BY	ENGR				

APERTURE CARD NUMBER

TITLE

P&I SKETCH
APPENDIX R ANALYSIS
DIESEL GENERATOR-A

SIZE C

DRAWN BY GW DATE 12-83

LOCATION RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | MNGR. ENGR. | NUC. ENGR. MGR. | RELEASE DATE

SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT

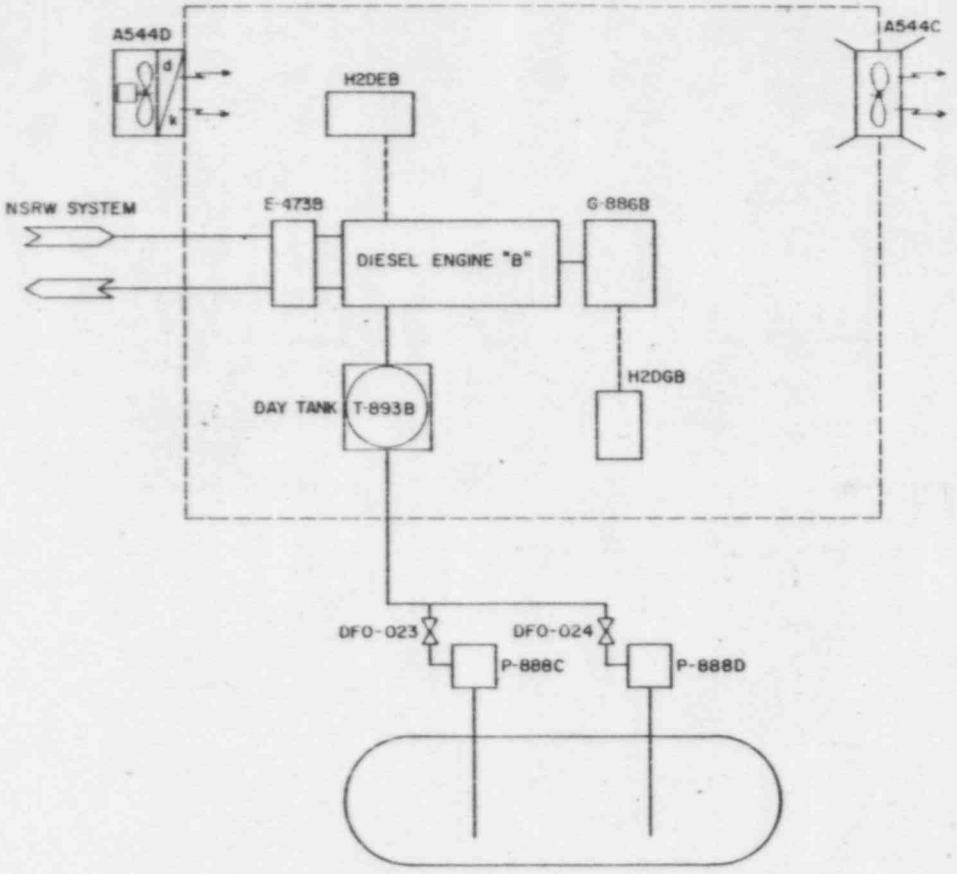
UNIT NO. | W.O. NO. | MICROFILM

DWG. NO. SK-M-552

REVISION 1

SHT. NO. | OF | SHTS.

G-003



DIESEL FUEL OIL TANK T-887B

NOTES

1. REFERENCE P&I DIAGRAM No. M-582

NO.	DATE	REVISIONS	DR. BY	CHKD. BY	ENGR	SUPV. ENGR.	MANAGER	FILM
						NUC. ENG. DEPT.		

APERTURE CARD NUMBER

TITLE: P&I SKETCH
APPENDIX R ANALYSIS
DIESEL GENERATOR-B

SIZE C

DR. BY RATLIFF DATE 11-30-83

CHKD. BY DATE

LOCATION: RANCHO SECO NUCLEAR GEN. STATION UNIT No. 1

DESIGN ENGR. | SUPV. ENGR. | PROJ. ENGR. | NUC. ENGR. MGR. | RELEASE DATE

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT

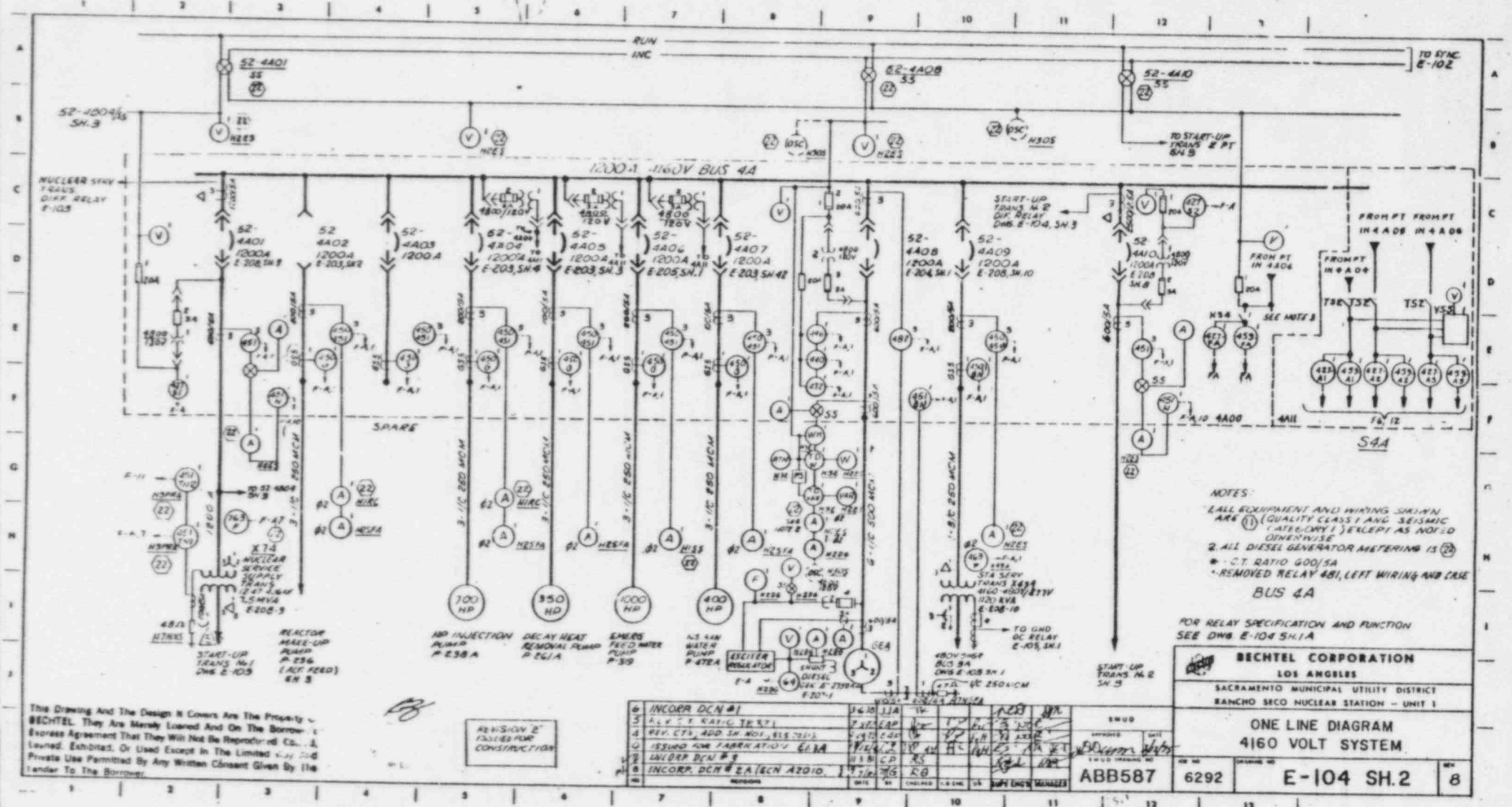
UNIT NO. | W.O. NO. | MICROFILM

DWG. NO. SK-M-582

REVISION: 0

SHT. NO. | OF SHTS.

G-003


RUN
INC
52-4A01
52-4A08
52-4A10
TO SYNC. E-102
1200A 4160V BUS 4A
52-4A01 1200A E-208, SH.3
52-4A02 1200A E-203, SH.2
52-4A03 1200A
52-4A04 1200A E-203, SH.4
52-4A05 1200A E-203, SH.3
52-4A06 1200A E-205, SH.1
52-4A07 1200A E-203, SH.2
52-4A08 1200A E-204, SH.1
52-4A09 1200A E-208, SH.10
52-4A10 1200A E-208, SH.8
SPARE
S4A
BUS 4A
700 HP
350 HP
1000 HP
400 HP
X74 NUCLEAR SERVICE SUPPLY TRANS 2.5 MVA E-208-9
START-UP TRANS. NO.1 DWG. E-105
REACTOR MAKE-UP PUMP P-236 (AUX. FEED) SH 3
AUX INJECTION PUMP P-238A
DECAY HEAT REMOVAL PUMP P-261A
EMERG. FEED WATER PUMP P-319
N.S. SAW WATER PUMP P-472A
EXCITER REGULATOR
GEA
TO GND. DC RELAY E-105, SH.1
START-UP TRANS. NO.2 SH.9
TO START-UP TRANS #2 PT
FROM PT IN 4A04
FROM PT IN 4A05
FROM PT IN 4A06
SEE NOTE 3
NOTES:
1. ALL EQUIPMENT AND WIRING SHOWN ARE (1E) (QUALITY CLASS I AND SEISMIC CATEGORY I) EXCEPT AS NOTED OTHERWISE
2. ALL DIESEL GENERATOR METERING IS (2A)
3. C.T. RATIO 600/5A
4. REMOVED RELAY 481, LEFT WIRING AND CASE
FOR RELAY SPECIFICATION AND FUNCTION SEE DWG. E-104 SH.1A
BECHTEL CORPORATION
LOS ANGELES
SACRAMENTO MUNICIPAL UTILITY DISTRICT
RANCHO SECO NUCLEAR STATION – UNIT 1
ONE LINE DIAGRAM
4160 VOLT SYSTEM
ABB587
6292
E-104 SH.2
8
REVISED 'B' ISSUED FOR CONSTRUCTION
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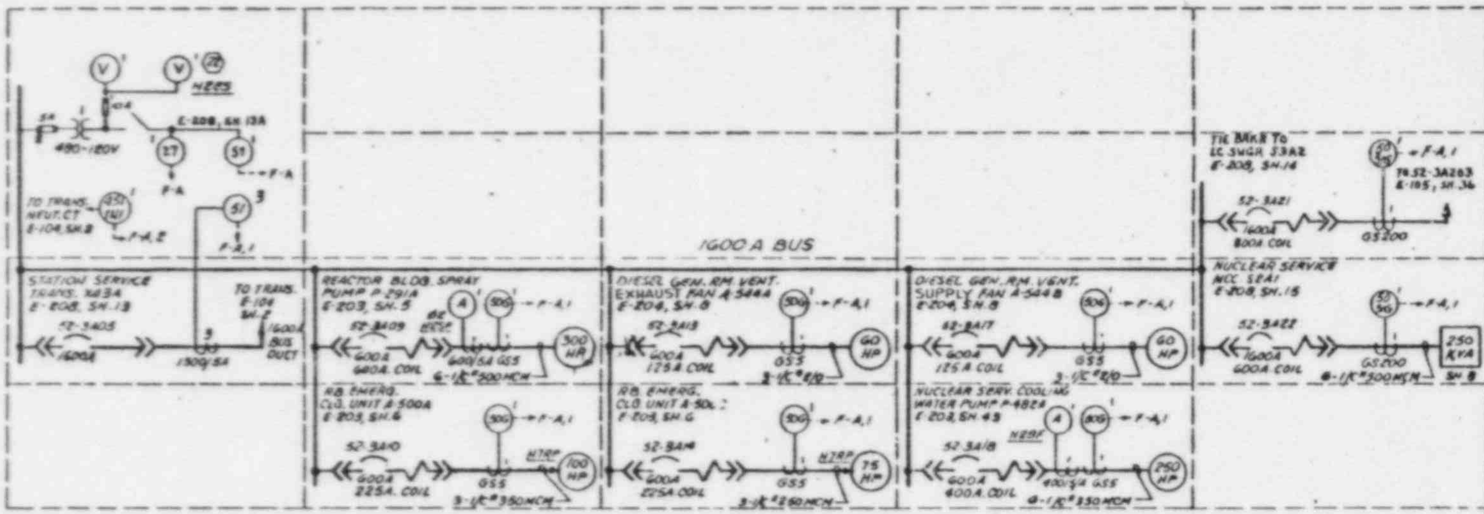


NO.	RELAY SPECIFICATION DESCRIPTION	MFR.	RANGE
27	UNDERVOLTAGE	ITE 27	60-110V
50/51G	GROUND OVERCURRENT	ITEGR200SF	200-2000A
51	PHASE OVERCURRENT	GE IAC53A	4-16A
51/1M	SS TRANS. GND. OVERCURRENT	ITEGR200SF	200-2000A
27T	UNDERVOLTAGE	(W) MG-6	
50G	GROUND OVERCURRENT	ITEGR5SF	5-50A
59	OVERVOLTAGE ALARM	ITE 59D	100-150V

CODE	RELAY FUNCTION DESCRIPTION
F-A	INITIATES ALARM
F-1	TRIPS FEEDER BREAKER
F-2	TRIPS STA. SERVICE TRANS. 4160V. BREAKER
F-3	TRIP AIR COMPRESSOR

REF. ECN. NO. 34-E20

REF. DWG. NO'S: 6292-E7.01 - 1, 17 & 52

REF. CCD NO: 531-E109

NOTES:

1. ALL EQUIPMENT AND WIRING SHOWN ARE (II) (QUALITY CLASS I AND SEISMIC CATEGORY I) EXCEPT AS NOTED OTHERWISE.

BUS 3A

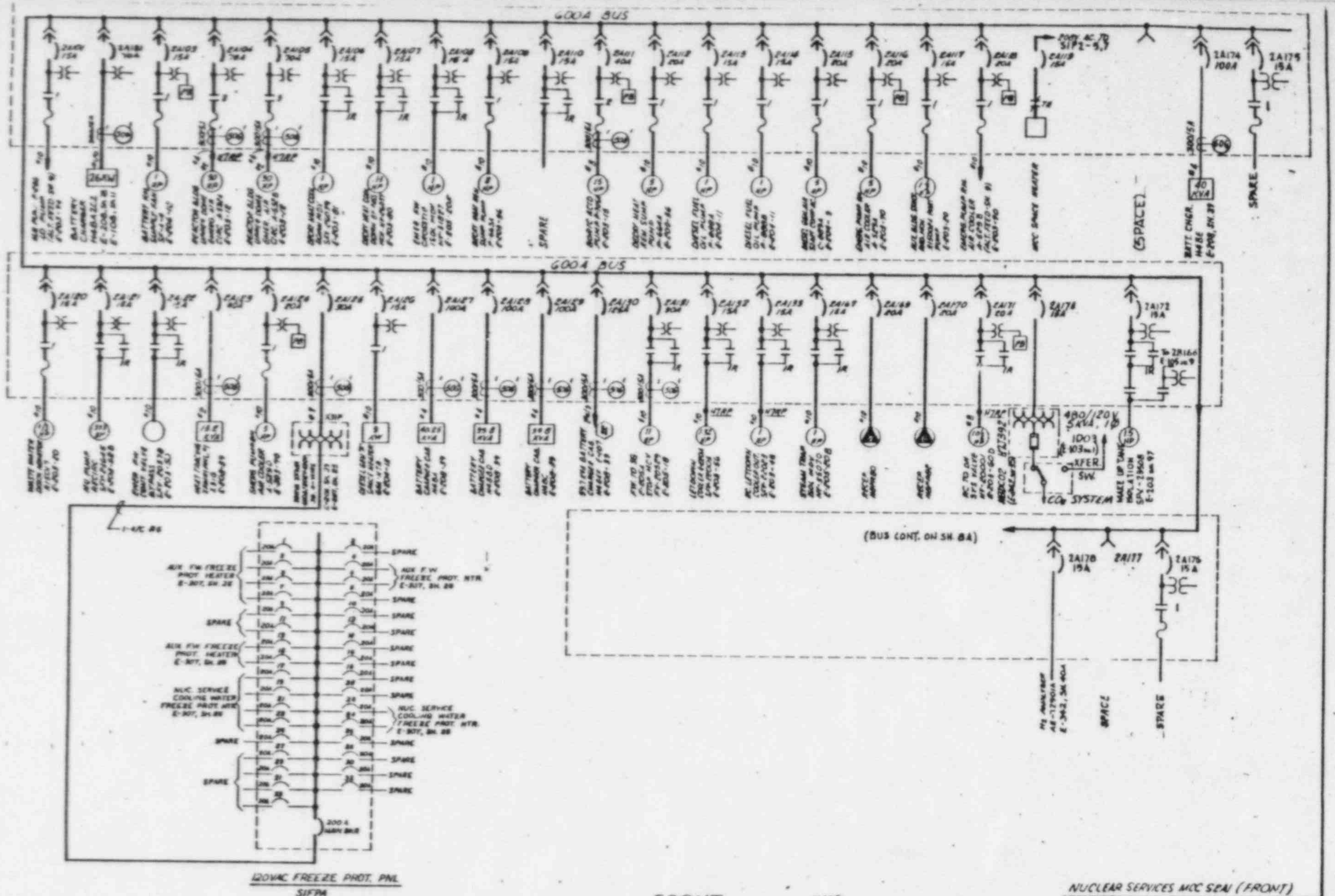
	REVISIONS
6	INCORP. DCN 38 (A 20101A & 38 (A-3460F)
E	REVISED & REDRAWN
C	ISSUED FOR INVITATION MTT
5	INCORP. DCN # 2
3	REV. DESCRIPTION OF 3AR 53A13
4	INCORP. DCN # 1
	REVISION 0 ISSUED FOR CONSTRUCTION

BECHTEL CORPORATION
LOS ANGELES

SACRAMENTO MUNICIPAL UTILITY DISTRICT
RANCHO SECO NUCLEAR STATION - UNIT 1

ONE LINE DIAGRAM
480 VOLT SYSTEM

ABB591 | 6292 | E-105 SH.1 | 6



FRONT

NOTE:

ALL EQUIPMENT AND WIRING SHOWN ARE (QUALITY CLASS I AND SEISMIC CATEGORY I) EXCEPT AS NOTED OTHERWISE. (11)

REF. ECN NO: 19-515

RELAY SPECIFICATION		
NO	DESCRIPTION	TYPE
50G	GROUND OVERCURRENT	IC2820A102

REV "0" ISSUED FOR CONTRUCTION	
22	[illegible]
21	INCORP DCN [illegible]
20	INCORP DCN #8 (7885)
19	INCORP DCN [illegible]
18	INCORP DCN #5
23	INCORP DCN #12 [illegible]

NUCLEAR SERVICES MCC S2A1 (FRONT)

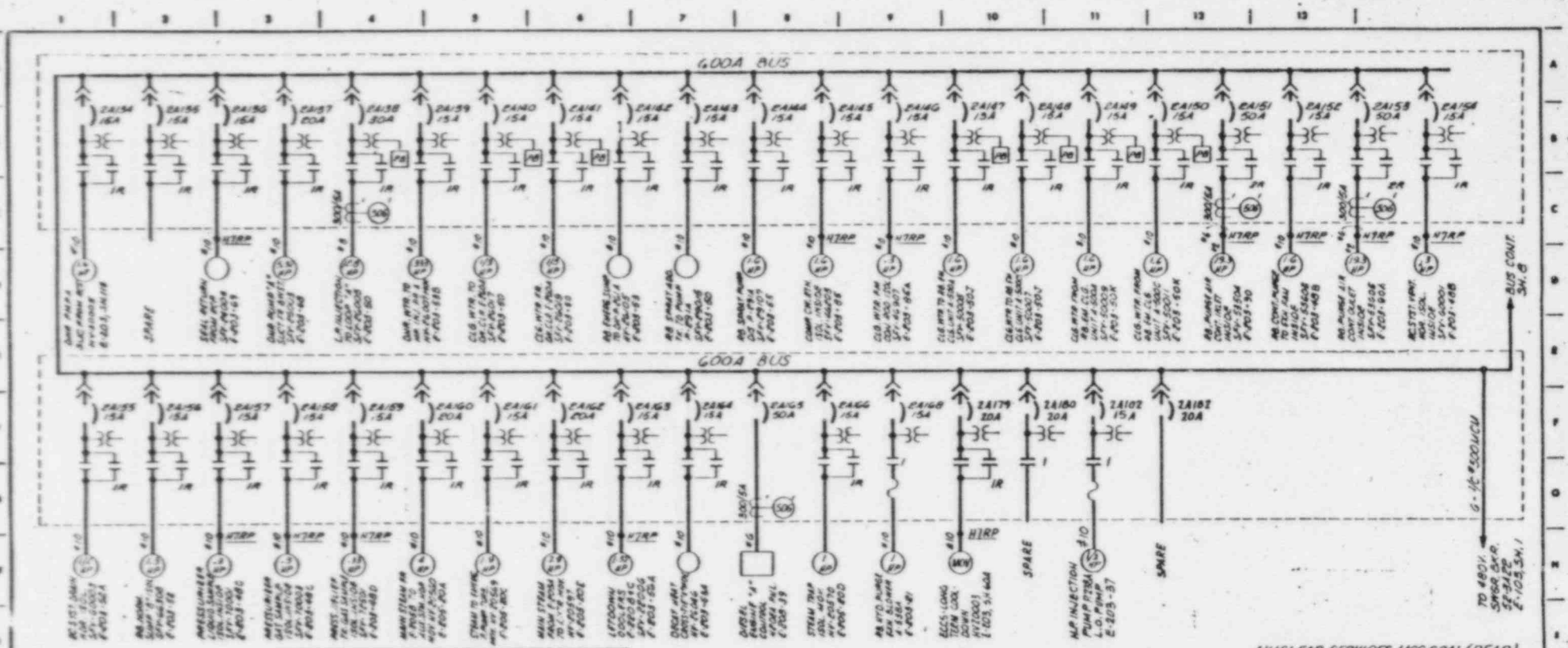
BECHTEL CORPORATION
LOS ANGELES

SACRAMENTO MUNICIPAL UTILITY DISTRICT
RANCHO SECO NUCLEAR STATION – UNIT 1

ONE LINE DIAGRAM
480 VOLT SYSTEM

ABB598 | 6292 | E-105 SH. 8 | 23

Uncontrolled Copy



RELAY SPECIFICATION		
NO	DESCRIPTION	TYPE
50G	GROUND OVERCURRENT	KC68D0A10E

REF. ECN. NO: 19-E15

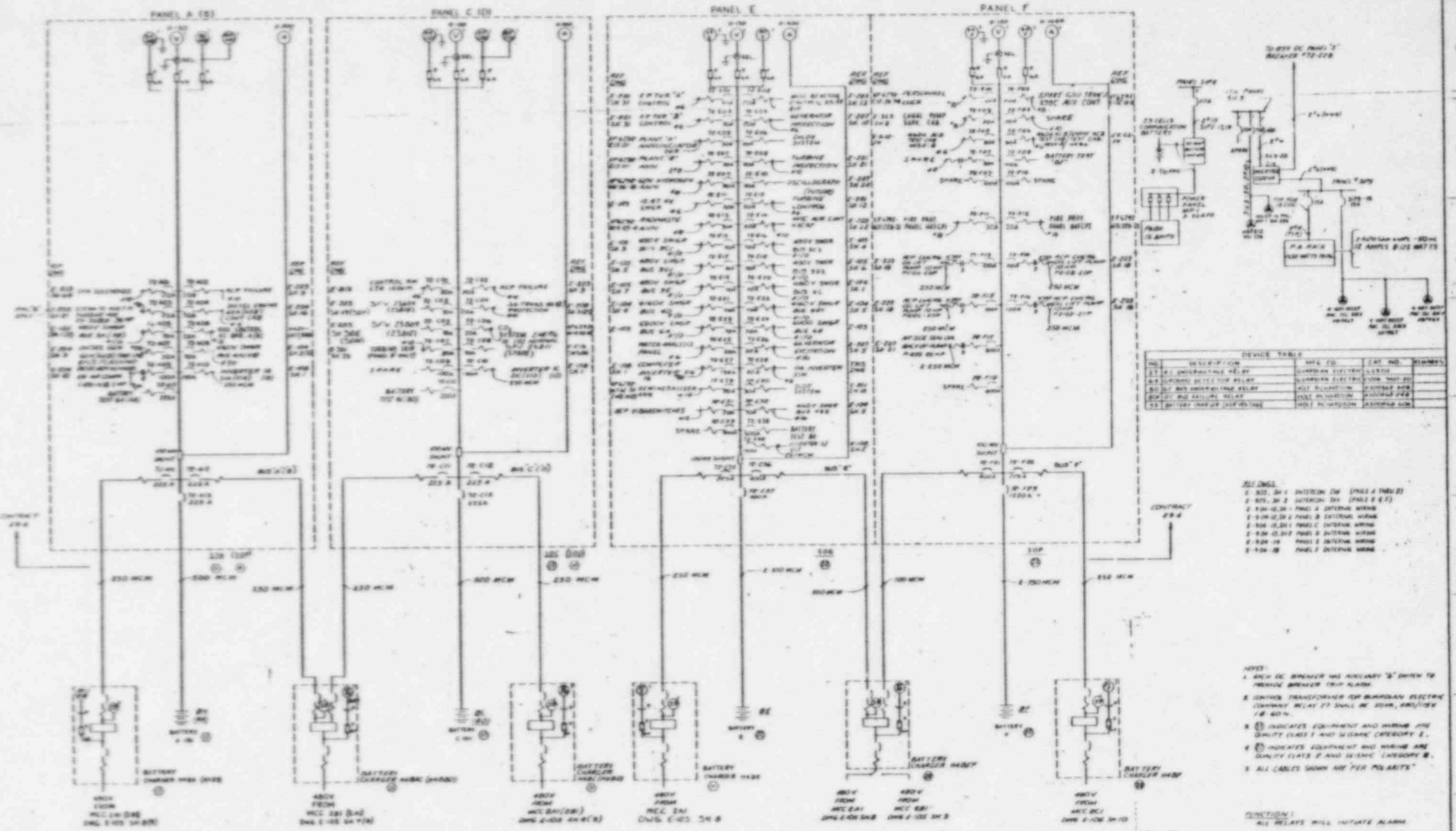
NOTE:
ALL EQUIPMENT AND WIRING SHOWN ARE (11) (QUALITY CLASS I AND SEISMIC CATEGORY I) EXCEPT AS NOTED OTHERWISE.

REV	DESCRIPTION	DRN	CHK	APP	DATE
5	INCORP. DCN #5	JJA			
4	INCORP DCN #3 & 4	SJA			
3	INCORP DCN #2	JK			
2	INCORP DCN #10 (A-4024)	T			
1	INCORP. DCN. #7 (3885)	JMF			
0	INCORP DCN #6	VE			

BECHTEL CORPORATION
LOS ANGELES
SACRAMENTO MUNICIPAL UTILITY DISTRICT
RANCHO SECO NUCLEAR STATION – UNIT 1

ONE LINE DIAGRAM
480 VOLT SYSTEM

BECHTEL DRAWING NO.	JOB NO.	DRAWING NO.	REV.
ABB599	6292	E-105 SH.8A	9



BECHTEL CORPORATION
LOS ANGELES

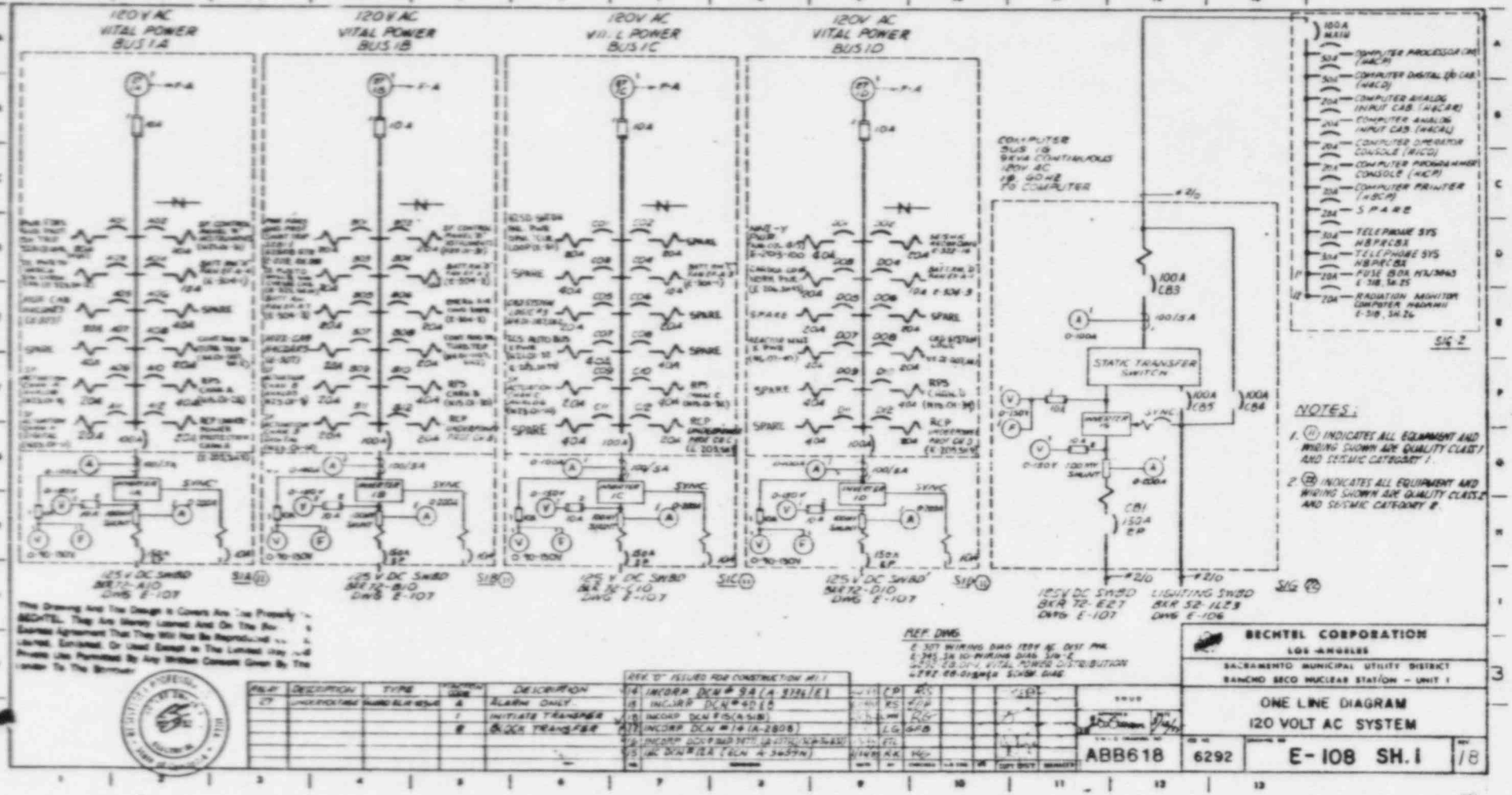
SACRAMENTO MUNICIPAL UTILITY DISTRICT
RANCHO SECO NUCLEAR STATION - UNIT 1

ONE LINE DIAGRAM
125 VOLT DC SYSTEM

ABA761

E-107

17


120V AC VITAL POWER BUS 1A
120V AC VITAL POWER BUS 1B
120V AC VITAL POWER BUS 1C
120V AC VITAL POWER BUS 1D
STATIC TRANSFER SWITCH
100A MAIN
COMPUTER PROCESSOR CAB (HACP)
COMPUTER DIGITAL I/O CAB (HACD)
COMPUTER ANALOG INPUT CAB (HACAE)
COMPUTER ANALOG INPUT CAB (HACAL)
COMPUTER OPERATOR CONSOLE (HACO)
COMPUTER PROGRAMMER CONSOLE (HACP)
COMPUTER PRINTER (HACP)
SPARE
TELEPHONE SYS HSPECBX
TELEPHONE SYS HSPECBX
FUSE BOX H13/3963 E-318, SH.25
RADIATION MONITOR COMPUTER HSDAHH E-318, SH.24
SIG 2
NOTES:
1. (1) INDICATES ALL EQUIPMENT AND WIRING SHOWN ARE QUALITY CLASS I AND SEISMIC CATEGORY I.
2. (2) INDICATES ALL EQUIPMENT AND WIRING SHOWN ARE QUALITY CLASS E AND SEISMIC CATEGORY E.
REF. DWG.
125 V DC SWBD BKR 72-A10 DWG E-107
125 V DC SWBD BKR 72-B10 DWG E-107
125 V DC SWBD BKR 72-C10 DWG E-107
125 V DC SWBD BKR 72-D10 DWG E-107
120V DC SWBD BKR 72-E27 DWG E-107
LIGHTING SWBD BKR 52-1L23 DWG E-106
SIG (2)
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BECHTEL CORPORATION
LOS ANGELES
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RANCHO SECO NUCLEAR STATION - UNIT 1
ONE LINE DIAGRAM
120 VOLT AC SYSTEM
ABB618
6292
E-108 SH.1
18