Point Beach Nuclear Plant
Units 1 & 2

FINAL REPORT

RESPONSE TO 10 CFR 50 APPENDIX R "ALTERNATE SHUTDOWN CAPABILITY"

October 1983

by

WISCONSIN ELECTRIC
POWER COMPANY

8311020097 831026
PDR ADOCK 05000266
F PDR

POINT BEACH

NUCLEAR PLANT UNITS 1 & 2

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

FIGURES

*ARED - Appendix R Evaluation Diagram

Table of Contents (continued)

Table of Contents (continued)

SECTION 6

SECTION ONE

INTRODUCTION

1. INTRODUCTION

1.1 Objective

The objective of this analysis is to demonstrate the technical feasibility and practicality of the use of alternative measures in place of a dedicated shutdown system as a means of achieving compliance with the separation requirements of 10 CFR 50 Appendix R at the Wisconsin Electric Power Company's Point Beach Nuclear Plant Units 1 and 2. The use of an alternative approach provides cost-effective regulatory compliance with a reduced set of plant modifications having the least impact on plant systems and procedures.

1.2 Scope

This analysis provides the basis for alternate shutdown capability outside the Control Room. A minimum set of systems and components is used involving local and manual control to accomplish the stipulated Appendix R safe shutdown functions. The equipment, manpower and operational time frames are presented to establish safe hot shutdown conditions, as well as the subsequent activities required to achieve cold shutdown. Modifications required to attain safe shutdown will be recommended and necessary procedures will be identified. A description is also provided of the historical basis of Appendix R criteria and Nuclear Regulatory Commission (NRC) Staff interpretation of those criteria as evidenced in their evaluation of similar situations in other operating nuclear power plants.

1.3 Background

At the time of the design and construction of the Point Beach Nuclear Plant, the fire protection features in effect at nuclear power plants were those specified by 10 CFR 50 Appendix A, General Design Criterion 3 - "Fire Protection". In March 1975, a fire involving the cable penetration seals separating the Browns Ferry Unit 1 Reactor Building from the Unit 1 Cable Spreading Room indicated the need to review the adequacy of these criteria. The need for this review was identified by the NRC's Special Review Group's report, "Recommendations Related to Browns Ferry Fire" (NUREG-0055), issued in February 1976. This report noted that reasonable improvements in existing fire protection programs could be achieved and called for a comprehensive review of the programs at operating nuclear power plants. In recommending such improvements, the Special Review Group articulated the need for a balanced approach in achieving improvements in order to protect the integrity of nuclear power plant design bases in other areas, and to ensure that fire protection enhancements would not be achieved at the expense of other reactor safety measures. The balanced approach envisioned by the NRC for the fire protection review was programmatic, involving the use of multiple layers of active and passive protective measures such as prevention, detection, suppression, fire barriers, fire retardant coatings and baffles so as to ensure that failure of any single method would be compensated for in other ways.

By December 1977, Wisconsin Electric Power Company (WE) and other licensees had completed their analyses, based on a defense-in-depth approach to fire protection. The analyses also contained proposed modifications in accordance with the criteria of Branch Technical Position (BTP) 9.5-1 Appendix A. In most cases, the modifications proposed by licensees as a result of these plant-specific analyses were deemed acceptable by the Staff and documented in fire protection safety evaluation reports (FPSER) on each docket. In some situations, technical disagreements between the licensees and the Staff ensued, reflecting differences in professional opinion. By early 1980, three years after the WE submittal, the NRC decided to resolve those areas of disagreement through rulemaking. It should be noted that between 1977 and 1980, WE had begun implementing those modifications which the Staff had agreed were appropriate.

The Commission embarked on rulemaking activities for the purpose of resolving all of the FPSER open items on the operating plant dockets with a single regulatory action. Ultimately, these rulemaking proceedings displaced the reviews of open item submittals in terms of Staff priorities. The resulting Commission actions led to the issuance of a proposed fire protection rule in May 1980 which addressed the protection of the safe shutdown capability generically through a plant-specific analysis of the effects of fire in accordance with the BTP 9.5-1 Appendix A philosophy.(1)

While consistent with the treatment provided by WE in earlier submittals, the proposed analytical approach was subsequently abandoned by the Commission in the final rule on the grounds that it is not possible to analyze the course of fire initiation or propagation. Rather, the final rule established "design basis protective features" as the criteria for the protection of the safe shutdown capability and offered the following compliance alternatives to operating plant licensees:

(1) Separation of redundant safe shutdown systems by either three-hour-rated barriers, one-hour-rated barriers plus automatic suppression and detection, or 20 feet of horizontal separation free of intervening combustibles or hazards plus automatic suppression and detection (Section III.G.2, 10 CFR 50 Appendix R);

(2) An alternate shutdown system and automatic suppression (Section III.G.3, 10 CFR 50 Appendix R);

(3) A dedicated shutdown system and automatic suppression (Section III.L, 10 CFR 50 Appendix R); or

(4) A combination of measures which are shown by analysis to provide an equivalent level of protection (10 CFR 50.48 [c][6]).

A fire hazards analysis was performed on specific plant areas of the Point Beach Nuclear Plant where redundant safe shutdown Appendix R systems existed. That analysis was the foundation for exemptions requested based on equivalent fire protection and was submitted in June 1982.(2) The NRC Staff responded to the June 1982 submittal with a draft SER which denied all exemptions requested except for the Control Room and the hydrogen hazard fire protection analysis. For the exemptions denied, the Staff recommended alternate shutdown capability be provided for the affected areas.(3)

An appeal meeting with NRC management was held March 22, 1983 to discuss the denied exemptions. As a result of the appeal meeting, WE submitted a document on April 28, 1983 revising the exemption requests and proposed modifications and withdrawing exemption requests which were not required.(4) The April 28, 1983 submittal also provided conceptual designs for alternate shutdown capability in some of the affected plant areas.

The report contained herein provides the detailed analysis of alternate shutdown capability for the Control Room and addresses the appropriate sections of Generic Letter 81-12. This report also provides alternative shutdown modifications required for three other plant areas.

1.3.1 Results of Analysis

The results of the analysis provide a method to safely shut down Point Beach Units 1 and 2 using alternative methods outside the Control Room. The areas for which alternative methods are required are as follows:

(1) Control Room - Alternative methods required for all safe shutdown functions.

(2) Cable Spreading Room - Alternative methods required in both units for reactor coolant inventory control (CVCS charging pumps).

(3) Containment Spray Additive and Monitor Tank Area - Alternative methods to provide indication for safe shutdown instrumentation.

(4) Emergency Diesel Generator Rooms - Modifications to control circuits to provide local manual operation.

The Point Beach Nuclear Plant has inherent fire protection features in several plant areas which ensure post-fire survivability of safe shutdown equipment such that both units can be simultaneously brought to cold shutdown within 72 hours. These unique features involve Halon suppression systems installed in three specific plant areas: 4kV Switchgear Room, Cable Spreading Room, and Auxiliary Feed Pump Room. All three areas presently have active, single failure-proof Halon suppression systems with a commitment to make initiating detection systems diverse and redundant.

The Appendix R Safe Shutdown Analysis provided in June 1982 established the basis for Section III.G.2 exemptions predicated on the capabilities of the installed Halon suppression systems. The configurations of these three areas do not lend themselves to the provision of Section III.G.2 separation criteria and after a presentation to the NRC Staff management during an appeal meeting held on March 22, 1983, WE agreed to upgrade the Halon systems as noted previously. Thus, in the as-modified condition as detailed in the April 28, 1983 submittal, these three areas will have inherent fire protection features which will ensure post-fire safe shutdown capability. For the 4kV Switchgear Room, the Cable Spreading Room and the Auxiliary Feed Pump Room, WE demonstrated to the NRC Staff management that the Halon suppression systems compensate for the Section III.G.2 separation criteria deficiencies. As a result of these discussions, the NRC Staff

requested that consideration be given to limited fire damage in each of the three areas as follows:

(1) Cable Spreading Room - Fire damage is assumed limited to Unit 1 or Unit 2 480V load centers;

(2) 4kV Switchgear Room - Fire damage is assumed limited to one section of switchgear including the relays on the face of the cabinets. The internal bus bars and mechanical components of breakers would not be damaged sufficiently to prevent local manual control;

(3) Auxiliary Feed Pump Area - Fire damage is assumed limited to two of four auxiliary feed pumps. One redundant safe shutdown division of components and cables will be free of fire damage as a result of existing or modified separation.

An evaluation of the three areas was made as a result of the NRC Staff's request for consideration of limited fire damage. The analysis indicated that the Cable Spreading Room requires modifications which are considered to be alternative shutdown modifications. Thus, with the exception of the Cable Spreading Room, the other two areas afford safe shutdown capability that ensures both units can achieve safe cold shutdown without the need for alternative shutdown modifications.

All plant areas containing required safe shutdown components and/or circuits meet one of the following Appendix R compliance criteria:

(1) One train of safe shutdown equipment is free of fire damage as a result of meeting one of the three criteria in Section III.G.2.

(2) The area meets (1) above and has in it repairable cold shutdown equipment.

(3) The area will sustain limited fire damage such that safe shutdown capability is not affected.

(4) An exemption has been requested from specific requirements of Section III.G.

1.4 Governing Regulatory Guidelines

1.4.1 Criteria

The criteria used in this analysis are derived from five regulatory documents which form the basis for the conclusions and recommendations:

(1) "Fire Protection Program for Operating Nuclear Power Plants" 10 CFR 50 Appendix R, Section III.G (45 FR 76611, November 19, 1980 and 46 FR 44735, September 8, 1981);

(2) Letter to All Power Reactor Licensees with Plants Licensed Prior to January 1, 1979, from Mr. D.G. Eisenhut (NRR/DL), SUBJECT: "Fire Protection Rule 45 FR 76602, November 19, 1980 - Generic Letter 81-12", dated February 20, 1981;

(3) Memorandum to Mr. D.G. Eisenhut (NRR/DL) from Dr. R.J. Mattson (NRR/DSI), SUBJECT: "Fire Protection Rule - Appendix R", dated March 22, 1982 (Clarification of Generic Letter 81-12);

(4) Memorandum to Mr. R.H. Vollmer (NRR/DE) from Dr. R.J. Mattson (NRR/DSI), SUBJECT: "Position Paper on Allowable Repairs for Alternative Shutdown and the Appendix R Requirement for Time Required to Achieve Cold Shutdown", date July 2, 1982; and

(5) Memorandum to Dr. R.J. Mattson (NRR/DSI) from Mr. L.S. Rubenstein (DSI/AD), SUBJECT: "Statement of Staff Position Regarding Source Range Flux, Reactor Coolant Temperature and Steam Generator Pressure Indication to Meet Appendix R, Alternate Shutdown Capability", dated January 7, 1983.

1.4.2 Interpretation of Guidelines

The goal of Appendix R Section III.G is the fire protection of structures, systems, and components important to safe shutdown. For the purposes of fire protection, Appendix R defines safe shutdown as both hot and cold shutdown.

This goal is reached by providing reasonable assurance that at least one train of systems necessary to achieve and maintain hot shutdown remains free of fire damage in the unlikely event of fire in any plant area. Systems necessary to achieve and maintain cold shutdown conditions may likewise be protected or repaired to the extent that cold shutdown can be achieved within 72 hours.

The second document listed above, Generic Letter 81-12, was issued subsequent to the promulgation of Appendix R for the purpose of identifying and clarifying the information required for Staff review of licensing submittals describing safe shutdown functions, systems, components and their associated circuits. To this end, Generic Letter 81-12 supplements the final rule and provides additional criteria which must be considered. Generic Letter 81-12 itself was clarified further by a "Clarification Letter" which was transmitted to power reactor licensees between March and May 1982.

The Mattson to Vollmer memorandum addresses two issues concerning cold shutdown:

(1) Allowable repairs to achieve cold shutdown; and

(2) Allowable time to achieve cold shutdown.

Both issues grew out of a lack of definition for the term "repairs" and apparent inconsistencies in requirements for repair and shutdown activities relative to the 72-hour limit. The principal aspects of these issues are resolved in this memorandum as follows:

Repair

(1) Repair activities may not be credited in assuming hot shutdown system availability;

(2) Manual operation of valves, switches, and circuit breakers is not considered to be a repair activity and, hence, is allowable for hot shutdown systems;

(3) Fuse removal under most circumstances is considered to be a repair activity and is not allowed for maintaining hot shutdown system availability for mitigating the consequences of potential spurious operation candidates; and

(4) Modifications, e.g., wiring changes, are allowed to cold shutdown systems and/or components which are not used for hot shutdown or are not used to mitigate the consequences of fire or fire suppressant-induced maloperations that directly affect hot shutdown systems. These repairs must be achievable prior to the maloperations causing an unrecoverable plant condition.

Time

(1) The sum of repair time and shutdown time must be less than or equal to 72 hours; and

(2) Off-site power is assumed to be restored after 72 hours.

The Staff documented the process-monitoring criteria for Appendix R compliance in the Rubenstein to Mattson memorandum. This document identified the following instrument requirements:

(1) Source range flux monitoring - reactivity (transition to and maintenance of cold shutdown only);

(2) T_h, T_c - decay heat removal;

(3) Steam generator level and pressure (wide-range) - decay heat removal;

(4) Reactor Coolant System pressure and level - reactor coolant inventory and pressure control.

REFERENCES

SECTION 1

(1) "Fire Protection Program for Operating Nuclear Power Plants", Proposed Rule, US Nuclear Regulatory Commission, 45 FR 36082, dated May 29, 1980.

(2) Response to 10 CFR 50 Appendix R "Fire Protection Safe Shutdown Capability", Wisconsin Electric Power Company, dated June 30, 1982.

(3) "Draft Safety Evaluation on Appendix R Exemption Request", from Robert A. Clark, Chief Operating Reactors Branch #3 Division of Licensing, dated January 14, 1983.

(4) Submittal to H.R. Denton, Director, Office of Nuclear Reactor Regulation, SUBJECT: "Appendix R Exemption Requests, Point Beach Nuclear Plant, Units 1 and 2", dated April 28, 1983.

SECTION TWO

ALTERNATE SHUTDOWN SYSTEMS AND COMPONENTS

2. ALTERNATE SHUTDOWN SYSTEMS AND COMPONENTS METHOD OF INVESTIGATION

2.1 Introduction

Paragraph 50.48(b) of 10 CFR 50, which became effective on February 17, 1981, requires all nuclear plants licensed to operate prior to January 1, 1979 to comply with specific portions of Section III of Appendix R to 10 CFR 50 regardless of the status of previous fire protection SERs. One of the applicable sections, Section III.G, requires that fire protection features be provided for those systems, structures and components important to safe shutdown. These features must be capable of limiting fire damage so that:

(1) One train of systems necessary to achieve and maintain hot shutdown conditions from either the Control Room or the Emergency Control Station(s) is free of fire damage, and

(2) Systems necessary to achieve and maintain cold shutdown from either the Control Room or the Emergency Control Station(s) can be repaired within 72 hours.

Section III.L of Appendix R and Generic Letter 81-12 (February 20, 1981) Enclosure 1 "Staff Position", provide additional guidance on the NRC Staff's requirements for demonstration of safe shutdown capability.

2.1.1 Design Basis Events

This report documents the additional review of safe shutdown capability performed for Point Beach Nuclear Plant. As a part of this review process a spectrum of possible exposure fires in plant areas containing safe shutdown circuits, involving either in-situ combustibles or transient combustibles, was postulated. The effects of these assumed fires were evaluated for adverse impacts on systems, structures or components essential to safe plant shutdown. The most limiting assumption with respect to the availability of off-site power was assumed. No concurrent or sequential design basis accidents or transients were assumed, except those which could be postulated to occur as a direct result of the exposure fire. In addition, no random single failures other than those which could be caused by fire were assumed.

2.2 Description of Safety Functions

The specific safe shutdown functions necessary to satisfy Appendix R acceptance criteria are as follows:

(1) Reactor Reactivity Control Function

(2) Reactor Coolant Make-up Control Function

(3) Reactor Coolant Pressure Control Function

(4) Reactor Heat Removal Function

(5) Process Monitoring Function

(6) Miscellaneous Supporting Functions

2.2.1 Reactivity Control

After a reactor trip, the reactivity control function must be capable of achieving and maintaining at least a 1% reactivity shutdown margin from zero power hot shutdown to cold shutdown conditions. The function must be capable of compensating for any positive reactivity changes as a result of xenon decay and reactor coolant temperature decreases occurring during cooldown. A safety sequence diagram, Figure 2-1, represents safe shutdown functions for reactivity control.

2.2.2 Reactor Coolant Make-up Control

The reactor coolant make-up control function must be capable of assuring that sufficient make-up inventory is provided to compensate for reactor coolant system fluid losses due to leakage from the system and shrinkage during cooldown. Adequate performance of this function is achieved by maintaining pressurizer level within acceptable limits. A safety sequence diagram, Figure 2-2, represents safe shutdown functions for reactor coolant makeup control.

2.2.3 Reactor Coolant Pressure Control

Reactor coolant pressure control is required to assure that the reactor coolant system is operated:

(1) Within the technical specifications for reactor coolant system pressure-temperature requirements;

(2) To prevent peak reactor coolant system pressure from exceeding 2735 PSIG (110% of system design pressure); and

(3) With a sufficient subcooling margin to minimize void formation within the reactor vessel during natural circulation decay heat removal conditions.

A safety sequence diagram, Figure 2-3, represents safe shutdown functions for reactor coolant pressure control.

2.2.4 Reactor Heat Removal

The reactor heat removal function must be capable of removing both decay and latent energy from the reactor core and primary systems at a rate such that overall system temperatures can be maintained within acceptable limits. This function shall also be capable of achieving cold shutdown conditions within a 72-hour period and maintain cold shutdown thereafter. A safety sequence diagram, Figure 2-4 represents safe shutdown functions for reactor heat removal.

2.2.5 Process Monitoring

When information on process variables is required by operators in order to either modify system alignments or control safe shutdown equipment, such monitoring information must be available. The preferred mode of process monitoring function is by direct indication of those plant process variables necessary for plant operators to perform and/or control the previously identified functions.

2.2.6 Miscellaneous Supporting Functions

The systems and equipment used to perform the previous functions may require miscellaneous supporting functions such as process cooling, lubrication and ac/dc power. These supporting functions shall be available and capable of providing the support necessary to assure acceptable performance of the previously identified safe shutdown functions.

2.2.7 Discussion

The selection of safety functions is principally based on those identified in BTP CEB 9.5-1 Section C.5.c. Other functions may exist under each of these broad headings. Examples of such functions are steam generator level control and steam generator pressure control which exist as a part of reactor heat removal. Steam generator level and pressure control are required during initial hot shutdown conditions. However, during certain portions of cooldown and all of cold shutdown, the Residual Heat Removal System is operable and these functions are not required. Other functions such as emergency power, process cooling, etc., are included in the miscellaneous supporting function definition.

In addition to the functions identified in BTP CEB 9.5-1, a Reactor Coolant Pressure Control Function has been included. Although this function could be placed within the Reactor Coolant Make-up Function and Reactor Heat Removal Function, the specific goals achieved by the performance of this function are unique enough to warrant a separate function classification.

The safety functions identified adequately assure that the reactor coolant pressure boundary will not be breached. Uncontrolled mass and energy releases to the containment from the primary systems are prevented by the achievement of these safety functions.

2.3 Analysis of Safe Shutdown Systems

2.3.1 Introduction

Various analytical approaches can be taken to assure that sufficient plant systems are available to perform the previously identified plant safety functions. Numerous plant systems are normally available, alone and in combination with other systems, to provide these required functions. However, the exact location and specific effects of exposure fires cannot be precisely determined. In general, recognizing the confined nature of fires in nuclear plant environments and the inherent operational flexibility and physical diversity of systems available to achieve safe shutdown, appropriate plant fire protection features limit the potential for fire damage to the extent that unaffected plant systems will be available to attain safe shutdown. An extensive effort would be required to identify the effects of postulated fires in all potential plant locations and on all the plant systems which are available to support safe shutdown. As a conservative alternative to such an approach, a minimum set of plant systems (Safe Shutdown Systems) and components is identified in response to the requirements of Appendix R. This

minimum set of components can achieve and maintain safe shutdown regardless of the location of the fire while assuming concurrent loss of off-site power. Demonstration of adequate protection of this minimum system set from the effects of postulated fires constitutes an adequate and conservative demonstration of the ability to achieve and maintain safe shutdown for the purposes of fire protection. Spurious operation of components within the systems, and interlocking systems, necessary to perform previously identified plant safety functions have been identified and addressed within this report. (Reference Section 3.2.3 and Table 3-1.)

The safe shutdown systems selected for Point Beach Nuclear Plant are capable of achieving and maintaining subcritical conditions in the reactor, maintaining reactor coolant inventory, achieving and maintaining hot conditions for an extended period of time, achieving cold shutdown conditions within 72 hours, and maintaining cold shutdown conditions thereafter.

2.3.2 Initial Assumptions

(1) The unit is operating at 100% power upon the occurrence of a fire.

(2) The reactor is tripped either manually or automatically.

(3) There is a loss of off-site power.

(4) No additional single failures are considered other than the loss of off-site power, those failures directly attributable to the fire, and spurious operations which can be postulated to occur as a result of the fire.

(5) No piece of equipment required for safe shutdown is assumed to be out-of-service.

2.3.3 Definitions

Hot Shutdown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature $\geq 540^{o}F$.

Cooldown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature between $540^{o}F$ and $200^{o}F$.

Cold Shutdown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature below or equal to $200^{o}F$.

2.3.4 Achievement of Safe Shutdown Functions

2.3.4.1 Reactivity Control Function

Initial reactivity control results from an automatic Reactor Protection System (RPS) trip or from operator initiation of a manual trip. The effects of fires on the RPS do not preclude the initiation of an automatic trip or control rod insertion because the system is designed to fail in the safe (scram) condition.

Following control rod insertion, hot subcritical conditions can be maintained for at least 24 hours with no addition of boron, assuming all rods are inserted into the core and the reactor trip occurs at worst case conditions (end of life and at 100% power), with xenon at steady-state level. As xenon decays, however, positive reactivity is added, requiring the addition of borated water from the Refueling Water Storage Tank (RWST) to maintain the required margin of shutdown reactivity. The cooldown transition from hot shutdown, and ultimately to cold shutdown, requires additional boration to compensate for the

negative moderator temperature coefficient. The total quantity of borated water from the RWST (a minimum Technical Specification concentration of 2000 ppm) which must be injected into the Reactor Coolant System (RCS) to achieve the required cold shutdown margin is less than the quantity of borated water from the same source required to maintain pressurizer level within the operating band during cooldown (Reactor Coolant System volume shrinkage compensation). The Chemical and Volume Control System (CVCS) is capable of injecting this quantity of borated water into the Reactor Coolant System and maintaining the required shutdown reactivity margin throughout safe shutdown.

2.3.4.2 Reactor Coolant Make-up Control

For the assumed fire scenario, reactor coolant make-up control can be achieved by isolation of the normal and excess letdown CVCS paths and operation of the charging portion of the CVCS through the RCP seal injection path and auxiliary charging path.

Successful maintenance of RCS integrity is also necessary to achieve adequate inventory and pressure control. Spurious opening of primary boundary isolation valves such as pressurizer and reactor vessel vent valves, pressurizer power-operated relief valves (PORVs), and RHR isolation valves will be precluded or mitigated, and adequate maintenance of reactor coolant pump seal integrity achieved.

Control of pressurizer water level is achieved manually by controlling CVCS charging flow using local or remote pressurizer level indication.

2.3.4.3 <u>Reactor Coolant Pressure Control</u>

Overpressure protection of the RCS prior to a controlled cooldown and depressurization is provided by the pressurizer safety valves. After alignment of the Residual Heat Removal System (RHR), at approximately 350^{O}F and 425 psig, overpressure protection is provided by the RHR safety valves. The pressurizer safety valves and RHR safety valves, in conjunction with a controlled cooldown and a timely transfer to shutdown cooling at or around a Reactor Coolant System temperature of 350^{O}F, will ensure that the RCS pressure-temperature limits are not exceeded. For adequate pressure control, isolation of the pressurizer auxiliary spray and normal letdown will occur as the result of operator action. Safety injection tank accumulators will also be manually isolated by operator action.

The establishment and maintenance of sufficient sub-cooling margin within the Reactor Coolant System is essential when conducting a natural circulation cooldown. Pressurizer heaters may not be available but maintaining a constant charging pump flow rate while decreasing cooldown rate will raise system pressure. In the event that depressurization is required during cooldown, the preferred method will be to maintain pressurizer level

constant and reduce pressure via ambient losses. If a more rapid means of depressurization is required, the auxiliary spray can be manually cycled at a pressure low enough to minimize thermal stresses.

2.3.4.4 Reactor Heat Removal Function

Following a reactor trip with an assumed loss of off-site power, decay heat is initially removed by natural circulation within the Reactor Coolant System, heat transfer to the Main Steam System via the steam generators, and operation of the air-operated atmospheric steam dump valves or the Main Steam System code safety valves. With the main steam safety valves alone, the RCS maintains itself close to the nominal no-load condition.

For decay heat removal via natural circulation a minimum of one steam generator is assumed to be available. This decay heat removal requires the ability to supply sufficient feedwater to a steam generator to make up for the inventory discharged as steam by the safety or relief valves. For maintenance of initial hot shutdown conditions, the secondary make-up flow required to a steam generator is less than 200 gpm and is supplied by the Auxiliary Feedwater System (AFW). The preferred feedwater source is the condensate storage tanks, with the Service Water System available as a backup. Feedwater may be supplied by the motor-driven auxiliary feed pumps or by the turbine-driven auxiliary feed pump.

Transition from stable hot shutdown conditions to cooldown is achieved by manual control of steam generator pressure. The removal of decay and latent energy is achieved by the controlled operation of the steam generator atmospheric steam dump valve and continued operation of the Auxiliary Feedwater System. During this cooldown phase, an auxiliary feedwater flow of up to 200 gpm is required which can be supplied with the turbine-driven or motor-driven auxiliary feed pump.

As described above, the transition from stable hot shutdown to cooldown is achieved via operation of the Auxiliary Feedwater System and the atmospheric steam dump valves. After reduction of reactor coolant system temperature below 350^{o}F, the Residual Heat Removal System is used to establish long-term core cooling through the removal of decay heat from the Reactor Coolant System to the environment via the Residual Heat Removal System, Component Cooling Water System, and the Service Water System.

2.3.4.5 Process Monitoring Function

The operator requires knowledge of various plant parameters to perform required system transitions and essential operator actions. A discussion of the necessary instrumentation by safe shutdown function is provided below.

For the fire scenarios assumed in this analysis, inventory make-up to the Reactor Coolant System will be from the Refueling

Water Storage Tank through the reactor coolant pumps' seal injection lines and auxiliary charging line. As previously discussed, sufficient negative reactivity exists in the Reactor Coolant System (after rod insertion) for 24 hours without the need for additional boron. Furthermore, the negative reactivity inserted by the control rods and the RWST water injected by the CVCS (to compensate for the RCS volume decrease) will maintain the core subcritical while cooling down from hot full power to a cold shutdown condition, assuming no letdown is available. Technical Specifications for Point Beach ensure that sufficient borated water is available to achieve the necessary cold shutdown reactivity margin. With boron addition under procedural control, no operator actions are expected or anticipated based on direct-reading neutron monitoring to ensure an adequate safe shutdown negative reactivity margin. However, core source range detectors will be available for core activity monitoring in the Control Room. An additional source range channel will also be added at a remote location to provide this information for areas requiring alternative shutdown.

Various process monitoring functions must be available to adequately achieve and maintain the reactor coolant makeup, pressure control and decay heat removal functions. For the assumed fire scenario, maintenance of hot shutdown requires that pressurizer level and RCS pressure instrumentation be available.

Reactor Coolant System temperature is controlled during hot shutdown and cooldown by energy removal via steam generator and self-actuation of the main steam code safety valves or manual operation of the atmospheric steam dump valves. In the natural circulation mode of operation, the difference between the hot leg and cold leg wide range temperatures (T_h-T_c) and steam generator pressure provide a direct indication of the existence of adequate natural circulation flow.

Operating personnel, monitoring RCS pressure and hot leg temperature (T_h) instrumentation, will control RCS pressure in such a manner that appropriate sub-cooling is maintained. Pressurizer level control is achieved by monitoring pressurizer level instrumentation and manual control of CVCS charging flow.

Maintenance of hot standby also requires the control of the secondary system to compensate for variations in the primary system performance. Steam generator level and pressure instruments are available to assure adequate and controlled decay heat removal. Steam generator level control is achieved by manual manipulation of AFW system flow, using local or remote steam generator level indication. Control of secondary system pressure will be monitored by steam generator pressure indication.

The transition from hot shutdown to cooldown will utilize the instrumentation discussed above for monitoring of natural

circulation conditions, subcooling margin, heat removal and compliance with the plant's pressure/temperature limits as it pertains to the low temperature overpressure protection of the Reactor Coolant System (cold leg temperature in conjunction with RCS pressure).

The safe shutdown systems needed to achieve cold shutdown are the following:

(1) Chemical and Volume Control System

(2) Reactor Coolant System Instrumentation

(3) Main Steam System

(4) Auxiliary Feedwater System

(5) Residual Heat Removal System

2.3.4.6 Supporting Functions

Various systems are required to provide support to safe shutdown equipment or systems. These support systems are:

(1) Component Cooling Water System

(2) Service Water System

(3) Emergency Power System

The following sections discuss each of the required safe shutdown systems and the support systems.

2.4 Safe Shutdown Systems

2.4.1 Chemical and Volume Control System (CVCS)

The charging portion of the Chemical Volume and Control System (CVCS) accomplishes the following safety functions:

(1) Reactivity Control by injection of a soluble chemical neutron absorber (boron) into the RCS; and

(2) Reactor Coolant Makeup Control by maintaining water inventory.

Normal reactivity shutdown capability is provided by control rods, with boric acid addition used to compensate for the xenon decay and plant cooldown. The control and shutdown rod groups ensure the reactor is at least 1% subcritical (K_{eff} = 0.99) following trip from any allowed operational condition, assuming the most reactive rod remains in the fully withdrawn position. For the assumed fire scenario, it is not necessary to assume a stuck-rod condition.

When the unit is at power, the quantity of boric acid retained in its Refueling Water Storage Tank and ready for injection to the RCS always exceeds that quantity required to compensate for normal cold shutdown. This quantity also exceeds the quantity of boric acid required to bring the reactor to hot shutdown and to compensate for subsequent xenon decay. The availability of sufficient boron is required by plant Technical Specifications.

For the assumed post-fire scenario, make-up water to the Reactor Coolant System will be provided by the Chemical and Volume Control System from the Refueling Water Storage Tank (borated at a minimum of 2000 ppm).

Numerous CVCS flow paths are normally available for charging to the RCS (see Figure 2-5). For the assumed event, two separate and independent flow paths will provide redundancy for reactor coolant makeup and boration:

(1) The charging line to the reactor coolant pumps' seals, and

(2) The auxiliary charging line to the loop B cold leg.

For the assumed event, charging and boration will be accomplished by operating a minimum of <u>one</u> charging pump taking suction from the Refueling Water Storage Tank and injecting borated water through to the loop B cold leg and the RCP seal injection lines to the RCS. Suction to the charging pump can be delivered from the RWST by manually opening one normally closed motor-operated valve.

Controlled leakage (letdown) from the Reactor Coolant System normally occurs via the seal leak-off return path and the normal and excess letdown paths. For the post-fire operational sequence, the normal and excess letdown paths will be isolated as a result of operator action to assure adequate inventory control.

Seal leak-off flow need not be available to achieve safe shutdown. The reactor coolant pump No. 1 seal leak-off motor-operated valves fail as-is. In that condition, seal return flow will be to the volume control tank (through the seal water heat exchanger). It may be locally or remotely isolated by a

motor-operated valve or by the seal water return filter manual isolation valves.

The injection path from the charging pumps to the Reactor Coolant Pump seals contains only manually operated, normally open valves. The auxiliary charging line contains one air-operated valve which is a special valve functioning as both an isolation valve and a relief valve (opens to provide flow to RCS cold leg with a 200 psid). The operation of one charging pump will ensure a minimum RCS charging flow of approximately 20 gpm (minimum flow for each charging pump).

Isolation of the volume control tank outlet (by closure of one motor-operated valve) during emergency makeup from the RWST and isolation of the seal return line to the seal water heat exchanger may be performed by local manual operation.

Pressurizer water level is maintained by operation of one positive displacement charging pump using pressurizer level instrumentation information.

Charging Pumps

Three charging pumps per unit inject coolant into the reactor coolant system. The pumps are the variable speed, positive displacement type. At full capacity, each pump is capable of delivering 60 gpm to the Reactor Coolant System. To ensure that the charging pump flow is always sufficient to meet both the seal water and minimum charging flow requirements, the pump has a variable control stop which does not permit pump flow lower than

the specified minimum. This control stop is adjustable to permit higher minimum flow limits to be set if mechanical seal leakage increases during operation. At minimum flow, each charging pump delivers approximately 20 gpm. The charging pumps require no external cooling water or lubricating oil supply.

Refueling Water Storage Tank

In addition to its normal duty to supply borated water to the refueling cavity for refueling operations, the RWST provides borated water to all of the ECCS pumps.

The capacity of the refueling water storage tank is based on the requirement for filling the refueling cavity. This quantity is in excess of that required for safe shutdown. Technical Specification minimum volume of the RWST is 275,000 gallons of borated water at a minimum of 2000 ppm boron.

2.4.2 Reactor Coolant System

The Reactor Coolant System (RCS) consists of two similar heat transfer loops connected in parallel to the reactor vessel (see Figure 2-6). Each loop contains a reactor coolant pump and a steam generator. In addition, the system includes a pressurizer with associated code safety and relief valves (PORVs). Reactor Coolant System instrumentation includes cold and hot leg temperatures (wide-range), pressure (wide-range) and pressurizer water level.

The natural circulation capability of the plant provides a means of decay heat removal when the reactor coolant pumps are unavailable. Natural circulation flow rates are governed by the amount of decay heat, component elevations, primary to secondary heat transfer, loop flow resistance and voiding. The conditions during natural circulation are related to maintaining adequate primary to secondary heat transfer, subcooling and inventory.

For this analysis of safe shutdown capability, one of the two RCS loops will be monitored to ensure that natural circulation is established and maintained.

While in natural circulation, adequate heat transfer and coolant flow are dependent on adequate inventory in both the primary and secondary systems. Maintaining water level within the operating band on the secondary side of the "U" tube steam generators and adequate level within the pressurizer are requirements for natural circulation. Confirmation of flow while in natural circulation is accomplished through the use of temperature indications. Those indications are cold leg temperature (T_c), and hot leg temperature (T_h). T_c should attain a value which is a few degrees higher than the saturation temperature of the secondary inventory. T_h should attain a value which is less than at full power. When T_c and T_h attain the values described above, flow and heat transfer have been achieved in the associated RCS loops. The amount of subcooling within the RCS is maintained by monitoring RCS pressure and loop hot leg

temperature (T_h).

Reactor Coolant System inventory control is based on the operation of the CVCS charging paths. High pressure seal water from the CVCS system is injected into the pumps through the lower radial bearing chamber to prevent leakage of high temperature reactor coolant along the pump shaft. The injection flow splits in the bearing chamber with a portion flowing up through the radial bearing and into the shaft seal chamber. The remaining portion flows down the shaft, through the RCP thermal barrier and into the Reactor Coolant System. An alternate unimpeded charging flow path exists through the auxiliary charging line to the cold leg B loop.

Pressurizer Safety Valves

Overpressurization protection of the RCS is assured by two pressurizer code safety valves. The two pressurizer safety valves are spring-loaded, self-activated and have a set pressure of 2485 psig. The combined capacity of the valves is equal to or greater than the maximum pressure surge resulting from a complete loss of load without reactor trip.

2.4.3 Main Steam System

For the post-fire scenario, maintenance of the main steam inventory and control of steam generator pressure are required for both hot shutdown and subsequent primary and secondary system cooldown to support the decay and sensible heat removal function within the applicable operational limits.

The Main Steam (MS) System consists of two parallel flow paths, one from each steam generator to the main turbine of the unit. The secondary system will be isolated either by operation of the turbine stop valves or by the main steam isolation valves.

In accordance with supporting FSAR analysis, control of one steam generator is sufficient to provide the reactor heat removal function during natural circulation conditions.

Maintenance of water level in the steam generator during the period of auxiliary feedwater operation (hot shutdown) involves remote or local manual positioning of the auxiliary feedwater flow control valves and operation of the turbine-driven auxiliary feed pump based on steam generator level information. Steam generator water level and pressure indication are available in the Control Room and on panels located in the turbine-driven AFW pump cubicles.

The MS system is also designed to deliver motive steam to the turbine driver of the turbine-driven auxiliary feed pumps (see Figure 2-7). Steam to these turbines is supplied by branch connections upstream of the main steam isolation valves on both steam lines in each unit. Either line can supply sufficient steam to the auxiliary feed pump turbine, but two are provided for redundancy. These lines are connected with a normally closed motor-operated stop check valve in each line before the tie.

Safety Valves

A bank of four code safety valves are installed on each steam line outside containment and upstream of main steam isolation valves. The four safety valves (one set at 1085 psig, one at 1100 psig, two at 1125 psig) on each line are installed to protect the MS system against overpressure and to provide a combined relieving capacity greater than the maximum steam flow rate. During initial hot shutdown conditions the code safeties will provide adequate decay heat removal.

Air-Operated Atmospheric Steam Dump Valves

An atmospheric steam dump valve is provided on each steam line which is capable of releasing the sensible and decay heat to the atmosphere. The steam dump valves are used for plant cooldown by steam discharge to the atmosphere. The two steam dump valves have a total combined capacity of approximately 10% of the maximum calculated steam flow. For the assumed fire scenario, one steam dump valve will be used to provide the Reactor Coolant System controlled cooldown.

Controls for the steam generator atmospheric steam dump valves are provided in the Control Room and can be manually (handwheel) operated at the valve. During the hot shutdown transition to cold shutdown, the one steam dump valve per unit will be manually operated to remove decay heat from the RCS. Thus, the RCS temperature is controlled by maintaining the steam

generator secondary water inventory at the temperature that corresponds to the saturation pressure.

2.4.4 Auxiliary Feedwater System

The Auxiliary Feedwater (AFW) System is required during hot shutdown to support RCS decay heat removal. For hot shutdown, secondary system (steam generator) inventory control is provided by the AFW system (see Figure 2-8). The AFW system consists of two turbine-driven and two motor-driven pumps. Each turbine-driven pump is dedicated to one unit, and valved to feed one or both steam generators in that unit. The motor-driven pumps are common to both units. One pump is valved to feed the A loop steam generator of one or both units. The other pump supplies feedwater to the B loop steam generators of one or both units. Cross-connect capability exists through normally locked closed valves such that either pump could supply feedwater to any of the four steam generators.

The AFW system is designed to deliver enough water to maintain sufficient heat transfer in the steam generators in order to prevent loss of primary water through the RCS pressurizer safety or relief valves.

Turbine-Driven Auxiliary Feed Pumps

The turbine-driven auxiliary feed pump (TDFP) is designed to deliver a sufficient flow to both steam generators of the unit with which it is associated and maintain steam generator water levels above the lower limit of the wide range level indicator.

Each is a horizontal, six-stage, centrifugal pump driven by a single-stage atmospheric exhaust turbine. Upon opening the steam inlet valve, the turbine will function as a single speed machine.

Each auxiliary feed pump turbine has its own self-contained lube oil system utilizing ring lubricated, water jacketed ball bearings. Cooling water is supplied by the service water system. Service water flow is provided by the service water pumps or alternately by the diesel-driven fire pump which is a proposed system modification. This proposed modification (not a result of Appendix R modifications) will allow fire main water to be supplied to the lube oil coolers. Manual operation of a block valve will be required. This proposed modification is expected to be completed during the fall 1983 and 1984 outages.

Both steam generators provide motive steam to the turbine driver for the auxiliary feed pump. The TDFP is capable of operating down to a steam pressure which corresponds to RCS pressure and temperature at which the Residual Heat Removal System may be placed in service.

Motor-Driven Auxiliary Feed Pumps

The two motor-driven auxiliary feed pumps (MDFP) are shared by both units. One MDFP supplies the A steam generators of both units, while the other supplies the B steam generators of both units.

Each pump is a horizontal, eight-stage centrifugal pump. Cooling water is supplied by the service water pumps. The pumps require no other support services other than ac power.

Condensate Storage

Normal volume in each condensate storage tank is approximately 45,000 gallons. Should the CST supply become exhausted, the service water system may be used as an alternate water source. The service water isolation valves are located in the AFW pump area. Ample time is available post-fire for a local manual re-alignment of the normally closed valves that isolate service water from the suction of the auxiliary feed pumps.

2.4.5 Residual Heat Removal System

The Residual Heat Removal (RHR) System is designed to remove decay and sensible heat from the core and reduce the temperature of the RCS during the cold shutdown phase.

The RHR system consists of two RHR heat exchangers, two RHR pumps and the associated piping, valving and instrumentation necessary for operational control of each unit (see Figure 2-9). The design residual heat load is based on the residual heat fraction of the full core MW (thermal) power level that exists 20 hours following reactor shutdown from an extended power run near full power.

During cold shutdown operations, reactor coolant flows from the RCS to the RHR pumps through the tube side of the RHR heat exchangers and back to the RCS. The heat load is transferred by

the RHR heat exchangers to the Component Cooling Water System which is circulating on the shell side of the heat exchangers. The inlet line to the RHR system is located in the hot leg of reactor coolant loop A while the return line is connected to the cold leg of reactor coolant loop B.

Two motor-operated valves in series isolate the inlet line to the Residual Heat Removal System from the Reactor Coolant System. The return lines are isolated by check valves and motor-operated valves in each line. To avoid potential RCS boundary leakage at this high/low pressure interface, one of the motor-operated valves in the RHR suction line will be kept closed (pre-fire condition) with the corresponding motor control center breaker in the open position.

An orificed minimum flow recirculation line from the downstream side of each residual heat exchanger to the corresponding pump's suction line is provided to assure that the RHR pumps do not overheat under low flow conditions.

The cooldown rate of the reactor coolant is controlled by regulating the flow through the tube side of the RHR heat exchangers. A bypass line, which serves both residual heat exchangers, is used to regulate and maintain a constant flow through the RHR system.

The RHR system can be placed in operation when the pressure and temperature of the RCS are less than 425 psig and 350°F, respectively. If one of the pumps and/or one of the heat exchangers is inoperative, safe cooldown of the plant is not affected; however, the time for cooldown is extended.

Residual Heat Removal Pumps

Two identical pumps per unit are installed in the Residual Heat Removal System. Each pump is sized to deliver sufficient reactor coolant flow through the residual heat exchangers to meet the plant cooldown requirements.

RHR Safety Valves

The RHR system safety valves provide RCS cold overpressure protection whenever the RHR system is in operation. The valves are located inside containment on the common RHR inlet pipe, the B train low head safety injection flow path, and the letdown line which provides relief capability for the A train low head safety injection flow path and the common RHR return pipe.

Accumulators

The manual isolation of the accumulators is assumed as a post-fire activity. The isolation valve at each accumulator is closed only when the RCS is intentionally depressurized below 1000 psig. If these valves' associated cables were damaged by fires, the isolation is assumed to be performed locally, governed by adequate plant procedures (post-fire).

2.4.6 Component Cooling Water System

The component cooling loop is designed to remove decay and sensible heat from the reactor coolant system, via the residual heat removal loop, during plant shutdown; to cool the letdown flow to the chemical volume and control system during power operation; and to provide cooling to dissipate waste heat from various primary plant components.

Normally the component cooling loops of each of the two units operate independently such that two component cooling pumps and one component cooling heat exchanger are used with each unit; a third heat exchanger serves as a shared standby. The capability exists for employing any of the four component cooling pumps with either of the two units (see Figure 2-10).

During normal full power operation, one component cooling pump and one component cooling heat exchanger accommodate the heat removal loads. The standby pump and the shared heat exchanger provide 100% backup during normal operation. Two pumps and two heat exchangers are utilized to remove the decay and sensible heat during cold shutdown. If one of the pumps or one of the heat exchangers is not operative, safe shutdown of the plant is not affected; however, the time for cooldown is extended.

The two component cooling loops associated with one unit are interconnected downstream from the heat exchangers to effectively form an open loop supply header for both essential and

nonessential loads. For the present analysis of safe shutdown, no isolation of nonessential loads is assumed to be required. However, in anticipation of a potentially large cooling demand, the operator can shift to the other unit's component cooling system by repositioning manually operated valves.

The essential loads, other than the residual heat exchangers, are normally valved open to the supply header and discharge to the suction of the component cooling pump with which these are normally associated, s that component cooling water is circulated continuously through the essential loads during normal operation.

Each of the component cooling outlet lines from the residual heat exchangers has a normally closed motor-operated valve which must be manually opened during RHR cooldown.

A surge tank is connected to the suction side of the pumps, and makeup to the system is supplied to the surge tank from either the demineralized water system or the reactor makeup water system.

Component Cooling Pumps

The four component cooling pumps, which circulate component cooling water through the component cooling loop, are horizontal, centrifugal units. Normally two pumps are used with each unit during a plant cooldown, but any of the four pumps can be used with either unit. During the recirculation phase following a loss-of-coolant accident, one of the two component cooling water

pumps associated with each unit delivers flow to the shell side of the residual heat exchangers.

Component Cooling Heat Exchangers

Three component heat exchangers are of the shell and straight tube (fixed tubesheet) type. Service water circulates through the tubes while component cooling water circulates through the shell side. Normally one heat exchanger is used with each unit with the third serving as a standby.

2.4.7 Service Water System

The Service Water (SW) System provides cooling for the following safe shutdown equipment:

(a) Component cooling heat exchangers;

(b) Emergency diesel generator heat exchangers;

(c) Auxiliary feed pump bearing oil coolers.

The system also provides a back-up supply of water to the AFW system in the event that the condensate storage tanks are depleted.

The Service Water System has also been designed to provide redundant cooling water supplies with isolation valves to the containment coolers, air compressors, spent fuel pool cooling system, and to the containment air recirculating cooling system.

This system also supplies water for the Emergency Diesel Room fire protection systems and containment hose reels. The design includes provisions for automatic isolation of nonessential components following any accident. Lake Michigan is the source of service water.

This system which is shared by both units (see Figure 2-11) consists of six motor-driven service water pumps and two main headers, with a discharge strainer in each header. Each redundant header is served by three pumps and the system is normally operated with the headers cross-connected. A loop header system is provided by which each header supplies cooling water to nonessential services in one unit. Supply of service water for essential services is redundant and can be maintained in case of failure of one loop section header. These components, together with the associated heat exchangers, valving, piping and local instrumentation, complete the Service Water System.

The system is sized to ensure adequate heat removal based on highest expected temperatures of cooling water, maximum loadings and leakage allowances. The system is monitored and operated from the Control Room. Isolation valves are incorporated in all service water lines penetrating the containment.

Service Water Pumps

Six motor-driven centrifugal service water pumps are provided. During normal operation, each service water pump has a capacity of 6800 gpm while during an accident each has a capacity

of 5500 gpm. Two service water pumps are connected to separated 480V buses, one per bus. The four remaining pumps are connected, two per bus, to two separate 480V buses. Two of the six pumps are capable of carrying the required normal cooling load for the two units.

The service water pumps are connected to the 480V buses that can be supplied by the emergency diesels in the event of loss of all outside power. For this condition, the service water system is designed to supply cooling water to only the required emergency systems. The pumps, which are located in the circulating water pumphouse, take suction directly from the lake and discharge to two below-ground pipelines leading to the ring header in the Class I section of the Control and Auxiliary Buildings. Supply lines are run to the containment from the Auxiliary Building from each side of the ring header. The return lines are manifolded by areas and are discharged to the condenser circulating water discharge pipe in either Unit 1 or Unit 2.

To preclude the possibility of an inadvertent blockage of cooling water flow, there are no automatically-operated valves in the service water system between the lake and the components which require cooling following the fire. Automatically-operated valves are provided to isolate sections of the service water system not required to be in operation.

In the event of a loss of normal safeguards electrical power, each of the two emergency diesel generator units is sized to supply three service water pumps in addition to the other vital engineered safeguard loads in the unit in which the accident occurred and the loads required by the other unit to maintain a hot shutdown condition.

The service water lines to the Auxiliary Building primarily supply cooling water to the three component cooling heat exchangers and the spent fuel pool heat exchangers. These heat exchangers are utilized to remove residual heat from the primary coolant system and from the spent fuel pool through the intermediate component cooling water loop. The Residual Heat Removal System is employed during normal shutdown operations. It also is placed in service following a loss-of-coolant accident for cooling of the recirculated flow from the reactor containment sump. The spent fuel pool cooling system is not considered an essential load and the service water cooling for this system is interrupted during an accident condition if less than four of the six service water pumps are operating.

2.4.8 <u>Emergency Power System</u>

The Emergency Power System (EPS) includes an on-site emergency source which supplies power to essential safe shutdown equipment if the normal or the off-site power sources are not available.

The emergency power facilities consist of two General Motors Corporation, Electro-Motive Division, Model 999-20 diesel engine-generator units, each rated at 2,850 kW continuous, 0.8 power factor, 900 rpm, 4,160 volts, 3-phase, 60 cycle. The units have an emergency capability of 3,050 kW for a 30-minute period. Off-site power is not locked out upon emergency generator operation. Bus supply breakers from off-site power are tripped on loss of bus voltage, and they must be manually reclosed upon restoration of off-site power.

Each emergency diesel generator is capable of sequentially starting and supplying the power requirement of one complete train of safeguards equipment for one reactor unit and providing sufficient power to allow the second reactor unit to be placed in a safe shutdown condition. The units are located in separate rooms in a Class I portion of the Control Building.

Each emergency diesel is automatically started by either one of two pairs of air motors. Each unit has its own independent starting system, including two banks of three air storage tanks and two compressor systems powered from the 480V emergency bus. By manually changing the pulley belt, one air compressor in each unit may be powered by its own independent auxiliary diesel engine. Each bank of air receivers has sufficient storage to crank the engine five times for the normal cranking duration.

The emergency unit is capable of being started and ready to accept load in ten seconds. The starting system is completely redundant for each diesel generator.

Starting air is admitted from the storage tanks at a working pressure of 200 psi to the starting system through a two-way solenoid valve. A selector switch determines which solenoid valve and, in turn, which bank of starting motors will be activated. When the signal to start the diesel is initiated, a dc motor-driven fuel pump and booster pump will start, and the preselected solenoid valve will be energized to open. When the starter motor pinions are engaged, the starter motors will crank the engine.

The units use No. 2 fuel oil. A 550-gallon storage tank is located in the base of each of the units. An additional 550-gallon "day tank" is located adjacent to each unit. The day tanks can be manually cross-connected allowing either tank to supply either unit. An underground emergency fuel oil storage tank on-site has a capacity of 12,000 gallons. This capacity provides sufficient fuel to allow one diesel to operate continuously at full load for an additional 48 hours. An additional supply of fuel oil is maintained on the site in two above-ground 60,000 gallon storage tanks to supply the gas turbine and heating boilers. This oil is transferred by a gravity feed to the 12,000 gallon underground emergency storage tank.

Gas Turbine

In addition to the two rapid starting emergency generators, there is a gas turbine generator installed at the site. This unit is rated approximately 23.1 MVA and is normally used for allowing high line and equipment maintenance outage, spinning reserve, black plant startup, and for peaking purposes. This gas turbine unit is connected to the auxiliary electrical system such that it can be paralleled with or serve in lieu of the normal source of plant startup and safeguards power, thereby accomplishing its principal function of making it possible to restart the Point Beach Nuclear Plant in case of an area "blackout" in which off-site ac voltage is unavailable. The unit is capable of being started and ready to accept partial load in approximately three minutes and full load in approximately five minutes. The gas turbine can be used as a power source for safeguard buses during loss of off-site ac.

Diesel Generator Loading Description

Each diesel unit is started on the occurrence of either of the following incidents:

(1) Initiation of safety injection operation either unit; or

(2) Undervoltage on either of the two 4,160V buses (1-A05 or 2-A05 for G01 and 1-A06 or 2-A06 for G02) to which the emergency generator is associated.

With the occurrence of undervoltage on 4,160V bus 1-A05, the automatic sequence is as follows:

(1) Trip bus 1-A05 supply and tie breakers 1A52-57 and 1A52-61 to isolate bus 1-A05 from buses 1-A03 and 1-A06.

(2) All feeder breakers on 480V bus 1-B03, except for the component cooling pump motor, auxiliary feed pump motor and the safeguards motor control center 1-B32, are tripped. The tie breakers to buses 1-B01 and 1-B04 are tripped.

(3) Start the emergency diesel generator G01.

(4) After the unit comes up to speed and voltage, close the emergency generator breaker 1A52/60.

(5) If the motor-driven auxiliary feed pump had been operating prior to the loss of voltage, it would be automatically restarted upon return of bus voltage. If it had not been running, it would be subject to the automatic starting logic.

(6) If the component cooling water pumps had been operating prior to a loss of voltage, these would automatically be restarted upon return of bus voltage. However, if the loss of voltage is coincident with a safety injection signal, the component cooling water pumps must be restarted manually.

(7) The operator would manually start any auxiliary equipment as required for safe plant operation. If there is a requirement for engineered safety features operation coincident with undervoltage, this equipment will restart sequentially upon return of bus voltage. However, if the loss of voltage is coincident with a safety injection signal, a sequential start of engineered safety feature equipment will occur following Step 4 above.

The automatic sequences for bus 2-A05 and for buses 1-A06 and 2-A06, associated with emergency generator G02, are similar to those described for bus 1-A05.

Two 60-cell, lead acid, station-type batteries are provided for power supply for control, emergency lighting and to the inverters for critical 60 cycle instrument power. Control power for each diesel generator can be supplied from either battery.

4160 Volt System

The 4160V system (Figures 2-12 through 2-15) is divided into six buses per unit. Two buses for Unit 1, numbers 1-A03 and 1-A04, are connected to the 13,800V system via bus main breakers and the low voltage station auxiliary transformer number 1-X04. Buses 1-A05 and 1-A06 are connected to buses 1-A03 and 1-A04 using manually closed tie breakers. Buses 1-A01 and 1-A02 are connected to the Unit 1 generator leads via bus main breakers and the Unit Auxiliary Transformer, number 1-X02. Buses 1-A01 and 1-A03 or buses 1-A02 and 1-A04 can be tied together via bus tie breakers. All normal operating 4160V auxiliaries are split between buses 1-A01 and 1-A02. In addition, buses 1-A01 and 1-A02 each serve one 4160-480V station service transformer. Buses 1-A03 and 1-A04 serve buses 1-A05 and 1-A06 respectively, as well as buses 1-A01 and 1-A02 during startup, shutdown and after reactor trip.

Buses 1-A05 and 1-A06 each serve one of the two 4160-480V station services transformers for the unit's 480V safeguards equipment and one of the two safety injection pumps. Thus, no transfer is required for the safeguards equipment in the event of a turbine generator trip. In addition to being served by buses

1-A03 and 1-A04, buses 1-A05 and 1-A06 are directly served by emergency diesel generators G01 and G02 respectively. Each emergency diesel generator will be automatically started and placed on-line upon undervoltage on either 4160V bus to which it is associated.

The six 4160V buses for Unit 2 have the same arrangement as described for Unit 1.

480 Volt System

The 480V system (Figure 2-16 and 2-17) is divided into four buses per unit. The buses for Unit 1 are supplied from the 4,160V buses though individual step down transformers as follows: 1-B01 from 1-A01, 1-B02 from 1-A02, 1-B03 from 1-A05 and 1-B04 from 1-A06. Tie breakers are provided between 480V buses 1-B01 and 1-B03, buses 1-B02 and 1-B04 and buses 1-B03 and 1-B04. The four 480V buses for Unit 2 have the same arrangement as described for Unit 1.

125 Volt dc System

The 125V dc system (Figure 2-18) is divided into two buses with one battery and battery charger (supplied from the 480V system) serving each bus. The battery chargers supply the normal dc loads, as well as maintaining proper charges on the batteries. A third battery charger is supplied to allow either of the above battery chargers to be removed for maintenance. The two 125V dc buses can be tied together in the event that one battery is removed from service.

Instrument Bus

The 120V ac instrument supply (Figure 2-19) is split into four buses per unit. Two of the buses are fed by inverters which are in turn supplied from separate 125V dc buses. The other two buses are supplied by motor-generator sets connected to separate 480V buses. In the event an inverter is taken out of service, a backup supply from a spare inverter is available to feed the associated bus. The backup supply for a motor-generator set is from a lighting panel.

2.5 Identification of Safe Shutdown System Components

Subsection 2.4 described the specific systems which will be used to achieve safe shutdown using the alternate shutdown capability. This subsection discusses the method of selection of safe shutdown components at Point Beach Nuclear Plant.

For each system, plant flow diagrams, system descriptions, and one-line diagrams were used to identify the precise primary flow paths and operational characteristics that must be established to accomplish the desired safe shutdown function. From this information, a list was compiled of the components which participate in the system's performance of its safe shutdown function. These components are:

(1) Active components that need to change position to achieve system function.

(2) Passive components which are in the proper position; power loss will not result in a change of position but components may change position due to fire damage.

(3) Power-operated components which need to change position to establish system function, whose loss of motive power results in the component adopting the desired position but which may be affected by fire damage.

(4) Major mechanical components which support safe shutdown (heat exchangers and storage tanks).

From the analysis of the safe shutdown system flow paths, those components whose spurious operation would threaten safe shutdown system operability were also identified. This identification included those branch flow paths that must be isolated and remain isolated to assure that flow wi'l not be substantially diverted from the primary flow path. See subsection 3.2.3 for the detailed discussion of spurious operations.

A minimum equipment list was generated for safe shutdown devices including device identification, normal operating status, operating requirements for hot shutdown and cold shutdown, required supporting services and plant location.

The final safe shutdown component list developed for Point Beach Units 1 and 2 includes the components required to protect the safe shutdown capability from any credible fire in the Switchgear Room, Cable Spreading Room, or Control Room. These lists are provided in Table 2-1. Figure 2-20 shows the physical location of the safe shutdown components.

TABLE 2-1.1: POINT BEACH NUCLEAR PLANT

HOT SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
1A52-58	AC/DC	STA. SERVICE TRANS. [1-X13] BREAKER	D11	1A05	D13	
1A52-60	AC/DC	EMERGENCY GENERATOR BREAKER	D11	G01	D13	
1A52-61	AC/DC	BUS TIE BREAKER	D11	1A05 to 1A06	D13	
1A52-64	AC/DC	STA. SERVICE TRANS. [1-X14] BREAKER	D13	1A06	D11	
1A52-66	AC/DC	EMERGENCY GENERATOR BREAKER	D13	G02	D11	
1-X13	AC/DC	STATION SERVICE TRANSFORMER		1A05		
1-X14	AC/DC	STATION SERVICE TRANSFORMER		1A06		
1B52-16B	AC/DC	STA. SERVICE TRANS. [1-X13] BREAKER	D11	1A05	D13	
1B52-16C	AC/DC	BUS TIE BREAKER	D11	1B03 to 1B04	D13	
1B52-17B	AC/DC	STA. SERVICE TRANS. [1-X14] BREAKER	D13	1A06	D11	
2A52-67	AC/DC	EMERGENCY GENERATOR BREAKER	D13	G02	D11	
2A52-69	AC/DC	STA. SERVICE TRANS. [2-X14] BREAKER	D13	2A06	D11	
2A52-72	AC/DC	BUS TIE BREAKER	D11	2A05 to 2A06	D13	
2A52-73	AC/DC	EMERGENCY GENERATOR BREAKER	D11	G01	D13	
2A52-75	AC/DC	STA. SERVICE TRANS. [2-X13] BREAKER	D11	2A05	D13	
2-X13	AC/DC	STATION SERVICE TRANSFORMER		2A05		
2-X14	AC/DC	STATION SERVICE TRANSFORMER		2A06		
2B52-25B	AC/DC	STA. SERVICE TRANS. [2-X14] BREAKER	D13	2A06	D11	
2B52-40B	AC/DC	STA. SERVICE TRANS. [2-X13] BREAKER	D11	2A05	D13	
2B52-40C	AC/DC	BUS TIE BREAKER	D11	2B03 to 2B04	D13	
D01	AC/DC	MAIN 125VDC DISTRIBUTION BUS		D05		
D02	AC/DC	MAIN 125VDC DISTRIBUTION BUS		D06		
D05	AC/DC	STATION BATTERY NO. 1				
D06	AC/DC	STATION BATTERY NO. 2				
D11	AC/DC	125VDC DISTRIBUTION PANEL		D01		

TABLE 2-1.1 (continued)

HOT SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
D12	AC/DC	125VDC DISTRIBUTION PANEL		D01		
D13	AC/DC	125VDC DISTRIBUTION PANEL		D02		
D14	AC/DC	125VDC DISTRIBUTION PANEL		D02		
D16	AC/DC	125VDC DISTRIBUTION PANEL		D11		
D17	AC/DC	125VDC DISTRIBUTION PANEL		D11		
D18	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D19	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D21	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D22	AC/DC	125VDC DISTRIBUTION PANEL		D11		
D105	AC/DC	STATION BATTERY				
D106	AC/DC	STATION BATTERY				
G01	AC/DC	DIESEL GENERATOR	D11,D12,D18			
G02	AC/DC	DIESEL GENERATOR	D13,D14,D16			
1-MOV4000	AFWS	AFW ISOLATION MOV [1-P29]		D14		
1-MOV4001	AFWS	AFW ISOLATION MOV [1-P29]		D12		
1-MOV4002	AFWS	AFW RECIRCULATION AOV				
1-MOV4006	AFWS	SWS BACKUP FEEDWATER SUPPLY TO 1-P29	1B42	1B42		
1-P29	AFWS	AUX. FEED PUMP (TURBINE DRIVEN)	PNEUMATIC			
2-MOV4000	AFWS	AFW ISOLATION MOV [2-P29]		D14		
2-MOV4001	AFWS	AFW ISOLATION MOV [2-P29]		D12		
2-MOV002	AFWS	AFW RECIRCULATION AOV				
2-MOV4006	AFWS	SWS BACKUP FEEDWATER SUPPLY TO 2-P29	2B42	2B42		
2-P29	AFWS	AUX. FEED PUMP (TURBINE DRIVEN)	PNEUMATIC			
MOV4007	AFWS	AFW RECIRCULATION AOV				
MOV4009	AFWS	SWS BACKUP FEEDWATER SUPPLY TO P38A	1B32	1B32		
MOV4014	AFWS	AFW RECIRCULATION AOV				

TABLE 2-1.1 (continued)

HOT SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
MOV4016	AFWS	SWS BACK FEEDWATER SUPPLY TO P38B	2B42	2B42		
MOV4020	AFWS	AFW ISOLATION MOV [P38A]	2B42	2B42		
MOV4021	AFWS	AFW ISOLATION MOV [P38B]	1B42	1B42		
MOV4022	AFWS	AFW ISOLATION MOV [P38A]	2B32	2B32		
MOV4023	AFWS	AFW ISOLATION MOV [P38B]	1B32	1B32		
P38A	AFWS	AUX. FEED PUMP (MOTOR DRIVEN)	D11	1B03	D13	
P38B	AFWS	AUX. FEED PUMP (MOTOR DRIVEN)	D13	2B04	D11	
1-LCV112B	CVCS	RWST CHARGING WATER SUPPLY ISOLATION MOV	1B32	1B32		
1-LCV112C	CVCS	VCT CHARGING WATER SUPPLY ISOLATION MOV	1B32	1B32		
1-P2A	CVCS	CHARGING PUMP	D11	1B03	D13	
1-P2B	CVCS	CHARGING PUMP	D11	1B03	D13	
1-P2C	CVCS	CHARGING PUMP	D13	1B04	D11	
1-V200A	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
1-V200B	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
1-V200C	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
2-LCV112B	CVCS	RWST CHARGING WATER SUPPLY ISOLATION MOV	2B32	2B32		
2-LCV112C	CVCS	VCT CHARGING WATER SUPPLY ISOLATION MOV	2B32	2B32		
2-P2A	CVCS	CHARGING PUMP	D11	2B03	D13	
2-P2B	CVCS	CHARGING PUMP	D11	2B03	D13	
2-P2C	CVCS	CHARGING PUMP	D13	2B04	D11	
2-V200A	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
2-V200B	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
2-V200C	CVCS	NORMAL LETDOWN ORIF. ISOLATION VALVE	D17			
1T13	CVCS	REFUELING WATER STORAGE TANK				
2T13	CVCS	REFUELING WATER STORAGE TANK				

TABLE 2-1.1 (continued)

HOT SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
1-CV2015	MRSS	SG ATM DUMP VALVE [1-HX1B]	1Y02			
1-CV2016	MRSS	SG ATM DUMP VALVE [1-HX1A]	1Y03			
1-MOV2019	MRSS	AFW PUMP [1-P29] STEAM SUPPLY MOV	D12			
1-MOV2020	MRSS	AFW PUMP [1-P29] STEAM SUPPLY MOV	D14			
1-CV2017	MRSS	MAIN STEAM ISOLATION VALVES	D17,D21			
1-CV2018	MRSS	MAIN STEAM ISOLATION VALVES	D17,D21			
2-CV2015	MRSS	SG ATM DUMP VALVE [2-HX1B]	2Y02			
2-CV2016	MRSS	SG ATM DUMP VALVE [2-HX1A]	2Y03			
2-MOV2019	MRSS	AFW PUMP [2-P29] STEAM SUPPLY MOV	D12			
2-MOV2020	MRSS	AFW PUMP [2-P29] STEAM SUPPLY MOV	D14			
2-CV2017	MRSS	MAIN STEAM ISOLATION VALVE	D19,D22			
2-CV2018	MRSS	MAIN STEAM ISOLATION VALVE	D19,D22			
T24A	MRSS	CONDENSATE STORAGE TANK				
T24B	MRSS	CONDENSATE STORAGE TANK				
1-PCV430	RCS	PRESSURIZER PRESSURE RELIEF AOV	D19			
1-PCV431C	RCS	PRESSURIZER PRESSURE RELIEF AOV	D17			
2-PCV430	RCS	PRESSURIZER PRESSURE RELIEF AOV	D19			
2-PCV431C	RCS	PRESSURIZER PRESSURE RELIEF AOV	D17			
1-TE451B	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'B'	1Y101			
1-TE451C	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'B'	1Y101			
1-PT483	PMS	'B' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	1Y01			
1-LT470A	PMS	'B' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	1Y101			
1-PT420	PMS	RCS PRESSURE TRANSMITTER (W.R)	1Y101			
1-LT426	PMS	PRESSURIZER LEVEL TRANSMITTER	1Y01			
2-TE451B	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'B'	2Y103			

TABLE 2-1.1 (continued)

HOT SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
2-TE451C	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'B'	2Y103			
2-PT483	PMS	'B' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	2Y01			
2-LT470A	PMS	'B' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	2Y101			
2-PT420	PMS	RCS PRESSURE TRANSMITTER (W.R.)	2Y101			
2-LT426	PMS	PRESSURIZER LEVEL TRANSMITTER	2Y01			
1-TE450D	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'A'	1Y103			
1-TE450A	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'A'	1Y103			
1-PT469	PMS	'A' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	1Y03			
1-LT460B	PMS	'A' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	1Y103			
1-PT420A	PMS	RCS PRESSURE TRANSMITTER (W.R.)	1Y103			
1-LT427	PMS	PRESSURIZER LEVEL TRANSMITTER	1Y03			
2-TE450D	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'A'	2Y103			
2-TE450A	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'A'	2Y103			
2-PT469	PMS	'A' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	2Y03			
2-LT460B	PMS	'A' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	2Y103			
2-PT420A	PMS	RCS PRESSURE TRANSMITTER (W.R.)	2Y103			
2-LT427	PMS	PRESSURIZER LEVEL TRANSMITTER	2Y03			
P32A	SWS	SW PUMP	D11	1B03	D13	
P32B	SWS	SW PUMP	D11	1B03	D13	
P32C	SWS	SW PUMP	D13	1B04	D11	
P32D	SWS	SW PUMP	D13	2B04	D11	
P32E	SWS	SW PUMP	D13	2B04	D11	
P32F	SWS	SW PUMP	D11	2B03	D13	
CV2838	SWS	CONTROL VALVE G01 COOLING	2Y05			
CV2839	SWS	CONTROL VALVE G02 COOLING	1Y05			

TABLE 2-1.2: POINT BEACH NUCLEAR PLANT

COLD SHUTDOWN COMPONENTS

			ELECTRICAL SOURCES			
			NORMAL		ALTERNATE	
COMPONENT	SYSTEM	DESCRIPTION	CONTROL	POWER	CONTROL	POWER
1A52-58	AC/DC	STA. SERVICE TRANS. [1-X13] BREAKER	D11	1A05	D13	
1A52-60	AC/DC	EMERGENCY GENERATOR BREAKER	D11	G01	D13	
1A52-61	AC/DC	BUS TIE BREAKER	D11	1A05 to 1A06	D13	
1A52-64	AC/DC	STA. SERVICE TRANS. [1-X14] BREAKER	D13	1A06	D11	
1A52-66	AC/DC	EMERGENCY GENERATOR BREAKER	D13	G02	D11	
1-X13	AC/DC	STATION SERVICE TRANSFORMER		1A05		
1-X14	AC/DC	STATION SERVICE TRANSFORMER		1A06		
1B52-14B	AC/DC	SAFEGUARD MCC-1B32 BREAKER	D11	1B03	D13	
1B52-16B	AC/DC	STA. SERVICE TRANS. [1-X13] BREAKER	D11	1A05	D13	
1B52-16C	AC/DC	BUS TIE BREAKER	D11	1B03 to 1B04	D13	
1B52-17B	AC/DC	STA. SERVICE TRANS. [1-X14] BREAKER	D13	1A06	D11	
1B52-23C	AC/DC	SAFEGUARD MCC-1B42 BREAKER	D13	1B04	D11	
2A52-67	AC/DC	EMERGENCY GENERATOR BREAKER	D13	G02	D11	
2A52-69	AC/DC	STA. SERVICE TRANS. [2-X14] BREAKER	D13	2A06	D11	
2A52-72	AC/DC	BUS TIE BREAKER	D11	2A05 to 2A06	D13	
2A52-73	AC/DC	EMERGENCY GENERATOR BREAKER	D11	G01	D13	
2A52-75	AC/DC	STA. SERVICE TRANS. [2-X13] BREAKER	D11	2A05	D13	
2-X13	AC/DC	STATION SERVICE TRANSFORMER		2A05		
2-X14	AC/DC	STATION SERVICE TRANSFORMER		2A06		
2B52-25B	AC/DC	STA. SERVICE TRANS. [2-X14] BREAKER	D13	2A06	D11	
2B52-32C	AC/DC	SAFEGUARD MCC-2B42 BREAKER	D13	2B04	D11	
2B52-38B	AC/DC	SAFEGUARD MCC-2B32 BREAKER	D11	2B03	D13	
2B52-40B	AC/DC	STA. SERVICE TRANS. [2-X13] BREAKER	D11	2A05	D13	
2B52-40C	AC/DC	BUS TIE BREAKER	D11	2B03 to 2B04	D13	

TABLE 2-1.2 (continued)

COLD SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
D01	AC/DC	MAIN 125VDC DISTRIBUTION BUS		D05		
D02	AC/DC	MAIN 125VDC DISTRIBUTION BUS		D06		
D05	AC/DC	STATION BATTERY NO. 1				
D06	AC/DC	STATION BATTERY NO. 2				
D11	AC/DC	125VDC DISTRIBUTION PANEL		D01		
D12	AC/DC	125VDC DISTRIBUTION PANEL		D01		
D13	AC/DC	125VDC DISTRIBUTION PANEL		D02		
D14	AC/DC	125VDC DISTRIBUTION PANEL		D02		
D16	AC/DC	125VDC DISTRIBUTION PANEL		D11		
D17	AC/DC	125VDC DISTRIBUTION PANEL		D11		
D18	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D19	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D21	AC/DC	125VDC DISTRIBUTION PANEL		D13		
D22	AC/DC	125VDC DISTRIBUTION PANEL		D11		
G01	AC/DC	DIESEL GENERATOR	D11,D12,D18			
G02	AC/DC	DIESEL GENERATOR	D13,D14,D16			
D105	AC/DC	STATION BATTERY				
D106	AC/DC	STATION BATTERY				
1-MOV738A	CCWS	CCWS TO RHR HX ISOLATION MOV	1B32	1B32		
1-MOV738B	CCWS	CCWS TO RHR HX ISOLATION MOV	1B42	1B42		
1-P11A	CCWS	CCWS PUMP	D11	1B03	D13	
1-P11B	CCWS	CCWS PUMP	D13	1B04	D11	
2-MOV738A	CCWS	CCWS TO RHR HX ISOLATION MOV	2B32	2B32		
2-MOV738B	CCWS	CCWS TO RHR HX ISOLATION MOV	2B42	2B42		
2-P11A	CCWS	CCWS PUMP	D11	2B03	D13	

TABLE 2-1.2 (continued)

COLD SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
2-P11B	CCWS	CCWS PUMP	D13	2304	D11	
HX12A	CCWS	CCWS HEAT EXCHANGER				
HX12B	CCWS	CCWS HEAT EXCHANGER				
HX12C	CCWS	CCWS HEAT EXCHANGER				
1-CV2015	MRSS	SG ATM DUMP VALVE [1-HX1B]	1Y02			
1-CV2016	MRSS	SG ATM DUMP VALVE [1-HX1A]	1Y03			
1-CV2017	MRSS	MAIN STEAM ISOLATION VALVES	D17,D21			
1-CV2018	MRSS	MAIN STEAM ISOLATION VALVES	D17,D21			
2-CV2015	MRSS	SG ATM DUMP VALVE [2-HX1B]	2Y02			
2-CV2016	MRSS	SG ATM DUMP VALVE [2-HX1A]	2Y03			
2-CV2017	MRSS	MAIN STEAM ISOLATION VALVE	D19,D22			
2-CV2018	MRSS	MAIN STEAM ISOLATION VALVE	D19,D22			
1-PCV430	RCS	PRESSURIZER PRESSURE RELIEF AOV	D19			
1-PCV431C	RCS	PRESSURIZER PRESSURE RELIEF AOV	D17			
2-PCV430	RCS	PRESSURIZER PRESSURE RELIEF AOV	D19			
2-PCV431C	RCS	PRESSURIZER PRESSURE RELIEF AOV	D17			
1-MOV852A	RHR	RHR INJECTION ISOLATION MOV	1B32	1B32		
1-MOV852B	RHR	RHR INJECTION ISOLATION MOV	1B42	1B42		
1-FCV626	RHR	RHR HXS BYPASS ISOLATION AOV	1Y02			
1-HCV624	RHR	RHR HX FLOW CONTROL AOV				
1-HCV625	RHR	RHR HX FLOW CONTROL AOV	1Y02			
1-HX11A	RHR	RHR HEAT EXCHANGER				
1-HX11B	RHR	RHR HEAT EXCHANGER				
1-MOV700	RHR	RHR/RCS BOUNDARY ISOLATION MOV	1B32	1B32		
1-MOV701	RHR	RHR/RCS BOUNDARY ISOLATION MOV	1B42	1B42		

TABLE 2-1.2 (continued)

COLD SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	NORMAL POWER	ALTERNATE CONTROL	ALTERNATE POWER
1-P10A	RHR	RHR PUMP	D11	1B03	D13	
1-P10B	RHR	RHR PUMP	D13	1B04	D11	
2-MOV852A	RHR	RHR INJECTION ISOLATION MOV	2B32	2B32		
2-MOV852B	RHR	RHR INJECTION ISOLATION MOV	2B42	2B42		
2-FCV626	RHR	RHR HXS BYPASS ISOLATION AOV	2Y02			
2-HCV624	RHR	RHR HX FLOW CONTROL AOV				
2-HCV625	RHR	RHR HX FLOW CONTROL AOV	2Y02			
2-HX11A	RHR	RHR HEAT EXCHANGER				
2-HX11B	RHR	RHR HEAT EXCHANGER				
2-MOV700	RHR	RHR/RCS BOUNDARY ISOLATION MOV	2B32	2B32		
2-MOV701	RHR	RHR/RCS BOUNDARY ISOLATION MOV	2B42	2B42		
2-P10A	RHR	RHR PUMP	D11	2B03	D13	
2-P10B	RHR	RHR PUMP	D13	2B04	D11	
1-TE451B	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'B'	1Y101			
1-TE451C	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'B'	1Y101			
1-PT483	PMS	'B' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	1Y01			
1-LT470A	PMS	'B' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	1Y101			
1-PT420	PMS	RCS PRESSURE TRANSMITTER (W.R.)	1Y101			
1-LT426	PMS	PRESSURIZER LEVEL TRANSMITTER	1Y01			
2-TE451B	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'B'	2Y103			
2-TE451C	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'B'	2Y103			
2-PT483	PMS	'B' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	2Y01			
2-LT470A	PMS	'B' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	2Y101			
2-PT420	PMS	RCS PRESSURE TRANSMITTER (W.R.)	2Y101			
2-LT426	PMS	PRESSURIZER LEVEL TRANSMITTER	2Y01			

COLD SHUTDOWN COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	ELECTRICAL SOURCES NORMAL CONTROL	ELECTRICAL SOURCES NORMAL POWER	ELECTRICAL SOURCES ALTERNATE CONTROL	ELECTRICAL SOURCES ALTERNATE POWER
1-TE450D	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'A'	1Y103			
1-TE450A	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'A'	1Y103			
1-PT469	PMS	'A' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	1Y03			
1-LT460B	PMS	'A' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	1Y103			
1-PT420A	PMS	RCS PRESSURE TRANSMITTER (W.R.)	1Y103			
1-LT427	PMS	PRESSURIZER LEVEL TRANSMITTER	1Y03			
2-TE450D	PMS	REACTOR COOLANT HOT LEG TEMP. ELEM., LOOP 'A'	2Y103			
2-TE450A	PMS	REACTOR COOLANT COLD LEG TEMP. ELEM., LOOP 'A'	2Y103			
2-PT469	PMS	'A' STEAM GENERATOR PRESSURE TRANSMITTER (W.R.)	2Y03			
2-LT460B	PMS	'A' STEAM GENERATOR LEVEL TRANSMITTER (W.R.)	2Y103			
2-PT420A	PMS	RCS PRESSURE TRANSMITTER (W.R.)	2Y103			
2-LT427	PMS	PRESSURIZER LEVEL TRANSMITTER	2Y03			
P32A	SWS	SW PUMP	D11	1B03	D13	
P32B	SWS	SW PUMP	D11	1B03	D13	
P32C	SWS	SW PUMP	D13	1B04	D11	
P32D	SWS	SW PUMP	D13	2B04	D11	
P32E	SWS	SW PUMP	D13	2B04	D11	
P32F	SWS	SW PUMP	D11	2B03	D13	
CV2838	SWS	CONTROL VALVE G01 COOLING	2Y05			
CV2839	SWS	CONTROL VALVE G02 COOLING	1Y05			

TABLE 2-2: SHUTDOWN INSTRUMENTATION

NUMBERING AND CODING

FUNCTION	RCS LOOP "A"		RCS LOOP "B"	
	INSTRUMENTS	COLOR	INSTRUMENTS	COLOR
T_{HOT}	1 [2] TE450 B	YELLOW	1 [2] TE451 B	RED
	1 [2] TE450 D	WHITE	1 [2] TE451 D	YELLOW
T_{COLD}	1 [2] TE450 A	WHITE	1 [2] TE451 A	YELLOW
	1 [2] TE450 C	YELLOW	1 [2] TE451 C	RED
STEAM GENERATOR PRESSURE (WIDE-RANGE)	1 [2] PT468	RED	1 [2] PT483	RED
	1 [2] PT469	WHITE	1 [2] PT478	BLUE
	1 [2] PT482	BLUE	1 [2] PT479	YELLOW
STEAM GENERATOR LEVEL (WIDE-RANGE)	1 [2] LT460 A	RED	1 [2] LT470 A	RED
	1 [2] LT460 B	WHITE	1 [2] LT470 B	YELLOW

FUNCTION	RED	BLUE	WHITE	YELLOW	NEUTRAL
RCS PRESSURE (WIDE-RANGE)	1 [2] PT420	———	1 [2] PT420A	1 [2] PT420B	———
PRESSURIZER LEVEL	1 [2] LT426	1 [2] LT428	1 [2] LT427	———	1 [2] LT433

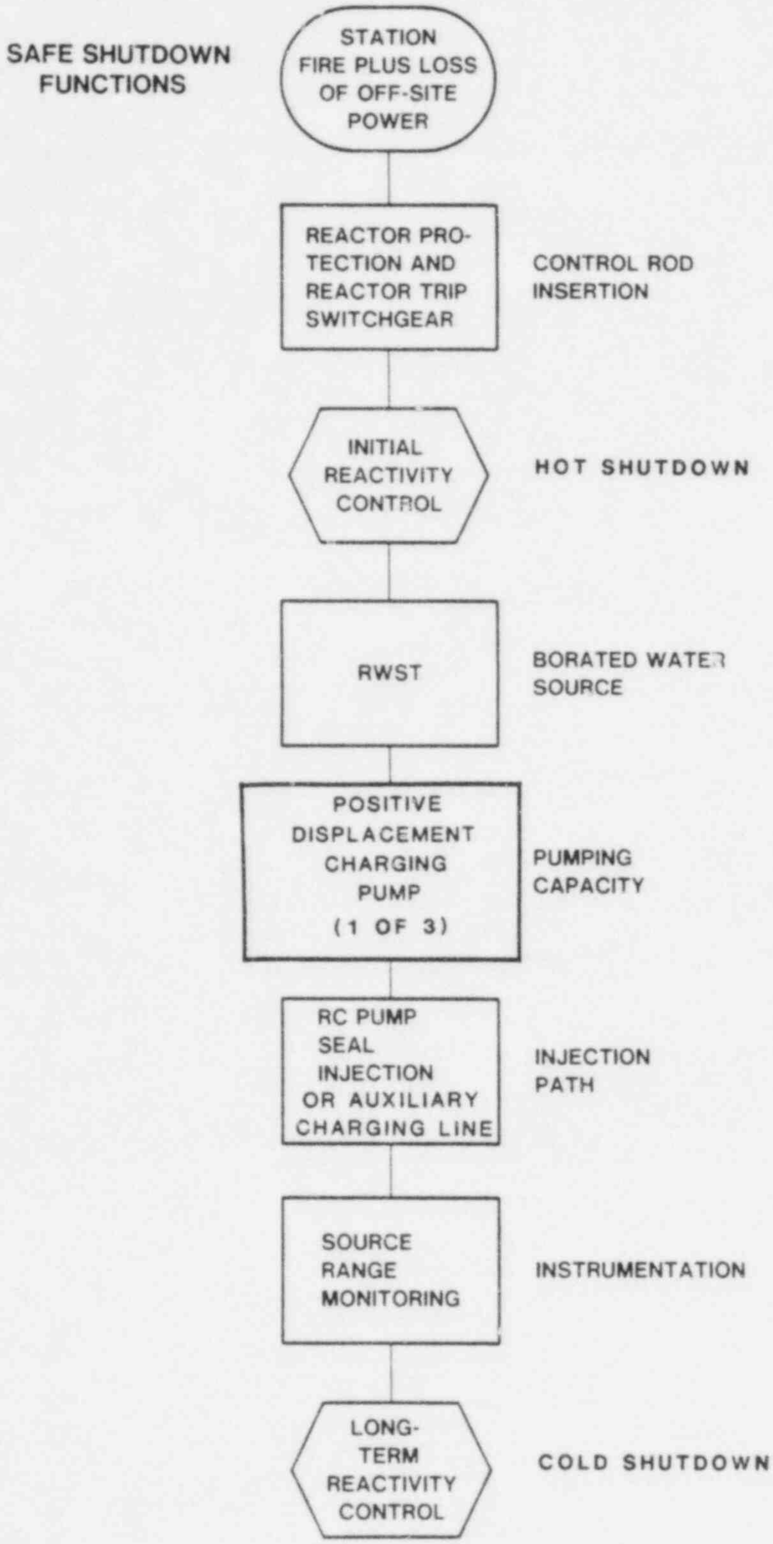


FIGURE 2-1

RCS REACTIVITY CONTROL

SAFE SHUTDOWN FUNCTIONS

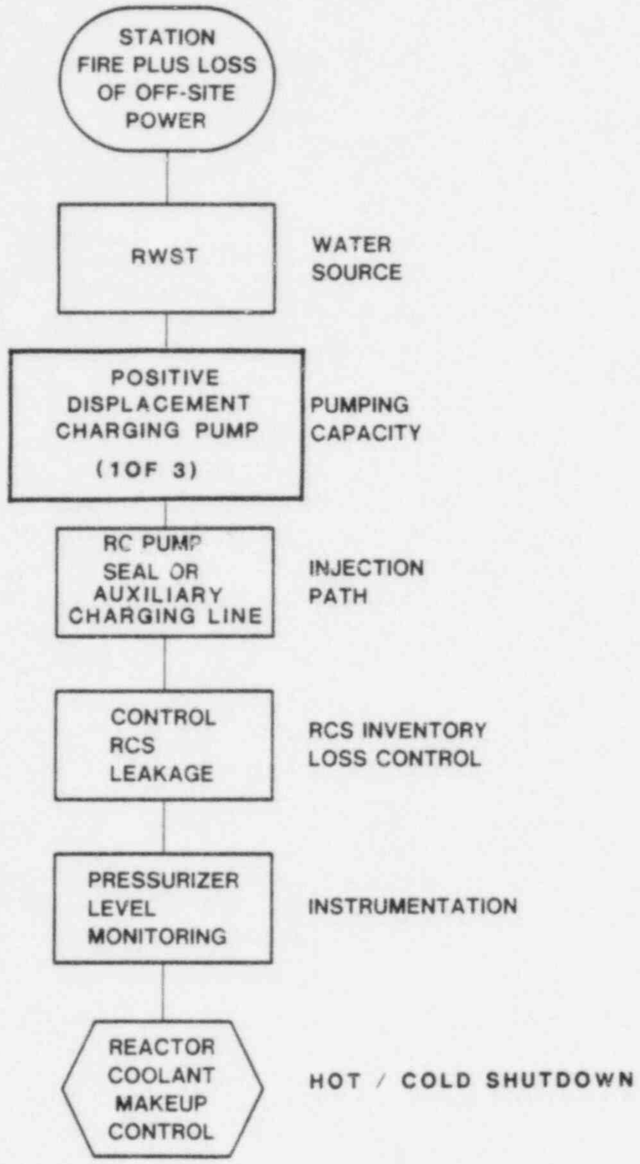


FIGURE 2-2

RCS MAKEUP CONTROL

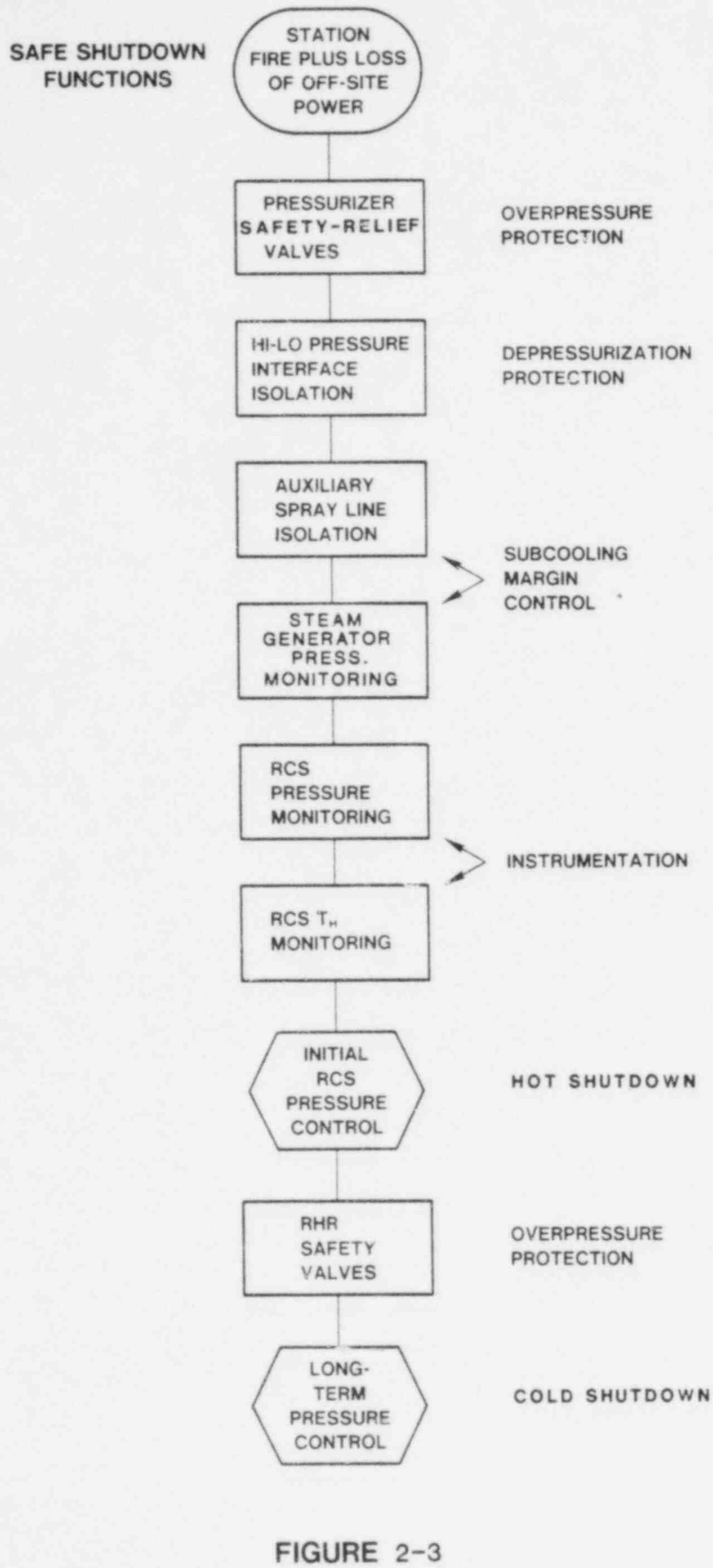


FIGURE 2-3

RCS PRESSURE CONTROL

SAFE SHUTDOWN FUNCTIONS

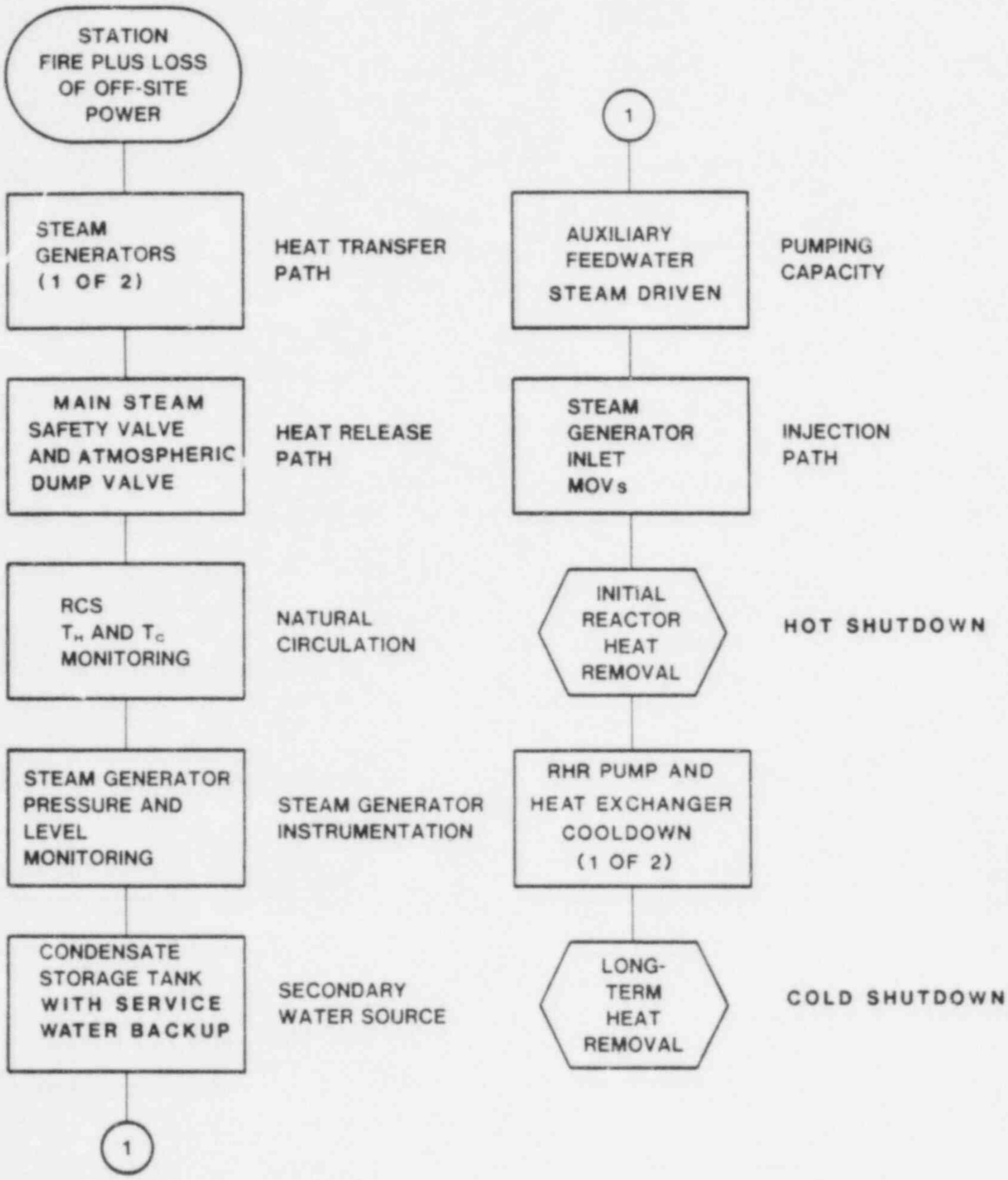
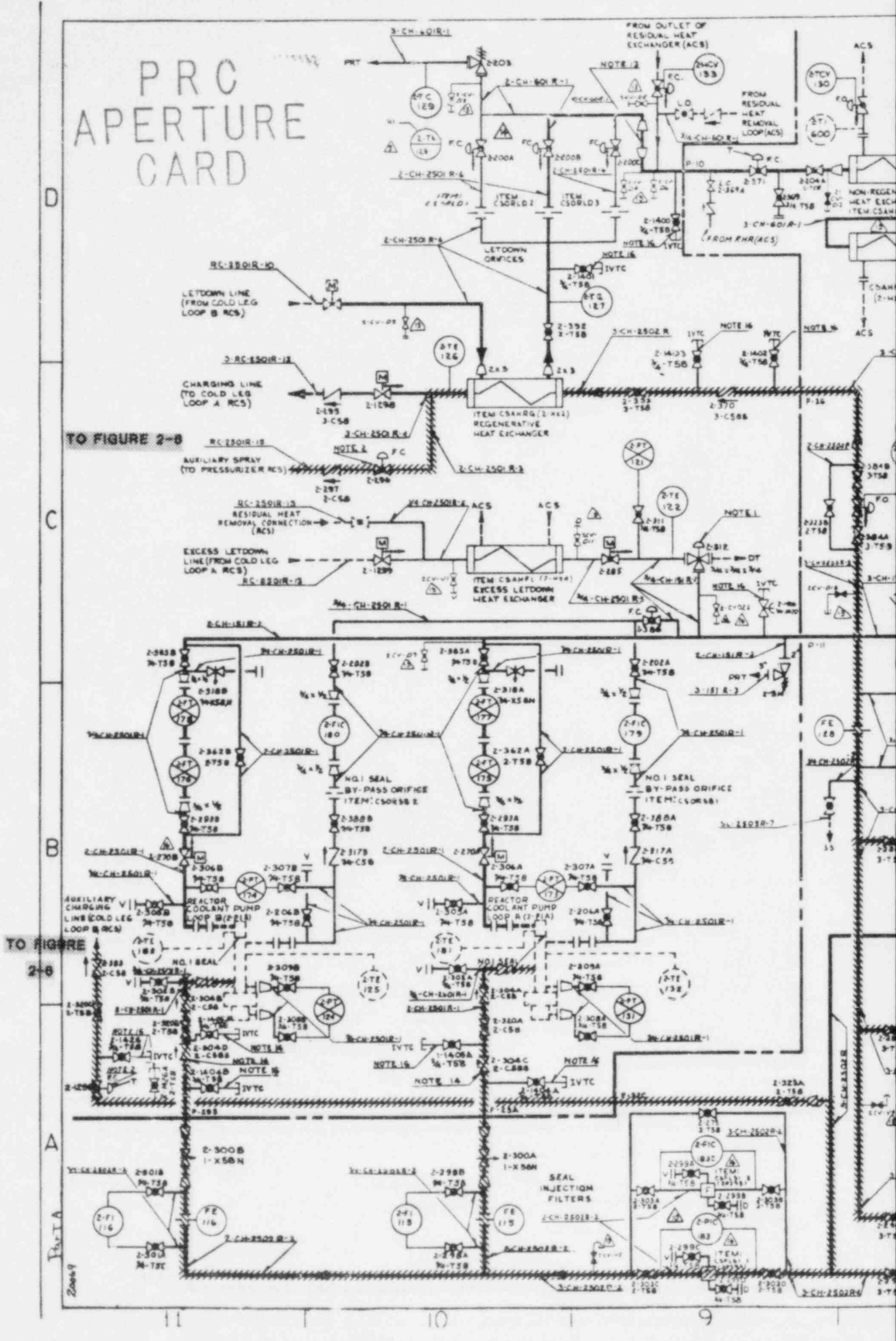
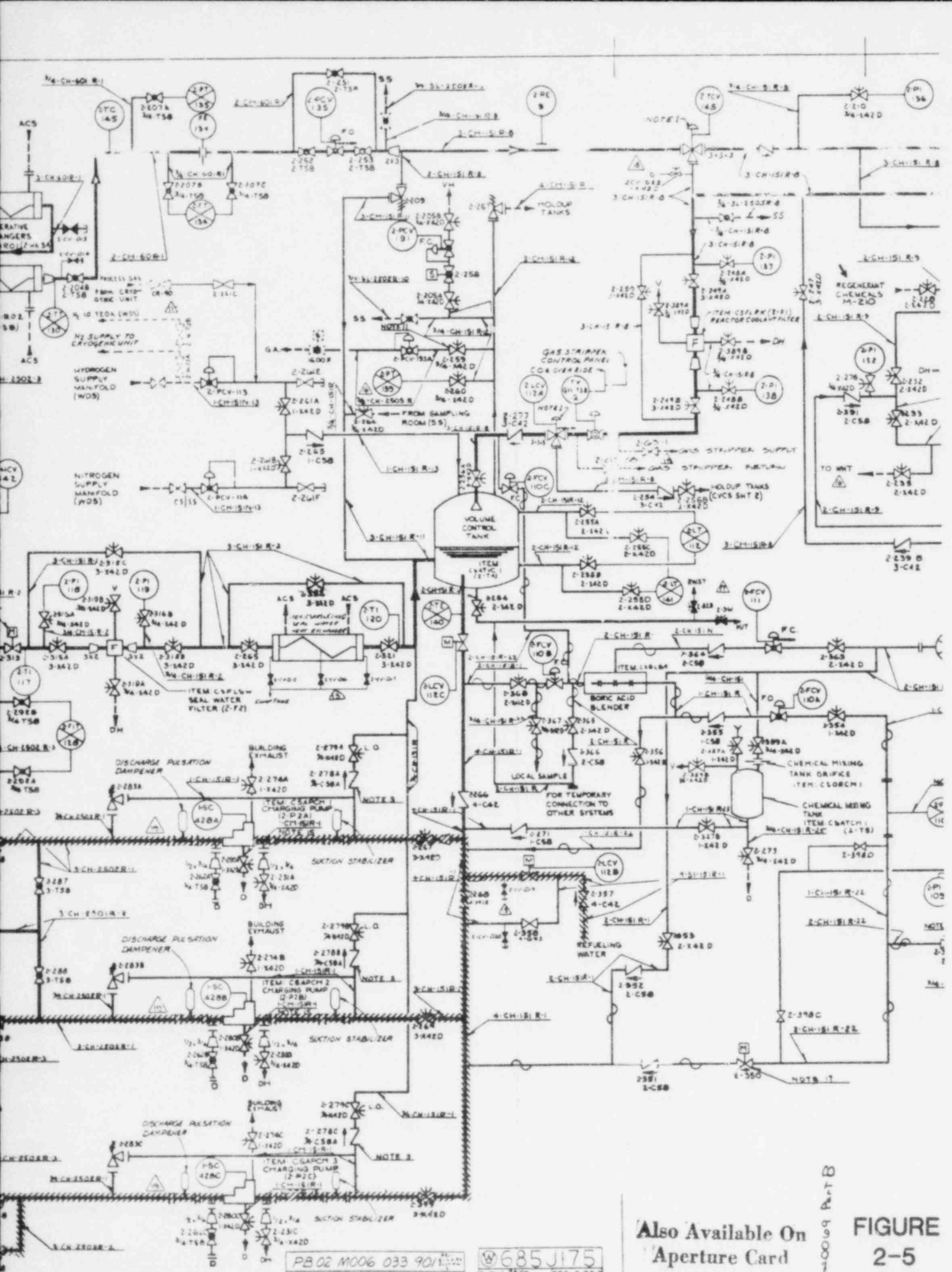


FIGURE 2-4

REACTOR HEAT REMOVAL


PRC
APERTURE
CARD
D
C
B
A
11
10
9
TO FIGURE 2-8
TO FIGURE 2-8
FROM OUTLET OF RESIDUAL HEAT EXCHANGER (ACS)
FROM RESIDUAL HEAT REMOVAL LOOP (ACS)
FROM RHR(ACS)
LETDOWN ORIFICES
LETDOWN LINE (FROM COLD LEG LOOP B RCS)
CHARGING LINE (TO COLD LEG LOOP A RCS)
ITEM CSAHRG (2-HX2) REGENERATIVE HEAT EXCHANGER
AUXILIARY SPRAY (TO PRESSURIZER RCS)
RESIDUAL HEAT REMOVAL CONNECTION (RCS)
EXCESS LETDOWN LINE (FROM COLD LEG LOOP A RCS)
ITEM CSAHFL (2-HX4) EXCESS LETDOWN HEAT EXCHANGER
NO. 1 SEAL BY-PASS ORIFICE
REACTOR COOLANT PUMP LOOP B
REACTOR COOLANT PUMP LOOP A
AUXILIARY CHARGING LINE (COLD LEG LOOP B RCS)
NO. 1 SEAL
SEAL INJECTION FILTERS
NOTE 14
NOTE 16
ACS
PRT

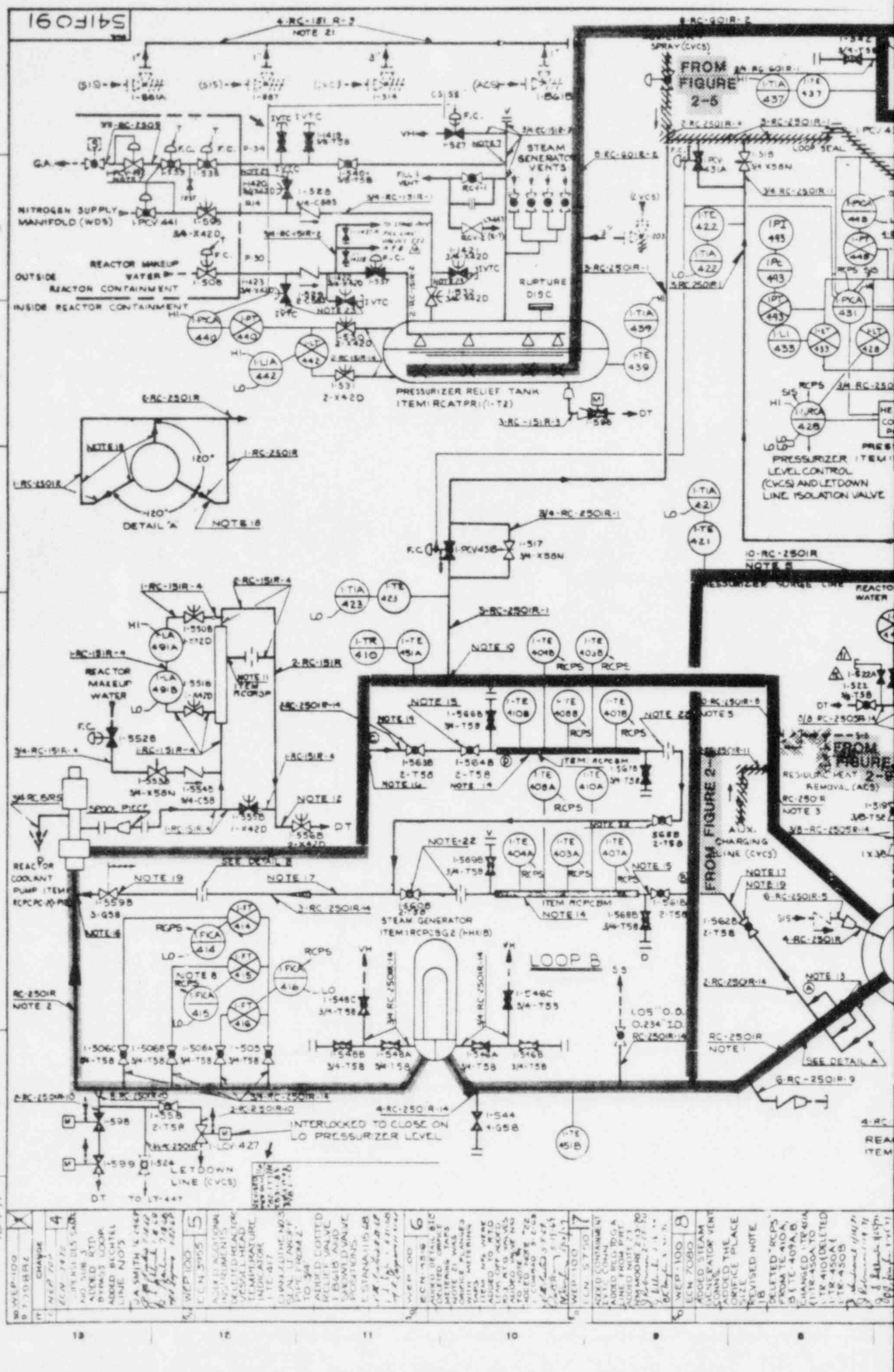


Also Available On Aperture Card

FIGURE 2-5

8311020097-01

PRC
APERTURE
CARD



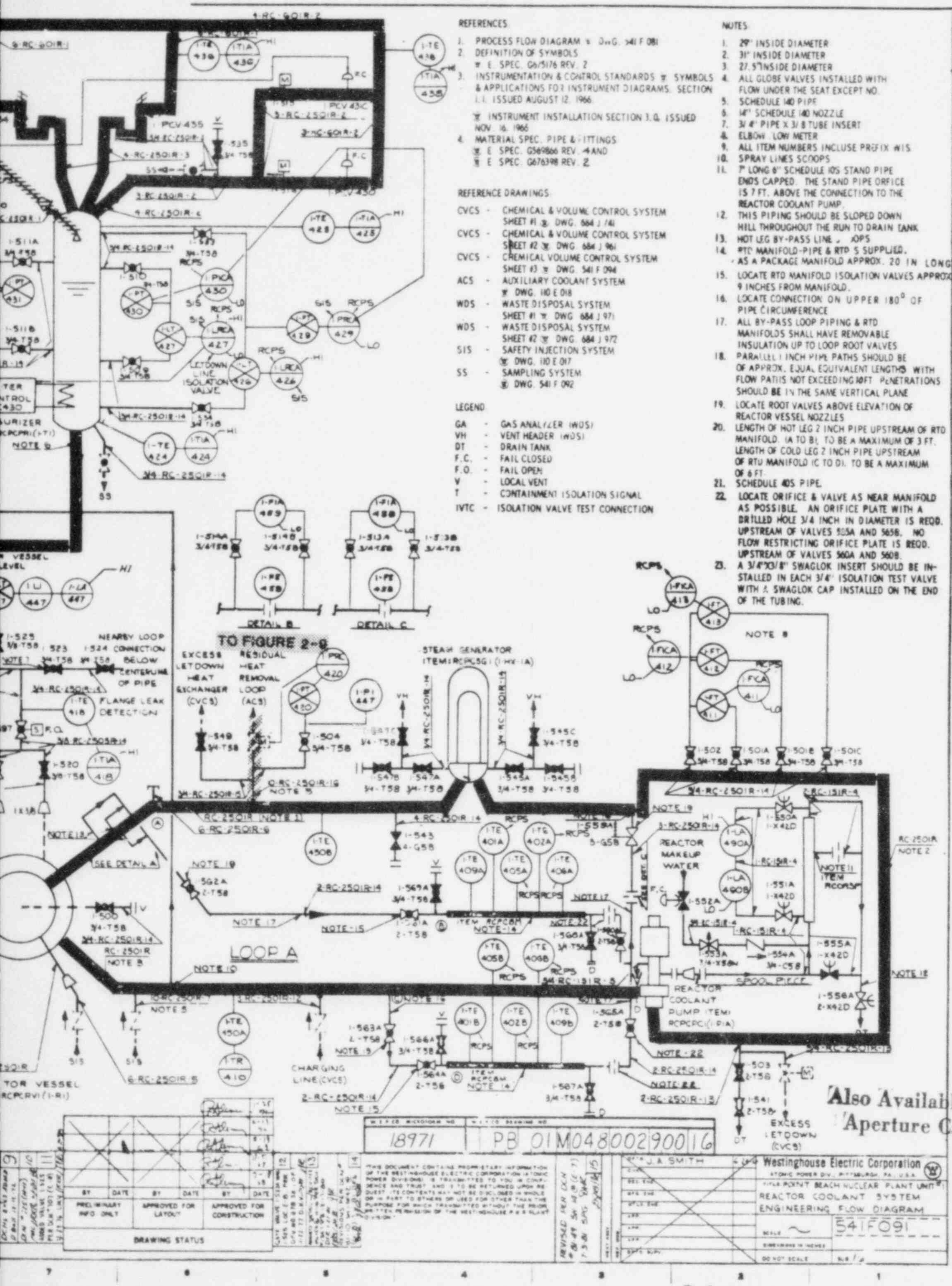
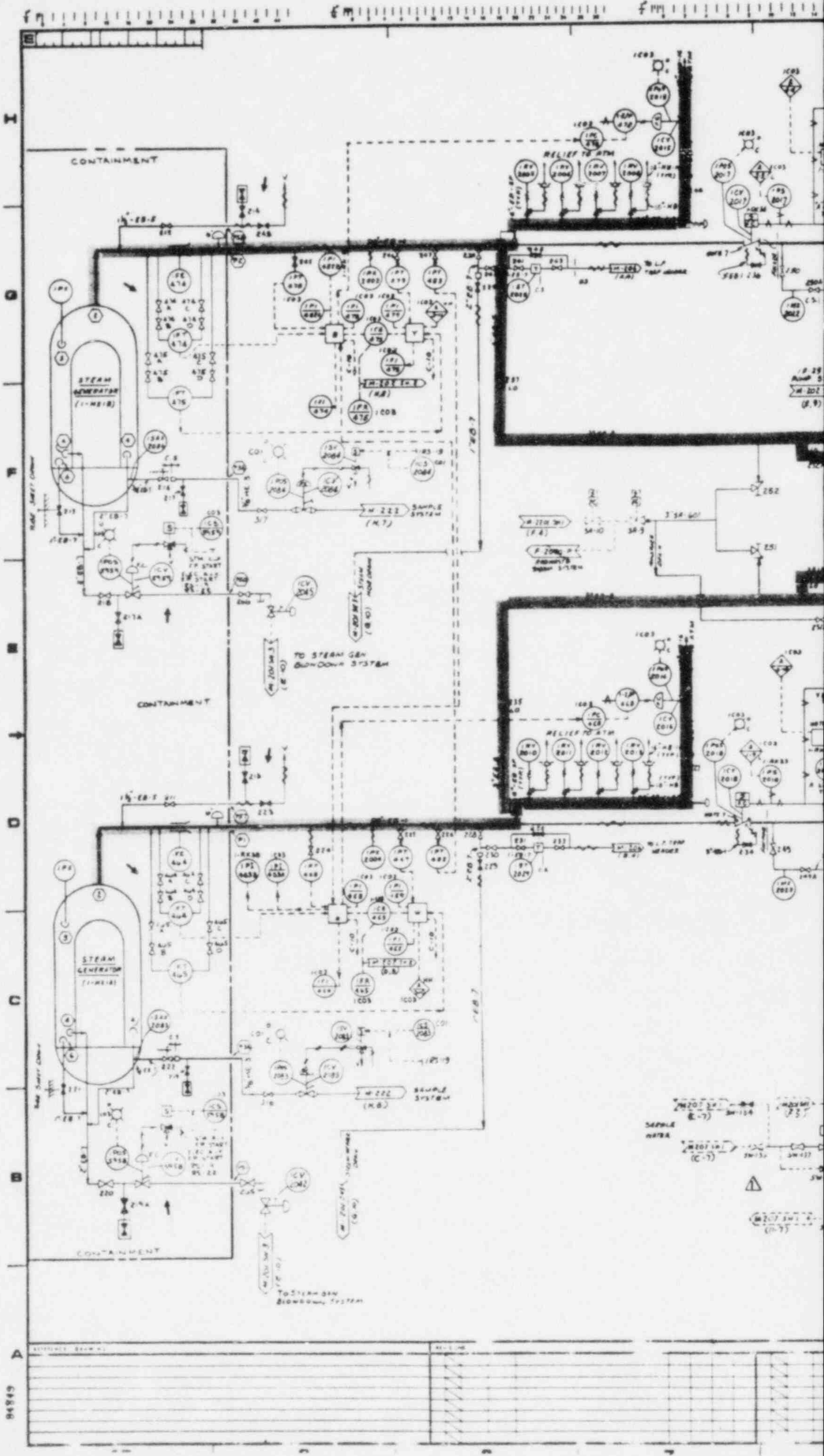
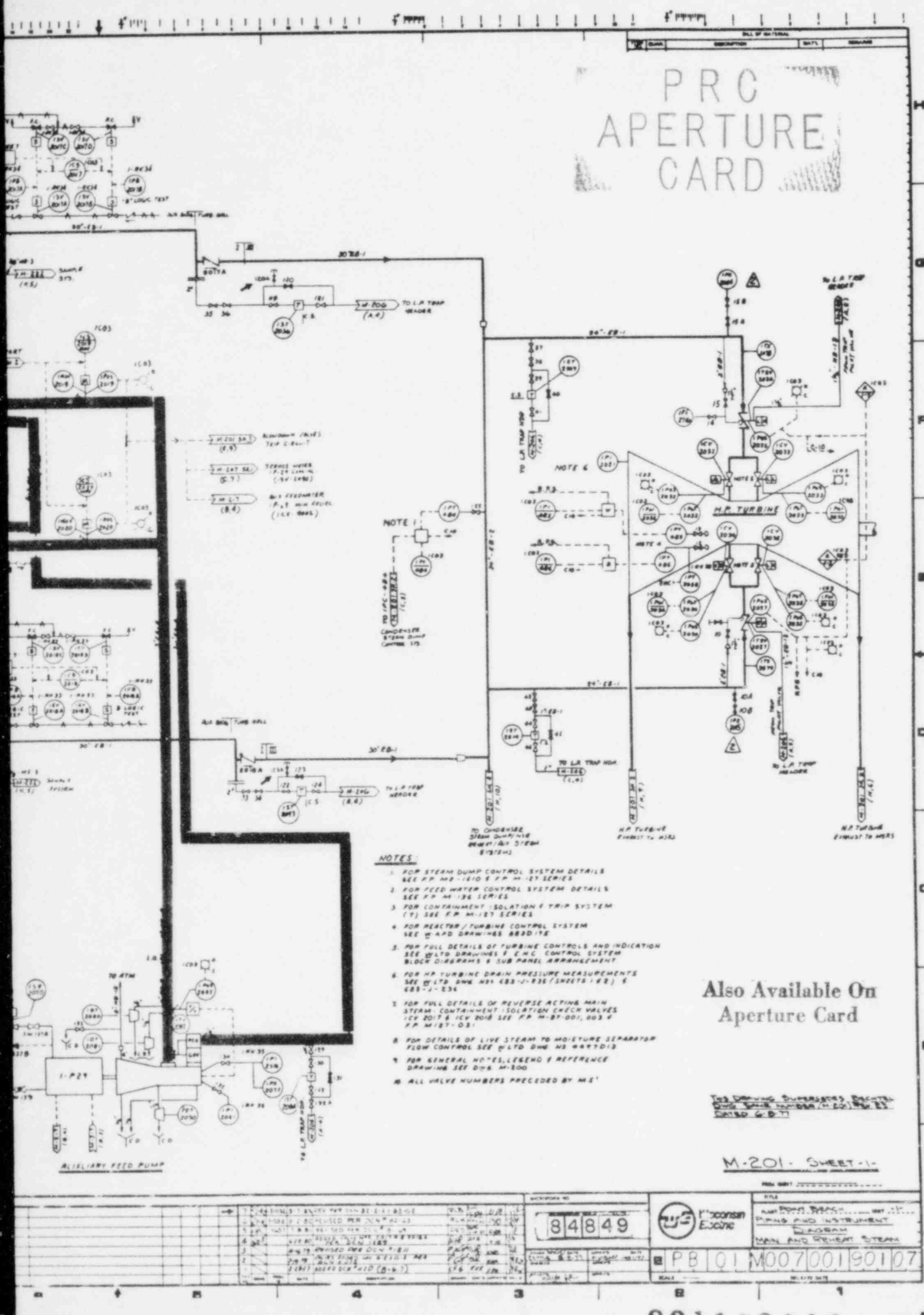


FIGURE 2-6

8311020097-02



CONTAINMENT
STEAM GENERATOR
RELIEF TO ATM
SAMPLE SYSTEM
TO STEAM GEN BLOWDOWN SYSTEM

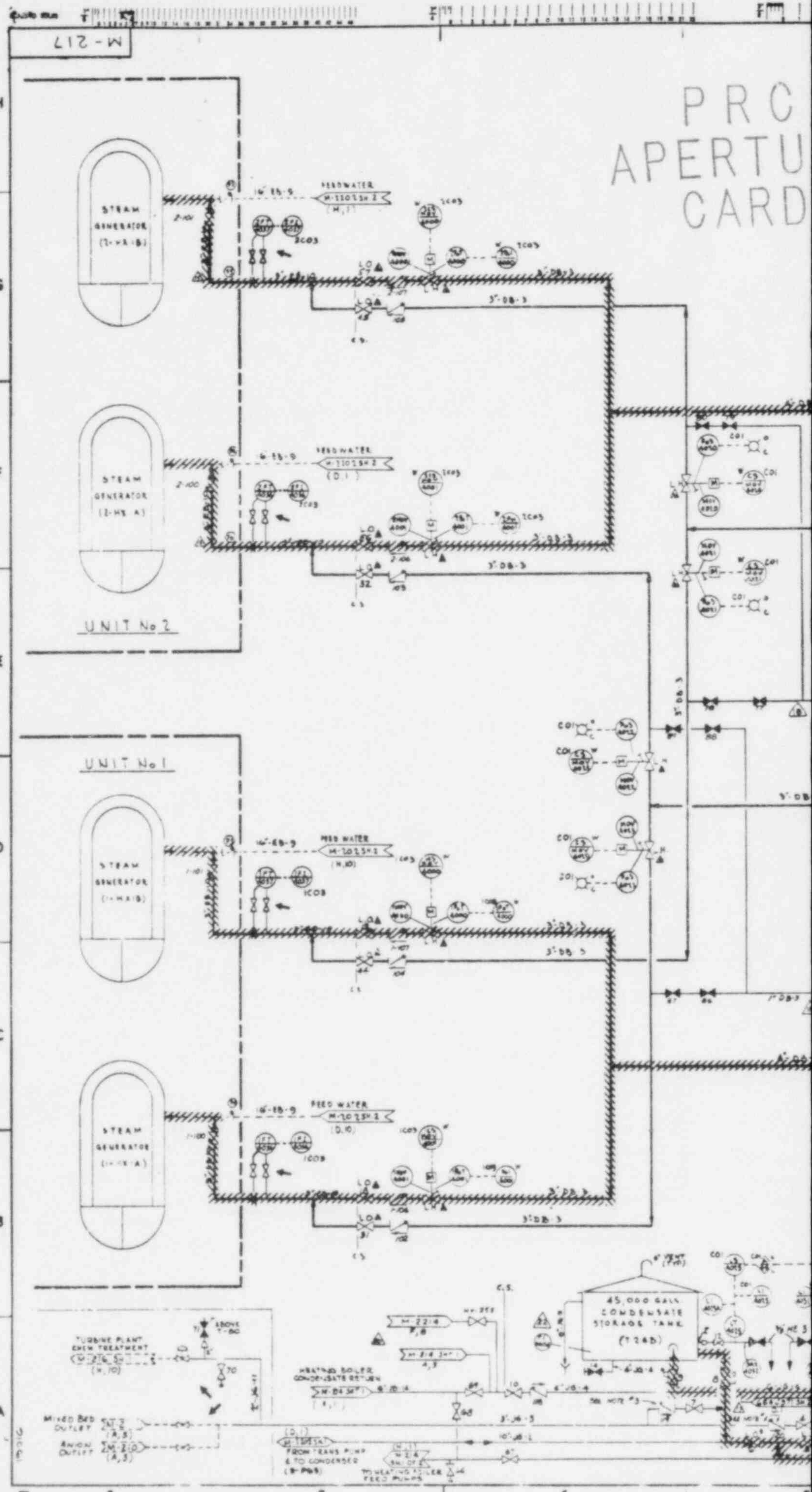


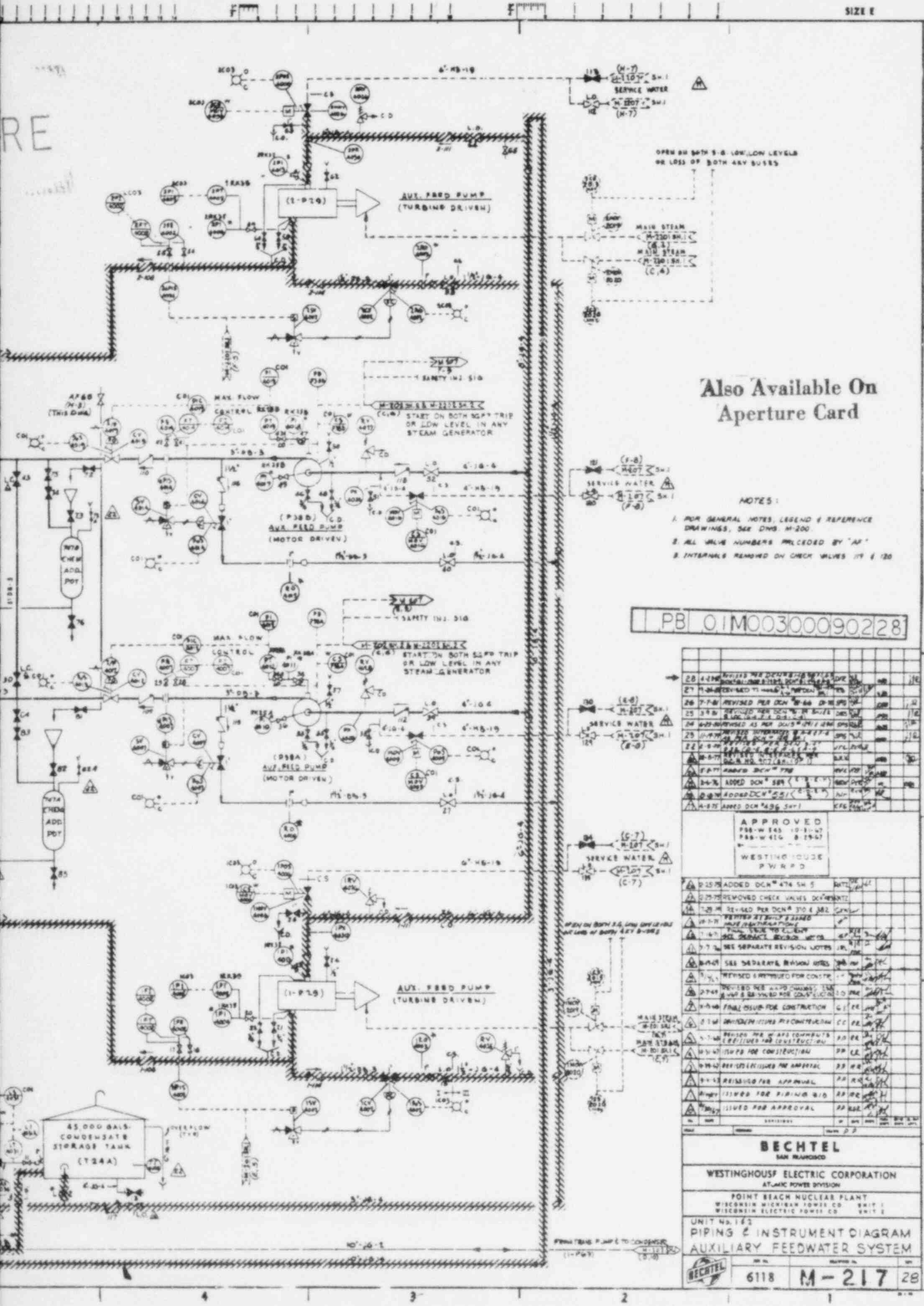
Also Available On
Aperture Card

FIGURE 2-7

8311020097-03

PRC
APERTU
CARD

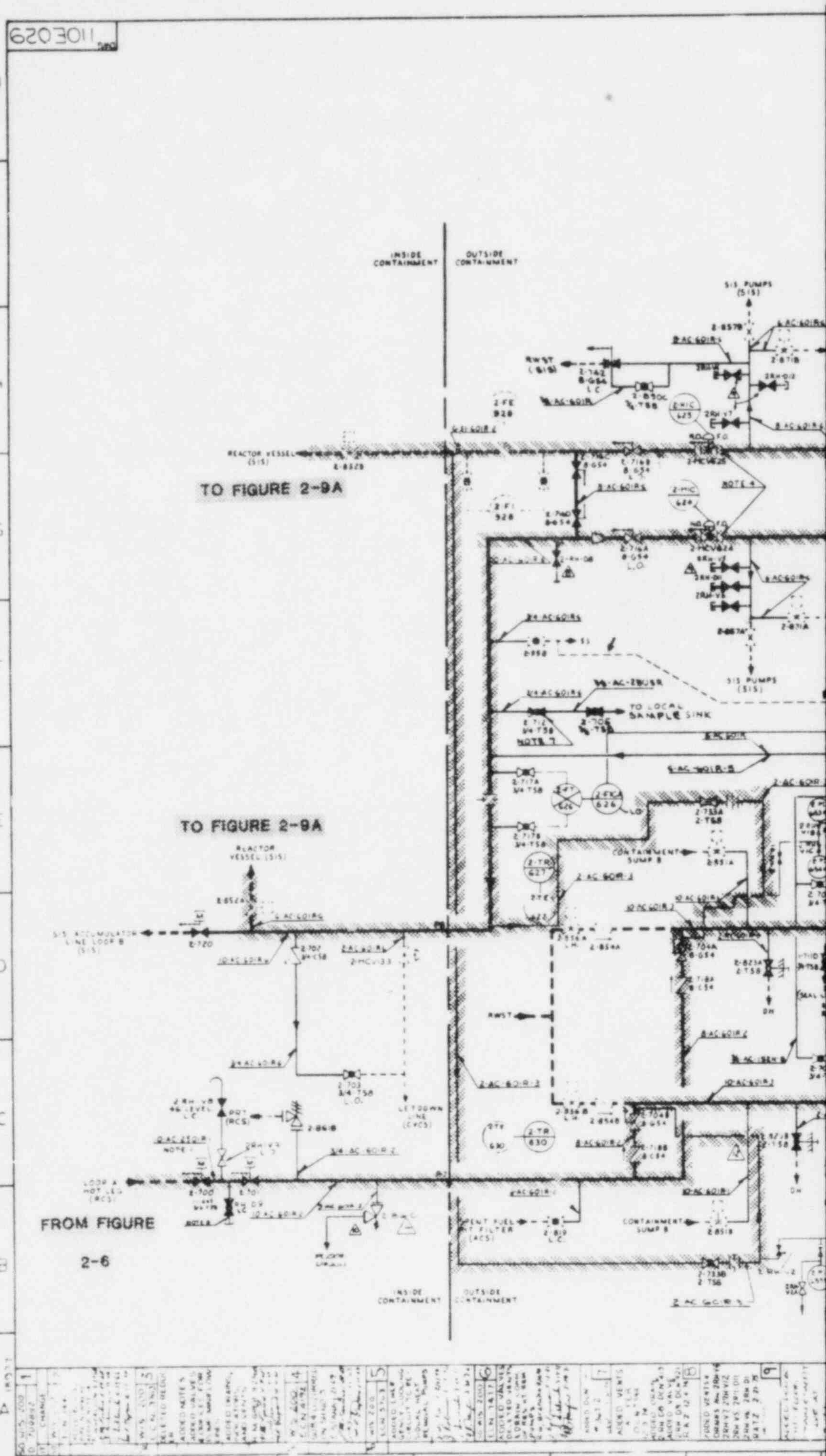




Also Available On Aperture Card

FIGURE 2-8

8311020097-04


INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
SIS PUMPS (SIS)
RWST (SIS)
REACTOR VESSEL (SIS)
TO FIGURE 2-9A
NOTE 4
TO LOCAL SAMPLE SINK
NOTE 7
SIS PUMPS (SIS)
TO FIGURE 2-9A
REACTOR VESSEL (SIS)
CONTAINMENT SUMP B
SIS ACCUMULATOR LINE LOOP B (SIS)
RWST
LETDOWN LINE (CVCS)
LOOP A HOT LEG (RCS)
FROM FIGURE 2-6
CONTAINMENT SUMP B
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT

PRC APERTURE CARD

Also Available On Aperture Card

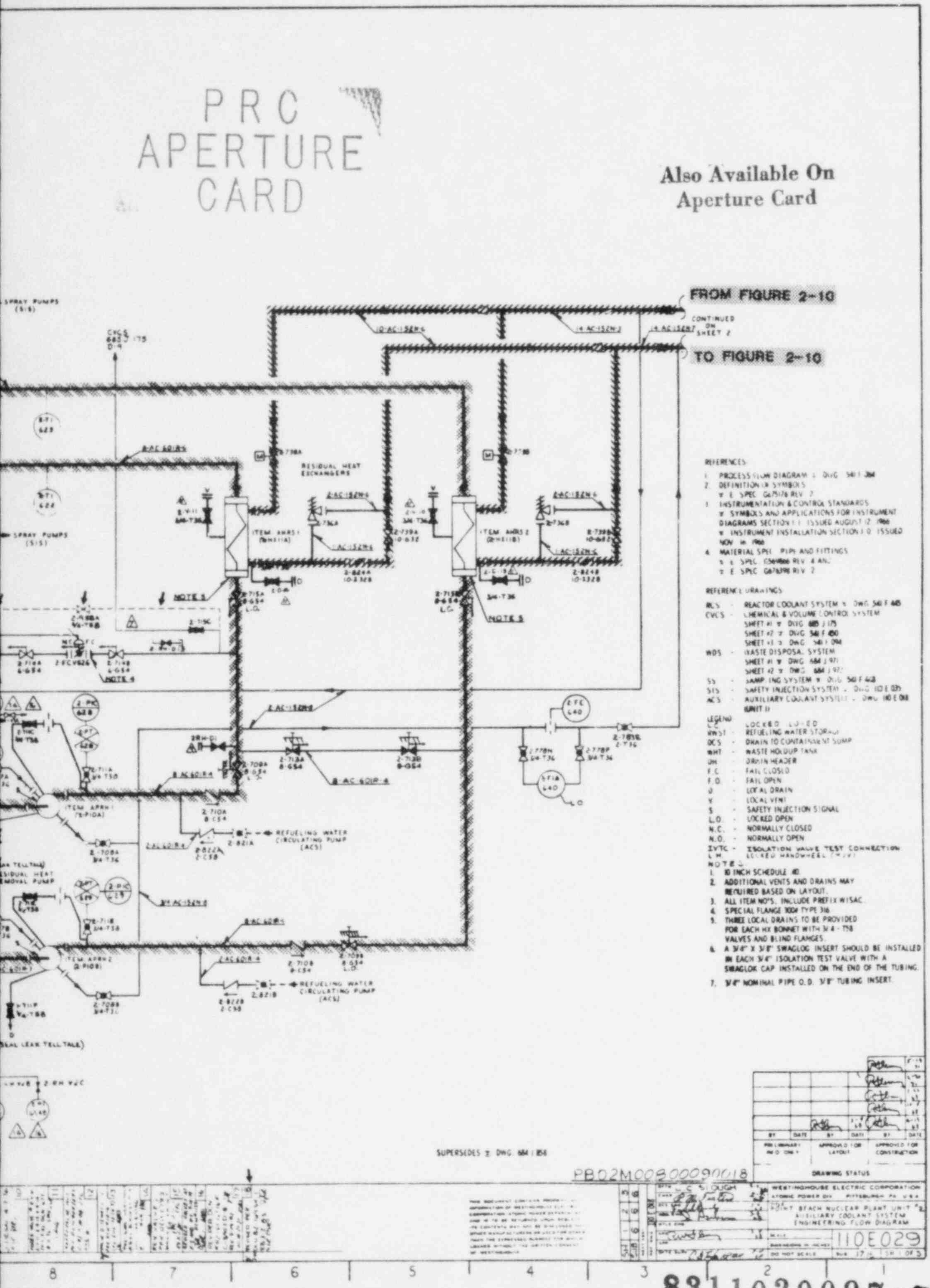
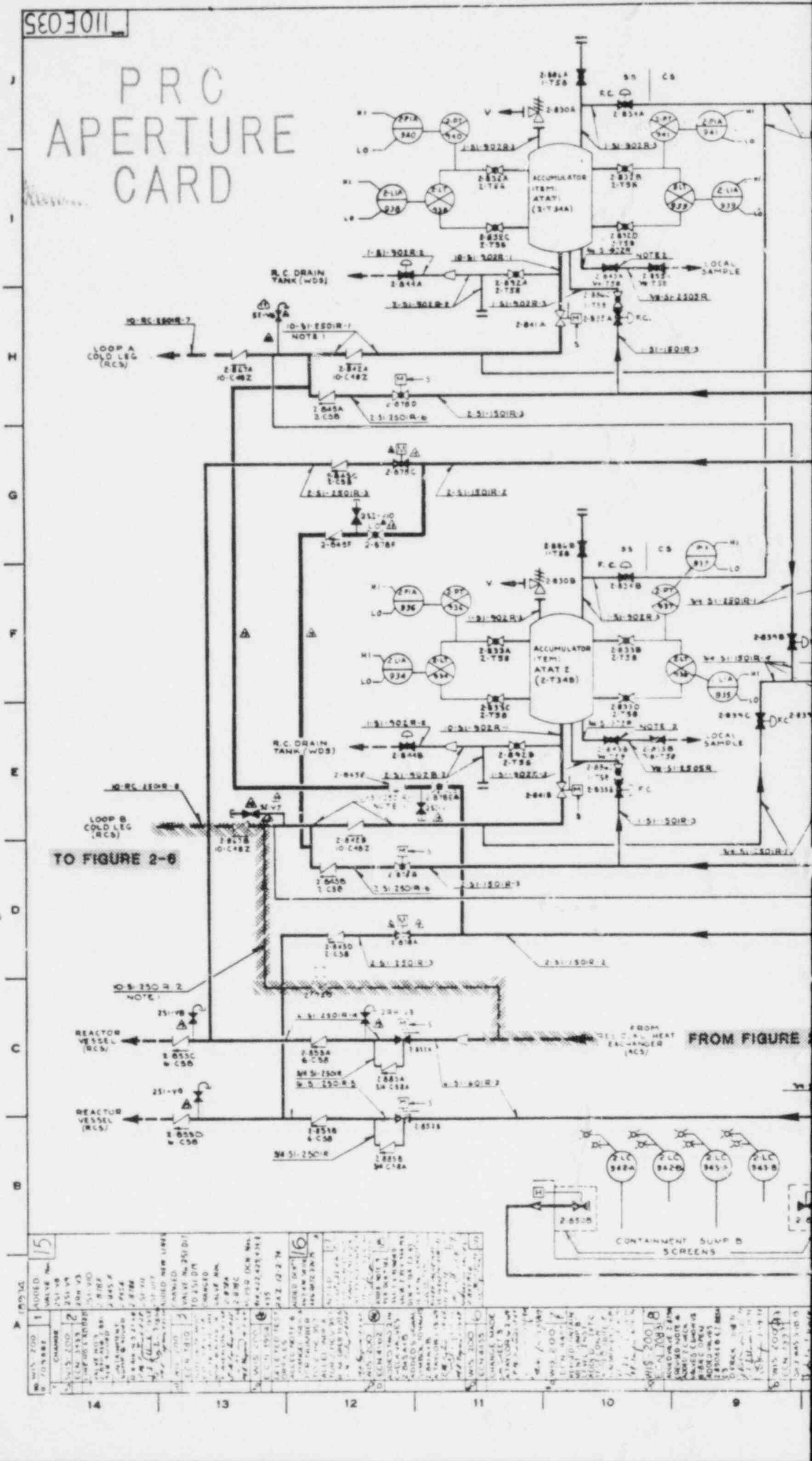
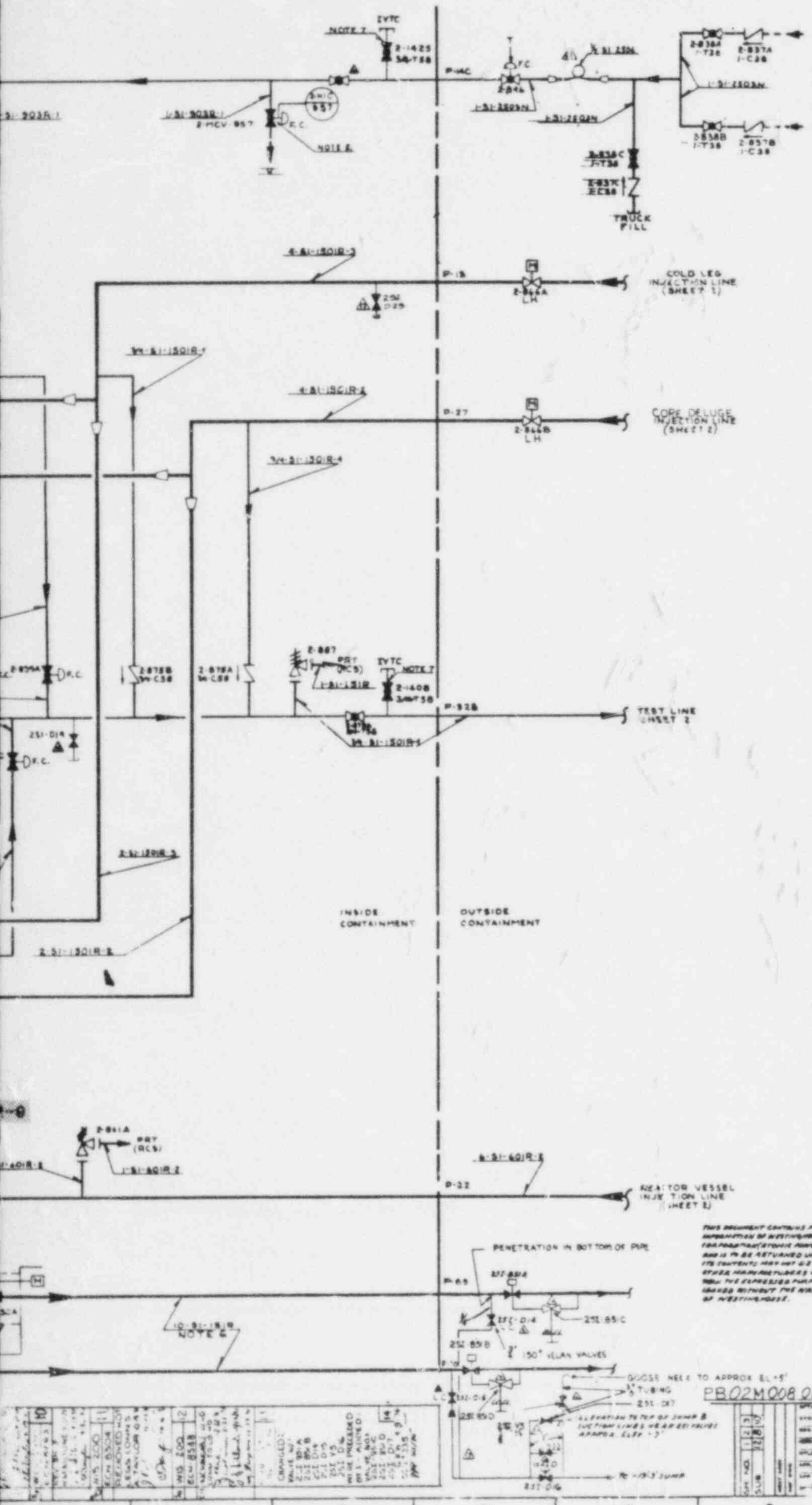


FIGURE 2-9

8311020097-05


110E035
PRC
APERTURE
CARD
ACCUMULATOR
R.C. DRAIN TANK (WDS)
LOCAL SAMPLE
LOOP A COLD LEG (RCS)
LOOP B COLD LEG (RCS)
TO FIGURE 2-6
REACTOR VESSEL (RCS)
FROM FIGURE 2
CONTAINMENT SUMP B SCREENS
NOTE 1
NOTE 2
J
I
H
G
F
E
D
C
B
A
14
13
12
11
10
9



Also Available On Aperture Card

REFERENCES:

1. PROCESS FLOW DIAGRAM W DWG. 541F456 & 541F457.
2. DEFINITION OF SYMBOLS
   W E. SPEC. G675176 REV. 2.
3. INSTRUMENTATION & CONTROL STANDARDS
   W SYMBOLS & APPLICATIONS FOR INSTRUMENT DIAGRAMS SECTION 1.1. ISSUED AUG. 12. 1966.
   W INSTRUMENT INSTALLATION SECTION 3.0. ISSUED NOV. 16, 1966.
4. MATERIAL SPEC. PIPE AND FITTINGS
   W E. SPEC. G569866 REV. 4 AND
   W E. SPEC. G676398 REV. 2

REFERENCE DRAWINGS:

RCS	-	REACTOR COOLANT SYSTEM W DWG. 541F445
ACS	-	AUXILIARY COOLANT SYSTEM W DWG. 110E029
CVCS	-	CHEMICAL & VOLUME CONTROL SYSTEM SHEET #1 W DWG. 685J175 SHEET #2 W DWG. 541F450 SHEET #3 W DWG. 541F094
SS	-	SAMPLING SYSTEM W DWG. 541F448
WDS	-	WASTE DISPOSAL SYSTEM SHEET #1 W DWG. 684J971 SHEET #2 W DWG. 684J972

LEGEND:

L	-	BORIC ACID TANK LO-LO LEVEL SIGNAL
CCW	-	COMPONENT COOLING WATER
L.C.	-	LOCKED CLOSED
L.O.	-	LOCKED OPEN
F.C.	-	FAIL CLOSED
F.O.	-	FAIL OPEN
D	-	LOCAL DRAIN
V	-	LOCAL VENT
T	-	CONTAINMENT ISOLATION SIGNAL
S	-	SAFETY INJECTION ACTUATION SIGNAL
P	-	CONTAINMENT SPRAY ACTUATION SIGNAL
IVTC	-	ISOLATION VALVE TEST CONNECTION

NOTES:

1. 30 INCH SCHEDULE 140 PIPE.
2. 3/4 PIPE X 3/8 TUBE INSERT.
3. ALL ITEM NUMBERS INCLUDE PREFIX WISSI.
4. GLOBE VALVES ARE NORMALLY INSTALLED WITH FLOW UNDER SEAT EXCEPT 834A, 834B, 835A, 835B, 878A, 878B, 878C & 878D & 879A
5. SPECIAL VALVE - FUNCTIONS AS BOTH ISOLATION & RELIEF VALVE.
6. LINES SHALL BE SCHEDULE 40S BETWEEN VALVES 850A AND 851A AND 850B AND 851B.
7. A 3/4" X 3/8" SWAGLOK INSERT SHOULD BE INSTALLED IN EACH 3/4" ISOLATION TEST VALVE WITH A SWAGLOK CAP INSTALLED ON THE END OF THE TUBING

▲ 8. L.H. LOCKED HANDWHEEL

▲ 9. THE HIGH HEAD S.I. SYS. DESIGN PRESS. HAS BEEN UP-GRADED FROM 1575 TO 1748 PSIG. REF MOD. REQ 172

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF WESTINGHOUSE ELECTRIC CORPORATION (ATOMIC POWER DEPARTMENT) AND IS TO BE RETURNED UPON REQUEST. ITS CONTENTS MAY NOT BE DISCLOSED TO OTHER MANUFACTURERS OR USED FOR OTHER THAN THE EXPRESSED PURPOSE FOR WHICH LOANED WITHOUT THE WRITTEN CONSENT OF WESTINGHOUSE.

BY	DATE	BY	DATE	BY	DATE
PRELIMINARY INFO. ONLY		APPROVED FOR LAYOUT		APPROVED FOR CONSTRUCTION	

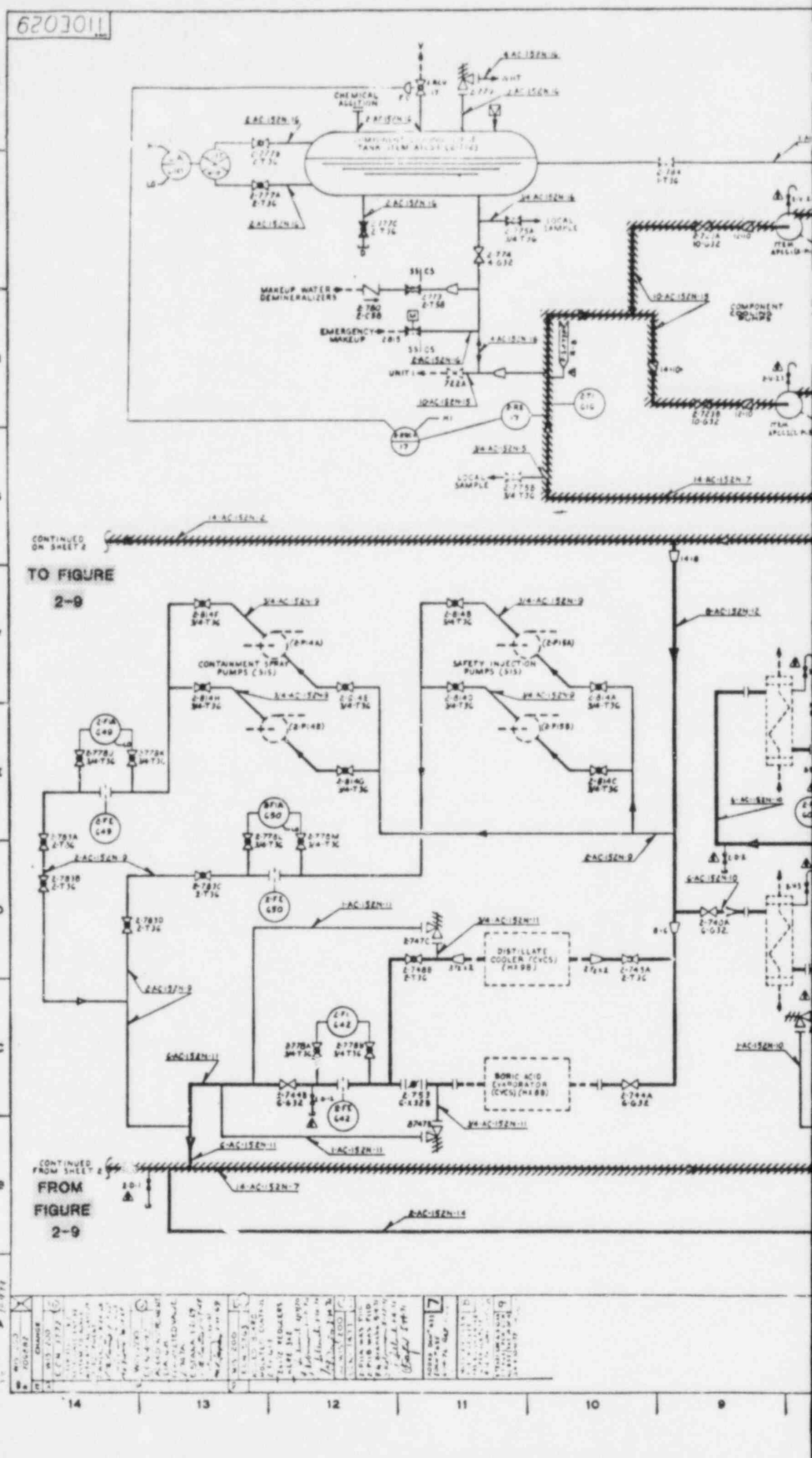
DRAWING STATUS

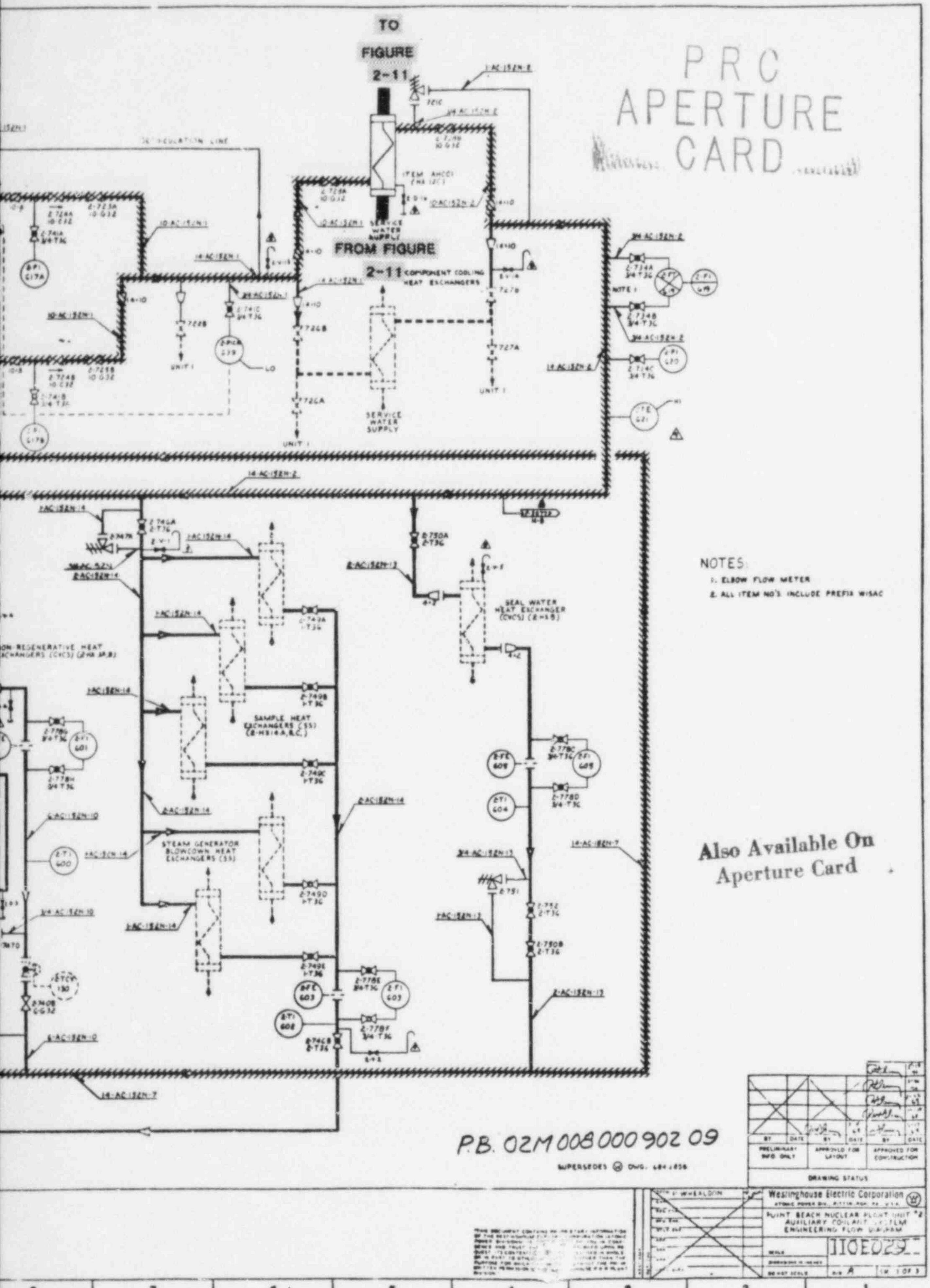
PB02M008 0199 0020

WESTINGHOUSE ELECTRIC CORPORATION
ATOMIC POWER DIV. PITTSBURGH, PA. U.S.A.
POINT BEACH NUCLEAR PLANT UNIT 2
SAFETY INJECTION SYSTEM
ENGINEERING FLOW DIAGRAM
110E035
DO NOT SCALE SH. 1 OF 2

FIGURE 2-9A

8311020097-06


6203011
CHEMICAL ADDITION
MAKEUP WATER DEMINERALIZERS
EMERGENCY MAKEUP
LOCAL SAMPLE
CONTINUED ON SHEET 2
TO FIGURE 2-9
CONTAINMENT SPRAY PUMPS (SIS)
SAFETY INJECTION PUMPS (SIS)
DISTILLATE COOLER (CVCS) (HX 9B)
BORIC ACID EVAPORATOR (CVCS) (HX 8B)
CONTINUED FROM SHEET 2
FROM FIGURE 2-9
14
13
12
11
10
9



PRC APERTURE CARD

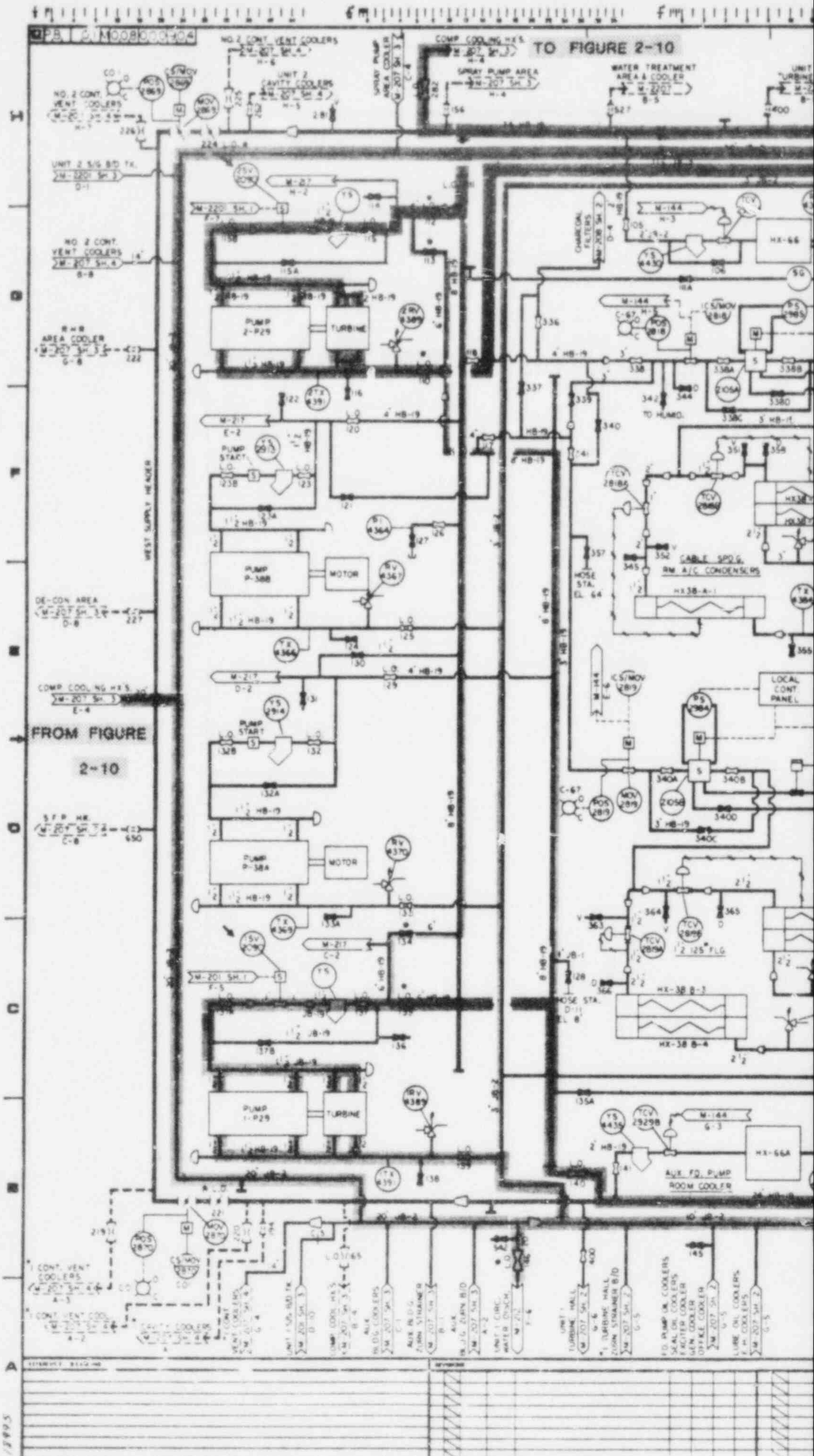
Also Available On Aperture Card

FIGURE 2-10

8311020097-07

**Also Available On
Aperture Card**

PRC
APERTURE
CARD



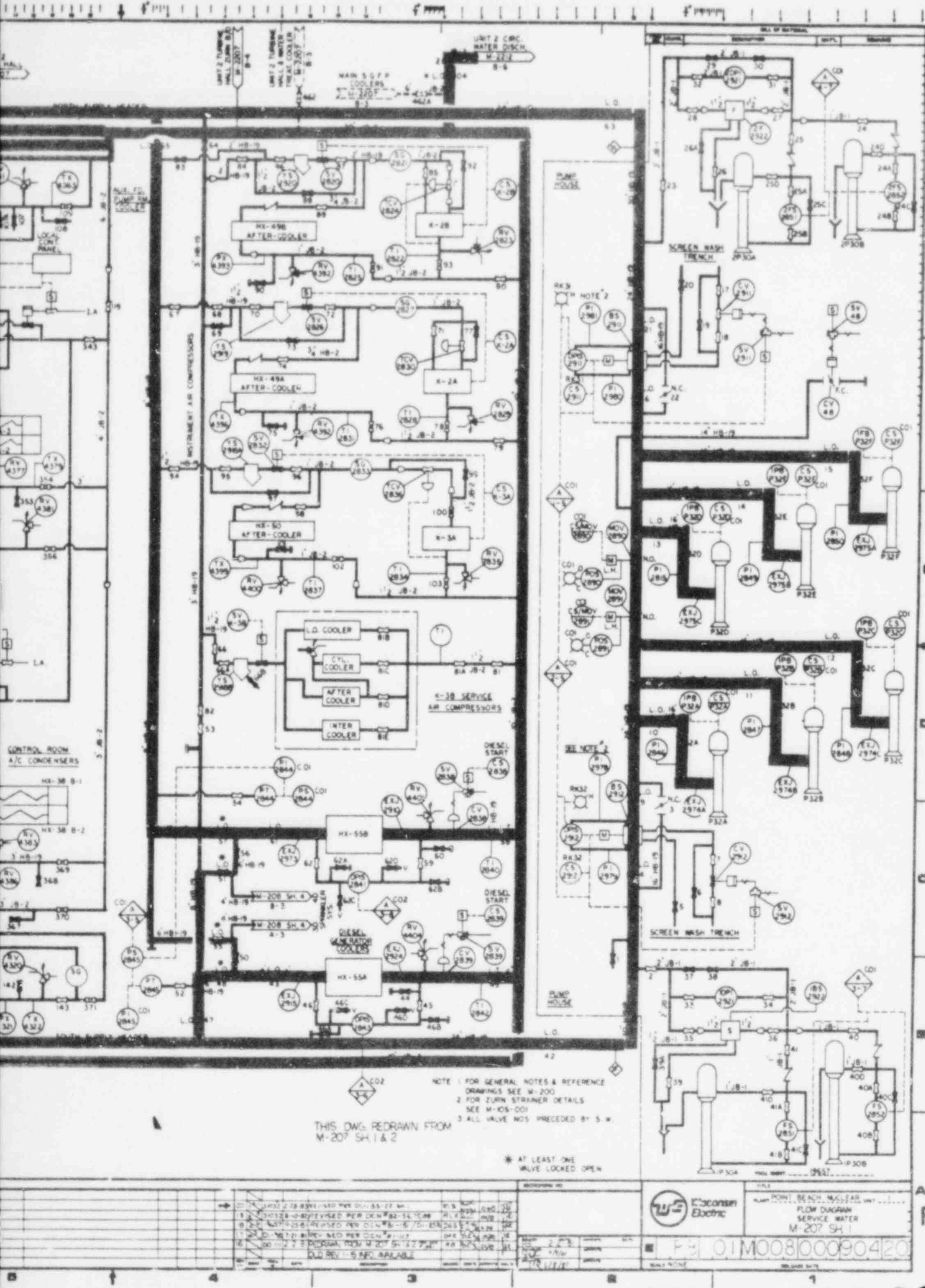
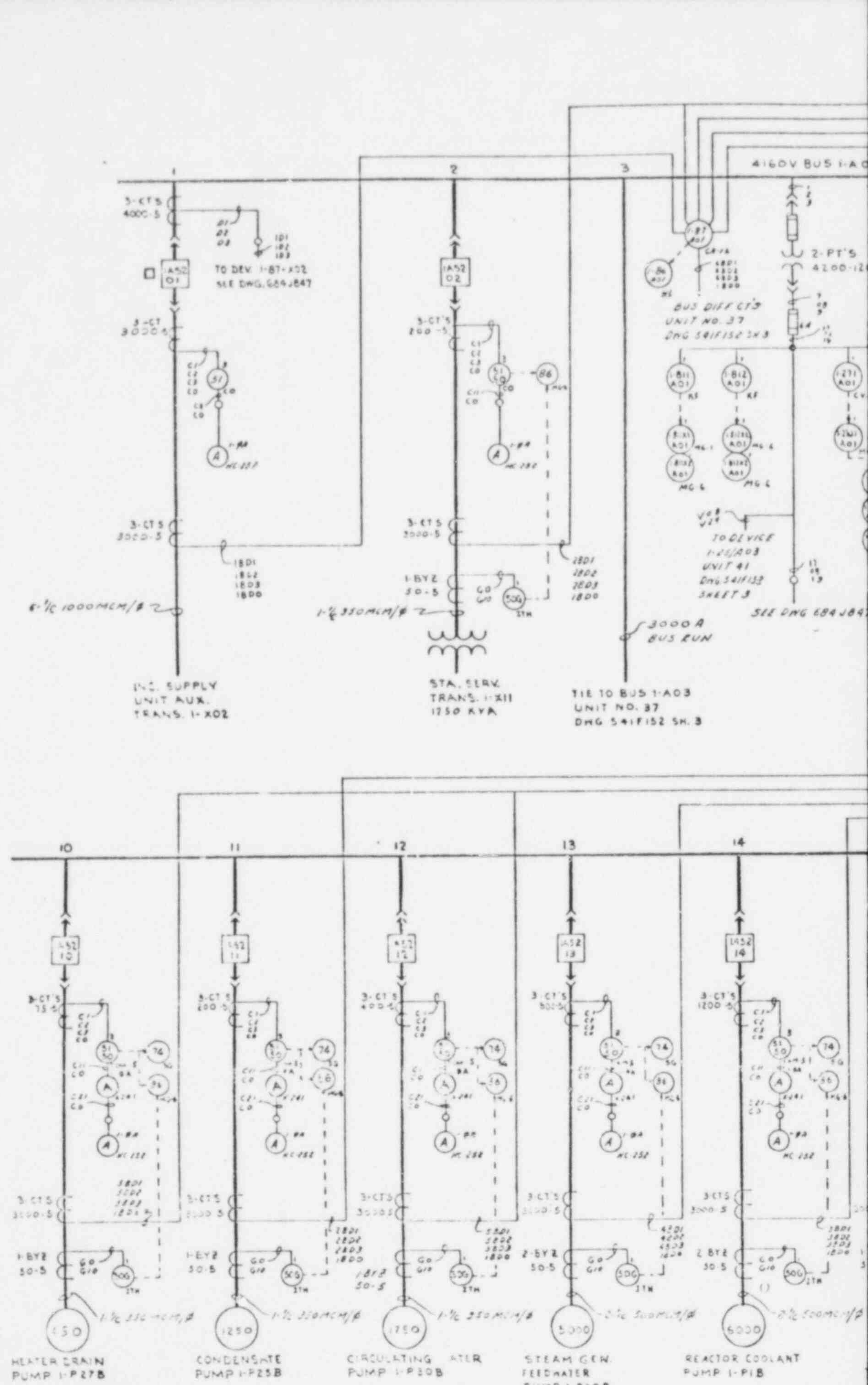
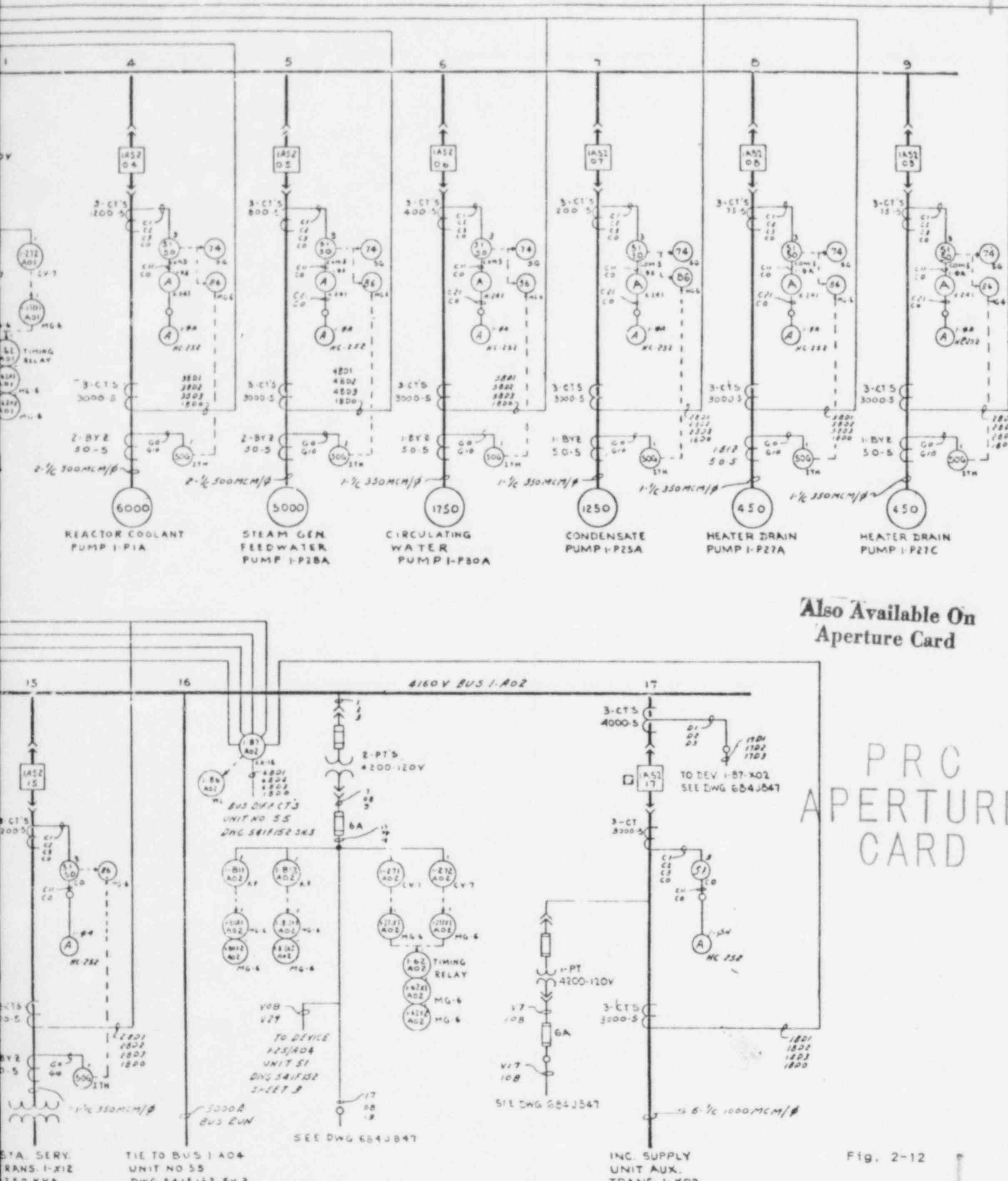


FIGURE 2-11

8311020097-08



4160V BUS 1-A0
1
2
3
3-CT'S 4000-5
1A52 01
TO DEV. 1-87-A02 SEE DWG. 684J847
3-CT 3000-5
3-CT'S 3000-5
6-1/C 1000MCM/Ø
INC. SUPPLY UNIT AUX. TRANS. 1-X02
1A52 02
3-CT'S 200-5
1-BYZ 50-5
1-1/C 350MCM/Ø
STA. SERV. TRANS. 1-X11 1750 KVA
3000 A BUS RUN
TIE TO BUS 1-A03 UNIT NO. 37 DWG 541F152 SH. 3
2-PT'S 4200-120
BUS DIFF CT'S UNIT NO. 37 DWG 541F152 SH 3
TO DEVICE 1-25/A03 UNIT 41 DWG 541F152 SHEET 3
SEE DWG 684J847
10
11
12
13
14
1A52 10
1A52 11
1A52 12
1A52 13
1A52 14
3-CT'S 75-5
3-CT'S 200-5
3-CT'S 400-5
3-CT'S 500-5
3-CT'S 1200-5
3-CT'S 3000-5
1-BYZ 50-5
1-BYZ 50-5
1-BYZ 50-5
2-BYZ 50-5
2-BYZ 50-5
1-1/C 350MCM/Ø
1-1/C 350MCM/Ø
1-1/C 250MCM/Ø
2-1/C 500MCM/Ø
2-1/C 500MCM/Ø
450
1250
1750
3000
6000
HEATER DRAIN PUMP 1-P27B
CONDENSATE PUMP 1-P25B
CIRCULATING WATER PUMP 1-P30B
STEAM GEN. FEEDWATER PUMP 1-P28B
REACTOR COOLANT PUMP 1-P1B



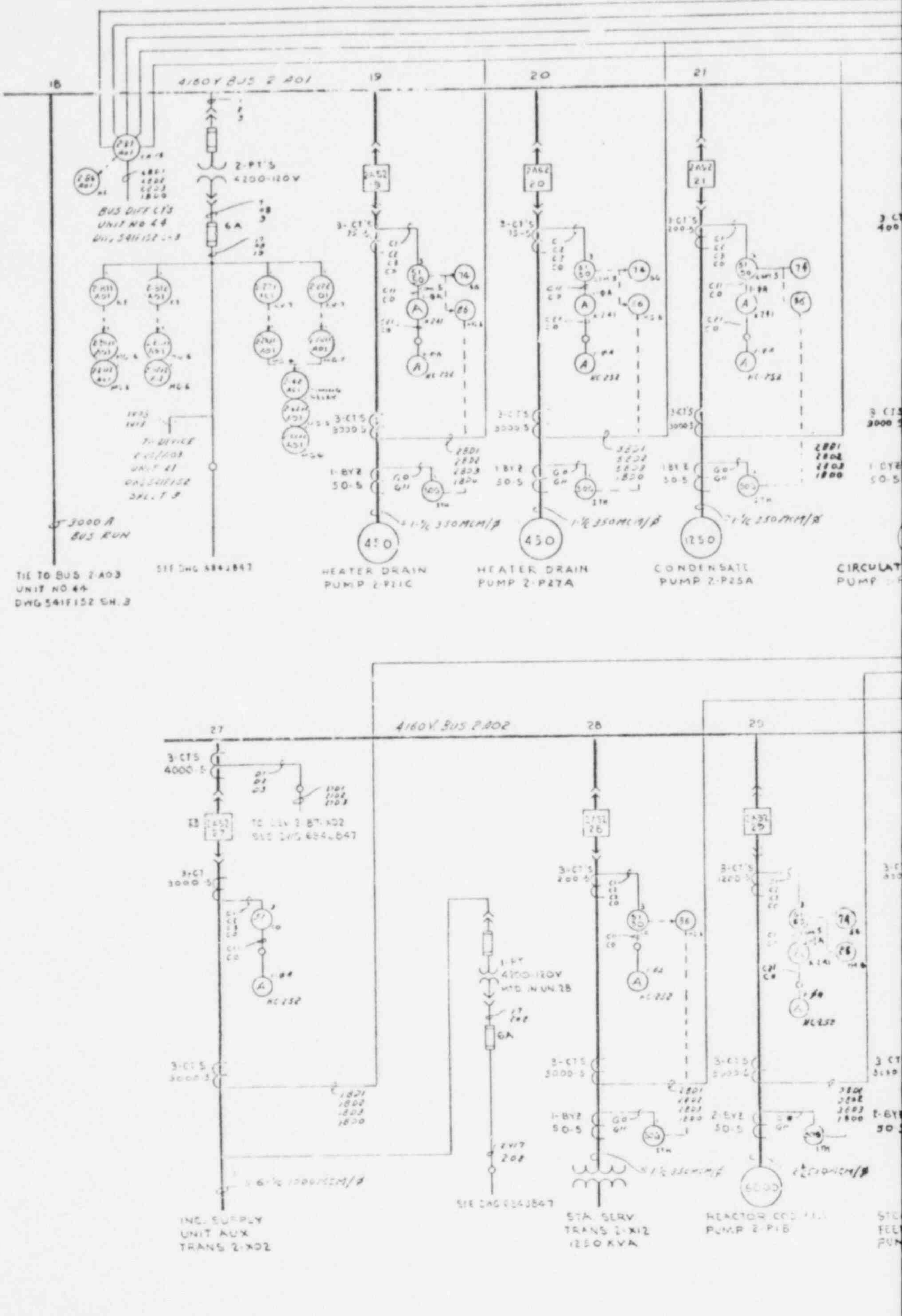
Also Available On Aperture Card

PRC APERTURE CARD

Fig. 2-12

4160 V ONE LINE DIAGRAM

8311020097-09



4160V BUS 2 A01
18
19
20
21
2-PT'S
4200-120V
6A
BUS DIFF CT'S
UNIT NO 44
3-CT'S
3000-5
1-BYZ
50-5
450
450
1250
HEATER DRAIN
PUMP 2-P21C
HEATER DRAIN
PUMP 2-P27A
CONDENSATE
PUMP 2-P25A
CIRCULAT
PUMP
5 3000 A
BUS RUN
TIE TO BUS 2-A03
UNIT NO.44
DWG 541F152 SH.3
SEE DWG 6842847
4160V BUS 2 A02
27
28
29
3-CTS
4000-5
TO DEV 2-87-X02
SEE DWG 6842847
3-CT
3000-5
1-PT
4200-120V
MTD. IN UN 28
6A
SEE DWG 6842847
STA. SERV
TRANS 2-X12
1250 KVA
6000
REACTOR COOLANT
PUMP 2-P1B
INC. SUPPLY
UNIT AUX
TRANS 2-X02

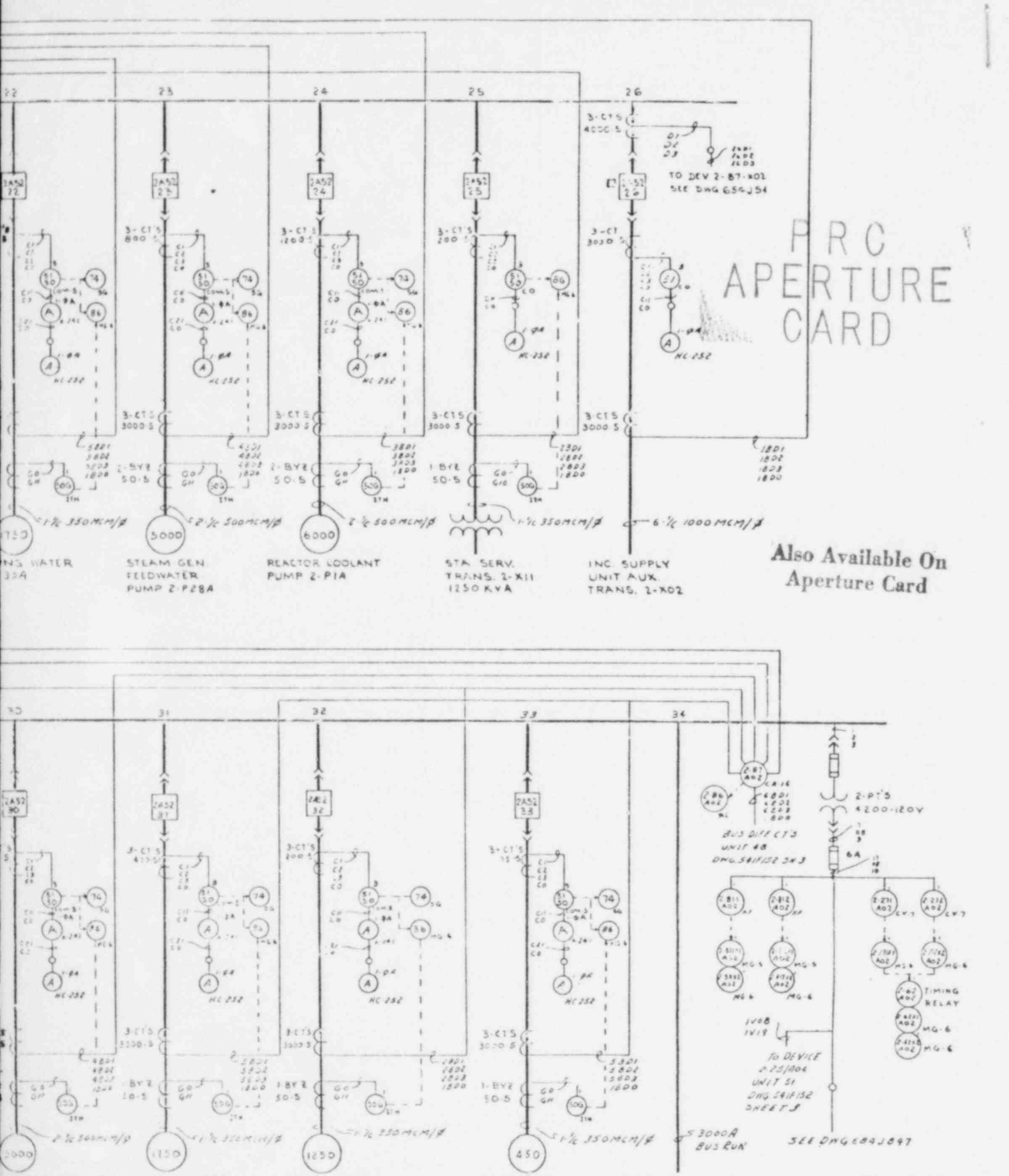


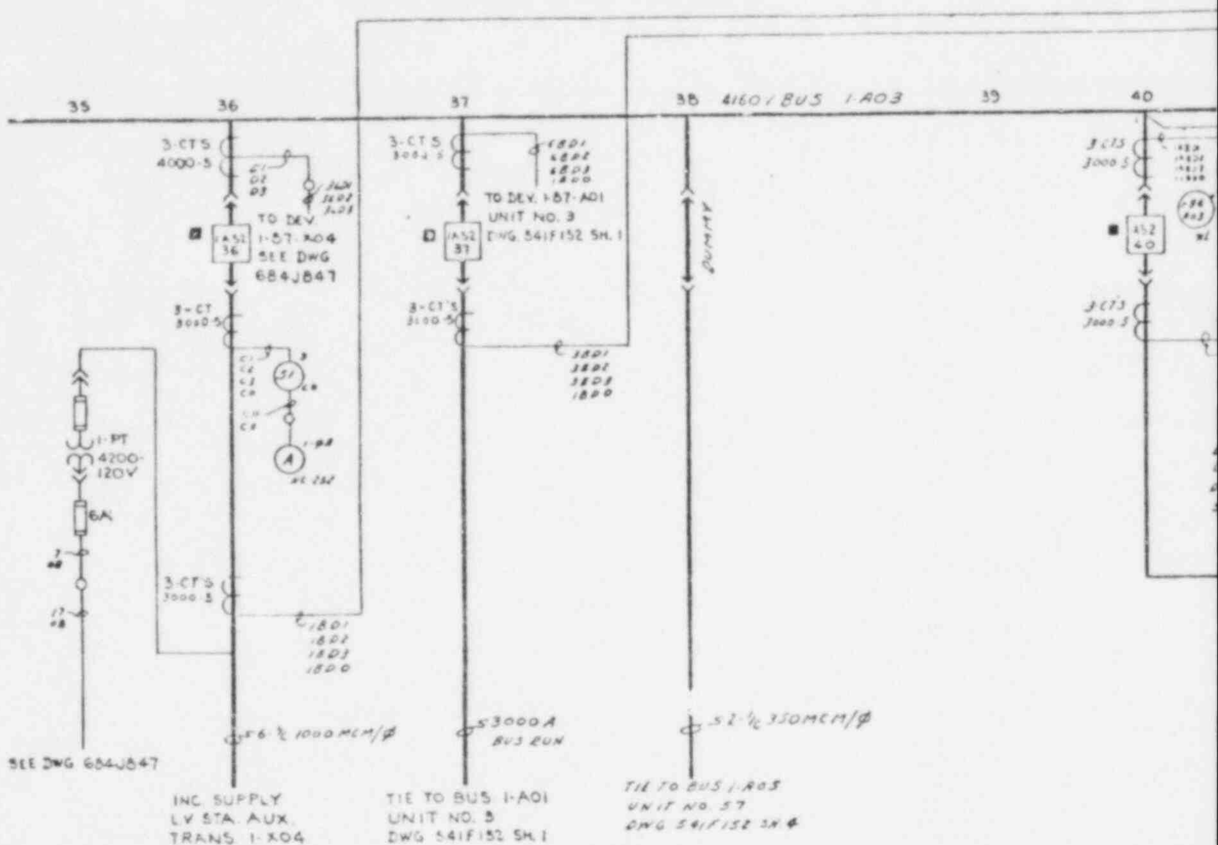
Fig. 2-13

4160 V ONE LINE DIAGRAM

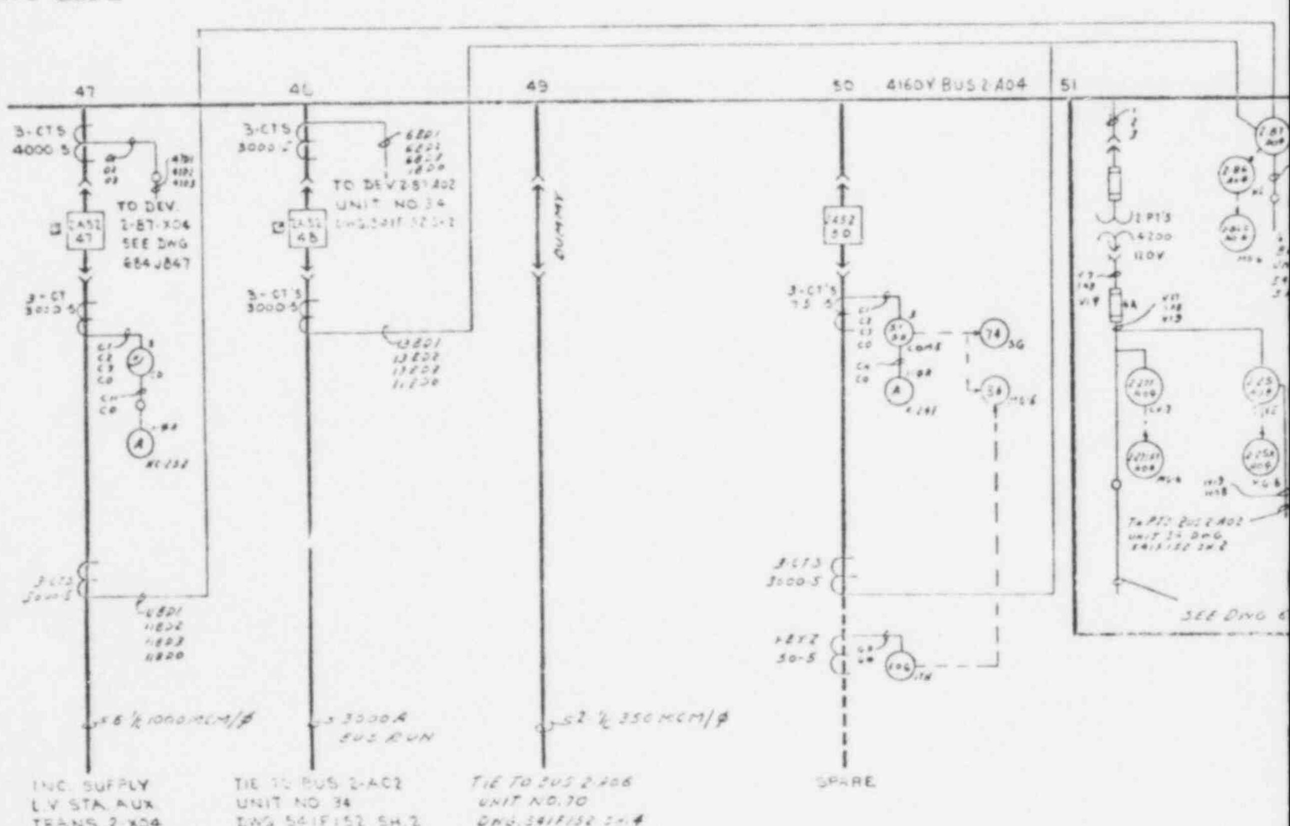
PRC APERTURE CARD

Also Available On Aperture Card

8311020097-10



Also Available On
Aperture Card



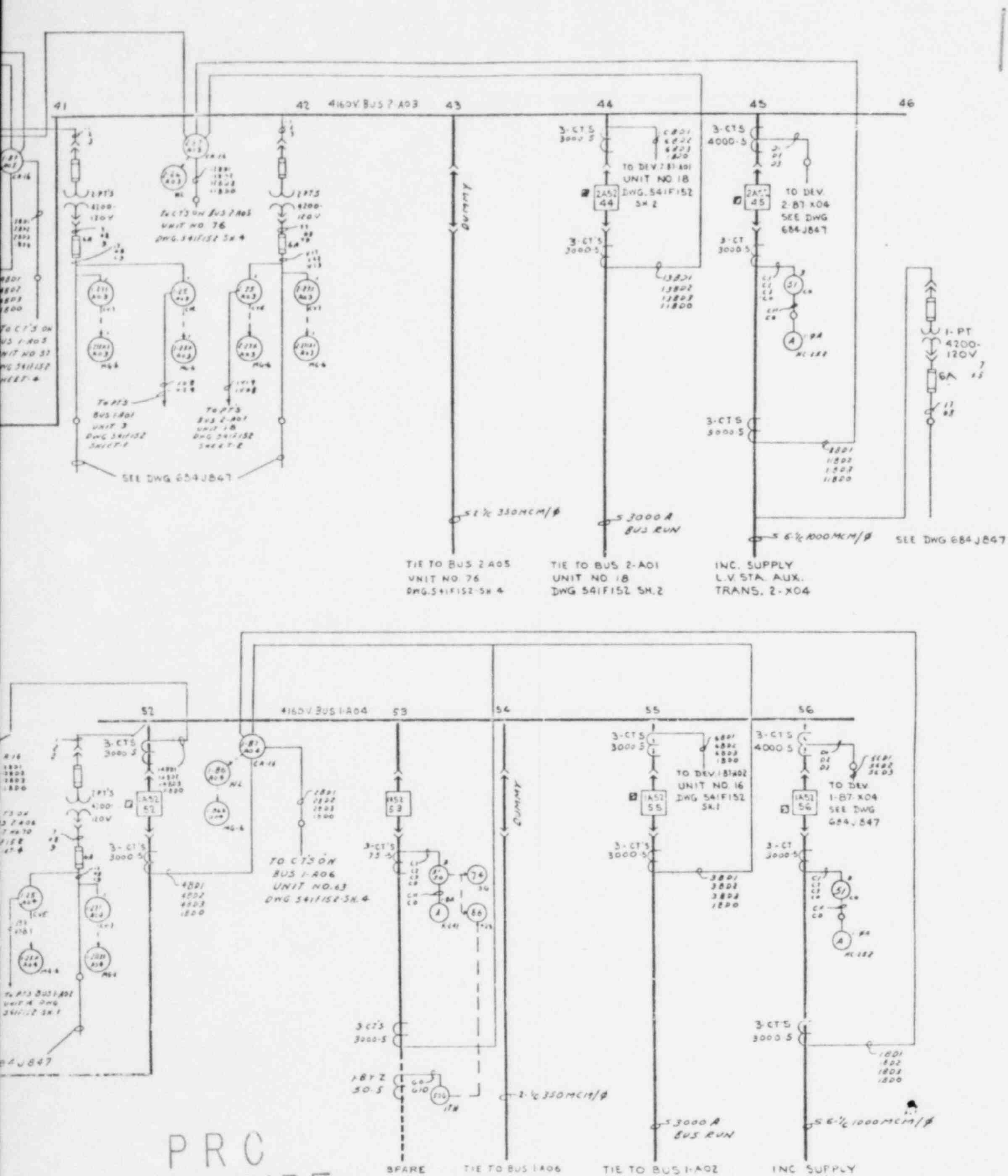


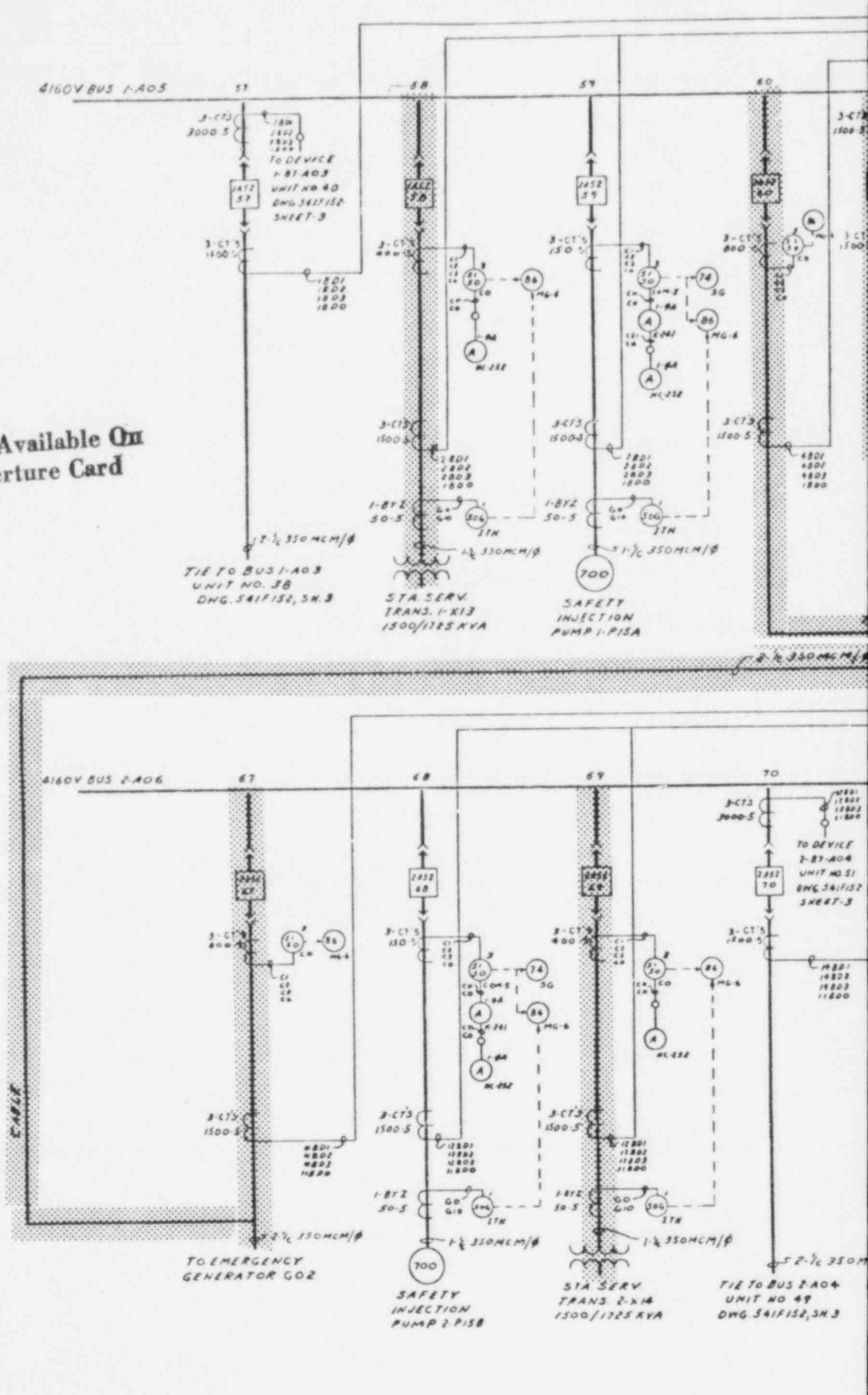
Fig. 2-14

4160 V ONE LINE DIAGRAM

PRC
APERTURE
CARD

8311020097-11

Also Available On
Aperture Card



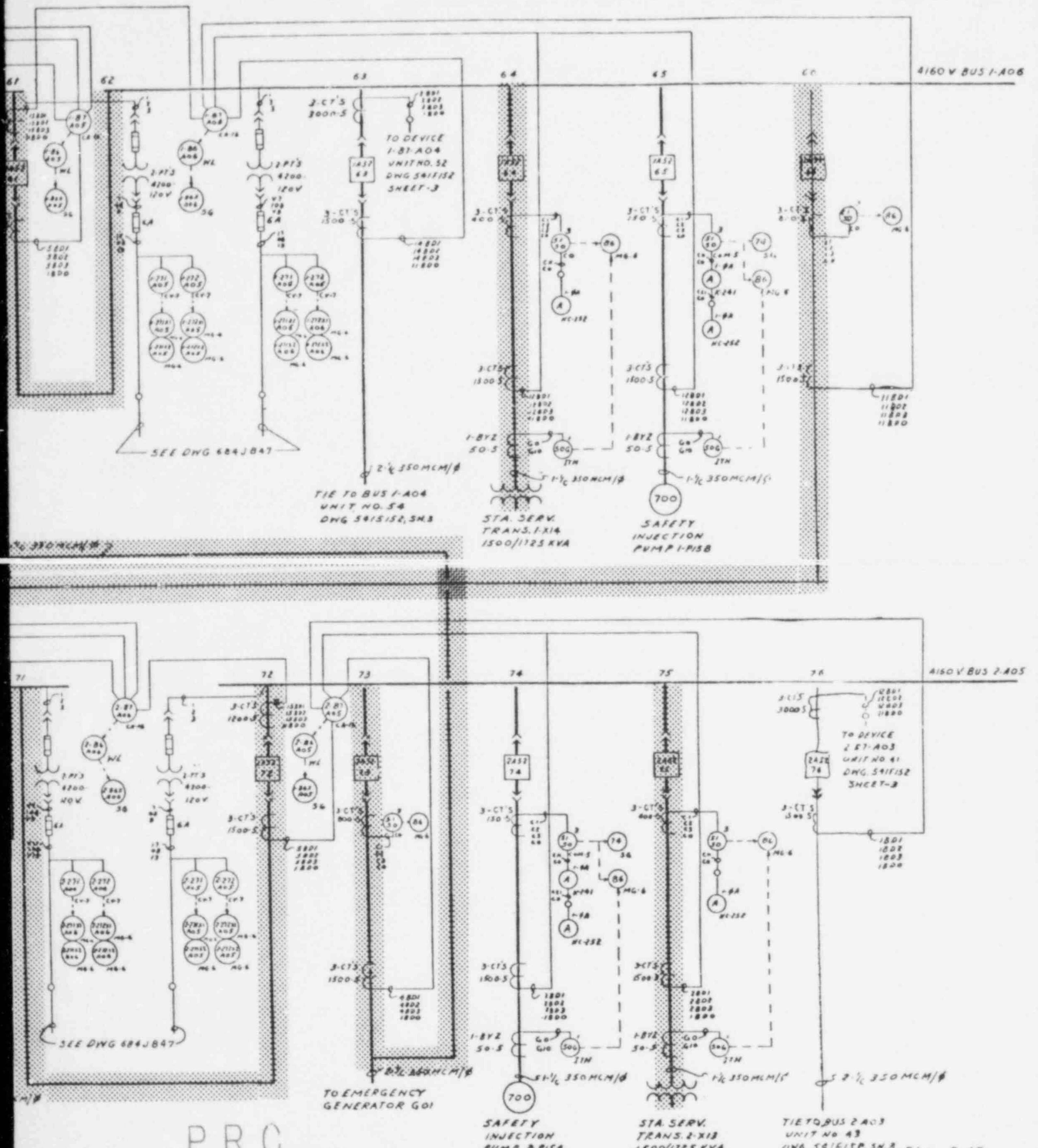


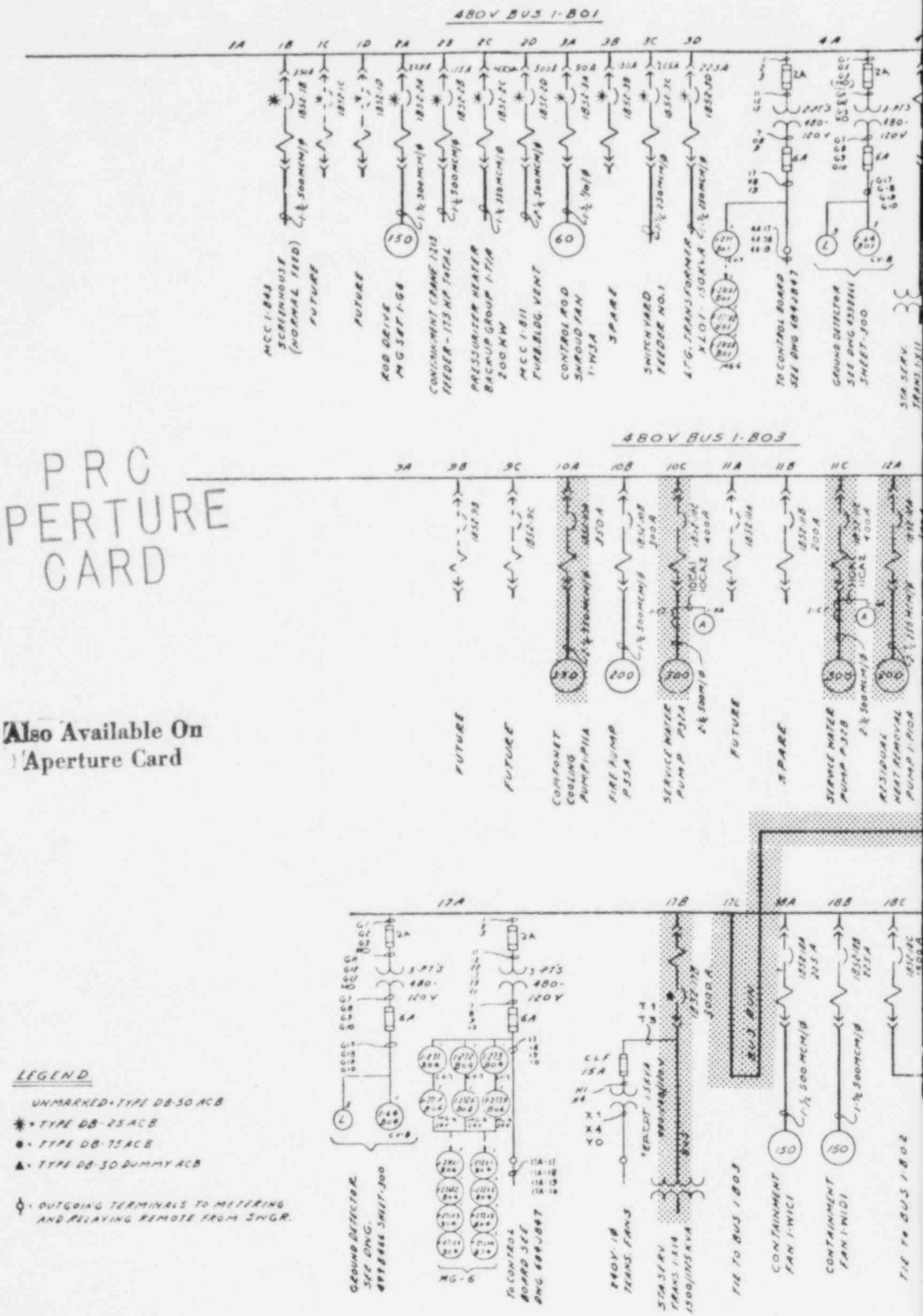
Fig. 2-15

4160 V ONE LINE DIAGRAM

PRC
APERTURE
CARD

PRC
APERTURE
CARD

Also Available On
Aperture Card



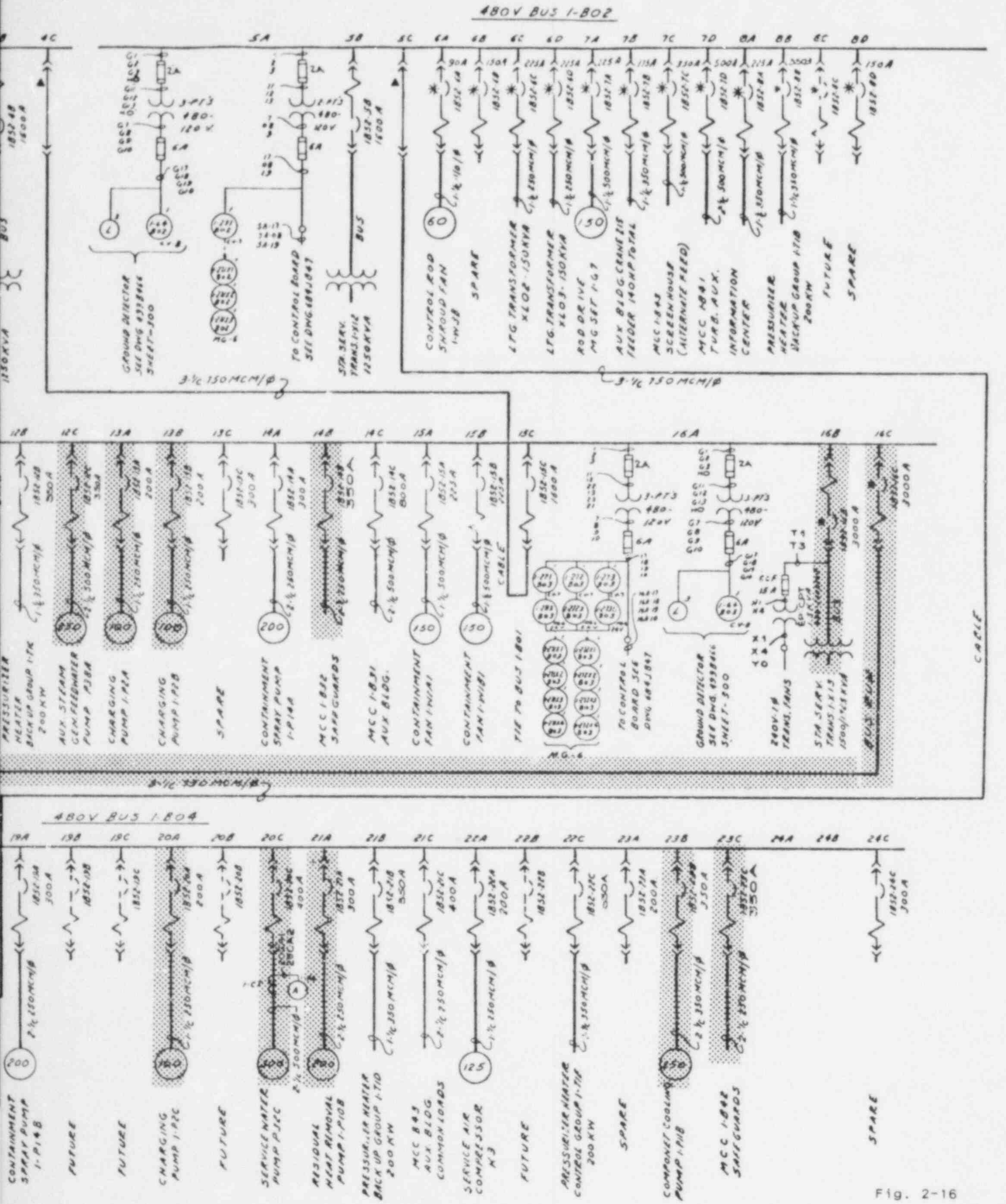


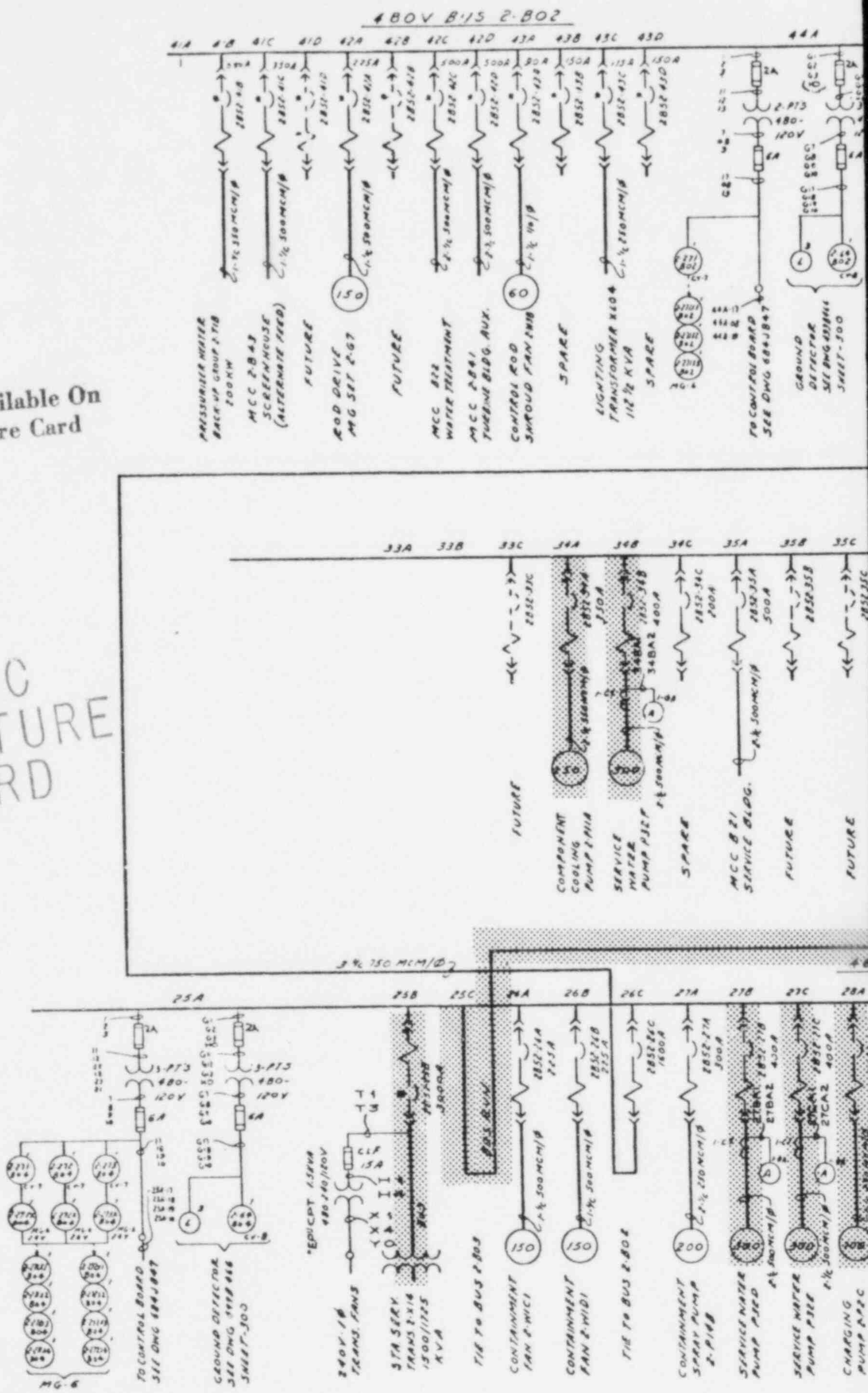
Fig. 2-16

480 V ONE LINE DIAGRAM

8311020097-13

Also Available On
Aperture Card

PRC
APERTURE
CARD



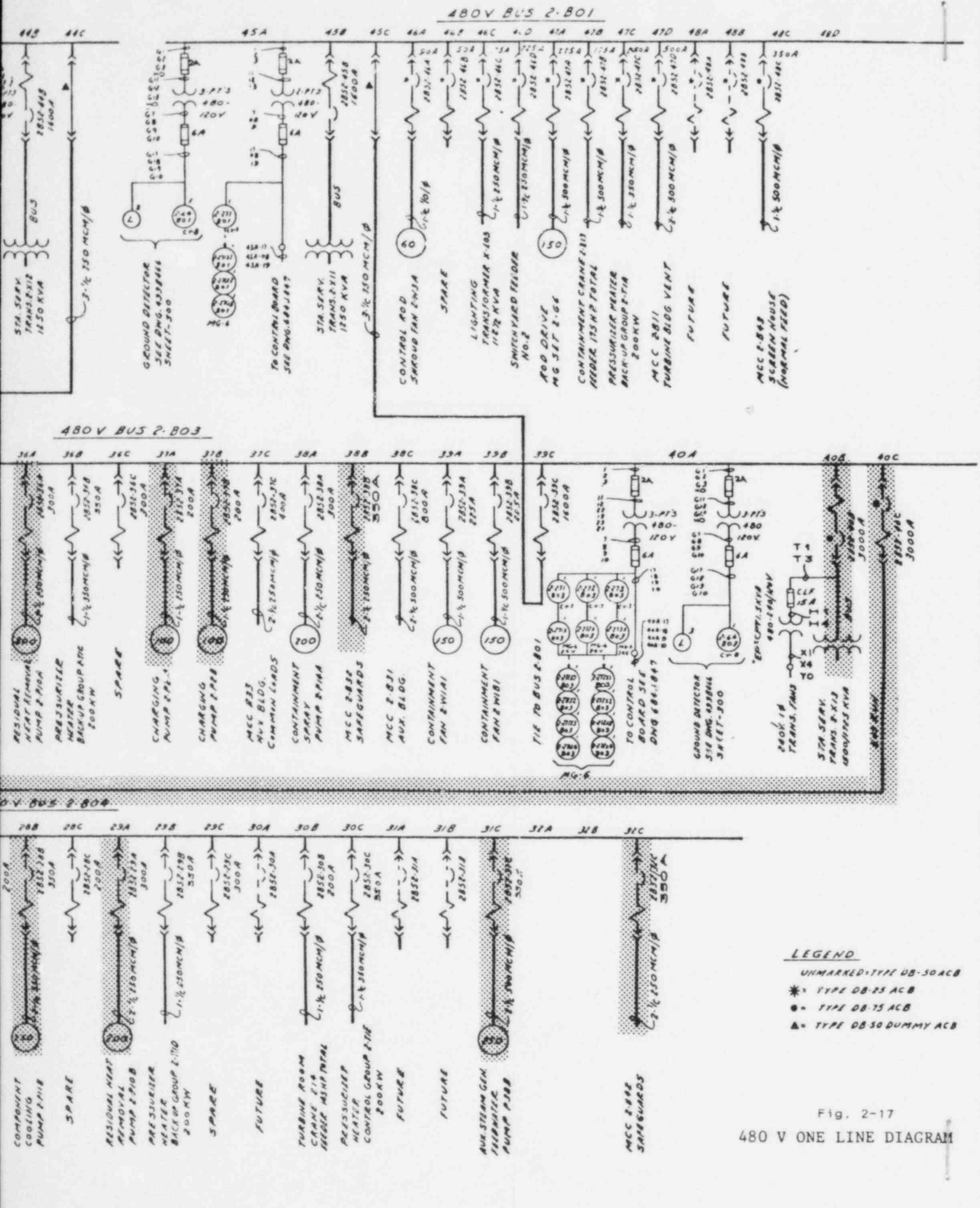
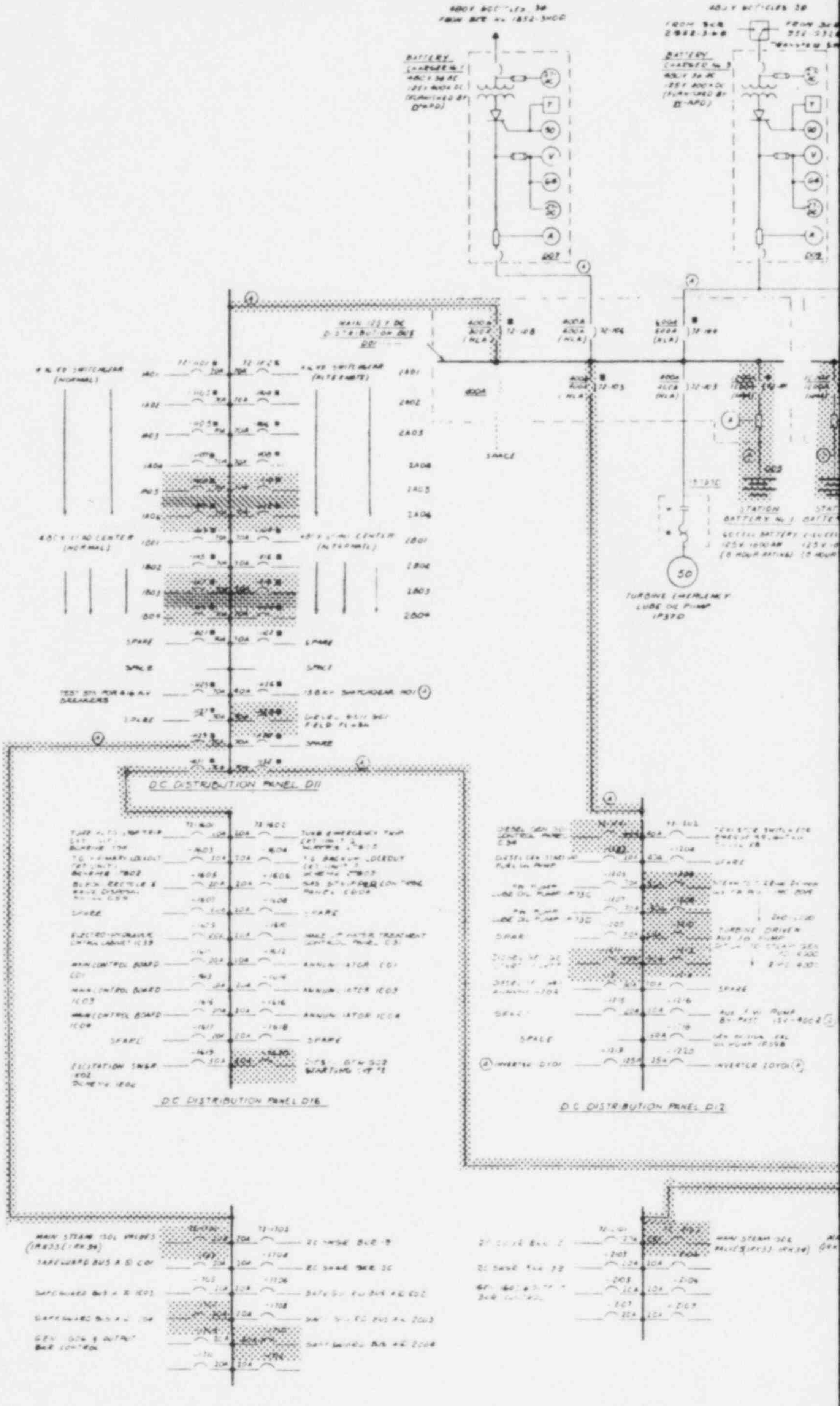


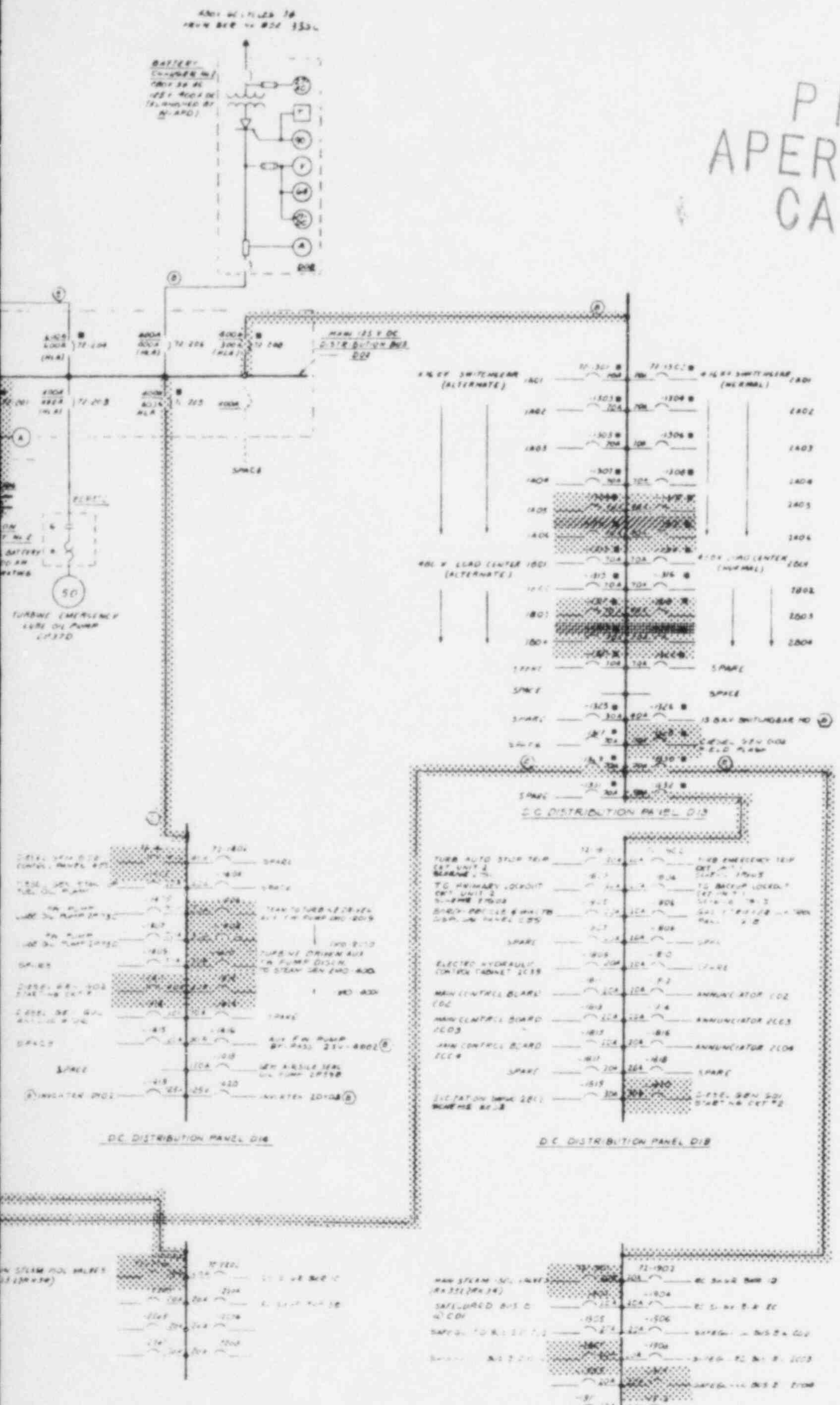
Fig. 2-17
480 V ONE LINE DIAGRAM

8311020097-14



D.C. DISTRIBUTION PANEL D11
D.C. DISTRIBUTION PANEL D16
D.C. DISTRIBUTION PANEL D12
D.C. DISTRIBUTION PANEL D17
D.C. DISTRIBUTION PANEL D21
TURBINE EMERGENCY LUBE OIL PUMP
STATION BATTERY
SPARE

PRC
APERTURE
CARD



Also Available On
Aperture Card

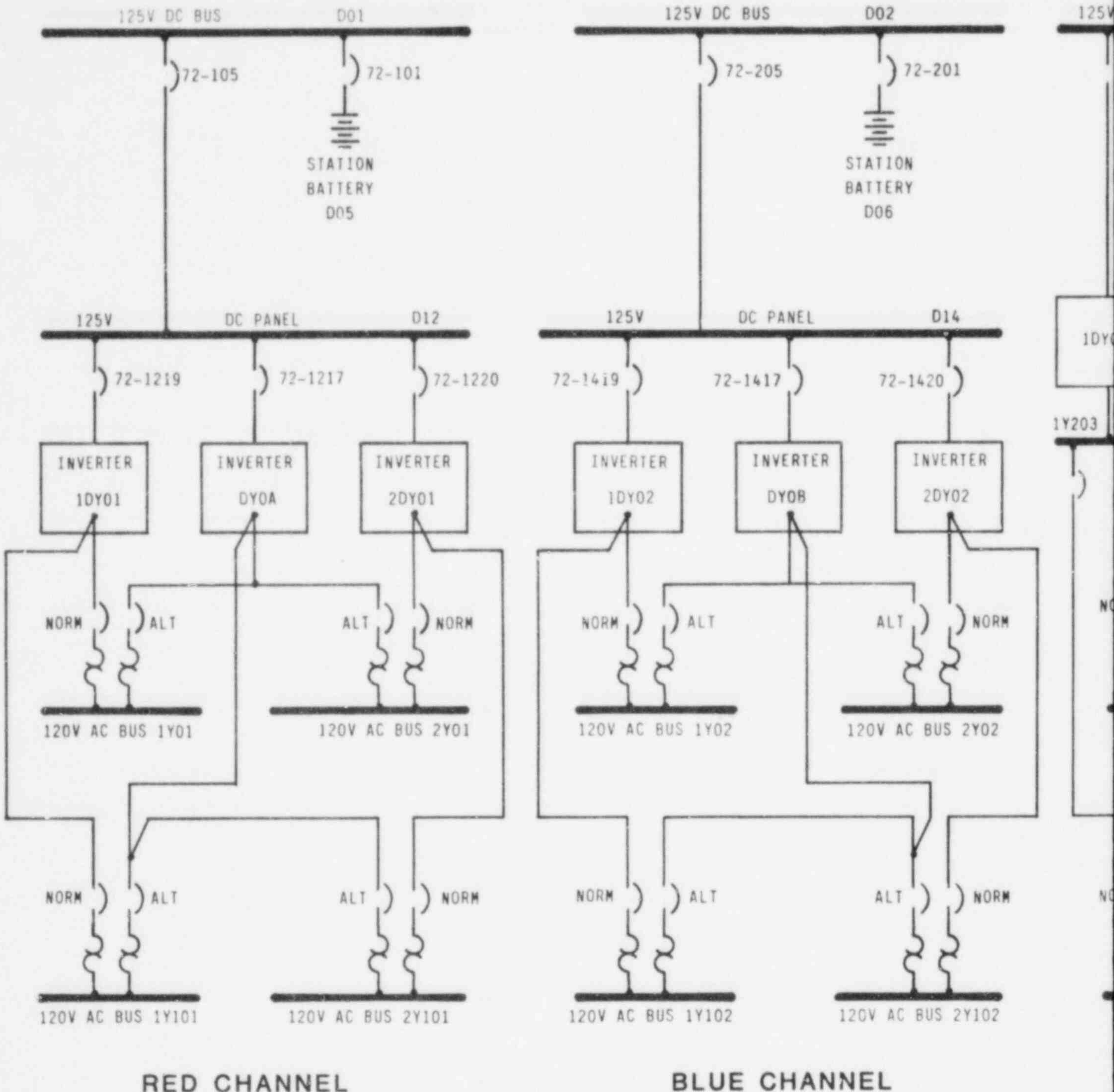
NOTES

REFERENCE DRAWING

Fig. 2-18

125 V D.C. ONE LINE DIAGRAM

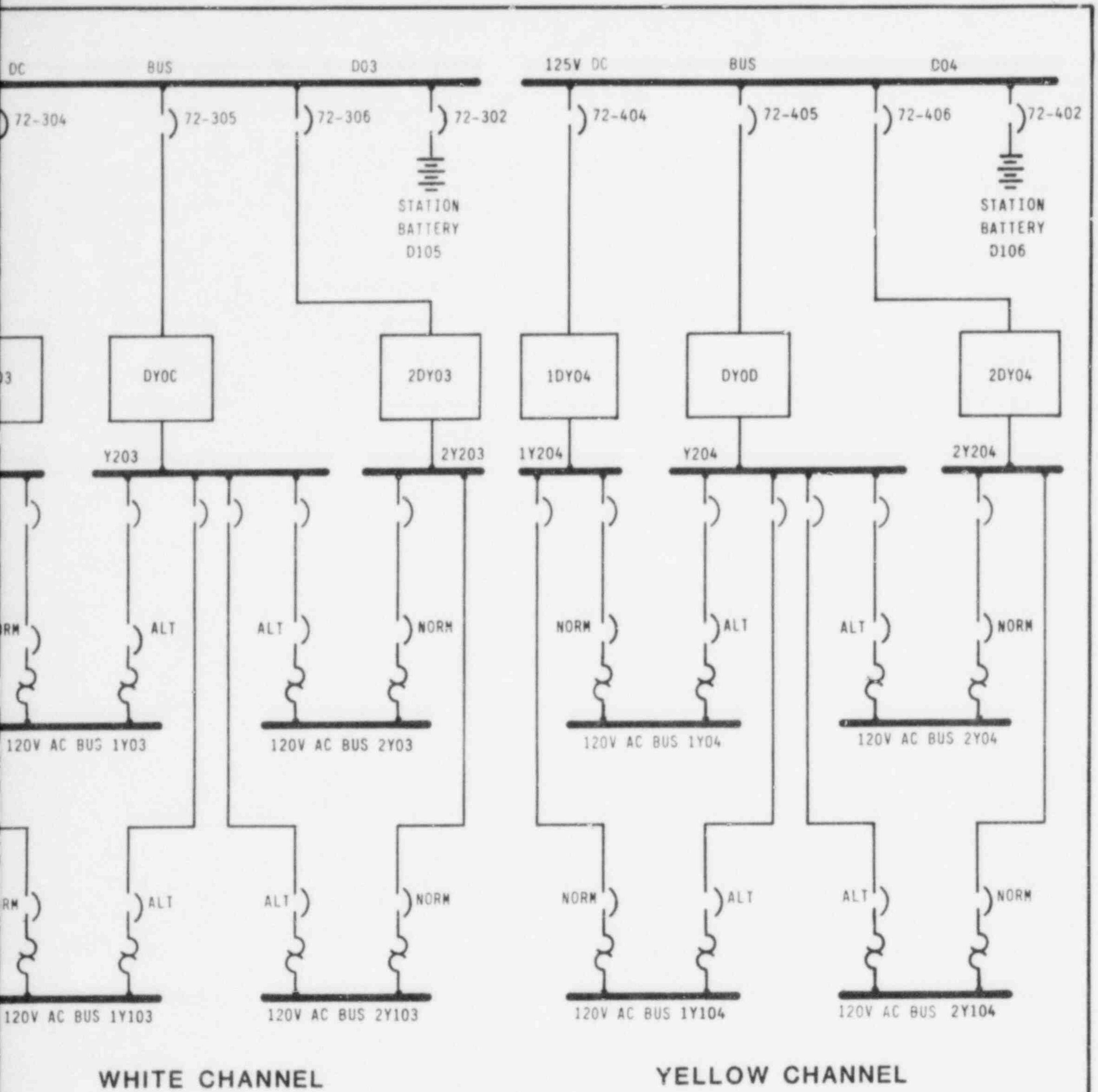
8311020097-15



Also Available On
Aperture Card

REFERENCE DWG. STONE & WEBSTER 13754-EW-A-2

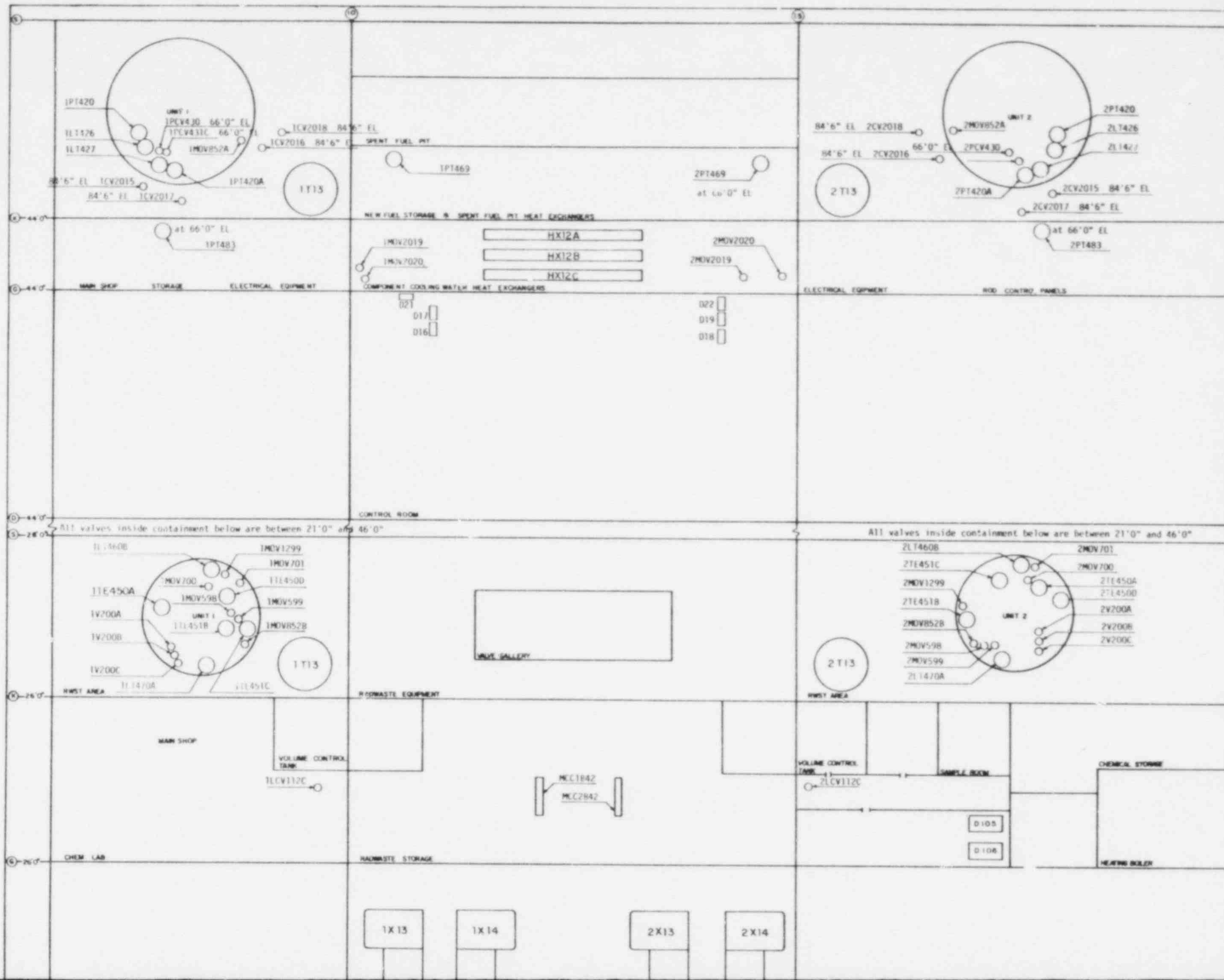
P025



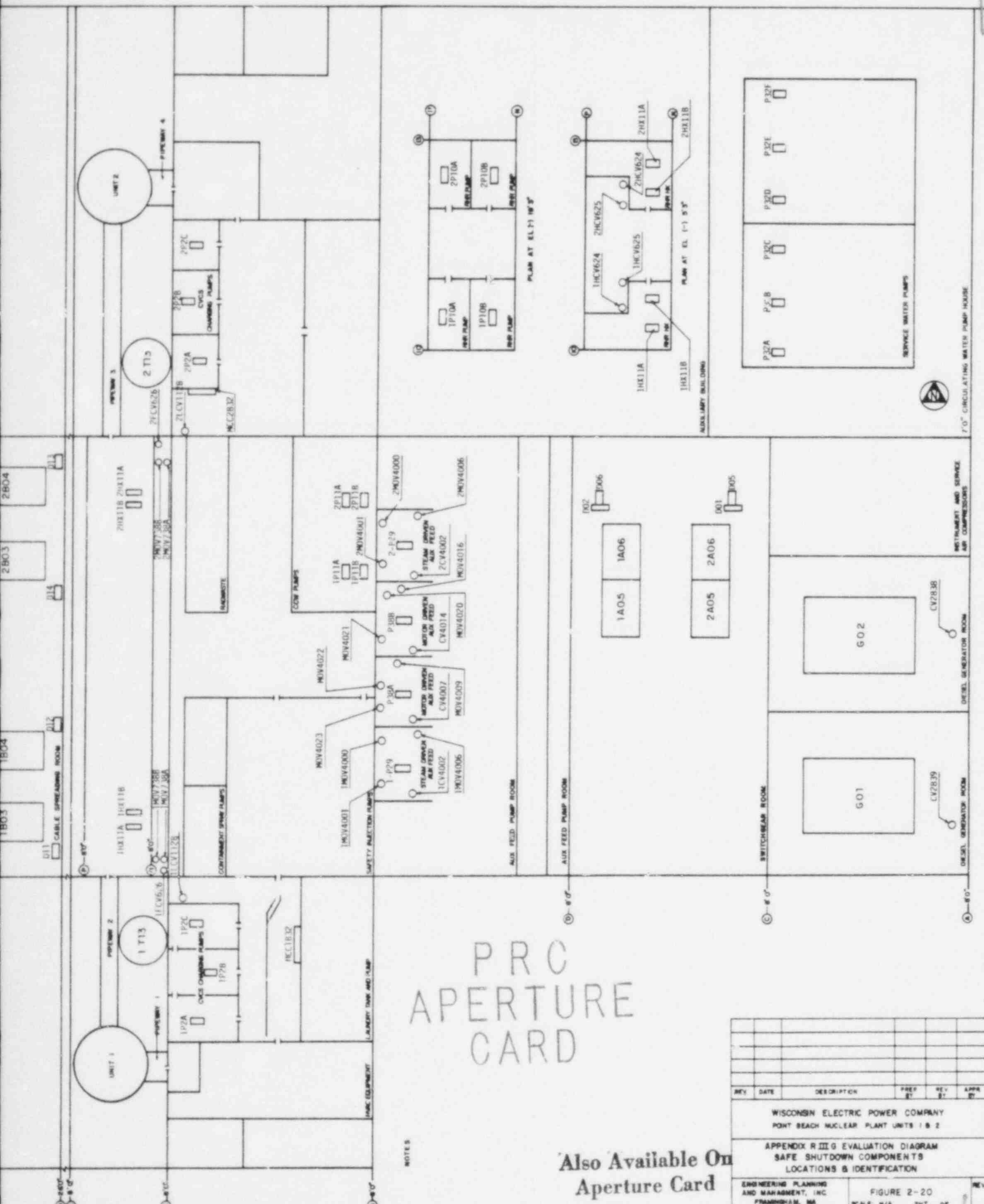
PRC
APERTURE
CARD

FIG. 2-19

INSTRUMENT BUS ONE LINE DIAGRAM



UNIT 1
1PT420
1LT426
1LT427
1PCV430 66'0" EL
1TCV431C 66'0" EL
1MOV852A
1PT420A
84'6" EL 1CV2015
84'6" EL 1CV2017
1CV2018 84'6" EL
1CV2016 84'6" EL
1T13
at 66'0" EL
1PT483
SPENT FUEL PIT
1PT469
2PT469
at 66'0" EL
NEW FUEL STORAGE & SPENT FUEL PIT HEAT EXCHANGERS
HX12A
HX12B
HX12C
1MOV2019
1MOV2020
2MOV2020
2MOV2019
COMPONENT COOLING WATER HEAT EXCHANGERS
D21
D17
D16
D22
D19
D18
MAIN SHOP
STORAGE
ELECTRICAL EQUIPMENT
ROD CONTROL PANELS
UNIT 2
2PT420
2LT426
2LT427
2MOV852A
2PCV430
2PT420A
84'6" EL 2CV2018
84'6" EL 2CV2016 66'0" EL
2CV2015 84'6" EL
2CV2017 84'6" EL
2T13
at 66'0" EL
2PT483
CONTROL ROOM
All valves inside containment below are between 21'0" and 46'0"
1LT460B
1MOV1299
1MOV701
1MOV700
1TE450D
1TE450A
1MOV598
1MOV599
1V200A
1TE451B
1MOV852B
1V200B
1V200C
1LT470A
1TE451C
1T13
All valves inside containment below are between 21'0" and 46'0"
2LT460B
2MOV701
2TE451C
2MOV700
2MOV1299
2TE450A
2TE450D
2TE451B
2V200A
2MOV852B
2V200B
2V200C
2MOV598
2MOV599
2LT470A
2T13
VALVE GALLERY
RWST AREA
RADWASTE EQUIPMENT
MAIN SHOP
VOLUME CONTROL TANK
1LCV112C
MCC1842
MCC2842
2LCV112C
SAMPLE ROOM
CHEMICAL STORAGE
D105
D106
CHEM LAB
RADWASTE STORAGE
HEATING BOILER
1X13
1X14
2X13
2X14



PRC APERTURE CARD

REV	DATE	DESCRIPTION	PREP BY	REV BY	APPR BY

WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT UNITS 1 & 2

APPENDIX R III G EVALUATION DIAGRAM
SAFE SHUTDOWN COMPONENTS
LOCATIONS & IDENTIFICATION

ENGINEERING PLANNING AND MANAGEMENT, INC FRAMINGHAM, MA

FIGURE 2-20

SCALE N/A SHT OF

REV.

Also Available On Aperture Card

8311020097-17

SECTION THREE

SAFE SHUTDOWN COMPONENT CIRCUIT ANALYSIS

3. SAFE SHUTDOWN COMPONENT CIRCUIT ANALYSIS

3.1 Identification of Safe Shutdown Circuits and Cables

The minimum component list developed during the Point Beach safe shutdown system analysis (see subsection 2.5) was the basic input for the identification of electrical circuits essential to ensure adequate equipment performance. All the electrically dependent devices in Table 2-1 were used to identify the corresponding safe shutdown electrical circuits. Components which cannot spuriously operate and components which can be manually operated and not spuriously operate were not considered electrically dependent. The circuits identified included power (4160V ac, 480V ac, and 125V dc), control (120V ac and 125V dc) and instrumentation.

The identification and analysis of the above essential electrical circuits were based on one-line diagrams, elementary circuit drawings, and cable block diagrams. From these documents all the necessary circuit cables were selected for the later phase of cable routing and separation analysis.

For each electrical circuit, all cables necessary to ensure operability of each electrically dependent component were identified as required for safe shutdown. The exceptions to the above criteria included only annunciator, computer, motor stator heater and external monitoring circuits that are electrically isolated from the electrical circuits of concern.

The Point Beach conduit and cable raceway schedules were then used to identify the individual cable physical routings. For each safe shutdown system, a package was also developed which contained the following information:

(1) Safe shutdown components, and

(2) Cable and raceway lists with cable routing information.

3.1.1 Appendix R Section III.G. Evaluation Diagrams and Separation Analysis

In order to develop an alternative shutdown approach, Appendix R Section III.G Evaluation Diagrams were developed. An example is presented in Figure 3-1 along with a detailed explanation of the data represented.

First, the component is located in its proper fire area. This is determined by noting the area elevation stated along the left side of a full-sized evaluation diagram and the corresponding building heading.

The power and control cables to this device are then identified by referring to the appropriate single-line diagram and cable block diagram respectively. Excerpts from these documents are presented at the bottom of Figure 3-1.

Safe shutdown cables are then located in the cable and circuit schedule to determine the cable route. With the route identified, the cable is located on the appropriate raceway drawings.

With the physical route now determined, this cable is presented on the evaluation diagram to show those fire areas through which the cable passes.

For Point Beach, these diagrams were prepared for the following safe shutdown systems:

(1) Auxiliary Feed Water (AFW)

(2) Chemical and Volume Control (CVCS)

(3) Main Steam (MS)

(4) Service Water (SW)

(5) Residual Heat Removal (RHR)

(6) Component Cooling Water (CCW)

(7) Reactor Coolant System Process Monitoring System (PMS)

(8) Emergency Power Systems (EPS)

These Evaluation Diagrams provide the following Point Beach information for both units:

(1) Major plant fire areas by plant elevation. These areas are not represented to scale nor do they necessarily correspond to contiguous rooms;

(2) Equipment location and identification (including major components and electrical distribution and control panels);

(3) Essential power and control cables interconnecting various system components and their location within fire areas.

The information contained in the Evaluation Diagrams facilitates:

(1) An area-by-area evaluation of postulated fire effects on safe shutdown systems and a determination of areas for which redundant safe shutdown methods are separated by rated fire barriers;

(2) A determination of which area(s) and system(s) are indicated for an alternative shutdown approach, the required modifications, and the location for alternate control station(s);

(3) A graphic demonstration of which essential cables for alternative shutdown are to be isolated from the fire area(s) of concern;

(4) A graphic representation of the independence of the selected equipment and cables (of the alternative shutdown method[s]) from the fire area(s) of concern;

(5) A determination by fire area of potential associated circuits and the resolution selected.

Using the Evaluation Diagrams, a fire separation evaluation of fire area of concern was completed.

3.2 Associated Circuits of Concern

3.2.1 Introduction

The separation and protection requirements of 10 CFR 50, Appendix R apply not only to safe shutdown circuits but also to "associated" circuits that could prevent operation or cause maloperation of shutdown systems and equipment. The identification of these associated circuits of concern was performed for Point Beach in accordance with NRC Generic Letter 81-12 and the Staff's Clarification to Generic Letter 81-12. The latter document further defined these "associated circuits of concern" as those which have a physical separation less than that required by Section III.G.2 of Appendix R, and have one of the following:

(1) A common power source with the shutdown equipment and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices;

(2) A connection to circuits of equipment whose spurious operation would adversely affect the shutdown capability;

(3) A common enclosure with the shutdown cables, and
   (a) are not electrically protected by circuit breakers, fuses or similar devices (Type 1), or

   (b) will allow propagation of the fire into the common enclosure (Type 2).

3.2.2 Identification of Associated Circuits by Common Power Supply and Common Enclosures

The electrical distribution system was reviewed to assure that acceptable coordination and selective tripping is provided for all circuits on the ac and dc Emergency Power System. The review was limited to the Emergency Power System since there is no equipment powered from the balance of plant distribution systems which is required for, or whose loss of power could prevent, safe shutdown.

The Emergency Power System consists of:

(1) 4160V ac switchgear and emergency diesel generators

(2) 480V ac load centers and motor control centers

(3) 120V ac distribution buses

(4) 125 dc distribution buses and emergency batteries.

Electrical circuit fault protection was originally designed to provi?e protection for plant electric circuits via protective relaying, circuit breakers, and fuses. This protective equipment was designed and applied to ensure adequate protection of all electrical distribution equipment from electric fault and overload conditions in the circuits.

An integral part of the original electrical system protection was the proper coordination of all these devices. Such coordination assures that the protective device nearest to the fault operates prior to the operation of any "upstream" devices, and provides interruption of electrical service to a minimum amount of equipment.

These design practices provided confidence that no associated circuits of concern by common power supply or by common enclosure (Type 1) exist at Point Beach. As an additional check, a review of certain safe shutdown power supplies was conducted for the 1982 Safe Shutdown analysis of the existing electrical protection and coordination at Point Beach. As expected, the circuit protective devices reviewed had been properly selected and were coordinated.

For associated circuits of concern by common enclosure Type 2, the design of the fire protection features at Point Beach ensures that no such circuits exist. Associated circuits by

common enclosure of this type that may appear as intervening combustibles are not a concern since one or both of the following criteria apply:

(1) Fire stops are (or will be) placed between safe shutdown raceways where a fire could propagate and damage redundant divisions;

(2) Electrical penetrations for safe shutdown raceways are (or will be) fire sealed at their wall penetrations with fire stops equivalent to those required for the wall.

3.2.3 Circuits Causing Spurious Operation

Cables that are not part of safe shutdown circuits may be damaged by the effects of postulated fires. The cable damage may consequently prevent the correct operation of safe shutdown components, or result in the maloperation of equipment which would directly prevent the proper performance of the safe shutdown systems.

The effects of spurious operations may be conceptually divided into two classes as follows:

(1) Maloperation of safe shutdown equipment due to control circuit electrical interlocks between safe shutdown circuits and other circuits; and

(2) Maloperation of equipment which is not defined as part of the safe shutdown systems, but which could prevent the accomplishment of a shutdown safety function; for example, inadvertent depressurization of the Reactor Coolant System by spurious opening of boundary valves.

Cables to equipment whose spurious operation would adversely affect shutdown capability were considered in this analysis to be safe shutdown cables and not associated cables, such that both operational and nonoperational requirements were considered. The separation of associated circuits in this category then was handled in a manner identical to those circuits required for system function.

Associated circuits involving high-low pressure interfaces were handled as a separate study. Each high-low pressure interface was defined as a separate safe shutdown function, and redundant components were identified which can provide a high-low pressure barrier.

For the high-low pressure interface Appendix R analysis, the following solutions are considered:

(1) A detailed circuit review to demonstrate that fire-induced spurious actuation is not credible; or

(2) A detailed circuits review to determine that fire-induced spurious actuation occurrences are credible, but circuit modification can be proposed to prevent a fire-induced failure; or

(3) Redundant components provide the high-low pressure barrier function and III.G.2 separation is maintained at all times; or

(4) Passive barriers or cable reroutes can be accomplished to provide III.G.2 separation for redundant high-low pressure components; or

(5) Pre-fire actions can be taken, such as racking out circuit breakers, to prevent fire-induced spurious operation of a high-low pressure interface component (based on the electrical failure mechanisms assumed for the analysis).

The analysis methodology presented above resulted in a list of potential spurious operation candidates for which a resolution was required to protect safe shutdown capability.

The results of these analyses were tabulated and resolution was achieved by:

(1) Providing a means to isolate the equipment when not normally needed (i.e., remove power cables, open circuit breakers), or

(2) Providing a means to detect spurious operations and then undertaking procedures to defeat the maloperation of equipment (i.e., opening of breakers to remove spurious operation, actuation of a master switch, etc.).

For these potential spurious circuits or components, the resolutions are shown in Table 3-1 and, to the extent necessary, will be incorporated into operating procedures.

TABLE 3-1: POINT BEACH NUCLEAR PLANT

POTENTIAL SPURIOUS MALFUNCTIONS THAT COULD AFFECT SAFE SHUTDOWN

POTENTIAL SPURIOUS COMPONENTS	SYSTEM	EFFECT OF MALFUNCTION	RESOLUTION
1-MOV-2019 2-MOV-2019	MRSS	Spurious closing of this valve would result in loss of steam supply to turbine-driven auxiliary feed water pump.	Manual operation of the valve to the open position after de-energizing dc power to the valve.
1-MOV-2020 2-MOV-2020	MRSS	Spurious opening of this valve would result in steam being supplied to turbine-driven AFW pumps from both steam generators. Indication is provided for the "B" steam generator to ensure stable hot shutdown conditions, feed flow and motive steam is associated with one steam generator.	Manual operation of the valve to the closed position after de-energizing dc power to the valve.
1-CV-2015 1-CV-2016 2-CV-2015 2-CV-2016	MRSS	Spurious opening of the main steam atmospheric dump valves (as a result of fire-induced control circuit failures) will result in uncontrolled cooldown.	Isolation by placing the auto/manual controller in manual at the Control Room and securing instrument air to the valves (air--operated atomospheric dump valves fail closed with loss of air or loss of current signal).
1-CV-2017 2-CV-2017 1-CV-2018 2-CV-2018	MRSS	Spurious opening of the main steam isolation valves would result in loss of secondary system inventory.	Manual isolation of instrument air to the valves. Air operated valves will fail closed on loss of air signal.
1,2-V200A 1,2-V200B 1,2-V200C	CVCS	Spurious opening of these valves would result in loss of primary coolant system inventory.	Disconnecting dc power or cutting off instrument air to these valves would ensure that valves remain closed.
1-MOV-1299 2-MOV-1299	CVCS	Spurious opening of this valve will result in continual bleed of reactor coolant from the RCS by the excess letdown lines.	A proposed fire safe modification will be provided for this valve, to ensure its continuous closure in the event of spurious operation.
1-V-296 2-V-296	CVCS	This valve functions as both isolation and relief valve so that any operation of the charging pumps could cause possible cold feed to the pressurizer aux. spray system, thus causing premature cooling of the pressurizer during shutdown.	Operator closure of manual valve 1-V384A and 2-V384A.

TABLE 3-1 (continued) POINT BEACH NUCLEAR PLANT

POTENTIAL SPURIOUS MALFUNCTIONS THAT COULD AFFECT SAFE SHUTDOWN

POTENTIAL SPURIOUS COMPONENTS	SYSTEM	EFFECT OF MALFUNCTION	RESOLUTION
1-MOV-851A 1-MOV-851B 2-MOV-851A 2-MOV-851B	SIS	Potential spurious opening of this valve when the RHR system is operating, drawing suction from the RWST, will result in drain down and loss of coolant to the containment sump.	Upon indication of spurious opening of RHR pump suction to the containment sump, operator immediately closes both sump suction valves, either from the Control Room, or by local manual valve operation.
1-MOV-700 1-MOV-701 2-MOV-700 2-MOV-701	RHR	Spurious opening of both RHR/RCS boundary isolation valves when not in shutdown cooling mode will result in breach of the RCS boundary.	Breaker for either 1-MOV-700 (2-MOV-700) or 1-MOV-701 (2-MOV-701) will be opened and tagged open during normal (pre-fire) operation, with valve closed.
1-PCV-430 1-PCV-431C 2-PCV-430 2-PCV-431C	RCS	Spurious opening of the pressurizer PORVs will result in uncontrolled cooldown of the pressurizer and loss of reactor primary coolant; that is in an RCS boundary breach.	Isolation by and closure of respective block valves; or by manual opening of the dc power to the air-controlling solenoid valves, or by cutting off air, and venting air lines to the PORVs (Air-operated PORVs fail closed with loss of power or loss of air).
1,2-RC 570A 1,2-RC 570B 1,2-RC 580A 1,2-RC 580B 1,2-RC 575A 1,2-RC 575B	RCS	Spurious opening of these Reactor Vessel head and pressurizer solenoid operated vent valves would result in loss of coolant system inventory.	Disconnecting D.C. Power or positioning breakers for these valves open during normal (pre-fire) operation would ensure valves remain closed.
1-MOV-598 1-MOV-599 2-MOV-598 2-MOV-599	RCS	Spurious opening of both RCS/DT boundry isolation valves would result in loss of RCS inventory to the drain tank.	Breaker for either 1-MOV-598 (2-MOV-598) or 1-MOV-599 (2-MOV-599) will be opened and tagged open during normal (pre-fire) operation with valve closed.
1-A52-57 1-A52-63 2-A52-70 2-A52-76	AC/DC	Spurious closing of the off-site 4kV breakers with the emergency diesel on the 4kV busses could result in damage to the breakers and/or the diesel.	Verify the breakers have tripped open or manually trip the breaker to the open position.
1-A52-66	AC/DC	Spurious closing of the cross-tie breaker 66 could tie an energized 4kV bus to an idle diesel generator resulting in damage to the generator.	Verify the breaker has tripped open or manually trip the breaker to the open position.
2-A52-73	AC/DC	Spurious closing of this breaker would energize the Unit 2 4kV busses 2-A05 and 2-A06 resulting in overloading of the emergency diesel #1 during starting and/or operation.	Verify the breaker has tripped open or manually trip the breaker to the open position.

TABLE 3-1 (continued) POINT BEACH NUCLEAR PLANT

POTENTIAL SPURIOUS MALFUNCTIONS THAT COULD AFFECT SAFE SHUTDOWN

POTENTIAL SPURIOUS COMPONENTS	SYSTEM	EFFECT OF MALFUNCTION	RESOLUTION
1-A52-59 1-A52-65 2-A52-74 2-A52-68	AC/DC	Spurious closing of these breakers would energize safety injection pumps P15A and P15B and cause an excessive load on busses A05 and A06 respectively when being energized from the emergency diesel.	Verify the breakers have tripped open or manually trip the breakers to the open position.

TABLE 3-2.1: POINT BEACH NUCLEAR PLANT

ALTERNATE HOT SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
G01	AC/DC	Emergency Diesel Generator	New*	New	New
G02	AC/DC	Emergency Diesel Generator	New*	New	New
1A05	AC/DC	4.16 KV Bus	G01	1A52-60	ZE1A60A
1A06	AC/DC	4.16 KV Bus	G02	1A52-66	ZF1A66A
2A05	AC/DC	4.16 KV Bus	G01	2A52-73	ZE2A73A
2A06	AC/DC	4.16 KV Bus	G02	2A52-67	ZF2A67A
1A52-61	AC/DC	4.16 KV Bus Tie Breaker	1A05 to 1A06	---	N/A
2A52-72	AC/DC	4.16 KV Bus Tie Breaker	2A05 to 2A06	---	N/A
1-x13	AC/DC	Station Service Transformer	1A05	1A52-58	ZA1A58A
1-x14	AC/DC	Station Service Transformer	1A06	1A52-64	ZB1A64A
2-x13	AC/DC	Station Service Transformer	2A05	2A52-75	ZC2A75A
2-x14	AC/DC	Station Service Transformer	2A06	2A52-69	ZD2A69A
1B03	AC/DC	480 V ac Bus	1-x13	1B52-16B	ZA1J67A
1B04	AC/DC	480 V ac Bus	1-x14	1B52-17B	ZB1J68A
2B03	AC/DC	480 V ac Bus	2-x13	2B52-40B	ZC2J67A
2B04	AC/DC	480 V ac Bus	2-x14	2B52-25B	ZD2J68A
1B52-16C	AC/DC	480 V Bus Tie Breaker	1B03 to 1B04	---	N/A
2B52-40C	AC/DC	480 V Bus Tie Breaker	2B03 to 2B04	---	N/A

TABLE 3-2.1 (continued) POINT BEACH NUCLEAR PLANT

ALTERNATE HOT SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
P38A	AFWS	Aux. Feed Pump	1B03	1B52-12C	ZE1B12CA
P38B	AFWS	Aux. Feed Pump	2B04	2B52-31C	ZF2B31CA
1P2A	CVCS	Charging Pump	1B03	1B52-13A	ZA1B13AA
1P2B	CVCS	Charging Pump	1B03	1B52-13B	ZA1B13BA
1P2C	CVCS	Charging Pump	1B04	1B52-20A	ZB1B20AA
2P2A	CVCS	Charging Pump	2B03	2B52-37A	ZC2B37AA
2P2B	CVCS	Charging Pump	2B03	2B52-37B	ZC2B37BA
2P2C	CVCS	Charging Pump	2B04	2B52-28A	ZD2B28AA
P32A	SWS	Service Water Pump	1B03	1B52-10C	ZE1B10CA
P32B	SWS	Service Water Pump	1B03	1B52-11C	ZE1B11CA
P32C	SWS	Service Water Pump	1B04	1B52-20C	ZF1B20CA
P32D	SWS	Service Water Pump	2B04	2B52-27B	ZF2B27BA
P32E	SWS	Service Water Pump	2B04	2B52-27C	ZF2B27CA
P32F	SWS	Service Water Pump	2B03	2B52-34B	ZE2B34BA
1TE451B	PMS	Reactor Coolant Hot leg temp.	New**	New	New
1TE451C	PMS	Reactor Coolant Cold leg temp.	New**	New	New
1PT483	PMS	SG "B" Pressure Transmitter	New**	New	New
1LT470A	PMS	SG "B" Level Transmitter	New**	New	New
1PT420	PMS	RCS Pressure Transmitter	New**	New	New
1LT426	PMS	Pressurizer Level Transmitter	New**	New	New

TABLE 3-2.1 (continued) POINT BEACH NUCLEAR PLANT

ALTERNATE HOT SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
2TE451B	PMS	Reactor Coolant Hot Leg Temp.	New**	New	New
2TE451C	PMS	Reactor Coolant Cold Leg Temp.	New**	New	New
2PT483	PMS	SG "B" Pressure Transmitter	New**	New	New
2LT470A	PMS	SG "B" Level Transmitter	New**	New	New
2PT420	PMS	RCS Pressure Transmitter	New**	New	New
2LT426	PMS	Pressurizer Level Transmitter	New**	New	New

*Modified Alternate DC Control Power Source.

**Modified Alternate Independant DC Power Source(s).

TABLE 3-2.2: POINT BEACH NUCLEAR PLANT

ALTERNATE COLD SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
G01	AC/DC	Emergency Diesel Generator	New*	New	New
G02	AC/DC	Emergency Diesel Generator	New*	New	New
1A05	AC/DC	4.16 KV Bus	G01	1A52-60	ZE1A60A
1A06	AC/DC	4.16 KV Bus	G02	1A52-66	ZF1A66A
2A05	AC/DC	4.16 KV Bus	G01	2A52-73	ZE2A73A
2A06	AC/DC	4.16 KV Bus	G02	2A52-67	ZF2A67A
1A52-61	AC/DC	4.16 KV Bus Tie Breaker	1A05 to 1A06	---	N/A
2A52-72	AC/DC	4.16 KV Bus Tie Breaker	2A05 to 2A06	---	N/A
1-x13	AC/DC	Station Service Transformer	1A05	1A52-58	ZA1A58A
1-x14	AC/DC	Station Service Transformer	1A06	1A52-64	ZB1A64A
2-x13	AC/DC	Station Service Transformer	2A05	2A52-75	ZC2A75A
2-x14	AC/DC	Station Service Transformer	2A06	2A52-69	ZD2A69A
1B03	AC/DC	480 V ac Bus	1-x13	1B52-16B	ZA1J67A
1B04	AC/DC	480 V ac Bus	1-x14	1B52-17B	ZB1J68A
2B03	AC/DC	480 V ac Bus	2-x13	2B52-40B	ZC2J67A
2B04	AC/DC	480 V ac Bus	2-x14	2B52-25B	ZD2J68A
1B52-16C	AC/DC	480 V Bus Tie Breaker	1B03 to 1B04	---	N/A

TABLE 3-2.2 (continued) POINT BEACH NUCLEAR PLANT

ALTERNATE COLD SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
2B52-40C	AC/DC	480 V Bus Tie Breaker	2B03 to 2B04	---	N/A
1P11A	CCWS	Component Cooling Pump	1B03	1B52-10A	ZA1B10AA
1P11B	CCWS	Component Cooling Pump	1B04	1B52-23B	ZB1B23BA
2P11A	CCWS	Component Cooling Pump	2B03	2B52-34A	ZC2B34AA
2P11B	CCWS	Component Cooling Pump	2B04	2B52-28B	ZD2B28BA
1P10A	RHR	Residual Heat Removal Pump	1B03	1B52-12A	ZA1B12AA
1P10B	RHR	Residual Heat Removal Pump	1B04	1B52-21A	ZB1B21AA
2P10A	RHR	Residual Heat Removal Pump	2B03	2B52-36A	ZC2B36AA
2P10B	RHR	Residual Heat Removal Pump	2B04	2B52-29A	ZD2B29AA
P32A	SWS	Service Water Pump	1B03	1B52-10C	ZE1B10CA
P32B	SWS	Service Water Pump	1B03	1B52-11C	ZE1B11CA
P32C	SWS	Service Water Pump	1B04	1B52-20C	ZF1B20CA
P32D	SWS	Service Water Pump	2B04	2B52-27B	ZF2B27BA
P32E	SWS	Service Water Pump	2B04	2B52-27C	ZF2B27CA
P32F	SWS	Service Water Pump	2B03	2B52-34B	ZE2B34BA
1TE451B	PMS	Reactor Coolant Hot leg temp.	New**	New	New
1TE451C	PMS	Reactor Coolant Cold leg temp.	New**	New	New
1PT483	PMS	SG "B" Pressure Transmitter	New**	New	New
1LT470A	PMS	SG "B" Level Transmitter	New**	New	New
1PT420	PMS	RCS Pressure Transmitter	New**	New	New

TABLE 3-2.2 (continued) POINT BEACH NUCLEAR PLANT

ALTERNATE COLD SHUTDOWN METHOD COMPONENTS

COMPONENT	SYSTEM	DESCRIPTION	POWER SOURCE	BREAKER	POWER CABLE
1LT426	PMS	Pressurizer Level Transmitter	New**	New	New
2TE451B	PMS	Reactor Coolant Hot Leg Temp.	New**	New	New
2TE451C	PMS	Reactor Coolant Cold Leg Temp.	New**	New	New
2PT483	PMS	SG "B" Pressure Transmitter	New**	New	New
2LT470A	PMS	SG "B" Level Transmitter	New**	New	New
2PT420	PMS	RCS Pressure Transmitter	New**	New	New
2LT426	PMS	Pressurizer Level Transmitter	New**	New	New

*Modified Alternate DC Control Power Source.

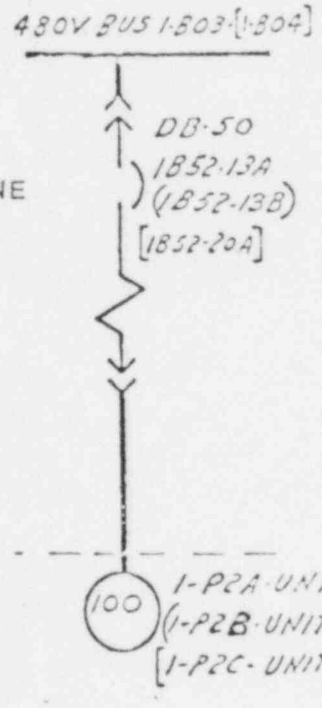
**Modified Alternate Independant DC Power Source(s).

ELECTRICAL CIRCUIT SCHEDULE

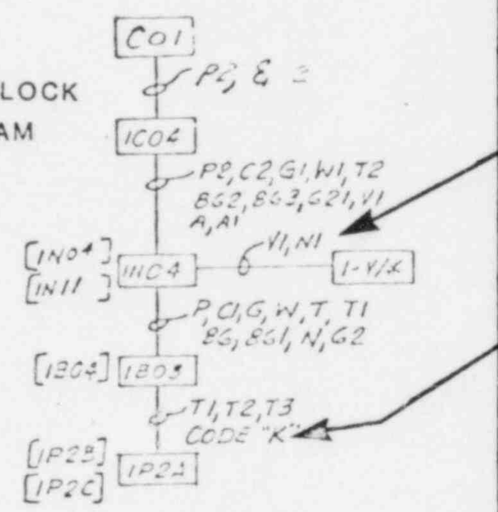
POINT BEACH NUCLEAR PLANT

ACTION	CABLE NUMBER	CABLE DESTINATION FROM / TO	DWG SYS	CABLE DESCRIPTION		STATUS	WIRES NO	COLOR	NO	COLOR	NO	COLOR	CONN DWG FROM / TO			
	ZA1B12A B	1B03 1C03	321	1 C07	58 50	F T	P W SP	BLK GRN W/BK	C1 T	WHT ORN	G T1	RED BLU		G004	1B03-1	DJ09
	ZA1B12A C	1C03 1C156-R	321	1 C02	51 90	F T	C1	BLK	C2	WHT				R13	DJ05	DJ06
	ZA1B13A A	1B03 1P2A	316	3 K25	142 162	F T	T1		T2		T3			FP05	FP06	JJ08
	ZA1B13A B	1B03 1N04	316	1 C09	159 153	F T	P W 861	BLK GRN W/BK	C1 T N	WHT ORN R/BK	G 86 62	RED BLU G/BK		FP05 QS01	FP06	FP07
	ZA1B13A C	1N04 1C04	316	1 C09	413 190	F T	P2 W1 863	BLK GRN W/BK	C2 T2 621	WHT ORN R/BK	G1 862 V1	RED BLU G/BK		QS01 DJ06	JD03 DJ07	JD02 R09
	ZA1B13A D	1N04 1V-1P2A	316	1 C02	28 50	F T	V1	BLK	N1	WHT				1P[illegible]A-1		
	ZA1B13A F	1B03 1N04	316	1 C01	159 170	F T	T1							FP[illegible]5 QS01	FP06	FP07

SINGLE LINE DIAGRAM

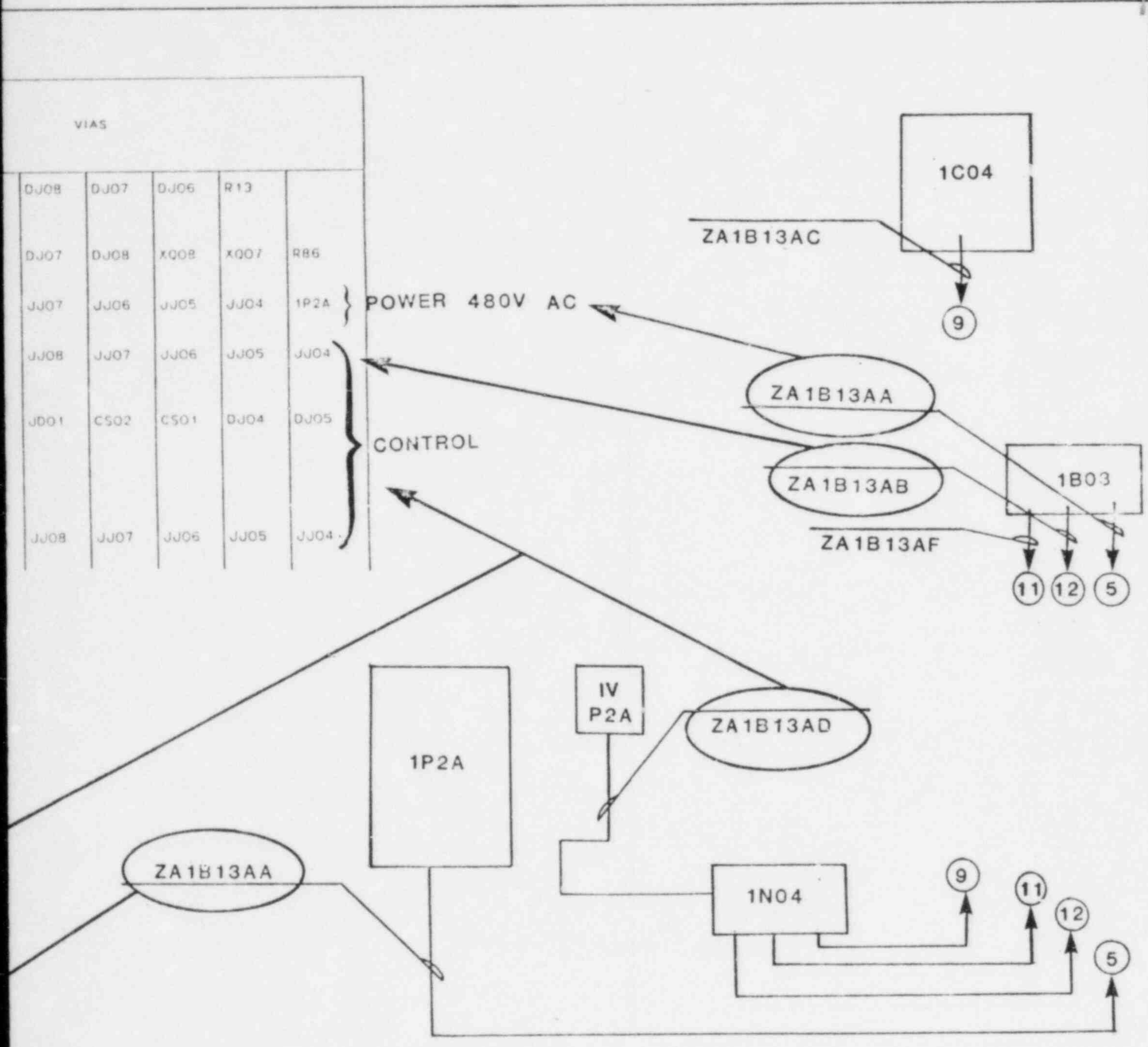


CABLE BLOCK DIAGRAM



1-P2A-UNIT 13A-SAFEGUARD TRAIN "A" SCHEME NO. 1B13A (1B13B)
(1-P2B-UNIT 13 B)- " " "A"
[1-P2C-UNIT 20A]- " " "B"

P025



[1B20A]

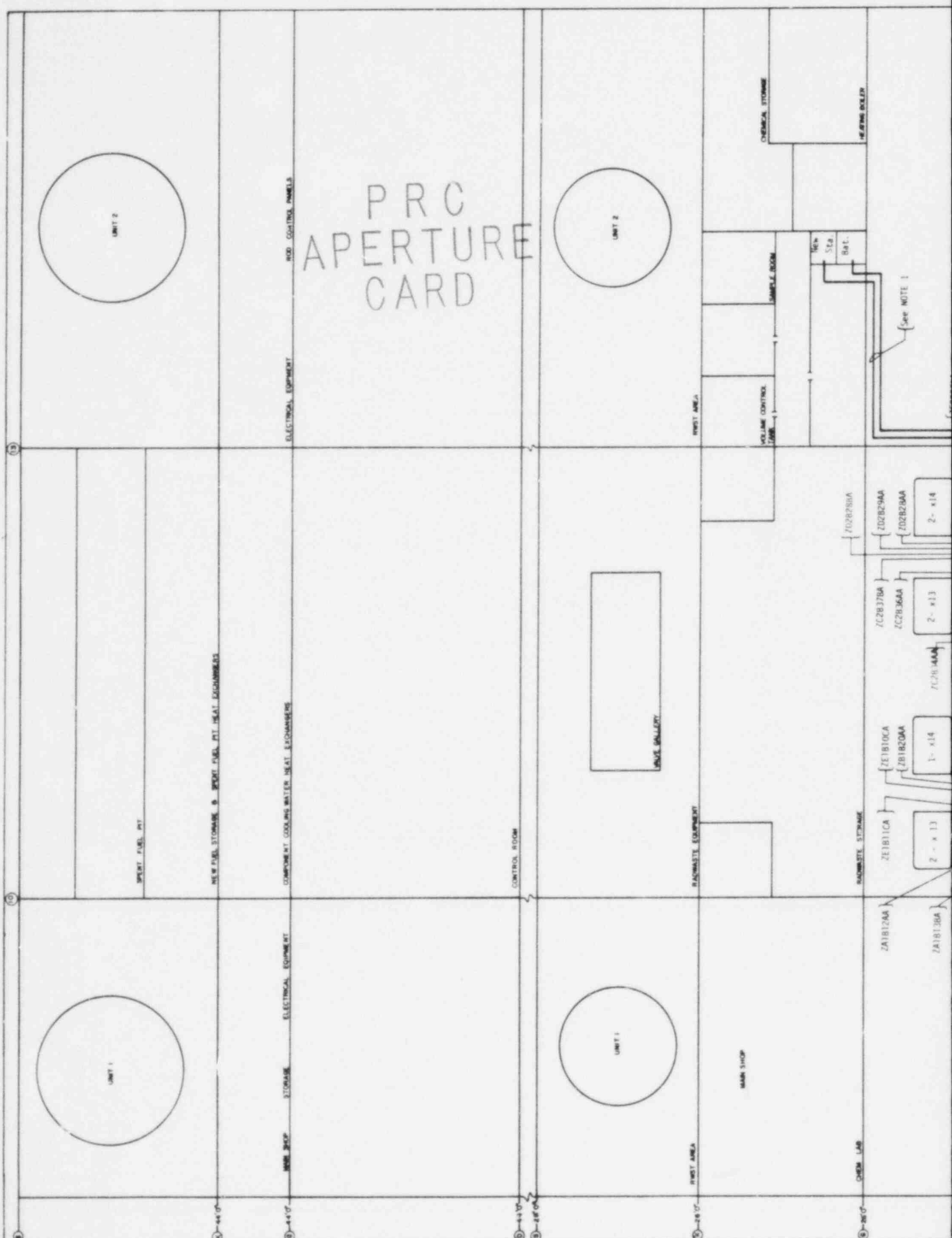
PRC
APERTURE
CARD

Also Available On
Aperture Card

FIG. 3-1

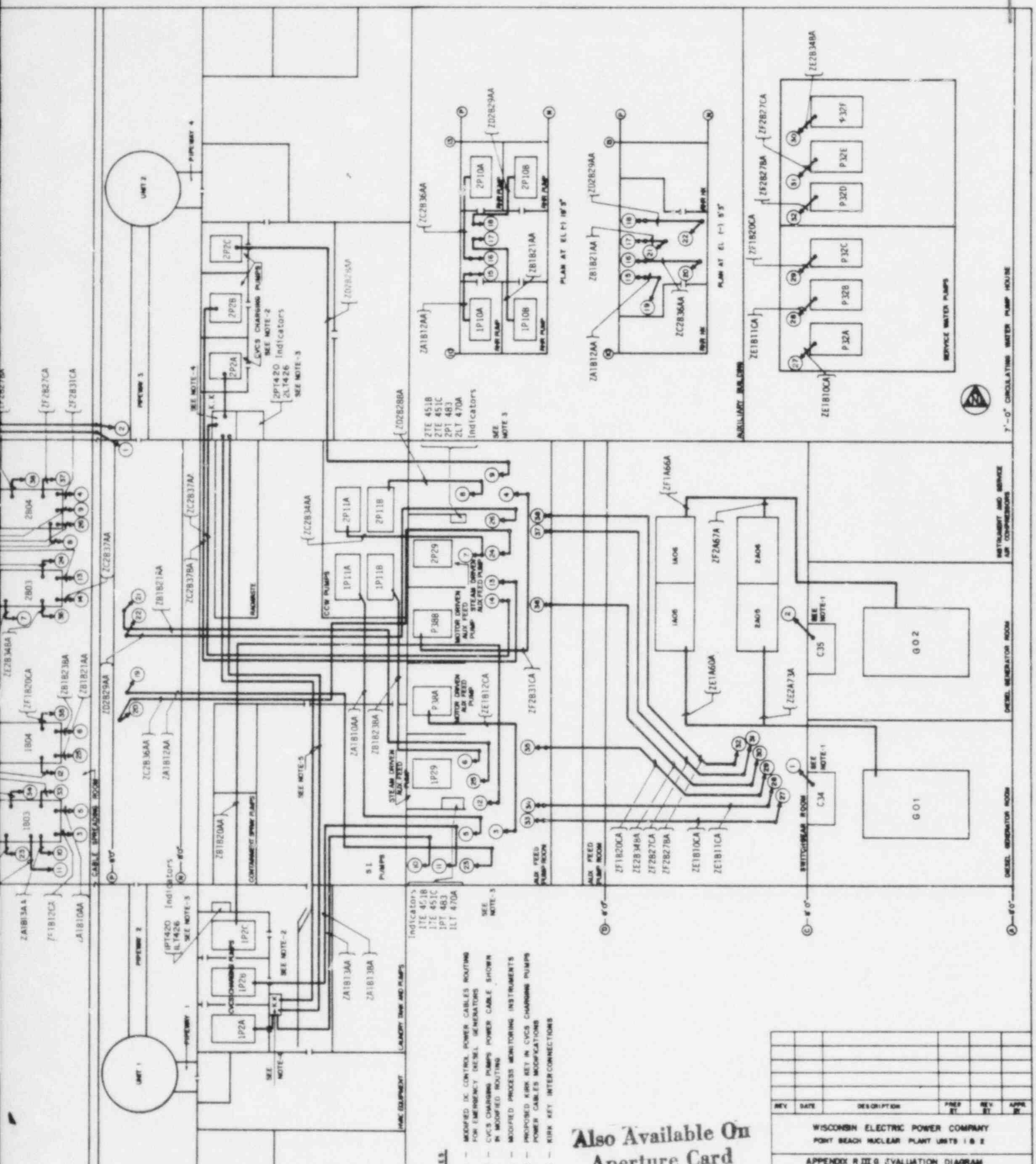
ILLUSTRATION OF THE METHOD OF
USE OF
APPENDIX R III G EVALUATION DIAGRAM

8311020097-18



PRC APERTURE CARD

P026



REV	DATE	DESCRIPTION	PREP BY	REV BY	APPR BY

WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT UNITS 1 & 2

APPENDIX R III G EVALUATION DIAGRAM
ALTERNATIVE SHUTDOWN METHOD COMPONENTS
CABLE ROUTING LOCATION INFORMATION

ENGINEERING PLANNING AND MANAGEMENT, INC. FRAMINGHAM, MA

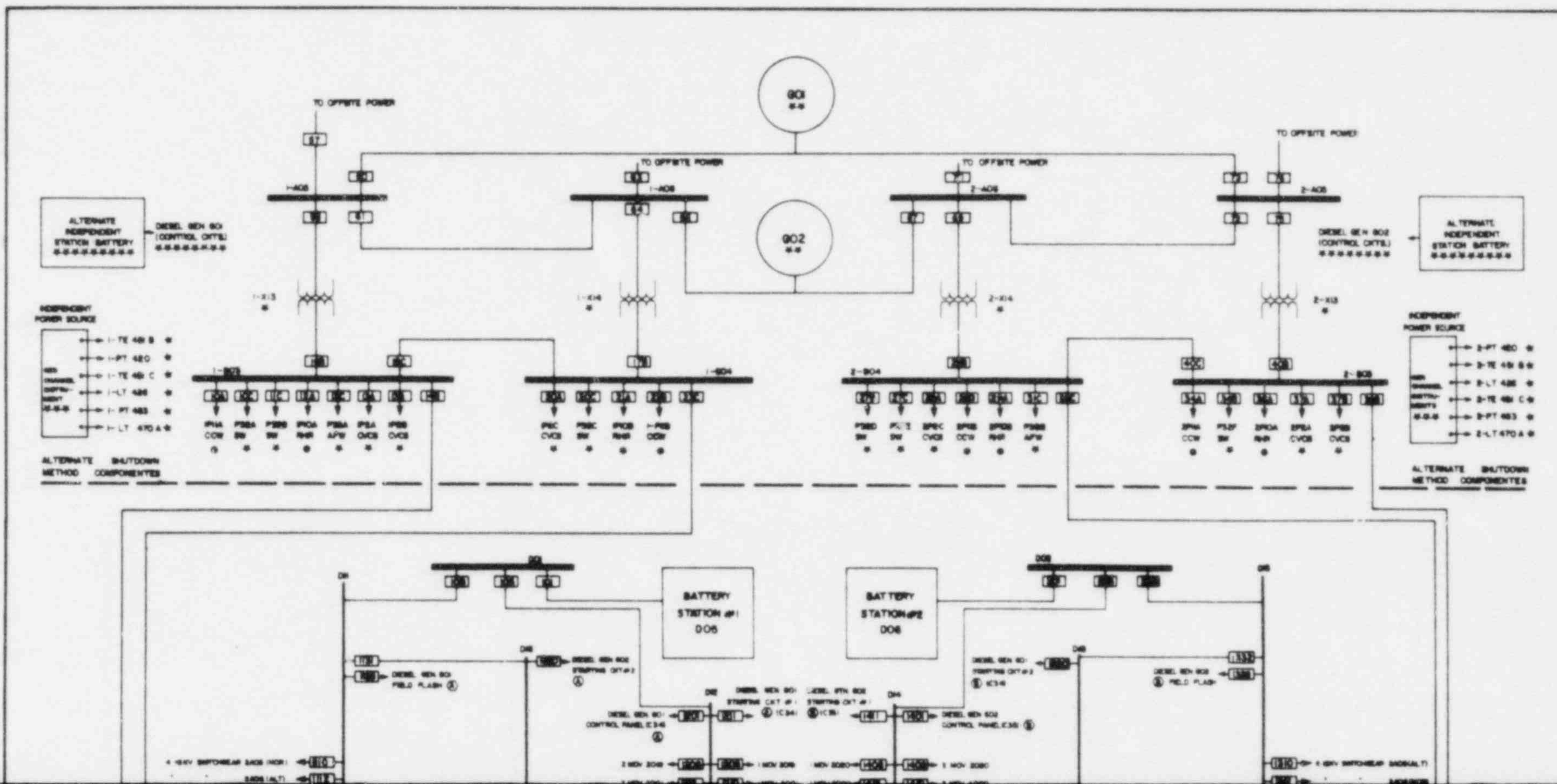
FIGURE 3-2

SCALE N/A SHT. OF

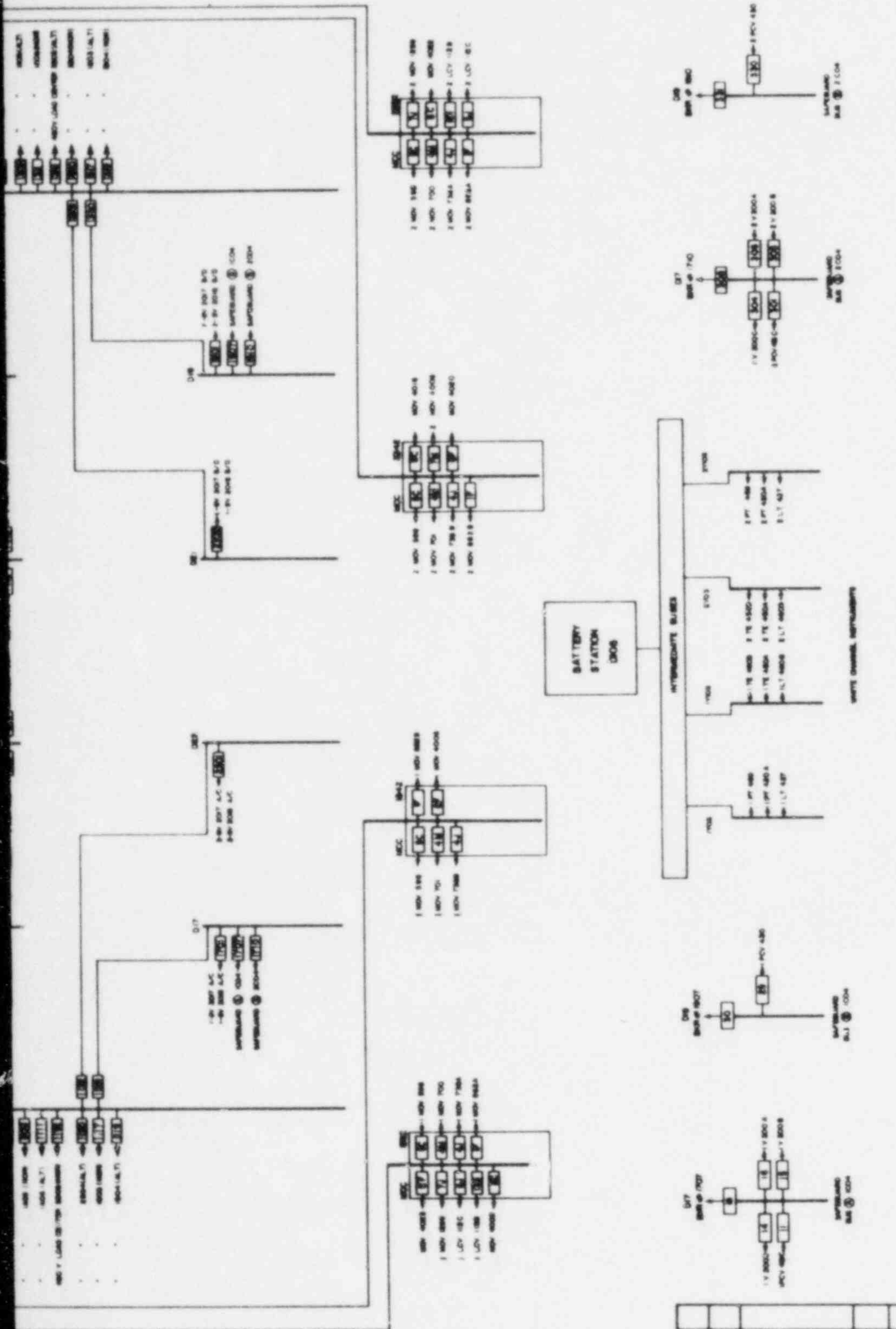
REV

Also Available On Aperture Card

8311020097-19



TO OFFSITE POWER
ALTERNATE INDEPENDENT STATION BATTERY
DIESEL GEN 801 (CONTROL CKTS)
INDEPENDENT POWER SOURCE
ALTERNATE SHUTDOWN METHOD COMPONENTES
BATTERY STATION #1 DO5
BATTERY STATION #2 DO6
DIESEL GEN 802 (CONTROL CKTS)



LEGEND

***** - HOT SAFE SHUTDOWN COMPONENT

●●●●● - COLD SAFE SHUTDOWN COMPONENT

PRC
APERTURE
CARD

Also Available On
Aperture Card

REV. NO.	DATE	DESCRIPTION	PREP. BY	REV. BY	APPD. BY

WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT UNITS 1 & 2

SAFE SHUTDOWN SYSTEM COMPONENTS
ELECTRICAL ONE LINE DIAGRAM
SAFE SHUTDOWN SYSTEM COMPONENTS
ELECTRICAL OUTLINE DIAGRAM

Engineering Planning and Management, Inc.
Three Speen Street, Framingham, MA

DWG. NO. FIG. 3-5

8311020097-20

SECTION FOUR

PROPOSED MODIFICATIONS FOR ALTERNATE SHUTDOWN CAPABILITY

4. PROPOSED MODIFICATIONS FOR ALTERNATE SHUTDOWN CAPABILITY

4.1 Introduction

For various Point Beach Nuclear Plant fire zones, compliance with the provisions of Section III.G.2 cannot be effectively or economically achieved due to the configuration of safe shutdown equipment, cables and associated circuits. For these areas WE has determined that the appropriate technical approach necessary to comply with the provisions of Section III.G of Appendix R is to provide an alternative shutdown capability. This section provides sufficient information to the NRC for review of the proposed plant modifications necessary to provide alternative shutdown capability. In addition, this section responds to the information requests contained in the NRC Staff's clarification to Generic Letter 81-12 dated March 22, 1982, "Fire Protection Rule - Appendix R."

4.2 Areas Requiring Alternative Shutdown

The Point Beach Nuclear Plant has inherent fire protection features in several plant areas which ensure post-fire survivability of safe shutdown equipment such that both units can be simultaneously brought to cold shutdown within 72 hours. These unique features involve Halon suppression systems for three plant-specific areas: 4kV Switchgear Room, Cable Spreading Room,

and Auxiliary Feed Pump Area. The Halon suppression systems for all three rooms are active single failure-proof systems. In addition, the initiating detection system will be made diverse and redundant.

The Appendix R Safe Shutdown Analysis provided in June, 1982 established the basis for Section III.G.2 exemptions predicated on the capabilities of the installed Halon suppression systems. The configurations of these three areas do not lend themselves to the provision of Section III.G.2 separation criteria and after a presentation to the NRC Staff management during an appeal meeting held on March 22, 1983, WE agreed to upgrade the Halon systems as noted above. Thus, in the as-modified condition as detailed in the supplemental document transmitted to the NRC on April 28, 1983,[1] these three areas will have inherent fire protection features which will ensure post-fire safe shutdown capability. For the 4kV Switchgear Room, the Cable Spreading Room and the Auxiliary Feed Pump Area, WE demonstrated to the NRC Staff management that the Halon suppression systems compensate for the Section III.G.2 separation criteria deficiencies. As a result of these discussions, the NRC Staff requested that consideration be given to limited fire damage in each of the three areas as follows:

---

[1]Letter to Mr. H.R. Denton from Mr. C.W. Fay with enclosure, titled "Appendix R Exemption Requests Point Beach Units 1 and 2."

(1) Cable Spreading Room - Fire damage is assumed limited to Unit 1 or Unit 2 480V load centers;

(2) 4kV Switchgear Room - Fire damage is assumed limited to one section of switchgear including the relays on the face of the cabinets. The internal bus bars and mechanical components of breakers would not be damaged to prevent local manual control;

(3) Auxiliary Feed Pump Area - Fire damage is assumed limited to two of four auxiliary feed pumps. One redundant safe shutdown division of components and cables will be free of fire damage as a result of existing or modified separation.

An evaluation of the three areas was made as a result of the NRC Staff's request for consideration of limited fire damage. The analysis indicated that the Cable Spreading Room requires modifications which are considered to be alternative shutdown modifications. Thus, with the exception of the Cable Spreading Room, the other two areas afford safe shutdown capability that ensures both units can achieve safe cold shutdown without the need for alternative shutdown modifications.

The Point Beach areas for which WE has identified the need for alternative shutdown capability are:

(1) Control Room

(2) Containment Spray Additive Tank Area

(3) Cable Spreading Room

4.3 RCS Monitoring - Alternative Shutdown Modifications

The Containment Spray Additive and Monitor Tank Area, called Fire Zone 7 in previous WE submittals, contains all channels of safe shutdown RCS instrumentation for both units. The area contains no other necessary safe shutdown cables or components. A fire in the area could possibly damage the cables associated with all channels of safe shutdown instruments for either unit. There is no area automatic suppression system; however, the area is provided with photo-electric smoke detectors and manual suppression capability.

4.3.1 Safe Shutdown Cables and Instruments

The configuration of the safe shutdown RCS instrument cables is shown in Figure 4-1.

Monitoring instrumentation for safe shutdown is presently located both locally and remotely in the Control Room. Local monitoring instrumentation is located at the local control panels for the charging pumps of Units 1 and 2 and at the auxiliary feed pump local control panels of Units 1 and 2. Presently, the local control panels for the Unit 1 and Unit 2 charging pumps contain indication for pressurizer level and pressurizer pressure for the respective unit.

The auxiliary feed pump local control panels at each unit's turbine-driven pump cubicle contain indication for the steam generators A and B level (wide range) and pressure for the respective unit.

Thus, the present configuration of local and remote instrumentation does not comply with Appendix R since not all essential safe shutdown parameters have monitoring capability independent from a fire in the Cable Spreading Room, Control Room or Fire Zone 7.

4.3.2 Proposed Modifications

The necessary safe shutdown monitoring instrumentation will be modified to provide both local and remote monitoring capability as shown in Figure 4-3. This modification will provide adequate separation between the alternate instruments at the 8 ft elevation (as shown in Figure 4-1) and the redundant channels located in the 26 ft elevation which are routed to the Control Room. To provide the necessary alternate instrumentation to be used in the event of a fire in 26 ft elevation Zone 7, the Cable Spreading Room or the Control Room, transfer switches will be installed to transfer indication of the following instruments from the Control Room to the Unit 1 and Unit 2 Charging Pump Areas and Auxiliary Feed Pump Areas:

In Charging Pump Areas Units 1 and 2

- o Pressurizer Level
- o Reactor Coolant System Pressure (wide range)

In Auxiliary Feed Pump Area Units 1 and 2

- o RCS Loop B Steam Generator Level (wide range)
- o RCS Loop B Steam Generator Pressure (wide range)

- o Reactor Coolant Loop B Hot Leg Temperature (T_h)
- o Reactor Coolant Loop B Cold Leg Temperature (T_c)

This will be accomplished by tapping into the safe shutdown instrument cables in the 8 ft elevation and routing new cables to the alternate instruments located in the Charging Pump and Auxiliary Feed Pump areas. Steam generator pressure indication will be provided by routing new cables from the existing cables at a location which is isolated from Fire Zone 7 down to the 8 ft elevation to the alternate instruments.

Indicating instruments already installed at these locations will be reconnected to the transfer switch instrument connections. New instruments for RCS loop temperature will be added to the Auxiliary Feed Pump Area panels. Figure 4-3 shows a conceptual schematic of the modifications for the alternate safe shutdown instruments.

Alternate power sources which are independent of the normal shutdown instrumentation divisions will be provided for the alternate safe shutdown instrumentation. Recommended modifications for power supplies are listed below with the final decision to be made after an on-site review of alternative designs:

(1) New and independent battery at each instrument location, with an ac/dc inverter and battery charger powered from a convenient 120V ac source. In the event of loss of the normal ac charging supply, sufficient time will be available post-fire and post-hot shutdown for repair procedures to provide a suitable ac charging source; or

(2) An ac/dc inverter at each instrument location powered from an independent dc power cable from the new station battery, routed to avoid the areas of concern; or

(3) An ac/dc inverter at each instrument location powered from an independent dc power cable from an existing station battery, routed to avoid the areas of concern.

Existing safe shutdown instruments in Unit 1 and Unit 2 Charging Pump areas are:

<u>In Charging Pump Areas Units 1 and 2</u>

- o RCS Loop B Instrument Transfer Switch (New)
- o Pressurizer Level Indicator (reconnected to new red channel cables with new transfer switch)
- o Reactor Coolant System Pressure Indicator (reconnected to new red channel cables with new transfer switch)

Modified safe shutdown instrumentation in the Auxiliary Feed Pump Area will be:

<u>In Auxiliary Feed Pump Area Units 1 and 2</u>

- o RCS SG Loop B Instrumentation Transfer Switch (new)
- o Steam Generator A Level Indicator, wide range (existing)
- o Steam Generator B Level Indicator, wide range (reconnected to red channel cables with new transfer switch)
- o Steam Generator A Pressure Indicator, wide range (existing)
- o Steam Generator B Pressure Indicator, wide range (reconnected to red channel cables with new transfer switch)

- o Reactor Coolant Loop B Hot Leg Temperature (T_h) Indicator

  (reconnected to red channel cables with new transfer switch)

- o Reactor Coolant Loop B Cold Leg Temperature (T_c) Indicator
  (reconnected to red channel cables with new transfer switch)

- o Pressurizer level
  (existing)

4.3.3 Source Range Flux Monitoring

Post-fire source range flux monitoring is to be provided to meet the requirements of Section III.L.2 of Appendix R. A spare portable instrument or suitably installed spare instrument rack will be maintained by plant instrumentation surveillance procedures. If installed, the new instrument rack will be outside all fire zones of concern. In the event of damage to existing installed core flux monitoring equipment, the portable or installed instrument will be connected or transferred to an existing detector inside containment. If necessary, a post-fire administrative repair procedure will be prepared and approved.

4.4 CVCS Charging Pumps - Alternative Shutdown Modifications

Sections of the Auxiliary Building contain redundant trains of charging pump power and control circuits for each unit which do not comply with Section III.G.2 of Appendix R. The existing routing of these cables for the three charging pumps is provided

in Figure 4-4. The Cable Spreading Room also contains redundant trains of charging pump power and control circuits such that either unit could have its three charging pumps affected by one fire. Thus, as presently routed, a postulated fire could affect both trains of charging pumps in one unit.

4.4.1 Safe Shutdown Cables and Equipment

Power and control cables for the three pumps in each unit originate at each pump in the individual pump cubicles. The cables for Unit 1 exit the cubicles on the east walls and are routed north into the safety injection pump area, then east to ceiling penetrations above the south end of the AFW pump area tunnel. The Unit 2 cables exit the cubicles on the east wall, then are routed south to the CCW pump area, then run east to ceiling penetrations above the north end of the AFW pump area tunnel. The Cable Spreading Room is located directly above the tunnel where Unit 1 cables enter into the bottom of 480V load centers 1B03 and 1B04 and Unit 2 into 2B03 and 2B04. Figure 4-4 shows existing cable routing information.

The breakers in the 480V load centers for Unit 1 are located in 1B03 and 1B04 and similarly in 2B03 and 2B04 for Unit 2. No power cables within the Cable Spreading Room are run overhead as all power cables enter and exit the Cable Spreading Room from floor penetrations. Local instrumentation and control in each charging pump area is provided for each charging pump. The present configuration is as follows:

- o 1N11[2N11] - Start/Stop Local Controls for Pump 1P2C[2P2C]
- o 1N04[2N04] - Start/Stop Local Controls for Pumps 1P2A[2P2A] and 1P2B[2P2B]
- o 1RK24[2RK24] - Speed Controls for All Pumps 1P2A,B,C[2P2A,B,C]
  - Pressurizer Pressure, Level, and Charging Flow Instruments

4.4.2 Proposed Modifications

The present routing of charging pump power and control cables and the location of equipment necessary for remote or local operation do not comply with Appendix R separation criteria. One charging pump for each unit with necessary instrumentation will be operable and free of fire damage as a result of the proposed modifications for fires in the areas of concern.

The power cables for charging pump 1P2C will be rerouted to provide adequate separation within the Unit 1 charging pump area and the safety injection pump area. The power cables for charging pump 2P2A and 2P2B will be rerouted to provide adequate separation in the Unit 2 charging pump area and the CCW pump area. Unit 2 CVCS pump 2P2C power and control cables will be provided with appropriate fire wraps to eliminate the potential of intervening combustibles causing fire damage to redundant safe shutdown equipment.

The existing panels 1N11 (Unit 1) and 2N04 (Unit 2) will be relocated to provide separation between redundant divisions. Provisions for an alternate power source to one charging pump in each unit will also be made. This will be accomplished with the addition of Kirk-key type breakers which will be installed in panels 1N04 for Unit 1 and in the relocated 2N04 for Unit 2.

The Kirk-key assembly consists of two key-locked breakers located inside a single enclosure. These breakers can only be closed with the key inserted and the key cannot be removed until the breaker is re-opened. Only a single key is supplied with each set of breakers.

In the event of a limited fire in the Cable Spreading Room disabling buses 1B03 and 1B04, causing loss of power to all three Unit 1 charging pumps, power to pump 1P2A will be restored by operation of the Kirk-key breaker pair in Unit 1 Charging Pump Room, electrically disconnecting the pump from 1B03 and providing alternate power from 2B03. Similarly, power will be restored to pump 2P2A should a limited fire disable buses 2B03 and 2B04 by providing alternate power from 1B03 as shown in Figure 4-5.

As explained in the alternative shutdown instrument modification section, these panels (1N11, 2N04) will also contain pressurizer level and pressure indication as part of the alternate process monitoring system.

A summary of charging pump modifications is presented below.

Unit 1 Charging Pump Area:

(1) Relocate panel 1N11 with control for Pump 1P2C;

(2) Relocate indicating instruments (pressurizer level and pressure) by panel 1N11;

(3) Install Kirk-key breakers in Panel 1N04 and route new power cables from Unit 2 pump 2P2A to the Kirk-key breaker in Unit 1; and

(4) Reroute power and control cables for pump 1P2C to achieve Appendix R separation between redundant safe shutdown trains.

Unit 2 Charging Pump Area:

(1) Relocate panel 2N04 with control for pumps 2P2A and 2P2B;

(2) Relocate instrument indication (pressurizer level and pressure) by panel 2N04;

(3) Install Kirk-key breaker in panel 2N04 and route new power cable from Unit 1 pump 1P2A to the Kirk key breaker in Unit 2; and

(4) Reroute power and control cables for pumps 2P2A and 2P2B to achieve Appendix R separation between redundant safe shutdown trains.

4.5 Emergency Generator Control Alternate Shutdown Modifications

The emergency diesel generators installed at the Point Beach plant were adapted from units originally designed for electromotive applications. Consequently, the unit is "self-contained"; thus, the functions, controls, cooling system, lube oil system, etc., except for dc control power and service water flow, when under local control (i.e., control from panels in the Emergency Generator Room), are contained within the unit and the Emergency Generator Room.

In adapting the unit to its emergency generator function in the Point Beach plant, essential remote connections were added. These include:

(1) Remote starting and stopping from panels in the Control Room;

(2) Remote exercising start from the Control Room;

(3) Interlocking with generator bus and bus tie circuit breakers to prevent closing the emergency generator on to a live bus;

(4) Control of speed, alternator voltage, and excitation flashing;

(5) Connections to remote indicating instruments in the Control Room;

(6) Control of remote fuel transfer pumps; and

(7) Connection of dc supplies from remote panels energized by the station battery. It is noted that all emergency generator control circuits are energized by external dc supplies.

4.5.1 Safe Shutdown Cables and Equipment

The equipment necessary to start and operate the Emergency Diesel Generators is contained within the diesel rooms. Service water flow is not required to start the diesel generators. Sufficient cooling capacity exists in components and piping to prevent overheating of diesel prior to initiating service water flow. The self-contained diesel units, as previously described, have been provided with operating capability independent of the Control Room.

Fire-induced damage to the external circuits which are routed through the 4KV Switchgear Room, Cable Spreading Room and Control Room could prevent starting and operating the diesel generators. Modifications already performed on the control circuits to the diesel generators provide isolation for all but six cables that could affect the diesel start and operation. The circuits associated with these cables are:

(1) Starting circuit #2 - dc power source

(2) Generator Field Flash - dc power source

(3) Starting Circuit #1 - dc power source

(4) Engine Stop and Governor - dc power source

(5) Auto Start Safeguard Circuit - Accident auto start

(6) Auto Start Safeguard Circuit - Undervoltage auto start

4.5.2 Emergency Diesel Generator Modifications

The circuits identified in the previous section will be modified to provide isolation and/or alternate dc power sources. The modifications proposed will provide local manual start and operation of the diesels from within the diesel rooms by isolating the potentially affected circuits between the diesel rooms and the Control Room. The modifications to these circuits include:

(1) The addition of transfer switches in the Emergency Diesel Generator Rooms to isolate circuits from areas where a fire could affect diesel start or operation;

(2) The addition of an alternate dc power source for control circuits which is independent of areas where a fire could affect existing dc power control circuits.

In addition to the dc control circuit modifications the diesel generator current transformers (CT) will be provided with protective devices in the event of fire-induced open circuits downstream of the CTs. Modifications to dc control circuits are shown in Table 4-3 and Figures 4-6 and 4-7.

Modifications will be made to dc control circuits to provide isolation by using the existing transfer switch in each Diesel Generator Room. An alternate dc power source will be provided to the diesel control circuits by routing new dc power cables from the new station batteries to the diesel rooms. The routing of these cables will be independent of the areas where existing (normal) dc power cables are located. An isolation switch in the Battery Room and a manually operated transfer switch in the Diesel Generator Room will be provided to disconnect these cables during normal station operation. The position of the transfer switch in the Emergency Generator Room will be alarmed in the Control Room to alert the operator of maintenance or unauthorized operation. The position of the cover to the transfer switch in the Emergency Generator Room will also be alarmed to prevent unauthorized use. A new circuit breaker in the Station Battery Room will protect against potential damage to the battery or to the new cables.

When modified, the diesel generators will be operable from within the diesel rooms and dc control circuits that could be potentially damaged to prevent starting or operation will be isolated from the affected areas. Additionally, alternate control power will be available to locally start and operate the diesels.

The two fuel oil transfer pumps (P70A and P70B) could be affected by a single fire. The storage capacity of the fuel oil day tanks (approximately 1,000 gallons) will support diesel operation to establish hot shutdown conditions (approximately 8-10 hours at diminished load). Modifications to the fuel oil transfer system piping will be made to allow gravity feed of fuel oil from the 60,000 gallon storage tanks to the diesel room day tanks. Adequate manual valves will be provided for isolation and selection of the necessary flow paths, and level indicators will be provided in order to allow the operator to prevent overflow while manually filling the day tank. The proposed piping modifications are shown in Figure 4-8.

4.6 Excess Letdown Isolation MOV Modification

Administrative procedures require the excess letdown isolation valves (1 MOV 1299, 2 MOV 1299) to be closed for normal station operation. They must also be closed during hot and cold shutdown. The 1982 Fire Protection of Safe Shutdown Capability Report identified these valves as potential spurious components and recommended that the respective valves breakers be kept

locked open during plant operation. To avoid unnecessary burden on plant administrative and surveillance procedures, a modification of the excess letdown valves inboard control circuits is proposed which will resolve this type of spurious operation.

4.6.1 Safe Shutdown Cables and Equipment

Two control cables for each valve originate at the respective motor control center (at charging pump area 8 ft elevation). One control cable is routed to the valve limit switches (inside containment). Any fault in this cable would not cause the valve to be opened. The other control cable is routed to the Control Room. A hot short or a control signal short on this cable could energize the opening coil causing the valve to be spuriously opened.

4.6.2 Proposed Modifications

The modified circuit shown in Figure 4-9 will prevent spurious opening of the valves. Required elements are:

FSR relay:	High-speed isolation relay and normally closed FSR contact;
Contact C1:	a) C1 is open when switch 1/* is closed; b) C1 is closed when switch 1/* is open;
Contact C2:	a) C2 is open when 42a(o) is closed; b) C2 is closed when 42a(o) is open.

4.7 Response to the Generic Letter 81-12 Request for Additional Information

In conformance with fire protection rule 45 FR 76602, November 19, 1980 - Generic Letter 81-12, and the Clarification of the Generic Letter, the following additional information is given with reference to the modifications provided for alternative shutdown.

Request (a)

> List the system(s) or portions thereof used to provide the shutdown capability with the loss of off-site power.

Response (a)

Refer to Section 2 which describes the normal shutdown systems used by this analysis to achieve cold safe shutdown. As discussed in that section, the systems and equipment selected for the purpose of this analysis are a minimum set of plant systems which can be used to achieve safe shutdown. Should a loss of off-site power occur without an assumed plant fire, these systems and others will be available to achieve safe shutdown.

The modifications provided for CVCS, DGS, and RCS instrumentation for alternative shutdown do not alter the safe shutdown operational scenarios defined for Point Beach Units 1 and 2.

Request (b)

> For those systems identified in Section 2 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. 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 alternative 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 separated from the fire area in accordance with Section III.G.2.

Response (b)

The safe shutdown equipment and cables are all shown on the attached Evaluation Diagrams for CVCS, DGS, RCS instrumentation, and Alternative Shutdown Modifications. The function of the new equipment and connections are identified in Section 4. Location of the alternative shutdown equipment is shown in Figure 3-2.

Request (c)

Provide drawings of the alternative shutdown system(s) which highlight any connections to the normal systems. Show the electrical location of all breakers for power cables and isolation devices for control and instrumentation circuits for the alternative shutdown system for that fire area.

Response (c)

The location of the alternative shutdown isolation switches, breakers, cables and equipment and their connections to the normal systems are shown in the Evaluation Diagrams.

Request (d)

> Verify that changes to safety systems will not degrade safety systems (e.g., new isolation switches and control switches should meet design criteria and standards in the FSAR for electrical equipment in the system that the switch is to be installed; cabinets that the switches are to be mounted in should also meet the same criteria (FSAR) as other safety-related cabinets and panels; to avoid inadvertent isolation from the Control Room, the isolation switches should be key-locked or alarmed in the Control Room if in the "local" or "isolated" position; periodic checks should be made to verify that the switch is in the proper position for normal operation; and a single transfer switch or other new device should not be a source of failure which causes loss of redundant safety systems).

Response (d)

The new switching devices will meet the design criteria and standards in the Point Beach FSAR. They will be alarmed in the Control Room if in the "local" or "isolated" position. Periodic position checks will not be required because of the redundant alarms provided to the Control Room. Failure of the transfer switches will not cause loss of redundant safety systems. In addition, all proposed modifications will undergo 10 CFR 50.59 reviews.

Request (e)

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

Response (e)

Alternative shutdown procedures will be developed and will describe the post-fire operator actions to be performed. Section 5 includes the description of the assumed fire scenario description and the expected operator actions post-fire.

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.

Response (f)

Manpower requirements for both the safe shutdown and for fire brigade manning are described in Section 5.

Request (g)

> Provide a commitment to perform adequate acceptance tests of the alternative shutdown capability. 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 the equipment cannot be operated from the Control Room; and that equipment operates from the Control Room that cannot be operated at the local Control Station when the transfer isolation switch is in the "remote" position.

Response (g)

Upon completion of the proposed modifications, acceptance tests will be performed in accordance with existing procedures to

ensure that the new and existing equipment operate properly in the "local" and "remote" modes.

Request (h)

> Provide technical specifications of the surveillance requirements and the limiting conditions for operation of 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 IEEE 338. Credit may be taken for other existing tests using group overlap test concepts.

Response (h)

Technical specifications will be reviewed for any necessary changes.

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.

Response (i)

The modifications made to the safe shutdown systems and equipment for alternate shutdown capability will not alter their performance capability.

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.

Response (j)

The proposed alternative shutdown modifications identify an additional repair procedures to be performed for source range flux monitoring (Refer to subsection 4.3). Thus, one additional repair procedure will be required in addition to those identified in the 1982 Fire Protection of Safe Shutdown Capability report.

Request (k)

> For each fire area where an alternative or dedicated shutdown method, in accordance with Section III.G.3 of Appendix R is provided, the following information is required to demonstrate that associated circuits will not prevent operation or cause maloperation of the alternative or dedicated shutdown method. 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).

Response (k)

The power cables for the alternative shutdown instruments will not be routed through the Cable Spreading Room or the Containment Spray Additive and Monitor Tank Area, nor will they depend on any power circuits presently routed through the Cable Spreading Room.

The modified 125V dc control power source for the Diesel Generator is independent from the existing control power. Modifications for CVCS will use the capability of existing switchgear breakers and distribution panels and the added Kirk-key breakers. Since electrical protective coordination was established during the 1982 review of safe shutdown capability and the new protective devices to be added will be selected to provide load to feeder fuse/breaker coordination, no associated circuits of concern by common power source will impact the alternative shutdown equipment.

Request (1)

> 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.

Response (1)

Resolution of spurious operations affecting safe shutdown capability for DGS circuits is provided by isolation of all control cables at the local control stations by transfer switches. In addition, current transformer circuits that could affect safe shutdown capability are protected by overvoltage shorting devices.

For CVCS pump switchgear breakers, isolation of the respective 125V dc control power feeders (at the corresponding dc distribution panels) will assure no impact of potential spurious

signals in the control circuit. Local valve manipulations (CVCS and AFW) after opening the respective valve MCC breakers will provide a similar resolution of potential associated circuits by spurious operations.

For the excess letdown valves, a modification described in subsection 4.6 will provide resolution for potential spurious operations. For the alternative shutdown instrumentation circuits, this type of associated circuit does not exist.

Request (m)

> 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 system and the function of each cable listed.

Response (m)

There are no circuits which are part of the alternative shutdown instrumentation panels that are routed through the Cable Spreading Room. This is accomplished by the addition of isolation switches in the instrument loops between the transducers located inside containment and the present instrumentation located in the Control Room.

However, there is a common enclosure (a red instrumentation raceway) which runs through both the Cable Spreading Room and Containment Spray Additive Area. The conductors in that enclosure are prevented from presenting a fire hazard in the alternative shutdown instrumentation panels by the fire stops

placed between the new panels and the fire zones of concern. Since these conductors are routed in instrumentation raceways, there are no conductors in these enclosures which have sufficient energy to induce a failure remote from the fire zones of concern.

With the proposed modifications to the DG circuits, effective electrical isolation of the necessary power and control circuits is obtained when in the "local" mode of operation, as well as electrical protection at the respective power distribution buses. The fire barrier separation between the active alternative shutdown circuits and the fire zones of concern effectively resolves any concerns regarding fire propagation.

Likewise, the method of control proposed for CVCS and AFW (local manual) resolves any concerns regarding associated circuits by common enclosures by eliminating fire propagation paths and assuring electrical protection and separation from the areas of concern.

Request (n)

> Show that fire-induced failures (hot shorts, open circuits or short 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.

Response (n)

Post-fire maloperation is prevented by the added isolation/transfer switches (these switches will electrically

isolate the alternative shutdown conductors from the fire zones of concern), the de-energization of unnecessary dc and ac control power circuits at distribution panels, the provisions for alternative shutdown electrical power from sources which will be electrically protected and coordinated, and the separation of the alternative shutdown circuits from the fire zones of concern by fire barriers.

TABLE 4-1
SAFE SHUTDOWN INSTRUMENTS

Unit	Instrument Number	Cable Number	Description	Channel
1	1-TE451B	WK1SPR09	Reactor coolant hot leg temp.	Red
	1-TE451C	WK1SPR10	Reactor coolant cold leg temp.	
	1-PT483	ZK1I483	Steam generator "B" pressure transmitter (W.R.)	
	1-LT470A	ZK1I470	Steam generator "B" level transmitter (W.R.)	
	1-PT420	ZK1I420	RCS pressure transmitter (W.R.)	
	1-LT426	ZK1I426	Pressurizer level transmitter	
2	2-TE451B	WP2I451	Reactor coolant hot leg temp.	Red
	2-TE451C	WP2I451	Reactor coolant cold leg temp.	
	2-PT483	ZP2I483	Steam generator "B" pressure transmitter (W.R.)	
	2-LT470A	ZP2I470	Steam generator "B" level transmitter (W.R.)	
	2-PT420	ZP2I420	RCS pressure transmitter (W.R.)	
	2-LT426	ZP2I426	Pressurizer level transmitter	

TABLE 4-1 (continued)
SAFE SHUTDOWN INSTRUMENTS

Unit	Instrument Number	Cable Number	Description	Channel
1	1-TE450D	WL1I450	Reactor coolant hot leg temp.	White
	1-TE450A	WL1I450	Reactor coolant cold leg temp.	
	1-PT469	ZL1I469	Steam generator "A" pressure transmitter (W.R.)	
	1-LT460B	ZL1I460	Steam generator "A" level transmitter (W.R.)	
	1-PT420A	ZL1I420	RCS pressure transmitter (W.R.)	
	1-LT427	ZL1I427	Pressurizer level transmitter	
2	2-TE450D	WQ2I450	Reactor coolant hot leg temp.	White
	2-TE450A	WQ2I450	Reactor coolant cold leg temp.	
	2-PT469	ZQ2I469	Steam generator "A" pressure transmitter (W.R.)	
	2-LT460B	ZQ2I460	Steam generator "A" level transmitter (W.R.)	
	2-PT420A	ZQ2I420	RCS pressure transmitter (W.R.)	
	2-LT427	ZQ2I427	Pressurizer level transmitter	

TABLE 4-2

CVCS CHARGING PUMPS POWER AND CONTROL CABLES

Unit	Pump	Cable	Description	Modification
1	1P2A	ZA1B13AA	Main Power	Kirk key inserted
		ZA1B13AB	Start & Stop Ckts	
		ZA1B13AC	Control Room Control Ckts	
		ZA1B13AF	Red Light Ckt	
1	1P2B	ZA1B13BA	Main Power	
		ZA1B13BB	Start & Stop Ckts	
		ZA1B13BC	Control Room Control Ckts	
		ZA1B13BF	Red Light Ckt	
1	1P2C	ZB1B20AA	Main Power	Rerouted
		ZB1B20AB	Start & Stop Ckts	Rerouted
		ZB1B20AC	Control Room Ckts	Rerouted
		ZB1B20AF	Red Light Ckt	Rerouted
2	2P2A	ZC2B37AA	Main Power	Rerouted & Kirk key inserted
		ZC2B37AB	Start & Stop Ckts	Rerouted
		ZC2B37AC	Control Room Control Ckts	Rerouted
		ZC2B37AF	Red Light Ckt	Rerouted
2	2P2B	ZC2B37BA	Main Power	Rerouted
		ZC2B37BB	Start & Stop Ckts	Rerouted
		ZC2B37BC	Control Room Control Ckts	Rerouted
		ZC2B37BF	Red Light Ckt	Rerouted
2	2P2C	ZD2B28AA	Main Power	
		ZD2B28AB	Start & Stop Ckts	
		ZD2B28AC	Control Room Control Ckts	
		ZD2B28AF	Red Light Ckt	

Table 4-3

EXTERNAL POWER AND CONTROL CABLES TO EMERGENCY GENERATOR ROOM

Cable	Conductor	Function	Purpose	From	To	Disconnected by existing transfer switch	Disconnected by modified transfer switch	Transferred to modified power cable by new transfer switch
ZE1A60E [ZF1A66E]	11	ESTX/G01 [G02] D.G.Stop	Trip SWGR 1A52-60 [1A52-66]	C34 [C35]	C02	X		
	7E,7F	FSX/G01 [G02] D.G. Auto Start	Close SWGR 1A52-60 [1A52-66]					
ZE2A73E [ZF2A67E]	11	ESTX/G01 [G02] D.G.Stop	Trip SWGR 2A52-73 [2A52-67]	C34 [C35]	C02	X		
	7E,7F	FSX/G01 [G02] D.G. Auto Start	Close SWGR 2A52-73 [2A52-67]					
ZEG0101R [ZFG0201R]	F1Y9,S1AX	43/G01 [G02] Auto Start Selector Sw.	Auto Start Sw. Ckt #1	C34 [C35]	C02	X		
	F1J,S1AX	1/G01[G02], 43/G01[G02] Start Exercise	Exercise Start Sw. Ckt #1					
	F2Y9,S2AX	43/G01[G02] Auto Start Selector Sw.	Auto Start Sw. Ckt #2					
	S2X,S2AX	1/G01[G02], 43/G01[G02] Start Exercise	Exercise Start Sw. Ckt #2					
ZEG0101S [ZFG0201S]	CGL9,CP9	90G/G01 [G02] Lower	Governor Control Ckt.	C34 [C35]	C02	X		
	CGR9,CP9	90G/G01 [G02] Raise	Governor Control Ckt.					
	CAJ,CP9	Field Flash	Field Flash Ckt.					
	CAT9,CP9	1/G01 [G02] Stop	Stop Ckt.					
	RL,LCX	90V/G01 [G02] Lower	Voltage Regulation Ckt.					
	RR,LCX	90V/G01 [G02] Raise	Voltage Regulation Ckt					
SEG0101D [ZFG0201D]	KD,CN9 KX,CN9	Green Light Yellow Light	Ready for Load Running	C34 [C35]	C02	X		
ZEG0101N [ZFG0201N]	CCO,CC	43/G01 [G02] Exercise	Exercise Mode CT-7 Short Ckt.	C34 [C35]	C02	X		
ZE2A5-01F [ZF2A6-01F]	14,16,18	Metering	V,W,F,Var Meters	C34 [C35]	C02	X		

Table 4-3 (continued)

EXTERNAL POWER AND CONTROL CABLES TO EMERGENCY GENERATOR ROOM

Cable	Conductor	Function	Purpose	From	To	Disconnected by existing transfer switch	Disconnected by modified transfer switch	Transferred to modified power cable by new transfer switch
ZE2A5-01E [ZF2A6-U1E]	5,7,9,0	Metering	A,W,Var Meters	C34 [C35]	C02	X		
ZFD1820A [ZFD1620A	P,N	DC Power Source	Start Ckt. #2	C34 [C35]	D18 [D16]			X
ZED1128A [ZFD1328A]	P,N	DC Power Source	Generator Field Flash	C34 [C35]	D11 [D13]			X
ZED1211A [ZFD141A]	P,N	DC Power Source	Start Ckt #1	C34 [C35]	D12 [D14]			X
ZED1201A [ZFD1401A]	P,N	DC Power Source	Engine Stop and Governor	C34 [C35]	D12 [D14]			X
ZEG0101F [ZFG0201F]	S1PA S2PA	Under Voltage Signal	Auto Start Ckt #1 & Ckt #2	C34 [C35]	1A05 [1A06]		X	
ZEG0101H [ZFG0201H]	S2PA S1PA	Safeguard Accident Signal	Auto Start Ckt. #1 & Ckt. #2	C34 [C35]	1C157 [1C167]		X	

Table 4-3 (continued)

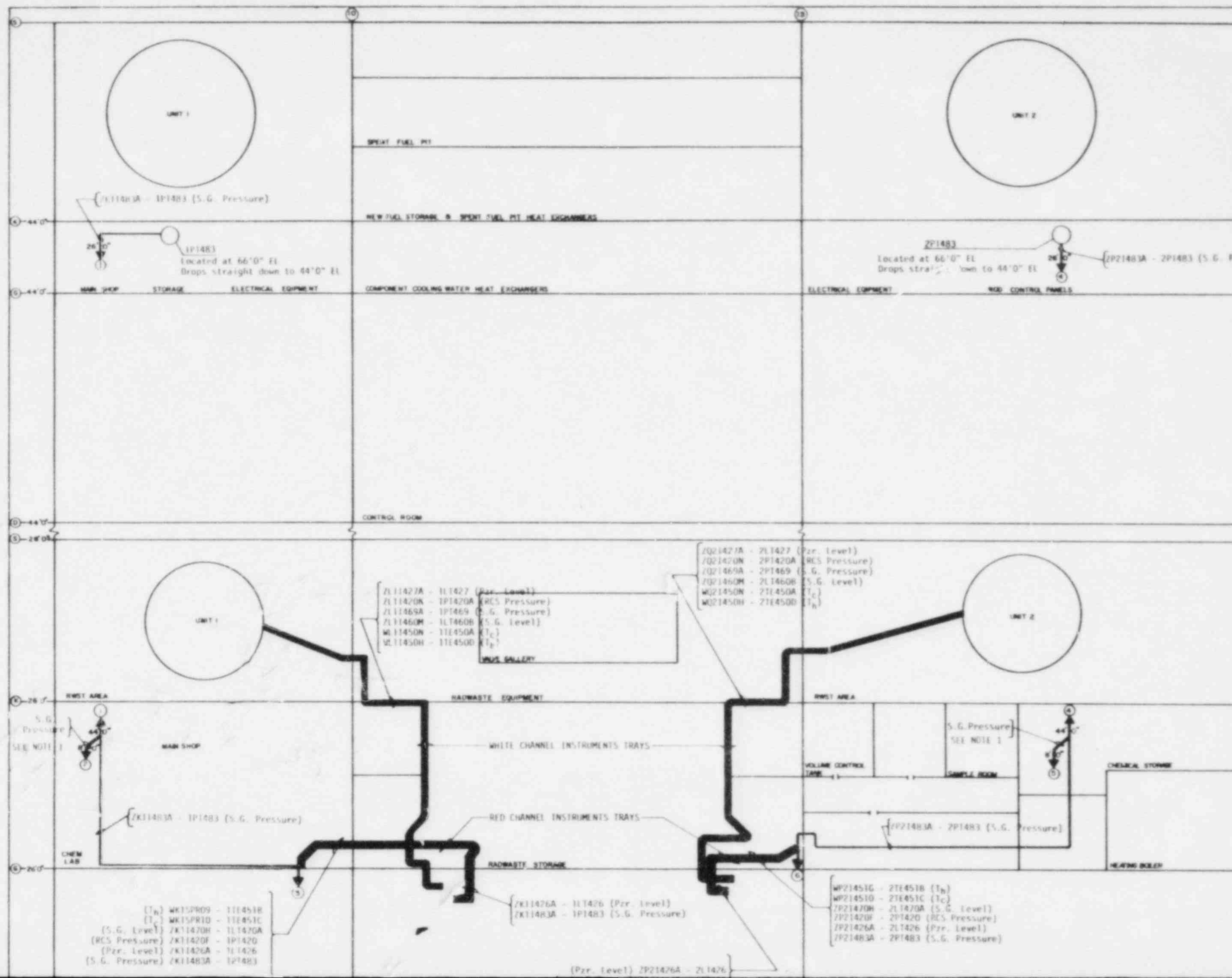
EXTERNAL POWER AND CONTROL CABLES TO EMERGENCY GENERATOR ROOM

Cable	Function	Purpose	From	To
D1213A [D1413A]	DC Power Source	DG Annunciator	C34 [C35]	D12 [D14]
ZE1A60D [ZF1A66D]	ESTX DG Stop	To Trip 1A52-60 [1A52-66]	C34 [C35]	1A05 [1A06]
ZE1A60A [ZF1A66A]	DG Main Power Cables	Feed to 4.16 KV Bus 1A05 [1A06]	G01 [G02]	1A05 [1A06]
ZE2A73D [ZF2A67D]	ESTX DG Stop	To Trip 2A52-73 [2A52-67]	C34 [C35]	2A05 [2A06]
ZE2A73A [ZF2A67A]	DG Main Power Cables	Feed to 4.16 KV Bus 2A05 [2A06]	G01 [G02]	2A05 [2A06]
ZEG0101G [ZFG0201G]	Undervoltage Signal	To Start DG	2A05 [2A06]	1A05 [1A06]
G0101L [G0201L]	Power	Space Heater	G01 [G02]	7L
ZE23211MA [ZE14210MA]	Power	Fuel Line MOV3930 [MOV3931]	MOV3930 [MOV3931]	MCC 2B32 [MCC1B42]
ZE23211MB [ZF14210MB]	Control	MOV3930 [MOV3931] Limit Switches	MOV3930 [MOV3931]	MCC2B32 [MCC1B32]
ZF1429KA [ZE2329KA]	Power	DG Air Compressor	K5A [K5B]	MCC1B42 [MCC2B32]
ZF1429KB [ZE2329KB]	Control	Manual or Auto Start of DG Air Compressor	C64 [C65]	MCC1B42 [MCC2B32]
ZE1329KA [ZF2429KA]	Power	DG Air Compressor	K4A[K4B]	MCC1B32 [MCC2B42]
ZE1329KB [ZF2429KB]	Control	Manual or Auto Start of DG Air Compressor	C64[C65]	MCC1B32 [MCC2B42]
G0101K [G0201K]	Power	Lube Oil CPM and immersion Heater	C64 [C65]	PP3
ZE1329MA [ZF2429MA]	Power	To Fuel Transfer pumps P70A [P70B]	P70A [P70B]	MCC1B32 [MCC2B42]

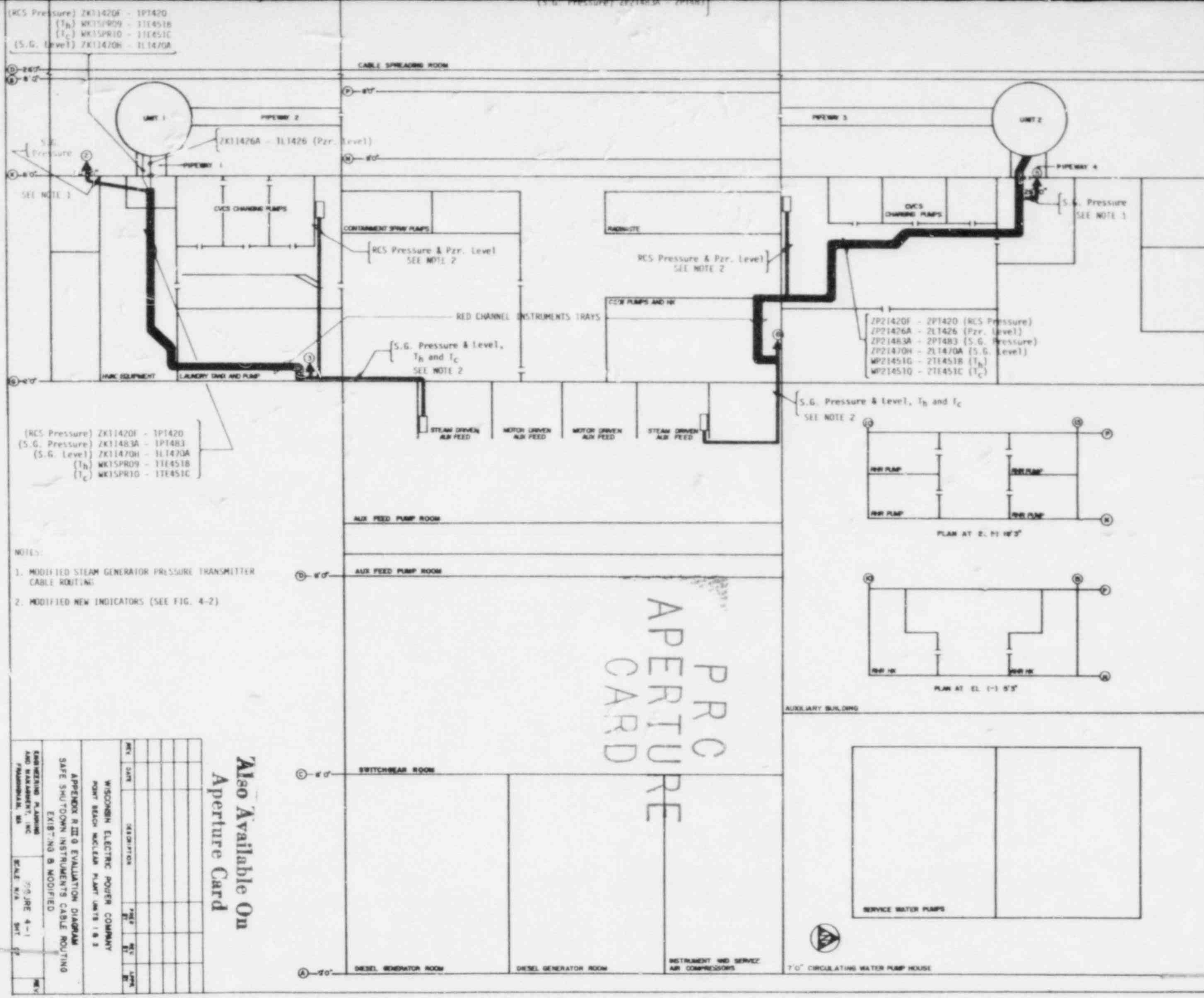
Table 4-3 (continued)

EXTERNAL POWER AND CONTROL CABLES TO EMERGENCY GENERATOR ROOM

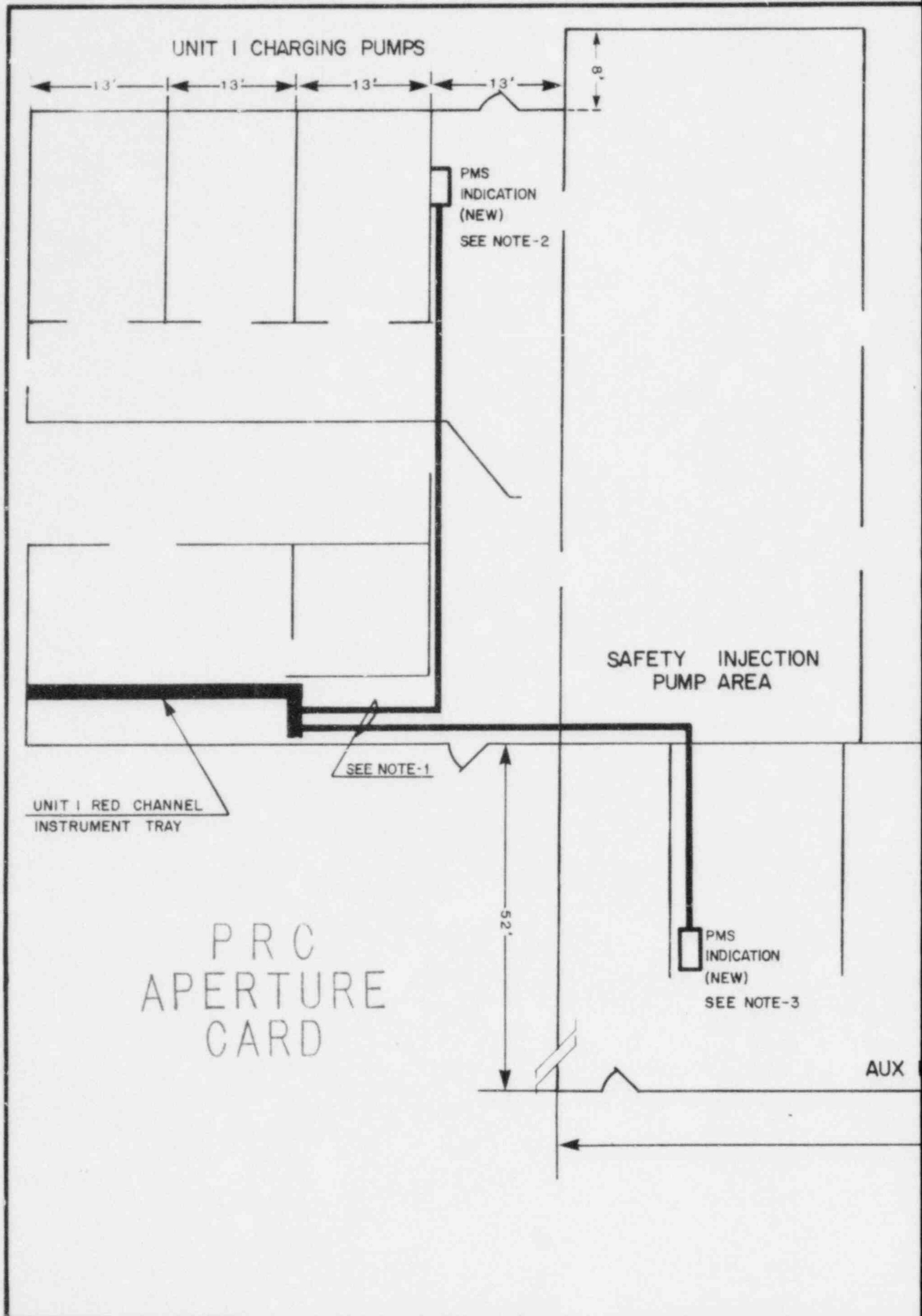
Cable	Function	Purpose	From	To
ZE1329MB [ZF2429MB]	Control	Manual or Auto Start of Fuel Transfer Pumps	P70A [P70B]	C01
ZENA010A [ZFNB009A]	Control	DG Day Tank Limit Switch High Level	LS3930A [LS3931A]	C01
ZENA010B [ZFNB009B]	Control	DG Day Tank Limit Switch Low Level	LS3930B [LS3931B]	C01



UNIT 1
UNIT 2
SPENT FUEL PIT
NEW FUEL STORAGE & SPENT FUEL PIT HEAT EXCHANGERS
ZKI1483A - 1PT483 (S.G. Pressure)
1PT483
Located at 66'0" EL
Drops straight down to 44'0" EL
2PT483
ZP21483A - 2PT483 (S.G. Pressure)
MAIN SHOP
STORAGE
ELECTRICAL EQUIPMENT
COMPONENT COOLING WATER HEAT EXCHANGERS
ROD CONTROL PANELS
CONTROL ROOM
ZLI1427A - 1LT427 (Pzr. Level)
ZLI1420N - 1PT420A (RCS Pressure)
ZLI1469A - 1PT469 (S.G. Pressure)
ZLI1460M - 1LT460B (S.G. Level)
WLI1450N - 1TE450A (Tc)
VLI1450H - 1TE450D (Th)
VALVE GALLERY
ZQ21427A - 2LT427 (Pzr. Level)
ZQ21420N - 2PT420A (RCS Pressure)
ZQ21469A - 2PT469 (S.G. Pressure)
ZQ21460M - 2LT460B (S.G. Level)
WQ21450N - 2TE450A (Tc)
WQ21450H - 2TE450D (Th)
RWST AREA
RADWASTE EQUIPMENT
S.G. Pressure
SEE NOTE 1
WHITE CHANNEL INSTRUMENTS TRAYS
VOLUME CONTROL TANK
SAMPLE ROOM
CHEMICAL STORAGE
RED CHANNEL INSTRUMENTS TRAYS
ZKI1483A - 1PT483 (S.G. Pressure)
ZP21483A - 2PT483 (S.G. Pressure)
CHEM LAB
RADWASTE STORAGE
HEATING BOILER
ZKI1426A - 1LT426 (Pzr. Level)
ZKI1483A - 1PT483 (S.G. Pressure)
(Th) WKISPR09 - 1TE451B
(Tc) WKISPRID - 1TE451C
(S.G. Level) ZKI1470H - 1LT420A
(RCS Pressure) ZKI1420F - 1PT420
(Pzr. Level) ZKI1426A - 1LT426
(S.G. Pressure) ZKI1483A - 1PT483
WP21451G - 2TE451B (Th)
WP21451D - 2TE451C (Tc)
ZP21470H - 2LT470A (S.G. Level)
ZP21420F - 2PT420 (RCS Pressure)
ZP21426A - 2LT426 (Pzr. Level)
ZP21483A - 2PT483 (S.G. Pressure)
(Pzr. Level) ZP21426A - 2LT426



8311020097-21



PRC
APERTURE
CARD

P025

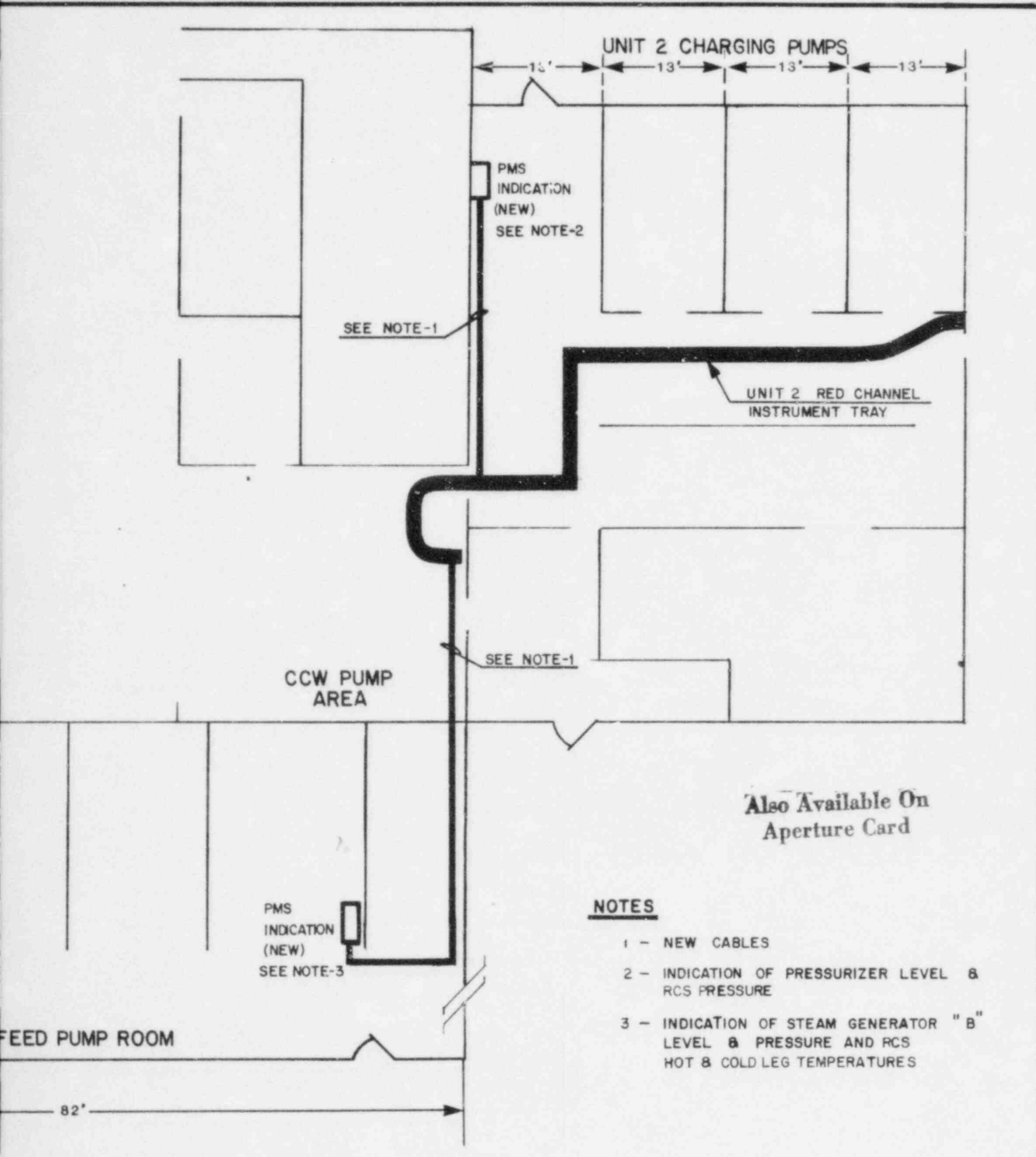
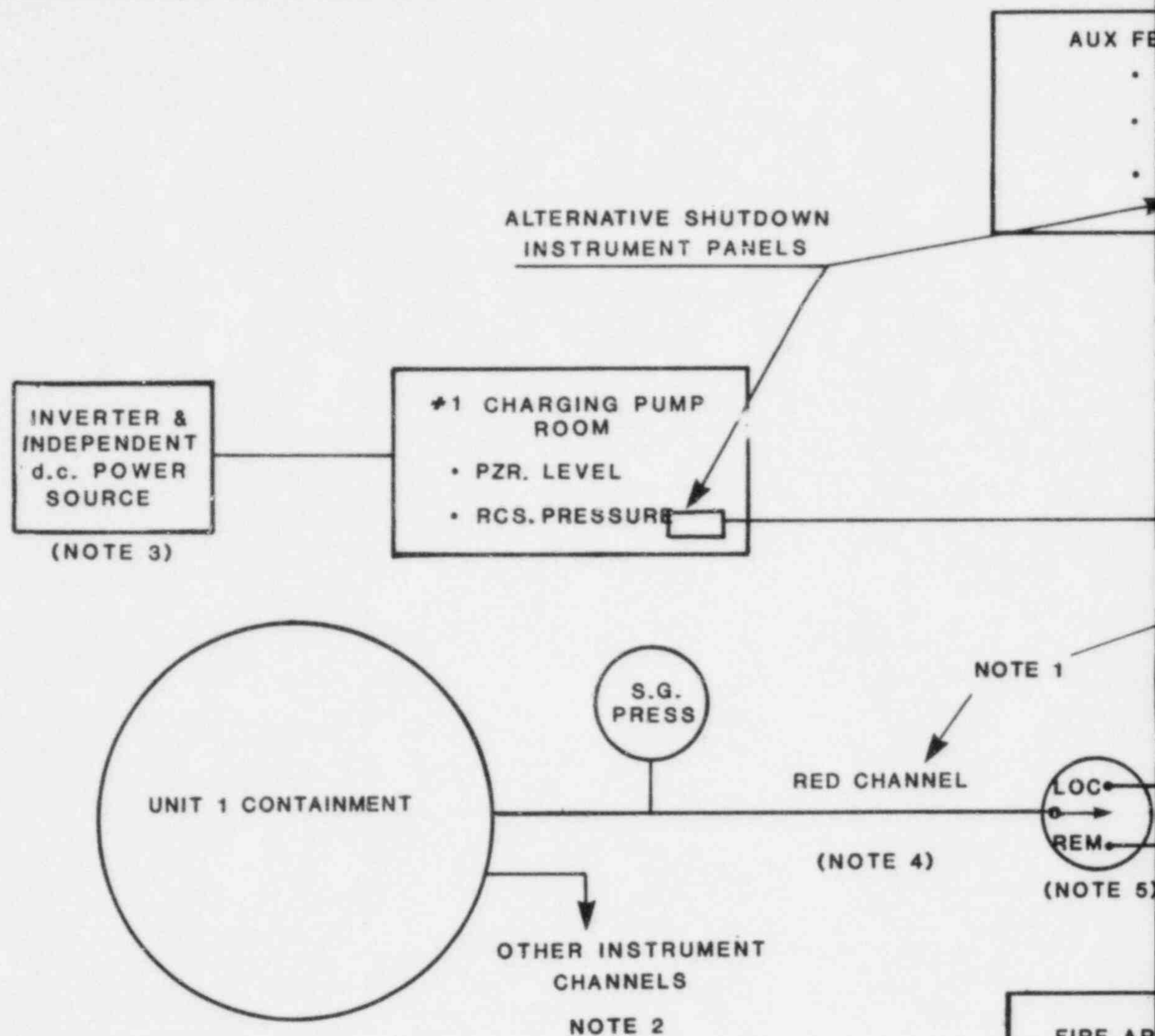
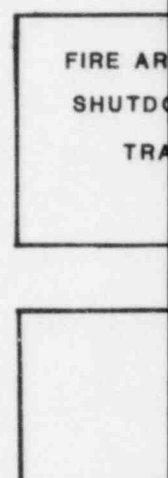


FIG. 4-2:

ALTERNATIVE SHUTDOWN INSTRUMENTS AT 8 FT. ELEVATION (DETAIL)

8311020097-22

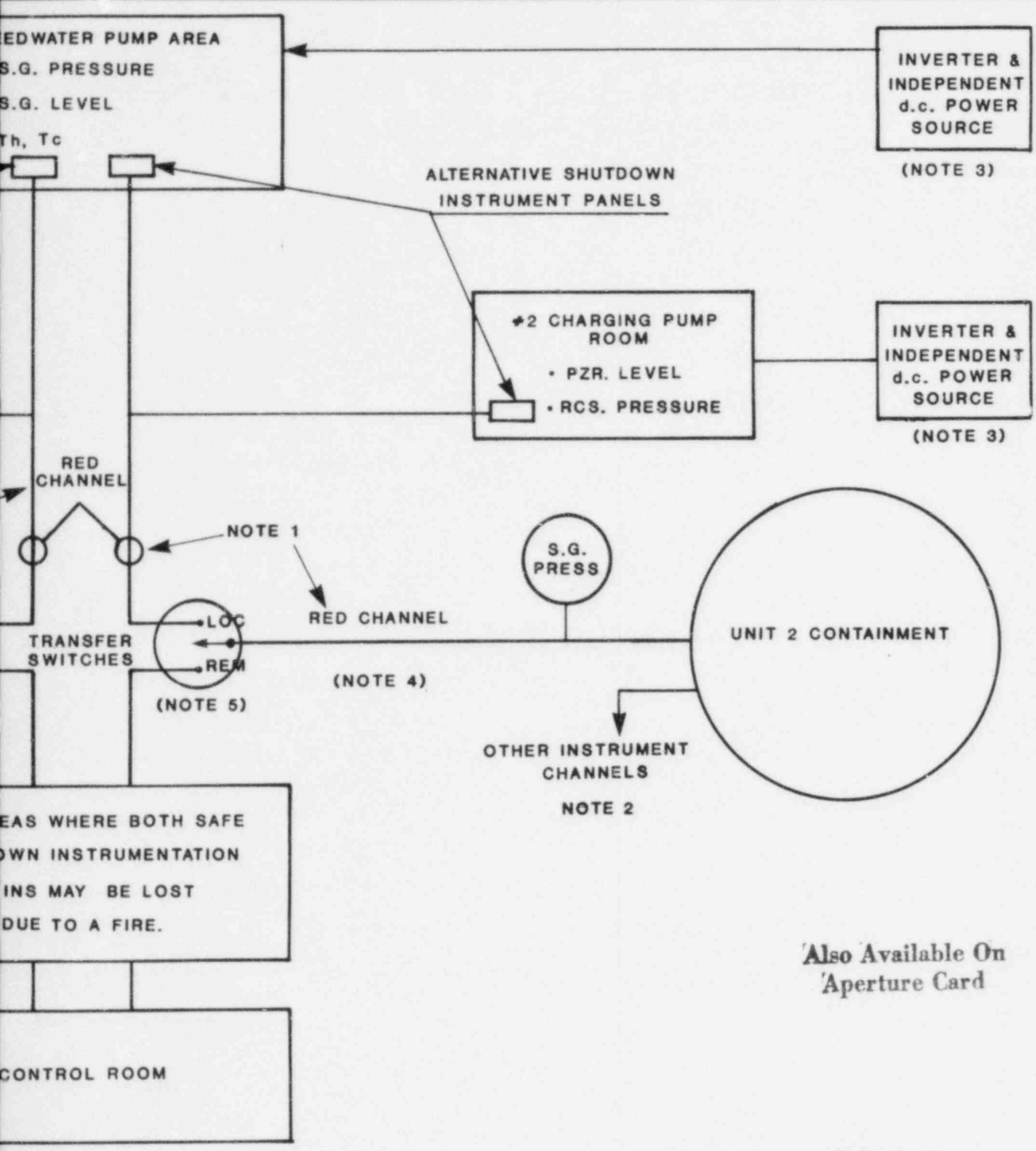




NOTES:

1. ELEVATION 8' 0"
2. AT LEAST ONE CHANNEL PER INSTRUMENT IS OUTSIDE THE AREAS OF THE ALTERNATIVE INSTRUMENT ROUTING.
3. INDEPENDENT d.c. POWER SUPPLY WILL BE PROVIDED
4. SAFE SHUTDOWN INSTRUMENTS FOR EACH UNIT WILL BE PZR LEVEL RCS PRESSURE, STEAM GEN. LEVEL & PRESSURE, HOT LEG AND COLD LEG TEMPERATURE
5. TRANSFER SWITCH WILL PROVIDE POSITION INDICATION IN THE CONTROL ROOM WHEN IN LOCAL POSITION

P025

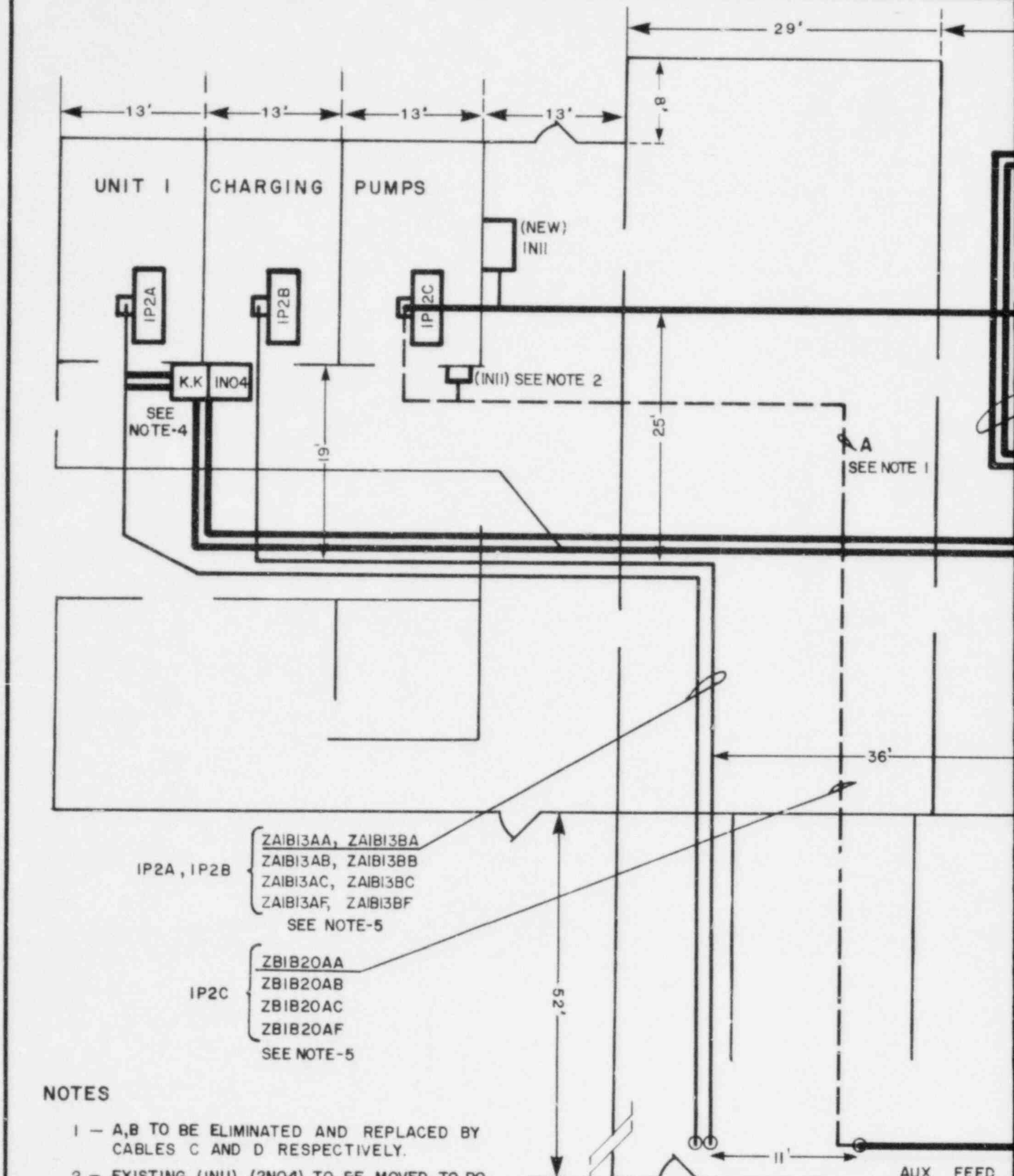


Also Available On
Aperture Card

FIG. 4-3:

CONCEPTUAL ELECTRICAL SCHEMATIC OF PROPOSED INSTRUMENTATION MODIFICATIONS FOR ALTERNATIVE SHUTDOWN SYSTEM

PRC
APERTURE
CARD



NOTES

1 — A,B TO BE ELIMINATED AND REPLACED BY CABLES C AND D RESPECTIVELY.

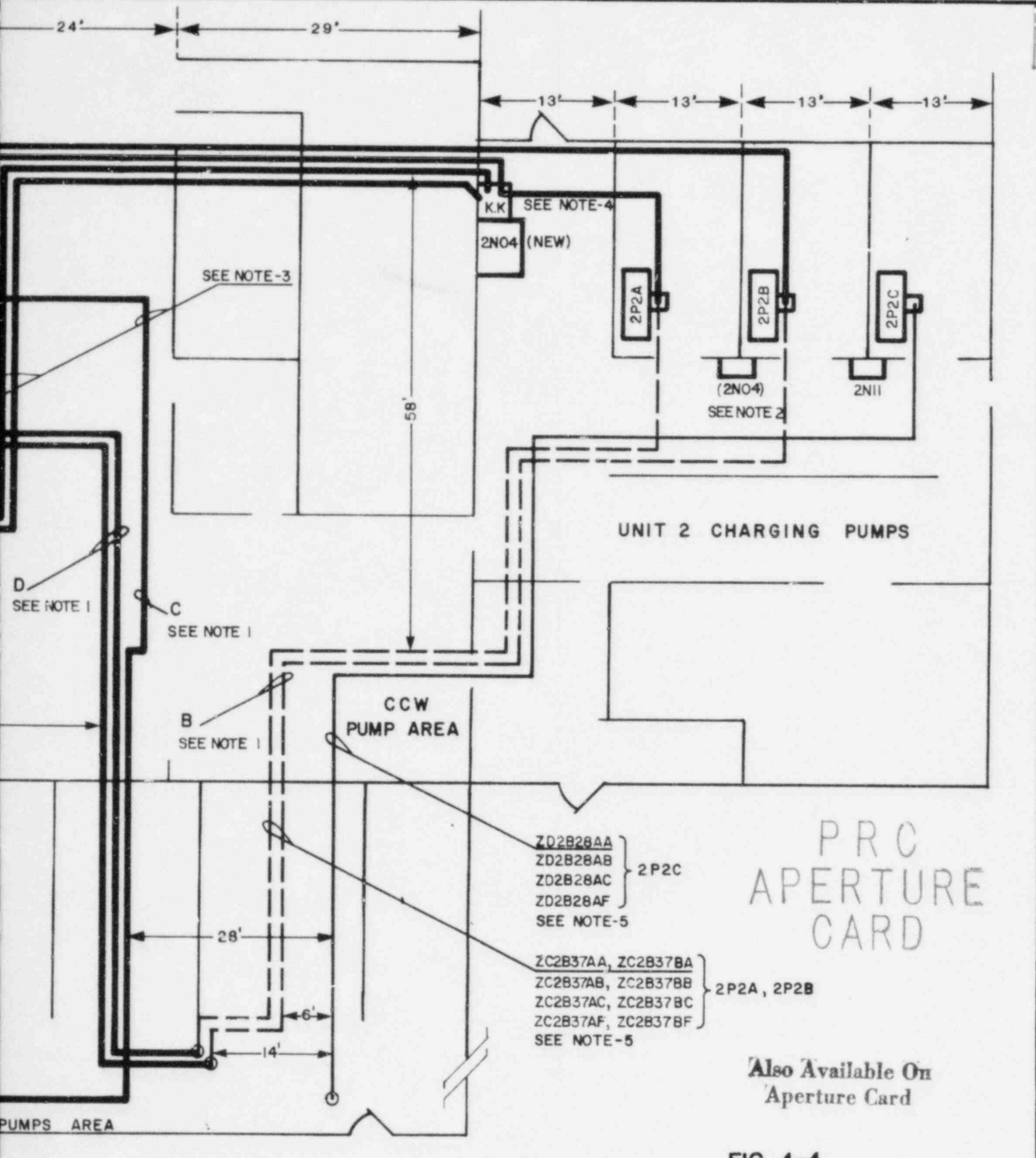
2 — EXISTING (INII), (2NO4) TO BE MOVED TO POSITIONS INDICATED AS INII, 2NO4.

3 — THESE HEAVY LINES INDICATE NEW OR REROUTED CABLES.

4 — K.K. IS KIRK KEY BEAKER.

5 — POWER CABLE(S)...ABOVE THE LINE. CONTROL CABLES...BELOW THE LINE

P025



PRC APERTURE CARD

Also Available On Aperture Card

FIG. 4-4

CVCS CHARGING PUMP EXISTING AND MODIFIED POWER AND CONTROL CABLE ROUTING

8311020097-24

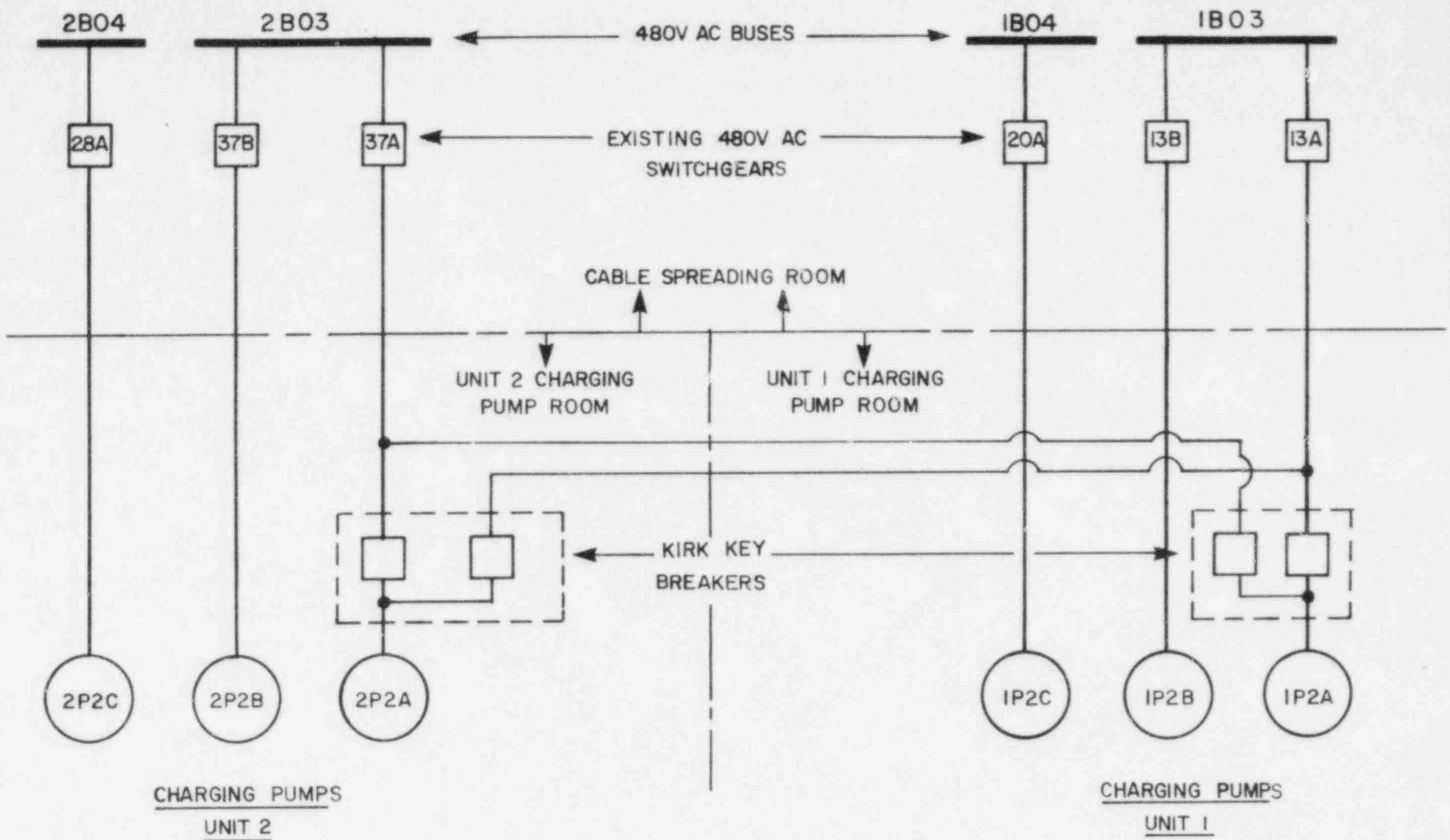
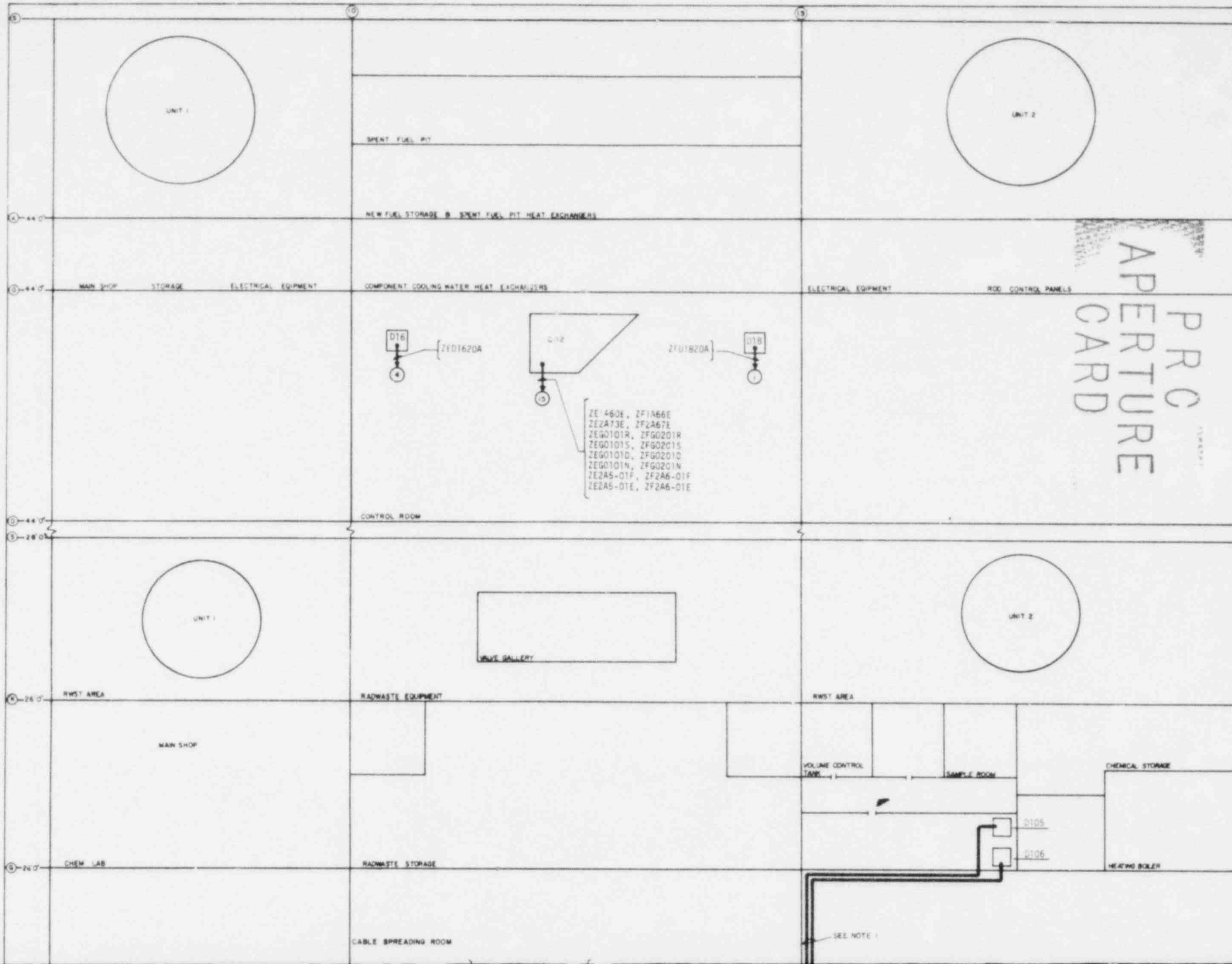


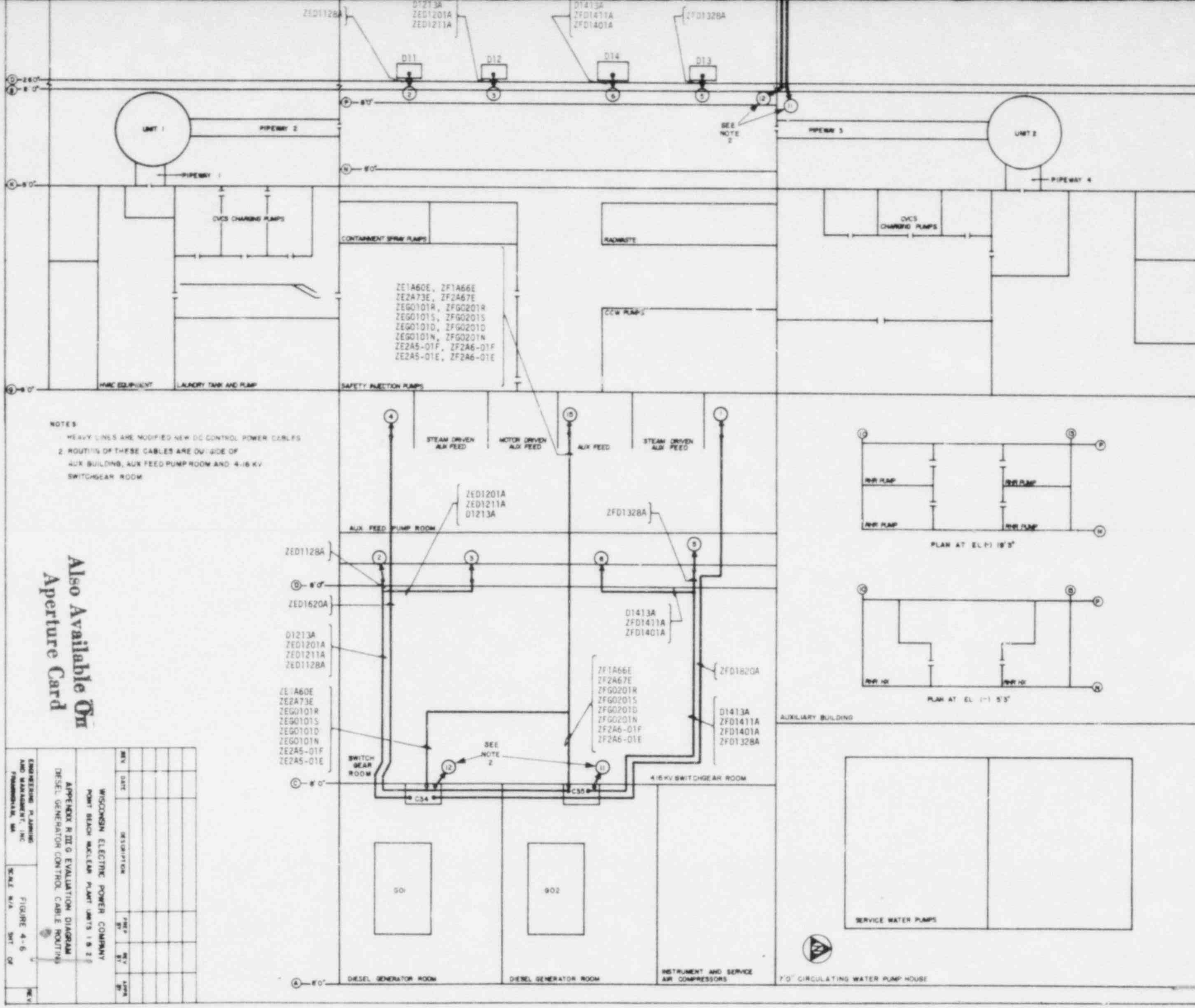
FIG. 4-5:

KIRK KEY BREAKER MODIFICATIONS TO THE CHARGING PUMP POWER CIRCUITS

P025

PRC
APERTURE
CARD



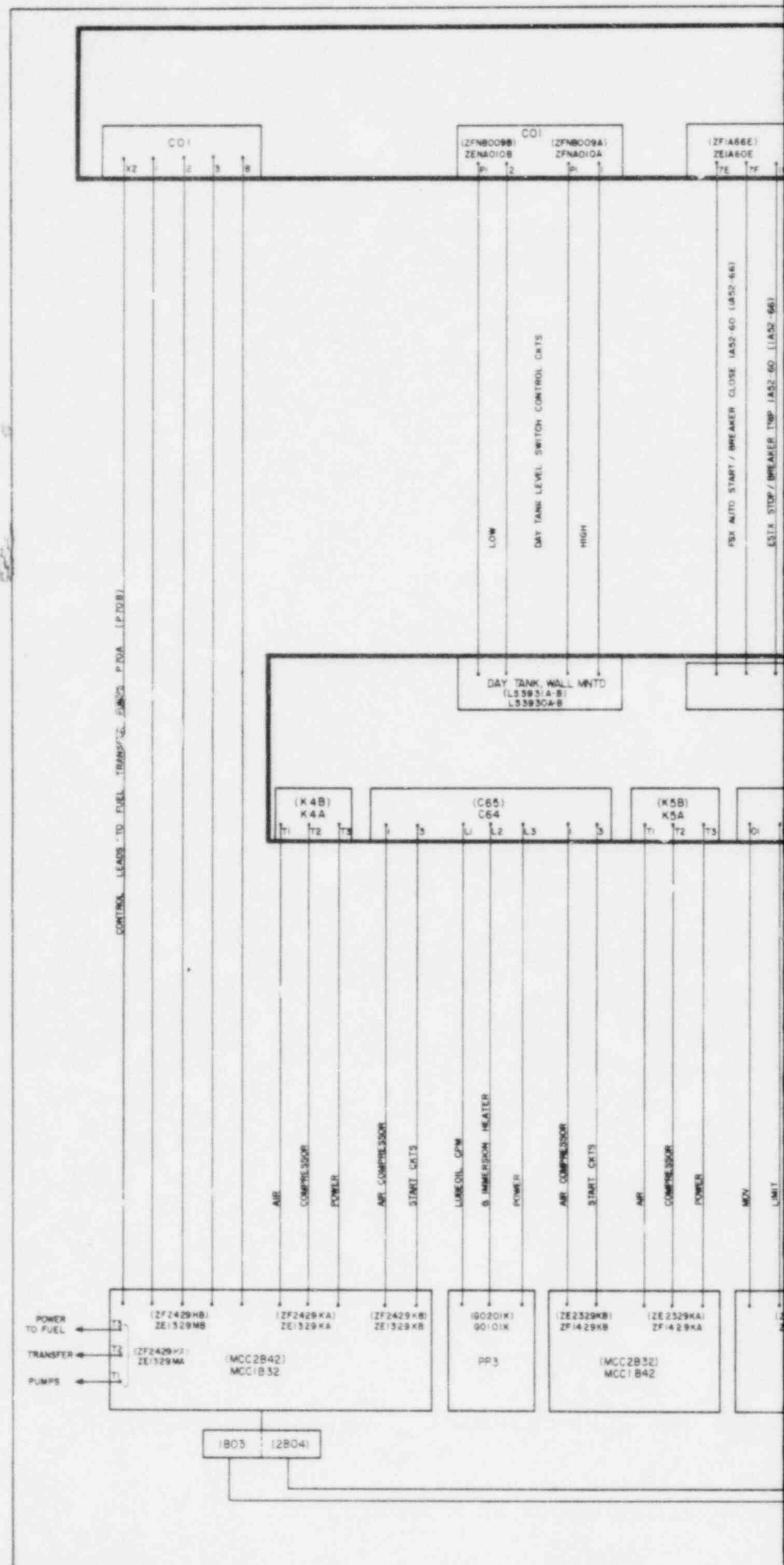


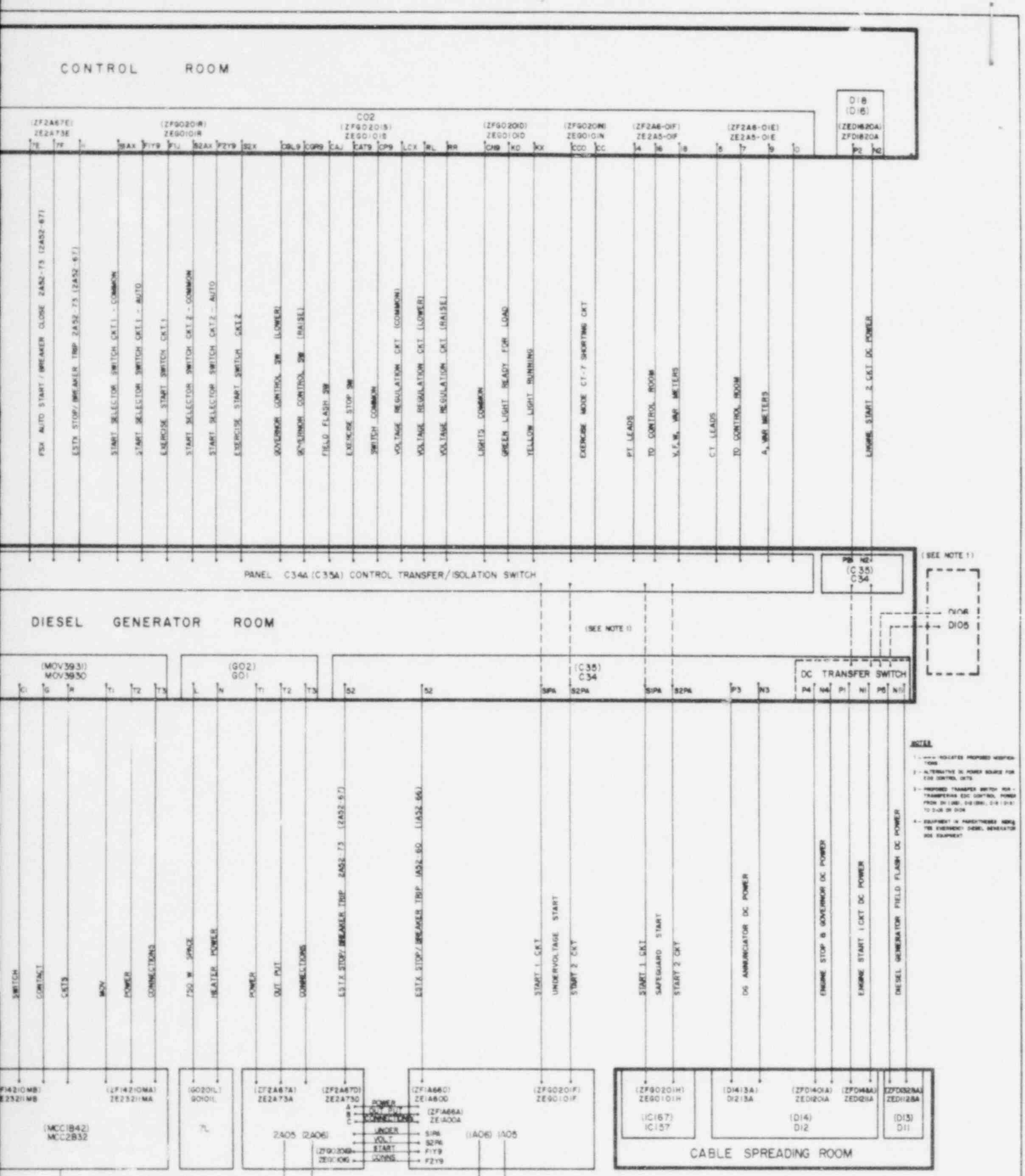
Also Available On Aperture Card

8311020097-25

PRC
APERTURE
CARD

Also Available On
Aperture Card





WISCONSIN ELECTRIC POWER COMPANY

POINT BEACH NUCLEAR PLANT UNITS 1 & 2

FIG 4-7

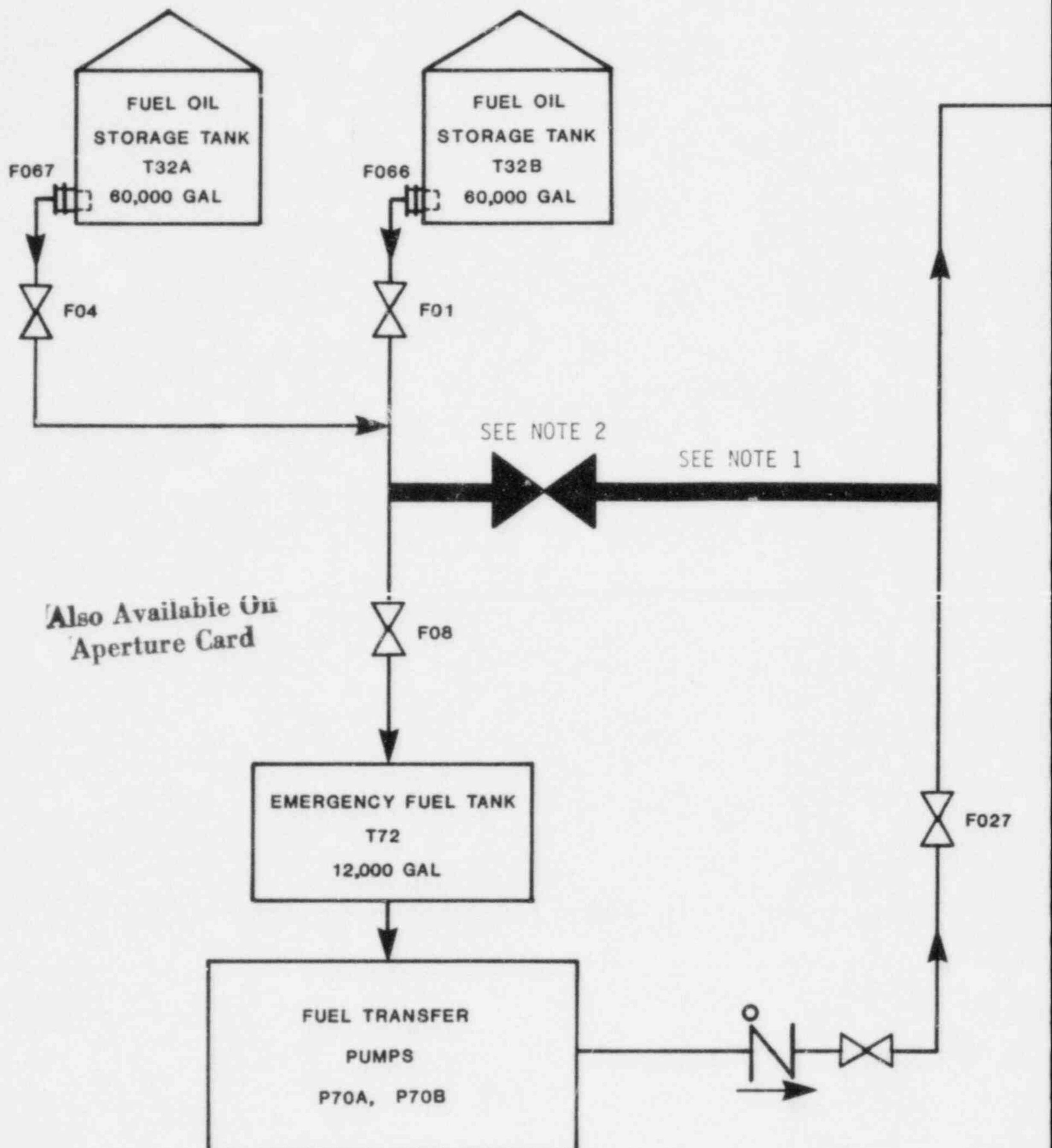
EMERGENCY GENERATOR EXTERNAL POWER AND CONTROL CABLE BLOCK DIAGRAM

Engineering Planning and Management, Inc. Framingham, MA

REV NO	DATE	DESCRIPTION	PREP BY	REV BY	APPR BY
0	10/83	Issued			

DWG NO | REV 0 | SCALE

8311020097 -26



Also Available On
Aperture Card

NOTES:

1. HEAVY LINES INDICATE PROPOSED FUEL LINE MODIFICATIONS
2. MANUALLY OPERATED VALVES

REFERENCE DWG. WEPCo 6118 M219 REV 12

LEGEND:

NORMALLY OPEN VALVE

NORMALLY CLOSED VALVE

MOV M ELECTRICAL MOTOR-OPERATED VA

P025

PRC
APERTURE
CARD

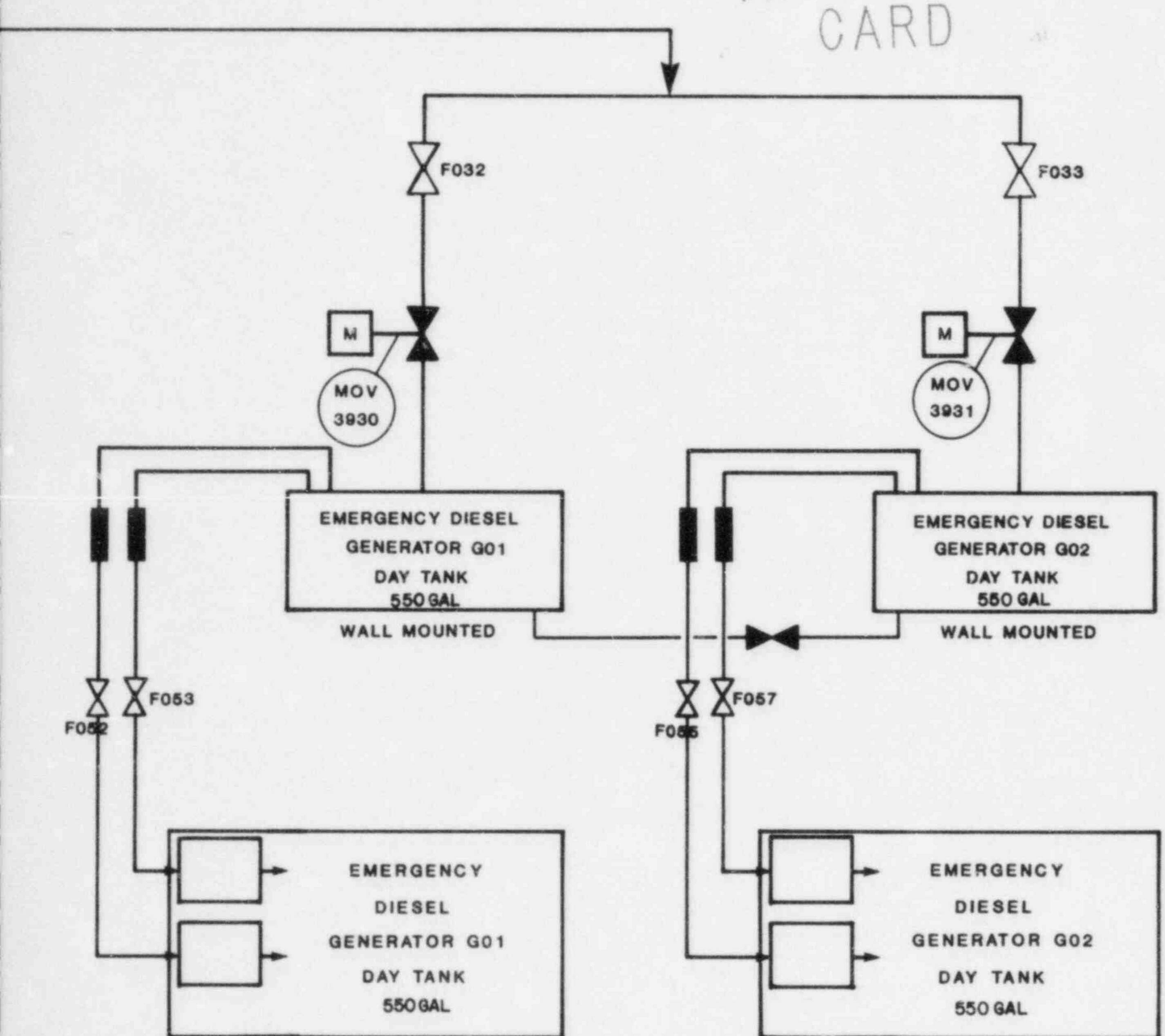


FIG. 4-8

EMERGENCY DIESEL GENERATOR
FUEL LINE MODIFICATION

LVE

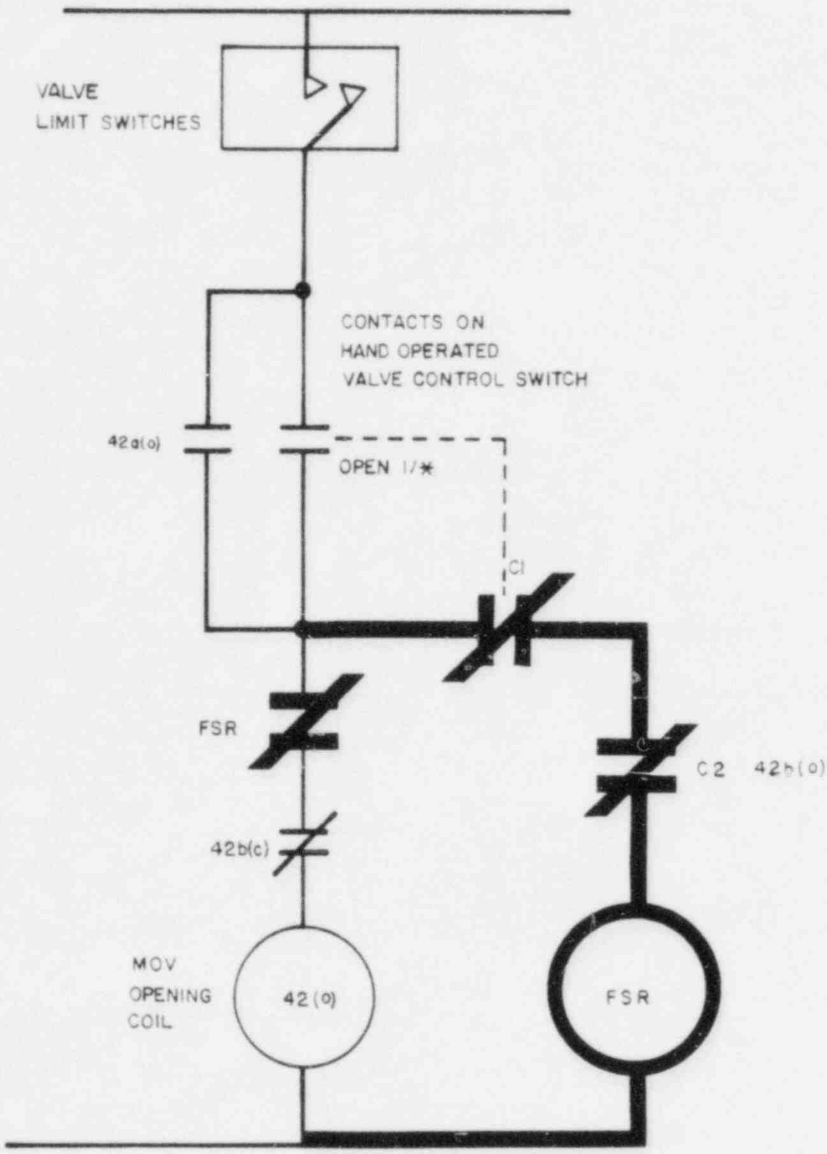


FIG. 4-9

FIRE SAFE RELAY MODIFICATION FOR EXCESS LETDOWN ISOLATION VALVES (1,2 MOV 1299)

SECTION FIVE

SAFE SHUTDOWN SCENARIO AND TIMETABLE

5. SAFE SHUTDOWN SCENARIO AND TIMETABLE

5.1 Introduction

The safe shutdown scenario provided in this section is based on a worst-case fire affecting the Control Room which requires the use of alternative shutdown methods independent of the Control Room. The equipment and personnel used in the scenario are the minimum necessary to achieve stable hot shutdown. It is assumed per established Point Beach procedures that additional personnel will become available for operating, maintaining and repairing equipment necessary to perform plant cooldown and subsequently achieve cold shutdown. The scenario presented in this section will be integrated into safe shutdown procedures for Point Beach.

5.2 Assumptions

Previous discussions highlight the components required for achieving safe shutdown using the following assumptions:

(1) The units are operating at 100% power upon the occurrence of a fire.

(2) The reactors are tripped either manually or automatically.

(3) As a limiting condition the loss of off-site power causes the 345kV to 4kV breakers to open. These breakers must be manually closed which precludes the possibility of off-site power spuriously returning and energizing the 4kV switchgear.

(4) No additional single failures are considered other than the loss of off-site power and those directly attributable to the fire.

(5) No equipment required for safe shutdown is assumed to be out-of-service.

(6) All MSIV's will go closed.

(7) All motor operated valves will be available for manual operation when de-energized.

(8) All required mechanical components (valves etc.) are assumed operable and free of damage due to fire.

(9) Electrically dependent components (pumps, Mcc's etc.) will have power cables available. No control power will be assumed available.

5.3 Definitions

Hot Shutdown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature $\geq 540^{O}F$.

Cooldown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature between $540^{O}F$ and $200^{O}F$.

Cold Shutdown - Reactor at zero power, K_{eff} less than 0.99 and RCS temperature below or equal to $200^{O}F$.

5.4 Acronyms and Abbreviations

AFW - Auxiliary Feedwater

AOV - Air Operated Valve

CCW - Component Cooling Water

CVCS - Chemical and Volume Control System

EPS - Emergency Power System

MCC - Motor Control Center

MOV - Motor-Operated Valve

MS - Main Steam

PORV - Power-Operated Relief Valve

RCP - Reactor Coolant Pump

RCS - Reactor Coolant System

RHR - Residual Heat Removal

RWST - Refueling Water Storage Tank

SV - Safety Valve

5.5 Manual Action and Repairs

As stated in Section 1.4.2 of this report, the Mattson to Vollmer memorandum addresses two issues concerning cold shutdown:

(1) Allowable repairs to achieve safe shutdown; and

(2) Allowable time to acnieve cold shutdown.

Both issues grew out of a lack of definition for the term "repairs" and apparent inconsistencies in requirements for repair and shutdown activities relative to the 72-hour limit. The principal aspects of these issues resolved in this memorandum are as follows:

Repair

(1) Repair activities may not be credited in assuming hot shutdown system availability;

(2) Manual operation of valves, switches, and circuit breakers is not considered to be a repair activity and, hence, is allowable for hot shutdown systems;

(3) Fuse removal (under most circumstances) is considered to be a repair activity and is not allowed for maintaining hot shutdown system availability for mitigating the consequence of potential spurious operation candidates; and

(4) Modifications, e.g., wiring changes, are allowed to cold shutdown systems and/or components which are not used for hot shutdown or are not used to mitigate the consequences of fire or fire suppressant-induced

maloperations that directly affect hot shutdown systems. These repairs must be achievable prior to the maloperations causing an unrecoverable plant condition.

Time

(1) The sum of repair time and cold shutdown time must be less than or equal to 72 hours; and

(2) Off-site power is assumed to be restored after 72 hours.

The manual activities necessary to support cold shutdown are allowed a wider latitude reflecting the greater amount of time and resources available to achieve that condition. Thus, fuse removal for isolation is permissible. Equipment replacement is also permissible if it can be demonstrated as feasible. In this context, feasibility is judged on an individual-case basis considering procedures, available materials, analysis of entry time, and task durations. Repairs must also be of sufficient quality to ensure safe operation. The only requirement for manual operation of alternate shutdown systems is the availability of written procedures to conduct an orderly transfer of control between the remote stations and the Control Room.

5.6 Activities to be Accomplished

Within the first hour post-fire, the following general activities must be accomplished to ensure hot stable shutdown conditions. By performing the actions identified within the designated time frame, neither unit will reach an unrecoverable plant condition.

Communication will be established between the operators performing the described activities. Radios or sound powered phones will be used to provide coordination to ensure the proper sequence of actions and to maintain control of information regarding required plant parameters.

5.6.1 Spurious Valves and Components

Valves whose spurious operation could prevent hot safe shutdown conditions can be de-energized to fail in a safe position or will be de-energized and manually positioned. These valves are listed in Section 5.7.1.

5.6.2 Steam Generator Inventory Control

Sufficient water must be available in the secondary system to provide for initial primary system heat removal. The steam generator code safety valves provide the path for initial heat removal and the auxiliary feed pumps replenish the water inventory due to steam relieved through the safeties. The following components are required to establish steam generators inventory control:

1. Turbine-Driven Auxiliary Feed Pump Steam Inlet Valves
2. Turbine-Driven Auxiliary Feed Pump Recirculation Valves
3. Turbine-Driven Auxiliary Feed Pump Discharge Valves
4. Plant Process Monitoring System (Instrumentation)
5. Auxiliary Feed Pump Turbine Bearing Cooling Water

5.6.3 Support Systems

The auxiliary feed pump turbine bearings require cooling water within the first thirty minutes of operations to avoid bearing failure. In the event that service water is not available, the diesel driven fire pump will supply the auxiliary feed pump turbines of both units with cooling water. Thus, bearing cooling water will be available whenever the turbine-driven auxiliary feed pump is started.

One emergency diesel generator is required for establishing hot shutdown conditions. Breakers can be manually operated, if necessary, to provide power to service water pumps and charging pumps. The service water pumps provide cooling water to the emergency diesel generator and the auxiliary feed pump turbines.

The description of actions required to provide power to electrically dependent safe shutdown equipment indicates use of the Unit 1 emergency diesel generator. Similar action could be taken using the Unit 2 emergency diesel generator. Unit 2 is shown in brackets [ ].

Bus-tie breakers provide further operational flexibility to allow any or all 4kV and 480V buses to be powered from either emergency diesel. Refer to Figure 5.3-1 and 5.3-2 which depict the safe shutdown component breaker alignments and also indicates whether the components are required for hot or cold shutdown.

5.6.4 Primary System Inventory

Primary system inventory control and boration to cold shutdown requirements is accomplished using charging pumps and borated water from the refueling water storage tank (RWST). The suction valve from the RWST will be manually opened after de-energizing the respective valve control power circuit in the Cable Spreading Room. The volume control tank outlet valve will be shut. The breakers for the charging pumps will be closed manually.

5.6.5 Plant Monitoring System

Maintenance and control of various plant operating modes requires indication of certain plant parameters. A minimum set of instruments provides an alternate method of indication and for each unit includes: pressurizer level, reactor coolant system pressure, hot and cold leg temperature and steam generator level and pressure.

5.7 Safe Shutdown Process, Timeline and Manpower Requirements

Using the assumptions and considerations previously presented, a safe shutdown process is presented describing the actions necessary to achieve hot and cold safe shutdown. The process assumes a fire of sufficient severity to cause alternative operation of equipment outside of the Control Room. It is assumed that plant operators will not immediately resort to this process but rather will utilize all plant systems available

post-fire to perform a controlled cooldown to cold shutdown. The actions presented are predicated on the minimum set of safe shutdown equipment and by using this equipment cold shutdown can be achieved. It is also assumed that only three operators are available to perform the initial actions to reach stable hot shutdown. Either as a result of the fire brigade being dismissed or the personnel call-in procedure, other operators will be available to perform cooldown and repairs required for cold shutdown.

5.7.1 Actions Required to Achieve Hot Shutdown

The actions required to achieve stable hot shutdown conditions will be accomplished with three operators (1,2 and 3) within approximately the first hour after the fire alarm is sounded. Before leaving the Control Room, operator 1 will place the manual/auto station for the main steam atmospheric steam dump valves in the manual position for Units 1 and 2. This action will preclude any spurious opening of these valves as a result of fire-induced control circuit failures. Operator 1 will then proceed to the 84 ft elevation to secure the instrument air at the main steam isolation valves (MSIVs) and the main steam atmospheric dump valves for Units 1 & 2. This action will guarantee that spurious opening of these valves will not be caused by a fire-induced control circuit failure. Operator 1 will now establish auxiliary feedwater flow using turbine-driven feed pumps. A fire in the Control Room could have adversely

affected the automatic starting capability of the auxiliary feedwater pumps such that pumps and valves could have spuriously operated. The turbine-driven auxiliary feed pumps are independent of ac power, however, the steam inlet valves and discharge valves are dc controlled. To allow for manual operation the dc control power to these valves will be de-energized.

Operator 2 will proceed to the Cable Spreading Room and perform the following actions:

(1) In dc panel D-12 open the following breakers

- (a) 1208 (2MOV-2019)
- (b) 1206 (1MOV-2019)
- (c) 1212 (2MOV-4001)
- (d) 1210 (1MOV-4001)

(2) In dc panel D-14 open the following breakers:

- (a) 1408 (1MOV-2020)
- (b) 1406 (2MOV-2020)
- (c) 1412 (1MOV-4000)
- (d) 1410 (2MOV-4000)

Operator 1 will proceed to the 46 ft elevation and check closed (or close) steam supply valves 1MOV-2020 and 2MOV-2020 and open steam supply valves 1MOV-2019 and 2MOV-2019. The valves, thus aligned, will provide motive steam to the turbine-driven auxiliary feed pumps of each unit from the "B" steam generators.

Operator 1 will now proceed to elevation 26 ft pipeway 2 and 3 and isolate and vent instrument air to the containment. This will ensure that the pressurizer PORVs and the letdown orifice valves all close on loss of instrument air. Isolation of containment instrument air will prevent any spurious electrical signal from affecting the position of these valves.

Operator 1 will then proceed directly to the auxiliary feed pump room on the 8 ft elevation. The following actions will be performed at each turbine-driven auxiliary feed pump bay:

(1) Establish cooling water flow to the turbine bearings.

(2) Establish steam generator feed flow to the "B" steam generator. (Note: Use recirculation flow path when feed flow is temporarily secured)

(3) Transfer instrumentation to the local station.

Establishing cooling water flow to the turbine is essential to prevent bearing failure. Service water pumps (normal cooling water) or the diesel driven fire pumps will supply turbine bearing cooling water which requires a manual valve manipulation at the auxiliary feed pumps. The diesel-driven fire pump will auto-start on low service water pressure and provide cooling water to the turbine-driven auxiliary feed pump bearings. No operator action except for the manual valve line-up at the auxiliary feed station is required. Operator 1 will have controlled feed flow established to both units in approximately 22 minutes.

The "B" steam generators of each unit are being supplied with feed flow and are providing motive steam to the auxiliary feed pump turbines. The alternate instrumentation monitors the "B" steam generator, thus one steam generator in each unit is used to control and monitor the plant cooldown.

Operator 2 while in the Cable Spreading Room will electrically isolate the remaining potentially spurious components and perform the breaker line-up to manually start and load one emergency diesel generator. As a result of the fire in the Control Room, it is assumed that the diesel generator must be manually started and that breakers must be manually operated. The 4kV and 480V switchgear are provided with external tripping devices and manual closing capability exists for any of the breakers associated with the switchgear. The actions performed by Operator 2 will ensure that control power is de-energized to the switchgear requiring manual operation, (Refer to figures 5.1). Operator 2 will provide the proper breaker line-up to ensure the necessary safe shutdown equipment is energized when the emergency diesel generator is brought up to rated speed and voltage. This will be accomplished by positioning breakers correctly before starting the diesel. The following sequence of activities will be accomplished by Operator 2:

(1) In the Cable Spreading Room.

A. Open the following breakers in dc panel D-11

(1) 1109 Control Power (normal) to 1A05
[1112 Control Power (alternate) to 2A06]

(2) 1117 Control Power (normal) to 1B03
[1118 Control Power (normal) to 2B03 and
1120 Control Power (alternate) to 2B04]

(3) 1127 Control Power to Control Panel 1C20

(4) 1130 Control Power to Control Panel 2C20

B. Open the following breakers in dc panel D-13.

(1) 1309 Control Power (alternate) to 1A05
[1312 Control Power (normal) to 2A06]

(2) 1317 Control Power (alternate) to 1B03
[1318 Control Power (alternate) to 2B03 and
1320 Control Power (normal) to 2B04]

(3) 1332 Control Power to Control Panel 1C20

(4) 1327 Control Power to Control Panel 2C20

C. Open the following breakers in the 480V switchgear cabinets.

(1) In 1-B03 open 14B to MCC-1B32

(2) In 1-B04 open 23C to MCC-1B42

(3) In 2-B03 open 38B to MCC-2B32

(4) In 2-B04 open 32C to MCC-2B42

The breakers above, once open, will de-energize the circuits associated with spurious components, valves requiring manual alignment and the breaker control power to switchgear cabinets requiring manual breaker alignment.

Operator 2 can now proceed to align 480V power to essential hot shutdown loads. He will align the following breakers on 480V buses.

1. Open all 480V breakers on 1-B03 [2-B03 and 2-B04] with the exception of:

   A. 10C [27B] and/or 11C [27C] for P32A [P32D] and/or P32B [P32E] (service water pumps) close or checked closed. (Note: Only one service water pump is required for hot shutdown of both units)

   B. 13A [37A] and 13B [37B] for 1P2A [2P2A] and 1P2B [2P2B] (Unit 1 "A" and "B" charging pumps) [Unit 2 "A" and "B" charging pumps] close or checked closed.

   C. Ensure 16C [40C] is open [closed] (bus-tie to 1-B04 [2B04]).

   D. Close breaker 16B [25B] from 1-X13 [2-X14] to bus 1-B03 [2B04].

2. Open breaker 17B [40B] at bus 1-B04 [2-B03] from 4kV bus 1-A06 [2-A05].

3. Open breaker 29A [12A] at bus 2-B04 [1-B03] to 2P10B [1P10A] (Unit 2 "B" RHR pump) [Unit 1 "A" RHR pump].

Operator 2 will then proceed to the 4kV switchgear room at the 8 ft elevation to align breakers such that diesel generator G01 [G02], when started, will provide power to hot safe shutdown components. The following 4kV breakers must be aligned to provide power to 4kV bus 1A05 [2A06] and ultimately to 480V bus 1B03 [2B03, 2B04]:

1. Open the following breakers:

   A. 73 and 76 in 2-A05 [63 and 66 in 1-A06]

   B. 70 in 2-A06 [57 in 1-A05]

   C. 63 and 66 in 1-A06 [73 and 76 in 2-A05]

   D. 57 in 1-A05 [70 in 2-A06]

   E. All four safety injection pump breakers (one on each 4kV bus)

2. Close the following breakers:

   A. 60 [67] and 58 [69] on 1-A05 [2-A06]

Thus aligned, 4kV bus 1-A05 [2-A06] can be energized from diesel generator G01 [G02] through breakers 60 [67] and 58 [69] to the 4kV/480V transformer 1-X13 [2-X14] in the Cable Spreading Room.

Operator 2 will then proceed to the Diesel Generator Room (G01) and transfer diesel control to local. He then may start the diesel which when up to speed and voltage will power the 4kV bus 1-A05 and 480V bus 1-B03. Pumps (service water and charging) powered from 1-B03 will be running. Operator 2 will ensure the diesel generator is operating properly and then proceed to the charging pump area to assist operator 3.

Operator 3, leaving the Control Room with Operators 1 and 2 is to provide manual alignment of potentially spurious components and line-up components for charging pump flow in both units. He first proceeds to the 8 ft elevation to open (or check open) the RWST suction valves to the charging pumps for both units.

He then proceeds to the 26 ft elevation, Unit 2, and the new station battery room and closes the breaker for 125V dc control power for the emergency diesel generator G01 [G02]. Once closed alternate 125V dc control power is available in the Emergency Diesel Generator Room (G01) to allow the diesel to be locally started.

While on the 26 ft elevation he will isolate the volume control tank from the charging pump suction for Units 1 and 2. This action will preclude the possibility of boron dilution and allow only borated water from the RWST to be pumped through the charging pumps.

Operator 3 will then proceed to 8 ft elevation, charging pump area's and close (or check closed) manual isolation valves the auxiliary spray line in both units. This action prevents charging through the auxiliary spray line which could affect primary system pressure control.

Operator 3 then proceeds to the Unit 1 charging pump area to properly align the Kirk key breakers for the charging pumps. By design, the Kirk key breakers prevent one charging pump from being powered by two independent power sources. The possibility exists however for one power source to provide power to two charging pumps. The breaker alignment at 1-B03 provides the "A" and "B" Unit 1 charging pumps with 480V power. Thus, Unit 2 "A" charging pump will be powered from Unit 1 480V bus by properly

aligning the Kirk key breakers. Operator 3 will go to Unit 1 "A" charging pump local panel and align the Kirk key breaker to isolate Unit 1 "A" charging pump. Then going to Unit 2 "A" charging pump to align the Kirk key supply power from the Unit 1 480V bus 1-B03. Once aligned Unit 2 "A" charging pump can be powered from Unit 1 bus 1-B03. Operator 3 will transfer to the local position the plant monitor instrumentation at the Unit 2 local panel while Operator 2 does likewise for Unit 1.

The above actions completed by Operators 1, 2, and 3 will have established the following:

1. Auxiliary feed flow to the "B" steam generator in each Unit. The steam generator code safety valves are providing initial primary system heat removal.

2. Borated water flow through a charging pump in each unit to the reactor coolant pump seals and, if system conditions allow, through the auxiliary charging lines to the cold leg.

3. Unit 1 [Unit 2] emergency diesel generator in operation and essential electrical busses energized.

4. Service water flow to the cooling system of the emergency diesel generator and each auxiliary feed pump turbine. (Note: prior to service water pump operation the diesel driven fire pump was available to provide cooling flow to the cooling system for each auxiliary feed pump turbine if necessary)

5. Safe shutdown instrument indication for both units. (Hot and cold leg temperature, steam generator level and pressure, reactor coolant system pressure and pressurizer level.)

6. All potentially spurious components that could affect hot safe shutdown in each unit are in a safe condition.

A. Pressurizer PORV's are shut

B. Pressurizer Vent Valves are shut

C. Reactor Vessel Head Vent Valves shut

D. Steam Generator Atmospheric Dump Valves are shut

E. Auxiliary Spray Valves are isolated

F. VCT outlet valves are shut

G. RWST suction valves are open

H. Normal letdown system isolation valves are shut

I. By modification, the excess letdown valves cannot spuriously open.

J. The electrical distribution is aligned in such a way that spurious return of offsite power could not affect safeguards busses. Also, if the other diesel were to start it would be isolated from the busses powered by the running diesel.

The safe stable hot shutdown conditions provided by the above described actions can be maintained until operators become available from fire brigade dismissal or procedural call-in for cooldown to cold shutdown conditions.

5.7.2 Actions Required to Achieve Cold Shutdown

The safe shutdown scenario, thus far presented, has assumed a fire has occurred in the Control Room which is the only credible fire requiring use of alternative methods for all hot safe shutdown systems. This assumption was made to demonstrate hot safe shutdown capability outside of the Control Room using alternate shutdown methods. The fire occurring in the Control Room would preclude the requirement to repair or re-power cold

shutdown components, i.e. local and/or manual operation would be available. The remainder of this section will explain the alternative methods used to achieve cold shutdown outside the Control Room. Additional sections will provide the potential repairs required to achieve cold shutdown in the event a fire has occurred in other plant areas (i.e. other than the Control Room or the previously established limited fire damage areas) where evaluation has shown that fire damage will be limited to one division of safe shutdown systems or repairable cold shutdown systems.

After establishing stable hot safe shutdown conditions, which will be achieved in approximately 1-1/2 hours, a plant cooldown will commence. At that time additional operators will be available to assist in the cooldown. The cooldown phase requires additional systems and components and also requires manual operation of valves. The component cooling water system and residual heat removal system will be required for the cooldown. Additional support system components will be required to provide power and cooling water to cold shutdown components.

The actions required to achieve cold shutdown are summarized as follows:

1) Manually operate the "B" Steam generator atmospheric dump valves to remove residual heat from the primary system.

2) Start the other emergency diesel generator G01 or [G02] and provide power to either bus 1B03 [2B03] and/or 1B04 [2B04]. Alternatively, provide power from the running diesel through bus ties to bus 1B03 [2B03] and/or 1B04 [2B04].

3) Start an additional service water pump (a minimum of two are required for cooldown of both units).

4) Line up and initiate component cooling water system operation (minimum of one pump for both units required with associated heat exchanger).

5) Line up and provide manual control of auxiliary spray (as necessary) to decrease reactor coolant system pressure.

6) Line up and initiate residual heat removal system operation.

Primary system cooldown can be initiated by dispatching two operators to manually control each of the "B" steam generator atmospheric dump valves. The total flow capacity of each valve is approximately 5% of maximum calculated steam flow. By controlled release of steam to the atmosphere and continued feed flow from auxiliary feed pumps, primary system heat is removed. The operators at the steam dump valves and at the auxiliary feed station will be in communication with each other to coordinate the rate of cooldown. The cooldown rate will be controlled to within Technical Specification limits or will be controlled within the limits of safe shutdown system capabilities.

As soon as practical, containment entry will be made (approximately 90 min.) in each unit to manually isolate the reactor coolant pump seal return lines. Approximately 160 gallons per hour, per reactor coolant pump, will return to the

volume control tank as a result of return flow. Though not presenting a short-term threat to primary system inventory control this action is performed to prevent filling the VCT and to ensure minimum loss of borated water from the primary system. The excess letdown line isolation valve [1MOV-1299 2MOV-1299] will be modified to prevent spurious operation. (Refer to Section 4.6)

The other emergency diesel generator can be started to provide power to additional safe shutdown components. The second diesel is not required to perform the cooldown but if available can be used. A gravity feed system will be available to provide diesel fuel oil to both emergency diesels in the event the diesel oil transfer pumps are inoperable. Local level indication will provide the operator with day tank level which can be maintained by a manually controlled valve. Other valves in the fuel oil system must be aligned, if necessary, to allow flow from the 60,000 gallon diesel oil storage tanks. (Refer to Section 4.5.2 and Figure 4-8).

A second method to provide additional components with power is through the power distribution bus ties. One diesel is capable of powering the safe guards buses in both units. Thus, manually closing the correct breakers can provide power to needed cold shutdown components in the opposite Unit. (Refer to Figure 5.3-1 or 5.3-2)

Either from the other diesel or through bus ties each unit will have a residual heat removal pump available. Due to inherent system design and modifications the RHR pumps are the only unit specific components required for cold shutdown.

A component cooling water pump (1P11A) [2P11B] though not required for hot shutdown is available within the first hour and if desired could be started by manually closing the 480V breaker on bus 1-B03 [2-B04] and performing the desired valve line-up.

The cooldown using the atmospheric steam dumps and the auxiliary feed pumps will proceed until the pressure and temperature have reached residual heat removal system operating conditions (425 psig and 350^{O}F). The auxiliary spray line can be manually controlled to lower the primary system pressure, if necessary.

The component cooling water pumps and heat exchangers and the service water pumps are required to support RHR system operation. Manual valve operation will be required to align the systems.

5.7.2.1 Component Cooling Water System Operation

The component cooling water system can be placed into operation to support cold shutdown by providing power to one of the four pumps and manually opening the inlet valve on the appropriate residual heat removal heat exchanger. The component cooling water system is cross-connected between units. Manual operation of the isolation valves is required if one CCW pump is

used. Component cooling water flow is from the CCW pump through the CCW heat exchangers which are cooled by the service water system to the RHR heat exchangers back to the suction of the CCW pumps. Any unnecessary heat loads can be manually isolated to provide maximum cooling capability to the RHR heat exchangers.

5.7.2.2 Residual Heat Removal System Operation

The residual heat removal system can be placed in operation only when the reactor coolant system pressure is at or less than 425 psig. and temperature at or less than 350°F. As a result of fire induced damage valves may have changed position requiring a check of the system valve line-up before system operation. One of the RCS suction isolation valves in each unit is shut with the associated breaker racked-out. This valve in each unit will require manual alignment. The containment sump isolation valves (1MOV-851A, 1MOV-851B, 2MOV-851A, 2MOV-851B) in each unit should be shut. The RHR heat exchanger discharge isolation valve (1HCV-624, 1HCV-625, 2HCV-624, 2HCV-625) are normally open, fail open, air operated valves. If not open, the appropriate valve can be failed in the open position to provide flow back to the cold leg. Thus aligned, the RHR pumps provide primary system heat removal with reactor coolant flowing from the"A" loop hot leg through the RHR pump and RHR heat exchanger back to the rector vessel.

5.8 Potential Cold Shutdown Repairs

5.8.1 Component Cooling Water System

As a result of a postulated fire in the area of the component cooling water pumps, operability of all four pumps could be affected. Power cable to the pumps could also be affected. A spare CCW pump motor and sufficient power cable will be avaliable to reestablish component cooling water system operability. A repair procedure will be written to ensure proper installation of both the spare motor and power cables.

5.8.2 Residual Heat Removal System

As a result of a postulated fire in various locations, redundant RHR pump motor power cables could be damaged. Sufficient power cable will be avaliable to reestablish RHR system operability. Procedures will be written to ensure that proper connections are made.

TABLE 5-1 ACTION CHART

OPERATOR 1

Action		Component Number	Reference Section
(1)	Place atmospheric steam dump valves manual/auto station in manual position in Control Room	1,2-PC468 1,2-PC478	2.4.3
(2)	Isolate instrument air to main steam isolation valves and atmospheric steam dump valves	1,2-CV2015 1,2-CV2016 1,2-CV2017 1,2-CV2018	2.4.3
(3)	(a) Close AFW Pump Steam Supply MOVs (from A steam generators)	1MOV2020 2MOV2020	2.4.3
	(b) Open AFW Pump Steam Supply MOVs (from B steam generators)	1MOV2019 2MOV2019	2.4.3
(4)	Isolate and vent instrument air to to containment (both units)	1,2-IA3047 1,2-IA3048	2.3.4.2
(5)	(a) Open AFW Pump Discharge MOVs to B steam generators	1MOV4000 2MOV4000	2.2.4, 2.4.3, 2.4.4
	(b) Close AFW Pump Discharge MOVs to A steam generators	1MOV4001 2MOV4001	2.2.4, 2.4.3, 2.4.4
(6)	Verify cooling water to AFW pumps	Diesel Fire Pump or Service Water	2.2.6, 2.4.4
(7)	Transfer instrumentation to local at AFW Pump Area (both units)	1,2TE451B 1,2TE451C 1,2PT483 1,2LT470A	2.2.4, 2.3.4.5, 4.3, 4.3.1, 4.3.2
(8)	Open AFW pumps minimum recirculation valves	1CV4002 2CV4002	2.2.6
(9)	Establish and maintain water level in B steam generators (both units)		2.2.4, 2.3.4.4, 2.4.3, 2.4.6

OPERATOR 2

Action	Component Number	Reference Section
(1) Open breakers at 125V dc distribution buses		
(a) AFW pump steam supply MOVs power	1206, 1209, 1406, 1408	to have manual control of the MOVs
(b) AFW pump discharge MOVs power	1210, 1212, 1410, 1412	to have manual control of the MOVs
(c) 4KV Switchgear Breakers control power (normal and alternative)	1109 [1112] 1309 [1312]	to have manual control of the Breakers
(d) 480V Breakers control power (normal and alternative)	1117 [1118] 1317 [1318, 1320]	to have manual control of the Breakers
(2) Breaker line up at 480V buses in Cable Spreading Room		
(a) Close two CVCS charging pump breakers	13A [37A] 13B [37B]	2.3.4.1, 2.3.4.2, 2.4.1, 4.4.2
(b) Close two service water pump breakers	10C [27N] 11C [27C]	2.2.6, 2.3.4.6, 2.4.7
(c) Close one station service transformer breaker [and one bus tie breaker]	16B [25B, 40C]	to energize 1B03 [2B03, 2B04]
(d) Open two RHR pump breakers (one pump for each unit)	12A, 29A	to ensure availability of the pumps for cold shutdown
(e) Open two CCW pump breakers (open 17B in Unit 1)	0A, 17B [28B, 34A]	to ensure availability of the pumps for cold shutdown
(f) Open four MCC breakers	4B, 23C, 32C, 38B	to have manual control of the valves powered from these MCCs
(g) Open all breakers (other than noted from (a) to (f)) from 480V bus(es) 1B03 [2B03, 2B04]		to prevent spurious operation or not needed (and to reduce EDG's load)

TABLE 5-1 ACTION CHART (continued)

OPERATOR 2 (continued)

Action	Component Number	Reference Section
(3) Breaker line up at 4KV Switchgear Room		
(a) Open four offsite power breakers	57, 63, 70, 76	2.3.2
(b) Open four safety injection pump breakers	59, 65, 68, 74	2.3.1
(c) Close two breakers	58, 60 [67, 69]	to energize one 4KV bus and one 480V bus station service transformer
(d) Open two bus tie breakers	66, 73	to ensure two Diesel Generators won't be cross tied
(4) Start Emergency Diesel Generator	G01 [G02]	2.2.6, 2.3.4.6, 2.4.8, 4.5.2
(5) Transfer instrumentation to local at CVCS Chargin Pump Area (Unit 1)	1PT420 1LT427	2.2.5, 2.3.4.5, 4.3, 4.3.1, 4.3.2
(6) (a) Monitor Unit 1 pressurizer level	1LT427	2.2.2, 2.3.4.2, 2.4.2, 4.3.2
(b) Monitor Unit 1 RCS pressure	1PT420	2.2.3, 2.3.4.3, 2.4.2, 4.3.2

NOTE: The components inside bracket is being operated when G02 and Unit 2 480V buses are energized (refer to Figure 5.3-2).

TABLE 5-1 ACTION CHART (continued)

OPERATOR 3

Action	Component Number	Reference Section
(1) Open RWST discharge valves to charging pumps	1LCV112B 2LCV112B	2.4.1
(2) Close breaker of modified 125V dc control power for EDG		4.5, 4.5.1, 4.5.2
(3) Close VCT discharge valves to charging pumps	1LCV112C 2LCV112C	2.3.1, 2.4.1
(4) Isolate auxiliary pressurizer spray and normal charging from charging pumps	1-V384A 2-V384A	2.2.3, 2.4.1
(5) Operate Kirk-key breakers at CVCS Charging Pump Areas (Units 1, 2)		4.4.2
(6) Transfer instrumentation to local at CVCS Charging Pump Area (Unit 2)	2LT427 2PT420	2.2.5, 2.3.4.5, 4.3, 4.3.2, 4.3.2
(7) (a) Monitor Unit 2 pressurizer level	2LT427	2.2.2, 2.3.4.2, 2.4.2, 4.3.2
(b) Monitor Unit 2 RCS pressure	2PT420	2.2.3, 2.3.4.3, 2.4.2, 4.3.2

Operator No. 1

WISCONSIN ELE

ASSUMED CONTROL RO

EVACUATE
CONTROL
ROOM

(Ti

0 5 10 15 20 25

PRIOR TO CONTROL ROOM EVACUATION - MANUAL/AUTO STATION FOR ATMOSPHERIC DUM

PROCEED TO ELEVATION 84' - ISOLATE AIR TO MAIN STEAM

PROCEED TO ELEVATION 84' - ISOLATE AIR TO ATMOSPHERI

PROCEED TO ELEVATION 46'

PROCEED TO ELEVA

PRC
APERTURE
CARD

CTRIC POWER COMPANY

M FIRE SCENARIO FOR APPENDIX R

ne In Minutes)

30 35 40 45 50 55 60

P VALVES - PLACE IN MANUAL POSITION - UNITS 1 & 2

ISOLATION VALVES - UNITS 1 & 2

DUMP VALVES - UNITS 1 & 2

- MANUALLY CLOSE LOOP A STEAM SUPPLY MOV - UNITS 1 & 2

- MANUALLY OPEN LOOP B STEAM SUPPLY MOV - UNITS 1 & 2

ION 26' PIPEWAY 2 & 3 - ISOLATE AIR TO CONTAINMENT AIR HEADER - UNITS 1 & 2

PROCEED TO ELEVATION 8' AUXILIARY FEEDWATER PUMP AREA

- MANUALLY OPEN AUXILIARY FEEDWATER PUMP DISCHARGE VALVE 10% TO STEAM GENERATOR B - UNITS 1 & 2

- MANUALLY CLOSE AUXILIARY FEEDWATER PUMP DISCHARGE VALVE TO STEAM GENERATOR A - UNITS 1 & 2

- VERIFY COOLING WATER TO AUXILIARY FEEDWATER PUMP TURBINE BEARINGS - UNITS 1 & 2

- TRANSFER INSTRUMENTATION TO LOCAL ALTERNATIVE OPERATING STATION - UNITS 1 & 2

- OPEN MINIMUM RECIRCULATION VALVE FOR STEAM-DRIVEN AUXILIARY FEEDWATER PUMP - UNITS 1 & 2

ESTABLISH AND MAINTAIN LEVEL IN STEAM GENERATOR B WITH MANUAL CONTROL OF FEEDWATER DISCHARGE VALVE - UNITS 1 & 2

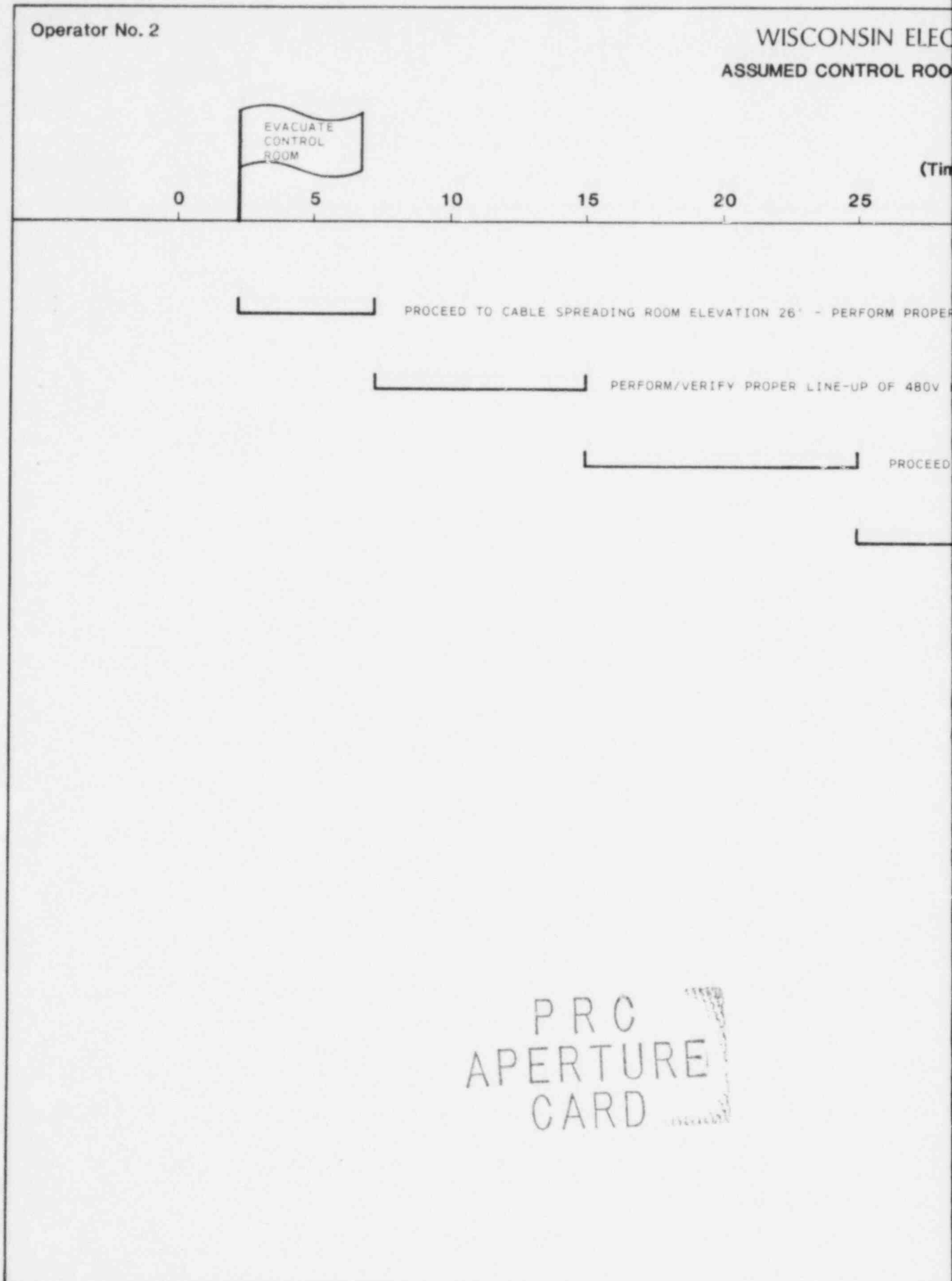
FLOW RATE CONTROLLED - MONITOR PRIMARY PLANT PARAMETERS - UNITS 1 & 2

Also Available On
Aperture Card

FIGURE 5-1

OPERATOR No.1 TIMELINE

8311020097-28



PRC
APERTURE
CARD

TRIC POWER COMPANY

M FIRE SCENARIO FOR APPENDIX R

e In Minutes)

30	35	40	45	50	55	60

LINE-UP OF 125V DC BREAKERS (12 TOTAL - UNIT 1; 14 TOTAL - UNIT 2)

REAKERS (MAXIMUM 25 BREAKERS)

TO 4kV SWITCHGEAR ELEVATION 8' - PERFORM PROPER LINE-UP OF 4kV BREAKERS (14 TOTAL)

PROCEED TO DIESEL GENERATOR AREA ELEVATION 8' - TRANSFER 125V DC CONTROL POWER
- START DIESEL AND BRING UP ON BUS
- VERIFY SERVICE WATER FLOW TO DIESEL COOLING
- TRANSFER TO LOCAL ALTERNATIVE CONTROL STATION

PROCEED TO CHARGING PUMP AREA UNIT 1 - TRANSFER INSTRUMENTATION TO LOCAL ALTERNATIVE OPERATING STATION
- VERIFY PROPER CHARGING PUMP OPERATION

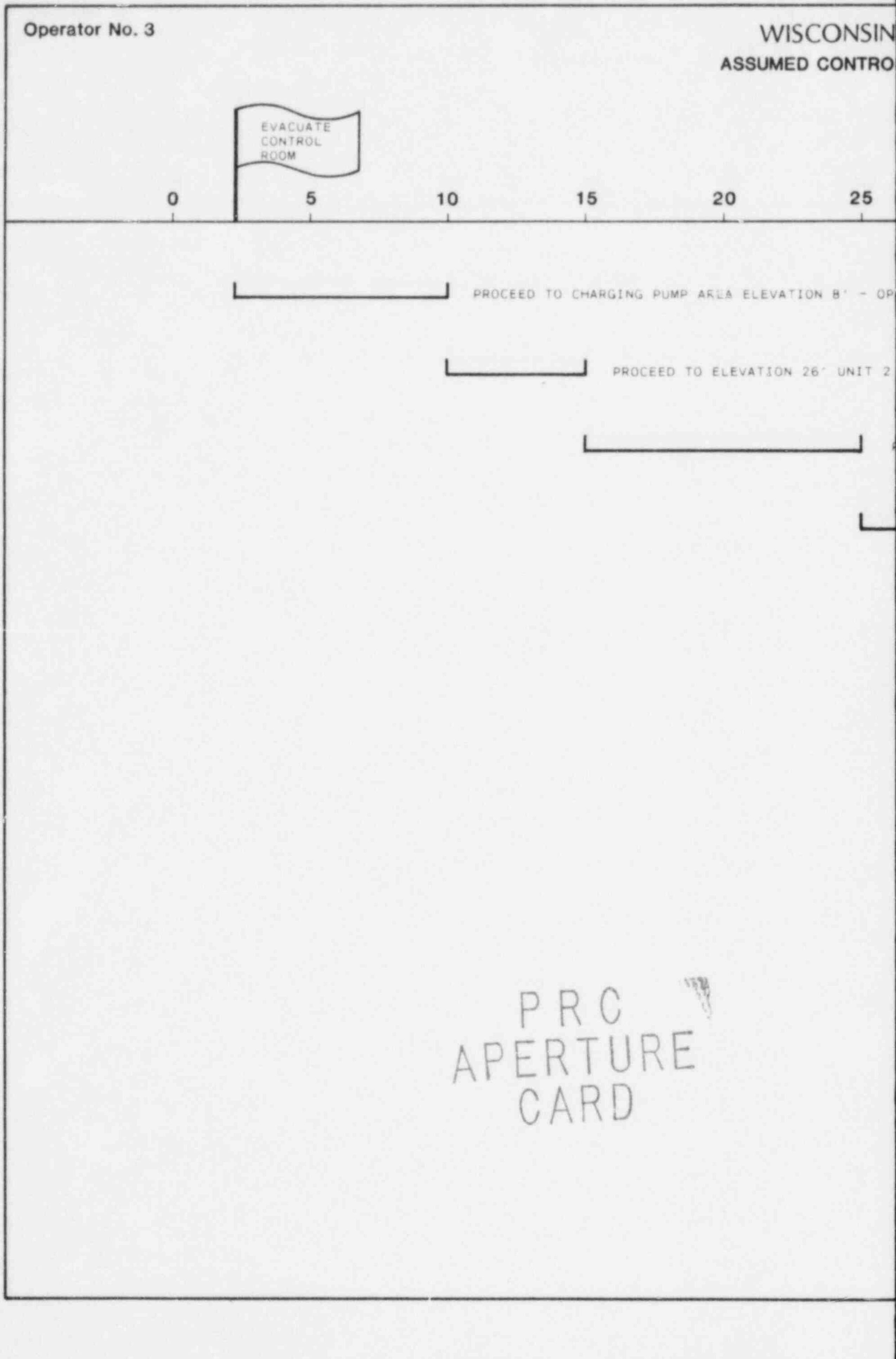
ESTABLISH/MONITOR PRESSURIZER LEVEL AND MONITOR REACTOR COOLANT SYSTEM PRESSURE - UNIT 1

MONITOR PRIMARY PLANT PARAMETERS - UNIT 1

Also Available On
Aperture Card

FIGURE 5-1

OPERATOR No. 2 TIMELINE



Operator No. 3
WISCONSIN
ASSUMED CONTRO
EVACUATE CONTROL ROOM
0
5
10
15
20
25
PROCEED TO CHARGING PUMP AREA ELEVATION 8' - OP
PROCEED TO ELEVATION 26' UNIT 2
PRC APERTURE CARD

ELECTRIC POWER COMPANY

L ROOM FIRE SCENARIO FOR APPENDIX R

(Time In Minutes)

30 35 40 45 50 55 60

N RWST TO CHARGING PUMP SUCTION - UNITS 1 & 2

BATTERY ROOM - LINE UP 125V DC POWER TO EMERGENCY DIESEL GENERATORS

ROCEED TO ELEVATION 26' - CLOSE VOLUME CONTROL TANK DISCHARGE TO CHARGING PUMPS - UNITS 1 & 2

PROCEED TO CHARGING PUMP AREA ELEVATION 8' - CLOSE MANUAL ISOLATION VALVE TO NORMAL CHARGING PATH - UNITS 1 & 2
- PERFORM PROPER LINE-UP OF KIRK KEY BREAKER TO SECURE UNIT 1 CHARGING PUMP 1P2A

LINE-UP OF KIRK KEY BREAKER TO UNIT 2 CHARGING PUMP 2P2A
- TRANSFER INSTRUMENTATION TO LOCAL ALTERNATIVE
- VERIFY PROPER CHARGING PUMP OPERATION

ESTABLISH/MONITOR PRESSURIZER LEVEL AND MONITOR REACTOR COOLANT SYSTEM PRESSURE - UNIT 2

MONITOR PRIMARY PLANT PARAMETERS - UNIT 2

Also Available On
Aperture Card

FIGURE 5-1

OPERATOR No.3 TIMELINE

WISCONSI

ASSUMED CONTR

0 1 2 3 4 5 6 7 8 9 10 20

- FIRE STARTS IN CRITICAL AREA OF PLANT - DETECTION SYSTEM ACTUATES
- FIRE BRIGADE ARRIVES AT FIRE SCENE
- FIRE DURATION - FIRE BRIGADE DETERMINES EXTENT OF DAMAGE - FIRE BRIGADE OPERATO
- LOSS OF OFF-SITE POWER
- REACTOR AND TURBINE TRIP
- 1 OPERATOR STARTS TURBINE-DRIVEN AUXILIARY FEEDWATER PUMP
- OPERATOR STATIONED AT ALTERNATIVE OPERATING STATION FEEDS B S
- 2 OPERATOR ELECTRICALLY ISOLATES SPURIOUS COMPONENTS
- 3 OPERATOR CHECKS POSITION OF SPURIOUS COMPONENTS - MANUALLY ALIGNS SAFE SHUTDOWN SYS
- 2 OPERATOR MANUALLY STARTS AND LOADS EMERGENCY DIESEL GENERATOR
- SERVICE WATER ESTABLISHED TO EMERGENCY DIESEL GENERATOR AND TURBINE-DRIVEN AUXILIAR
- 2,3 CHEMICAL AND VOLUME CONTROL SYSTEM CONTROLLING PRIMARY SYSTEM INVENTORY - OPERATO
- OPERATORS ASSESS FIRE DAMAGE TO COLD SHUTDOWN CIRCUITS
- IDENTIFY DAMAGED CIRCUITS - DEVELOP CORRECTIVE ACTION
- OPERATOR TO MANUALLY START AND LOAD SECOND EMERGENCY DIESEL TO POWER THE OTHER UNIT'S SAFEGUARDS BUSES
- PLACE INTO OPERATION ADDITIONAL SERVICE WATER PUMPS (MINIM
- CONTINUE PLANT COOLDOWN - REMOVE DECAY HEAT VIA STEAM
- ESTABLISH COMPONENT COOLING WATER FLOW (MINIMUM OF 1
- CONTAINMENT ACCESS AVAILABLE - 1) ISOLATE SAF
  2) VERIFY ISOL

NOTES:

1. POTENTIAL EQUIPMENT REPAIRS:
   A) RHR PUMP POWER CABLE REPLACEMENT
   B) CCW PUMP MOTOR REPLACEMENT AND POWER CABLE REPLACEMENT
2. 1 . 2 . 3 REPRESENTS WHICH OPERATOR RESPONSIBLE FOR THIS ACTION WITHIN FIRST HOUR OF THE EVENT

N ELECTRIC POWER COMPANY

OL ROOM FIRE SCENARIO FOR APPENDIX R

(Time In Hours)

30 40 50 60 70 80

RS RELEASED

TEAM GENERATORS TO CONTROL DECAY HEAT

TEMS

Y FEEDWATER PUMPS

R MONITORS PRIMARY PLANT PARAMETERS

GENERATOR OR PERFORM MANUAL BREAKER LINE THROUGH BUS TIES

UM OF 2 REQUIRED)

GENERATOR B FEED AND MANUAL OPERATION OF ATMOSPHERIC DUMP VALVES

REQUIRED)

ETY INJECTION TANK ACCUMULATORS; RCP $\geq$ 1000 PSIG

ATION OF LETDOWN ORIFICES FOR REACTOR COOLANT PUMP SEAL RETURN LINES

RHR SYSTEM LINE-UP - ENSURE POTENTIALLY SPURIOUS COMPONENTS ARE CHECKED AND SYSTEM IS ALIGNED PROPERLY

USING AUXILIARY SPRAY, AS NECESSARY - DEPRESSURIZE IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS AND PROCEDURES

START RHR SYSTEM WHEN RCP REACHES 350° AND 425 PSIG

ESTABLISH COOLDOWN WITH RHR SYSTEM AND COOLDOWN TO $\leq$ 200°

REACTOR IN COLD SHUTDOWN ▲

PRC APERTURE CARD

Also Available On Aperture Card

FIGURE 5-2

72 HOUR TIMELINE

8311020097-31

SECTION SIX

EXEMPTION REQUESTS & ANALYSES

6. EXEMPTION REQUESTS AND ANALYSES

6.1 Introduction

Review of the fire hazards analysis and alternate shutdown capability revealed that the following areas do not meet the specific criteria of Appendix R:

(1) Service Water Pump Room

(2) Residual Heat Removal Pump Zone

(3) Auxiliary Building 8 ft Elevation

The fire protection and/or system modifications required to provide verbatim compliance with Appendix R would not enhance fire protection capabilities above that which already exists. Exemptions are requested from certain requirements of Appendix R in each of these three plant areas.

A fire hazards analysis is presented for each of the plant areas requiring exemptions. The Auxiliary Building exemption request is included to provide clarification of information previously submitted to NRC Staff.

6.2 Service Water Pump Room

EXEMPTION REQUEST

Per the provisions of 10 CFR 50.12, Wisconsin Electric Power Company requests exemption from the requirement of separating redundant trains of safe shutdown equipment by a distance of 20 feet with no intervening combustibles as prescribed in Section III.G.2(b) of Appendix R.

6.2.1 Fire Zone Description

This fire zone is constructed of reinforced concrete and metal panel wall sections and is a separate Service Water Pump Room (SWPR) within the Circulating Water Pumphouse. The roof and one wall of the zone are common to the pumphouse. A sketch of the building appears in Figure 6-2. The upper section of the east wall and metal portions of the north and south walls of the SWPR are constructed of metal floor grating so that there is a free exchange of air and gases in the upper half of the zone with the air in the Circulating Water Pumphouse. Access to the SWPR is via an electronically supervised security door in the east wall. A part-height, 6-ft high wall which is constructed of one-hour fire-rated material extends from the west wall to the east wall of the SWPR dividing the service water pumps into two groups of three. An access opening with a door sill exists in the dividing barrier. A door will be installed in this opening to prevent flow of combustible fluid between the two halves of the room. The ceiling height of the zone is approximately 22 feet

with a total surface area of approximately 1000 ft^2 and room volume of 22,000 ft^3. Pertinent dimensional data are contained in Table 6-2 and Figure 6-2.

6.2.2 Safe Shutdown Equipment

The Service Water Pump Room contains the six service water pumps. The south half of the zone contains three service water pumps, a diesel-driven fire pump and a screen wash pump. The north half of the zone contains the other three service water pumps, a motor-driven fire pump, a jockey fire pump, accumulator tank, and a screen wash pump. No service water motor-operated valves are required for safe shutdown. Any one of the six service water pumps is capable of providing the required service water flow for both units to achieve stable hot shutdown and any two of the six service water pumps are required for both units to achieve cold shutdown. The addition of a second service water pump required for cold shutdown is a result of increased heat load during cooldown.

6.2.3 Fire Protection Systems

The zone is provided with four photo-electric detectors and an automatic wet pipe suppression system which has redundant connections to the fire main. The Circulating Water Pumphouse is provided with an additional 11 photo-electric detectors. Manual fire extinguishing capability exists within the circulating water

pumphouse in the form of two 20lb dry chemical portable fire extinguishers and two 1-1/2-in. hose reel stations located adjacent to the entrance doors.

6.2.4 Fire Hazards Analysis

The fire zone is located within the Circulating Water Pumphouse. The service water pumps are divided into two groups by a 6-ft part-height wall. The north pump of one group and the south pump of the other group are separated by approximately 26 feet. The outer two pumps in the north section are separated from the outer two pumps in the south section by approximately 16 feet. There are no intervening combustibles in the area. The power cables for each pump are routed through the floor slab immediately next to each pump.

The combustible loading in the fire zone is predominantly diesel fuel oil for the diesel-driven fire pump. Fuel oil is provided to the diesel from the day tank mounted in the northwest corner of the Circulating Water Pumphouse more than 12 feet north of the SWPR through pipe running under the floor. The day tank, which holds approximately 250 gallons of diesel oil, is mounted above a 6 ft x 8 ft x 2 ft high sump which is much larger than the volume of fuel oil in the day tank. The pumphouse is constructed such that leakage of fuel oil on the floor would drain to the circulating water pump sumps in the north section where the day tank is located or the south section where the diesel-driven fire pump is located. Thus, the diesel oil

drainage capabilities in the pumphouse limit the potential fire hazard and provide assurance that at least two of the six service water pumps will be available in the unlikely event of a diesel oil fire.

The part-height wall prevents the possibility of a fire affecting the north half of the zone as a result of a fire in the south half and vice versa. The top portion of the fire zone which is free of intervening combustibles is essentially open to prevent any buildup of hot combustible gases.

6.2.5 Fire Protection Modifications

A door will be placed in the opening that presently exists on the east end of the part-height wall. This is to preclude liquid transient combustibles from affecting both the north and south halves of the fire zone. The door sill will prevent liquids from flowing under the door.

6.2.6 Conclusions

Wisconsin Electric has provided fire protection features in the Service Water Pump Room which ensure operability of at least two service water pumps. However, as prescribed by Appendix R, the combination of existing fire protection features and modifications does not provide verbatim compliance with any of the three options in Section III.G.2. Therefore, Wisconsin Electric requests exemption from the separation of redundant

trains of safe shutdown equipment by a distance of 20 ft with no intervening combustibles requirement as prescribed in Section III.G.2(b) and to support the request provides the following bases:

(1) Two pumps in the north section are separated by at least 16 feet from two redundant train pumps in the south section.

(2) The extreme north pump of one group and the extreme south pump of the other group are separated by approximately 26 feet.

(3) The 6-ft part-height wall which separates the two groups of service water pumps is constructed of one-hour fire-rated material.

(4) A door will be installed in the part-height wall to prevent liquid combustibles from affecting both sections of the room.

(5) The zone is provided with automatic detection and a wet pipe suppression system.

(6) The predominant combustible source in the zone is fuel oil; however, the drainage capabilities in the fire zone will prevent any accumulation of fuel oil in the unlikely event of leakage.

(7) No hot combustible gases can accumulate in the zone due to the construction of the upper portion of the room.

(8) No transient combustibles are allowed to be stored in the zone.

(9) There are no intervening combustibles between the two sections of the zone.

(10) Additional wall height separating the two groups of service water pumps would not enhance fire protection above that which is already provided.

TABLE 6-2

FIRE ZONE: SERVICE WATER PUMP AREA

EVALUATION PARAMETERS SUMMARY

A. Zone Description

1. Construction

a.	Walls:	West: 1'-0" concrete North: 1'-0" concrete, metal section with grating South: 1'-0" concrete, metal section with grating East: metal with grating Zone division: 1-1/4" cemfil 6'-0" high
b.	Floor:	3'-0" concrete
c.	Ceiling:	0'-5" concrete

2. Ceiling height - 22 ft

3. Room Volume - approximately 22,000 ft^3

4. Ventilation - open - shared with circulating water pump house

5. Congestion - unobstructed

B. Safe Shutdown Equipment

1. Redundant Systems in Zone -

   Six service water pumps of which any two pumps are required for safe shutdown

2. Type of Equipment/Cables Involved -

   No power or control cables are exposed

C. Fire Hazards Analysis

1. Type of Combustibles in Area -

   Diesel fuel

TABLE 6-2 (continued)

2. Quantity of Fixed Combustibles -

   250 gallons of diesel fuel oil, which is 32 feet removed from the zone of concern and is provided with inherent fire protection features

3. Transient Combustibles -

   Only present during pump maintenance in accordance with PBNP Transient Combustible Controls Procedure

4. Suppression Damage to Equipment -

   None

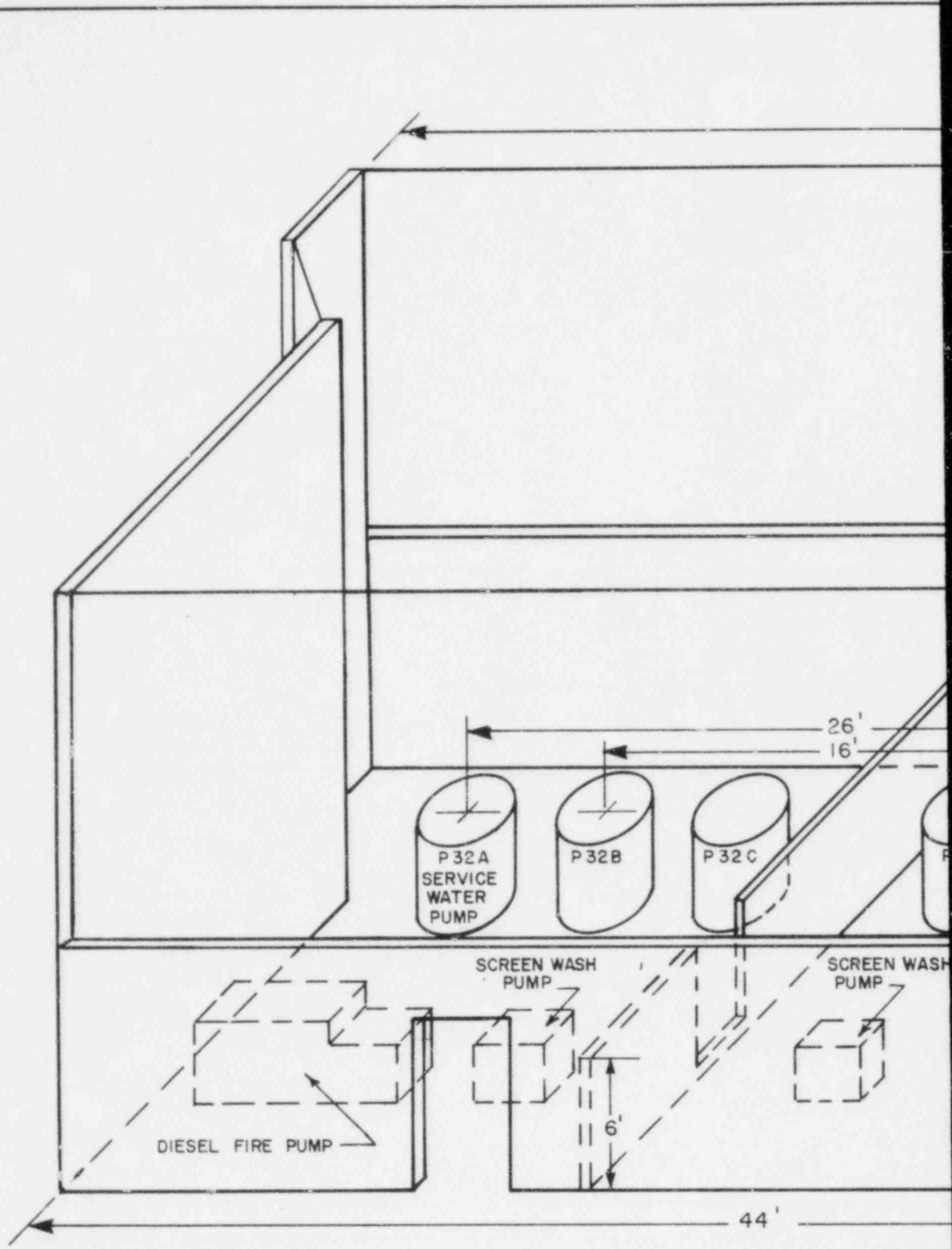
D. Existing Fire Protection

1. Fire detection systems -

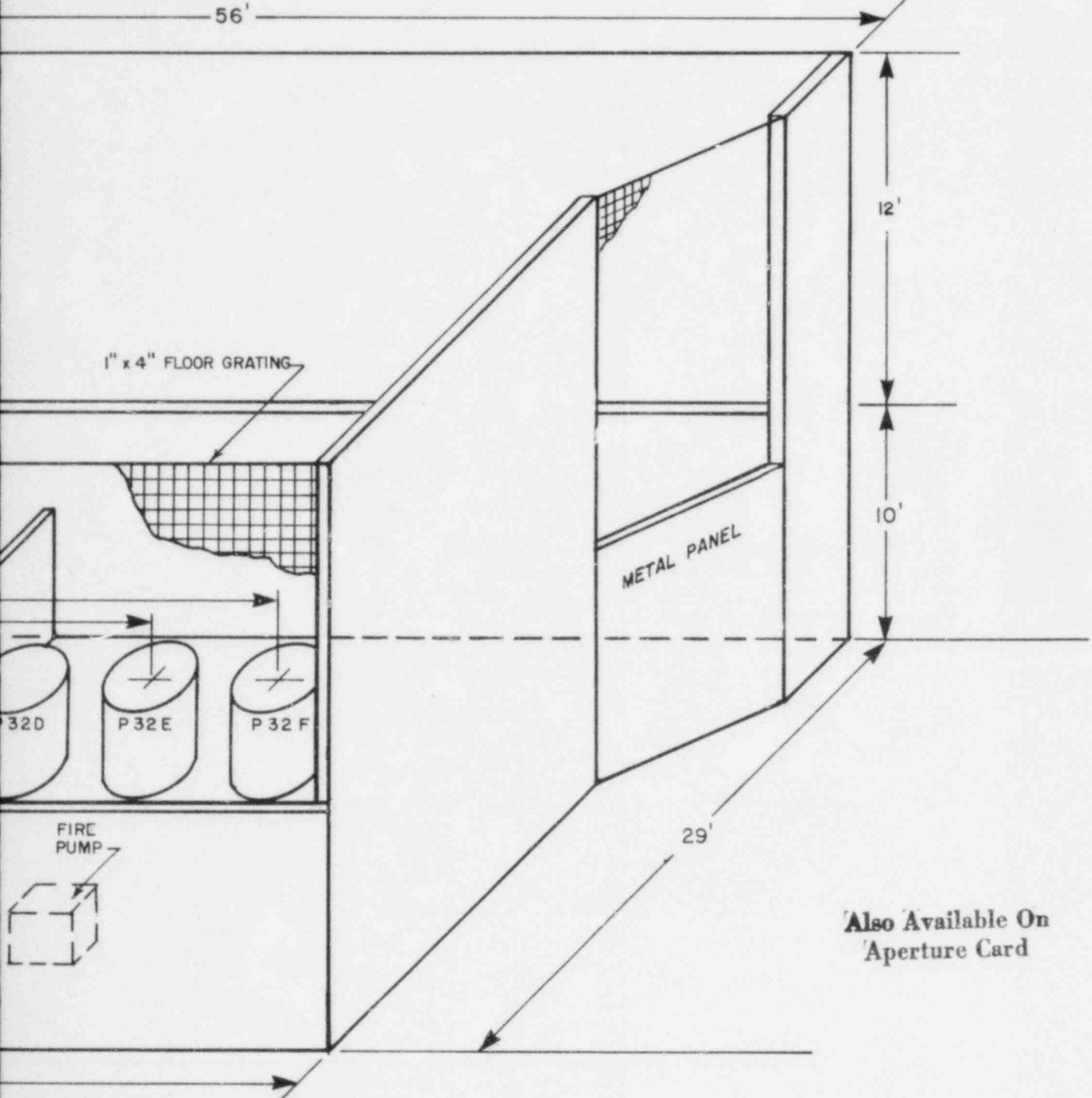
   a. 4 photo-electric detectors in zone
   b. 11 photo-electric detectors adjacent to zone

2. Fire extinguishing systems -

   a. Wet pipe suppression system with redundant supply connections.
   b. Portable extinguishers - 2 - 20lb dry chemical
   c. Manual hose stations - 2 - 1-1/2in. hose reels


26'
16'
P 32 A
SERVICE
WATER
PUMP
P 32 B
P 32 C
SCREEN WASH
PUMP
SCREEN WASH
PUMP
DIESEL FIRE PUMP
6'
44'

P025



Also Available On Aperture Card

PRC APERTURE CARD

FIG. 6-2

SERVICE WATER PUMP ROOM EQUIPMENT LOCATION DIAGRAM

8311020097-32

6.3 Residual Heat Removal Pump Zone

EXEMPTION REQUEST

Per the provision of 10 CFR 50.12, Wisconsin Electric Power Company requests exemption from the automatic suppression system requirement as prescribed in Section III.G.2(b) of Appendix R.

6.3.1 Fire Zone Description

This fire zone is located below grade level at elevation -19ft 3in. It is separated by reinforced concrete walls into five separate rooms: two to the north, which are on an east-west orientation separated by a common north-south wall, with each room containing one RHR pump for Unit 2; two to the south, also on an east-west orientation separated by a common north-south wall, with each room containing one RHR pump for Unit 1; and a common room between the north and south pump rooms. See the plan view of Figure 6-3. The floors, ceilings and walls of each room of this zone are of 3-ft thick non-fire-rated concrete construction.

Access is provided into the common room of this zone by a stairway from elevation - 5ft 3in. The wall of each pump room facing the common room is provided with a 4-ft square unprotected access opening. The openings are seven feet above the floor with steel ladders provided for personnel access. The clear floor-to-ceiling height of this zone is 11 feet. Pertinent dimensional data is contained in Table 6-3 and Figure 6-3.

6.3.2 Safe Shutdown Equipment

The zone contains the four RHR pumps: two pumps to the north for Unit 2 and two pumps to the south for Unit 1. All motor-operated RHR valves located in the zone will be manually operated at the time RHR system operation is initiated. Cables for RHR pumps are located in the zone and, if damaged during a fire, will be replaced as a repair allowed for cold shutdown equipment. Only one pump per unit is required to achieve cold shutdown.

6.3.3 Fire Protection Systems

The zone is provided with ten photo-electric detectors, two in each room of the zone. There is no automatic suppression system installed in the RHR pump zone. Manual fire extinguishing capability exists within the Auxiliary Building in the form of one 20lb dry chemical portable extinguisher in the common room of the zone, one 20lb dry chemical portable extinguisher, and two 1-1/2-in hose reel stations on elevation 8ft 0in. at the head of the stairway to the zone, which can be used for extinguishing fires in the RHR Pump Rooms.

6.3.4 Fire Hazards Analysis

The Unit 1 and Unit 2 RHR pumps are separated by approximately 50 feet and two 3-ft thick concrete walls. Cables in the fire zone are routed in conduit and the zone is essentially free of fixed combustibles. The two RHR pumps for each unit are separated by 15 ft 6 in. between pump center lines

and have a 3-ft thick concrete wall between them. The fixed combustible loading in each pump room is negligible. Each pump room contains two photo-electric detectors.

In order to affect both pumps in the same unit, a fire would have to propagate from one pump room to the other or from the common area between units to both pump rooms of the same unit. This is a highly improbable event because of the existing room separation by 3-ft thick concrete walls, the height of the access openings above the floor, the absence of intervening combustibles, fire detection in each room of the zone, and the heat and smoke venting provided by the grated hatch to elevation - 5ft 3in. with additional detection above.

No stored combustibles are allowed in this fire zone, and the pump rooms are not normally accessible to introduce transient combustible hazards.

6.3.5 Fire Protection Modifications

No modifications are proposed for this fire zone.

6.3.6 Conclusions

Wisconsin Electric has provided fire protection features in this fire zone to ensure operability of at least one RHR pump for each unit. However, as prescribed by Appendix R, the existing fire protection features do not provide verbatim compliance with any of the three options in Section III.G.2. Therefore, Wisconsin Electric requests exemption from the automatic

suppression requirement as prescribed in Section III.G.2(b) and to support the request provides the following bases:

(1) The design features of walls containing the RHR pumps precludes a fire from affecting both pumps in one unit.

(2) The pump rooms are provided with automatic fire detectors as is the common zone between units.

(3) The pump rooms by design are not in a pathway for transported combustibles, and each room has extremely low fixed combustible loadings.

(4) There are no intervening combustibles in the fire zone.

(5) Manual fire fighting capability exists in the fire zone.

(6) Addition of automatic suppression in the fire zone would not enhance fire protection above that which already exists.

TABLE 6-3

FIRE ZONE: RESIDUAL HEAT REMOVAL PUMP AREA

EVALUATION PARAMETERS SUMMARY

A. Zone Description

1. Construction

   a. Walls: 3'-0" concrete
   b. Floor: 3'-0" concrete
   c. Ceiling: 3'-0" concrete

2. Ceiling Height - 11 ft

3. Room Volume - Common room - 6300 ft^3
   Each pump room - 965 ft^3

4. Ventilation - 5600 CFM

5. Congestion - Unobstructed

B. Safe Shutdown Equipment

1. Redundant Systems in Zone -

   Residual heat removal pumps, in two pairs, only one of each pair being required for safe shutdown of the two units

2. Type of Equipment/Cables Involved -

   No power or control cables essential for hot shutdown exist in the area. Any cables damaged in the zone can be replaced by repair procedures within the time allowed to achieve cold shutdown

TABLE 6-3 (continued)

C. Fire Hazards Analysis

1. Type of Combustibles in Area -

   Only the electric motors and shaft lubricants

2. Quantity of Fixed Combustibles -

   2 quarts lubricating oil in each pump
   No intervening combustibles

3. Transient Combustibles -

   Only present during pump maintenance in accordance with PBNP Transient Combustible Controls Procedure

4. Suppression Damage to Equipment -

   None

D. Existing Fire Protection

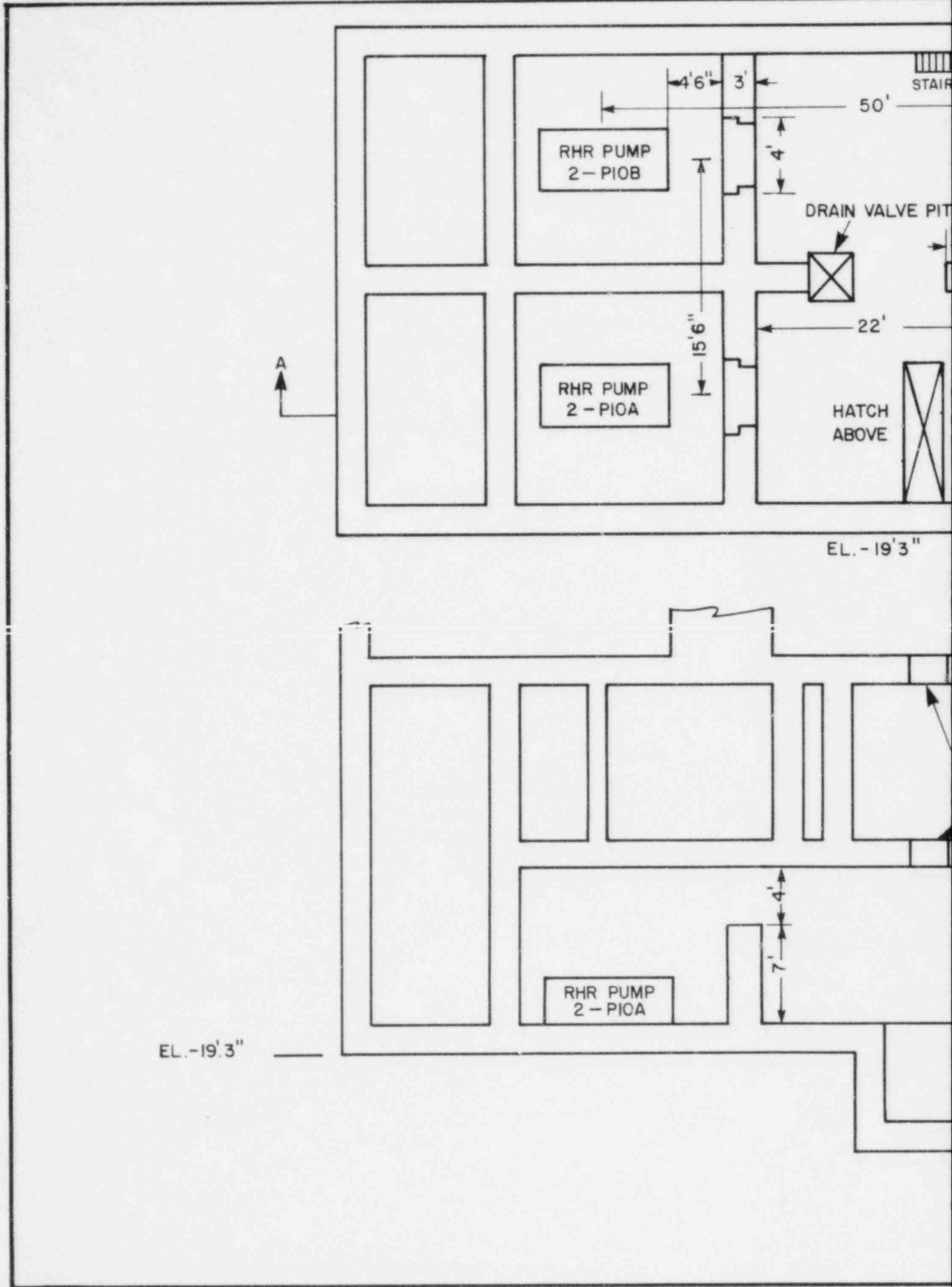
1. Fire detection systems -

   Two photo-electric detectors in each room for a total of ten detectors

2. Fire extinguishing systems -

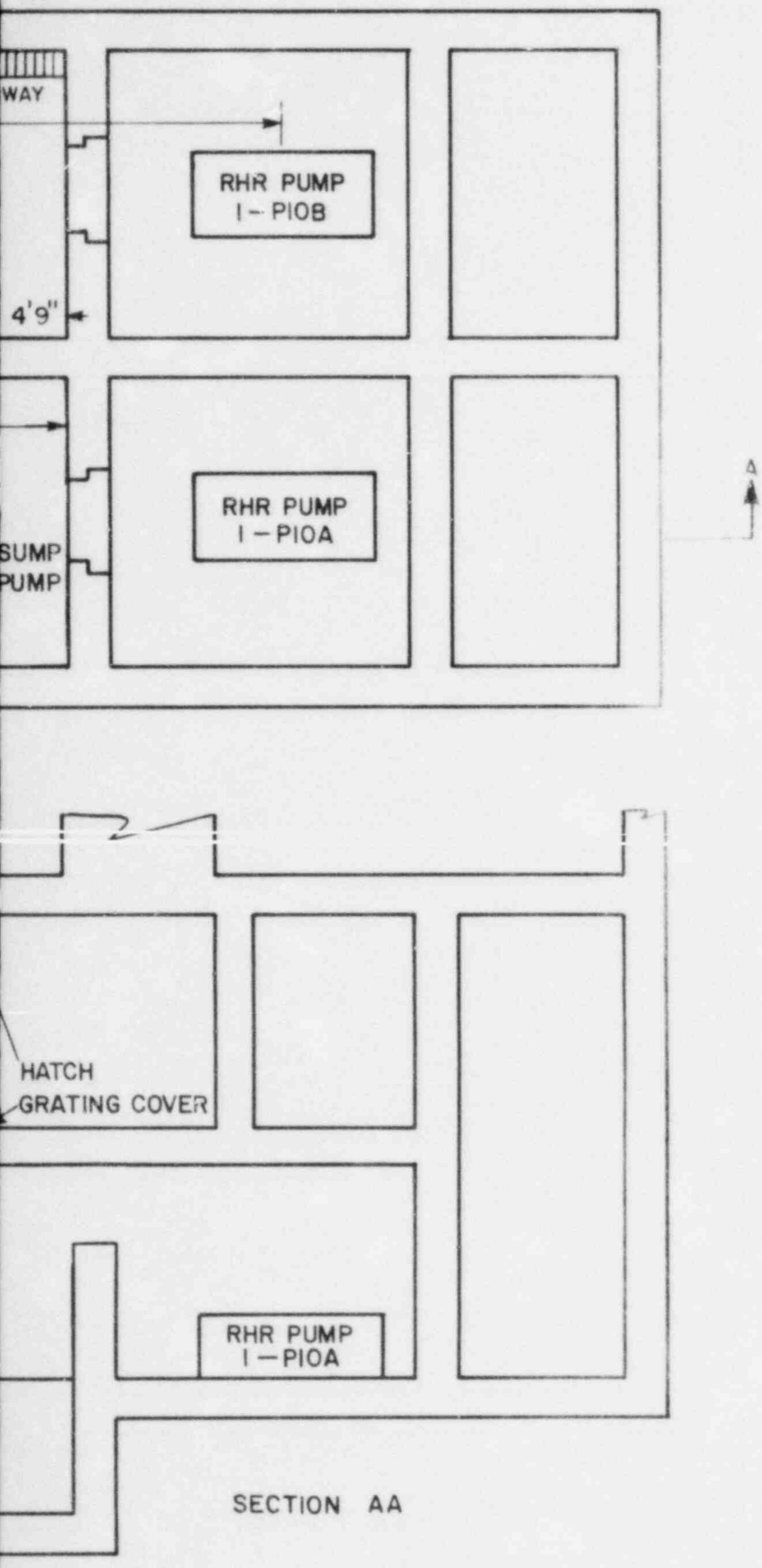
   a. Portable extinguishers-2-20lb dry chemical

   b. Manual hose stations-2-1-1/2in. hose reels



STAIR
4'6"
3'
50'
RHR PUMP 2-P10B
4'
DRAIN VALVE PIT
15'6"
22'
A
RHR PUMP 2-P10A
HATCH ABOVE
EL.-19'3"
4'
7'
RHR PUMP 2-P10A
EL.-19'.3"

P025



PRC
APERTURE
CARD

Also Available On
Aperture Card

FIG. 6-3
AUXILIARY BUILDING
ELEVATION -19'3"
RHR PUMP PITS

8311020097-33

6.4 Auxiliary Building Fire Area Exemption Request

6.4.1 Introduction

Wisconsin Electric requested an exemption from the three-hour fire-rated boundary requirements of 10 CFR 50 Appendix R Section III.G by letter dated April 28, 1983. The exemption is requested on the basis that the post-modification fire protection features provide suitable protection for required safe shutdown cables and equipment and that additional modifications would not enhance fire protection of safe shutdown capability in the Point Beach Auxiliary Building, above that provided by proposed modifications and existing features. This section of the report provides descriptive information in support of the requested exemption.

All components required for safe hot shutdown and cold shutdown in the Auxiliary Building are located on or below the 8 ft elevation. A summary of area features is presented in Table 6.4-1. The location of required shutdown equipment is shown in Figure 6.4-1. The fire protection features for this portion of the Auxiliary Building are shown in Figure 6.4-2.

6.4.2 Area Description and Fire Protection Features

6.4.2.1 West Wing

The west wing of the Auxiliary Building includes the -19ft 3in. elevation, the -5ft 3in. elevation, and area 142A at the 8' elevation. The -19ft 3in. elevation contains the residual heat removal pumps for both units. Two Unit 2 RHR pumps are located

in separate rooms in the north section of this elevation. Two Unit 1 RHR pumps are located in separate rooms in the south section of this elevation with a common room in between. The RHR pumps are separated from each other and from the common room by 3-ft thick non-fire-rated concrete walls. Exterior walls are three-hour fire-rated. The ceiling is non-fire-rated. The fire loading throughout this elevation is less than 8000 Btu/ft^2. Necessary cable is routed in conduit and there are no cable trays in this elevation. Fire protection for this elevation includes a total of 10 photo-electric smoke detectors, one 20 lb dry chemical portable extinguisher in the common room, one 20 lb dry chemical portable extinguisher and two 1-1/2in. hose reel stations on the 8 ft elevation.

The - 5ft 3in. elevation contains the RHR heat exchangers for each unit which are located in separate compartments and RHR system control valves. There are no safe hot shutdown components or cables located at this elevation. Exterior walls are three-hour fire-rated. The floor and ceiling are non-fire-rated. The fire loading throughout this elevation is less than 8000 Btu/ft^2. Necessary cable is routed in conduit and there are no cable trays in this elevation. Fire protection for this elevation includes two photo-electric smoke detectors and one 20 lb dry chemical portable extinguisher and two 1-1/2in. hose reel stations on the 8 ft elevation.

Area 142A contains 480V motor control centers B33 and B43, evaporator control panels and four exposed cable trays. No safe hot shutdown required components or cables are located in this area. The building exterior walls are of non-fire-rated concrete construction. The fire loading in this area is 28000 Btu/ft^2. This area is bordered by evaporator rooms to the north and south which have a fire loading of less than 8000 Btu/ft^2. Fire protection for this area includes four photo-electric smoke detectors, one 20 lb dry chemical portable extinguishers and two 1-1/2in. hose reel stations.

Redundant trains of RHR pump cables are located on all elevations of this building section in a configuration which is susceptible to damage from a single fire. The RHR system is not required to achieve safe hot shutdown and system repair is an acceptable means to satisfy the requirements of Appendix R. A dedicated set of RHR pump cables is provided for each unit. There are two contiguous openings which extend from the common room at the - 19ft 3in. elevation to upper elevations of the Auxiliary Building. One is stairway No. 8 and the other is a 5ft x 10 ft grated hatchway. The consequences of a fire propagating through either opening would be no greater than those from a fire event at any described elevation. Therefore, the fire protection of safe shutdown capability would not be enhanced by additional modifications to the west wing of the Auxiliary Building.

6.4.2.2 South Wing

The south wing of the Auxiliary Building at elevation 8 ft contains the building exhaust fan rooms, HVAC equipment room, laundry and chemical drain tank room, RCP seal water filter area, Unit 1 CVCS charging pump rooms, and MCC 1-B32 room.

The building exhaust fan rooms (160 and 161) contain the Auxiliary Building exhaust fans and associated charcoal and HEPA filters. There are no safe shutdown required components in these rooms. The floor, ceiling, east, west and south walls are three-hour fire-rated. The north wall is two-hour fire-rated. There are no cable trays in these rooms. The fire loading from 5150 lb of charcoal is 68000 Btu/ft^2 which correlates to a fire severity of 60 minutes. Fire protection for these rooms includes one thermal detector in the charcoal filter housing, one 20 lb dry chemical portable extinguisher and one 1-1/2in. hose reel station in the adjacent HVAC room. These rooms are an independent fire area.

The HVAC room (159) contains the service building exhaust fans, the general Auxiliary Building exhaust fan and associated charcoal and HEPA filters. Unit 1 red and blue channel instrument cables are routed through this room. The floor, ceiling, east, and west walls are three-hour fire-rated. The south wall is two-hour fire-rated. The north wall is of 2-ft thick concrete construction and is provided with three-hour fire-rated combustible pathway seals. The fire loading in this

room is 11200 Btu/ft^2 primarily due to a 740 lb charcoal filter located near the center of the room. The charcoal is contained in a totally enclosed filter housing. Fire protection for this room includes six photo-electric smoke detectors, one 20 lb dry chemical portable extinguisher and one 1-1/2in. hose reel station in the room, one 1-1/2in. hose reel station in the adjacent chemical drain tank area, one 20 lb dry chemical portable extinguisher in the adjacent MCC 1-B32 room and doorway-specific automatic suppression at the north wall exit to the MCC-1-B32 room. The listed fire protection features effectively protect the HVAC room in a manner which is practically equivalent to fire area separation.

The RCP seal water filter area (157) and the laundry and chemical drain tank area (158) are synonymous with the equipment contained therein. Unit 1 red and blue channel instrument cables are located in these rooms. The floor and east wall are three-hour fire-rated, the ceiling is provided with three-hour fire-rated penetration seals. The north and south walls are provided with three-hour fire-rated combustible pathway seals. The fire loading in these rooms is less than 8000 Btu/ft^2. Fire protection for these rooms includes two 20 lb dry chemical portable extinguishers in the adjacent MCC 1-B32 and HVAC rooms, one 1-1/2in. hose reel station in the rooms, one 1-1/2in. hose reel station in the adjacent HVAC room and doorway-specific

automatic suppression at all open archway entrances to these rooms in a manner which is practically equivalent to fire area separation.

The CVCS charging pump rooms (152, 153, 154) each contain one charging pump for Unit 1. One charging pump is required to achieve Unit 1 safe hot shutdown. The floor and west wall of each room are three-hour fire-rated. The ceiling and remaining room walls are provided with three-hour fire-rated penetration seals. The fire loading in each charging pump room is 8800 Btu/ft^2. due to lubricating oil. Lubricating oil can be considered a combustible hazard only if it is sprayed upon a hot surface which raises the temperature of the oil above its flash point (approximately 450°F). Suitable hot surfaces do not exist in this zone. There are no cable trays in the charging pump rooms. Fire protection for these rooms includes one photo-electric smoke detector in each room, two 20 lb dry chemical portable extinguishers and two 1-1/2in. hose reel stations located in adjacent rooms, and doorway-specific automatic suppression at the entrance to each room. The listed fire protection features effectively protect each charging pump room in a manner which is practically equivalent to fire area separation.

MCC 1-B32 room (156) contains train A 480V motor control center 1-B32, division A redundant divisions of Unit 1 charging pump cables, local charging pump control stations and Unit 1

alternate shutdown instrumentation. The floor and west wall are three-hour fire-rated. The ceiling is provided with three-hour fire-rated penetration seals. The north and south walls are provided with three-hour fire-rated combustible pathway seals. The room is bordered on the east by rooms 157 and 158 described above. The combustible loading in this room is 48000 Btu/ft^2. Charging pump cable and local control station separation suitable to meet the Staff's concern is described in an existing exemption request from the requirement for full area automatic suppression. The ceiling penetration seals provide greater than 40 feet horizontal and one floor elevation vertical separation for the alternate shutdown instrumentation. Fire protection for this room includes three photo-electric smoke detectors, fire stops in intervening cable trays, one 20 lb dry chemical portable extinguisher in the room, two 20 lb dry chemical portable extinguishers and three 1-1/2in. hose reel stations in adjacent areas, and partial room automatic suppression at all archway entrances to this room. The listed fire protection features effectively protect the room in a manner which is practically equivalent to fire area separation.

6.4.2.3 Safety Injection Pump Room

The safety injection pump room contains the safety injection and containment spray pumps for each unit. Redundant divisions of Unit 1 charging pump cables are routed through this room. The floor and the Control Building wall on the east side of the room

are three-hour fire-rated. The ceiling is provided with three-hour fire-rated penetration seals. The north, south, and west walls are provided with three-hour fire-rated combustible pathway seals. The combustible loading in the room is 24000 Btu/ft^2. Charging pump cable separation suitable to meet the Staff's concern is described in an existing exemption request from the requirements for full area automatic suppression. Fire protection for this room includes three photo-electric smoke detectors, two 20 lb dry chemical portable extinguishers and up to four 1-1/2in. hose reel stations in adjacent areas, partial room automatic suppression and doorway-specific automatic suppression at all archway entrances to this room. The listed fire protection features effectively protect the room in a manner which is practically equivalent to fire area separation.

6.4.2.4 Component Cooling Water Pump Room

The component cooling water pump room contains the component cooling water pumps for both units, redundant divisions of Unit 2 charging pump cables, division B of Unit 1 charging pump cables, charging pump alternate shutdown cables and several intervening cable trays. The floor and the Control Building wall on the east side of the room are three-hour fire-rated. The north wall, south wall, and the ceiling are provided with three-hour fire-rated combustible pathway seals. The room is bordered on the north by radwaste evaporator rooms 149 and 150. The combustible loading in these rooms is less than 8000 Btu/ft^2.

The component cooling water pump room is bordered on the west side by area 142A which is described in subsection 6.4.2.1 above. The combustible loading in the component cooling water pump room is 52800 Btu/ft^2. Fire protection for this room includes four photo-electric smoke detectors, four 20 lb dry chemical portable extinguishers, four 1-1/2in. hose reel stations, and partial room automatic suppression.

The component cooling water pumps are located in a configuration which could be susceptible to damage from a single fire. The component cooling water system is not required to achieve safe hot shutdown and system repair is an acceptable means to satisfy the requirements of Appendix R. One component cooling water pump is required to achieve cold shutdown. A spare component cooling water pump motor and a dedicated set of cables are provided for this purpose.

Charging pump cable separation for Units 1 and 2 suitable to meet the Staff's concern is described in an existing exemption request from the requirement for full area automatic suppression. Protection for the separation of Unit 1 cables is enhanced by the safety injection pump room fire protection features described in subsection 6.4.2.3 above. The charging pump alternate shutdown cables are normally de-energized and are required only in the event of a Cable Spreading Room or Control Room fire. Protection against simultaneous fires is not required. Protection of the

Unit 2 charging pump cables from intervening cable trays is provided by the wrapping of division B cable trays and conduit.

There are two contiguous openings from this room to upper elevations of the Auxiliary Building. One is stairway No. 7 and the other is a 13 ft x 15 ft open hatchway. Both openings are located in the long east to west section of the room. The consequences of a fire propagating through either opening would be no greater than those from a fire event within the room. Therefore, the fire protection of safe shutdown capability in the component cooling water pump room would not be enhanced by additional Auxiliary Building modifications.

6.4.2.5 North Wing

The north wing of the Auxiliary Building at elevation 8 ft contains pipeway 4, cryogenic room, gas decay tank room, Unit 2 CVCS charging pump rooms and MCC 2-B32 room.

Pipeway 4 (162) is a totally enclosed structure which provides access to Unit 2 containment penetrations with only one entrance from room 166. There are no shutdown required components in pipeway 4. The complete structure is three-hour fire-rated except for the open entrance. The combustible loading in this room is 8000 Btu/ft^2. Fire protection for this room includes two photo-electric smoke detectors, one 20 lb dry chemical portable extinguisher and one 1-1/2in. hose reel station.

The cryogenic room (167) contains waste gas processing equipment. There are no shutdown required components or cable trays in this room. The floor and east wall are three-hour fire-rated. The ceiling is provided with three-hour fire-rated penetration seals. Other walls are of non-fire-rated 18-in. thick concrete construction. The combustible loading in this room is less than 8000 Btu/ft^2. The cryogenic system is not used and no real potential for a fire occurrence exists. Fire protection for this room includes one 20 lb dry chemical portable extinguisher and one 1-1/2in. hose reel station.

The gas decay tank room (168) contains the waste gas processing gas decay tanks. There are no safe shutdown components or cable trays in this room. The floor and east wall are three-hour fire-related. The ceiling is provided with three-hour fire-rated penetration seals. Other walls are of non-fire-rated 18-in. thick concrete construction. Access is through a normally closed non-fire-rated lead and steel shield door. The combustible loading in this room is 240000 Btu/ft^2 due to 500 lb of charcoal in each of three totally enclosed ASME Section III Class 3 gas decay tanks. No real potential for a fire occurrence exists. Fire protection for this room includes one 20 lb dry chemical portable extinguisher and up to three 1-1/2in. hose reel stations.

The CVCS Charging Pump Rooms (163, 164, 165) each contain one charging pump for Unit 2. One charging pump is required to achieve Unit 2 safe hot shutdown. The floor and west wall of each room are three-hour fire-rated. The ceiling and remaining room walls are provided with three-hour fire-rated penetration seals. The fire loading in each charging pump room is 8800 Btu/ft^2 due to lubricating oil. Lubricating oil can be considered a combustible hazard only if it is sprayed upon a hot surface which raises the temperature of the oil above its flash point (approximately 450^{o}F). Suitable hot surfaces do not exist in this zone. There are no cable trays in the charging pump rooms. Fire protection for these rooms includes one photo-electric smoke detector in each room, one 20 lb dry chemical portable extinguisher, up to three 1-1/2in. hose reel stations and doorway specific automatic suppression at the entrance to each room. The listed fire protection features effectively protect each charging pump room in a manner which is practically equivalent to fire area separation.

MCC 2-B32 room (166) contains train A 480V motor control center 2-B32, redundant divisions of Unit 2 charging pump cables, local charging pump control stations, and Unit 2 alternate shutdown instrumentation. The floors, north wall and west wall are three-hour fire-rated. The ceiling is provided with three-hour fire-rated penetration seals. The south wall is provided with three-hour fire-rated combustible pathway seals.

The combustible loading in the waste holdup tank room is 8800 Btu/ft^2. The combustible loading in MCC 2-B32 room is 48000 Btu/ft^2. Charging pump cable and local control station separation suitable to meet the Staff's concern is described in an existing exemption request from the requirement for full area automatic suppression. The ceiling penetration seals provide greater than 40 feet horizontal and one floor elevation vertical separation for the alternate shutdown instrumentation. Fire protection for this room includes three photo-electric smoke detectors, fire stops in intervening cable trays, one 20 lb dry chemical portable extinguisher, three 1-1/2in. hose reel stations, partial room automatic suppression, and doorway-specific automatic suppression at all archway entrances to the room. The listed fire protection features effectively protect the room in a manner which is practically equivalent to fire area separation.

6.4.2.6 Elevation 26 ft

The 26 ft elevation of the Auxiliary Building contains redundant RCS instrumentation for both units in the center area above the safety injection pump and component cooling water pump rooms. No other safe shutdown components are located on this elevation of the Auxiliary Building. Alternate shutdown for the redundant instrumentation is described in an existing exemption request from the requirement for automatic suppression, and subsections 6.4.2.1 and 6.4.2.5 of this report. Fire protection

for this elevation includes eleven photo-electric smoke detectors, two 20 lb dry chemical portable extinguishers, and four 1-1/2in. hose reel stations.

The provision of alternate shutdown capability on elevation 8 ft for RCS instrumentation for both units locates all safe shutdown required components in the Auxiliary Building at or below elevation 8 ft. The effects of openings to elevation 8 ft are discussed in subsections 6.4.1 and 6.4.4 of this report. While other penetration openings exist at elevations 26 ft and 46 ft of the Auxiliary Building, they have no effect upon safe shutdown capability. Therefore, safe shutdown capability would not be enhanced by additional modifications to the Auxiliary Building and the exemption should be granted.

Table 6.4-1

8 FT ELEVATION AUXILIARY BUILDING

SUMMARY EVALUATION PARAMETERS

LOCATION	EQUIPMENT	HOT/COLD SHUTDOWN COMPONENT	FIRE LOADING BTU/sq.ft	NUMBER OF PHOTOELECTRIC SMOKE DETECTOR	NUMBER OF DRY CHEMICAL PORTABLE EXTINGUISHERS AVAILABLE	NUMBER OF HOSE REEL STATION AVAILABLE 1-1/2"	AUTOMATIC SUPPRESSION	CONSTRUCTION AND FIRE RATED	NOTES
-19'3" elevation west wing	4 RHR pumps	Cold	8000	10	2	2		Exterior walls: 3-hour fire-rated 3 ft thick concrete walls between pumps	
-5'3" elevation west wing	4 RHR heat exchangers and control valves	Cold	8000	2	1	2		Exterior walls: 3-hour fire-rated	
Area 142A 8' elevation	MCC B33, B43 evaporator control panel 4 cable trays	Not Required	28000	4	1	2		Exterior walls: Concrete	
Room 160, 161, 8' elevation south wing	Aux. Bldg. exhaust fans charcoal filters HEPA filters	Not Required	68000	1 Thermal Detector	1	1		Floor, ceiling east wall, west & south walls: 3-hour fire-rated North wall: 2-hour fire-rated	

Table 6.4-1 (continued)

8 FT ELEVATION AUXILIARY BUILDING
SUMMARY EVALUATION PARAMETERS

LOCATION	EQUIPMENT	HOT/COLD SHUTDOWN COMPONENT	FIRE LOADING BTU/sq.ft	NUMBER OF PHOTOELECTRIC SMOKE DETECTOR	NUMBER OF DRY CHEMICAL PORTABLE EXTINGUISHERS AVAILABLE	NUMBER OF HOSE REEL STATION AVAILABLE 1-1/2"	AUTOMATIC SUPPRESSION	CONSTRUCTION AND FIRE RATED	NOTES
Room 159 8' elevation south wing	Service Building exhaust fan Unit 1 red & blue channel instrument cables	Hot	11200	6	2	2	Doorway	Floor, ceiling, east, west walls: 3-hour fire-rated south wall: 2-hour fire-rated north wall: 2 ft thick concrete & 3-hour fire-rated combustible pathway seals	
Area 157, 158 8' elevation south wing	Unit 1 red & blue channel instrument cable	Hot	8000		2	2	Doorway	Floor & east wall 3-hour fire-rated North, south walls: 3-hour fire-rated combustible pathway seals Ceiling: 3-hour fire-rated penetration seal	
Room 152, 153, 154 8' elevation south wing	Unit 1 Charging Pumps One pump in each room	Hot	8800 per room	1 per room	2	2	Doorway	Floor & west wall 3-hour fire-rated Ceiling, south, east, north walls 3-hour fire-rated penetration seals	1) Exemption request previously submitted.
Room 156 8' elevation south wing	MCC 1B32 train A charging pump cables Unit 1 alternate shutdown instruments	Hot Hot	48000	3	3	1	Doorway and area of concern provided with automatic suppression	Floor, west wall: 3-hour fire-rated penetration seals North, south walls: 3-hour fire-rated combustible pathway seals	1) Exemption request previously submitted. 2) See Section 4 for charging pump cable & control station separation.

Table 6.4-1 (continued)

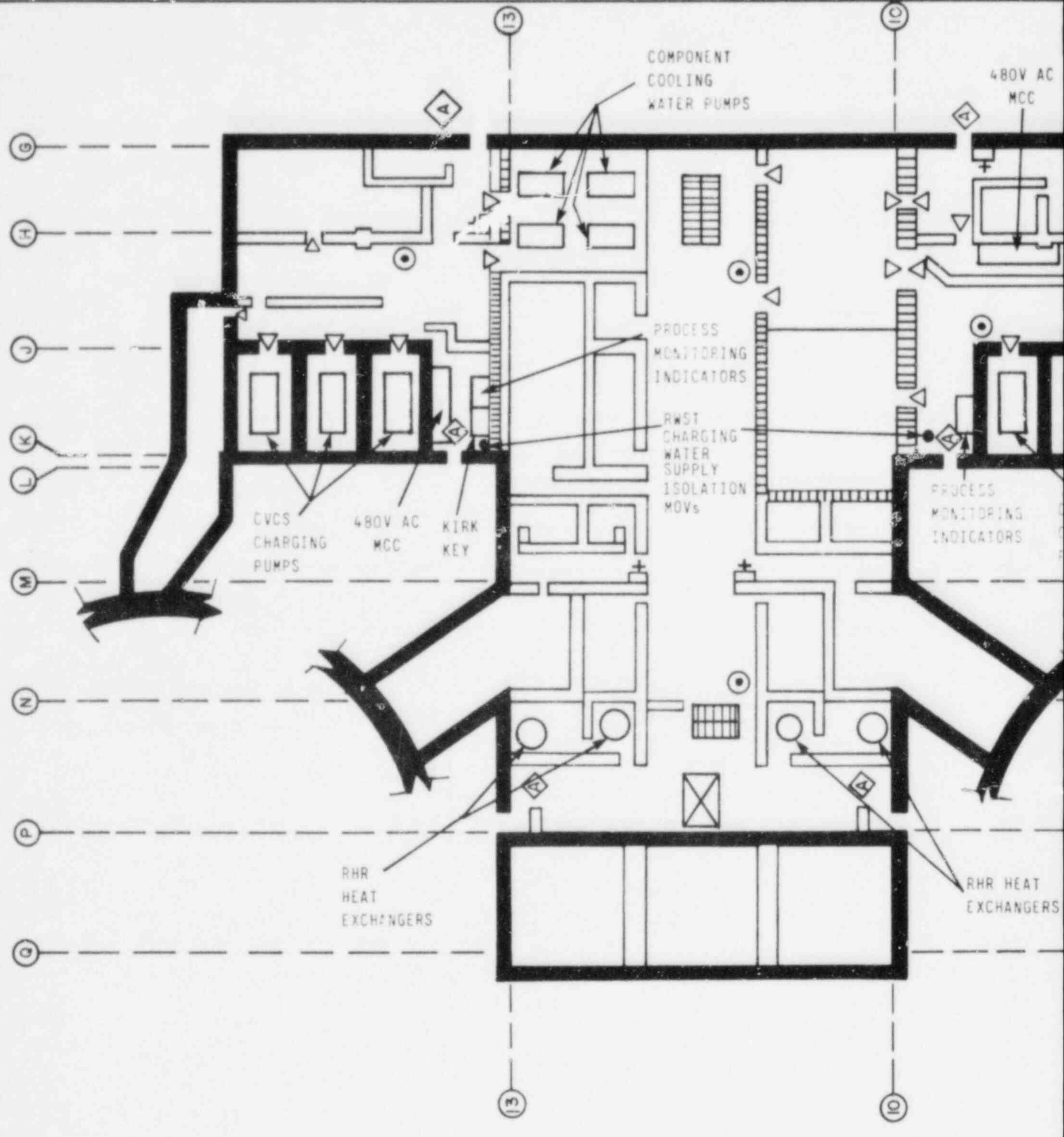
8 FT ELEVATION AUXILIARY BUILDING
SUMMARY EVALUATION PARAMETERS

LOCATION	EQUIPMENT	HOT/COLD SHUTDOWN COMPONENT	FIRE LOADING BTU/sq.ft	NUMBER OF PHOTOELECTRIC SMOKE DETECTOR	NUMBER OF DRY CHEMICAL PORTABLE EXTINGUISHERS AVAILABLE	NUMBER OF HOSE REEL STATION AVAILABLE 1-1/2"	AUTOMATIC SUPPRESSION	CONSTRUCTION AND FIRE RATED	NOTES
Room 151 8' elevation	4 Safety Injection Pumps 4 Containment spray pumps Train B of Unit 1 Charging Pump Cable	 Hot	24000	3	2	4	Partial room automatic suppression and doorway suppression	Floor, east wall: 3-hour fire-rated Ceiling: 3-hour fire-rated penetration seals. North, south, west walls: 3-hour fire-rated combustible pathway seals.	1) See Section 4 for charging pump cable separation. 2) Exemption Request submitted.
Room 142 8' elevation	4 CCW pumps Redundant divisions of Unit 2 Charging Pump Cables Division B of Unit 1 Charging Pump Cable	Cold Hot Hot	52800	4	4	4	Partial room automtic suppression	Floor, east wall: 3-hour fire-rated Ceiling, north, south walls: 3-hour fire-rated combustible pathway seals.	1) Exemption Request submitted. 2) Division B of Unit 2 cables and conduit will be wrapped.
Room 162 8' elevation north wing	Unit 2 Instrument Red channel & blue channel	Hot	8000	2	1	1	Doorway	Every wall: 3-hour fire-rated except the entrance	Redundant instrument cable is on 26' elevation.
Room 167 8' elevation north wing	Waste gas processing equipment		8000	1	1	1	Doorway	Floor, east wall: 3-hour fire-rated Ceiling: 3-hour fire-rated penetration seals Other walls: 18" thick concrete	This room is not being used

Table 6.4-1 (continued)

8 FT ELEVATION AUXILIARY BUILDING
SUMMARY EVALUATION PARAMETERS

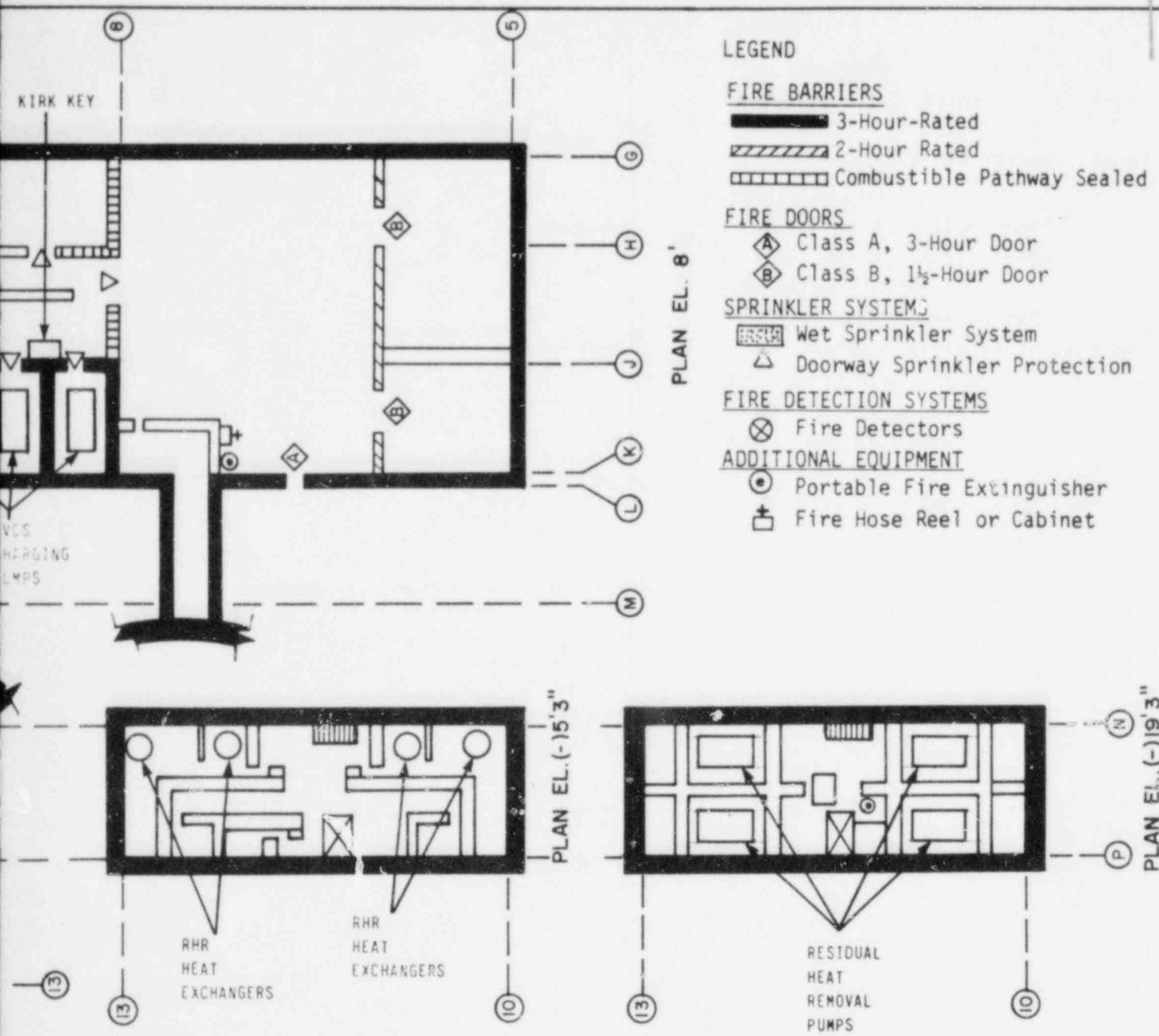
LOCATION	EQUIPMENT	HOT/COLD SHUTDOWN COMPONENT	FIRE LOADING BTU/sq.ft	NUMBER OF PHOTOELECTRIC SMOKE DETECTOR	NUMBER OF DRY CHEMICAL PORTABLE EXTINGUISHERS AVAILABLE	NUMBER OF HOSE REEL STATION AVAILABLE 1-1/2"	AUTOMATIC SUPPRESSION	CONSTRUCTION AND FIRE RATED	NOTES
Room 168 8' elevation north wing	Waste gas processing gas decay tanks		240000 (1500 lb totally contained charcoal)		1	3	Doorway and partial automatic suppression	Floor, east wall: 3-hour fire-rated Ceiling: 3-hour fire-rated penetration seals Other walls: 18" thick concrete	This room is not being used
Room 163, 164, 165 8' elevation north wing	1 CVCS Charging Pump per room	Hot	8800 per room	1 per room	1	3	Doorway	Floor, west wall: 3-hour fire-rated Ceiling, north, east, south walls 3-hour fire-rated penetrations seals	1) Exemption request previously submitted.
Room 166 8' elevation north wing	MCC 2B32 Division A of Unit 2 Charging pump cable Charging control Station Unit 2 alternate shutdown instruments	Hot Hot	48000	3	1	3	Doorway and area of concern provided with automatic suppression	Floor, north, west walls: 3-hour rated Ceiling: 3-hour fire rated penetration seals. South wall 3-hour fire-rated combustible pathway seals.	1) See Section 4 for charging pump cable and control station separation. 2) Exemption request submitted. 3) Fire stops provided in intervening cable trays



NOTE:

SEE FIG. 4-4 FOR CVCS CHARGING PUMP CABLE ROUTING

P025

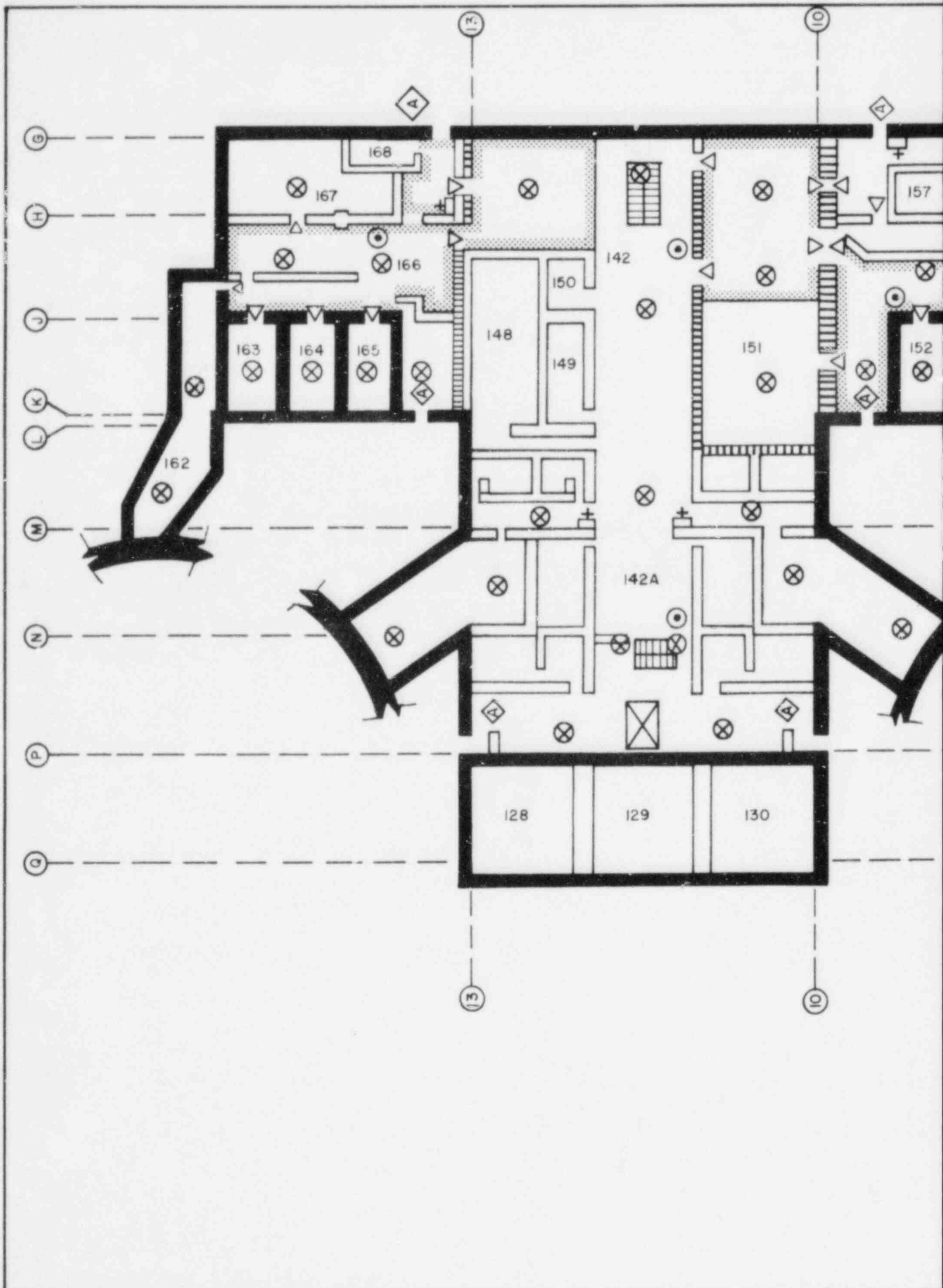


Also Available On
Aperture Card

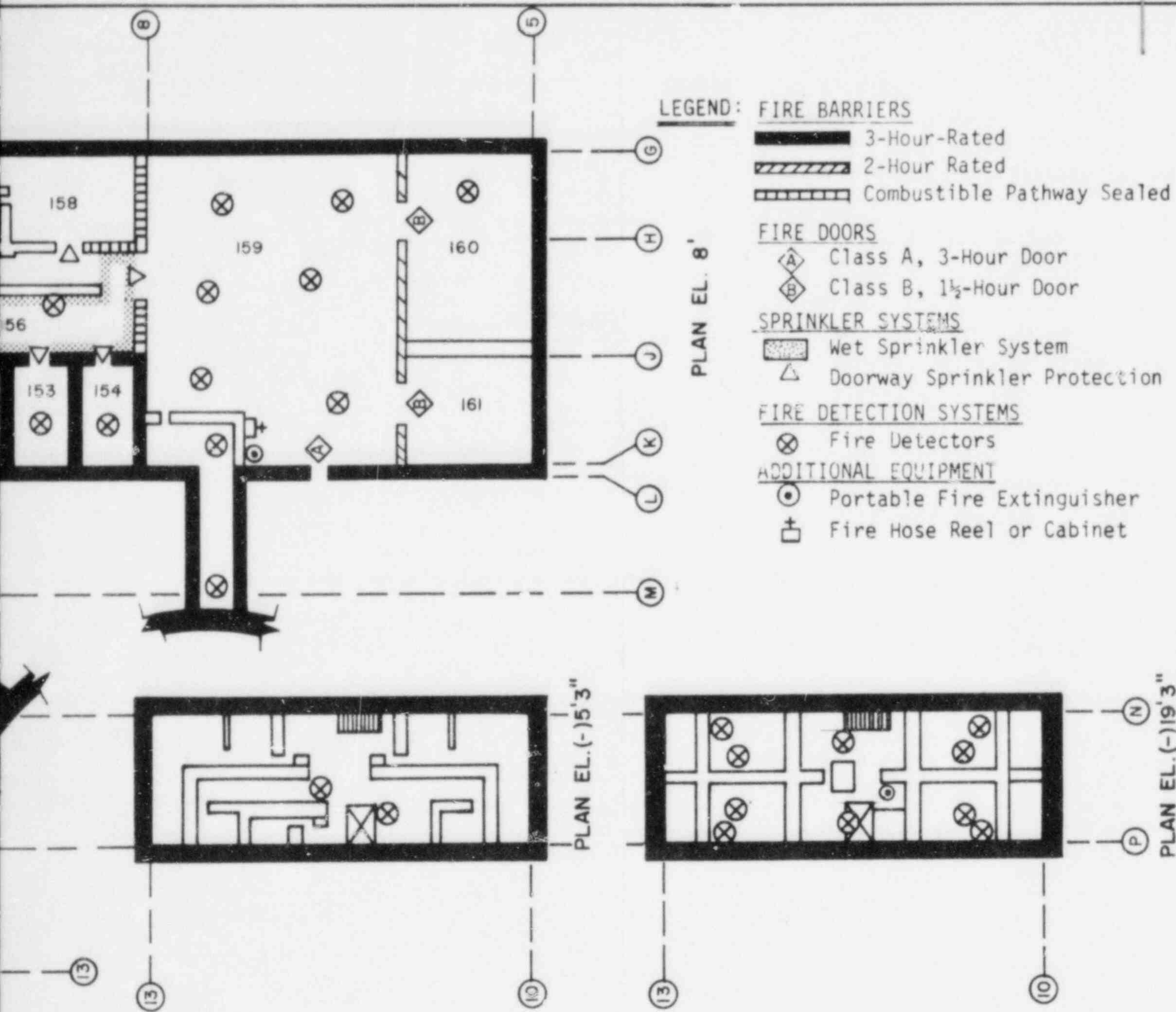
PRC
APERTURE
CARD

FIG. 6.4-1

AUXILIARY BUILDING
ELEVATION 8 FT.
SAFE SHUTDOWN COMPONENT
LOCATION DIAGRAM


13
10
G
H
J
K
L
M
N
P
Q
168
167
166
163
164
165
162
148
149
150
142
142A
151
152
157
128
129
130
A

P025



Also Available On Aperture Card

PRC APERTURE CARD

FIG. 6.4-2
AUXILIARY BUILDING
ELEVATION 8 FT.
FIRE PROTECTION AND ZONE
SEPARATION DIAGRAM