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Document Control Branch (Document Control Desk)

SUBJECT: Requests NRC consideration of & prompt review of alternate approach re design mods to comply w/SBO rule 10CFR50.63. Alternate approach utilizes TSC DG as alternate ac power source.

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September 18, 1992

10CFR 50.63

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Station Blackout Response

Reference: 1) Letter to KH Evers from MJ Davis dated November 20, 1990

2) Letter to Document Control Desk from KH Evers dated March 1, 1991

3) Letter to KH Evers from AG Hansen dated October 1, 1991

On November 20, 1990, (reference 1) we received the NRC staff's approval of our proposed modifications to the Kewaunee Nuclear Power Plant (KNPP) to comply with the Station Blackout (SBO) rule 10CFR 50.63. Our letter of March 1, 1991, (reference 2) requested a final completion date for the proposed modifications during the KNPP refueling outage scheduled for the spring of 1993. This completion schedule was granted in your letter dated October 1, 1991 (reference 3). Since receiving approval for our completion schedule, WPSC has been proceeding with the necessary design modifications to complete this project. However, WPSC recently performed a re-evaluation of the station blackout project to determine if there might be an acceptable alternate design for meeting the requirements of the rule.

A050

The re-evaluation resulted in an alternate approach which utilizes the technical support center (TSC) diesel generator as the alternate AC (AAC) power source. The TSC diesel generator is capable of powering the specific equipment that, in conjunction with manual operator actions both inside and outside of the control room, are necessary to bring and maintain the plant to a safe shutdown during a SBO. Since the completion of this re-evaluation, several discussions among our staffs have taken place, culminating in a meeting in your office on September 1, 1992. This letter and attachments hereto are submitted to provide the NRC staff with the information presented during the September 1 meeting incorporating feedback received. The following attachments are included with this letter: Attachment 1 - re-evaluation of the KNPP SBO coping duration; Attachment 2 - a general description of the proposed SBO design; and Attachment 3 - a detailed assessment addressing the coping topics identified in NUMARC 87-00 and additional NRC staff concerns.

We request your consideration of and prompt review of this alternate design recognizing the burden this review places upon the NRC staff, especially with the short time period remaining before the KNPP spring 1993 refueling outage. Our goal is to complete this project using the current completion schedule. In order to meet this schedule WPSC has been proceeding with the procurement of material to implement the modifications. However, in order to support this aggressive schedule and to ensure that any issues identified in the NRC safety evaluation report (SER) can be adequately addressed, WPSC hopes to receive the SER prior to the end of 1992. We appreciate the close cooperation and communication the staff has maintained with us to date concerning this matter. To further assist the staff reviewers we have assigned David Molzahn as the WPSC contact for this project. This assignment will provide a WPSC individual the NRC staff can contact directly with any questions that require immediate attention.

Sincerely,

C.A. Schrock

C.A. Schrock
Manager - Nuclear Engineering

DJM/jms

cc - US NRC - Region III
Mr. Patrick Castleman, US NRC

ATTACHMENT 1

LETTER FROM C.A. SCHROCK TO

DOCUMENT CONTROL DESK

DATED SEPTEMBER 18, 1992

RE-EVALUATION OF
STATION BLACKOUT COPING DURATION

Reference:

1) Letter to Director of Nuclear Reactor Regulation from CR Steinhardt dated April 17, 1989

2) Letter to Document Control Desk from KH Evers dated November 14, 1989

3) Letter to KH Evers from MJ Davis dated April 4, 1990

4) Letter to KH Evers from MJ Davis dated November 20, 1990

Reference 1 provided our response to the Station Blackout (SBO) Rule in accordance with the requirements of 10CFR 50.63(c). In this response Wisconsin Public Service Corporation (WPSC) provided the results of the evaluation of the Kewaunee Nuclear Power Plant (KNPP) design versus the requirements of the SBO rule using guidance from NUMARC 87-00, except where Regulatory Guide (RG) 1.155 takes precedence. The evaluation determined that the KNPP would have a 4 hour station blackout coping duration. This evaluation was based on an offsite power design characteristic group of "P1", an Emergency AC (EAC) power configuration group "C" and an Emergency Diesel Generator (EDG) reliability target of 0.95. The "P1" grouping is based on an independent offsite power classification group of "I 1/2", a severe weather (SW) classification of group "2", and an extremely severe weather (ESW) classification of group "2". In reference 2, WPSC provided additional analysis pertaining to weather data to support the "P1" offsite power design characteristic group. This additional weather data pertained specifically to the probability of extremely severe winds at the KNPP. The data provided justification to conclude that the KNPP should be an ESW Group 2 plant. In reference 3, the NRC staff reviewed the weather data and concurred that the KNPP should be categorized as an ESW group 2 plant. In reference 4, the NRC staff issued a safety evaluation concluding that the KNPP would be classified as a 4 hour station blackout coping duration plant.

Due to the proposed alternate approach for complying with the SBO rule, WPSC performed a review of the original baseline assumptions. This review concluded that the information used to determine the original SBO coping duration remained valid. Therefore, the NRC safety analysis conclusion that the KNPP should be classified as a 4 hour SBO coping duration plant remains valid and unchanged.

50-305 Kewaunee WPSC

WPSC

Station Blackout

Response

Rec'd w/ ltr dtd 9/18/92.... 9209240046

ATTACHMENT 2

LETTER FROM C.A. SCHROCK TO

DOCUMENT CONTROL DESK

DATED SEPTEMBER 18, 1992

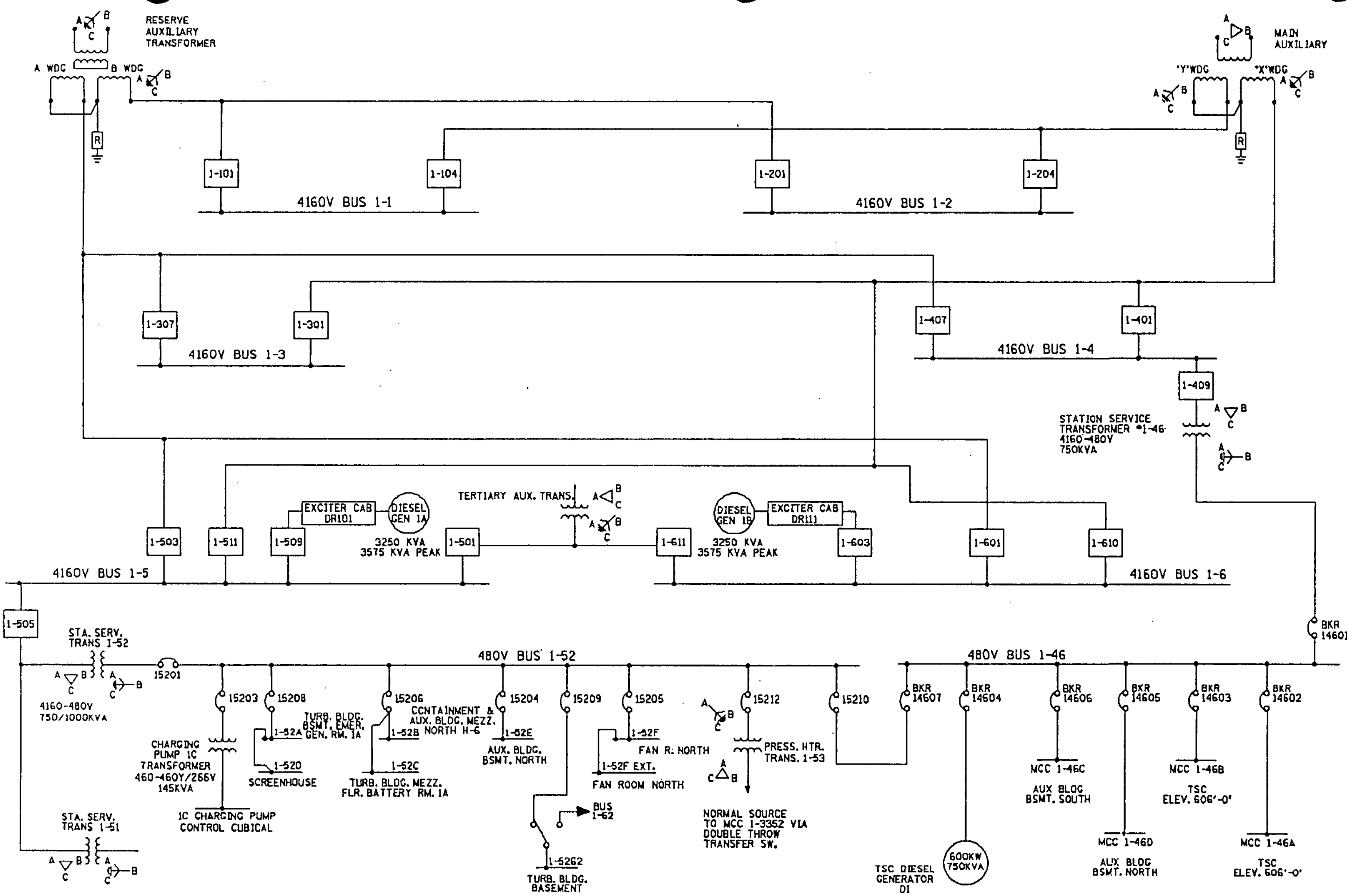
GENERAL DESCRIPTION OF SBO DESIGN

DESCRIPTION OF AAC SOURCE

The proposed alternate AC (AAC) source is the technical support center (TSC) diesel generator. The TSC diesel generator meets the criteria contained in 10CFR 50.2 for an alternate AC source. The criteria states that an AAC source is 1) connectable to but normally not connected to the off site or on site emergency AC power system, 2) has minimum potential for common mode failure with off site power or the on site emergency AC power sources, 3) is available in a timely manner after the onset of a station blackout, and 4) has sufficient capacity and reliability for operation of all systems required for coping with a station blackout (SBO) for the time period required to bring the plant to a safe shutdown. In addition, the TSC diesel generator meets the criteria of 10CFR 50.63 which assumes that there is not a concurrent single failure or a design basis accident.

The TSC diesel generator is an independent, non-class 1E, 600kW diesel generator that provides automatic emergency power to bus 1-46 for TSC equipment and essential loads other than engineered safeguards equipment. The proposed SBO design will provide the TSC diesel generator the capability of being connected to one of the two safeguards train A class 1E 480 volt buses (bus 1-52). Figure 1 provides a one line diagram showing the plants six 4160v buses along with the two 480v buses that are being powered by the TSC diesel generator during a SBO. The breaker operations for connecting the proposed AAC source to the safety bus (new breakers 14607 and 15210 added to buses 1-46 and 1-52 respectively) will be performed by local manual actions. During normal plant operations these manual breakers will remain opened, thus preventing the TSC diesel generator from being connected to the on site emergency AC power system. The TSC diesel generator will be available as an AAC power source to bus 1-52 within one hour of the onset of the SBO event and has sufficient capacity and capability to provide power to the equipment necessary to ensure a safe shutdown of the unit for a 4-hour duration.

WPSC has characterized the TSC diesel generator as meeting the minimally capable AAC power source design. This assessment is due to the TSC diesel generator not having the capability of powering the entire train of safe shutdown equipment. However, the TSC diesel generator does have the capability of powering the specific equipment that, in conjunction with manual operator actions both inside and outside of the control room, allows for the KNPP to maintain safe shutdown during a SBO for the 4 hour duration.



SBO
4160 & 480V BUSES

FIGURE 1

TSC DIESEL GENERATOR LOAD EVALUATION

The TSC diesel generator has a "Standby Rating" of 600KWe @ 0.8 power factor for 1000 hours/year. The "Overload Rating" of the TSC diesel generator is 660KWe @ 0.8 power factor for 2 hours in any 24 hour period. In the event of a SBO, the TSC will be activated as required by the KNPP Emergency Plan. The equipment that will be shed does not include any equipment needed to operate the TSC as a result of a SBO. After shedding the unnecessary electrical equipment the TSC diesel generator will have the following loads:

TSC DIESEL GENERATOR LOADS

MCC LOAD	LOAD DEMAND (KWe)	EQUIPMENT
MCC 1-46A	143.5	TSC HVAC Equipment Miscellaneous Equipment
MCC 1-46B	178.1	TSC and Diesel Generator Support Equipment
MCC 1-46D	117.3	Lighting Panels Sewage Treatment Plant Sample Room HVAC Equipment
BUS 1-52	150.8	1 Charging Pump (see note 1) 1 Train Boric Acid Heat Tracing And Tank Heaters 3 Motor Operated Valves (see note 2) 1 Battery Room 1A Exhaust Fan
TOTAL	589.7 KWe	

Note 1) Charging Pump 1C is assumed due to it having the greater electrical load and therefore bounding the use of Charging Pump 1A.

Note 2) The three motor operated valves are individually less than 1KW and their operation is completed prior to the start of the charging pump.

It can be concluded from this evaluation that the TSC diesel generator has a standby rating (600KWe capacity versus 589.7KWe SBO loads) which is sufficient in providing the power required for the safe shutdown of the unit for a 4 hour SBO duration.

REVIEW OF TSC DIESEL GENERATOR USING NUMARC 87-00 APPENDIX B CRITERIA

The TSC diesel generator was reviewed using the NUMARC 87-00 Appendix B criteria. The details of this review are provided in the following table entitled "Alternate AC Power Criteria". As a result of this review, WPSC has determined that the TSC diesel generator meets the guidelines of NUMARC 87-00, Appendix B.

ALTERNATE AC POWER CRITERIA

AAC POWER SOURCE CRITERION	COMPLIANCE OF TSC DIESEL GENERATOR
B1- CLASS 1E DESIGN	Since the TSC D/G and its components are not designed to meet class 1E requirements this criterion is not applicable.
B2- FIRE, PIPE WHIP, FLOODING, RADIATION, ETC	The TSC D/G is not required to be protected against the effects identified by this criterion since it is not a class 1E diesel generator.
B3- WEATHER EVENTS	The TSC D/G is protected against the effects of likely weather-related events.
B4- PHYSICAL SEPARATION	The TSC D/G is physically separated from safety related components as required by the KNPP licensing basis.
B5- AAC COMPONENT FAILURES	Failure of the TSC D/G components will not adversely affect class 1E AC power systems.
B6- ELECTRICAL ISOLATION	Electrical isolation of the TSC D/G bus (1-46) from the class 1E safeguards bus (1-52) shall be provided by two normally open circuit breakers in series, with one of the breakers being class 1E.
B7- DIRECT CONNECTION	The TSC D/G will not normally be directly connected to the on site emergency AC power system nor be capable of automatically loading equipment on the class 1E bus. (bus 1-52)
B8- COMMON CAUSE FAILURE	a) The TSC D/G is equipped with a DC power source that is independent from the plant's class 1E power system.

AAC POWER SOURCE CRITERION	COMPLIANCE OF TSC DIESEL GENERATOR
B8- COMMON CAUSE FAILURE	b) The TSC D/G is equipped with a battery powered start system. This battery is independent of the plant's class 1E power system. c) The TSC D/G is provided with a fuel oil supply that is separate from the fuel oil supply for the on site emergency AC power system. d) The TSC D/G is not the same as the class 1E emergency diesel generators. e) No single point vulnerability exists whereby a likely weather-related event or single active failure could disable any portion of the on site emergency AC power sources and simultaneously fail the TSC diesel generator. f) The TSC D/G is capable of operating during and after a SBO without any class 1E power system support. g) The portions of the TSC D/G system subject to maintenance activities shall be tested prior to returning the system to service.
B9- AAC POWER SYSTEM SIZE	The TSC D/G is sized to carry the required shutdown loads for the required 4 hour coping duration. It will also be capable of maintaining voltage and frequency within limits that will not degrade the performance of any shutdown system or component.
B10- TESTING	The TSC D/G shall be tested at intervals not longer than three months (±25% grace period), following the manufacturer's recommendations or in accordance with plant developed procedures. A rated load capacity test shall be performed at least once per fuel cycle. During periods of testing the diesel generator may be directly connected to the off site power system.

AAC POWER SOURCE CRITERION	COMPLIANCE OF TSC DIESEL GENERATOR
B11- PROCEDURES	Appropriate surveillance and/or maintenance procedures will be written using the manufacturer's recommendations for a diesel generator of limited use and utilizing lessons learned from operating experience.
B12- INITIAL TEST	Prior to declaring the system operational, the appropriate test(s) will be performed to demonstrate the capability of powering the required shutdown equipment.
B13- TARGET RELIABILITY	The target reliability of the TSC D/G will be 0.95 as previously specified in the letter to Document Control Desk from KH Evers dated March 30, 1990.

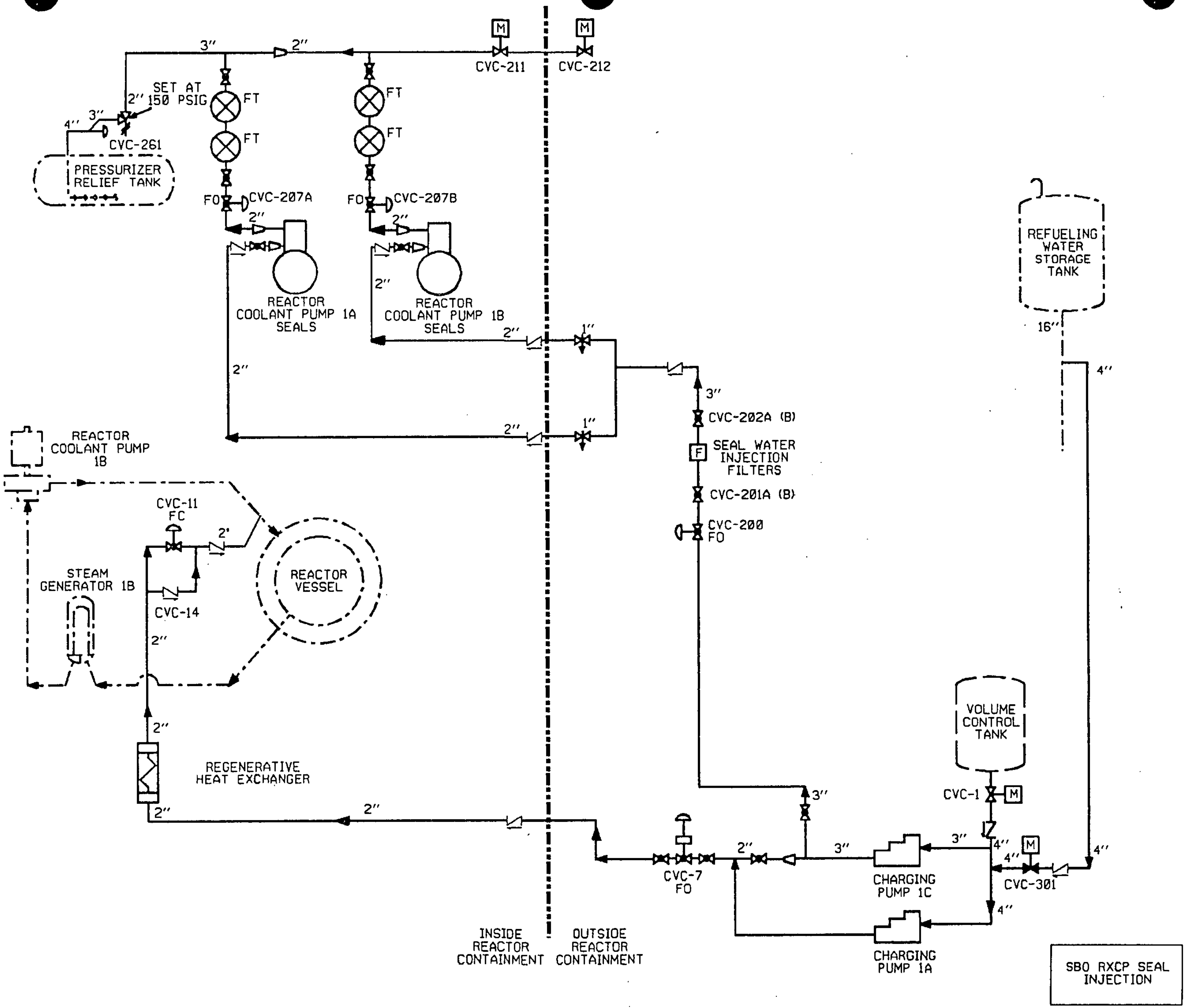
REACTOR COOLANT SYSTEM INVENTORY

The TSC diesel generator will power the necessary make-up system equipment to maintain adequate reactor coolant system inventory to ensure that the core is cooled for the required 4 hour coping duration. The equipment at KNPP necessary to ensure adequate core cooling and reactor coolant system inventory control includes one charging pump, three motor operated valves, one fail open air operated valve, and one relief valve. Figure 2 provides a one line diagram of the equipment that will be used to maintain the reactor coolant system inventory. The design requires the suction of the charging pump to be transferred to the refueling water storage tank. This will require valve CVC-1 to close and valve CVC-301 to open. The charging pump will discharge flow to the reactor coolant system (RCS) via the charging bypass line around CVC-11 and the reactor coolant pump (RCP) seals. The RCP seal injection filter valves (CVC-202A and CVC-202B) are adjusted to allow a nominal flow of 8 gpm to each seal during normal plant operation. With a charging pump flow of 60 gpm and assuming that there is a flow of 8 gpm to each of the RCP seals, the remaining pump flow capacity (44 gpm) is injecting into the RCS through the normal cold leg injection piping. The charging pump flow being injected into the RCP seals would displace the RCS loss through the seals and thus the net effect would be a volumetric balance equivalent to 60 gpm. In order to contain the reactor coolant pump seal water leakage within containment, valve CVC-212 will be closed and relief valve CVC-261 will open to provide a relief path to the pressurizer relief tank. To provide control room control of the amount of charging flow to the reactor coolant loop versus the reactor coolant pump seals, valve CVC-7 will be provided with an air supply. The following table discusses the function of each of these valves.

VALVES NEEDED FOR RCS INVENTORY CONTROL

VALVE NO.	POWER DESCRIPTION	FUNCTION
CVC-1	AC MOTOR OPERATED VALVE POWERED BY MCC 1-52B	This valve must close to isolate the volume control tank from the charging pump suction.
CVC-301	AC MOTOR OPERATED VALVE POWERED BY MCC 1-52E	This valve must open to supply the charging pump suction with 1950 ppm borated refueling water storage tank water.
CVC-212	AC MOTOR OPERATED VALVE POWERED BY MCC 1-52B	This valve must close to prevent seal water from returning to the volume control tank.
CVC-7	AIR OPERATED VALVE FAIL OPEN	This valve controls the amount of charging flow to the reactor coolant loop piping versus the reactor coolant pump seals.
CVC-261	RELIEF VALVE TO PRESSURIZER RELIEF TANK	This valve will provide a relief path to the pzr relief tank for the 25 gpm per reactor coolant pump seal leakage. At 100 psig the pzr relief tank will begin to discharge to containment.

Although the design provides for two charging pumps remaining functional, only one is required for compliance with the SBO rule. The justification for only one pump is based on a total 50 gpm reactor coolant pumps seal (RCP) leakage (25 gpm per RCP), a 10 gpm reactor coolant system leakage (maximum allowed by KNPP technical specification) and a minimal amount of cool down. Since the KNPP SBO design provides the capability to power selected equipment on bus 1-52, the control room operators have the option of using either the 1A charging pump or the 1C charging pump. The 1A charging pump is powered from MCC 1-52E and the 1C charging pump is powered directly from bus 1-52. Either of these pumps have the capability of supplying water at the rate of 60 gpm. The water supply for the charging pumps will be from the refueling water storage tank (RWST). The RWST has a technical specification minimum of 272,500 gallons of water with a boron concentration of at least 1950 ppm. The quantity of boric acid stored in the RWST is sufficient to achieve cold shutdown at any time during core life.



3"
2"
CVC-211
CVC-212
SET AT 150 PSIG
2"
3"
4"
CVC-261
FT
FT
FT
FT
PRESSURIZER RELIEF TANK
FO
CVC-207A
FO
CVC-207B
2"
2"
2"
REACTOR COOLANT PUMP 1A SEALS
REACTOR COOLANT PUMP 1B SEALS
2"
1"
2"
3"
CVC-202A (B)
2"
1"
SEAL WATER INJECTION FILTERS
CVC-201A (B)
CVC-200 FO
REFUELING WATER STORAGE TANK
16"
4"
REACTOR COOLANT PUMP 1B
CVC-11 FC
2'
REACTOR VESSEL
STEAM GENERATOR 1B
CVC-14
2"
2"
REGENERATIVE HEAT EXCHANGER
2"
2"
VOLUME CONTROL TANK
CVC-1
3"
3"
2"
3"
4"
4"
4"
CVC-7 FO
CVC-301
CHARGING PUMP 1C
4"
CHARGING PUMP 1A
INSIDE REACTOR CONTAINMENT
OUTSIDE REACTOR CONTAINMENT
SBO RXCP SEAL INJECTION

FIGURE 2

SECONDARY SIDE HEAT REMOVAL

The method of secondary side heat removal relies on available process steam, the turbine driven auxiliary feedwater pump (TDAFWP), the condensate storage tanks, the steam generator power operated relief valves, and DC power from the class 1E station batteries. Figure 3 provides a one line diagram of the equipment that will be used to remove secondary side heat and maintain secondary side inventory control. The turbine driven auxiliary feedwater pump is powered using steam from either of the steam generators (1A or 1B) through normally open valves MS-100A or MS-100B. The motor operated steam inlet valve (MS-102) which is powered from the train A class 1E station battery, will be opened to admit steam to the turbine. The auxiliary feedwater pump will draw water from the condensate storage tanks (CSTs) and discharge it to the steam generators 1A and 1B. Valves AFW-10A and AFW-10B will be used to control the supply of auxiliary feedwater to the steam generators. Heat removal and secondary side inventory control from either steam generator 1A or 1B will be via their respective power operated relief valves (SD-3A or SD-3B). One power operated relief valve is capable of removing all the decay heat necessary to maintain the plant in the hot shutdown condition. The main steam isolation valves (MS-1A and MS-1B) and the blowdown isolation valves (BT-3A and BT-3B) will be closed to prevent loss of secondary side inventory.

The auxiliary lube oil pump for the TDAFWP has a 125VDC motor that is powered from train A of the class 1E station battery. A discussion of the condensate storage tank inventory requirements is provided in attachment 3.

The following table discusses the function of each of the valves needed for secondary side heat removal.

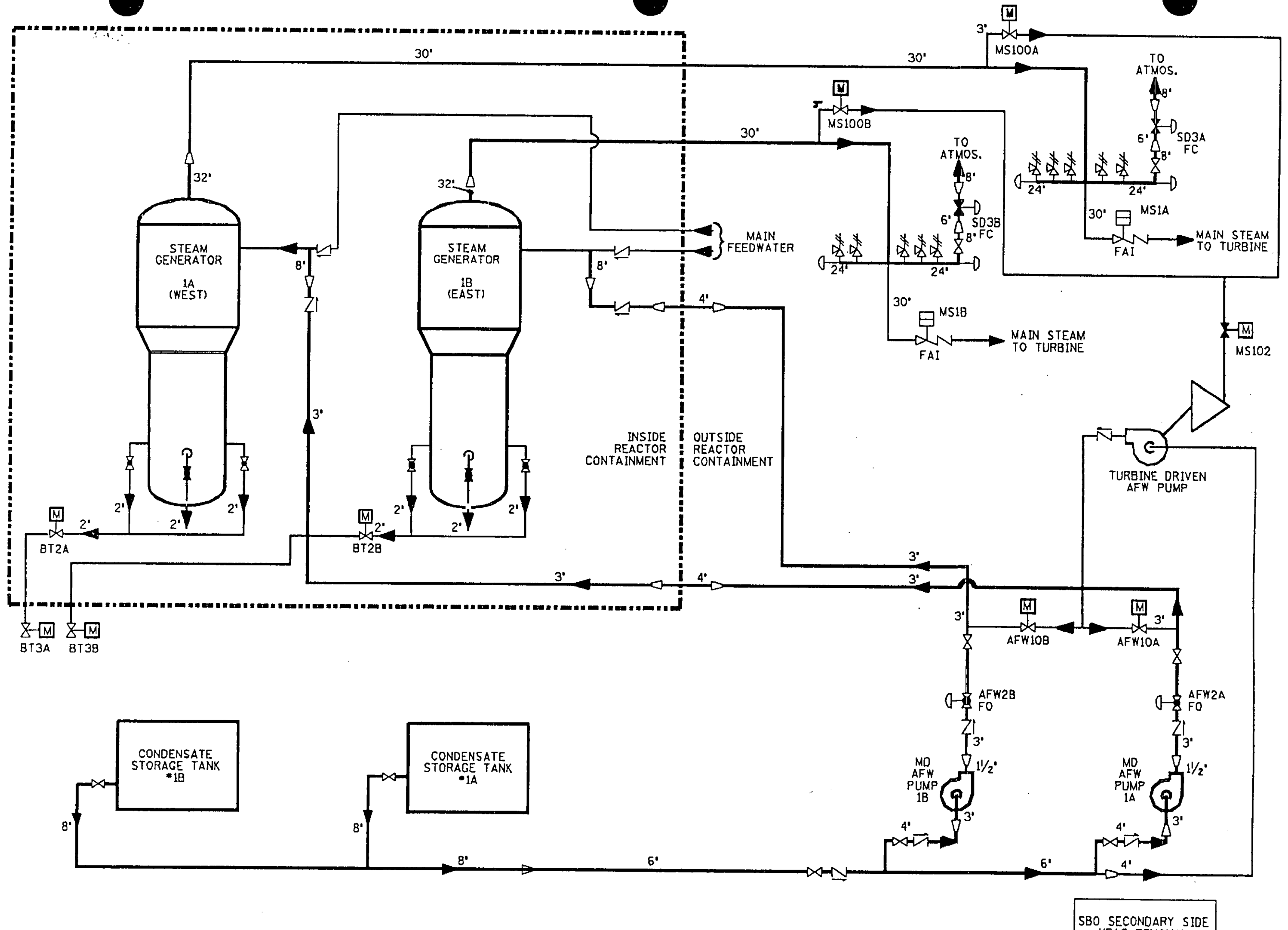
VALVES NEEDED FOR SECONDARY SIDE HEAT REMOVAL

VALVE NO.	POWER DESCRIPTION	FUNCTION
*MS-100A	AC MOTOR OPERATED VALVE NORMALLY OPEN	Steam supply to the TDAFWP from 1A steam generator.
*MS-100B	AC MOTOR OPERATED VALVE NORMALLY OPEN	Steam supply to the TDAFWP from 1B steam generator.
MS-102	DC MOTOR OPERATED VALVE NORMALLY CLOSED	Steam inlet valve to the TDAFWP.

VALVE NO.	POWER DESCRIPTION	FUNCTION
AFW-10A	DC MOTOR OPERATED VALVE NORMALLY OPEN	TDAFWP supply to steam generator 1A. This valve can be used to control steam generator 1A secondary side inventory control.
AFW-10B	DC MOTOR OPERATED VALVE NORMALLY OPEN	TDAFWP supply to steam generator 1B. This valve can be used to control steam generator 1B secondary side inventory control.
BT-3A	DC MOTOR OPERATED VALVE NORMALLY OPEN	Steam generator 1A blowdown isolation valve.
BT-3B	DC MOTOR OPERATED VALVE NORMALLY OPEN	Steam generator 1B blowdown isolation valve.
MS-1A	AIR OPERATED VALVE FAIL AS-IS	1A main steam isolation valve. This valve is equipped with DC powered solenoid valves.
MS-1B	AIR OPERATED VALVE FAIL AS-IS	1B main steam isolation valve. This valve is equipped with DC powered solenoid valves.
**SD-3A	AIR OPERATED VALVE FAIL CLOSED	Steam generator 1A power operated relief valve. This valve will be equipped with a DC solenoid valve and a backup air supply.
**SD-3B	AIR OPERATED VALVE FAIL CLOSED	Steam generator 1B power operated relief valve. This valve will be equipped with a DC solenoid valve and a backup air supply.

* Only MS-100A or MS-100B is needed to supply steam to the TDAFWP. During normal plant operation both valves are open and available to supply steam to the pump.

** Only SD-3A or SD-3B is needed to remove the decay heat and maintain the plant in the hot shutdown condition.



SBO SECONDARY SIDE HEAT REMOVAL

FIGURE 3

LIGHTING PROVISIONS

A plant walk down was conducted to determine whether adequate lighting exists to perform the actions necessary in response to a SBO. This walk down took credit for the 8 hour Appendix R wallpacks, existing incandescent and fluorescent lighting powered by the TSC Bus 1-46 lighting panels (except the Auxiliary Building South), and the entire Technical Support Center. The walk down determined that additional lighting is required at MCC 1-52E and may be required at the radiological assessment facility entrance in the Auxiliary Building Basement. Currently, for all other areas the available lighting for plant area travel paths and local manual operations was determined to be adequate. However, upon completion of the modification a re-evaluation will be performed in order to ensure that adequate lighting is available.

COMMUNICATION PROVISIONS

A review was conducted to determine whether adequate operator communication provisions were available to respond to a SBO event. This review took credit for hand held radios and the soundpowered hard wire system located throughout the plant. This review determined that the hand held radios together with the current soundpowered system provide sufficient communications capability to coordinate the manual actions.

REQUIRED OPERATOR ACTIONS

The following tables identify the plant locations along with the actions that are required to be taken by the operators outside the control room. These tables identify four plant locations outside the control room where breaker operations are required. These actions would be performed by a Plant Nuclear Auxiliary Operator.

PLANT LOCATION	REQUIRED OPERATOR ACTIONS
TSC ELECTRICAL EQUIPMENT ROOM BUS 1-46	1) **OPEN THE FOLLOWING BREAKER ON BUS 1-46** 14606 MCC 1-46C 2) **CLOSE THE BUS 1-46/1-52 TIE BREAKER** 14607

The operator actions performed in the TSC Electrical Equipment Room ensure that unnecessary equipment is prevented from loading onto the TSC diesel generator and that the tie breaker 14607 between bus 1-46 and bus 1-52 is closed. These are the only two breaker operations that must be performed by local manual operator actions at this plant location. These actions will be incorporated into appropriate SBO procedures and training will be provided to the individuals required to perform these actions.

PLANT LOCATION	REQUIRED OPERATOR ACTIONS
BATTERY ROOM 1A MCC 1-52C	1) **OPEN THE FOLLOWING BREAKERS ON MCC 1-52C** <u>BKR CUBICLE</u> A1 AFW PMP 1A AUX LUBE OIL PMP A2 BATTERY CHG BRA-108 B3 INVERTER BRA-111 B4 INST BUS TRANSFORMER BRA-106 B5 INST BUS INVERTER BRA-112 B7 BATTERY RM 1A FAN COIL UNIT 2) **OPEN THE FOLLOWING BATTERY ROOM DOORS** DR# 45 BETWEEN THE BATTERY ROOMS DR# 48 TURB BLDG TO BATTERY ROOM 1B

The operator actions performed in Battery Room 1A ensure that unnecessary equipment is prevented from loading onto the TSC diesel generator. There are six breaker operations that must be performed by local manual operator actions at this plant location. These actions will be incorporated into appropriate SBO procedures and training will be provided to the individuals required to perform these actions.

The operator actions of opening doors #45 and #48 ensure the battery rooms are adequately cooled during the entire 4 hour SBO event. These actions will be incorporated into the appropriate SBO procedures and training will be provided to the individuals required to perform these actions. Furthermore, these doors will be opened within 30 minutes of the onset of a SBO (as verified by the control room operators).

PLANT LOCATION	REQUIRED OPERATOR ACTIONS
AUX BLDG NORTH OF BORIC ACID EVAP CONTROL PANEL MCC 1-52E	1) **OPEN THE FOLLOWING BREAKERS ON MCC 1-52E** BKR CUBICLES A2 AUX BLDG BASEMENT FCU 1A A4 RHR PUMP PIT FCU 1A A5 AUX BLDG MEZZANINE FCU 1A C1 BA TANKS OUTLET ISOL VALVE S1-2A E4 HEATED LINE 'A' H2 ANALYZER E5 INST BUS TRANS BRA-106 (ALT) J1 AUX BLDG BASEMENT FCU 1C J6 CHARGING PUMP 1C FAN COIL UNIT

The operator actions performed at MCC 1-52E ensure that unnecessary equipment is prevented from loading onto the TSC diesel generator. There are eight breaker operations that must be performed by local manual operator actions at this plant location. These actions will be incorporated into appropriate SBO procedures and training will be provided to the individuals required to perform these actions.

PLANT LOCATION	REQUIRED OPERATOR ACTIONS
SAFEGUARDS ALLEY (TURBINE BUILDING BASEMENT) BUS 1-52	1) **OPEN THE FOLLOWING BREAKERS ON BUS 1-52** 15209 MCC 1-5262 15208 MCC 1-52A and MCC 1-52D 15205 MCC 1-52F and MCC 1-52F EXT 15212 PZR HEATERS TRANSFORMER 2) **CLOSE THE BUS 1-52/1-46 TIE BREAKER** 15210

The operator actions performed in the Turbine Building Basement ensure that unnecessary equipment is prevented from loading onto the TSC diesel generator and that the tie breaker 15210 between bus 1-52 and bus 1-46 is closed. There are five breaker operations that must be performed by local manual operator actions at this plant location. These actions will be incorporated into appropriate SBO procedures and training will be provided to the individuals required to perform these actions.

The local manual actions required to be performed at bus 1-52 can be depicted using Figure 1 in conjunction with the following table. This table shows the 480V switchgear breaker configuration with the TSC diesel generator as an AAC power to 480V bus 1-52.

BREAKER NUMBER	BREAKER POSITION DURING NORMAL PLANT OPERATION	FINAL BREAKER POSITION DURING A STATION BLACKOUT
**14601	CLOSED	OPEN
14602	CLOSED	CLOSED
14603	CLOSED	CLOSED
**14604	OPEN	CLOSED
14605	CLOSED	CLOSED
14606	CLOSED	OPEN
14607	OPEN	CLOSED
**15201	CLOSED	OPEN
15203	CLOSED	CLOSED
15204	CLOSED	CLOSED
15205	CLOSED	OPEN
15206	CLOSED	CLOSED
15208	CLOSED	OPEN
15209	CLOSED	OPEN
15210	OPEN	CLOSED
15212	CLOSED	OPEN

** 480V switchgear bus source breakers that are electrically operated with 125VDC control power and are therefore not local manual actions.

The following table identifies an action that could be performed by either of the Plant Nuclear Auxiliary Operators or by a Plant Control Room Operator.

PLANT LOCATION	REQUIRED OPERATOR ACTIONS
RELAY ROOM	1) **OPEN RELAY RACK CABINET DOORS**

The operator actions performed in the Relay Room ensures that the instrumentation located within the cabinets are adequately cooled during the entire 4 hour SBO event. These actions will be incorporated into appropriate SBO procedures and training will be provided to the individuals required to perform these actions. Furthermore, these cabinet doors will be opened within 30 minutes of the onset of a SBO (as verified by the control room operators).

In order to prevent the loss of the condensate storage tank contents to the main condenser, one additional manual operator action will be required. The block valves for normal and emergency makeup to the condenser from the condensate storage tanks (MU-2A and MU-2B) will also be closed. This will assure the availability of the entire condensate storage tank contents for shutdown decay heat removal requirements.

In summary, there is a total of 21 breaker operations that must be performed by local manual operator actions. These 21 breaker operations are limited to only four locations within the plant's adjacent auxiliary, turbine, and technical support center buildings. The physical location of the buses and MCCs are in close proximity to each other in these buildings. The inability of an operator to open any single motor control center (MCC) breaker will not result in the TSC diesel generator exceeding its overload rating. Furthermore, the 480V MCC breakers are subject to periodic maintenance which verifies both the passive and active breaker components. Finally, in addition to proceduralizing the operator actions and providing training to the individuals, the breakers which are required to be opened will also be locally identified. The actions which have been identified as being required to be performed in response to a SBO can be accomplished within one hour.

PROCEDURES AND TRAINING

WPSC will be reviewing the plant procedures affected by this proposed design. These procedures will be revised to incorporate the plant specific actions needed to mitigate a SBO event. Furthermore, training associated with the performance of these procedures will be provided. The operating procedures necessary to address a SBO along with the training required for the plant operators will be provided upon completion of installation of the modification.

QUALITY ASSURANCE (QA)

WPSC has reviewed the guidance provided in Regulatory Guide 1.155 Section 3.5 and Appendix A. This review has concluded that the quality assurance guidance provided by this regulatory guide is consistent with the quality assurance requirements identified with equipment classified by the KNPP QA Program as being QA type 2. A KNPP QA type 2 classification identifies those items for which the Quality Assurance Program should engender a high confidence level that the items will perform satisfactorily. This category includes those items whose failure would not directly affect the health and safety of the public but the failure of which could cause severe economic loss or cause the plant to experience an extended outage. A QA type 2 classification is consistent with the requirements of Regulatory Guide 1.155 which states;

> .... the equipment installed to meet the station blackout rule must be implemented such that it does not degrade the existing safety-related systems.

The TSC diesel generator and associated equipment were originally installed in accordance with the KNPP QA program as QA type 2. The remaining equipment that is being installed to meet the station blackout rule will be installed in accordance with the KNPP QA Program (ie. the bus 1-52 tie breaker will be a class 1E breaker) which meets or exceeds the requirements of the SBO rule. Lastly, QA audits will be conducted in accordance with the requirements of the KNPP Technical Specifications.

EDG RELIABILITY PROGRAM

In a letter to the Document Control Desk from KH Evers dated March 30, 1990, WPSC committed to a 0.95 target reliability goal for the non-class 1E AAC system. Since the TSC diesel generator will be the non-class 1E AAC power source for this design, following start-up from the 1993 refueling outage it will have a target reliability goal of 0.95. In order to determine whether a 0.95 reliability goal for the TSC diesel generator was realistic, a cursory review was performed of the available data. Based upon this review WPSC believes that a .95 target reliability goal is achievable. However, to further enhance its reliability WPSC will include the TSC diesel generator in the reliability centered maintenance (RCM) program.

The current EDG reliability program meets the intent of the guidance provided in Regulatory Guide 1.155 Section 1.2. However, the EDG reliability program will be evaluated and updated as appropriate to include the TSC diesel generator. This review will be completed prior to start up from the 1993 refueling outage. WPSC believes that with the implementation of the RCM together with the increased maintenance and testing on this diesel generator, in addition to incorporating it into the diesel generator reliability program, a continued targeted reliability goal of 0.95 will be met.

ATTACHMENT 3

LETTER FROM C.A. SCHROCK TO

DOCUMENT CONTROL DESK

DATED SEPTEMBER 18, 1992

CONDENSATE INVENTORY

References:
1) Letter to Director of Nuclear Reactor Regulation from CR Steinhardt dated April 17, 1989
2) Letter to KH Evers from MJ Davis dated November 20, 1990
3) Letter to Document Control Desk from KH Evers dated March 1, 1991
4) Letter to KH Evers from AG Hansen dated October 1, 1991
5) Letter to Document Control Desk from CR Steinhardt dated July 8, 1992

In reference 1, WPSC determined from section 7.2.1 of NUMARC 87-00 that 36,531 gallons of water are required for decay heat removal for the four-hour required coping duration category. The KNPP has two condensate storage tanks, each tank available with 75,000 gallons of condensate. WPSC noted that except for brief periods during plant start up, each condensate storage tank is typically 100% filled and available to supply water for decay heat removal.

In reference 2, the NRC determined that approximately 38,100 gallons of condensate would be required for decay heat removal. This estimate was based on a maximum licensed core thermal rating of 1683 MWt, or 102% of 1650 MWt (using the expression provided in NUMARC 87-00). Using this calculation as a basis, the NRC staff stated that the licensee needs to revise the plant's technical specifications for a minimum condensate storage tank level of 39,000 gallons.

In reference 3, WPSC committed to revise the KNPP technical specifications to require a minimum of 39,000 gallons be available in the condensate storage tanks for decay heat removal upon completion of the modifications. In reference 4, the NRC staff found this to be acceptable since it agreed with the NRC safety evaluation recommendation. A proposed technical specification amendment (PA 108) has been submitted to the NRC staff requiring a minimum of 39,000 gallons of water be available in the condensate storage tanks (reference 5). WPSC will administratively adhere to the 39,000 gallons after the 1993 refueling outage if the KNPP proposed technical specifications have not been issued. No further action on WPSC's part is necessary regarding this item.

BATTERY CAPACITY ASSESSMENT

The KNPP has four batteries that together provide the necessary DC power requirements to cope with a four hour SBO event. Figure 4 provides a one line diagram showing the three 125VDC batteries and their distribution cabinets. As shown in the table below the four batteries include two class 1E batteries (BRA-101 and BRB-101), one non-class 1E (BRD-101) and one non-class 1E battery dedicated to the TSC diesel generator. This table also provides the battery capacity at an 8 hour discharge rate for each of these batteries. The three 125VDC batteries and their distribution systems are independent except for bus-tie breakers between the class 1E batteries. The bus-tie breakers are normally open during plant operation. The TSC diesel generator battery is an independent stand alone battery that cannot be electrically connected to any other plant battery.

STATION BATTERY	CLASS 1E	BATTERY VOLTAGE	BATTERY CAPACITY @ 8 HOUR RATE
BRA-101 A TRAIN	YES	125 VDC	1304 AMP HOURS
BRB-10I B TRAIN	YES	125 VDC	1304 AMP HOURS
BRD-101	NO	125 VDC	1680 AMP HOURS
TSC D/G BATTERY	NO	24 VDC	N/A

The following table provides a summary of the battery power supplies associated with the electrical power sources available to the class 1E 4160V buses. Also included is the battery power supply for the TSC diesel generator and its associated 480V bus 1-46 source breaker.

EQUIPMENT	BRA-101	BRB-101	BRD-101	24VDC
Control Power for Source Breakers to Bus 1-5 (Train A)	X			
Train A Diesel Generator	X			
Control Power for Source Breakers to Bus 1-6 (Train B)		X		
Train B Diesel Generator		X		
TSC Diesel Generator Engine Start and Control				X
TSC Diesel Generator 480V Bus 1-46 Breaker Control			X	

125 VDC Battery Size

A battery capacity calculation has been performed to determine the battery sizing. This calculation is based on IEEE 485-1983 "Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations". This calculation included the following design considerations:

DESIGN CONSIDERATION	CALCULATION INPUT
Battery Aging	An aging factor of 1.25 was used to allow for the degradation in battery capacity permissible at the end of the 20 year design life.
Design Margin	A design margin of 1.10 was used to allow for future load additions being added to the batteries.
Temperature Corrections	The temperature correction factor assumed was 1.00. This is based on Table 1 of IEEE Std. 485-1983 and the design of the temperature control system for the battery rooms which is set to maintain average temperature at 77°F °F.

In accordance with IEEE 485-1983, the size of the four 125VDC batteries were determined based upon calculated battery duty cycles. Each battery duty cycle consists of continuous and momentary loads. Continuous loads are energized throughout the duty cycle; examples of continuous loads are inverters, indicating lights, annunciators and continuously energized solenoid valves. Momentary loads are energized at the beginning or the end of the duty cycle, and are considered to last for a time duration of one (1) minute; examples of momentary loads include switchgear operations, motor operated valve repositioning, and generator field flashing.

A battery duty cycle calculation was prepared for each of the 125VDC batteries. This analysis included a review of each distribution cabinet and fuse panel branch circuit for the expected operation of the powered components during the SBO duty cycle. All components were taken as nameplate electrical load except the Instrument Bus and Computer Inverters; inverters were taken at actual output load. All branch circuits were considered to determine the overall duty cycle imposed upon each battery.

In addition, on March 30 though May 1, 1992, an NRC Electrical Distribution System Functional Inspection (EDSFI) was conducted at the KNPP. This inspection included a review of the class 1E 125VDC battery design with respect to sizing, duty cycle loading, cell temperature, battery aging, and capacity. The inspection did not identify any concerns dealing with battery sizing issues. The following table identifies plant specific SBO duty cycle loads which were considered in the battery duty cycle calculation.

TIME PERIOD	SEQUENCE EVENTS CONSIDERED
INITIAL 1-MINUTE MOMENTARY LOADS	1) Loss of all off-site power sources. 2) Reactor and Turbine trip from full power. 3) Start of the onsite class 1E diesel generators with failure of its source breaker to close. 4) Automatic initiation of Turbine Driven Auxiliary Feedwater Pump on decreasing steam generator level, and isolation of steam generator blowdown. 5) Feedwater and Main Steam Isolation.
CONTINUOUS LOAD	1) Instrument Bus Inverters. 2) Computer Inverter. 3) Continuously energized solenoid valves, relays, and indicating lights.
LAST 1-MINUTE MOMENTARY LOAD	I) Restart of the onsite Class 1E diesel generators with successful closure of its source breaker.

The overall duty cycle duration selected for each 125VDC battery is eight (8) hours. This 8 hour duty cycle duration capability has been verified by test per the guidance of IEEE 450-1987. The present battery duty cycles expressed in d.c. amperes are as follows;

DUTY CYCLE PERIOD	BRA-101	BRB-101	BRD-101
Initial 1 minute	324 Amps	204 Amps	209 Amps
1 to 479 minutes	104 Amps	106 Amps	164 Amps
Last 1 minute	142 Amps	144 Amps	164 Amps

Note that the above duty cycle currents are more recent than presently documented in the USAR Chapter 8.

Since the 125VDC batteries were designed for a total duty cycle duration of eight (8) hours, and the required coping duration under Station Blackout conditions is four (4) hours, the present class 1E and non-class 1E batteries will have sufficient capacity to carry the required 4 hour SBO loads.

24VDC Battery

The TSC Diesel Generator has a dedicated 24VDC battery sized for engine starting and engine controls. This battery is provided with a battery charger powered by the diesel generator output bus for recharge and float operation. This 24VDC battery is totally independent of the class 1E and non-class 1E batteries.

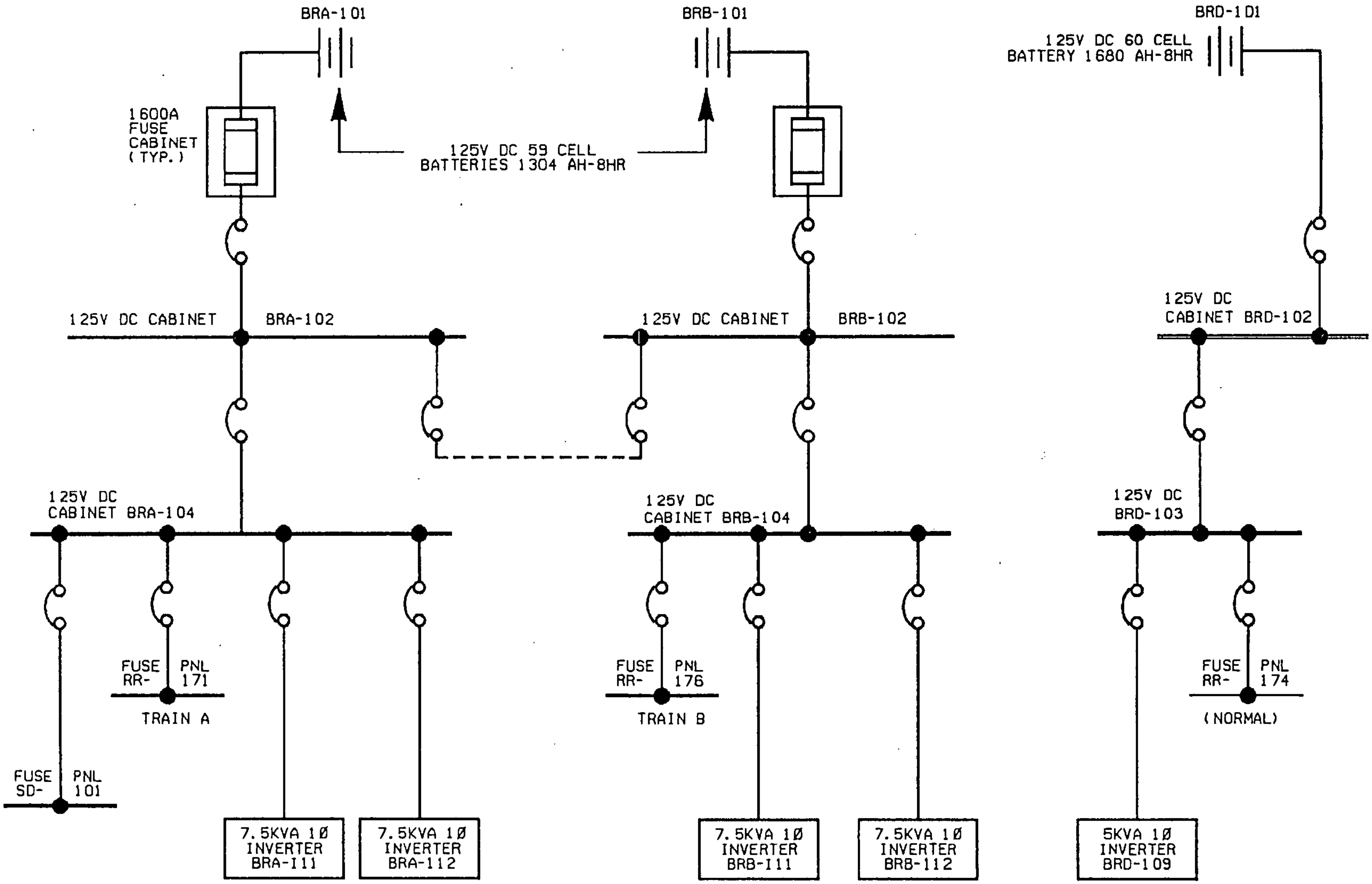
Substation Batteries

The Kewaunee substation has two batteries and distribution systems. The first system is a 48VDC system for solid state relay power and control, and the second system is a 125VDC system for substation breaker and electromechanical relay power and control.

The 48VDC system consists of a twenty (20) cell lead calcium battery rated 240 ampere-hours at the 8-hour discharge rate and 1-minute rated at 309 amperes. The 48VDC battery is provided with an inservice 50 ampere battery charger and also a spare (standby) 50 ampere battery charger. The battery output powers two (2) 48VDC distribution buses.

The 125VDC system consists of a sixty (60) cell lead calcium battery rated 560 ampere-hours at the 8-hour discharge rate and 1-minute rated at 693 amperes. The 125VDC battery is provided with an inservice 50 ampere battery charger and also a spare (standby) 50 ampere battery charger. The battery output powers two (2) 125VDC distribution buses. The substation Oil Circuit Breakers (OCBs) are equipped with two trip coils and one close coil. The electrical distribution in the substation is arranged such that the redundant trip coils of the OCBs are powered by the redundant 125VDC distribution buses.

The general conditions of the batteries are inspected monthly by the plant electrical department. Semi-annually the individual cell voltages (ICVs) and specific gravity readings of each of the battery cells are are taken by the substation and transmission department. Additional inspections performed by the substation and transmission department include a review for abnormal water useage, color of plates, lack of gassing on charge, ground tests and general condition of the batteries. These inspections provide further assurance that the batteries will be available as required during a SBO event.



125VDC SBO
POWER SUPPLIES

FIGURE 4

COMPRESSED AIR

In accordance with the NUMARC 87-00 guidelines, WPSC initiated an effort to determine the amount of air needed to operate the equipment required to respond to a SBO event. The equipment relied upon to operate post SBO and which requires air to operate is provided in the following table.

EQUIPMENT	POWER DESCRIPTION	FUNCTION
Valve CVC-7	AIR OPERATED VALVE FAIL OPEN	This valve controls the amount of charging flow to the reactor coolant loop versus the reactor coolant pump seals.
Valve SD-3A	AIR OPERATED VALVE FAIL CLOSED	Steam generator 1A power operated relief valve. This valve will be equipped with a DC solenoid valve.
Valve SD-3B	AIR OPERATED VALVE FAIL CLOSED	Steam generator 1B power operated relief valve. This valve will be equipped with a DC solenoid valve.
1A Charging Pump	AC POWERED WITH AIR OPERATED SPEED CONTROLLER	Provide makeup water to the reactor coolant system and reactor coolant pump seals.

An evaluation of this equipment was performed to determine the required amount of backup air capacity. Each of these valves are operated though the use of an actuator, positioner and signal converter, all of which use air during operation. The 1A charging pump has a pneumatic speed controller which is operated using a signal converter and a piston type actuator. This evaluation takes into consideration the following factors; actuator usage, expected operation (valve cycles), instrument usage and leakage.

General Assumptions

A. The volume within the actuator is computed by multiplying the effective diaphragm area of the actuator by the full stroke distance of the valve. The area and stroke are based on manufacturers data.

B. Each of the valves is operated pneumatically using a signal converter, and positioner. These components will use small amounts of air during steady state conditions and consume more when the valve is operated and changing position. Signal converters typically have ratings that reflect either a maximum steady state consumption or normal operating consumption rate. Since these valves are expected to be operated very little during a SBO, the consumption of supply by the converters should be less than the vendor rating. However, to remain conservative, it will be assumed that the converters will consume a supply according to the vendor rating.

C. The valve actuators will be controlled manually from the control room and will be operated infrequently with only minor adjustments. As a conservative basis for backup nitrogen supply provision, an adequate amount of nitrogen will be provided for each component to allow for two full cycles per hour in addition to operating leakage for the full four hour SBO duration.

D. The 1A charging pump will be controlled manually from the control room and will be operated with only minor adjustments. As a conservative basis for backup nitrogen supply provision, an adequate amount of nitrogen will be provided to allow for two full cycles (speed control changes) per hour in addition to operating leakage for the full four hour SBO duration.

WPSC believes that the number of valve cycles assumed available to the control room operator is more than adequate since the valves are expected to be throttled to a certain position (except for minor adjustments) and maintained in that position. Additionally, WPSC believes that the number of speed control changes on 1A charging pump is adequate since the pump will be brought to the required flow and then maintained at that speed (except for minor adjustments). Finally, the backup nitrogen supplies will be included in the appropriate plant surveillance program to assure that an adequate nitrogen supply is always available.

VENTILATION ISSUES

In accordance with the NUMARC 87-00 guidelines, WPSC initiated an effort to determine the average steady state temperature in areas containing equipment necessary to achieve and maintain safe shutdown during an SBO event. This effort resulted in calculating the steady state ambient air temperature for all areas where personnel or equipment would be required to operate for the entire SBO duration. The following areas have been reviewed for the effects of loss of ventilation.

Battery Rooms 1A and 1B
Control Room
Relay Room
Charging Pump Room
Turbine Driven Auxiliary Feedwater Pump Room
Containment
Steam Generator Power Operated Relief Areas 1A and 1B

An ambient air temperature evaluation for the area containing the TSC diesel generator and associated bus 1-46 has not been performed. The TSC diesel generator will provide power to the HVAC systems for this area and thus maintain adequate cooling. The temperature effects inside containment addressed generically in NUMARC 87-00, Section 2.7.1, were verified to apply to KNPP.

GENERAL ASSUMPTIONS FROM NUMARC 87-00

The NUMARC 87-00 methodology was utilized in calculating the steady state temperature for all areas. The assumptions from the NUMARC 87-00 guidelines which were generally applied in the calculations are presented below:

A) NUMARC 87-00 methodology for evaluating the loss of ventilation is based on the room having a concrete heat sink with an 8 inch minimum thickness. Heat transfer from the room is by natural convection to the wall. The conductance of the wall is not considered and therefore no credit will be taken for heat transfer through the wall to the surrounding environment. Any wall with a thickness greater than 8 inches of concrete will have a greater heat sink capacity (more mass) than assumed in the analysis, therefore making this a conservative calculation. Concrete heat sink temperature remains constant.

B) Walls between two rooms with internal heat loads following a SBO serve as heat sinks for each room. If the wall is at least 16 inches thick, the wall will be treated as separate 8 inch thick heat sinks for each room. Where the wall thickness is less than 16 inches, the wall volume used for the calculation will be reduced by the ratio of half the wall thickness to 8 inches (i.e. 12" thick wall would be reduced by 1/2 and then multiplied by 1/8 resulting in a ratio of 6/8). This accounts for the reduced heat sink mass of the wall.

C) Concrete block walls (cores not filled) will have less heat storage capacity than 8 inches of concrete. These lighter (per unit surface area) heat sinks will have their effective heat sink surface areas reduced so the mass per unit surface area is the same as that of an 8 inch thick heat sink.

D) Heat transfer through doors has not been considered as part of the evaluation. The temperature differences between the battery rooms is relative small. There will be little heat transfer between the rooms. Since the final battery rooms temperatures are higher than the assumed temperature of the turbine building, there will be heat transfer not accounted for in the analysis from the battery rooms. This will help lower the battery room temperature.

E) Equipment has not been considered as heat sinks.

SPECIFIC AREA TEMPERATURE CALCULATIONS

BATTERY ROOMS 1A and 1B	
ROOM SPECIFIC INFORMATION	
Initial Room Temperature	104°F
Total Area Battery Room 1A	217.807 sq meters
Total Area Battery Room 1B	219.855 sq meters
Total Area Heat Load Battery Room 1A	2891 watts SBO loads only
Battery Room 1B	4972 watts SBO loads only
Batteries Not Considered As A Heat Sink	
CONCLUSIONS	
Final Room Temperature	
Battery Room 1A	115°F Door# 45 Opened and Battery Room Exhaust Fan 1A Operating
Battery Room 1B	114°F Door# 48 Opened
In accordance with NUMARC 87-00 (Appendix J question 2.2) since the temperatures are calculated to be less than 120°F, reasonable assurance of equipment operability is established without further analysis. Operator action is required to open six MCC breakers within battery room 1A within one hour. Since the temperatures are below 120°F no further analysis is required for this area.	

CONTROL ROOM

ROOM SPECIFIC INFORMATION

Initial Room Temperature	78°F
People Assumed in the Control Room	10 Individuals
Total Area Heat Load	13821 watts

Walls below the drop ceiling are assumed to have a 5/8" drywall finish.

The ceiling is provided with an egg crate style light diffuser with the lights mounted greater than one foot above the diffuser. The diffuser allows hot air from the control room to rise into the ceiling plenum area.

Total Control Room Area	531.3 sq meters

CONCLUSIONS

Final Room Temperature	101°F

This analysis assumes the NUMARC 87-00 initial temperature of 78°F. This initial temperature is conservative since the control room HVAC is normally operating at all times, providing cooled and filtered air to the control room at a temperature below 78°F. In addition, the HVAC system is designed such that if one train of HVAC should fail to operate, the second train is automatically placed into service. Furthermore, procedure N-ACC-25 "Control Room Air Conditioning System" states that the control room thermostats should be set between 65°F and 69°F. Procedure A-ACC-25 "Abnormal Control Room A/C" describes the actions to be taken for a failure to maintain the control room temperature within $\pm$ 5°F of thermostat setpoint. Finally, in accordance with NUMARC 87-00 (Appendix J question 2.2) since the temperatures are calculated to be less than 120°F, reasonable assurance of equipment operability is established without further analysis. Therefore, no further analysis is required for this area.

RELAY ROOM

ROOM SPECIFIC INFORMATION

Initial Room Temperature	78°F
Total Area Heat Load	14864 watts
Total Relay Room Area	680.8 sq meters

CONCLUSIONS

Final Room Temperature	109°F

This analysis assumes the NUMARC 87-00 initial temperature of 78°F since the control room HVAC also provides cooling for this area. This initial temperature is conservative for the same reasons presented in the discussion of the control room. Relay rack cabinet doors will be opened (see Required Operator Actions) to provide adequate cooling inside the individual relay cabinets. Inaccordance with NUMARC 87-00 (Appendix J question 2.2) since the temperatures are calculated to be less than 120°F, reasonable assurance of equipment operability is established without further analysis. Therefore, no further analysis is required for this area.

CHARGING PUMP ROOM

ROOM SPECIFIC INFORMATION

Initial Room Temperature	104°F
Auxiliary Building Basement Temperature	104°F
Total Area Heat Load	5615 watts
Total Charging Pump Room Area	208 sq meters

CONCLUSIONS

Final Room Temperature	111°F

Inaccordance with NUMARC 87-00 (Appendix J question 2.2) since the temperatures are calculated to be less than 120°F, reasonable assurance of equipment operability is established without further analysis. No operator actions are required within this area. Therefore, no further analysis is required for this area.

TURBINE DRIVEN AUXILIARY FEEDWATER PUMP ROOM (TDAFWP)	
ROOM SPECIFIC INFORMATION	
Initial Room Temperature	120°F
Total Area Heat Load	3025 watts
Total TDAFWP Room Area	75.5 sq meters
CONCLUSIONS	
Final Room Temperature	141°F

The NUMARC 87-00 Appendix F Temperature Limits are 180°F For Pumps And Turbines with Mechanical Governors. Since the final room temperature is only 141°F reasonable assurance of equipment operability is established without further analysis. No operator actions are required within this area. Therefore, no further analysis is required for this area.

CONTAINMENT	
AREA SPECIFIC CONDITIONS	
Initial Area Temperature	120°F
Total Area Heat Load	2.66 million watts
Total Containment Area	1.21 million cubic feet
CONCLUSIONS	
Final Area Temperature	170.5°F

This temperature is enveloped by the loss of coolant accident (LOCA) and high energy line break environmental profiles. No operator actions are required within this area. Therefore, no further analysis is required for this area.

STEAM GENERATOR 1A and 1B POWER OPERATED RELIEF VALVE ROOMS

ROOM SPECIFIC INFORMATION

Initial Room Temperature

Steam Generator PORV 1A	101°F Average Temperature
Steam Generator PORV 1B	97°F Average Temperature
Outside Air Temperature	104°F
Total Area Heat Load PORV Area 1A	93490 watts
PORV Area 1B	72443 watts
Total Steam Generator PORV 1A Area	717.8 sq meters
Total Steam Generator PORV 1B Area	658.8 sq meters

No Credit For Heat Loss From Building Metal Siding To The Outside

CONCLUSIONS

Final Room Temperature

Steam Generator PORV 1A	122°F
Steam Generator PORV 1B	157°F

An analysis was performed to determine the temperature effects on the various pieces of equipment needed for operation during an SBO. This review determined that the 122°F in the area of PORV 1A would not be expected to cause any significant detrimental effects since typical electric equipment design will ensure operation up to 120°F for short periods of time. This conclusion is also supported by NUMARC 87-00 section G.3.3.2 which states that electronic transmitters are rated for continuous operation at 180°F.

The equipment in the area of PORV 1B that would experience a temperature of 157°F has been analyzed by the EQ group. This review determined that the most susceptible material was nitrile. According to WPSC EQ Reference 320, another popular name for nitrile is BUNA-N and its generic designation is acrylonitrile-butadiene. NUMARC 87-00 documents that acrylonitrile-butadiene-styrene has a maximum continuous service temperature of 244°F. WPSC EQ Reference 157 states that the maximum continuous service temperature for BUNA-N is 225°F. Therefore, the devices will not be impacted by exposure to 157°F for four hours.

One PORV is capable of removing all the decay heat necessary to maintain the plant in the hot shutdown condition.

Finally, no operator actions are required within either of these areas.

CONTAINMENT ISOLATION

In order to ensure that appropriate containment integrity is provided during a station blackout, a review was conducted of USAR Table 5.2-2 Containment Penetrations. Each of these penetrations were then evaluated using guidance provided in NUMARC 87-00 Section 7.2.5, Containment Isolation. The following evaluation justifies the exclusion of each of the penetrations from further consideration in accordance with the NUMARC 87-00 guidance. (It was recognized during this review that a number of the penetrations could be excluded from further consideration based upon several of the NUMARC Guidance criteria.)

NUMARC GUIDANCE SECTION 7.2.5

Containment Isolation Criteria

Criteria 1) **Valves normally locked closed dnring operation.**

PENETRATIONS EXCLUDED PER CRITERIA 1

9	49 (Bolted Closed From Inside Containment)
18	50 (Containment access is controlled by locked annulus doors)

Criteria 2) **Valves that fail closed on loss of AC power or air.**

PENETRATIONS EXCLUDED PER CRITERIA 2

5	25N	26
11	25S	

Criteria 3) **Check valves.**

PENETRATIONS EXCLUDED PER CRITERIA 3

7E & 7W	24	31	44L	48
13N &13E	28N	41E	45	
20	28E	41S/S	46E	
22	29N & 29E	49E	46W	

Criteria 4) Valves in non-radioactive closed-loop systems not expected to be breached in a station blackout (with the exception of lines that communicate directly with the containment atmosphere).

PENETRATIONS EXCLUDED PER CRITERIA 4

6E & 6W	33N	37EN	38EN
32E	37NW	38NW	39
32N	37NE	38NE	40
33E	37ES	38ES	

Criteria 5) All valves less than 3-inch nominal diameter.

PENETRATIONS EXCLUDED PER CRITERIA 5

1	27N(X1)	27EN-X	36N (X1)
2	27N(X2)	34 Elec A	36N (X2)
3	27N(SW)	34 Elec B	36N (SW)
4	27NE(X1)	34 Elec C	36S
15	27NE(X2)	34 Elec D	36W
19	27NE(X3)	34 Elec E	36SE
21	27E	34 Elec F	36NW
23	27EN	35	44R

The following penetrations could not be excluded from consideration based upon the five NUMARC 87-00 criteria. However, they can be excluded from further consideration for the following reasons.

PENETRATION	VALVES	CONTROL CAPABILITY
30E & 30W	SI350A & B SI351A & B	These valves are used for long term cooling post-LOCA and are normally closed. These valves are maintained closed by procedure and their position is monitored in the control room by valve position status lights.
42N	-	Double O-ring blind flanged.
43N	-	Double O-ring blind flanged.
10	RHR-44 LD-60	Eliminated using criteria 5 (less than 3 inches nominal diameter).
	RHR-11	Eliminated using criteria 3 (check valve SI303A).
	SI-302A	Eliminated using criteria 1 (locked closed)

The following containment penetrations will have valves capable of being controlled from the control room post station blackout.

PENETRATION	VALVES	CONTROL CAPABILITY
8N & 8S	BT 3A and BT 3B	DC Powered Motor Operators
12	CVC 7	Backup Air Supply Provided
14	CVC 212	AC Powered From TSC Diesel