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Susquehanna SES Emergency Core Cooling Systems' Outage Report for Unit 1

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PENNSYLVANIA POWER & LIGHT COMPANY PP&L

SUSQUEHANNA STEAM ELECTRIC STATION
EMERGENCY CORE COOLING SYSTEMS' OUTAGE REPORT
FOR UNIT ONE

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SUMMARY

This report was prepared for Unit One of the Susquehanna Steam Electric Station (SSES) in response to the TMI Action Plan Requirement II.K.3.17, "Report on Outages of Emergency Core Cooling Systems." This requirement states that licensees will submit a report detailing out of service information for all Emergency Core Cooling (ECC) systems covering five years of operation. This data is required to demonstrate that cumulative allowed outage times are not warrented for these systems.

This report presents out of service data for the first five years of commercial operation (period ending June 8, 1988) for the High Pressure Coolant Injection (HPCI) system, Automatic Depressurization System (ADS), Core Spray (CS) system, and the Residual Heat Removal (RHR) system in the Low Pressure Cooling Injection (LPCI) mode of operation. Also included are the support systems which are necessary for the ECC systems to function. In addition, system unavailability is calculated.

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DEFINITIONS

Functional Unavailability: The time period in which the system (division, channel, or component) could not perform its function if called upon. This demand is caused by an initiating event which could lead to a severe accident condition.

Administrative Unavailability: The time period in which the system (division, channel, or component) could still perform its function even though it was declared inoperable according to the plant Technical Specifications.

Preventive Maintenance (PM): A scheduled task in which a component or set of components are examined or serviced to ensure that they will perform as expected.

Corrective Maintenance (CM): An unscheduled task which is performed after a component or set of components have been examined or operated and determined to be in an unacceptable state of degradation.

Testing: A scheduled task in which a component or set of components are operated to ensure that they will perform as expected.

Plant Modification (MOD): A scheduled task which changes the design of a plant system.

System: A set of components which interact to perform a given function.

Division: A set of components within a system that can still perform the given system function.

Channel: A set of components within a division that can still perform the given system function.

Component: A component includes all of the equipment specific to that component required for that component to function (i.e., pump breaker is considered part of the pump).

Frontline System: A system which performs a specific safety function (i.e., reactor vessel injection).

Support System: A system which supplies the necessary facilities to enable a frontline system to perform its function.

Common System: A system capable of supporting Unit One and Unit Two operation simultaneously. This system can be either a frontline or support system.

Out of Service (OOS or O/S) Time: Time at which the system was declared inoperable by plant Technical Specifications.

Return Time: Time at which the affected equipment was declared operable (This includes time to tag out, repair/replace, test, restore, and closeout of Administrative paperwork).

Failure: An event that inhibits the function of the component. For example, a pump does not start when needed or stops spuriously, or a valve does not open/close on demand. This event always leads to corrective maintenance.

Repair Time: The time during which the component is actually being repaired.

Down Time: The time during which the component is out of service.

Initiating Event: An occurrence of some event that places the plant in an unplanned abnormal state which requires actuation of systems to mitigate its affects. Presently, only those events which effect the reactor core while at power are considered.

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1.0 INTRODUCTION

In this section the background for the NRC requirement is discussed, as well as the overall scope of this report. The material covered includes: the background of the NRC requirement, the purpose of this document and the organization of the material presented.

1.1 Background

The Nuclear Regulatory Commission (NRC) in 1981 developed an action plan (ref. 1) as a result of the accident at Three Mile Island which was implemented as part of the plant licensing process. The requirements presented in the action plan included various measures which were identified (ref. 2) to improve the capability of plants to mitigate the consequences of a loss of coolant accident (LOCA), and loss of feedwater event (task II.K). As a result, PP&L committed to implement these tasks as part of the plant operating license (ref. 3). Specifically, task II.K.3.17 of the action plan requires a report of Emergency Core Cooling (ECC) system outages for boiling water reactors. The systems subject to this requirement for SSES Unit One are the High Pressure Coolant Injection (HPCI) system, Automatic Depressurization System (ADS) Core Spray (CS) system and Residual Heat Removal (RHR) system (in the low pressure coolant injection mode of operation). Further clarification of this task (ref. 4) defines the NRC position and requirements which are repeated below:

> "Several components of the Emergency Core Cooling (ECC) systems are permitted by Technical Specifications to have substantial outage times (e.g., 72 hours for one diesel-generator; 14 days for the HPCI system). In addition, there are no cumulative outage time limitations for ECC systems. Licensees should submit a report detailing outage dates and lengths of outages for all ECC systems for the last 5 years of operation. The report should also include the causes of the outages (i.e., controller failure, spurious isolation)."
>
> "The present Technical Specifications contain limits on allowable outage times for ECC systems and components. However, there are no cumulative outage time limitations on these same systems. It is possible that ECC equipment could meet present Technical Specification requirements but have a high unavailability because of frequent outages within the allowable Technical Specifications."
>
> "The licensees should submit a report detailing outage dates and length of outages for all ECC systems for the last 5 years of operation, including causes of the outages. This report will provide the staff with a quantification of historical unreliability due to test and maintenance outages, which will be used to determine if a need exists for cumulative outage requirements in the Technical Specifications."

"Based on the above guidance and clarification, a detailed report should be submitted. The report should contain (1) outage dates and duration of outages; (2) cause of the outage; (3) ECC systems or components involved in the outage; and (4) corrective action taken. Test and maintenance outages should be included in the above listings which are to cover the last 5 years of operation. The licensee should propose changes to improve the availability of ECC equipment, if needed."

As a result of this requirement, this study was performed in order to collect the necessary information for Unit One ECC systems. In addition, overall system unavailability was calculated.

1.2 Purpose and Scope

This report was prepared in response to task II.K.3.17, "Report on outages of ECC systems." Outage data for the first five years of commercial operation (period ending June 7, 1988) for Unit One of the SSES was gathered for the HPCI, ADS, Core Spray, and RHR (LPCI mode of operation) systems. Systems which are required by the ECC systems in order to perform their intended function are defined as support systems. Outage data for these support systems are also included in this report. These support systems are the Emergency Service Water (ESW) system, the 125V DC power system, the 250V DC power system, and the AC power system.

Also, for each of the systems, unavailability calculations were performed. These calculations were deemed necessary in order to demonstrate that the systems are being taken out of service for acceptable lengths of time and that the allowed outage times imposed by the plant Technical Specifications need not be changed to cumulative allowed outage times.

This document also includes a discussion of the system outage data collection and analysis method (Section 2.0), a discussion of the results (Section 3.0), and presents in a set of appendices the data used in calculating unavailabilities for each system analyzed.

2.0 DATA COLLECTION AND ANALYSIS METHODOLOGY

In this section the database used to extract the required outage data for this report is discussed, along with the method used to collect and analyze the raw data for input into the database. The material covered includes: the database overview, the method of raw data collection, the method of raw data analysis, and the calculation of system unavailability.

2.1 Database Overview

The database used to extract the outage data for the ECC systems and support systems was developed in 1987, when Pennsylvania Power & Light (PP&L) in cooperation with Idaho National Engineering Laboratory (INEL) reviewed plant data taken from Limiting Condition for Operation (LCO) log sheets for safety related systems. Data was collected for both units from the date of initial criticality, (for Unit 1, 9/10/82 and Unit 2, 5/8/84) analyzed, and placed in a Ashton-Tate DBASE III+ database on an International Business Machine (IBM) personal computer. There is a separate database file for each safety related system. This activity is being performed by PP&L with the database updated monthly. The database file structure is defined in Appendix I.

2.2 Method of Raw Data Collection

2.2.1 Definition of System and Component Boundaries

Prior to collecting plant data, system and component boundaries were defined to ensure system outages were consistently and properly assigned. In defining the system boundaries two classes of systems were considered, frontline systems and support systems. Frontline systems perform a specific safety function such as injecting water into the reactor vessel (i.e., HPCI). Support systems supply necessary facilities to enable a frontline system to perform its safety function, (i.e., AC power provides motive force). An outage was collected for a frontline system if it only caused the frontline system to be out of service. An outage was collected for a support system if it caused more than one frontline system to be out of service.

As an example, if the circuit breaker for the RHR injection valve failed open, the outage required for repair would be collected for the RHR system because it only affected the RHR system. If, however, the AC power motor control center failed, the outage would be collected for the AC power system, because its failure would cause other systems to become unavailable (ref. 5).

Component boundaries were also defined. After investigating available information on the subject it was decided to adopt those defined in reference 6.

2.2.2 Data Recording Process

The outages of systems identified in the SSES plant Technical Specifications (ref. 7) (i.e., ECC systems) are controlled by System Status and Control procedure AD-QA-302 (ref. 8). This procedure requires operators to keep a daily log of all systems in an outage which require entering a LCO. These log sheets form the primary source of safety system outage information. The outages for each of the safety related systems covered in the SSES Probabilistic Risk Assessment (ref. 9) were identified from the log sheets and recorded. A sample LCO log sheet is shown in Figure 1.

The information recorded on the log sheet was usually insufficient to determine if an outage represented a functional unavailability or an administrative unavailability. Thus, other sources of information were queried. The second source of information used was the Plant Maintenance Information System (PMIS). The PMIS is discussed in Section 2.3.

2.3 Method of Raw Data Evaluation

As presented in Section 2.2.2 the LCO log sheets were used as the raw data source. Each log sheet was reviewed and applicable outage entries were recorded. A sample of the form used to record the outage entries for a safety related system is presented in Figure 2.

However, the LCO log sheet entry does not include all of the information required to complete the form (Figure 2). For example, the impact of the outage on the system (division, channel, or component), the information required to determine whether the outage was administrative and/or included a component failure, and the plant condition at the time the outage occurred usually could not be determined. Therefore, other sources of information were considered. As stated previously, the PMIS was used as a secondary source of information.

The PMIS is a computer based system intended to assist in the scheduling, tracking, and historical retention of work activities at Susquehanna. It includes the tracking and scheduling of Preventive Maintenance, Corrective Maintenance, Testing, and other Work Authorizing documents. Information within PMIS is sorted by the system of interest (i.e., RHR) and is organized in chronological order. This information includes unit number, equipment number, problem and action taken, work authorizing document number, and the applicable technical specification. The edits for each system are used to identify the information presented above.

If sufficient information was not available from the PMIS edit, other sources of information were identified and reviewed. This involved reading surveillance procedures, checking electrical elementary diagrams, piping and instrumentation diagrams, work authorizations (including WAs for preventive maintenance, corrective maintenance or other work), or equipment release forms.

Once all of the outage information is recorded, each outage entry is input into the database described in Section 2.1. These entries are then printed and reviewed for correctness. Once reviewed and signed off they become an official record within the database. The flow chart depicted in Figure 3 graphically presents the method which is used to evaluate the LCO log sheet entries.

2.4 Calculation of System Unavailability

One use of the data collected is to calculate overall system unavailability. This unavailability is used to demonstrate that plant systems are being taken out of service (OOS) for acceptable lengths of time when the potential for a severe accident condition exists. In this calculation, functional unavailable hours were used, along with the hours the system was required to be functional during a single calendar year. The equation used for the calculation is:

P(system being functionally OOS)=

$$[A/CRITHRS + B/2(CRITHRS) + C/4(CRITHRS) + D/COMP(CRITHRS)] \quad (1)$$

where: A = the total functional unavailable hours which impact the system only,

B = the total functional unavailable hours which impact the division only,

C = the total functional unavailable hours which impact the channel only,

D = the total functional unavailable hours which impact the component only,

CRITHRS = number of hours the system was required to be functional,

COMP = number of components under observation.

The observation time period used in this calculation was a single calendar year. As a result, a trend can be developed over the five year period of interest. The method of determining the values for each variable used in equation (1) is discussed below.

2.4.1 Functional Unavailable hours (A,B,C,D)

The value for each time period was taken from each ECC systems' database using a program sorting routine.

2.4.2 Required Operable Hours (CRITHRS)

The value for each time period was determined by first identifying the criteria in which each frontline system (ECC system) and support system was required to be operable in order to respond to an initiating event which could lead to a severe accident. This time period covers reactor criticality to cold shutdown. From comparing this criteria to the plant Technical Specifications (ref. 8), the frontline systems (i.e., ECC systems) are required to be operable during plant Operating Conditions 1, 2, and 3. Based upon a review of the plant operating records, the time in which the systems are required to be operable is dominated by the time in which Unit One was critical (Condition 1, and part of Condition 2). Therefore, it was assumed that the time in which the systems are required to be operable is equal to the time in which the Unit One was critical over the observation time period. Table 1 presents the critical hours for Unit One over the five year period. The support systems are required to be operable during all plant operating conditions (ref. 8) to satisfy the above criteria. Therefore, the value used are the calendar hours during the observation time period (i.e., there are 8766 hours per year).

2.4.3 Components Under Observation (COMP)

The number of components for each system which are required to be functional were identified from P&ID's, maintenance work orders (used to identify blocking requirements) and also surveillance procedures.

3.0 RESULTS

This section presents the results from evaluating the outages for the ECC systems and their support systems. The material covered includes: a discussion of how the result tables were prepared, and the organization of the appendices which present the data obtained from the DBASE III+ database for each system.

3.1 Results Preparation

Each systems' database was queried according to the appropriate observation time period (i.e., yearly) over the first five years of commercial operation using a computer program developed in-house. This computer program reviewed the applicable database records and provided output in a form similar to that presented in Tables 2 through 7.

These tables present the results of an edit performed on each system database for Unit One, on a yearly basis, starting from the date of commercial operation (6/8/83) covering a period of five years. The unavailability of each system was calculated using equation (1) presented in Section 2.4. Also, the unavailability of each division (and channel where applicable) was calculated using the applicable portion of equation (1).

As discussed in Section 2.4, unavailabilities were calculated using the functional unavailable hours and also the number of hours the system was required to be operable during the time interval of interest. The critical hours for Unit One are presented in Table 1.

3.2 Appendices Organization

An Appendix for each system evaluated is presented which contains a brief system description (ref. 9) and also the information which resides in the database that was used in calculating the results.

Table 1: Critical Hours for Unit One

Time Interval	Critical Hours
6/8/83 - 12/31/83	3745.00
1/1/84 - 12/31/84	6432.00
1/1/85 - 12/31/85	5496.00
1/1/86 - 12/31/86	6048.00
1/1/87 - 12/31/87	5540.00
1/1/88 - 6/7/88	3357.00

TABLE 2: Activities Resulting in an LCO During 1983 (6/8/83-12/31/83) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	1.91E-02	71.39	0	55.48	15.91	0	125.73	0	99.55	26.18	0
ADS	1.28E-04	0	0	0	0	0	0	0	0	0	0
ADS-Division I	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel A	8.01E-04	3.00	0	3.00	0	0	3.00	0	3.00	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0	0	0	0	0
ADS-*	N/A	0	0	0	0	0	16.67	0	16.67	0	0
Core Spray	0	0	0	0	0	0	0	0	0	0	0
CS-Division I	0	0	0	0	0	0	0	0	0	0	0
CS-Channel A	0	0	0	0	0	0	0	0	0	0	0
CS-Channel C	0	0	0	0	0	0	0	0	0	0	0
CS-Division II	0	0	0	0	0	0	0	0	0	0	0
CS-Channel B	0	0	0	0	0	0	0	0	0	0	0
CS-Channel D	0	0	0	0	0	0	0	0	0	0	0
CS-*	N/A	0	0	0	0	0	5.26	0	0	5.26	0
RHR[3]	3.50E-02	0	0	0	0	0	3.35	0	0	3.35	0
RHR-Division I	6.59E-03	24.67	0	24.67	0	0	140.67	0	140.67	0	0
RHR-Channel A	2.61E-02	97.58	0	97.58	0	0	97.58	0	97.58	0	0
RHR-Channel C	0	0	0	0	0	0	0	0	0	0	0
RHR-Division II	4.90E-02	183.50	0	183.50	0	0	246.95	246.95	0	0	0
RHR-Channel B	2.27E-03	8.50	8.50	0	0	0	9.80	9.80	0	0	0
RHR-Channel D	0	0	0	0	0	0	0	0	0	0	0
RHR-*	N/A	0	0	0	0	0	37.42	0	37.42	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 2: Activities Resulting in an LCO During 1983 (6/8/83-12/31/83) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total OOS Hours[2]	Total OOS Hours for: PM	CM	TEST	MOD
ESW		0	0	0	0	0	0	0	0	0	0
ESW-Division I	7.67E-04	3.83	0	3.83	0	0	246.16	0	3.83	0	242.33
ESW-Channel A	1.40E-04	7.00	7.00	0	0	0	7.00	7.00	0	0	0
ESW-Channel C	1.12E-04	5.58	5.58	0	0	0	5.58	5.58	0	0	0
ESW-Division II	0	0	0	0	0	0	57.50	0	57.50	0	0
ESW-Channel B	2.38E-03	11.89	4.22	7.67	0	0	11.89	4.22	7.67	0	0
ESW-Channel D	8.45E-03	4.22	4.22	0	0	0	4.22	4.22	0	0	0
ESW-*	N/A	0	0	0	0	0	0	0	0	0	0
125V DC	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	0	0	0	0	0	0	0	0	0	0
250V DC	0	0	0	0	0	0	0	0	0	0	0
250V DC-Division I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Division II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 2: Activities Resulting in an LCO During 1983 (6/8/83-12/31/83) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	1.34E-02	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I	2.67E-02	133.95	0	133.95	0	0	135.37	1.42	133.95	0	0
AC Power-Div. II	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (4160V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0.97	0	0	0.97	0
AC Power-Channel B	0	0	0	0	0	0	1.05	0	0	1.05	0
AC Power-Channel C	0	0	0	0	0	0	0.52	0	0	0.52	0
AC Power-Channel D	0	0	0	0	0	0	1.08	0	0	1.08	0
AC Power-*	N/A	0	0	0	0	0	4.83	4.00	0	0.83	0
AC Power (480V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I (Swing Bus)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	1.55E-03	7.75	7.75	0	0	0	7.75	7.75	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 3: Activities Resulting in an LCO During 1984 (1/1/84-12/31/84) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	5.33E-03	34.30	0	32.67	1.63	0	69.07	4.00	61.14	3.93	0
ADS	3.59E-04	0	0	0	0	0	12.22	0	0	12.22	0
ADS-Division I	0	0	0	0	0	0	4.00	0	0	4.00	0
ADS-Channel A	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	2.25	0	0	2.25	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0	0	0	0	0
ADS-*	N/A	9:23	0	0	9.23	0	294.36	0	33.35	261.01	0
Core Spray	0	0	0	0	0	0	132.91	0	129.33	3.58	0
CS-Division I	0	0	0	0	0	0	4.25	4.25	0	0	0
CS-Channel A	0	0	0	0	0	0	0	0	0	0	0
CS-Channel C	0	0	0	0	0	0	0	0	0	0	0
CS-Division II	0	0	0	0	0	0	3.92	0	0	3.92	0
CS-Channel B	0	0	0	0	0	0	0	0	0	0	0
CS-Channel D	0	0	0	0	0	0	0	0	0	0	0
CS-*	N/A	0	0	0	0	0	16.98	0	15.48	1.50	0
RHR[3]	0	0	0	0	0	0	19.92	0	0	19.92	0
RHR-Division I	0	0	0	0	0	0	46.78	0	0	46.78	0
RHR-Channel A	0	0	0	0	0	0	5.73	0	5.73	0	0
RHR-Channel C	0	0	0	0	0	0	0	0	0	0	0
RHR-Division II	0	0	0	0	0	0	40.00	37.00	0	3.00	0
RHR-Channel B	0	0	0	0	0	0	31.68	0	0	31.68	0
RHR-Channel D	0	0	0	0	0	0	0.17	0.17	0	0	0
RHR-*	N/A	0	0	0	0	0	1.17	0	0	1.17	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and division or channels which are tested sequentially.

TABLE 3: Activities Resulting in an LCO During 1984 (1/1/84-12/31/84) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
ESW	1.27E-02	0	0	0	0	0	0	0	0	0	0
ESW-Division I	1.44E-02	126.00	0	0	126.00	0	145.00	0	0	145.00	0
ESW-Channel A	6.56E-04	5.75	0	5.75	0	0	5.75	0	5.75	0	0
ESW-Channel C	2.93E-03	25.70	0	17.50	8.20	0	25.70	0	17.50	8.20	0
ESW-Division II	7.99E-03	70.00	0	70.00	0	0	670.80	0	670.80	0	0
ESW-Channel B	2.08E-03	18.25	0	18.25	0	0	18.25	0	18.25	0	0
ESW-Channel D	2.57E-04	2.25	0	2.25	0	0	2.25	0	2.25	0	0
ESW-*	N/A	0	0	0	0	0	0	0	0	0	0
125V DC	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	0	0	0	0	0	0	0	0	0	0
250V DC	1.24E-04	0	0	0	0	0	0	0	0	0	0
250V DC-Div. I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	6.50	0	6.50	0	0	6.96	0	6.96	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 3: Activities Resulting in an LCO During 1984 (1/1/84-12/31/84) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	5.52E-04	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I	1.45E-04	1.27	0	1.27	0	0	1.27	0	1.27	0	0
AC Power-Div. II	9.58E-04	8.40	8.00	0	0.40	0	25.28	8.00	16.88	0.40	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (4160V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	2.79	0	0	2.79	0
AC Power-Channel B	0	0	0	0	0	0	1.63	0	0	1.63	0
AC Power-Channel C	0	0	0	0	0	0	2.39	0	0	2.39	0
AC Power-Channel D	0	0	0	0	0	0	1.73	0	0	1.73	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (480V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I (Swing Bus)	0	0	0	0	0	0	12.53	12.53	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	0	0	0	0	0	0	8.83	8.83	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 4: Activities Resulting in an LCO During 1985 (1/1/85-12/31/85) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	1.32E-02	72.32	11.49	43.35	17.48	0	224.09	40.82	110.82	72.45	0
ADS	1.17E-04	0	0	0	0	0	6.24	0	0	6.24	0
ADS-Division I	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel A	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0	0	0	0	0
ADS-*	N/A	2.58	0	0	2.58	0	37.30	0	29.97	7.33	0
Core Spray	0	0	0	0	0	0	0	0	0	0	0
CS-Division I	0	0	0	0	0	0	4.50	4.50	0	0	0
CS-Channel A	0	0	0	0	0	0	0	0	0	0	0
CS-Channel C	0	0	0	0	0	0	0	0	0	0	0
CS-Division II	0	0	0	0	0	0	2.58	2.58	0	0	0
CS-Channel B	0	0	0	0	0	0	0	0	0	0	0
CS-Channel D	0	0	0	0	0	0	0	0	0	0	0
CS-*	N/A	0	0	0	0	0	0.33	0	0	0.33	0
RHR[3]	5.22E-03	0	0	0	0	0	0.70	0	0	0.70	0
RHR-Division I	9.25E-03	50.83	50.83	0	0	0	50.83	50.83	0	0	0
RHR-Channel A	2.39E-03	13.13	0	13.13	0	0	13.13	0	13.13	0	0
RHR-Channel C	N/A	0	0	0	0	0	0	0	0	0	0
RHR-Division II	0	0	0	0	0	0	15.17	0	15.17	0	0
RHR-Channel B	N/A	0	0	0	0	0	0	0	0	0	0
RHR-Channel D	N/A	0	0	0	0	0	0	0	0	0	0
RHR-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are listed sequentially.

TABLE 4: Activities Resulting in an LCO During 1985 (1/1/85-12/31/85) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
ESW	5.20E-03	0	0	0	0	0	0	0	0	0	0
ESW-Division I	2.04E-03	17.91	0	0	17.91	0	17.91	0	0	17.91	0
ESW-Channel A	2.73E-03	23.92	13.25	0	10.67	0	23.92	13.25	0	10.67	0
ESW-Channel C	3.58E-03	31.42	25.42	0	6.00	0	31.42	25.42	0	6.00	0
ESW-Division II	3.21E-03	28.16	10.50	0	17.66	0	28.16	10.50	0	17.66	0
ESW-Channel B	1.63E-03	14.33	0	10.75	3.58	0	14.33	0	10.75	3.58	0
ESW-Channel D	2.34E-03	20.53	0	18.00	2.53	0	20.53	0	18.00	2.53	0
ESW-*	N/A	108.54	23.47	0	0	85.07	108.54	23.47	0	0	85.07
125V DC	1.43E-04	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	10.02	0	10.02	0	0	10.19	0	10.02	0.17	0
250V DC	9.51E-05	0	0	0	0	0	0	0	0	0	0
250V DC-Div. I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	5.00	0	5.00	0	0	31.83	0	31.83	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 4: Activities Resulting in an LCO During 1985 (1/1/85-12/31/85) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	4.49E-03										
AC Power-Div. I	8.97E-03	78.66	69.73	8.93	0	0	78.66	69.73	0	8.93	0
AC Power-Div. II	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (4160V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	12.60	0	0	1.77	10.83
AC Power-Channel B	0	0	0	0	0	0	1.80	0	0	1.80	0
AC Power-Channel C	0	0	0	0	0	0	1.97	0	0	1.97	0
AC Power-Channel D	0	0	0	0	0	0	10.47	0	0	2.00	8.47
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (480V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I (Swing Bus)	0	0	0	0	0	0	9.67	9.67	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	0	0	0	0	0	0	6.00	6.00	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	12.58	12.58	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	N/A	0	0	0	0	0	0	0	0	0	0
AC Power-*											

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 5: Activities Resulting in an LCO During 1986 (1/1/86-12/31/86) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	2.73E-02	170.51	68.58	81.00	20.93	0	1764.85	68.58	1666.47	29.80	0
ADS	0	0	0	0	0	0	0	0	0	0	0
ADS-Division I	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel A	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0.83	0	0.83	0	0
ADS-*	N/A	0	0	0	0	0	2.50	0	2.50	0	0
Core Spray	0	0	0	0	0	0	0	0	0	0	0
CS-Division I	0	0	0	0	0	0	337.58	0	337.58	0	0
CS-Channel A	0	0	0	0	0	0	3.92	0	0	3.92	0
CS-Channel C	0	0	0	0	0	0	0	0	0	0	0
CS-Division II	0	0	0	0	0	0	0	0	0	0	0
CS-Channel B	0	0	0	0	0	0	2.43	0	0	2.43	0
CS-Channel D	0	0	0	0	0	0	0	0	0	0	0
CS-*	N/A	0	0	0	0	0	5.92	0	0	5.92	0
RHR[3]	1.40E-03	0	0	0	0	0	5.71	5.24	0	0.47	0
RHR-Division I	0	0	0	0	0	0	95.95	0	0.58	95.37	0
RHR-Channel A	1.90E-03	11.50	7.92	3.58	0	0	11.50	7.92	3.58	0	0
RHR-Channel C	1.57E-03	9.50	5.92	3.58	0	0	13.03	5.92	3.58	3.53	0
RHR-Division II	0	0	0	0	0	0	65.00	0	0	65.00	0
RHR-Channel B	9.71E-04	5.87	3.17	2.70	0	0	5.87	3.17	2.70	0	0
RHR-Channel D	1.16E-03	7.00	4.58	2.42	0	0	10.50	4.58	2.42	3.50	0
RHR-*	N/A	0	0	0	0	0	5.29	2.45	0	2.84	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are listed sequentially.

TABLE 5: Activities Resulting in an LCO during 1986 (1/1/86-12/31/86) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
ESW	1.74E-02	0	0	0	0	0	30.83	0	0	30.83	0
ESW-Div. I	1.74E-03	15.25	10.67	4.58	0	0	15.25	10.67	4.58	0	0
ESW-Channel A	3.48E-02	305.66	0.58	305.08	0	0	310.46	0.58	309.88	0	0
ESW-Channel C	7.41E-03	64.92	0	64.92	0	0	64.92	0	64.92	0	0
ESW-Div. II	1.19E-02	104.58	0	104.58	0	0	104.58	0	104.58	0	0
ESW-Channel B	0	0	0	0	0	0	0	0	0	0	0
ESW-Channel D	0	0	0	0	0	0	0	0	0	0	0
ESW-*	N/A	0	0	0	0	0	0	0	0	0	0
125V DC	4.64E-04	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	48.80	0	48.80	0	0	86.20	0	48.80	37.40	0
250V DC	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 5: Activities Resulting in an LCO During 1986 (1/1/86-12/31/86) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	2.13E-03	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II	4.26E-03	37.32	37.32	0	0	0	37.32	37.32	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (4160V)											
AC Power-Channel A	3.86E-03	33.80	19.67	0	14.13	0	37.26	19.67	0	17.59	0
AC Power-Channel B	1.99E-03	17.45	0	0	17.45	0	22.19	1.27	0	20.92	0
AC Power-Channel C	1.62E-03	14.23	0	0	14.23	0	17.15	0	0	17.15	0
AC Power-Channel D	1.79E-03	15.59	0	0	15.59	0	18.51	0	0	18.51	0
AC Power-*	N/A	4.83	0	0	4.83	0	12.90	7.00	0	5.90	0
AC Power (480V)											
AC Power-Div. I (Swing Bus)	0	0	0	0	0	0	12.00	12.00	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	9.27E-03	81.23	74.56	6.67	0	0	102.48	95.81	6.67	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 6: Activities Resulting in an LCO During 1987 (1/1/87-12/31/87) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	3.00E-02	166.83	2.58	142.25	3.75	18.25	754.61	40.91	149.16	546.29	18.25
ADS	0	0	0	0	0	0	0	0	0	0	0
ADS-Division I	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel A	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0	0	0	0	0
ADS-*	N/A	0	0	0	0	0	0	0	0	0	0
Core Spray	3.72E-03	0	0	0	0	0	23.00	18.70	0	4.30	0
CS-Division I	1.51E-03	8.37	8.37	0	0	0	8.00	8.00	0	0	0
CS-Channel A	1.44E-03	8.00	8.00	0	0	0	0	0	0	0	0
CS-Channel C	0	0	0	0	0	0	780.91	24.72	756.19	0	0
CS-Division II	5.20E-03	28.80	11.05	17.75	0	0	0	0	0	0	0
CS-Channel B	0	0	0	0	0	0	0	0	0	0	0
CS-Channel D	0	0	0	0	0	0	11.36	0	3.09	8.27	0
CS-*	N/A	0	0	0	0	0	0	0	0	0	0
RHR[3]	2.11E-03	0	0	0	0	0	0	0	0	0	0
RHR-Division I	5.87E-03	18.67	18.67	0	0	0	18.67	18.67	0	0	0
RHR-Channel A	0	0	0	0	0	0	9.08	9.08	0	0	0
RHR-Channel C	0	0	0	0	0	0	0	0	0	0	0
RHR-Division II	4.82E-04	2.67	0	2.67	0	0	6.44	0	6.44	0	0
RHR-Channel B	7.53E-04	4.17	4.17	0	0	0	4.17	4.17	0	0	0
RHR-Channel D	0	0	0	0	0	0	0	0	0	0	0
RHR-*	N/A	0	0	0	0	0	1.16	0	0	1.16	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 6: Activities Resulting in an LCO During 1987 (1/1/87-12/31/87) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
ESW	3.60E-03	0	0	0	0	0	0	0	0	0	0
ESW-Division I	3.93E-03	34.47	24.05	0	0	10.42	226.66	24.05	0	192.19	10.42
ESW-Channel A	2.33E-03	20.42	20.42	0	0	0	23.67	20.42	0	3.25	0
ESW-Channel C	2.17E-03	19.00	19.00	0	0	0	23.38	19.00	0	4.38	0
ESW-Div. II	1.02E-03	8.96	8.96	0	0	0	213.71	8.96	0	204.75	0
ESW-Channel B	0	0	0	0	0	0	0	0	0	0	0
ESW-Channel D	0	0	0	0	0	0	0	0	0	0	0
ESW-*	N/A	0	0	0	0	0	0	0	0	0	0
125V DC	2.79E-04	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	1.97E-04	1.73	0	1.73	0	0	1.73	0	1.73	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	5.73	0	5.73	0	0	5.73	0	5.73	0	0
250V DC	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Div. II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 6: Activities Resulting in an LCO During 1987 (1/1/87-12/31/87) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	1.49E-03	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I	0	0	0	0	0	0	11.58	0	11.58	0	0
AC Power-Div. II	2.97E-03	26.06	0	26.06	0	0	26.06	0	26.06	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power(4160V)	1.52E-03	0	0	0	0	0	0.38	0	0.38	0	0
AC Power-Channel A	1.95E-03	17.08	0	17.08	0	0	21.93	0	17.08	4.85	0
AC Power-Channel B	0	0	0	0	0	0	3.97	0	0	3.97	0
AC Power-Channel C	1.88E-03	16.50	0	16.50	0	0	19.61	0	16.50	3.11	0
AC Power-Channel D	2.27E-03	19.92	0	19.92	0	0	22.95	0	19.92	3.03	0
AC Power-*	N/A	1.82	1.82	0	0	0	11.64	1.89	0	9.75	0
AC Power (480V)	2.32E-03	0	0	0	0	0	0	0	0	0	0
AC Power-Div.	1.45E-03	12.75	9.42	3.33	0	0	12.75	9.42	3.33	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	2.46E-03	21.58	9.08	12.50	0	0	30.25	17.75	12.50	0	0
AC Power-Channel B	1.45E-03	12.75	0	12.75	0	0	12.75	0	12.75	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 7: Activities Resulting in an LCO During 1988 (1/1/88-6/8/88) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
AC Power (13.8kv)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (4160V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	1.15	0	1.15	0	0
AC Power-Channel B	0	0	0	0	0	0	0.78	0	0.78	0	0
AC Power-Channel C	0	0	0	0	0	0	0.81	0	0.81	0	0
AC Power-Channel D	0	0	0	0	0	0	0.68	0	0.68	0	0
AC Power-*	N/A	0	0	0	0	0	6.00	0	4.58	1.42	0
AC Power (480V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. I (Swing Bus)	0	0	0	0	0	0	7.83	7.83	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Div. II (Swing Bus)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0
AC Power (120V)	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel A	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel B	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel C	0	0	0	0	0	0	0	0	0	0	0
AC Power-Channel D	0	0	0	0	0	0	0	0	0	0	0
AC Power-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 7: Activities Resulting in an LCO During 1988 (1/1/88-6/8/88) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for:				Total[2] OOS Hours	Total OOS Hours for:			
			PM	CM	TEST	MOD		PM	CM	TEST	MOD
ESW	3.47E-03	0	0	0	0	0	0	0	0	0	0
ESW-Div. I	3.30E-03	28.92	28.92	0	0	0	35.25	28.92	0	6.33	0
ESW-Channel A	3.49E-04	3.06	3.06	0	0	0	3.06	3.06	0	0	0
ESW-Channel C	1.37E-03	12.00	12.00	0	0	0	12.00	12.00	0	0	0
ESW-Div. II	2.78E-03	24.41	24.41	0	0	0	24.41	24.41	0	0	0
ESW-Channel B	0	0	0	0	0	0	0	0	0	0	0
ESW-Channel D	0	0	0	0	0	0	0	0	0	0	0
ESW-*	N/A	0	0	0	0	0	0	0	0	0	0
125V DC	1.31E-05	0	0	0	0	0	0	0	0	0	0
125V DC-Channel A	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel B	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel C	0	0	0	0	0	0	0	0	0	0	0
125V DC-Channel D	0	0	0	0	0	0	0	0	0	0	0
125V DC-*	N/A	0.92	0	0.92	0	0	14.50	0	0.92	13.58	0
250V DC	0	0	0	0	0	0	0	0	0	0	0
250V DC-Division I	0	0	0	0	0	0	0	0	0	0	0
250V DC-Division II	0	0	0	0	0	0	0	0	0	0	0
250V DC-*	N/A	0	0	0	0	0	0	0	0	0	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

TABLE 7: Activities Resulting in an LCO During 1988 (1/1/88-6/8/88) for SSES Unit One

System	Unavailability[1]	Total Functional Unavailable Hours	Functional Unavailable Hours for: PM	CM	TEST	MOD	Total[2] OOS Hours	Total OOS Hours for: PM	CM	TEST	MOD
HPCI	4.11E-04	1.58	0	0.58	1.00	0	191.01	12.91	3.16	15.44	159.50
ADS	1.23E-04	0	0	0	0	0	0	0	0	0	0
ADS-Division I	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel A	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel C	0	0	0	0	0	0	0	0	0	0	0
ADS-Division II	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel B	0	0	0	0	0	0	0	0	0	0	0
ADS-Channel D	0	0	0	0	0	0	0	0	0	0	0
ADS-*	N/A	2.83	0	0	2.83	0	2.83	0	0	2.83	0
Core Spray	0	0	0	0	0	0	0	0	0	0	0
CS-Division I	0	0	0	0	0	0	1.19	0	0	1.19	0
CS-Channel A	0	0	0	0	0	0	0	0	0	0	0
CS-Channel C	0	0	0	0	0	0	0	0	0	0	0
CS-Division II	0	0	0	0	0	0	0.58	0	0	0.58	0
CS-Channel B	0	0	0	0	0	0	0	0	0	0	0
CS-Channel D	0	0	0	0	0	0	0	0	0	0	0
CS-*	N/A	0	0	0	0	0	2.58	0	0	2.58	0
RHR[3]	0	0	0	0	0	0	0	0	0	0	0
RHR-Division I	0	0	0	0	0	0	0	0	0	0	0
RHR-Channel A	0	0	0	0	0	0	0	0	0	0	0
RHR-Channel C	0	0	0	0	0	0	0	0	0	0	0
RHR-Division II	0	0	0	0	0	0	0	0	0	0	0
RHR-Channel B	0	0	0	0	0	0	14.58	14.58	0	0	0
RHR-Channel D	0	0	0	0	0	0	0	0	0	0	0
RHR-*	N/A	0	0	0	0	0	1.67	0	0	1.67	0

Notes:
(1) Calculated using only "functional unavailable" hours.
(2) Sum of "functional unavailable" + "adminstrative unavailable" hours.
(3) RHR in the LPCI mode of operation.
(*) Includes component impact and divisions or channels which are tested sequentially.

LCO LOG SHEET

UNIT ______ DATE __________

SYSTEM	O.O.S Date/Time	IMPACT Date/Time	REASON:	Circle One S CH PM CH O	T.S. SECTION	S.S. INIT.
OPER. COND.	REFERENCE FORMS		ACTION REQUIREMENTS:		RETURN Date/Time	S.S. INIT
SYSTEM	O.O.S Date/Time	IMPACT Date/Time	REASON:	Circle One S CH PM CH O	T.S. SECTION	S.S. INIT.
OPER. COND.	REFERENCE FORMS		ACTION REQUIREMENTS:		RETURN Date/Time	S.S. INIT
SYSTEM	O.O.S Date/Time	IMPACT Date/Time	REASON:	Circle One S CH PM CH O	T.S. SECTION	S.S. INIT.
OPER. COND.	REFERENCE FORMS		ACTION REQUIREMENTS:		RETURN Date/Time	S.S. INIT
SYSTEM	O.O.S Date/Time	IMPACT Date/Time	REASON:	Circle One S CH PM CH O	T.S. SECTION	S.S. INIT.
OPER. COND.	REFERENCE FORMS		ACTION REQUIREMENTS:		RETURN Date/Time	S.S. INIT

Daily Review__________ Reviewed______________________________
Initials Day Shift Supervisor / Date

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Figure 1: The LCO Log Sheet

SAFETY SYSTEM OUT-OF-SERVICE LOG SHEETS: SYSTEM NAME:___________

UNIT/SIS	OOS DATE	OOS TIME	RETURN DATE	RETURN TIME	OOS DURATION	REFERENCE FORMS	P M	C M	SURV	MOD	LCO REF	SYS	DIV	CHN	COMPONENT ID#	VLO	FAIL	PLT ST	DESCRIPTION	ANAL BY (DATE)	REV BY (DATE)

Figure 2: Form used for log sheet entry analysis

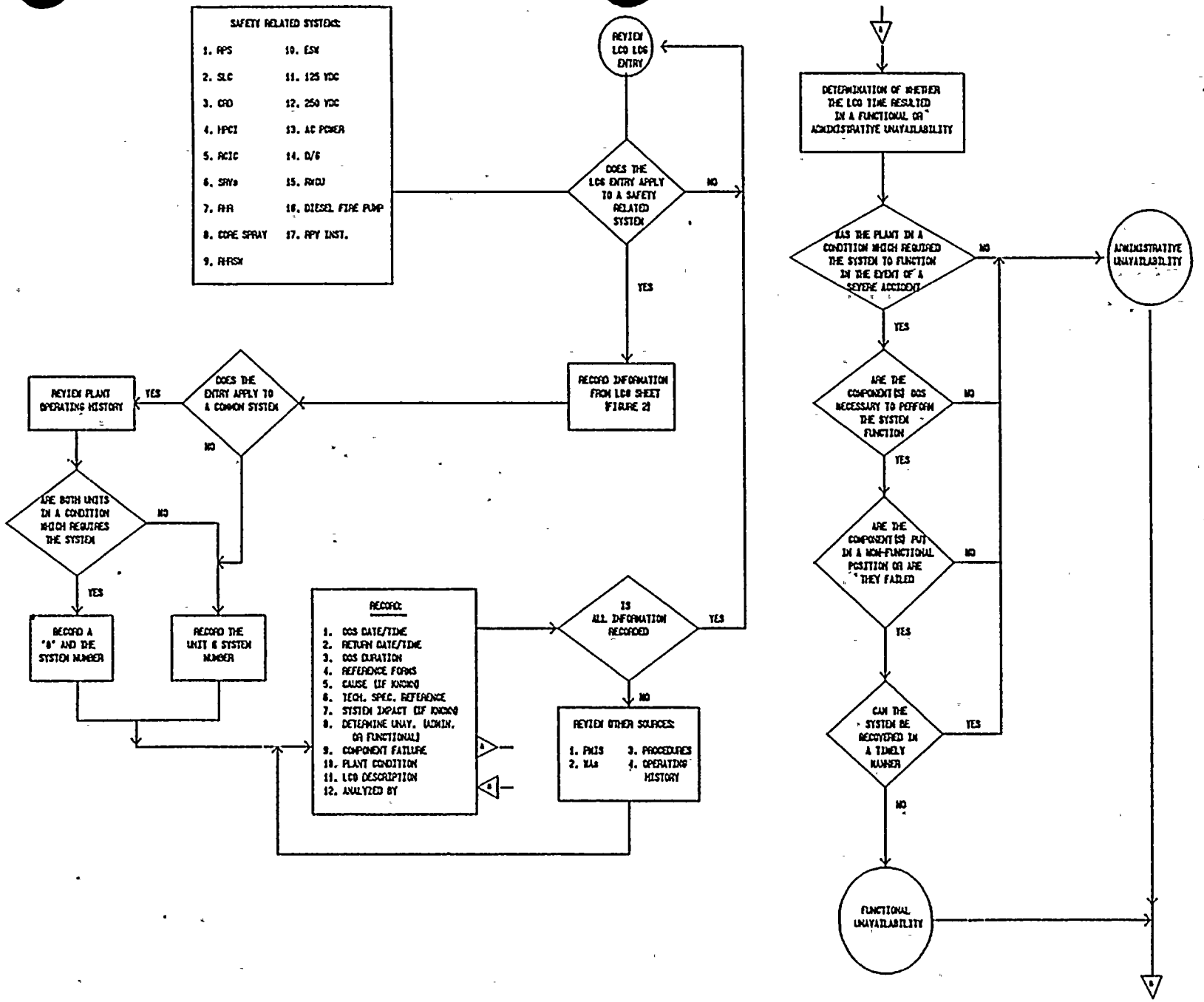


FIGURE 3: FLOWCHART OF THE METHOD USED TO ANALYZE LCO LOG SHEET ENTRIES

4.0 REFERENCES

1. NUREG-0737, "Clarification of TMI Action Plan Requirements", November, 1980.

2. NUREG-0626, "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near-Term Operating License Applications," Recommendation A.6, January, 1980.

3. "Final Safety Analysis Report," Susquehanna Steam Electric Station, page 18.1-103.

4. NUREG-0776, "Susquehanna SES Safety Evaluation Report," Supplement 1, page 3-159.

5. Kukielka, Sanders, Boschetti, Carr; "Safety System Unavailability Monitoring program: 1986 - A status report," Pennsylvania Power & Light, August, 1987.

6. Reliability Data Book for Components in Swedish Nuclear Power Plants, Nuclear Safety Board of the Swedish Utilities.

7. NUREG-0931, "Technical Specification Susquehanna Steam Electric Station, Unit 1," July, 1982.

8. "System Status and Equipment Control;" AD-QA-302, Rev. 4, Susquehanna Steam Electric Station.

9. "Susquehanna Steam Electric Station Probabilistic Risk Assessment Report," Volume II, Rev. 1, 1986.

APPENDIX I

DATABASE STRUCTURE

Database Structure

Field Name	Type	Width	Field Name	Type	Width
UNITSYSTEM	Character	3	CAUSE_PM	Character	1
SYS	Character	2	CAUSE_CM	Character	1
TS_SECTION	Character	11	CAUSE_S	Character	1
REF_FORM1	Character	14	CAUSE_MOD	Character	1
REF_FORM2	Character	14	VALID	Character	1
REF_FORM3	Character	14	FAILURE	Character	1
RHR_MODE	Character	1	CRIT_TIME	Numeric	7
OOS_DATE	Date	8	SD_TIME	Numeric	7
OOS_TIME	Character	4	CRITSDTIME	Numeric	7
MOD_DATE	Date	8	PLANT_STAT	Character	1
MOD_TIME	Character	4	SYSTEM	Character	1
RETRN_DATE	Date	8	DIVISION	Character	1
RETRN_TIME	Character	4	CHANNEL	Character	1
COMPONENT	Character	5	COMP	Character	1
ID	Character	11	REPAIRTIME	Numeric	7
DESCRPTION	Character	254	NAME	Character	40
			ANAL_BY	Character	3
			REV_BY	Character	3

The UNITSYSTEM field (UNITSYSTEM) - contains a one character unit designator (1 for Unit 1, 2 for Unit 2, or 0 for systems which affect both units) in the first position and a two character system designator in the second and third positions. The system designator is defined to be the plant startup system number.

The SYSTEM field (SYS) - contains a two character code for the unavailable system. This is the same as the two characters in the Unitsystem field.

The TECHNICAL SPECIFICATION field (TS_SECTION) - contains the Susquehanna Technical Specification number taken from the LCO log sheet.

The REFERENCE FORM fields (REF_FORM1 - 3) - contains the Susquehanna procedure numbers, work authorization numbers, or equipment release form numbers taken from the LCO log sheet. These reference forms are used to identify what task(s) were performed during the outage.

The RHR MODE field (RHR_MODE) is unique to the RHR system and contains which mode of RHR was affected by the outage (Mode 1 is RHR general, Mode 2 is suppression pool cooling, Mode 3 is shutdown cooling, Mode 4 is low pressure coolant injection mode, and Mode 5 is containment spray).

The OUT OF SERVICE (OOS) Date field (OOSDATE) - contains the OOS date taken from the LCO log sheet.

The OOS TIME field (OOS_TIME) - contains the OOS time taken from the LCO log sheet.

The MODIFIED OOS DATE field (MOD_DATE) - contains the modified OOS date. This date is used to calculate the unavailable time when there is an overlap in LCO time/date periods for the system, division (channel, or component).

The MODIFIED OOS TIME field (MOD_TIME) - contains the modified OOS time. This time is used to calculate the unavailable time when there is an overlap LCO in time periods for the system (division, channel, or component).

The RETURN TO SERVICE DATE field (RETRN_DATE) - contains the date that the system was declared operable and was taken from the LCO log sheet.

The RETURN TO SERVICE TIME field (RETRN_TIME) - contains the time that the system was declared operable and was taken from the LCO log sheet.

The COMPONENT field (COMPONENT) - contains a five character code.

The COMPONENT IDENTIFIER field (ID) - contains the specific Susquehanna component identification designator taken from the LCO log sheet or from reference forms.

The DESCRIPTION field (DESCRPTION) - contains the problem description taken from the LCO log sheet or reference forms.

The PREVENTATIVE MAINTENANCE CAUSE field (CAUSE_CM) - contains a 'Y' if the unavailability was due to corrective maintenance being performed.

The TEST CAUSE field (CAUSE_S) - contains a 'Y' if the unavailability was due to a test being performed.

The PLANT MODIFICATION CAUSE field (CAUSE_MOD) - contains a 'Y' if the unavailability was due to plant modifications being performed.

The VALID field (VALID) - contains a 'Y' if the task being performed resulted in a functional unavailability or contains a 'N' if the unavailability was administrative.

The FAILURE field (FAILURE) - contains a 'Y' if the unavailability resulted from a component failure, or contains 'N' if no failure occurred.

The CRITICAL UNAVAILABLE Hours field (CRIT_TIME) - contains the unavailable hours while the reactor was critical.

The SHUTDOWN UNAVAILABLE HOURS field (SD_TIME) - contains the unavailable hours when the reactor was shutdown.

The TOTAL UNAVAILABLE HOURS field (CRITSDTIME) - contains the total unavailable hours (critical plus shutdown unavailable hours).

The PLANTS STATUS FIELD (PLANSTAT) - contains the plant mode of operation (per the Technical Specifications) when the system outage occurred.

The SYSTEM LEVEL UNAVAILABILITY field (SYSTEM) - contains a 'Y' if the unavailability was at the system level.

The DIVISION LEVEL UNAVAILABILITY field (DIVISION) - contains the division (i.e., 1 or 2) if the unavailability was at the division level.

The CHANNEL LEVEL UNAVAILABILITY field (CHANNEL) - contains the channel (i.e., A, B, C, or D) if the unavailability was at the channel. A '*' in the field means that each channel was tested sequentially.

The COMPONENT LEVEL UNAVAILABILITY field (COMP) - contains a 'Y' if the unavailability was at the component level. A '*' in the field means that each component was tested sequentially.

The REPAIR TIME field (REPAIRTIME) - contains the repair time in hours if known. (Currently not evaluated.)

The SYSTEM NAME field (NAME) - contains the system name spelled out in full.

The ANALYZED BY field (ANAL_By) - contains the initials of the individual who recorded and analyzed the LCO entry.

The REVIEWED BY field (REV_BY) - contains the initials of the individual who reviewed the LCO entry in the database.

APPENDIX II

HIGH PRESSURE COOLANT INJECTION SYSTEM

HIGH PRESSURE COOLANT INJECTION SYSTEM

SYSTEM DESCRIPTION

Function

The primary function of the High Pressure Coolant Injection (HPCI) system is to provide makeup water during events which reduce reactor water inventory and do not cause a rapid depressurization. The HPCI system is part of the emergency core cooling system (ECCS). The system is redundant to the reactor core isolation cooling (RCIC) system and can perform the makeup function of the RCIC system in the event of its failure.

Design and Operation

The HPCI system is a single loop system consisting of turbine-driven injection and booster pumps, piping, valves, controls, and instrumentation. A simplified flow diagram is shown in Figure 4. The system is designed to pump water into the reactor vessel with a maximum capacity of 5000 gpm for a range of reactor pressures between 150 and 1150 psig. Two sources of cooling water are available, the condensate storage tank (CST), which contains demineralized water, and the suppression pool. Initially, the HPCI pump takes suction from the CST through normally open manual valve F010 and motor-operated valve (MOV) F004. The pump suction automatically transfers to the suppression pool on low CST level or high suppression pool level. This transfer is accomplished by a signal that opens the suppression pool suction valve, F042. Once valve F042 is fully open, valve-position-limit switch contacts act to automatically close the CST suction valve, F004. The system is designed to take suction from a source that is less than 170°F. Events which raise the suppression pool temperature above 170°F may require a manual suction transfer back to the CST. The pump is located below the level of the CST and the suppression pool to ensure a positive suction head from either source.

Upon initiation of the HPCI system, a normally closed injection valve, F006, automatically opens, allowing water to be pumped into the reactor vessel through the main feedwater header B. The feedwater spargers distribute the flow within the downcomer, causing the injected water to mix with water or steam in the vessel. A minimum-flow bypass is provided for pump protection. The bypass valve, F012, automatically opens on a low-flow signal when pump discharge pressure is greater than 125 psig. This valve automatically closes on a high-flow signal. When the bypass is open, flow is directed to the suppression pool. A full-flow test line is also provided to recirculate water back to the CST. The two isolation valves, F008 and F011, are equipped with interlocks to automatically close the test line (if open) upon generation of a HPCI initiation signal.

The HPCI turbine is driven by reactor steam. The inboard and outboard HPCI isolation valves, F002 and F003, in the steam line to the HPCI turbine are normally open to keep the piping to the turbine at an elevated temperature, thus permitting rapid startup of the HPCI system. Upon receiving a signal from the HPCI isolation logic, these valves will close and cannot be reopened until the isolation signal is cleared and the logic is reset. Isolation valve F002 is powered from Division I 480 V AC power and controlled by isolation logic system A; F003 is powered from Division II 250 V DC power and controlled by isolation logic system B.

Steam is admitted to the HPCI turbine through supply valve F001, turbine stop valve 15612, and turbine control valve 15611, all of which are normally closed and are opened by a HPCI initiation signal. Exhaust steam from the turbine is discharged to the suppression pool, while condensed steam from the steam lines and leakage from the turbine gland seals are routed to a barometric condenser.

The HPCI system is automatically actuated on low reactor water level (level 2) or high drywell pressure. If automatic actuation fails, the system can be manually initiated from the control room.

A HPCI initiation signal automatically results in an actuation signal to the following valves:

1. Normally closed HPCI turbine cooling-water valve F059 receives "open" signal.

2. Normally closed HPCI full flow test valves F008 and F011 receive "close" signals.

3. Normally open HPCI/CST suction valve F004 receives "open" signal.

4. Normally closed HPCI pump injection valve F006 receives "open" signal.

5. Normally closed HPCI steam supply valve F001 receives "open" signal.

6. Normally open HPCI pump-discharge valve F007 receives "open" signal.

The initiation of HPCI also automatically starts the condenser vacuum pump and the auxiliary lubricating oil pump, which is required to open the hydraulically operated turbine stop valve 15612 and turbine control valve 15611.

The HPCI flow controller, which provides a control signal to the control valve, 15611, can be operated in an automatic or a manual mode. When the flow controller is in the automatic mode, the HPCI pump flow rate and turbine speed will automatically satisfy and maintain the flow-control setpoint value. The setpoint can be manually changed by the operator in order to maintain the reactor water level.

There are several diagnostic trip signals that shut down the HPCI turbine by closing the turbine stop valve, 15612. Minimum flow valve F012 and injection valve F006 are subsequently closed.

A HPCI turbine trip results from any of the following:

1. Two of two high reactor water level signals (level 8).

2. Remote manual turbine trip.

3. Low pump suction pressure.

4. High turbine exhaust pressure (50 psig).

5. Turbine overspeed.

6. Isolation of the HPCI steam supply (see below).

With the exception of the trip caused by a high reactor water level and HPCI isolation, the HPCI system will automatically restart once the trip signal is cleared. The signal for a high reactor water level "seals in" but is reset if a subsequent low-level (level 2) signal is received, allowing the system to automatically restart.

The HPCI steam supply is isolated manually or automatically by closing the inboard and/or outboard isolation valves. There is no automatic reopen capability. The automatic isolation results from any of the following:

1. High differential temperature in the HPCI equipment area.
2. High temperature in the HPCI equipment area.
3. High differential temperature in the steam line space.
4. High temperature in the steam line space.
5. High flow in the steam line.
6. High pressure in the exhaust line of the turbine rupture disks.
7. Low steam supply pressure (104 psig).
8. High temperature in the inlet to the equipment room emergency air cooler.
9. Manual isolation if the system has been initiated.

When the HPCI system is operating, the operator controls the flow rate by adjusting the HPCI flow controller as indicated earlier. When the system is automatically initiated, it is set to deliver full flow (5000 gpm). For most events if the operator fails to take control of the flow, the reactor water level will cycle between the set levels for HPCI initiation and trip, levels 2 and 8, respectively.

Extensive indication of system status is available in the control room. Specific indications include the following:

1. Pump discharge flow.
2. Pump discharge pressure.
3. Position of all motor-operated valves.
4. Turbine inlet pressure.
5. Low level in the condensate storage tank.
6. Suppression pool level.
7. Suppression pool temperature.
8. Turbine exhaust pressure.
9. Pump suction pressure.

System Interfaces

Instrumentation

The HPCI water source is normally the CST. An automatic transfer of pump suction from the CST to the suppression pool occurs on low CST level or high suppression pool level. Level in the CST is monitored by two level switches, either of which can initiate suction transfer. The same is true of suppression pool level. The CST instrumentation and logic is completely independent of that from the suppression pool. The instrumentation that initiates HPCI suction transfer is independent of that which initiates RCIC suction transfer.

Electric Power

The initial startup and operation of the HPCI system is completely independent of AC power supplies. The system requires 250 V DC power for the auxiliary lubricating oil pump, the condensate transfer pump, and the motor-operated valves; 125 V DC power is required for the turbine-driven pump flow controller and the instrumentation associated with HPCI initiation and operation. The DC power is supplied from the ESS bus through a charger or, in the event of AC power failure, from 125 V and 250 V batteries.

The fans of the two room cooling units require 480 V AC power. The HPCI steam-supply isolation valve (F002) is supplied by 480 V AC power. However, the valve is normally open and is therefore not required to operate during system startup or operation.

Room/Pump Cooling

In order to ensure correct operation of the HPCI control system, the temperature of the HPCI pump room must be maintained within prescribed limits. This temperature control is normally provided by reactor building zone I HVAC. Zone I HVAC is shut down by a low reactor water level (level 2) or high drywell pressure. These same signals will initiate the Emergency Service Water (ESW) system, which will automatically circulate water through the two redundant room cooling units. The HVAC system will also be unavailable in the event of a loss of offsite power. However, ESW will be initiated automatically by the diesel start logic. The room cooling units are both supplied by ESW loop B. However, there is a plant modification that will allow both loop A and B to each feed one room cooler (this is to be completed in 1987). The fans of the cooling units are interlocked to start when the HPCI steam supply valve (F001) is opened. The turbine and pump lubricating oil is cooled by water supplied from the discharge of the pump.

Water Sources

The CST (the normally aligned suction source) and the suppression pool (the alternative source) are shared with other systems (e.g., RCIC, CSS, LPCI).

The condensate storage facility consists of two 300,000 gallon tanks, one for each reactor unit, and a single (shared) 680,000 gallon refueling water storage tank. There are numerous interconnections between the tanks, and condensate transfers can be accomplished by means of the refueling water pumps and condensate transfer pumps.

Each CST is designed to maintain a minimum reserve of 135,000 gallons specifically for the use of the HPCI and RCIC systems in the particular unit. CST level is normally maintained between 165,000 gallons (the low level alarm setpoint) and 270,000 gallons (the high level alarm setpoint).

The HPCI system pipes are normally pressurized by means of the condensate transfer system to prevent waterhammer on initiation. This system was not modeled, but the rate of pipe failure (rupture) that was used in the fault tree implicitly includes the effect of failure in the condensate transfer system.

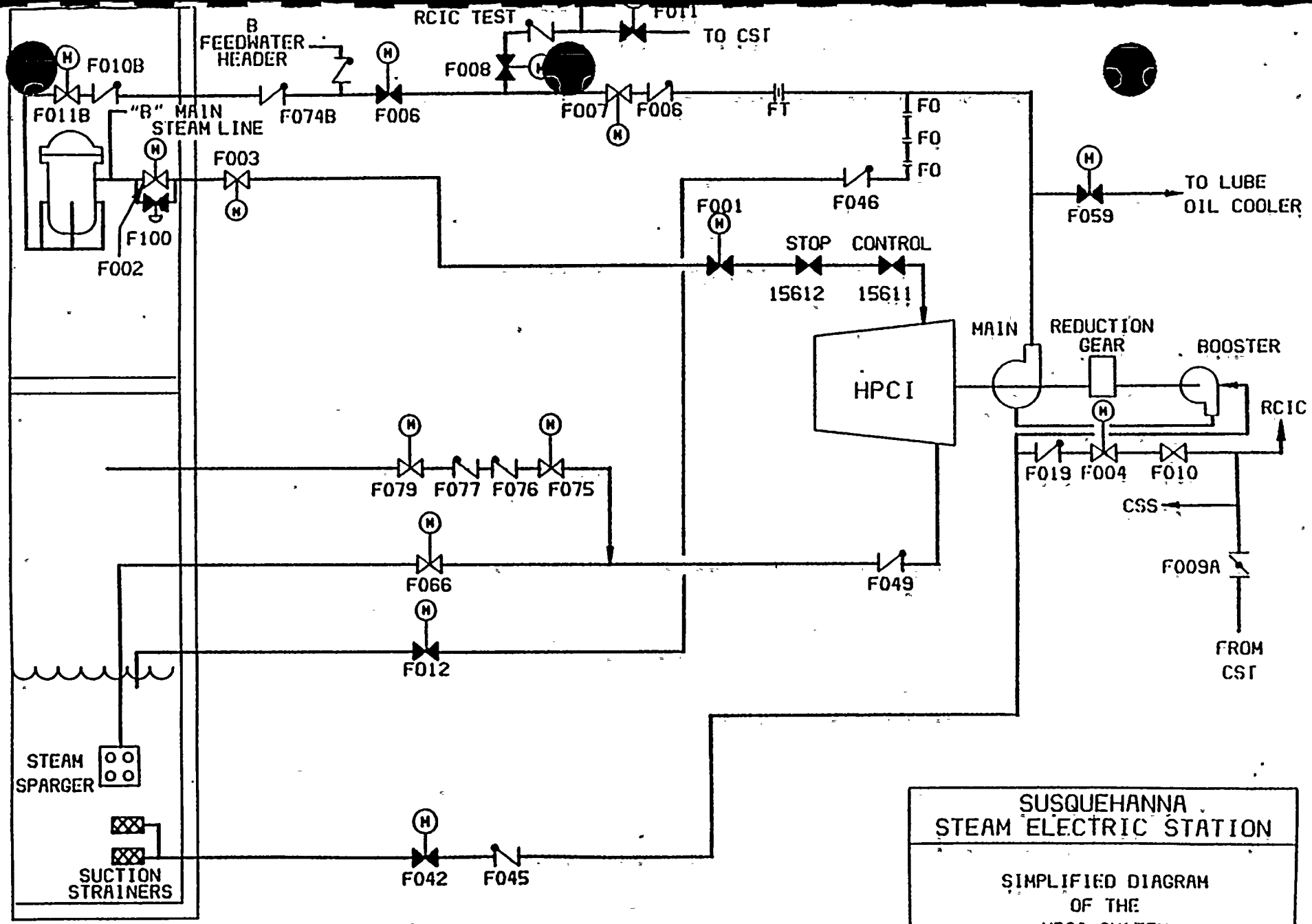
Table 8. AC power supplies for HPCI

ESF 4.16 kV bus	480 V MCC bus	Component supplied
1A202	1B226	Room cooler A fan
1A203	1B237	1F002
1A204	1B247	Room cooler B fan

Table 9. DC power supplies for HPCI

Load center	Distribution panel or control center	Component supplied
1D622	125 V DC distribution panel	
	1D624	HPCI logic
		Pneumatic valves:
		1F029
		1F054
		1F025
1D612	125 V DC distribution panel	
	1D614	HPCI logic
		Pneumatic valves:
		1F026
		1F028
1D662	250 V DC control center	
	1D254	Motor-operated valves:
		1F079
	1D264	Motor-operated valves:
		1F001[a]
		1F003
		1F004
		1F006[a]
		1F011
		1F012[a]
		1F042
		1F059[a]
		1F075
	1D274	Motor-operated valves:
		1F007
		1F008
		1F066
		Vacuum pump
		Condensate pump
		Auxiliary lube oil pump

[a]Valves that change position for the automatic initiation of HPCI.



SUSQUEHANNA
STEAM ELECTRIC STATION

SIMPLIFIED DIAGRAM
OF THE
HPCI SYSTEM

FIGURE 4 REV. 01

GN2204

BEGIN DATE: 06/08/83 END DATE: 12/31/83

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UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	OIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
152	1	3.5.1	06/22/83	1325	06/22/83	1325	06/22/83	1515	1.83	0.00	1.83			Y		N/A	Y				N	N	INVESTIGATE POSSIBLE FLOW ERROR IN HPCI SYS.
152	1	3.5.1	06/24/83	0838	06/24/83	0838	06/24/83	0839	0.02	0.00	0.02			Y		1N012A-D	Y				N	N	HPCI STEAM SYS. ISOL HPCI OOS DUE TO SI-152-211. (CHANNEL CHECK OF TURBINE EXHAUST DIAPHRAGM PRESSURE CHANNELS 1N012A THRU D.)
152	1	3.5.1	08/02/83	1120	08/02/83	1120	08/02/83	1945	8.42	0.00	8.42			Y		1N005	Y				N	N	HPCI FAILED TO PASS REQUIREMENT OF SO-152-002.
152	1	3.5.1	08/05/83	0115	08/05/83	0115	08/06/83	2050	43.58	0.00	43.58		Y			1F059	Y				Y	Y	HPCI L.O CLR VLV 1F059 BKR TRIPPED WILL NOT STAY RESET.
152	1	3.5.1	09/27/83	0900	09/27/83	0900	09/29/83	0446	43.77	0.00	43.77		Y			1N017A/B	Y				N	N	HPCI OOS DUE TO WORK ON PSHIN017A/B.
152	1	3.5.1	10/01/83	0330	10/01/83	0330	10/01/83	0545	2.25	0.00	2.25			Y		N/A	Y				Y	N	HPCI OOS DUE TO BKRS OPENED FOR THERMAL INSPECTION.
152	1	3.5.1	10/03/83	0656	10/03/83	0656	10/03/83	1850	11.90	0.00	11.90		Y			1F059	Y				Y	N	HPCI OOS 1F059 VALVE DE-ENERGIZED FOR OPERATOR INSPECTION.
152	1	3.5.1	10/05/83	1050	10/05/83	1050	10/05/83	1108	0.30	0.00	0.30		Y			1F012	Y				N	N	OPENED 1F012 MAIN FLOW VLV & BKR FOR MAINT TO CHECK SEAL.
152	1	3.5.1	11/30/83	0950	11/30/83	0950	11/30/83	2055	11.08	0.00	11.08			Y		N/A	Y				Y	N	HPCI O/S FOR SO-152-003 WILL BE O/S FOR HOURS. (18 MONTH HPCI SYSTEM AND LOGIC FUNCTIONAL TEST.)
152	2	3.5.1/3.0.3	12/04/83	0910	12/04/83	0910	12/04/83	1145	0.00	2.58	2.58			Y		N/A	Y				Y	N	HPCI O/S FOR SO-152-003.
### Total ###									123.15	2.58	125.73												

HPCI

BEGIN DATE: 01/01/84 END DATE:12/31/84

U S N Y I S I	P C L O M N T D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	Y A L	F A I L	DESCRIPTION OF EVENT
152	1	3.5.1	02/21/84	0700	02/21/84	0700	02/21/84	0915	2.25	0.00	2.25		Y		1F003		f			N	N	HPCI INOP. OPENED HPCI OUTBOARD STM SUPPLY VALVE (HV-1F003) EFFECTIVE 10264031.
152	1	3.5.1	05/09/84	1800	05/09/84	1800	05/09/84	2200	4.00	0.00	4.00	Y			1U209A				f	N	N	HPCI "B" LOOP ROOM COOLER OOS FOR CLEANING.
152	1	3.5.1	05/19/84	1424	05/19/84	1424	05/20/84	1257	22.55	0.00	22.55		Y		1F204		Y			N	N	HPCI INOP WILL NOT PUMP >= 5000GPM AT >1200# PER SW B1002. ALSO, OIL LEAK.
152	1	3.5.1	05/22/84	2217	05/22/84	2217	05/22/84	2255	0.63	0.00	0.63			Y	1F002		Y			Y	N	HPCI OUT OF SERVICE FOR PERFORMANCE OF SO-152-004.
152	1	3.5.1	06/18/84	0952	06/18/84	0952	06/18/84	1140	1.80	0.00	1.80			Y	1N005		Y			N	N	HPCI NOT IN AUTO TO PERFORM SO-152-002.
152	2	3.5.1.C	07/03/84	1545	07/03/84	1545	07/03/84	2000	0.00	4.25	4.25		Y		1F005		Y			Y	Y	HPCI ISOLATED FROM SERVICE DUE TO DISCHARGE CHECK VALVE NOT HOLDING AND LIFTING SUCTION RELIEF VALVE.
152	1	3.5.1	07/31/84	0720	07/31/84	0720	07/31/84	2215	14.92	0.00	14.92		Y		N/A		Y			Y	N	HPCI SYS OUT OF SERVICE TO REPACK VARIOUS VALVES.
152	1	3.3.2.6	09/12/84	1330	09/12/84	1330	09/12/84	1410	0.67	0.00	0.67		Y		1N001D				s	N	N	STEAM LINE LOW PRESSURE SWITCH PSL E31-1N001D FOR HPCI ISOLATION LOGIC INOP FOR MAINTENANCE.
152	1	3.5.1	10/18/84	1450	10/18/84	1450	10/19/84	0420	6.52	6.98	13.50		Y		1P204		Y			f	N	HPCI SYS DECLARED INOP DUE TO EXCESSIVE VIBRATION ON MAIN PUMP.
152	1	3.5.1	11/11/84	0940	11/11/84	0940	11/11/84	0942	0.03	0.00	0.03			Y	1F003		Y			N	N	HPCI O/S TO STROKE 1F003 O.B STM ISOLATION.
152	1	3.5.1	11/20/84	1600	11/20/84	1600	11/20/84	1700	1.00	0.00	1.00			Y	1F002		Y			Y	N	HPCI O/S FOR SO-152-004.
152	1	3.5.1	12/14/84	1330	12/14/84	1330	12/14/84	1358	0.47	0.00	0.47			Y	1N005		Y			N	N	HPCI FLOW CONTROLLER IN MANUAL FOR SO-152-002.
152	1	3.6.3/3.5.1	12/20/84	1340	12/20/84	1340	12/20/84	1640	3.00	0.00	3.00		Y		1F003		Y			N	N	MANUALLY BACKSEATED HPCI STEAM SUPPLY VALVE 1F003 TO STOP STEAM LEAK.
*** Total ***									57.84	11.23	69.07											

######################## HPCI ########################

BEGIN DATE: 01/01/85 END DATE:06/07/85

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
152	2	3.3.2	01/25/85	1050	01/25/85	1050	01/25/85	1146	0.00	0.93	0.93			Y		1N005	Y				N	N	HPCI ISOLATION INSTRUMENTATION (HI STEAM LINE FLOW) WAS FOUND TO BE INOPERABLE DURING SI-152-303 (PDIS-E41-N005).
152	1	3.5.1/3.3.3	02/05/85	0000	02/05/85	0000	02/05/85	0510	5.17	0.00	5.17			Y		N/A	Y				N	N	HPCI SYS INOP DUE TO EXPIRED SURV SI-152-208 (CST LOW LEVEL SUCTION SWOP).
152	1	3.5.1	06/09/85	0630	06/09/85	0630	06/09/85	1015	3.75	0.00	3.75			Y		1F006	Y				Y	N	HPCI INOP DUE TO INJECTION VALVE BREAKER OPEN OF SO-152-005.
152	1	3.5.1	06/09/85	1850	06/09/85	1850	06/10/85	0100	6.17	0.00	6.17			Y		1N005	Y				N	N	HPCI INSP. CONTROLLER IN MANUAL FOR SO-152-002.
152	1	3.5.1	06/18/85	1600	06/18/85	1600	06/18/85	1949	3.82	0.00	3.82			Y		1N005	Y				N	N	HPCI FLOW CONTROLLER TO MANUAL.
152	1	3.5.1.C	06/19/85	1015	06/19/85	1015	06/19/85	1230	2.25	0.00	2.25			Y		1N005	Y				N	N	CONTROLLER PLACED IN MANUAL FOR PERFORMANCE OF TP-152-009 FOR VIBRATION DATA.
152	1	3.5.1.C	06/24/85	1100	06/24/85	1100	06/25/85	0430	17.50	0.00	17.50		Y			1S211	Y				Y	N	TP-152-011 INOPS HPCI TURBINE DEVELOPED OIL LEAK DURING TEST RUN.
152	1	3.5.1.C	06/27/85	1105	06/27/85	1105	06/27/85	1207	1.03	0.00	1.03			Y		N/A	Y				N	N	HPCI INOP DURING TP-152-011.
152	1	3.5.1	07/01/85	0650	07/01/85	0650	07/01/85	1430	7.67	0.00	7.67	Y				1P215	Y				N	N	HPCI OOS FOR PM TO CHANGE BRUSHES ON VAC TANK COND DRAIN PUMP.
152	1	3.5.1.C	07/11/85	0630	07/11/85	0630	07/11/85	1620	9.83	0.00	9.83			Y		N/A	Y				Y	N	HPCI O/S FOR I&C CAL. CHECKS.
152	1	3.5.1	08/06/85	0615	08/06/85	0615	08/06/85	1545	9.50	0.00	9.50	Y				N/A	Y				N	N	HPCI OOS FOR MAINTENANCE.
152	1	3.5.1	08/08/85	0420	08/08/85	0420	08/08/85	1110	6.83	0.00	6.83	Y				N/A	Y				N	N	HPCI OOS FOR MAINTENANCE.
152	1	3.5.1	08/23/85	0951	08/23/85	0951	08/23/85	1050	0.98	0.00	0.98			Y		1F002	Y				N	N	HPCI I.B. STM. ISOLATION - ISOLATED DURING PERFORMANCE OF SI-152-311.
152	1	3.6.3	08/23/85	1050	08/23/85	1050	08/23/85	1440	3.83	0.00	3.83		Y			1F100	Y				N	N	HPCI INBOARD BYPASS 1F100 HAS DUAL INDICATION IN THE CLOSED POSITION.
152	1	3.5.1	08/23/85	1425	08/23/85	1425	08/23/85	1935	5.17	0.00	5.17		Y			1F002	Y				Y	N	HPCI IB ISOLATION VLV MANUALLY ISOLATED.
152	1	3.5.1	09/07/85	1711	09/07/85	1711	09/07/85	1800	0.82	0.00	0.82			Y		1F002	Y				Y	N	HPCI INOP DUE TO PERFORMANCE OF SO-152-004.
152	1	3.5.1	09/13/85	0800	09/13/85	0800	09/13/85	0840	0.67	0.00	0.67		Y			1F007	Y				N	N	HPCI SYSTEM INOP TO ADJUST PACKING ON 1F007 DISCH VALVE.
152	1	3.5.1	09/18/85	1038	09/18/85	1038	09/18/85	1245	2.12	0.00	2.12	Y				1N006	Y				Y	N	HPCI SYSTEM INOP FOR CALIBRATION OF FSHL-1N006.
152	1	3.5.1	09/19/85	0800	09/19/85	0800	09/19/85	1320	5.33	0.00	5.33	Y				1F012	Y				N	N	HPCI INOPERABLE TO PERFORM PM ON MIN FLOW VALVE CIRCUITRY.
152	1	3.5.1	09/28/85	1000	09/28/85	1000	09/28/85	1315	3.25	0.00	3.25			Y		1N024B/D				1	N	N	HPCI INOPERABLE FOR SI-180-208.
152	1	3.3.3	09/28/85	1200	09/28/85	1200	09/28/85	1315	1.25	0.00	1.25			Y		1N024B/D				1	N	N	HPCI INOP FOR SI-180-205 (TABLE 3.3.3-1 3.E) (HI WTR LEVEL CHANNEL).
152	1	3.5.1	09/30/85	2222	09/30/85	2222	10/01/85	1903	20.68	0.00	20.68		Y			1F029	Y				Y	N	HPCI STEAM SUPPLY ISOLATED TO REPAIR STEAM LEAKS ON VALVE 1F029.
152	1	3.3.2	10/05/85	1253	10/05/85	1253	10/05/85	1351	0.97	0.00	0.97		Y			N/A				Y	N	N	"A" DIV OF HPCI ISOL INSTRUMENTATION INOP FOR MAINT.
152	1	3.5.1	10/06/85	1925	10/06/85	1925	10/08/85	2000	48.58	0.00	48.58		Y			1F003	Y				N	N	HPCI SYSTEM INOPERABLE FOR MAINTENANCE ON 1F003 (PACKING LEAK) AND 1N013.
152	1	3.3.3/3.5.2	10/28/85	1123	10/28/85	1123	10/28/85	1315	1.87	0.00	1.87			Y		1N024B/D				1	N	N	HPCI HI LVL TRIP INOP DURING SI-180-305 (1N024B&D).
152	1	3.3.3/3.5.2	10/28/85	1517	10/28/85	1517	10/28/85	1945	0.27	4.20	4.47			Y		1N024B/D				1	N	N	HPCI INOP DURING SI-180-305.
152	1	3.5.1	11/07/85	1045	11/07/85	1045	11/07/85	1200	1.25	0.00	1.25			Y		1N005	Y				N	N	HPCI FLOW CONT. IN MANUAL TO PERFORM SO-152-002.
152	1	3.6.3	11/14/85	0730	11/14/85	0730	11/14/85	1130	4.00	0.00	4.00			Y		1F079	Y				N	N	HV155F079 CLOSED DURING LLRT SE-159-098 HPCI VAC BRKR.
152	1	3.3.3&3.5.	11/27/85	1733	11/27/85	1733	11/27/85	1825	0.87	0.00	0.87			Y		1N024B/D				1	N	N	HPCI INOP DURING SI-180-205 LEVEL SWITCH B & D.
152	1	3.5.1	12/02/85	1010	12/02/85	1010	12/02/85	1932	4.97	4.40	9.37	Y				N/A	Y				Y	N	HPCI O/S FOR PM'S ON STOP/CONTROL VALVES, TURBINE, PUMP.
152	2	3.5.1	12/03/85	1015	12/03/85	1015	12/03/85	2110	0.00	10.92	10.92		Y			1S211	Y				N	N	HPCI O/S TO REPAIR OIL LEAK ON HPCI TURBINE.
152	1	3.5.1	12/08/85	0815	12/08/85	0815	12/08/85	1515	7.00	0.00	7.00			Y		N/A	Y				N	N	HPCI INOP DUE TO "B" LOOP ESW INOP FOR TP.
152	1	3.5.1	12/09/85	1010	12/09/85	1010	12/09/85	1415	4.08	0.00	4.08			Y		N/A	Y				N	N	HPCI INOP DUE TO "B" LOOP ESW T.P.
152	1	3.3.2	12/10/85	0830	12/10/85	0830	12/10/85	1020	1.83	0.00	1.83		Y			N/A				Y	N	N	HPCI STEAM LEAK DETECTION DIV II O/S FOR RELAY REPLACEMENT.
152	1	3.5.1	12/12/85	1310	12/12/85	1310	12/12/85	1945	6.58	0.00	6.58			Y		N/A	Y				N	N	HPCI INOP DUE TO "B" LOOP ESW TP.
152	1	3.5.1.C	12/18/85	1030	12/18/85	1030	12/18/85	1335	3.08	0.00	3.08			Y		N/A	Y				Y	N	HPCI SYSTEM INOP DURING TP-152-012 ON SUCTION PRESSURE INDICATION.
152	1	3.5.1	12/23/85	1750	12/23/85	1750	12/23/85	1830	0.67	0.00	0.67		Y			N/A	Y				N	N	HPCI INOP DUE TO ESW LOOP "A" INOP NO FLOW FOR ROOM COOLERS.
### Total ###									203.64	20.45	224.09												

HPCI

BEGIN DATE: 01/01/86 END DATE: 12/31/86

U S N Y I S T	P C L O N N T D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C G N P	? A L O	F A I L	DESCRIPTION OF EVENT
152	1		01/28/86	1640	01/28/86	1640	01/28/86	1800	1.33	0.00	1.33			Y		1N024B/D				!	Y	N	REACTOR WATER LEVEL SWITCH CALIBRATION (1N024B&D).
152	1		01/29/86	2200	01/29/86	2200	01/30/86	1135	13.58	0.00	13.58			Y		N/A	Y				Y	N	QUARTERLY VALVE EXERCISING (SO-152-004).
152	1		01/30/86	0330	01/30/86	0730	01/30/86	0730	0.00	0.00	0.00		Y			1-55-001	Y				Y	N	UNAVAILABLE TO BACKSEAT INSTRUMENTATION ROOT VALVE LSH-IN014.
152	1		04/20/86	1550	04/20/86	1550	04/20/86	1847	2.95	0.00	2.95			Y		1P204	Y				N	N	HPCI PUMP TUNEUP.
152	4		04/21/86	2002	04/21/86	2002	04/22/86	0339	3.97	3.50	7.47		Y			1F003	Y				N	N	FIX VALVE 1F003 VALVE PACKING (UNIT SHUT DOWN).
152	1		04/29/86	0945	04/29/86	0945	04/29/86	1140	1.92	0.00	1.92			Y		1F006	Y				N	N	HPCI PUMP PERFORMANCE VERIFICATION CST TO CST (INJECTION VALVE CLOSED AND DE-ENERGIZED).
152	1		05/15/86	1338	05/15/86	1338	05/15/86	1500	1.37	0.00	1.37			Y		1N024B/D				!	Y	N	SURVEILLANCE OF REACTOR WATER LEVEL INITIATION SWITCHES (1 OF 4 AT A TIME).
152	1		07/11/86	1115	07/11/86	1115	07/11/86	1215	1.00	0.00	1.00			Y		1N024B/D				!	Y	N	REACTOR WATER LEVEL TRIP SWITCH CALIBRATION.
152	1		07/15/86	0200	07/15/86	0200	09/18/86	2000	1436.65	141.35	1578.00		Y			1F100	Y				N	N	VALVE 1F100 DUAL INDICATION.
152	1		08/11/86	1115	08/11/86	1115	08/11/86	1145	0.50	0.00	0.50			Y		1N024A-D				!	Y	N	SURVEILLANCE OF INITIATION SWITCHES.
152	1		09/09/86	1030	09/09/86	1030	09/09/86	1110	0.67	0.00	0.67			Y		1N024B/D				!	N	N	REACTOR WATER HIGH LEVEL TRIP FUNCTIONAL TEST.
152	1		10/10/86	1030	10/10/86	1030	10/10/86	1130	1.00	0.00	1.00			Y		1N012A-D				!	N	N	TURBINE EXHAUST DIAPHRAGM FAILED SURVEILLANCE (SI-152-311).
152	1		10/20/86	1140	10/20/86	1140	10/20/86	1400	2.33	0.00	2.33			Y		1N005	Y				N	N	HPCI FLOW RATE PRESSURE TEST.
152	1		11/07/86	0500	11/07/86	0900	11/10/86	1800	81.00	0.00	81.00		Y			1S211	Y				Y	N	REMOVE PIPE NIPPLE ON TURBINE.
152	1		11/12/86	0936	11/12/86	0936	11/12/86	1023	0.78	0.00	0.78			Y		1N024B/D				!	Y	N	CALIBRATE LEVEL INITIATION SWITCHES LIS-B21-1N024B & D.
152	1		12/01/86	0920	12/01/86	0920	12/01/86	0950	0.50	0.00	0.50			Y		1S211	Y				Y	N	HPCI MECHANICAL OVERSPEED TRIP CHECK.
152	1		12/10/86	0500	12/10/86	0500	12/13/86	0135	68.58	0.00	68.58	Y				N/A	Y				Y	N	HPCI O/S FOR SYSTEM PM'S.
152	1		12/13/86	0846	12/13/86	0846	12/13/86	0920	0.57	0.00	0.57			Y		1N024B/D				!	Y	N	REACTOR WATER LEVEL SENSOR FUNCTIONAL TEST FOR LIS-B21-1N024B & D.
152	1		12/26/86	1145	12/26/86	1145	12/26/86	1215	0.50	0.00	0.50			Y		1F002	Y				Y	N	1F002 CLOSED FOR DRYWELL LEAKAGE TESTING.
152	1		12/29/86	1903	12/29/86	1903	12/29/86	1951	0.80	0.00	0.80			Y		1F002	Y				Y	N	1F002 CLOSED FOR DRYWELL LEAKAGE TESTING.
*** Total ***									1620.00	144.85	1764.85												

UNIT	SYS	PLNT	CONO	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	CUMP	VALV	FAIL	DESCRIPTION OF EVENT
152		1		3.5.1	01/02/87	1315	01/02/87	1315	01/02/87	1330	0.25	0.00	0.25			Y		N/A	Y				Y	N	HPCI INOP DURING TP (MONTHLY OVERSPEED TRIP CHECK).
152		1		3.3.3.3.5.1	01/08/87	1125	01/08/87	1125	01/08/87	1635	5.17	0.00	5.17			Y		1N024B/D				!	N	N	HPCI INOP DURING PERFORMANCE OF SI ON LEVEL 8 INSTRUMENTATION.
152		1		3.5.1	02/02/87	1115	02/02/87	1115	02/02/87	1145	0.50	0.00	0.50			Y		N/A	Y				Y	N	HPCI INOP FOR OVERSPEED TRIP CHECK.
152		1		3.5.1	02/05/87	0930	02/05/87	0930	02/05/87	1005	0.58	0.00	0.58			Y		1N024B/D				!	Y	N	HPCI INOP FOR I&C SURVEILLANCE ON 1N024B&D.
152		1		3.5.1	02/23/87	0800	02/23/87	0800	02/23/87	1700	9.00	0.00	9.00		Y			1F603	Y				Y	Y	HPCI O/S FOR INSPECTION AND REPAIR OF TOPAZ INVERTER FAILURE.
152		1		3.5.1	03/02/87	1515	03/02/87	1515	03/02/87	1700	1.75	0.00	1.75		Y			1F003	Y				Y	N	HPCI INOP DURING PACKING REWORK OF 1F003.
152		1		3.5.1	03/05/87	0415	03/05/87	0415	03/10/87	1200	127.75	0.00	127.75		Y			N/A	Y				Y	N	HPCI O/S FOR WORK ON 1F001, 1F003, 1F007, AND VARIOUS INSTRUMENTATION. ALSO PERFORMED SO-152-002.
152		1		3.5.1	03/10/87	1401	03/10/87	1401	03/10/87	1445	0.73	0.00	0.73			Y		1N024B/D				!	N	N	HPCI O/S FOR I&C SURVEILLANCE ON 1N024B&D (54" TRIP).
152		1		3.6.3	03/12/87	1300	03/12/87	1300	03/12/87	1430	1.50	0.00	1.50		Y			1F003	Y				Y	N	HPCI STEAM SUPPLY VALVE (1F003) REQUIRED PACKING ADJUSTMENT.
152		1			04/27/87	1730	04/27/87	1730	04/27/87	2240	5.17	0.00	5.17		Y			N/A	Y				N	N	PIPE ROUTING AREA TSH FAULTY - AFFECTS ISOLATION ONLY.
152		1		3.6.3.3.5.1	05/22/87	0015	05/22/87	0015	05/22/87	1830	18.25	0.00	18.25				Y	1F002	Y				Y	N	HPCI INOP FOR 1F002 MODIFICATION WORK.
152		1		3.5.1	05/26/87	0745	05/26/87	0745	05/26/87	1000	2.25	0.00	2.25		Y			1F003	Y				Y	N	HPCI INOP FOR MAINTENANCE TO RETORQUE PRESSURE SEAL FOR OUTBOARD ISOLATION VALVE 1F003.
152		1		3.5.1	05/26/87	2141	05/26/87	2141	05/26/87	2200	0.32	0.00	0.32		Y			1F603	Y				N	N	HPCI INVERTER O/S FOR TEST EQUIPMENT HOOKUP.
152		1		3.5.1	05/27/87	1715	05/27/87	1715	05/27/87	1950	2.58	0.00	2.58	Y				1F603	Y				Y	N	HPCI O/S TO PERFORM CALIBRATON OF TOPAZ INVERTER.
152		1		3.6.3	06/05/87	1125	06/05/87	1125	06/05/87	1250	1.42	0.00	1.42		Y			1N012A/C	Y				N	N	HPCI O/S TO REPLACE BANANA JACKS FOR HPCI TURBINE EXHAUST PRESSURE SENSORS (PSH-1N012A&C).
152		1		3.5.1	06/15/87	0500	06/15/87	0500	06/16/87	0700	26.00	0.00	26.00	Y				N/A	Y				N	N	HPCI TAKEN O/S FOR SCHEDULED EQ INSPECTION.
152		1		3.3.3.3.5.1	07/07/87	1310	07/07/87	1310	07/07/87	1435	1.58	0.00	1.58			Y		1N024B/D				!	N	N	HPCI O/S FOR 1N024B&D SURVEILLANCE (54" TRIP).
152		1			08/05/87	0850	08/05/87	0850	08/05/87	1115	2.42	0.00	2.42			Y		N/A	Y				Y	N	HPCI OUT OF SERVICE FOR SURVEILLANCE (VALVE EXERCISING).
152		1			08/06/87	1428	08/06/87	1428	08/06/87	1456	0.47	0.00	0.47			Y		1N024B/D				!	N	N	HPCI HIGH LEVEL CALIBRATION SI.
152		1		3.3.3.3.5.1	09/03/87	1406	09/03/87	1406	09/03/87	1445	0.65	0.00	0.65			Y		1N024B/D				!	N	N	HPCI O/S FOR SI.
152		5		3.4.8	10/14/87	1400	10/14/87	1400	11/05/87	1710	0.00	531.17	531.17			Y		DBA-102-1-1A	Y				N	N	HPCI STEAM LINE WELD DBA-102-1-1A FAILED IN-SERVICE INSPECTION (ISI).
152		1		3.5.1	11/21/87	1700	11/21/87	1700	11/21/87	1906	2.10	0.00	2.10			Y		1F006	Y				N	N	HPCI O/S FOR SI WITH UNIT SHUTDOWN AND DEPRESSURIZED.
152		1		3.5.1	12/08/87	0845	12/08/87	0845	12/08/87	0925	0.67	0.00	0.67			Y		1N024B/D				!	N	N	HPCI O/S FOR SI ON HIGH LEVEL TRIP.
152		1		3.5.1	12/10/87	0445	12/10/87	0445	12/10/87	1015	5.50	0.00	5.50	Y				N/A	Y				N	N	PACKING ADJUSTMENT ON 1F001 AND 1F007 VALVES.
152		1		3.5.1	12/31/87	1010	12/31/87	1010	12/31/87	1700	6.83	0.00	6.83	Y				1F007	Y				N	N	PACKING ADJUSTMENT ON 1F007 VALVE.
*** Total ***											223.44	531.17	754.61												

HPCI

BEGIN DATE: 01/01/88 END DATE: 06/07/88

UNIT	SYS PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
152	1	3.3.3.3.5.1	01/08/88	1030	01/08/88	1030	01/08/88	1100	0.50	0.00	0.50			Y		1N024B/D				!	N	N	HPCI HIGH LEVEL TRIP DISABLED FOR SI.
152	1	3.3.2	01/20/88	1030	01/20/88	1030	01/20/88	1305	2.58	0.00	2.58		Y			N/A				Y	N	N	HPCI TEMP CHANNEL O/S FOR MAINTENANCE.
152	1	3.3.3.3.5.1	02/07/88	0835	02/07/88	0835	02/07/88	1000	1.42	0.00	1.42			Y		1N024B/D				!	N	N	HPCI HIGH LEVEL TRIP OUT OF SERVICE FOR SI.
152	1	3.3.3.3.5.1	02/07/88	1100	02/07/88	1100	02/07/88	1247	1.78	0.00	1.78			Y		1N024B/D				!	N	N	HPCI HIGH LEVEL TRIP OUT OF SERVICE FOR SI.
152	1	3.5.1.C	02/19/88	0510	02/19/88	0510	02/19/88	1500	9.83	0.00	9.83	Y				1P204	Y				N	N	HPCI INOP FOR MAINTENANCE PM'S - CALIBRATION CHECK ON PUMP TRIPS (INSPECTED TRIPS ONE AT A TIME).
152	1	3.6.3	02/19/88	0940	02/19/88	0940	02/19/88	1245	3.08	0.00	3.08	Y				1F003	Y				N	N	PACKING ADJUSTMENT ON HPCI 1F003 VALVE - NO BLOCKING USED.
152	1	3.6.3	03/23/88	1460	03/23/88	1460	03/30/88	0630	159.50	0.00	159.50				Y	1F100				Y	N	N	HPCI WARMUP VALVE (1F100) HAD DUEL INDICATION.
152	1	3.3.9	03/28/88	1250	03/28/88	1250	03/28/88	1330	0.67	0.00	0.67			Y		1N024B/D				!	N	N	54" TRIP DISABLED FOR SURVEILLANCE.
152	1	3.3.3,3.5.1	04/06/88	1410	04/06/88	1410	04/06/88	1445	0.58	0.00	0.58			Y		1N024B/D				!	N	N	HIGH LEVEL TRIP FOR HPCI O/S ONE AT A TIME FOR I&C SURVEILLANCE.
152	1		05/03/88	0830	05/03/88	0830	05/03/88	1015	1.75	0.00	1.75			Y		1N024B/D				!	N	N	HPCI RX HIGH WATER LEVEL TRIP INOP FOR I&C SURV. - INOPS HPCI.
152	1	3.5.1	05/09/88	0110	05/09/88	0110	05/09/88	0210	1.00	0.00	1.00			Y		N/A	Y				Y	N	HPCI O/S FOR VALVE STROKE TIMING.
152	1	3.3.2	05/12/88	0850	05/12/88	0850	05/12/88	1600	7.17	0.00	7.17			Y		1N012D				Y	N	N	HPCI EXHAUST DIAPHRAGM PRESS SWITCH PSH-E41-N012D FAILED SURVEILLANCE ACCEPTANCE CRITERIA.
152	1	3.5.1.C	05/20/88	0125	05/20/88	0125	05/26/88	0200	0.58	0.00	0.58		Y			1R203	Y				Y	Y	HPCI INVERTER POWER FAILURE - INVERTER OUT OF SERVICE.
152	1		06/01/88	1121	06/01/88	1121	06/01/88	1155	0.57	0.00	0.57			Y		1N024B/D				!	N	N	HPCI SYSTEM LEVEL 8 ACTUATION INST. O/S WHILE PERFORMING SI.
*** Total.***									191.01	0.00	191.01												

APPENDIX III

AUTOMATIC DEPRESSURIZATION SYSTEM

AUTOMATIC DEPRESSURIZATION SYSTEM

SYSTEM DESCRIPTION

Function

The primary function of the Automatic Depressurization System (ADS) is to depressurize the reactor during events which reduce reactor water inventory and insufficient makeup is being provided by high pressure makeup systems. The ADS rapidly decreases reactor pressure below the shutoff head of low pressure makeup systems, and below the setpoint of the low pressure injection valve permissive signal.

Design and Operation

The ADS accomplishes reactor depressurization by using 6 of the 16 Safety Relief Valves (SRVs) in the nuclear steam pressure relief system. All 16 SRVs act to protect the reactor vessel and connected piping from overpressurization by automatic and self-actuated operations which discharge reactor steam to the suppression pool. The six ADS valves have additional control circuits to perform the ADS function.

Functional Modes of the Nuclear Steam Pressure Relief System

The nuclear steam pressure relief system is designed to operate in three functional modes: the overpressure safety valve mode, the overpressure relief mode, and the depressurization (ADS) mode. These are briefly described below.

In the overpressure safety valve mode, the SRVs are self-actuated. A coil spring normally holds the valve shut against normal operating pressure (refer to Figure 5). As reactor pressure increases above the spring setpoint, it causes the valve seat to lift, compressing the spring and opening the valve. The spring setpoints are staggered to give a range of relief capacity and to distribute blowdown to the suppression pool. The SRVs reclose when the reactor pressure is reduced below that necessary to overcome the spring closing force.

Individual SRVs can be manually opened from the control room by operation of the solenoid valve. In the overpressure relief mode, a reactor pressure increase is detected by sensors. When the pressure exceeds the sensor setpoint, a signal is generated which operates a pilot solenoid valve. This solenoid valve allows gas from the Containment Instrument Gas (CIG) system to open the SRV via a pneumatic cylinder which overcomes the spring closing force (a minimum of 65 psid is required). If the Containment Instrument Gas system is unavailable, gas is supplied from an accumulator (which is sufficient for one operation against normal drywell pressure). The SRV recloses when the open signal is removed, which causes the solenoid valve to vent air from the pneumatic cylinder (to containment) and allows the spring to force the valve seat shut.

In the depressurization (ADS) mode, an initiation signal is generated during conditions of decreased reactor water inventory which is indicative of insufficient makeup from high pressure systems. These signals operate pilot solenoid valves which open the six ADS (SRVs) valves as described in the overpressure relief mode. However, these solenoid valves are separate from those performing the overpressure relief mode. In addition, there are two

solenoids per ADS (SRV) valve, one from Division 1 logic and one from Division 2 logic. The valve can be opened by either solenoid valve. The ADS solenoids connect the pneumatic cylinder to an additional accumulator to assure ADS operation even when Containment Instrument Gas is unavailable.

ADS Initiation

The initiation of ADS can occur in either of the following ways.

1. Both a high drywell pressure and a low reactor water level (level 1) are required as initiating conditions. However, ADS will actuate only if the following permissive conditions exist: low reactor water level (level 3) conformity signal and adequate discharge pressure from a Residual Heal Removal (RHR) pump or Core Spray (CS) loop (two pumps). The signals produced by these conditions start an actuation timer. After the timer runs out, an ADS initiation signal is generated. If all the initiating and permissive conditions exist when the timer runs out, ADS will be initiated. ADS can be manually initiated only if the permissive conditions exist (the lack of an initiating condition does not preclude manual initiation).

2. A low reactor water level (level 1) starts a drywell pressure signal bypass timer. When this timer runs out, the need for a high drywell pressure signal is bypassed. If the level 1 condition still exists, the actuation timer is started. After the actuation timer runs out, an ADS initiation signal is generated if all permissive conditions are satisfied (as in item 1 above).

Many provisions exist to prevent inadvertent ADS initiation. If any of the initiating or permissive conditions do not exist when the actuation timer runs out, ADS will not be initiated and the timers (bypass and actuation) will reset. The timers permit the operator to determine if ADS should occur. Clear indication is provided in the control room so that the operator can make a determination. A manual inhibit switch and a manual actuation timer reset are available to prevent or recycle initiation.

System Interfaces

Instrumentation

The initiating signal for the automatic depressurization system depends on the output of instruments that are also used to initiate other systems. These instruments sense:

1. Low reactor water (level 1).
2. Low reactor water (level 3)
3. High drywell pressure.

A permissive signal is required for the automatic initiation of the ADS valves. This signal is derived from sensors which monitor the discharge pressure of the RHR pumps and Core Spray pumps. In order to satisfy the permissive requirement, the following conditions must be fulfilled for ADS Division 1 logic: either RHR pump A is running or RHR pump C is running or Core Spray pumps A and C are running. The same conditions must be met for ADS Division 2 logic, except that RHR pumps B and D or Core Spray pumps B and D would be involved. This permissive is also required for manual initiation.

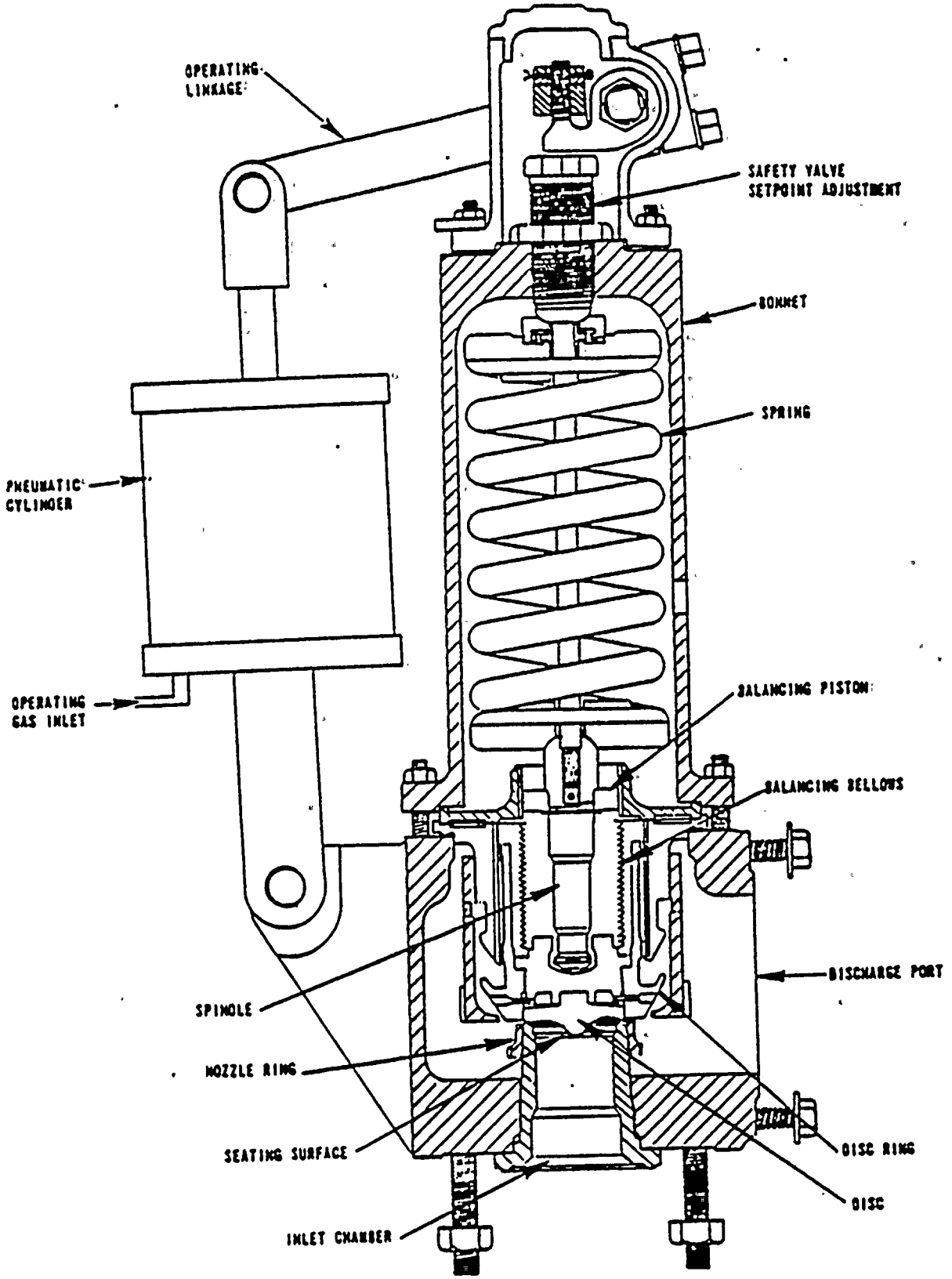
Even if these permissives do not exist, depresssurization can still be accomplished by manually openeing SRVs in the relief mode.

Electric Power

The automatic depressurization system requires 125 V DC power to operate the initiation logic and the SRVs. This power is supplied from the ESS buses through chargers, or, in the event of AC power failure, from two 125 V DC batteries. The power comes from 125 V DC distribution panel 1D614 for logic channels A and C and from 125 V DC distribution panel 1D624 for logic channels B and D as well as. The 10 remaining SRVs receive power from distribution panel 1D614.

Containment Instrument Gas

Containment Instrument Gas (CIG) is required for ADS operation. Two separate and independent headers are provided which are pressurized to 150 psig by the CIG compressors or bottled gas (if the compressors are unavailable). An alarm is provided in the control room on low header pressure. Each header serves three ADS valves to prevent the loss of all ADS valves due to the unavailability of a header (through blockage or leakage). Each ADS valve is also provided with an accumulator which can provide adequate gas pressure for one actuation in the event of CIG unavailability. A check valve assures each accumulator is not discharged due to a break or leak in the header (shown on Figure 6).

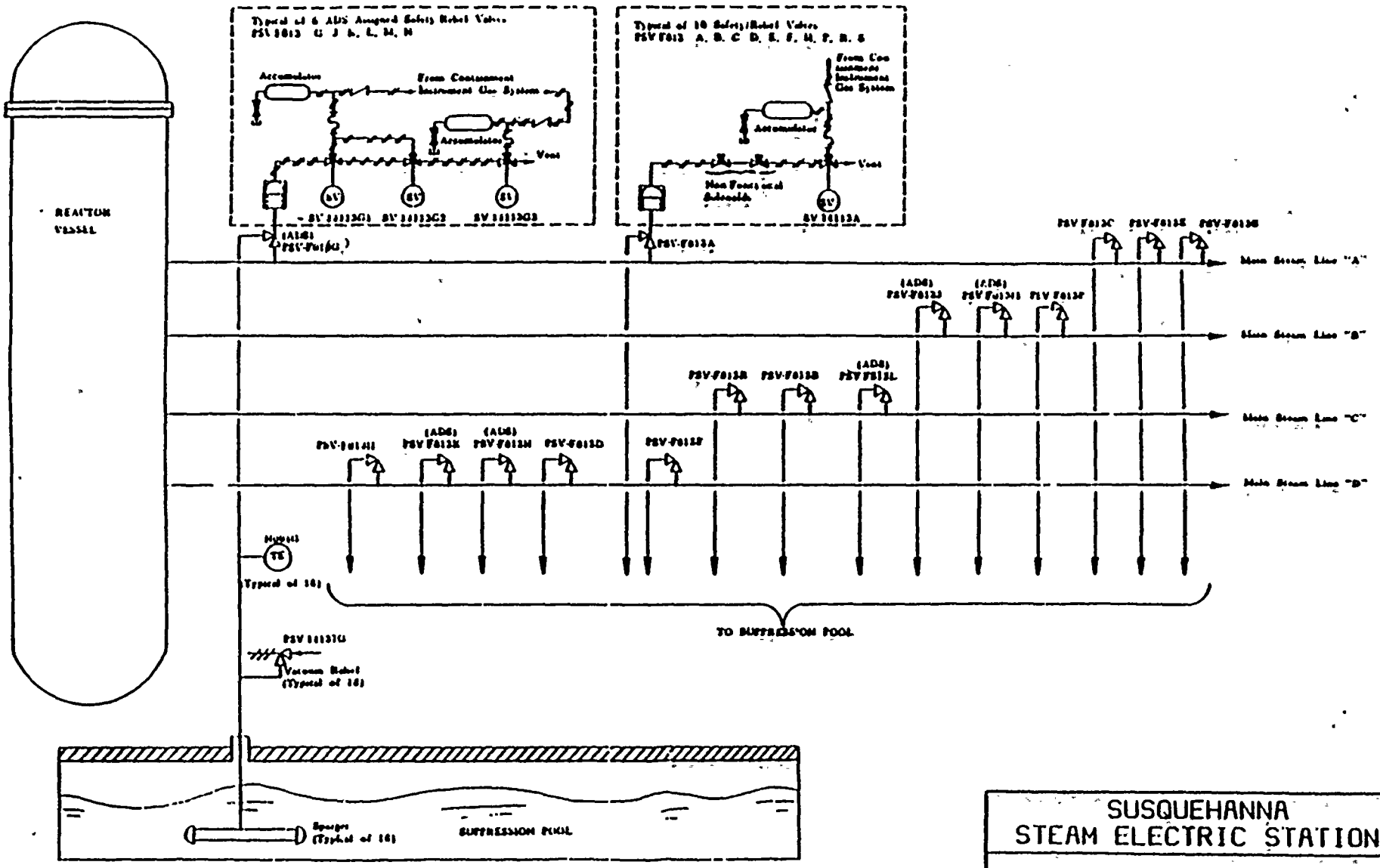


SUSQUEHANNA
STEAM ELECTRIC STATION

SAFETY RELIEF VALVE

FIGURE 5

REV. 01



SUSQUEHANNA STEAM ELECTRIC STATION

SIMPLIFIED DIAGRAM OF THE STEAM PRESSURE RELIEF SYSTEM

FIGURE 6 REV. 01

********************************* ADS *********************************
BEGIN DATE: 06/08/83 END DATE: 12/31/83

Page No. 1
09/20/88

UNIT	SYS	FLNI	CDND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MDD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
183		2		3.4.2.C	12/04/83	0215	12/04/83	0215	12/04/83	1855	0.00	16.67	16.67	Y				N/A				Y	N	N	B & A ACOUSTICAL MON INOPERABLE FOR B SRV.
*** Total ***											0.00	16.67	16.67												

BEGIN DATE: 01/01/84 END DATE:12/31/84

UNIT	SCRAM	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	F M	C T M E O S D I	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L I D	F A I L	DESCRIPTION OF EVENT
183	2	3.5.1.D	02/25/84	1437	02/25/84	1437	02/25/84	1614	1.62	0.00	1.62		Y	N/A					N	N	ADS INOP FOR PERFORMANCE OF TP-125-006.
183	2	3.5.1.D	02/25/84	1835	02/25/84	1835	02/25/84	2355	0.25	5.08	5.33		Y	N/A		Y			N	N	ADS INOP FOR TP-125-006.
183	2	3.5.1.D	02/25/84	2350	02/25/84	2355	02/26/84	2360	0.00	23.08	23.08	Y		1F013M				Y	N	Y	"M" ADS VALVE INOP. FAILED TO CLOSE DURING TESTING.
183	2	3.5.1.D	02/26/84	0150	02/26/84	0150	02/26/84	0530	0.00	3.67	3.67		Y	N/A		Y			N	N	ADS INOP FOR TP-125-006.
183	2	3.5.1	02/27/84	1722	02/27/84	1722	02/28/84	0338	5.42	4.85	10.27	Y		1F013M				Y	N	N	"M" SRV SOLENOID BLOCK REPLACEMENT.
183	1	3.5.1.D.2	02/28/84	0924	02/28/84	0924	02/28/84	1018	0.87	0.00	0.87		Y	N/A		Y			N	N	ADS AIR SUPPLY ISOLATED FOR SO-183-002.
183	1	3.3.3/3.5.1	08/28/84	0810	08/28/84	0810	08/28/84	1025	2.25	0.00	2.25		Y	N/A			8		Y	N	ADS INOP FOR I&C SURVEILLANCE.
183	1	3.3.3/3.5.1	08/30/84	0927	08/30/84	0927	08/30/84	0943	0.27	0.00	0.27		Y	N/A			8		N	N	ADS INOP DUE TO PERFORMANCE OF SI-183-201.
183	1	3.3.3/3.5.1	08/30/84	1311	08/30/84	1311	08/30/84	1540	2.48	0.00	2.48		Y	N/A			8		Y	N	ADS INOP DUE TO PERFORMANCE OF SI-160-203.
183	1	3.3.7.5 ?	09/07/84	0750	09/07/84	0750	09/07/84	0758	0.13	0.00	0.13		Y	N/A		Y			N	N	ADS ACCOUSTIC MONITORS O/S FOR I&C SURVEILLANCE.
183	1	3.5.1	09/07/84	1255	09/07/84	1255	09/07/84	1312	0.28	0.00	0.28		Y	N/A			8		N	N	ADS O/S FOR I&C SURVEILLANCE.
183	1	3.3.3/3.5.1	09/19/84	0019	09/19/84	0015	09/19/84	0125	1.10	0.00	1.10		Y	1N016A-D			8		N	N	I&C PERFORMING SURV ON RHR FP PERMISSIVE FOR ADS - THIS INOP'S ADS.
183	1	3.3.3/3.5.1	09/28/84	0136	09/28/84	0136	09/28/84	0236	1.00	0.00	1.00		Y	1N009A/B			8		N	N	ADS SYSTEM INOP FOR I&C SURV ON CS FP DISCH PRESS CHANNELS.
183	1	3.3.3/3.5.1	09/28/84	0300	09/28/84	0300	09/28/84	0339	0.65	0.00	0.65		Y	1N010A-D			8		Y	N	ADS SYSTEM INOP FOR I&C SURV ON DRYWELL PRESS CHANNELS.
183	1	3.3.3	10/08/84	1250	10/08/84	1250	10/08/84	1326	0.60	0.00	0.60		Y	N/A		Y			N	N	ADS TIMER O/S. INOPS ADS SYS WHILE PERFORMING SURVEILLANCE.
183	1	3.3.3/3.5.1	10/18/84	0356	10/18/84	0356	10/18/84	0455	0.98	0.00	0.98		Y	N/A			8		N	N	ADS INOP DURING PERFORMANCE OF SI-149-303 ON RHR FP DISCH PRESS CHANNEL.
183	2	3.5.1/3.3.3	10/19/84	0805	10/19/84	0805	10/19/84	1100	0.00	2.92	2.92		Y	N/A			8		N	N	ADS SYSTEM INOPERABLE DURING PERFORMANCE OF SI-149-302.
183	1	3.5.1	10/24/84	0515	10/24/84	0515	10/24/84	0915	4.00	0.00	4.00		Y	N/A		1			N	N	ADS O/S TO PERFORM I&C SURVEILLANCE SI-183-308 DIVISION I 24 HRS.
183	1	3.5.1	10/24/84	0920	10/24/84	0920	10/24/84	1135	2.25	0.00	2.25		Y	N/A		2			N	N	ADS O/S TO PERFORM I&C SURVEILLANCE SI-183-308, DIV II SWITCH.
183	1	3.5.1	10/26/84	0004	10/26/84	0004	10/26/84	0100	0.93	0.00	0.93		Y	N/A			8		N	N	ADS SYSTEM INOPERABLE DURING SI-183-301.
183	1	3.3.3/3.5.1	10/26/84	1000	10/26/84	1000	10/26/84	1145	1.75	0.00	1.75		Y	1N010A-D			8		Y	N	HIGH DRYWELL PRESS CHANNELS TO ADS SYSTEM OOS FOR PERFORMANCE OF SI-183-321.
183	1	3.3.3/3.5.1	11/08/84	0940	11/08/84	0940	11/08/84	1034	0.90	0.00	0.90		Y	N/A			8		Y	N	"A" & "B" ADS SYS INOP FOR PERFORMANCE OF SI-153-322.
183	1	3.5.1	11/16/84	1250	11/16/84	1250	11/16/84	1410	1.33	0.00	1.33		Y	N/A			8		N	N	ADS SYSTEM O/S FOR SI-149-202 AND SI-149-203.
183	1	3.5.1	11/21/84	1100	11/21/84	1100	11/21/84	1150	0.83	0.00	0.83		Y	N/A			8		Y	N	ADS SYSTEM INOP WHILE PERFORMING SI-83-205 RX VESSEL LOW-LOW LEVEL.
183	1	3.5.1	11/26/84	0845	11/26/84	0845	11/26/84	0907	0.37	0.00	0.37		Y	N/A			8		Y	N	ADS O/S TO PERFORM SI-163-221.
183	1	3.3.3/3.5.1	12/09/84	1000	12/09/84	1000	12/09/84	1010	0.17	0.00	0.17		Y	N/A			8		N	N	ADS TIMERS INOP FOR I&C SURVEILLANCE.
183	1	3.5.1	12/15/84	1311	12/15/84	1311	12/15/84	1524	2.22	0.00	2.22		Y	N/A			8		N	N	ADS INOP FOR PERFORMANCE OF SO-149-202 AND SI-140-203.
183	1	3.5.1	12/21/84	0815	12/21/84	0815	12/31/84	0859	123.65	116.93	240.58		Y	N/A			8		N	N	ADS O/S FOR I&C SURVEILLANCE SI-183-201.
*** Total ***									156.30	156.53	312.83										

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05/20/88

|||||||||||||||||||||||||||||| F65 ||||||||||||||||||||||||||||

BEGIN DATE: 01/01/85 END DATE: 06/07/85

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	TEST	MOD	COMPONENT ID	SYS	G I V N	C H A N	C O M F	V A L D	F A I L	DESCRIPTION OF EVENT
183		1		3.5.1	01/08/85	0920	01/08/85	0920	01/08/85	0947	0.45	0.00	0.45			Y		N/A	Y				N	N	ADS TIMER SURV BY I&C INOP COMPLETE ADS SYS.
183		1		3.3.7.5	01/10/85	0502	01/10/85	0502	01/11/85	1106	29.97	0.00	29.97		Y			N/A				Y	N	N	SRV 'K' ACOUSTIC MONITOR INOP - SPIKING.
183		1		3.5.1	01/15/85	0805	01/15/85	0805	01/15/85	1120	3.25	0.00	3.25			Y		N/A			I		N	N	ADS SYSTEM INOPERABLE DURING SI-149-303 AND 302.
183		1		3.3.3	01/18/85	1455	01/18/85	1455	01/18/85	1545	0.83	0.00	0.83			Y		N/A			I		Y	N	SI-183-208 RX WATER LOW LEVEL 3 INOPS ADS.
183		1		3.3.3	01/26/85	0900	01/26/85	0900	01/26/85	1030	1.50	0.00	1.50			Y		N/A			I		N	N	ADS INOP DURING SI ON C.S. DISCH PRESS PERMISSIVE.
183		1		3.5.1	01/27/85	1330	01/27/85	1330	01/27/85	1515	1.75	0.00	1.75			Y		N/A			I		Y	N	ADS INOP FOR PERFORMANCE OF SI-183-321.
183		1		3.5.1.0	02/08/85	1008	02/08/85	1008	02/08/85	1100	0.87	0.00	0.87			Y		N/A	Y				N	N	ADS INOP DURING TIMER CHECKS.
183		1		3.5.1	11/24/85	2195	11/24/85	2195	11/25/85	0330	4.92	0.00	4.92			Y		N/A	Y				N	N	BOTH DIVISIONS OF BOTTLED AIR VALVED OUT (A DIVISION AND B DIVISION) FOR IE-1.5-002.
*** Total ***											43.54	0.00	43.54												

BEGIN DATE: 01/01/86 END DATE:12/31/86

UNIT	LOG	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	F N	C N	T E S	M O D	COMPONENT ID	S Y S	D I V	C K T	C A N	V A L	F A I L	DESCRIPTION OF EVENT
163	1		04/24/86	0830	04/24/86	0830	04/24/86	1100	2.50	0.00	2.50	Y				1F013				Y	N	N	VALVE B-21-F013 - POSITION INDICATION INOPERABLE. SRV VALVE NOT ASSIGNED TO A CHANNEL.
163	1		08/08/86	1050	08/08/86	1050	08/08/86	1140	0.83	0.00	0.83	Y				BK114D		D			N	N	REPLACE DRYWELL PRESSURE BYPASS TIMER B21C-K114D - CHANNEL D.
*** Total ***									3.33	0.00	3.33												

********** ABS **********
BEGIN DATE: 01/01/87 END DATE:12/31/87

UNIT	PLANT	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	F M	C N	T E S I	M O D	COMPONENT ID	S Y S T	D I V N	C H A P	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
*** Total ***									0.00	0.00	0.00												

BEGIN DATE: 01/01/88 ... END DATE: 06/07/88

UNIT	S r S	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	SPIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	F H	C H	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALV	FAIL	DESCRIPTION OF EVENT
183		1		3.3.3.3.5.1	04/14/88	0910	04/14/88	0910	04/14/88	1200	2.83	0.00	2.83			Y		1N042A				Y	Y	N	ADS INOP DUE TO FAILURE OF 1N042A TO MEET ACCEPTANCE CRITERIA WHILE PERFORMING TEC SURV.
*** Total ***											2.83	0.00	2.83												

APPENDIX IV

CORE SPRAY SYSTEM

CORE SPRAY SYSTEM

SYSTEM DESCRIPTION

Function

The function of the reactor Core Spray (CS) system is to provide makeup water and spray cooling for the core during events which reduce reactor water inventory following reactor depressurization. The CS system is part of the low pressure Emergency Core Cooling Systems (ECCS) and is an alternative to the Residual Heat Removal (RHR) system (LPCI mode).

Design and Operation:

The CS system consists of two redundant loops, A and B. Successful system operation is dependent on the sequence of events. During some events, analysis has shown that one pump injection is sufficient to adequately cool the core, while in others, two pumps are required for success. Each loop takes suction from the suppression pool and pumps the water into a separate spray sparger above the core in the reactor vessel. An alternative suction source, through two normally locked-closed manual valves, is the Condensate Storage Tank (CST). Since the two loops are independent and are redundant, only loop A is described here and shown in the simplified diagram of Figure 7.

Each loop contains two centrifugal pumps, each of which can deliver flow needed for successful system operation and adequate spray distribution. Each pump has a capacity of 3175 gpm at a reactor pressure of 105 psig. The system is designed to take suction from a source that is less than 212°F. Events which raise the suppression pool temperature above 212°F may require a manual suction transfer to the CST. The pumps are located below the level of the suppression pool and the CST to ensure a positive suction head from either source.

The two pumps of CS loop A (pumps A and C) are aligned to take suction from the suppression pool through a normally open motor-operated valve (MOV), F001A. Each pump discharges through a separate check valve to a common header. A minimum-flow bypass line connects the discharge of each pump to the suppression pool through a common valve, F031A. This valve is normally open, and closes when the flow through the discharge header exceeds the flow setpoint. The function of the bypass line is to prevent pump damage from overheating when the discharge line valves are closed or the reactor pressure exceeds the CS discharge pressure after system initiation. A full flow test line that bypasses the reactor is provided for system full flow tests. It returns the flow to the suppression pool through a normally closed valve, F015A.

Loop A discharges to the spray spargers through a normally open valve F004A, normally closed valve F005A, testable check valve F006A, and locked-open manual valve F007A. A bypass around F006A is provided through valve F037A to equalize the pressure across the check valve disk and minimize the required opening force when testing the testable check valve F006A.

The CS system is automatically actuated by low reactor water level (level 1), or high drywell pressure and low reactor pressure. The actuation signal will start the pumps. The system will inject when an additional low reactor pressure permissive signal is also present which allows valve F005A to be

opened. The system can be manually actuated, but injection will occur only if the low reactor pressure permissive is satisfied.

When the system is operating, the operator controls the flow rate to the reactor by throttling valve F005A or stopping and starting the pumps as necessary. There is no automatic flow control of the system.

The operator has the following indications available in the control room:

1. Discharge pressure of loops A and B.
2. System flow (each loop).
3. Position indication for all motor-operated valves.
4. Pump motor currents.

System Interfaces

Instrumentation

The low reactor pressure permissive signal common to both the Core Spray and Residual Heat Removal (LPCI mode) systems, does not allow these systems to inject into the reactor until reactor pressure is below 436 psig. For the Core Spray system, this signal must exist along with a pump initiation signal before a signal to open injection valve F005 is generated. Also, the Core Spray pump discharge pressure signal is one of the permissives needed for the initiation of the Automatic Depressurization System (ADS).

Electric Power

The CS system requires 4.16 kV AC power to operate the pumps and 480 V AC power for the motor-operated valves. Also, 125 V DC power is used for the control logic of both pumps and valves. The AC power is supplied from the ESS buses, which are energized either by offsite power or, in the event of its failure, the diesel generators. The DC power is supplied from the ESS bus via a charger or, in the event of AC power failure, from four 125 V batteries.

Room/Pump Cooling

The CS system pump rooms are normally cooled by reactor building Zone I HVAC. This system is isolated by a low reactor water level (level 1) or high drywell pressure. These same signals will initiate the Emergency Service Water (ESW) system, which will automatically supply cooling water to the CS room coolers. The HVAC system will also be unavailable in the event of a loss of offsite power. However, the ESW system is initiated automatically by the diesel start logic. The pumps for a loop of Core Spray are located in the same room. The fans of the cooling units are interlocked to start when the pump breakers close.

The CS pumps do not rely on support systems for other cooling requirements. The pump seal cooling and lubricating water is supplied by the pump discharge flow.

Water Sources

The suppression pool (the normally aligned suction source) and the Condensate Storage Tank (the alternate suction source) are shared with other systems. The inventory of the suppression pool is assumed to be adequate for long term operation of all low pressure makeup systems.

The condensate storage facility consists of two 300,000 gallon tanks, one for each reactor unit, and a single (shared) 680,000 gallon refueling water storage tank. There are numerous interconnections between the tanks, and condensate transfers can be accomplished by means of the refueling water pumps and condensate transfer pumps.

Each CST is designed to maintain a minimum reserve of 135,000 gallons specifically for the use of the HPCI and RCIC systems in the particular unit. CST level is normally maintained between 165,000 gallons (the low level alarm setpoint) and 270,000 gallons (the high level alarm setpoint).

Condensate Transfer System

The system pipes are normally pressurized by means of the condensate transfer system to prevent waterhammer on initiation. This system was not modeled, but the rate of pipe failure (rupture) that was used in the fault tree implicitly includes the effect of failure in the condensate transfer system.

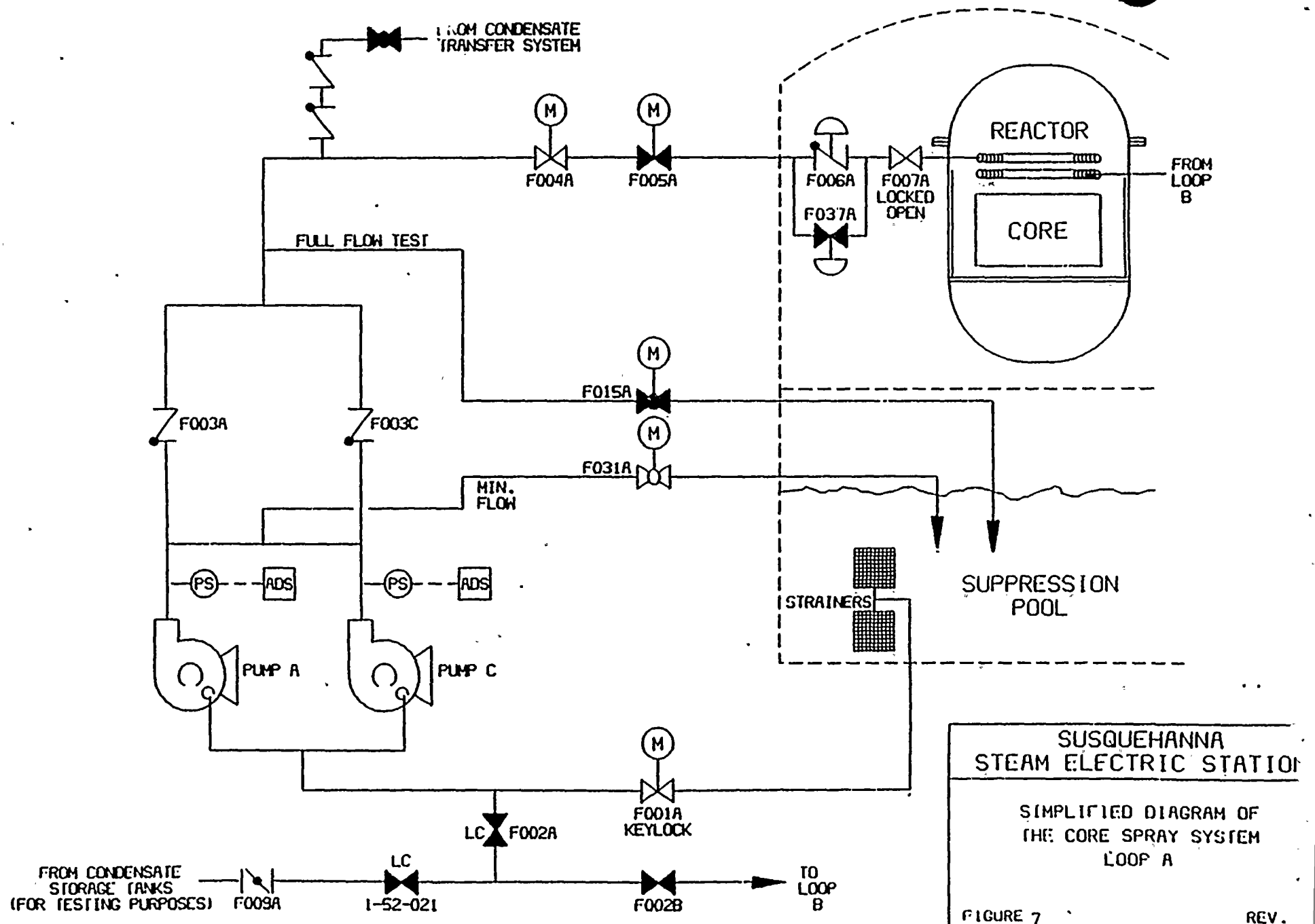
Table 12. AC power supplies for Core Spray

ESF 4.16 kV bus	480 V MCC	Component supplied
1A201	-	CS pump A
	1B216	F031A[a]
		CSS room cooler fan A
	1B217	F004A
		F005A[a]
1A202	-	CS pump B
	1B226	F031B[a]
		F001B
		CS room cooler fan B
	1B227	F004B
		F005B[a]
1A203	-	CS pump C
	1B237	F015A
		CS room cooler fan C
1A204	-	CS pump D
	1B247	F015B
		CS room cooler fan D

[a]Valves that change position for the automatic initiation of CS.

Table 13. DC power supplies for Core Spray

Battery	125 V DC load center	Component supplied
1D610	1D614	CS pump A switchgear Division 1 logic
1D620	1D624	CS pump B switchgear Division 2 logic
1D630	1D634	CS pump C switchgear
1D640	1D644	CS pump D switchgear



SUSQUEHANNA STEAM ELECTRIC STATION

SIMPLIFIED DIAGRAM OF THE CORE SPRAY SYSTEM LOOP A

FIGURE 7 REV.

IV-5

################################ CS ################################

BEGIN DATE: 08/08/83 END DATE: 12/31/83

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
151		1		3.5.1	08/08/83	0840	08/08/83	0840	08/08/83	1300	4.33	0.00	4.33			Y		1N006B				Y	N	N	'A' CS LOOP INOPERABLE FOR CALIB. OF FIS-E21-1N006B.
151		1		3.6.3	12/03/83	1442	12/03/83	1442	12/03/83	1506	0.00	0.40	0.40			Y		1F037B				Y	N	N	CS F037B INTERLOCKS DEFEATED & VLV OPEN FOR SO-00-019.
151		1		3.6.3	12/03/83	1510	12/03/83	1510	12/03/83	1542	0.00	0.53	0.53			Y		1F037A				Y	N	N	CS F037A INTERLOCK DEFEATED & VLV OPEN FOR SO-00-019.
### Total ###											4.33	0.93	5.26												

U N I T	S Y S	P L N T	C O N D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S / S	O I V	C H A N	C O M P	V A L I D	F A I L	DESCRIPTION OF EVENT
151		3		3.5.2	01/23/84	0825	01/23/84	0825	01/23/84	1200	0.00	3.58	3.58			Y		1F005A/B	Y				N	N	ECCS RHR AND CORE SPRAY INOP INJECTION VALVES CLOSED & DEENERGIZED FOR F-200.
151		3		3.5.2	01/26/84	1640	01/26/84	1640	02/01/84	0200	0.00	129.33	129.33		Y			N/A	Y				N	N	ONLY ONE ECCS SUBSYSTEM (RHR LOOP) AVAILABLE WHEN S/D & WITH JUST POOL GATES INSTALLED.
151		1		3.5.1	04/24/84	0616	04/24/84	0616	04/24/84	1200	5.73	0.00	5.73		Y			1U211A				Y	N	N	'A' CORE SP ROOM COOLER INOP.
151		1		3.5.1.A	10/07/84	0230	10/07/84	0230	10/07/84	1215	9.75	0.00	9.75		Y			N/A				Y	N	N	CORE SPRAY LOOP 'A' LEAK DETECTION INSTRUMENTATION QUESTIONABLE AFTER CHANGE IN D/P READINGS.
151		1		3.5.1.A	10/09/84	0805	10/09/84	0805	10/09/84	1220	4.25	0.00	4.25	Y				1P206A		1			N	N	'A' LOOP CORE SPRAY INOP FOR PM.
151		1		3.5.1.E	10/26/84	0115	10/26/84	0115	10/26/84	0245	1.50	0.00	1.50			Y		N/A			1		N	N	CORE SPRAY HEADER DELTA-P INSTRUMENT CHANNEL INOP FOR SI-162-201.
151		1		3.5.1.A.1	10/26/84	1400	10/26/84	1400	10/26/84	1755	3.92	0.00	3.92			Y		1P206B/D		2			N	N	CORE SPRAY PUMPS 'B' AND 'D' DECLARED INOP DUE TO FAILING ISI FOR PUMP DELTA-P DURING PERFORMANCE OF SO-151-002.
*** Total ***											25.15	132.91	158.06												

CS BEGIN DATE: 01/01/85 END DATE: 05/07/85

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UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
151		1		3.5.1.E	07/13/85	1100	07/13/85	1100	07/13/85	1120	0.33	0.00	0.33			Y		N/A			1		N	N	CORE SPRAY SPARGER BREAK DETECTION CHANNELS A AND B INOP FOR SI-1&2-201.
151		1		3.5.1	07/17/85	1030	07/17/85	1030	07/17/85	1500	4.50	0.00	4.50	Y				1F031A		1			N	N	'A' LOOP CORE SPRAY INOP DUE TO MIN FLOW VALVE FLOW SWITCH OOS FOR I&C.
151		1		3.5.1	07/18/85	0825	07/18/85	0825	07/18/85	1100	2.58	0.00	2.58	Y				1F031B		2			N	N	'B' LOOP CORE SPRAY INOP DUE TO MIN FLOW VALVE FLOW SWITCH OOS FOR I&C.
*** Total ***											7.41	0.00	7.41												

UNIT	SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
151		1		01/29/86	2000	01/29/86	2000	01/29/86	2145	1.75	0.00	1.75			Y		N/A			1		N	N	CSS VALVE EXERCISING.
151		1		05/02/86	1330	05/02/86	1330	05/02/86	1415	0.75	0.00	0.75			Y		1N007A/B			1		N	N	SURVEILLANCE OF HIGH/LOW PRESSURE INTERFACE VALVE LEAKAGE MONITORS.
151		1		06/30/86	0030	06/30/86	0030	06/30/86-	0100	0.50	0.00	0.50			Y		1N007A/B			1		N	N	SURVEILLANCE OF HIGH/LOW PRESSURE INTERFACE VALVE LEAKAGE MONITORS.
151		1		09/03/86	1450	09/03/86	1450	09/03/86	1845	3.92	0.00	3.92			Y		1N003A			A		N	N	CALIBRATION CHECK OF FIE21 1N003A SENSOR IN LOOP A.
151		1		09/05/86	1055	09/05/86	1055	09/05/86	1321	2.43	0.00	2.43			Y		1F031A			B		N	N	CALIBRATION CHECK OF B LOOP PI-N001B SENSOR - F031A AFFECTED.
151		1		11/16/86	1000	11/16/86	1000	11/16/86	1230	2.50	0.00	2.50			Y		N/A			1		N	N	CORE SPRAY SPARGER BREAK DETECTION INOP DURING SURVEILLANCE.
151		1		11/18/86	1250	11/18/86	1250	11/18/86	1315	0.42	0.00	0.42			Y		1N007A/B		1			N	N	PSH 1N007A & B SENSOR INOP DURING SURVEILLANCE. ONE DIVISION AT A TIME.
151		1		12/07/86	1540	12/07/86	1540	12/21/86	1715	249.63	87.95	337.58		Y			1F015A		1			N	N	1F015A FULL FLOW TEST VALVE LEAKING.
*** Total ***										261.90	87.95	349.85												

UNIT	SYS	PLNT	CONG	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	FN	CM*	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALB	FAIL	DESCRIPTION OF EVENT
1	51	1		3.5.1	01/29/87	0945	01/29/87	0945	01/29/87	1400	4.25	0.00	4.25			Y		N/A			1		N	N	CORE SPRAY DELTA PRESS. BREAK DETECTOR CHANNELS SEQUENTIALLY OOS FOR SURV.
1	51	1		3.5.1	02/24/87	0700	02/24/87	0700	02/25/87	0045	17.75	0.00	17.75		Y			1F005B		2			Y	Y	'B' LOOP OF CORE SPRAY OOS FOR REPAIR OF INJECTION VALVE F005B.
1	51	1		3.5.1	03/30/87	0850	03/30/87	0850	03/30/87	0921	0.52	0.00	0.52			Y		N/A.			1		N	N	CORE SPRAY SPRAYER BREAK DETECTOR INOP DURING SI.
1	51	1		3.5.1	04/28/87	0830	04/28/87	0830	04/28/87	0845	0.25	0.00	0.25			Y		N/A			1		N	N	CORE SPRAY LEAK DETECTION SI.
1	51	1		3.4.3.2	05/11/87	0915	05/11/87	0915	05/11/87	1000	0.75	0.00	0.75			Y		1N007A/B		1			N	N	CORE SPRAY PSH-1N007A,B OOS ONE AT A TIME FOR SI.
1	51	1		3.5.1	05/29/87	0805	05/29/87	0805	05/29/87	0905	1.00	0.00	1.00			Y		N/A			1		N	N	CORE SPRAY HEADER DELTA PRESS. INSTRUMENT OOS FOR SURV.
1	51	1		3.5.1	06/29/87	0830	06/29/87	0830	06/29/87	0900	0.50	0.00	0.50			Y		N/A			1		N	N	'A' CORE SPRAY PUMP OOS FOR ELECTRICAL MAINTENANCE AND INSPECTION.
1	51	1		3.5.1	06/29/87	0930	06/29/87	0930	06/29/87	1730	8.00	0.00	8.00	Y				N/A			A		Y	N	CORE SPRAY BREAK DETECTOR SYSTEM OOS FOR TROUBLE-SHOOTING.
1	51	3		3.4.3.2	07/11/87	1330	07/11/87	1330	07/11/87	1540	0.00	2.17	2.17		Y			N/A			1		N	N	CORE SPRAY LEAK DETECTOR PSH-E21-N007A,B OOS ONE AT A TIME FOR SI.
1	51	1		3.5.1	07/30/87	1015	07/30/87	1015	07/30/87	1040	0.42	0.00	0.42			Y		N/A			1		N	N	CORE SPRAY LEAK DETECTION SI.
1	51	1		3.5.1	08/12/87	0850	08/12/87	0850	08/12/87	0925	0.58	0.00	0.58			Y		1N007A/B			1		N	N	CORE SPRAY PSH-1N007A,B O/S ONE AT A TIME FOR SI.
1	51	1		3.5.1	08/26/87	0608	08/26/87	0608	08/26/87	1430	8.37	0.00	8.37	Y				1P206A/C		1			Y	N	CORE SPRAY PUMP 'A' AND 'C' OOS FOR MOTOR OIL PM'S.
1	51	1		3.5.1	08/27/87	0607	08/27/87	0607	08/27/87	1710	11.05	0.00	11.05	Y				1P206B/D		2			Y	N	CORE SPRAY PUMP 'B' AND 'D' OOS FOR MOTOR OIL PM'S.
1	51	1		3.5.1	09/08/87	0430	09/08/87	0430	09/08/87	1645	14.25	0.00	14.25		Y			1U211B		2			N	N	'B' LOOP CS OOS TO REPAIR ROOM COOLER LEAK.
1	51	1		3.5.1	09/08/87	1850	09/08/87	1850	09/08/87	2230	3.67	0.00	3.67		Y			1U211A		1			N	N	'A' LOOP CS OOS TO REPAIR ROOM COOLER LEAK.
1	51	1		3.5.1	09/11/87	1335	09/11/87	1335	09/11/87	1413	0.63	0.00	0.63			Y		N/A		1			N	N	LOOP OF CS OOS DUE TO SI-199-207 ON XV'S (EXCESS FLOW CHECK VALVES).
1	51	1		3.5.1	09/11/87	1414	09/11/87	1414	09/11/87	1430	0.27	0.00	0.27			Y		N/A		2			N	N	LOOP OF CS OOS DUE TO SI-199-207 ON XV'S (EXCESS FLOW CHECK VALVES).
1	51	5		3.4.7	09/29/87	1600	09/29/87	1600	10/07/87	1645	0.00	192.75	192.75		Y			N/A		2			N	N	CORE SPRAY LOOP B SNUBBERS REMOVED.
1	51	5		3.4.8	10/14/87	1400	10/14/87	1400	11/05/87	1710	0.00	531.17	531.17		Y			DCA-107-2		2			N	N	CORE SPRAY WELD DCA-107-2-FWS FAILD ISI.
1	51	1		3.5.1	12/04/87	0850	12/04/87	0850	12/04/87	0945	0.92	0.00	0.92		Y			N/A			1		N	N	CS SPRAYER LEAK DETECTION SI.
1	51	1		3.5.1	12/14/87	0640	12/14/87	0640	12/14/87	1700	10.33	0.00	10.33	Y				1U211A		1			N	N	CORE SPRAY ROOM COOLER FLEX HOSE REPLACED.
1	51	1		3.5.1	12/18/87	0405	12/18/87	0405	12/18/87	1745	13.67	0.00	13.67	Y				1U211B		2			N	N	CORE SPRAY ROOM COOLER FLEX HOSE REPLACED.
### Total ###											97.18	726.09	823.27												

BEGIN DATE: 01/01/88 END DATE: 06/07/88

U S N Y I S T	P C L O N N I D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P N	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C G H F	V A L I D	F A I L	DESCRIPTION OF EVENT
151	1	3.5.1	04/04/88	0845	04/04/88	0845	04/04/88	0916	0.52	0.00	0.52			Y		N/A		1			N	N	CORE SPRAY SPARGER BREAK DETECTION CHANNELS O/S ONE AT A TIME FOR ILC SURVEILLANCE.
151	1	3.5.1	05/05/88	1655	05/05/88	1655	05/05/88	1730	0.58	0.00	0.58			Y		N/A		2			N	N	DIV II CORE SPRAY LOOP INOP FOR AUTO INITIATION DURING U-2 LOCA/LOOP TEST.
151	1	3.5.1.A	05/06/88	0810	05/06/88	0810	05/06/88	1045	2.58	0.00	2.58			Y		N/A		1			N	N	CORE SPRAY BREAK DETECTION INDICATION O/S FOR SURVEILLANCE.
151	1	3.4.3.2	05/16/88	0815	05/16/88	0815	05/16/88	0855	0.67	0.00	0.67			Y		N/A		1			N	N	CORE SPRAY LEAK DETECTION INOP FOR SURVEILLANCE.
*** Total ***									4.35	0.00	4.35												

APPENDIX V

RESIDUAL HEAT REMOVAL (LPCI MODE) SYSTEM

RESIDUAL HEAT REMOVAL SYSTEM

The Residual Heat Removal (RHR) system can be used in seven modes:

1. Low Pressure Coolant Injection (LPCI) mode.
2. Suppression Pool Cooling Mode (SPCM).
3. Shutdown Cooling Mode (SDCM).
4. Steam Condensing mode.
5. Containment Spray mode.
6. Fuel Pool Cooling mode.
7. Reactor Head Spray mode.

In the Low Pressure Coolant Injection mode, the RHR system is used to provide makeup water during events which reduce the reactor water inventory and involve a reactor depressurization.

In the Suppression Pool Cooling Mode, the RHR system is used to transfer heat from the suppression pool to the spray pond (the ultimate heat sink) via the RHR heat exchangers. The RHR Service Water (RHRSW) system is used to remove heat from the RHR heat exchangers and transfers it from the RHR system to the spray pond.

In the Shutdown Cooling Mode, the RHRSW and RHR systems are used to transfer heat from the reactor coolant to the spray pond. This is accomplished by circulating reactor water through the RHR heat exchangers and by using RHR Service Water to cool the heat exchangers. This can be established when the reactor pressure is less than 98 PSIG.

In the Steam Condensing mode, the RHR system is used to condense steam from the reactor. The condensate is diverted to the suppression pool or pumped back to the reactor vessel by the Reactor Core Isolation Cooling (RCIC) pump. This mode is designed for reactor shutdown from high pressure when the power-conversion system is not available. This mode of RHR has been deleted as a result of system modifications.

In the Containment Spray mode, the RHR system is used to pump water from the suppression pool directly into the containment drywell and wetwell.

In the Fuel Pool Cooling mode, the RHR system is used to transfer heat from the fuel pool to the spray pond. The fuel pool cooling mode was not modeled because no initiating event considered in the PRA affects the fuel pool.

LOW PRESSURE COOLANT INJECTION (LPCI) MODE

DESCRIPTION

Function

The function of the LPCI mode is to provide makeup water during events which reduce the reactor water inventory and involve a reactor depressurization. The LPCI mode of the RHR system is part of the Emergency Core Cooling System (ECCS) and is an alternative to the Core Spray (CS) system.

Design and Operation

The RHR system consists of two redundant loops, A and B. Successful system operation requires full flow from one pump but both loops are initiated simultaneously. Figure 8 shows a simplified diagram of loop A. Each loop consists of two pumps (12,200 gpm/pump), each of which takes suction from the suppression pool and pumps the water into the reactor vessel through the recirculation loop discharge piping. Since loops A and B are redundant, only loop A will be described.

The two pumps in loop A, (pumps A and C), are aligned to take suction from the suppression pool through normally open motor-operated valves (MOVs) (F004A and F004C). Each pump discharges through its own check valve to a common header. A minimum-flow bypass line connects the combined discharge of both pumps to the suppression pool through MOV F007A. This valve is normally open and closes when the flow through the discharge header into the reactor or the suppression pool exceeds the high-flow setpoint. The function of the bypass line is to prevent pump damage from overheating when the discharge line valves are closed or the reactor pressure exceeds 430 PSIG. The common discharge passes through an RHR heat exchanger, via normally open MOVs F003A and F047A, and a normally open heat-exchanger bypass valve, MOV F048A. The majority of flow bypasses the heat exchanger. Loop A discharges into the recirculation loop on the discharge side of the recirculation pump via normally open MOV F017A, normally closed MOV F015A, testable check valve F050A, and locked-open manual valve F060A. For test purposes F050A is provided with a bypass, F122A. In order to avoid pumping water back through the recirculation pump, the recirculation loop discharge valve MOV F031A closes on an LPCI initiation signal to isolate the recirculation pump. Alternative discharge paths downstream of the heat exchanger (which are not part of the LPCI mode) to the containment spray, through MOVs F016A and F021A, and the head spray (loop A only), through MOVs F023 and F022, are normally isolated. Therefore, in the standby condition, there is only one closed MOV in the LPCI loop A discharge path (F015A). Full flow tests can be performed via a test line to the suppression pool via (normally closed) MOVs F028A and F024A.

The RHR pumps will automatically start on receiving any of the following initiation signals:

1. Low reactor water level (level 1).
2. High drywell pressure and low reactor pressure.
3. RHR manual initiation.

Injection valve MOV F015A(B) will open on receiving a level 1 or high drywell pressure signal and a low reactor pressure permissive signal. Manual initiation is also possible, but the low reactor pressure permissive is still required.

The recirculation loop discharge valves, MOV F031A(B), close on receiving a low reactor pressure signal (with a LPCI initiation signal present).

If the RHR system is in use at the time of LPCI initiation, it will automatically reconfigure to the LPCI mode.

The operator has the following major indications available in the control room:

1. System flow.
2. Position indication for all motor-operated valves.
3. Loop discharge pressures.

System Interfaces

Instrumentation

The low reactor pressure permissive signal common to both the Residual Heat Removal (LPCI mode) and Core Spray systems, does not allow these systems to inject into the reactor until reactor pressure is below 430 psig. For the LPCI mode, the signal must exist along with a pump initiation signal before a signal to open injection valve F015 is generated.

Electric Power

The RHR system requires: 4.16 kV AC power to operate the LPCI pumps, 480 V AC power for the motor-operated valves, and 125 V DC power for the control logic of pumps and valves. Normally, the 4.16 kV AC system receives offsite power through an Engineered Safeguards Systems (ESS) bus. Should the offsite-power supply to an ESS bus fails, a diesel generator will start up to reenergize the bus. The DC power is supplied from the ESS bus through a charger or, in the event of AC power failure, from 125 V batteries.

Room/Pump Cooling

Each loop of RHR (two pumps) is located in a room in the reactor building basement, with these rooms being normally cooled by reactor building Zone 1 HVAC. This system is isolated by a low reactor water level (level 1) or high drywell pressure signal. These same signals will automatically initiate the Emergency Service Water (ESW) system which will supply cooling water to the room coolers (there are two room coolers/loop of RHR) of RHR. It should be noted that the ESW system will also be initiated by the diesel generator start logic. Also, the fan of each room cooling unit in an RHR loop is interlocked to start when the pumps in that particular loop start.

Each RHR pump requires cooling for its lubricating oil and mechanical seal. The seal water and lube oil coolers are cooled by water from the ESW system, therefore the loss of adequate flow from the ESW system will result in the failure of RHR pumps. RHR pumps A and D are cooled by ESW loop A, RHR pumps B and C are cooled by ESW loop B.

Water Sources

The suppression pool is the only source of water for LPCI.

Condensate Transfer System

The system pipes are normally kept filled by means of the condensate transfer system to prevent waterhammer on initiation. This system was not modeled, but the rate of pipe failure (rupture) that was used in the fault tree analysis implicitly includes the effect of failure in the condensate transfer system.

Table 15. AC power supplies for the RHR system

ESF 4.16 kV bus	480 V MCC bus	Component supplied
1A201		RHR Pump A
	1B216	F003A
		F004A
		F006A
		F010A
		F017A
		F028A
		F047A
		Room Cooler Fan A
	1B217	F016A
		F020
		F021A
1A202		RHR Pump B
	1B226	F003B
		F004B
		F006B
		F010B
		F016B
		F017B
		F028B
		F047B
		Room Cooler Fan B
	1B227	F021B
1A203		RHR Pump C
	1B236	F009
		F027A
	1B237	F004C
		F006C
		F022
		F024A
		F048A
		Room Cooler Fan C
1A204		RHR Pump D
	1B246	F027B
		F048B

Table 15. AC power supplies for the RHR system (continued)

ESF 4.16 kV bus	480 V MCC bus	Component supplied
	1B247	F004D
		F006D
		F024B
		Room Cooler Fan D
1A201[a]	1B219	F007A[b]
		F015A[b]
		F031A[d]
		F032A[d]
1A202[c]	1B229	F007B[b]
		F015B[b]
		F031B[d]
		F032B[d]

[a]MCC 1B219 is normally supplied from bus 1A201, but if this bus fails, it will be supplied from bus 1A203.

[b]Valves that have to change position for the automatic initiation of LPCI.

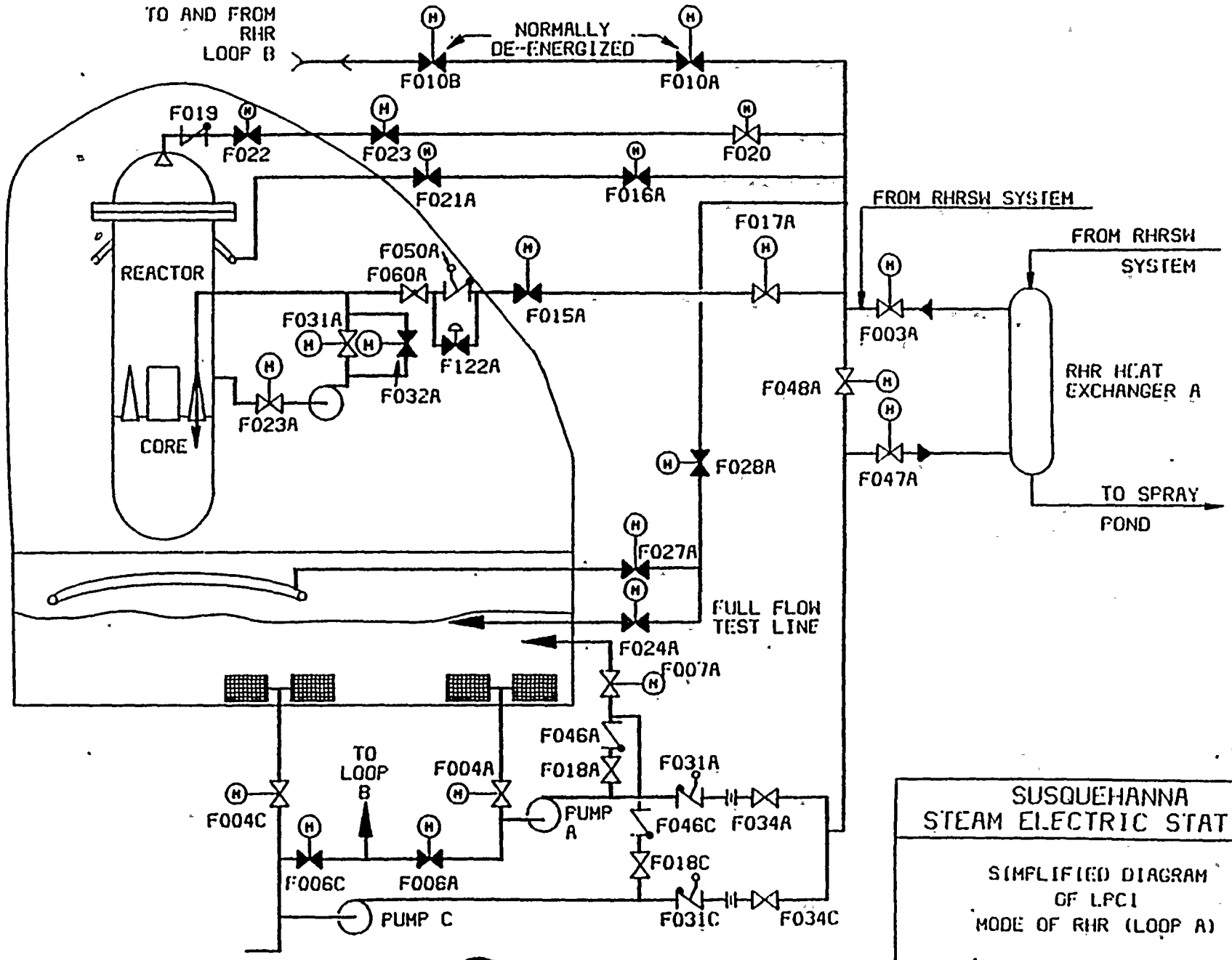
[c]MCC 1B229 is normally supplied from bus 1A202, but if this bus fails, it will be supplied from bus 1A204.

[d]These valves are in the recirculation loop.

Table 16. DC power supplies for the RHR system

125 V DC load center	125 V distribution panel	Component supplied
1D612	1D614	RHR pump A control logic
1D622	1D624	RHR pump B control logic
1D632	1D634	RHR pump C control logic
1D642	1D644	RHR pump D control logic

250 V DC control center	Component supplied
1D274	F008 F023



SUSQUEHANNA STEAM ELECTRIC STATION

SIMPLIFIED DIAGRAM OF LPCI MODE OF RHR (LOOP A)

FIGURE 8 REV. 0

GN2

RHR

BEGIN DATE: 06/08/83 END DATE: 12/31/83

U N I T	S Y S	F L N T	C O N D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L G	F A I L	DESCRIPTION OF EVENT
149		1		3.5.1	06/09/83	0115	06/09/83	0720	06/15/83	2030	122.45	34.72	157.17		Y			N/A		2			Y	N	'B' LOOP RHR INOPERABLE FOR LCPI INJECTION.
149		3		3.6.2.2&2.3	06/13/83	0115	06/14/83	1810	06/14/83	1810	0.00	0.00	0.00		Y			N/A		2			Y	N	'B' LOOP RHR UNVAIL. FOR LPCI MODE.
149		3		3.4.9.2	06/30/83	0224	06/30/83	0224	06/30/83	0545	0.00	3.35	3.35			Y		N/A	Y				N	N	NO SDC IN OPERATION.
149		3		3.4.9.2	06/30/83	1140	06/30/83	1140	07/01/83	1400	0.00	26.33	26.33		Y			N/A		2			Y	N	'B' LOOP RHR INOPERABLE FOR SHUTDOWN COOLING.
149		1		3.5.1	08/15/83	0500	08/15/83	0500	08/19/83	0520	96.33	0.00	96.33		Y			1F031A			A		Y	N	'A' RHR PUMP O/S SUCTION VLV SHUT TO TRY TO SEAT DISCH. VALVE,
149		1		3.5.1	08/23/83	1450	08/23/83	1450	08/23/83	1605	1.25	0.00	1.25		Y			1F031A			A		Y	N	'A' RHR PUMP ISOL. TO ATTEMPT TO SEAT DISCH VLV.
149		3		3.4.9.2	08/30/83	0415	08/30/83	0415	08/30/83	0533	0.00	1.30	1.30	Y				N/A			B		N	N	B RHR INOPERABLE SDC INOPERABLE DUE TO HMA RELAY INSPECTION.
149		3		3.4.9.2	08/31/83	0200	08/31/83	0200	08/31/83	0230	0.00	0.50	0.50		Y			1F013A		1			Y	N	'A' LOOP RHR INOPERABLE FOR SDC DUE TO 13A VALVE INOPERABLE.
149		1		3.5.1	09/21/83	0500	09/21/83	0500	09/22/83	0510	24.17	0.00	24.17		Y			1F031A		1			Y	N	'A' RHR PUMP O/S TO REPAIR DISCHARGE CHECK VLV.
149		1		3.6.2.2&2.3	10/14/83	0910	10/14/83	0910	10/14/83	1740	8.50	0.00	8.50	Y				1P202B			B		Y	N	1B RHR PUMP BKR O/S FOR PM WORK.
149		1		3.5.1	11/06/83	0445	11/06/83	0445	11/07/83	1810	37.42	0.00	37.42		Y			1F021B				Y	N	N	CHECK VALVE 1F021B WILL NOT SEAT.
149		3		3.4.9.2	12/05/83	0100	12/05/83	0100	12/09/83	2100	0.00	116.00	116.00		Y			N/A		1			N	N	'A' RHR S/D COOLING INOPERABLE.
149		3		3.9.11.2	12/07/83	2100	12/09/83	2100	12/12/83	1200	0.00	63.00	63.00		Y			N/A		2			N	N	ONLY ONE LOOP OF RHR AVAILABLE FOR SDC.
149		5		3.9.11	12/13/83	0535	12/13/83	0535	12/13/83	0602	0.00	0.45	0.45		Y			N/A		2			N	N	'B' RHR LOOP ISOLATED WHILE IN SDC DUE TO BLOWN RPS FUSE-EPS TRIP.
*** Total ***											290.12	245.65	535.77												

############################# RHR #############################

BEGIN DATE: 01/01/84 END DATE: 12/31/84

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOO DATE	MOO TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PN	CN	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALG	FAIL	DESCRIPTION OF EVENT
149		1		3.5.1	04/24/84	0616	04/24/84	0616	04/24/84	1200	5.73	0.00	5.73		Y			N/A			A		N	N	"A" RHR ROOM COOLER INOP.
149		1		3.6.2.2	07/21/84	1355	07/21/84	1355	07/23/84	1040	44.75	0.00	44.75			Y		1P202B/D		1			N	N	"B" & "D" RHR PUMPS OUT OF SERVICE.
149		1		3.6.3	07/21/84	2140	07/21/84	2140	07/23/84	1040	37.00	0.00	37.00	Y				1F122B/056B		2			N	N	DURING PERFORMANCE OF MONTHLY PM-50J0G, 1F122B/056B INDICATION PROBLEMS.
149		1		3.3.2	08/07/84	1830	08/07/84	1830	08/08/84	1425	19.92	0.00	19.92			Y		N/A	Y				N	N	SURV. PAST DUE FOR SHUTDOWN COOLING DELTA-T AND HIGH TEMP ISOLATION SWITCHES.
149		1		3.5.1.6	08/20/84	1140	08/20/84	1140	08/21/84	1921	31.68	0.00	31.68			Y		1P202B			B		N	N	"B" RHR PP DECLARED INOP DUE TO FAILING DELTA-P FOR ISI PORTION OF SO-149-0[illegible].
149		1		3.5.1	09/09/84	1610	09/09/84	1610	09/09/84	1640	0.50	0.00	0.50			Y		1F004A-D		1			N	N	"A" LOOP RHR INOP FOR INJECTION WHILE PERFORMING SO-149-605 ON PUMP SUCT VLVS.
149		1		3.5.1	09/09/84	2120	09/09/84	2120	09/09/84	2150	0.50	0.00	0.50			Y		1F004A-D		2			N	N	"B" LOOP RHR INOP FOR INJECTION WHILE PERFORMING SO-149-605 ON PUMP SUCTION VALVES.
149		1		3.5.1	09/10/84	0106	09/10/84	0106	09/10/84	0116	0.17	0.00	0.17	Y				1P202D			D		N	N	"D" RHR PUMP INOP FOR BREAKER INSPECTION.
149		1		3.4.3.2	10/25/84	1335	10/25/84	1335	10/25/84	1445	1.17	0.00	1.17			Y		1N022A		1			N	N	PSH-E11-N022A & B OOS ONE AT A TIME FOR PERFORMANCE OF SI-149-310. (RHR HIGH PRESSURE MONITORS.)
149		1		3.5.1	12/09/84	1630	12/09/84	1630	12/09/84	1900	2.50	0.00	2.50			Y		N/A		2			N	N	"B" LOOP RHR INOP DURING VAL EXERCISE.
149		1		3.5.1	12/09/84	2013	12/09/84	2013	12/09/84	2145	1.53	0.00	1.53			Y		N/A		1			N	N	"A" LOOP RHR INOP DURING VALV EXERCISE.
### Total ###											145.45	0.00	145.45												

RHR

BEGIN DATE: 01/01/85 END DATE: 12/31/85

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	NOD DATE	NOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	NOD	COMPONENT ID	SYS	DIV	CHAN	CGMP	VALD	FAIL	DESCRIPTION OF EVENT
1	49	3		3.9.11.2	02/13/85	1111	02/13/85	1111	02/13/85	1153	0.00	0.70	0.70			Y		N/A	Y				N	N	NO RHR LOOP IN SDC SO U-2 CAN PERFORM RHR QUARTERLY FLOW SURVEILLANCE.
1	49	1		3.6.2.2	07/09/85	0530	07/09/85	0530	07/09/85	2040	15.17	0.00	15.17		Y			1S1-029		2			N	N	'B' LOOP RHR INOP FOR REPAIR OF 1S1-029 & LOOP HO2 VENT.
1	49	1		3.6.2.2	10/06/85	1925	10/06/85	1925	10/08/85	2215	50.83	0.00	50.83	P				1E205A		1			Y	N	A RHR HEAT EXCHANGER OOS FOR MAINT. A LOOP SUPP POOL SPRAY AND A LOOP SUPP POOL CLG INOP.
1	49	1		3.5.1	12/16/85	0352	12/16/85	0352	12/16/85	1700	13.13	0.00	13.13		Y			1F004A			A		Y	N	"A" RHR PP OOS FOR MAINT ON OIL COOLER AND 'A' PUMP SUCTION VLV INDICATION (1F004A).
*** Total ***											79.13	0.70	79.83												

RHR

BEGIN DATE: 01/01/86 END DATE: 12/31/86

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	TEST	M G D	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
149	1	3.5.1b	02/04/86	0530	02/04/86	0930	02/04/86	1240	3.17	0.00	3.17	Y				1F006B			B		Y	N	STROKE F006B FOR 'B' PUMP - F004B CLOSED.
149	1	3.5.1	02/06/86	1045	02/06/86	1045	02/06/86	1245	2.00	0.00	2.00	Y				1F006D			D		Y	N	F004D CLOSED TO STROKE F006D.
149	1	3.5.1	02/07/86	0750	02/07/86	0750	02/07/86	1025	2.58	0.00	2.58	Y				1F006D			D		Y	N	F004D CLOSED TO STROKE F006D.
149	1	3.5.1	02/12/86	0950	02/12/86	0950	02/12/86	1745	7.92	0.00	7.92	Y				1F006A			A		Y	N	F004A CLOSED TO SET LIMITS ON F006A.
149	1	3.5.1	02/13/86	1100	02/13/86	1100	02/13/86	1655	5.92	0.00	5.92	Y				1F006C			C		Y	N	F004C CLOSED TO SET LIMITS ON F006C.
149	2	3.5.1	02/15/86	1330	02/15/86	1330	02/15/86	1820	0.00	4.83	4.83			Y		N/A		2			N	N	'B' LOOP INOP FOR LPCI.
149	1	3.4.3.2	05/02/86	1000	05/02/86	1000	05/02/86	1110	1.17	0.00	1.17			Y		N/A			I		N	N	FUNCTION CHECK OF HIGH/LOW PRESSURE INTERFACE VALVE LEAKAGE MONITORS.
149	3	3.4.9.2	06/07/86	0730	06/07/86	0730	06/11/86	0652	0.00	95.37	95.37			Y		N/A		1			N	N	'A' LOOP INOP FOR VALVE INSPECTION.
149	3	3.4.9.2	06/11/86	0740	06/11/86	0740	06/13/86	1950	0.00	60.17	60.17			Y		N/A		2			N	N	'B' LOOP VALVE INSPECTION.
149	3	3.4.9.2	06/12/86	0818	06/12/86	0818	06/12/86	1045	0.00	2.45	2.45	Y				N/A			I		N	N	SDC INOP FOR PUMP FLUSH.
149	3	3.4.9.2	06/12/86	1814	06/12/86	1814	06/12/86	1850	0.00	0.60	0.60	Y				N/A	Y				N	N	SDC O/S & OTHER LOOP INOP TO SWAP RPS POWER.
149	3	3.4.9.2	06/13/86	0921	06/13/86	0921	06/13/86	1107	0.00	1.77	1.77	Y				N/A	Y				N	N	SDC O/S FOR RPS TRANSFER.
149	3	3.4.9.2	06/14/86	0326	06/14/86	0326	06/14/86	0339	0.00	0.22	0.22	Y				N/A	Y				N	N	SDC O/S FOR RPS TRANSFER.
149	3	3.4.9.2	06/14/86	0847	06/14/86	0847	06/14/86	1126	0.00	2.65	2.65	Y				N/A	Y				N	N	SDC O/S FOR RPS TRANSFER.
149	1	3.4.3.2	07/02/86	0750	07/02/86	0750	07/02/86	0835	0.75	0.00	0.75			Y		1N022A/B			I		N	N	CHECK HIGH PRESSURE DISCHARGE SWITCHES PSH-E11-N022 A & B.
149	1	3.3.7.1	07/02/86	0950	07/02/86	0950	07/02/86	1045	0.92	0.00	0.92			Y		1N018			I		N	N	FUNCTIONAL CHECK OF PSH-E11-N018 SENSOR.
149	1	3.5.1	09/02/86	0730	09/02/86	0730	09/02/86	1105	3.58	0.00	3.58		Y			1P202A			A		Y	N	A PUMP OUT OF SERVICE TO REPLACE AGASTAT RELAY.
149	1	3.5.1	09/02/86	1115	09/02/86	1115	09/02/86	1450	3.58	0.00	3.58		Y			1P202C			C		Y	N	C PUMP OUT OF SERVICE TO REPLACE AGASTAT RELAY.
149	1	3.5.1	09/03/86	0735	09/03/86	0735	09/03/86	1017	2.70	0.00	2.70		Y			1P202B			B		Y	N	'B' PUMP OUT OF SERVICE TO REPLACE AGASTAT RELAY.
149	1	3.5.1	09/03/86	1025	09/03/86	1025	09/03/86	1250	2.42	0.00	2.42		Y			1P202D			D		Y	N	'D' PUMP OUT OF SERVICE TO REPLACE AGASTAT RELAY.
149	3	3.4.4	09/17/86	0429	09/17/86	0429	09/17/86	0457	0.00	0.47	0.47			Y		N/A	Y				N	N	RHR LOOP SHUTDOWN FOR SURVEILLANCE.
149	1	3.4.5.1	09/25/86	0001	09/25/86	0001	09/25/86	0333	3.53	0.00	3.53			Y		1P202C			C		N	N	'C' PUMP WILL NOT START DUE TO UNIT 2 LOCA LOGIC TEST.
149	1	3.5.1	09/27/86	0220	09/27/86	0220	09/27/86	0550	3.50	0.00	3.50			Y		1P202D			D		N	N	'D' PUMP WILL NOT START DUE TO UNIT 2 LOCA LOGIC TEST.
149	1	3.3.2	11/26/86	0840	11/26/86	0840	11/26/86	0915	0.58	0.00	0.58		Y			1N030C		1			N	N	DIVISION I LEAK DETECTION TEMP ELEMENT TE-E11-1N030C UNAVAILABLE.
*** Total ***									44.32	168.53	212.85												

RHR

BEGIN DATE: 01/01/87 END DATE: 12/31/87

UNIT	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	FM	CH	IEST	MOSD	COMPONENT ID	SYS	DIV	CHAN	COMP	/ALU	FAIL	DESCRIPTION OF EVENT
149	1	3.4.3.2	03/25/87	0930	03/25/87	0930	03/25/87	1005	0.58	0.00	0.58			Y		N/A				Y	N	N	LEAKAGE MONITOR O/S FOR SI'S.
149	1	3.4.3	06/19/87	1055	06/19/87	1055	06/19/87	1130	0.58	0.00	0.58			Y		N/A			1		N	N	ALL LEAKAGE CONTROL SENSOR O/S ONE AT A TIME FOR SI.
149	1	3.5.1	07/01/87	0920	07/01/87	0920	07/01/87	1330	4.17	0.00	4.17	Y				1P202B			B		Y	N	RHR PUMP 1B O/S FOR INSPECTION AND MAINTENANCE OF PUMP MOTOR.
149	4	3.4.9.2	07/09/87	1620	07/09/87	1620	07/10/87	1100	0.00	18.67	18.67		Y			1F006C		1			Y	N	"A" LOOP OF RHR S/D COOLING O/S FOR OUTAGE WORK.
149	1	3.6.2.3	08/17/87	0934	08/17/87	0934	08/17/87	1320	3.77	0.00	3.77		Y			1F048B		2			N	N	1F048B VALVE OPEN WITH BREAKER RACKED OUT.
149	1	3.5.1	08/17/87	1320	08/17/87	1320	08/17/87	1600	2.67	0.00	2.67		Y			1F048B		2			Y	N	1F048B VALVE CLOSED AND DE-ENERGIZED FOR ANTI-ROTATION COLLAR INSPECTION.
149	4	3.4.9.2	12/28/87	0910	12/28/87	0910	12/28/87	1815	0.00	9.08	9.08	Y				1V210A			A		N	N	REPLACE FLEX HOSE ON RCOM COOLERS.
*** Total ***									11.77	27.75	39.52												

V-13

********************************** RHR **********************************

BEGIN DATE: 01/01/88 END DATE: 06/07/88

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
149	1	3.6.2.2	01/11/88	0430	01/11/88	0430	01/11/88	1905	14.58	0.00	14.58	Y				1V210B			B		N	N	RHR ROOM COOLER FLEX HOSE REPLACEMENT 'B' DIV RHR.
149	1	3.4.3.2	01/27/88	1040	01/27/88	1040	01/27/88	1110	0.50	0.00	0.50			Y		N/A				*	N	N	MONTHLY SI ON RHR HI/LOW PRESSURE MONITOR.
149	1	3.4.3.2	01/27/88	1040	01/27/88	1040	01/27/88	1110	0.50	0.00	0.50			Y		N/A				*	N	N	MONTHLY SI ON RHR HI/LOW PRESSURE MONITOR.
149	1	3.4.3.2	04/28/88	0840	04/28/88	0840	04/28/88	0920	0.67	0.00	0.67			Y		1N022A/B				*	N	N	RHR LPCI INJECTION AND SDC SUCTION HIGH PRESSURE MONITORS O/S FOR ILC FUNCTIONAL ONE AT A TIME PSH-N016 & PSH-N022A,B.
*** Total ***									16.25	0.00	16.25												

APPENDIX VI

EMERGENCY SERVICE WATER SYSTEM

EMERGENCY SERVICE WATER SYSTEM

SYSTEM DESCRIPTION

Function

The function of the Emergency Service Water (ESW) system is to provide cooling water for the emergency diesel generators (short term cooling), both units' Residual Heat Removal (RHR) system (intermediate term cooling), the High Pressure Coolant Injection (HPCI) system (long term cooling), RCIC system (long term cooling), and essential bus room coolers in the event of any condition that requires the operation of the Emergency Core Cooling Systems, including the loss of offsite power. The ESW system also is a backup to both units' Service Water (SW) system which cools the Turbine Building Closed Cooling Water (TBCCW) system and Reactor Building Closed Cooling Water (RBCCW) system.

Design and Operation

As shown in the simplified diagram of Figure 9 (and 10), the ESW system consists of two independent loops, each of which is designed to supply 100 percent of the flow required by one division in both units and four emergency diesel generators. Each loop is equipped with two motor-driven pumps, a 36-inch header, and various valves. Since the two loops are similar and perform the same function, only loop A is described here.

The ESW system takes suction from the spray pond, which has a normal capacity of 25 million gallons. The system is designed to operate for up to 30 days without water makeup to the spray pond. In the event that makeup for the spray pond is required, water is supplied from either the circulating water system or the river-water makeup pumps.

Each of the two pumps in loop A is located in its own concrete basin inside the ESW pumphouse, and the pump suctions are in the spray pond. Each pump basin is equipped with a large-mesh fixed screen to prevent the entry of floating debris.

Each ESW pump discharges through a check valve and a normally open manual valve (0-11-005 for pump A) to the loop A header. A 36-inch pipe takes the water from the ESW pumphouse to the diesel generator enclosure and the reactor building. The diesel cooling is normally aligned to loop A. If there is insufficient flow from loop A, initially, (i.e., failure of one pump to start), and both pumps in loop B have started, then there is an automatic transfer to loop B of ESW. However, there is no automatic transfer back to loop A if loop B cannot adequately cool the diesels. This is important because of the ESW system's unique dependence on diesel power during a Loss Of Offsite Power (LOOP) event. This dependency can be shown in the following scenario. A loss of offsite power occurs. However, diesels A and B fail to start. Even though two ESW pumps are available to cool the diesels (one pump/diesel; also because both pumps are not available in loop A diesel cooling is transferred to loop B) the spray pond bypass valves (one valve/loop) that are required to open in order to allow flow return to the spray pond do not open because they normally receive power from diesels A (valve in loop A) and B (valve in loop B). Therefore, there is no cooling flow to the diesels and the diesels trip on overtemperature in about four minutes, resulting in a Station Blackout (SBO). All other loads on ESW loop A

are supplied through a locked-open manual valve, 1-11-102. Each of these loads has a manual valve for individual system isolation.

The return path is through a locked-open manual valve, 1-11-186. Downstream of this valve the ESW return line combines with the diesel return line and the Residual Heat Removal Service Water (RHRSW) systems return line to form a common return path to the spray pond through a locked-open manual valve, 0-12-012. The return line then divides, and the water is discharged to the spray pond through one of three paths. Motor-operated valve 01222A opens automatically when any pump in ESW system loop A or RHRSW loop A is started and admits the return water directly to the spray pond. In addition, the discharge from each loop can return through either of two spray networks that are sized according to the heat load that must be dissipated. (However, this is a manual action.) The larger spray network, supplied through valve 01224A1, was designed to dissipate the heat associated with one ESW loop and one RHR heat exchanger; the smaller network, supplied through valve 01224A2, was designed to dissipate the heat from either one RHR heat exchanger or the ESW loop. Both of these spray network valves are manually opened and have no automatic operation.

Each ESW pump receives a start signal when its associated diesel starts. Thus each ESW pump indirectly receives a start signal when offsite power is lost, or by low reactor water level (level 1) or high drywell pressure signals. The pump-start signal is received by the pump (45 seconds after the diesel starts for pumps A and B, and 53 seconds for pumps C and D). As stated earlier, loop A discharge valve 01222A receives an open signal on the starting of pump A or C. The operator can start any pump from the control room and open the spray pond return valves as required. Once the pump is running, no adjustments are required, as the individual coolers all have flow balancing valves.

The operator has the following indications available in the control room:

1. System pressure in each common pump discharge header.
2. System flow in each common pump discharge header.
3. Water level in the pump inlet basin.
4. Temperature and diesel-outlet high-temperature alarms.
5. Position of motor-operated valves.

System Interfaces

Instrumentation

The pump-start signal is derived from the diesel generator instrumentation and does not interface with any other systems. After the pump starts, the running signal is used to open the return valve to the spray pond.

Electric Power

The ESW system requires 4.16 kV AC power to operate the pumps, each of the four pumps being supplied from one of the four ESS buses. In addition, 480 V AC power is required for valve operation, and 125 V DC power is used for the control logic of the pumps and valves.

The ESS buses are energized from offsite power or, in the event of a loss of offsite power (LOOP), from the diesel generators. The diesels can operate

for about 4 minutes without ESW cooling to the diesel generators. Thus, in the event of a LOOP, the diesels will start and connect to the buses. The ESW system pumps are sequenced to start and supply cooling water to the diesels. The DC power is supplied from the ESS bus via a charger or, in the event of a DC power failure, from two 125 V batteries.

All the power supplies for the ESW system are listed in Tables 18 and 19.

Cooling

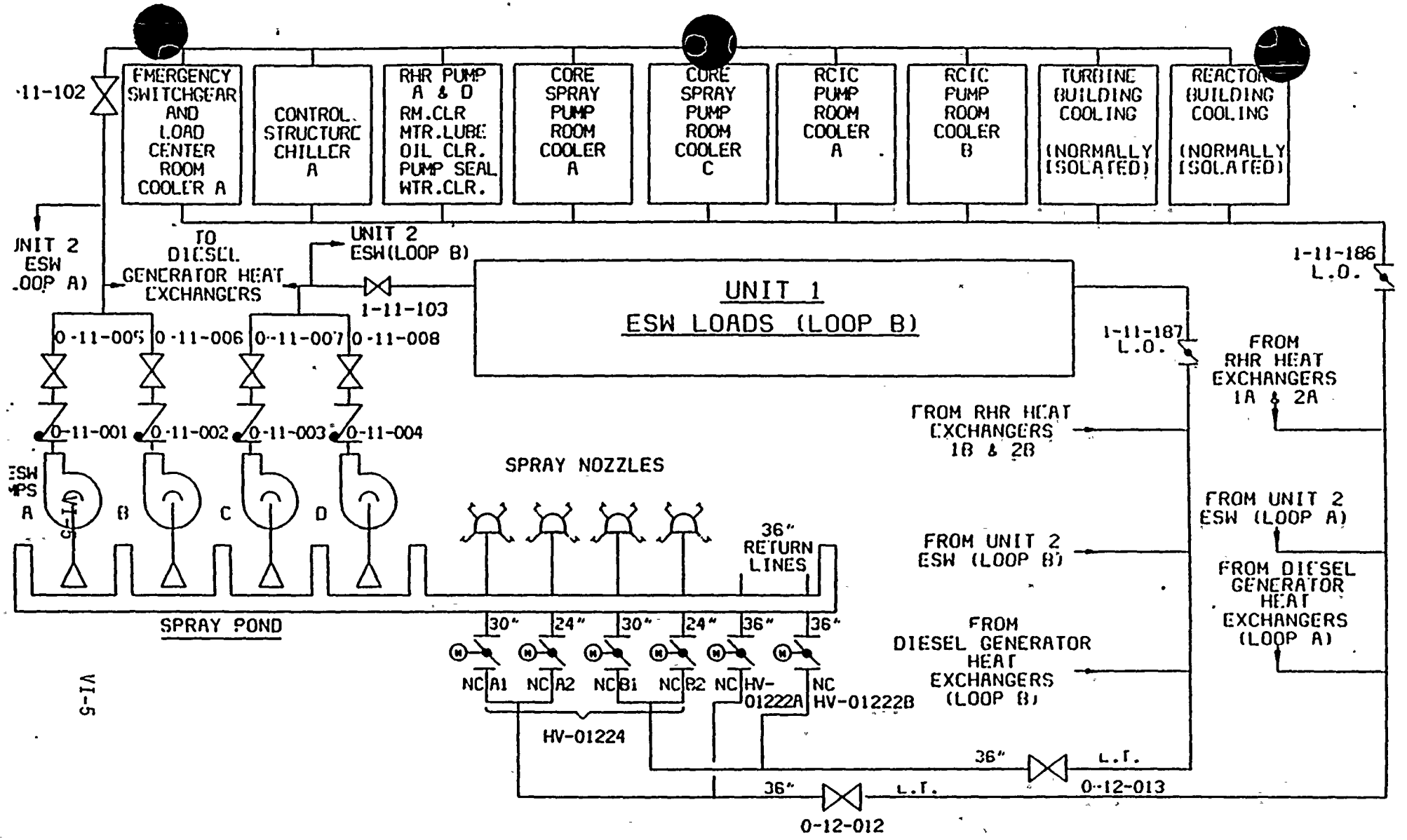
The motors of the ESW pumps are air cooled and do not rely on water for cooling. The pump house has an HVAC system. A failure in this system is assumed to not fail the ESW pumps, because the pump house has a common overhead area which allows ventilation to be performed by other non-failed components.

Table 18. AC power supplies for the ESW system

ESF 4.16 kV bus	480 V MCC	Component supplied
1A201		ESW pump A
	OB517	Loop A return line to spray pond, HV-01222A
		Loop A return line to riser A1, HV-01224A1
		Loop A return line to riser A2, HV-01224A2
		Pump A discharge valve HV-011-01A
		Pump C discharge valve HV-011-01C
1A202		ESW pump B
	OB527	Loop B return line to spray pond, HV-01222B
		Loop B return line to riser B1, HV-01224B1
		Loop B return line to riser B2, HV-01224B2
		Pump B discharge valve HV-011-01B
		Pump D discharge valve HV-011-01D
1A203		ESW pump C
1A204		ESW pump D

Table 19. DC power supplies for the ESW system

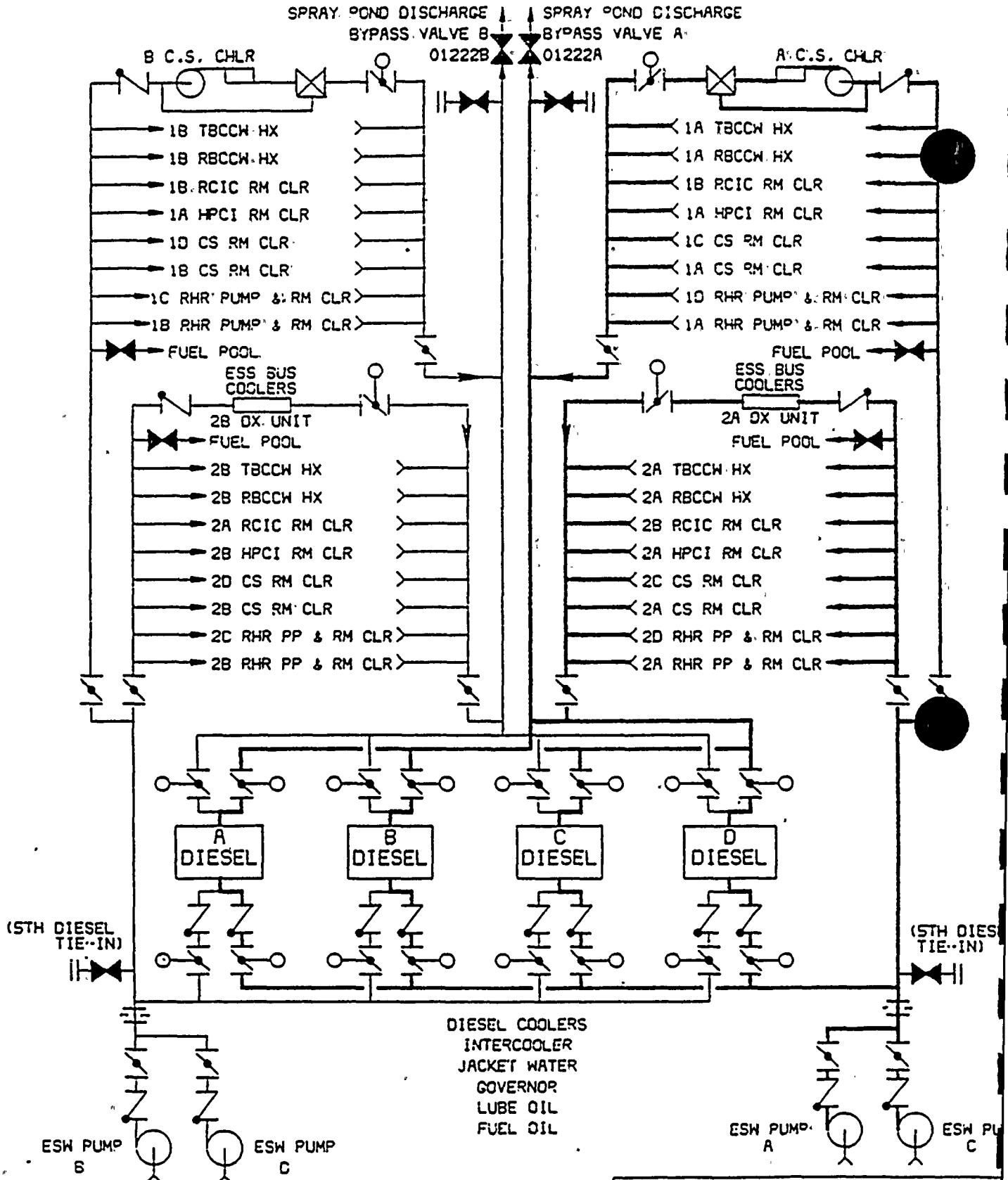
Battery	125 V DC load center	Component supplied
610	1D614	ESW pump A control logic
620	1D624	ESW pump B control logic
610	1D614	ESW pump C control logic
620	1D624	ESW pump D control logic



SUSQUEHANNA
STEAM ELECTRIC STATION

SIMPLIFIED DIAGRAM OF
THE EMERGENCY SERVICE
WATER SYSTEM LOOP A

FIGURE 9 REV. 02



SUSQUEHANNA STEAM ELECTRIC STATION

FLOWPATH OF THE EMERGENCY SERVICE WATER SYSTEM

FIGURE 10 REV. 01

######################### ESW #########################

BEGIN DATE: 06/08/83 END DATE: 12/31/83

U E N V I S T	P E L O N N T D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
154	1	3.0.3	08/18/83	1155	08/18/83	1155	08/19/83	1545	3.83	0.00	3.83		Y			0-12-012		1			Y	N	'A' LOOP ESW INOPERABLE DUE TO 0-12-012 CLOSED 13.0.3 APP TEST.
154	1	3.7.1.2	10/03/83	0800	10/03/83	0800	10/03/83	1500	7.00	0.00	7.00	Y				0F504A			A		Y	N	'A' ESW PUMP O/S FOR PM.
154	1	3.7.1.2	10/04/83	0830	10/04/83	0830	10/04/83	1405	5.58	0.00	5.58	Y				0F504C			C		Y	N	'C' ESW O/S FOR PM'S.
154	1	3.7.1.2	10/05/83	0635	10/05/83	0635	10/05/83	1048	4.22	0.00	4.22	Y				0F504B			B		Y	N	'B' ESW PUMP O/S FOR PM.
154	1	3.7.1.2	10/05/83	1220	10/05/83	1220	10/05/83	1633	4.22	0.00	4.22	Y				0F504D			D		Y	N	'D' ESW PUMP O/S FOR PM.
154	1	3.7.1.2	11/02/83	1105	11/02/83	1105	11/02/83	1245	0.00	7.67	7.67		Y			0F504B			B		Y	Y	'B' ESW PUMP WOULD NOT START MAN.
154	3	3.7.1.1	12/05/83	0350	12/05/83	0350	12/15/83	0610	0.00	242.33	242.33				Y	N/A		1			N	N	'A' ESW LOOP OOS 5TH DIESEL TIE-IN. NOTE: 'E' 83.
154	3	3.7.1.2	12/29/83	1430	12/29/83	1430	12/31/83	2400	0.00	57.50	57.50		Y			N/A		2			N	N	'B' LOOP ESW INOP.
*** Total ***									24.65	307.50	332.35												

############################## SPRAY ##############################

BEGIN DATE: 04/08/83 END DATE: 12/31/83

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
### Total ###											0.00	0.00	0.00												

U S N Y I S T	P C L O N N T	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M N	C M E S	T M E D I	COMPONENT ID	S D Y I S V	C C H D A M N P	V F A A L I D L	DESCRIPTION OF EVENT
154	1	3.7.1.2	06/17/84	0805	06/17/84	0805	06/17/84	1020	2.25	0.00	2.25	Y			0-11-004		D	Y Y	DISCHARGE VALVE FOR 'D' ESW PUMP TRIPPED ITS BREAKER AND BREAKER WON'T RESET - VALVE IS CLOSED. 'D' ESW PUMP INOP.
154	3	3.7.1.2	01/01/84	0000	01/01/84	0000	01/26/84	0048	0.00	600.80	600.80	Y			N/A		2	N N	'B' LOOP ESW INOP.
154	3	3.7.1.2	01/25/84	0200	01/31/84	0000	01/31/84	1900	0.00	19.00	19.00		Y		N/A		1	N N	'A' ESW LOOP O/S TO PERFORM HYDRO.
154	3	3.9.11.2	01/25/84	2100	01/26/84	2100	02/01/84	0300	0.00	126.00	126.00		Y		N/A		1	Y N	'A' ESW O/S FOR HYDRO & FLOW BALANCING.
154	3	3.7.1.2	01/28/84	0543	01/31/84	0200	01/31/84	0200	0.00	0.00	0.00	Y			OPS04A/C		1	Y N	ESW PUMPS 'A'&'C' O/S FOR INSPECTION.
154	3	3.7.1.2.B.1	01/29/84	1350	01/31/84	1900	01/31/84	1900	0.00	0.00	0.00			Y	N/A		1	N N	'A' LOOP ESW INOP DUE TO PROBLEMS WITH SPDS TIE-IN.
154	3	4.7.1.3.A	01/29/84	1350	01/29/84	1420	01/29/84	1420	0.00	0.00	0.00	Y			N/A	Y		N N	BOTH LOOPS ESW INOP DUE TO SPRAY POND TEMP GREATER THAN 40 DEG F WITH NO SPRAY NETWORKS AVAILABLE. ADMINISTRATIVE PROBLEM.
154	3	3.7.1.2.B.1	01/29/84	1350	01/29/84	1553	01/29/84	1553	0.00	0.00	0.00			Y	N/A	Y		N N	BOTH LOOPS ESW INOP DUE TO PROBLEMS WITH SPDS TIE-IN.
154	3	3.7.1.2	02/03/84	1400	02/03/84	1400	02/06/84	1200	0.00	70.00	70.00	Y			N/A		2	Y N	'B' ESW LOOP - O/S AND DRAINED.
154	3	3.7.1.2	02/09/84	1958	02/09/84	1958	02/10/84	0410	0.00	8.20	8.20		Y		OPS04C		C	Y Y	DURING PERFORMANCE OF SO-024-002C. 'C' ESW PP FAILED TO START AUTOMATICALLY AND SUBSEQUENTIALLY FAILED TO START MANUALLY.
154	3	3.7.1.2	02/15/84	0520	02/15/84	0820	02/15/84	2100	0.00	12.67	12.67	Y			N/A		B	Y N	'B' ESW O/S FOR WIRE CHANGE - 'B' LOOP INOP.
154	3	3.7.1.2	02/15/84	0400	02/16/84	0400	02/16/84	2130	0.00	17.50	17.50	Y			OPS04C		C	Y N	PUMP 'C' INOP.
154	3	3.7.1.2	02/17/84	0905	02/17/84	0905	02/17/84	1450	0.00	5.75	5.75	Y			1A20108		A	Y N	1A20108 BIR OPEN - "A" ESW PP O/S FOR BYR INOP.
154	1	3.7.1.2	03/24/84	0845	03/24/84	0845	03/24/84	1420	5.58	0.00	5.58	Y			OPS04B		B	Y N	'B' ESW PUMP INOP FOR MAINT.
*** Total ***									7.83	859.92	867.75								

******************************** SPRAY ********************************

BEGIN DATE: 01/01/84 END DATE: 12/31/84

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIVN	CHAP	COM	VALD	FAIL	DESCRIPTION OF EVENT
*** Total ***											0.00	0.00	0.00												

################################ ESW ################################

BEGIN DATE: 01/01/85 END DATE: 12/31/85

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
054	1	3.7.1.2.A	10/09/85	1150	10/09/85	1150	10/09/85	2230	10.67	0.00	10.67			Y		0PS04A			A		Y	N	'A' ESW PUMP INOP DURING PERFORMANCE OF SE-054-001.
054	1	3.7.1.2	10/10/85	0300	10/10/85	0300	10/10/85	2100	18.00	0.00	18.00		Y			0-11-004			D		Y	N	'D' ESW PUMP O/S FOR REPAIRS TO DISCH. CHECK VALVE.
054	1	3.7.1.2.A.I	10/21/85	0900	10/21/85	0900	10/21/85	1500	6.00	0.00	6.00			Y		0PS04C			C		Y	N	'C' ESW PUMP INOPERABLE FOR SURVEILLANCE TESTING.
054	1	3.7.1.2.A.I	10/22/85	0930	10/22/85	0930	10/22/85	1305	3.58	0.00	3.58			Y		0PS40B			B		Y	N	'B' ESW PUMP INOPERABLE FOR SURVEILLANCE TESTING.
054	1	3.7.1.2.A.I	10/23/85	0940	10/23/85	0940	10/23/85	1212	2.53	0.00	2.53			Y		0PS04D			D		Y	N	'D' ESW PUMP INOP FOR SURV TEST.
054	1	3.7.1.2	12/08/85	0915	12/08/85	0815	12/08/85	1515	7.00	0.00	7.00			Y		N/A		2			Y	N	'B' LOOP ESW INOP FOR PERFORMANCE OF TP-054-050.
054	1	3.7.1.2	12/09/85	1010	12/09/85	1010	12/09/85	1415	4.08	0.00	4.08			Y		N/A		2			Y	N	'B' LOOP ESW INOP FOR PERFORMANCE OF TP-054-050.
054	1	3.7.1.2	12/11/85	1415	12/11/85	1415	12/11/85	1700	2.75	0.00	2.75			Y		N/A		1			Y	N	'A' LOOP ESW INOP FOR TP-054-050.
054	1	3.7.1.2	12/12/85	0905	12/12/85	0905	12/12/85	1305	4.00	0.00	4.00			Y		N/A		1			Y	N	'A' LOOP ESW INOP FOR TP-054-050.
054	1	3.7.1.2	12/12/85	1310	12/12/85	1310	12/12/85	1945	6.58	0.00	6.58			Y		N/A		2			Y	N	'B' LOOP ESW INOP FOR TP-054-050.
054	1	3.7.1.2	12/16/85	0345	12/16/85	0345	12/16/85	1700	13.25	0.00	13.25	Y				0PS04A			A		Y	N	'A' ESW PP O/S FOR MAINT TO CHANGE OIL.
054	1	3.7.1.2	12/19/85	0420	12/19/85	0420	12/19/85	1915	14.92	0.00	14.92	Y				0PS04C			C		Y	N	'C' ESW PUMP INOP FOR OIL CHANGE.
054	1	3.7.1.2	12/23/85	0415	12/23/85	0415	12/23/85	1500	10.75	0.00	10.75		Y			0PS04B			B		Y	N	'B' ESW PP O/S FOR MAINT. TO CHANGE OIL.
054	1	3.7.1.2	12/26/85	0600	12/26/85	0600	12/26/85	1630	10.50	0.00	10.50	Y				0PS04C			C		Y	N	'C' ESW PP O/S TO CHANGE OIL.
154	5	3.7.1.2	04/21/85	1015	04/21/85	1015	04/21/85	1350	0.00	3.58	3.58			Y		1-11-102		1			Y	N	'A' LOOP ESW O/S TO ALLOW FOR U-1 RX BUILD FLOW BALANCING AND WATERHAMMER TEST.
154	1	3.7.1.2	12/07/85	0740	12/07/85	0740	12/07/85	1515	7.58	0.00	7.58			Y		N/A		1			Y	N	DIV I 'A' LOOP ESW INOP DURING TP.
### Total ###									122.19	3.58	125.77												

|||||||||||||||||||||||||||||||| SPRAY ||||||||||||||||||||||||||||||||

BEGIN DATE: 01/01/85 END DATE: 12/31/85

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOO DATE	MOO TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
0	SP	1		3.7.1.1	06/14/85	0830	06/14/85	0830	06/14/85	1900	10.50	0.00	10.50	Y				HV01222B		2			Y	N	ESW LOOP 'B' INOP DUE TO SPRAY POND VALVS. HV-01222B AND HV-01224B INOPERABLE.
0	SP	1		3.7.1.2.A.3	10/24/85	0730	10/24/85	0730	10/25/85	1720	33.83	0.00	33.83				Y	A-1,A-2				Y	Y	N	ESW 'A' LOOP INOPERABLE - A1 AND A2 SPRAY NETWORK OOS FOR FMR PREP WORK.
0	SP	1		3.7.1.2	10/26/85	0815	10/26/85	0815	10/26/85	1520	7.08	0.00	7.08				Y	B-2				Y	Y	N	ESW 'B' LOOP INOP FOR FMR ON SPRAY HEADER (B2 SPRAY NETWORK INOP).
0	SP	1		3.7.1.2	10/28/85	0800	10/28/85	0800	10/28/85	1315	5.25	0.00	5.25				Y	B-1				Y	Y	N	B-1 SPRAY POND NETWORK INOP DURING PERFORMANCE OF FMR 84-3092C.
0	SP	1		3.7.1.2	11/07/85	0750	11/07/85	0750	11/08/85	1525	31.58	0.00	31.58				Y	A-1,A-2				Y	Y	N	'A' LOOP ESW INOP FOR SPRAY NETWORK A-1 AND A-2 PUMP DOWN MODS (INOPS SPRAY NETWORK-
0	SP	1		3.7.1.2	11/09/85	0755	11/09/85	0755	11/09/85	1515	7.33	0.00	7.33				Y	B-1,B-2				Y	Y	N	'B' LOOP ESW SPRAY NETWORKS INOPERABLE FOR PUMPDOWN MOD. WORK.
0	SP	1		3.7.1.2	11/25/85	1315	11/25/85	1315	11/25/85	1715	4.00	0.00	4.00	Y				A-1,A-2				Y	Y	N	ESW SPRAY NETWORK PUMPDOWN IN PROGRESS 'A' LOOP.
0	SP	1		3.7.1.2	11/26/85	0950	11/26/85	0950	11/26/85	1610	6.33	0.00	6.33	Y				A-1,A-2				Y	Y	N	ESW SPRAY NETWORK PUMPDOWN IN PROGRESS LOOP 'A'.
0	SP	1		3.7.1.2	11/27/85	0950	11/27/85	0950	11/27/85	1433	4.88	0.00	4.88	Y				B-1,B-2				Y	Y	N	'B' LOOP ESW INOP DUE TO VALVES OPEN FOR NEW PUMPDOWN NETWORK.
0	SP	1		3.7.1.2	12/23/85	1305	12/23/85	1305	12/23/85	1745	4.67	0.00	4.67	Y				B-1,B-2				Y	Y	N	'B' LOOP ESW INOP FOR 'B' SPRAY NETWORK PUMPDOWN.
0	SP	1		3.7.1.2	12/23/85	1750	12/23/85	1750	12/23/85	1830	0.67	0.00	0.67	Y				A-1,A-2				Y	Y	N	'A' LOOP ESW INOP FOR 'A' SPRAY NETWORK PUMPDOWN.
0	SP	1		3.7.1.2	12/23/85	1835	12/23/85	1835	12/23/85	2130	2.92	0.00	2.92	Y				B-1,B-2				Y	Y	N	'B' LOOP ESW INOP FOR 'B' NETWORK PUMPDOWN.
*** Total ***											119.04	0.00	119.04												

VI-12

**************** ESW ****************

BEGIN DATE: 01/0 END DATE: 12/31/86

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
054	1	3.7.1.2	01/14/86	1240	01/14/86	1240	01/14/86	1315	0.58	0.00	0.58			Y		0-11-001			A		Y	N	'A' PUMP BREAKER RACKED OUT TO TEST DISCHARGE CHECK VALVE.
054	1	3.7.1.2	05/22/86	0100	05/22/86	0100	05/24/86	1755	62.50	2.42	64.92		Y			0P504C			C		Y	Y	ESW 'C' PUMP INOPERABLE DUE TO A SHEARED SHAFT.
054	1	3.7.1.2	05/22/86	0100	05/24/86	1755	06/06/86	1100	0.00	305.08	305.08		Y			0P504A			A		Y	Y	PUMP 'A' DAMAGE TO PUMP SUCTION. ALL PUMPS ERODED, BUT ONLY 'A' INOP.
054	3	3.7.1.2	06/06/86	1200	06/06/86	1200	06/10/86	1105	0.00	95.08	95.08		Y			0P504B/D		2			Y	N	ESW 'B' LOOP INOPERABLE FOR 'B' & 'D' PUMP REPAIRS.
054	3	3.7.1.2	06/12/86	1050	06/12/86	1050	06/12/86	2130	0.00	10.67	10.67	Y				0P504A/C		1			Y	N	ESW 'A' LOOP INOPERABLE TO REPLACE RELAYS FOR PUMPS 'A' & 'C'.
154	3	3.7.1.2	02/14/86	1410	02/14/86	1410	02/15/86	2100	11.63	19.20	30.83			Y		N/A	Y				N	N	NO ESW COOLING FOR HPCI AND RCIC ROOMS. ESW INOPERABLE DUE TO TESTING.
*** Total ***									74.71	432.45	507.16												

U S N Y I S I	P C L O M N T O	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M S	T M E D	N O D	COMPONENT ID	S Y S	D I V	C H N	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
OSP	1	3.7.1.2	02/14/86	1100	02/14/86	1100	02/14/86	1548	4.80	0.00	4.80	Y				II-012288			A		N	N	SPRAY POND TEMP SWITCH II-012288 REPLACEMENT AND CALIBRATION.
OSP	1	3.7.1.2	11/03/86	0900	11/03/86	0900	11/03/86	1830	9.50	0.00	9.50	Y				HV01222B		2			Y	N	'B' LOOP OOS TO REPLACE AGASTAT RELAY ON SPRAY POND DISCHARGE BYPASS VALVE.
ISP	1	3.7.1.2	10/12/86	1345	10/12/86	1345	10/12/86	1820	4.58	0.00	4.58	Y				N/A		1			Y	N	'A' LOOP INOPERABLE FOR AGASTAT RELAY CHANGES FOR VALVES HV01222A AND HV01221A1, A2
*** Total ***									18.88	0.00	18.88												

UNIT	SYS	PCL	TECH. SPEC	DOE DATE	OBS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PMS	CTS	MED	COMPONENT ID	SYS	DIV	CHAN	MAL	FAIL	DESCRIPTION OF EVENT
054	1		3.7.1.2	02/12/87	0745	02/12/87	0745	02/12/87	1810	10.42	0.00	10.42		Y		N/A	1			Y	N	REPLACED VARIOUS RELAYS PER FMR.
054	1		3.7.1.2	02/26/87	0600	02/26/87	0600	02/26/87	1635	8.58	0.00	8.58	Y			OPS04B/D	2			Y	N	'B' & 'D' ESW PUMPS O/S FOR PM'S.
054	1		3.7.1.2	02/27/87	0630	02/27/87	0630	02/27/87	1640	10.17	0.00	10.17	Y			OPS04A/C	1			Y	N	'A' & 'C' ESW PUMPS O/S FOR PM'S.
054	1		3.7.1.2	03/25/87	0656	03/25/87	0656	03/25/87	2100	12.03	0.00	12.03		Y		N/A	1			N	N	'A' LOOP ESW O/S FOR 18 MONTH LOGIC SURV.
054	1		3.7.1.2	03/26/87	0825	03/26/87	0825	03/26/87	1500	6.58	0.00	6.58		Y		N/A	1			N	N	'A' LOOP ESW O/S FOR 18 MONTH LOGIC SURV.
054	1		3.7.1.2	03/27/87	0740	03/27/87	0740	03/27/87	1220	4.67	0.00	4.67		Y		N/A	2			N	N	'B' LOOP ESW O/S FOR 18 MONTH LOGIC SURV.
054	1		3.7.1.2	05/27/87	0940	05/27/87	0940	05/27/87	1200	2.33	0.00	2.33		Y		N/A	2			N	N	'B' LOOP ESW INOP WHILE ISOLATION VALVES OPEN TO 'E' DIESEL FOR TESTING.
054	1		3.7.1.2	05/27/87	1300	05/27/87	1300	05/27/87	1345	0.75	0.00	0.75		Y		OPS04A/C	1			N	N	'A' LOOP ESW O/S FOR 'A' & 'C' PUMP PERFORMANCE TEST.
054	1		3.7.1.2	05/28/87	0500	05/28/87	0500	05/28/87	1853	13.88	0.00	13.88	Y			OPS04A/C	1			Y	N	'A' LOOP ESW O/S FOR PUMP INSPECTION.
054	1		3.7.1.2	05/30/87	0940	05/30/87	0540	05/30/87	1310	3.50	0.00	3.50		Y		N/A	2			N	N	LOOP 'B' ESW INOP WHILE LINED UP TO 'E' DIESEL.
054	1		3.7.1.2	09/09/87	0315	09/09/87	0315	09/09/87	2340	20.42	0.00	20.42	Y			OPS04A		A		Y	Y	REPLACE 'A' ESW PUMP END BELL AND LINER.
054	1		3.7.1.2	09/10/87	0230	09/10/87	0230	09/10/87	2130	19.00	0.00	19.00	Y			OPS04C		C		Y	N	REPLACE 'C' ESW PUMP END BELL AND LINER.
054	1		3.7.1.2	09/10/87	1009	09/10/87	1009	09/10/87	1032	0.38	0.00	0.38	Y			2FU3	2			Y	N	WIRING CHANGE TO FUSE 2FU3.
054	1		3.7.1.2	09/11/87	0240	09/11/87	0240	09/11/87	0555	3.25	0.00	3.25		Y		OPS04A		A		N	N	TP-054-065 TESTS PUMP FLOW.
054	1		3.7.1.2	09/11/87	0605	09/11/87	0605	09/11/87	1028	4.38	0.00	4.38		Y		OPS04C		C		N	N	TP-054-065 TESTS PUMP FLOW.
154	5		3.7.4	09/29/87	1600	09/29/87	1600	10/07/87	1815	0.00	194.25	194.25		Y		1-11-102	2			N	N	ESW LOOP 'B' ISOLATED TO REACTOR BUILDING (UNIT 1) FOR HANGERS AND SNUBBER TESTING
154	5		3.7.1.2	10/06/87	1320	10/08/87	1320	10/15/87	1810	0.00	172.83	172.83		Y		1-11-102	1			N	N	U-1 RB ISOLATED FROM ESW FOR SNUBBER WORK.
*** Total ***										120.34	367.08	487.42										

########## SPRAY ##########

BEGIN DATE: 01/01/87 END DATE: 12/31/87

U S N Y J S T	P C L O N N T D	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M	C N	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
### Total ###									0.00	0.00	0.00												

******************************** ESW ********************************

BEGIN DATE: 01/01/88 END DATE: 06/07/88

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALO	FAIL	DESCRIPTION OF EVENT
0	54	1		3.7.1.2	02/04/88	0745	02/04/88	0745	02/04/88	0914	1.48	0.00	1.48	Y				0P504A			A		Y	N	'A' ESW PUMP O/S DURING SWAP OF BREAKER 1A201-08 WITH A SPARE BREAKER.
0	54	1		3.7.1.2	02/22/88	0500	02/22/88	0500	02/22/88	1620	11.33	0.00	11.33	Y				0P504C			C		Y	N	'C' ESW PUMP O/S FOR CHECK VALVE MAINTENANCE & MOTOR WINDING INSPECTION.
0	54	1		3.7.1.2	02/23/88	1715	02/23/88	1715	02/23/88	2150	4.58	0.00	4.58	Y				0P504B/D		2			Y	N	'B' & 'D' ESW PUMPS O/S TO ADJUST DISCHARGE CHECK VALVES.
0	54	1		3.7.1.2	02/23/88	2200	02/23/88	2200	02/23/88	2335	1.58	0.00	1.58	Y				0P504A			A		Y	N	'A' ESW PUMP O/S TO ADJUST DISCHARGE CHECK VALVES.
0	54	1		3.7.1.2	02/26/88	1930	02/26/88	1930	02/28/88	0025	28.92	0.00	28.92	Y				HV01101A/C		1			Y	N	'A' LOOP ESW O/S FOR CHECK VALVE INSPECTION AND DISCHARGE VALVE ADJUSTING.
0	54	1		3.7.1.2	02/28/88	0040	02/28/88	0040	02/28/88	2030	19.83	0.00	19.83	Y				HV01101B/D		2			Y	N	'B' LOOP ESW O/S FOR CHECK VALVE INSPECTION AND DISCHARGE VALVE ADJUSTING.
0	54	4		3.7.1.2	06/07/88	0740	06/07/88	0740	06/07/88	0820	0.00	0.67	0.67	Y				0P504C			C		Y	N	'C' ESW PUMP INOP WHILE BREAKER CHANGEOUT I/P. (1A20303)
1	54	1		3.7.1.2	04/13/88	2140	04/13/88	2140	04/14/88	0400	6.33	0.00	6.33			Y		N/A		1			N	N	U-2 SURVEILLANCE INOPS 'A' LOOP OF ESW.
*** Total ***											74.05	0.67	74.72												

******************************** SPRAY ********************************

BEGIN DATE: 01/01/83 END DATE: 06/07/83

UNIT	SYS	PLNT	COND	TECH. SPEC	DOS DATE	DOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VAL	FAIL	DESCRIPTION OF EVENT
*** Total ***											0.00	0.00	0.00												

APPENDIX VII

DC POWER SYSTEM

DC POWER SYSTEM

SYSTEM DESCRIPTION

Function

The function of the DC power system is to provide electric power to plant systems used for the normal operation of the plant and also for systems used to mitigate events that may occur. The DC power system is divided in accordance with the two primary functions into the non-safety feature and the Essential Safety Systems (ESS) DC system. Only the ESS is discussed in this section.

The Class 1E DC power system provides a reliable source of DC power for Class 1E AC switchgear, diesel generators, valves, plant alarms and indicators, and the emergency lighting system.

Design and Operation

Class 1E DC power is provided at the 125 V and 250 V levels. There are four Class 1E 125 V channels (A, B, C, and D) and two Class 1E 250 V divisions (I and II).

The 24 V DC system, which is also a class 1E power supply, supplies radiation and neutron monitors for normal plant operation: Source Range Monitors, Intermediate Range Monitors, and Process Radiation Monitors. This system has no impact on accident mitigation. Even if the 24 V DC system failed, the series of events that would have to occur to affect the safe shutdown of the reactor following an initiating event have such low probabilities of failure that this system failure does not need to be considered. Therefore, the 24 V DC system was not modeled.

Figure 11 is a simplified diagram of one channel in the 125 V DC power system (each channel is identical in layout). The voltage supply on each channel is normally maintained by a charger powered from a 480 V load center. The charger also keeps a 125 V lead-acid battery charged. Power to the charger connected to each 125 V DC load center comes from an ESS 480 V AC load center through an intermediate motor control center (MCC) common to Units 1 and 2. (These common MCCs, OB516, OB526, OB536, and OB546, also provide diesel generator support.) The common MCCs are connected to a Unit 1 and 2 ESS 480 V AC load center through an automatic transfer switch. There is no preferred load center. The battery on each channel has a design discharge time of 4 hours with a full load.

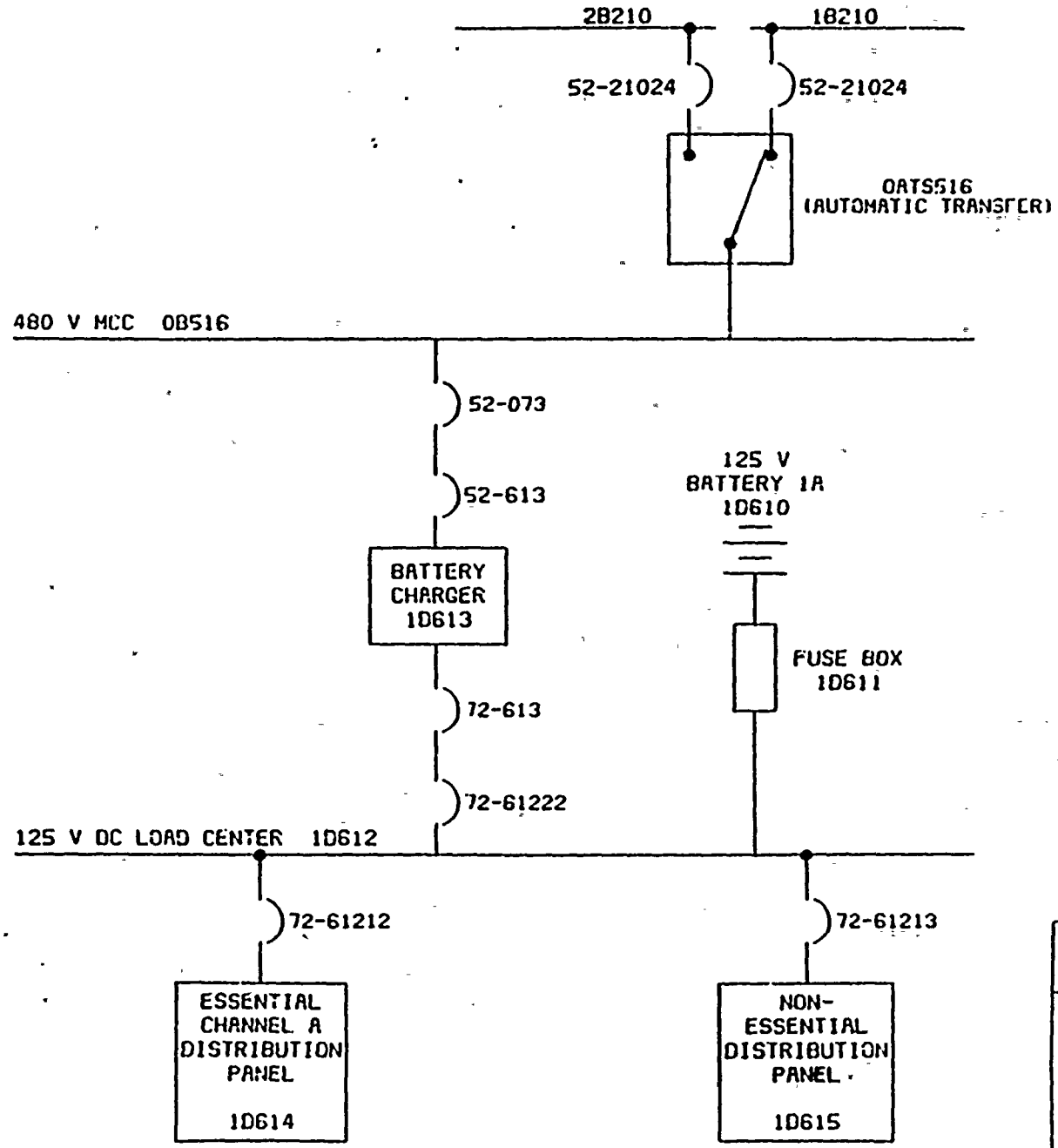
Division I of the 250 V DC system (see Figure 12) is provided with one 250 V battery and two chargers. Each charger is powered from a separate 480 V AC MCC. Division II (See Figure 13) has one 250 V battery and one charger which is powered from a 480 V AC MCC. These two divisions provide DC power for larger loads, such as DC driven pumps and valves. The battery chargers are full-wave silicon-controlled rectifiers. They have the capacity to supply the largest combined loads on each DC load center and fully recharge the batteries within 12 hours. Like the batteries in the 125 V DC system, the 250 V batteries have a design discharge time of 4 hours with a full load.

Voltmeters and ammeters are used to continuously monitor the load centers and battery chargers. Ground-detection lights are located on each DC load

center to indicate the presence of bus grounding. Battery monitors check on the status of each battery and indicate whether the battery is losing normal charge. There are control room annunciators for each DC channel or division. These annunciators alarm when there is a problem with the DC load centers, chargers, batteries, control centers, or distribution panels.

Support Systems

The Class 1E 480 V AC distribution system is the power source for the DC battery chargers. The ventilation system supplies and exhausts the battery rooms to prevent hydrogen-gas buildup to combustible levels.



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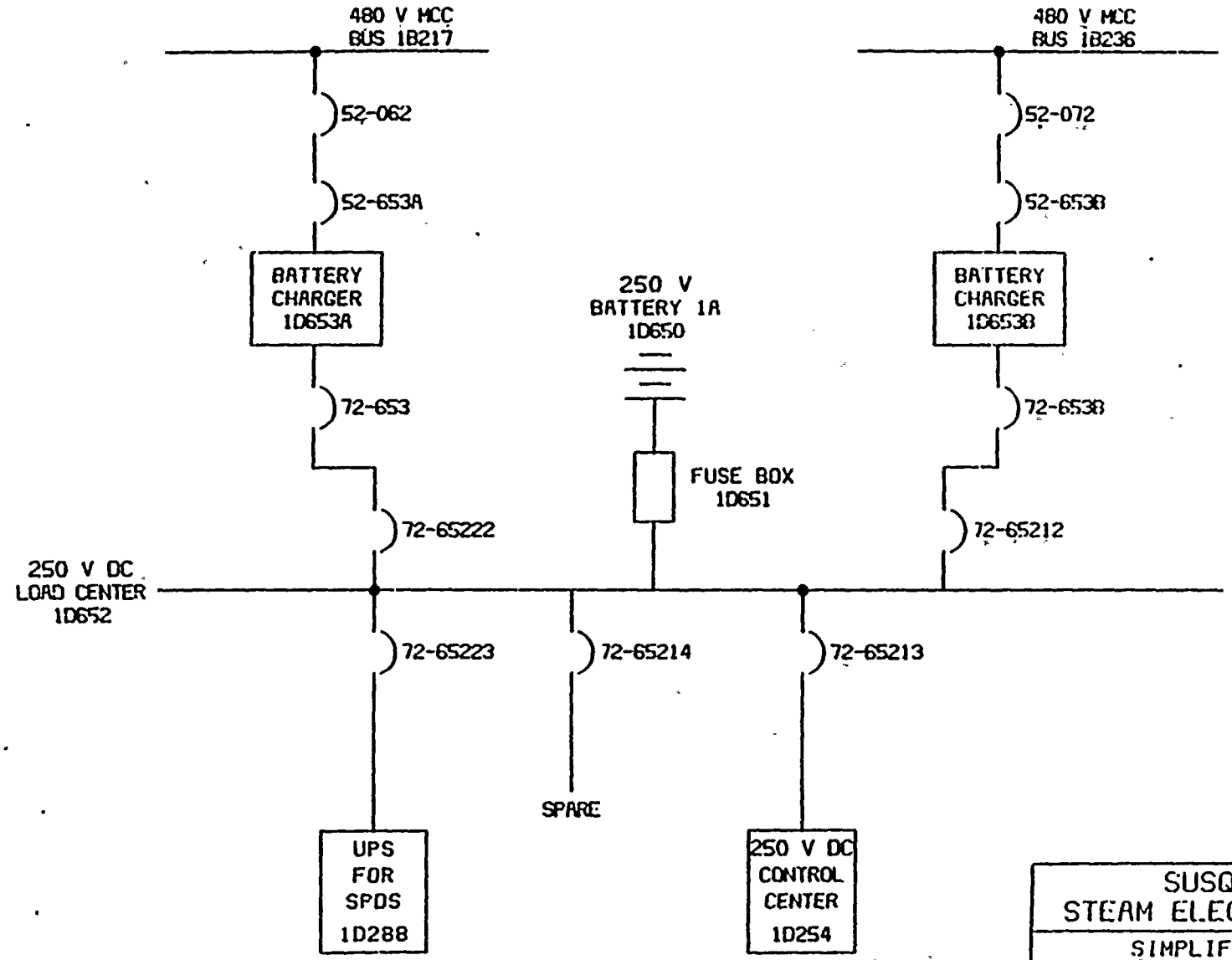
SIMPLIFIED DIAGRAM
OF ONE CHANNEL IN THE
125 V DC POWER SYSTEM

FIGURE 11 REV. 01



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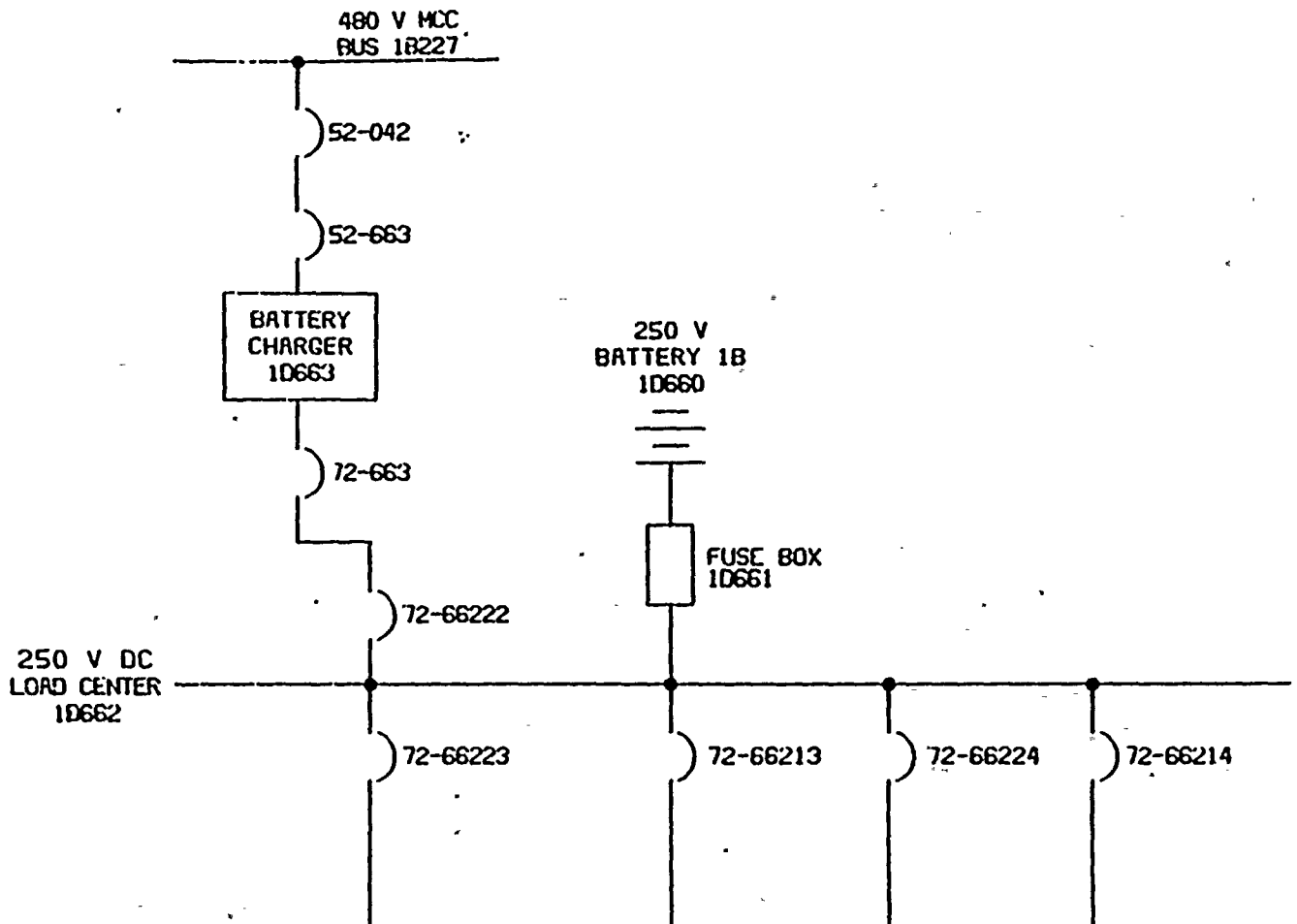
SIMPLIFIED DIAGRAM
OF 250 V DC
POWER SYSTEM
DIVISI

FIGURE 12 REV. 01



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SIMPLIFIED DIAGRAM
OF 250 V DC
POWER SYSTEM
DIVISION II

FIGURE 13 REV. 01

0403207

UNIT	FAC LOC	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	F M S T	C M E D	T H D	COMPONENT ID	S F S	D I V	C H A	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
*** Total ***									0.00	0.00	0.00											

U S N Y I S T	P C L O N M T O	TECH. SPEC	DOS DATE	DOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M S	C M E S T	T O D	N O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
*** Total ***									0.00	0.00	0.00												

IIIIIIIIIIIIIIIIIIIIIIIIIIIIII TC125 IIIIIIIIIIIIIIIIIIIIIIIIIIIIII

BEGIN DATE: 01/01/85 END DATE: 12/31/85

U N I T	S Y S	P L N T	C O N C	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L I D	F A I L	DESCRIPTION OF EVENT
102		1		3.8.2.1	01/02/85	1117	01/02/85	1117	01/02/85	1154	0.62	0.00	0.62		Y			1D623				Y	Y	N	1D623 BATTERY CHARGER REMOVED FROM SERVICE TO INVESTIGATE DATS526 TROUBLE.
102		1		3.8.2.1	01/02/85	1400	01/02/85	1400	01/02/85	1420	0.33	0.00	0.33		Y			1D623				Y	Y	N	1D623 BATTERY CHARGER REMOVED FROM SERVICE TO INVESTIGATE DATS526 TROUBLE.
102		1		3.8.2.1	01/03/85	1155	01/03/85	1155	01/03/85	1216	0.35	0.00	0.35		Y			1D623				Y	Y	N	1D623 BATTERY CHARGER REMOVED FROM SERVICE TO INVESTIGATE DATS526 TROUBLE.
102		1		3.8.2.1	01/21/85	1301	01/21/85	1301	01/21/85	1319	0.30	0.00	0.30		Y			1D643				Y	Y	N	1D643 BATTERY CHARGER REMOVED FROM SERVICE TO REPLACE TRANSDUCER IN CAFD.
102		1		3.8.2.1	06/17/85	0830	06/17/85	0830	06/17/85	1045	2.25	0.00	2.25		Y			1D610				Y	Y	N	REPLACE CELLS #8. 9 AND 21 IN BATTERY BANK 1D610.
102		1		3.8.2.1	06/18/85	0635	06/18/85	0635	06/18/85	1030	3.92	0.00	3.92		Y			1D630				Y	Y	N	REPLACE DEFECTIVE CELL IN BATTERY 1D630.
102		1		3.8.2.1	06/19/85	0625	06/19/85	0625	06/19/85	0750	1.42	0.00	1.42		Y			1D640				Y	Y	N	U-1 BATTERY BANK 1D640 REMOVED FROM SERVICE TO REPLACE BAD CELLS.
102		1		3.8.2.1	09/04/85	1110	09/04/85	1110	09/04/85	1200	0.83	0.00	0.83		Y			1D623				Y	Y	Y	1D623 O/S TO REPLACE FAULTY CIRCUIT BOARD.
102		1		3.8.2.1.B	09/30/85	0050	09/30/85	0050	09/30/85	0100	0.17	0.00	0.17			Y		1D643				Y	N	N	1D643 BATTERY CHARGER NOT MAINTAINING 125 VDC VOLTAGE (VOLTAGE @ 122 VDC).
*** Total ***											10.19	0.00	10.19												

UNIT	SYS	FOL	NTD	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PMS	CMEDT	IMEDT	COMPONENT ID	SYS	DIV	CHAN	VOID	FAIL	DESCRIPTION OF EVENT
102	3			3.8.2.2	02/17/86	1530	02/17/86	1530	02/18/86	2359	0.00	32.48	32.48		Y		N/A	Y	N	N			DIV 1A NOT ALIGNED TO NORMAL SOURCE FOR BATTERY TESTS 125V DC (ALL FOUR CHANNELS).
102	1			3.8.2.1	04/28/86	1345	04/28/86	1345	04/28/86	1840	4.92	0.00	4.92		Y		1D643	Y	N	N			INVESTIGATE BATTERY CHARGER 1D643 - NO PROBLEMS WERE FOUND (125V DC).
102	1			3.8.2.1	05/01/86	1400	05/01/86	1400	05/01/86	1500	1.00	0.00	1.00	Y			1D643	Y	Y	Y			REPLACE 1D643 BATTERY CHARGER AMPLIFIER BOARD (125V DC).
102	1			3.8.2.1	05/16/86	0840	05/16/86	0840	05/16/86	0958	1.30	0.00	1.30	Y			1D643	Y	Y	Y			REPLACE 1D643 BATTERY CHARGER CURRENT LIMIT AND AMPLIFIER BOARD (125V DC).
102	2			3.8.2.1	12/19/86	2230	12/19/86	2230	12/21/86	2100	0.00	46.50	46.50		Y		1D613	Y	Y	Y			BATTERY CHARGER 1D613 INOPERABLE (125V DC).
*** Total ***											7.22	78.98	86.20										

********************************** DC125 **********************************

BEGIN DATE: 01/01/87 END DATE: 12/31/87

UNIT	SYS	PLNT	CONO	TECH. SPEC	DOS DATE	DOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALG	FAIL	DESCRIPTION OF EVENT
102		1		3.8.2.1	02/09/87	0815	02/09/87	0815	02/09/87	0845	0.50	0.00	0.50		Y			1D613				Y	Y	Y	CHARGER 1D613 FAILED AS A RESULT OF CAPACITOR FAILURE.
102		1		3.8.2.1	02/20/87	1030	02/20/87	1030	02/20/87	1135	1.08	0.00	1.08		Y			1D613				Y	Y	Y	CHARGER 1D613 FAILED AS A RESULT OF CAPACITOR FAILURE.
102		1		3.8.2.1	02/20/87	1136	02/20/87	1136	02/20/87	1320	1.73	0.00	1.73		Y			1D612			A		Y	N	BUS 1D612 O/S FOR REPAIR.
102		1		3.8.2.1	02/20/87	1321	02/20/87	1321	02/20/87	1730	4.15	0.00	4.15		Y			1D613				Y	Y	N	CHARGER 1D613 O/S FOR REPAIR.
*** Total ***											7.46	0.00	7.46												

########## DC125 ##########

BEGIN DATE: 01/01/88 END DATE: 06/07/88

UNIT	SYS	PCL	NON	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PMT	CME	TSD	COMPONENT ID	SYS	DIV	CAK	CNP	VAL	FAI	DEL	DESCRIPTION OF EVENT
102	1			3.8.2.1	05/05/88	1325	05/05/88	1325	05/06/88	0300	13.58	0.00	13.58		Y		1D610			Y		N	N		1D610 CELL 845 TESTED AT 2.071 VOLTS - DOES NOT MEET CATEGORY B LIMITS.
102	1			3.8.2.1	05/06/88	0205	05/06/88	0205	05/06/88	0300	0.92	0.00	0.92	Y			1D610			Y		Y	N		1D610 (125V DC BATTERY BANK) INOP WHILE REMOVING CELL 845.
### Total ###											14.50	0.00	14.50												

U S N Y I S T	P C L O H N T D	TECH. SPEC	COS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	E H A	C O M P	V A L	F A I L	DESCRIPTION OF EVENT
*** Total ***									0.00	0.00	0.00												

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALO	FAIL	DESCRIPTION OF EVENT
168	1	3.8.2.1	04/12/84	0830	04/12/84	0830	04/12/84	0844	0.23	0.00	0.23	Y				1D653A				Y	N	N	BATTERY CHARGER 1D653A REMOVED FROM SERVICE TO ADJUST OUTPUT VOLTAGE.
168	-1	3.8.2.1	04/12/84	0844	04/12/84	0844	04/12/84	0858	0.23	0.00	0.23	Y				1D653B				Y	N	N	BATTERY CHARGER 1D653B REMOVED FROM SERVICE TO ADJUST OUTPUT VOLTAGE.
168	1	3.8.2.1	07/13/84	1259	07/13/84	1259	07/13/84	1743	4.73	0.00	4.73	Y				1D653A				Y	Y	Y	1D653A 250VDC BATTERY CHARGER - BLOWN CAPACITOR.
168	1	3.8.2	07/16/84	1120	07/16/84	1120	07/16/84	1306	1.77	0.00	1.77	Y				1D653A				Y	Y	Y	1D653A BATTERY CHARGER OUT OF SERVICE TO REPLACE CHARGER FAILURE BOARD.
*** Total ***									6.96	0.00	6.96												

############################## DC250 ##############################

BEGIN DATE: 01/01/85 END DATE: 12/31/85

UNIT	SYS	PLNT	COND	TECH. SPEC	DOS DATE	DOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	FM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
158		2		3.8.2.1	12/03/85	1455	12/03/85	1455	12/04/85	1745	0.00	26.83	26.83		Y			1D653A/B				Y	N	N	1D653A&B WILL NOT OPERATE IN PARALLEL - ONLY 1 CHARGER I/S.
165		1		3.8.2.1	12/10/85	0730	12/10/85	0730	12/10/85	1230	5.00	0.00	5.00		Y			1D653B				Y	Y	N	1D653B 250VDC BATTERY CHARGER O/S FOR MAINTENANCE.
*** Total ***											5.00	26.83	31.83												

******************************* DC250 *******************************

BEGIN DATE: 01/01/86 END DATE: 12/31/86

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOO	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
*** Total ***											0.00	0.00	0.00												

############################## DC250 ##############################

BEGIN DATE: 01/01/87 END DATE: 12/31/87

UNIT	SYS	PLNT	COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALD	FAIL	DESCRIPTION OF EVENT
### Total ###											0.00	0.00	0.00												

******************** ** DC250 ********************************

BEGIN DATE: 01/01/8 END DATE: 06/07/88

U N I T	S Y S	P L N T	C O N C	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	O I V	C H A N	C O M P	V A L D	F A I L	DESCRIPTION OF EVENT
*** Total ***																									
											0.00	0.00	0.00												

APPENDIX VIII

AC POWER SYSTEM

AC POWER SYSTEM

SYSTEM DESCRIPTION

Function

The function of the AC power system is to provide electric power to plant systems used for the normal operation of the plant and also for systems used to mitigate events that may occur. The AC power system is divided in accordance with the two primary functions into the non-safety feature and the Essential Safety Systems (ESS) AC system. Only the ESS system is discussed in this section.

Design and Operation

Offsite power to the Class 1E AC power system is supplied by the non-Class 1E 13.8 kV system. The Class 1E ESS AC power is distributed at 4.16 kV. Offsite power is supplied to the 4.16 kV Class 1E ESS buses of Unit 1 via the 13.8 kV startup buses of Units 1 and 2. The Unit 1 startup bus and transformer are supplied directly by the Montour-Mountain 230 kV line as shown in Figure 14. The Unit 2 startup bus and transformer are connected to the 230-500 kV switchyard tie line.

Figure 15 is a diagram of the distribution of the power from the startup buses to the 4.16 kV and 480 V ESS buses. The Class 1E buses and safety-related loads are divided into four channels. The 4.16 kV bus of each channel is provided with connections to the two startup buses designated preferred and alternative power supplies. Each 4.16 kV bus is normally energized by a preferred startup bus. Two 4.16 kV buses are normally supplied by the startup bus 10 (1A201 and 1A203), and the other two 4.16 kV buses are normally supplied by the startup bus 20 (1A202 and 1A204).

If offsite power is lost to either startup bus, there is a fast transfer scheme between the startup buses that can be used to supply the startup bus from the other startup transformer, thus restoring power to both startup buses.

If either the 13.8 kV/4.16 kV ESS transformer fails or the 13.8 kV tie breaker fails to close when required, then two 4.16 kV buses will momentarily lose power. For example, a total loss of power to startup bus 10 or ESS transformer 10 will cut power to 4.16 kV buses 1A201 and 1A203. These buses will automatically transfer to the alternative offsite startup supply, thus supplying all four 4.16 kV buses from one startup bus.

If both preferred and alternative startup buses become deenergized or other failures prevent offsite power supplies to the 4.16 kV ESS buses, then the buses and the safety-related loads are picked up automatically by the diesel generator assigned to that bus.

Loads Supplied from the 4.16 kV Class 1E ESS Buses

Table 23 shows the loads on each Unit 1 4.16 kV ESS bus (Unit 2 buses have similar loads). This table also shows the connections from the preferred and alternative startup buses and the diesel generators.

480 V Load Centers

There are four 480 V load centers, one to each 4.16 kV ESS bus. Each load center receives its supply via a 4.16 kV/480 V ESS transformer from a 4.16 kV ESS bus as follows:

4.16 kV bus	4.16 kV/480 V ESS transformer	480 V load center
1A201	1X210	1B210
1A202	1X220	1B220
1A203	1X230	1B230
1A204	1X240	1B240

Each load center can be supplied only from its corresponding ESS bus. Loss of power on a 4.16 kV ESS bus results in a loss of power to the 480 V load center.

Figure 16 shows the Motor Control Centers (MCCs) supplied by each 480 V load center. It can be seen that six of the MCCs (OB516, OB526, OB536, OB546, 1B219, and 1B229) can draw power from alternative 480 V load centers. MCCs 1B219 and 1B229 are designated Class 1E swing buses and supply the RHR injection valves, recirculation loop bypass valves, and recirculation discharge valves. The preferred power to buses 1B219 and 1B229 comes through the electrical isolation of a motor generator set. The alternative power, when required, comes directly from a load center. The motor generator set is used for electrically isolating the two load centers since faults at the swing buses cannot propagate to another load center. An automatic transfer switch is provided for transferring the swing buses from the preferred bus to the alternative bus upon loss of voltage on the preferred bus. If the undervoltage is caused by a fault on the swing bus itself, then the transfer is inhibited. If power is restored on the preferred load center bus, then the swing bus is transferred back to the preferred source.

Four MCCs can be supplied from either Unit 1 or Unit 2 480 V load centers. The function of these MCCs (OB516, OB526, OB536, OB546) is to provide diesel generator support and supply the 125 V DC battery chargers. The MCCs are connected by automatic transfer switches to their load centers. There is no preferred load center, and at any instant in time the MCCs can be supplied from Unit 1 or 2 480 V load centers. If the load center from which the MCC is being supplied fails, then the automatic transfer switch will transfer the MCC to the alternative load center.

120 V Power Scheme

As seen in Figure 17 there are ten 120 V AC power buses that are used to supply power to the plant (Unit 2 system arrangement is identical). Of these ten only two are needed by systems that are used to mitigate events as follows:

System	120 V power source	480 V supply
Standby Liquid Control	1Y216 1Y226	1B216 1B226
High Pressure Coolant Injection (Level 8 Trip logic)	1Y216 1Y226	1B216 1B226

1Y21(2,3,4)6 are supplied by only one 480 V Motor Control Center, while 1Y218 and 1Y128 can take power from one of two possible 480 V MCCs. The other 120 V buses receive power from a Motor Generator set connected to a 480 V MCC.

Protection of AC Supply Circuits

Protective trip devices are provided through circuit breakers in order to isolate faulty buses and equipment and thus prevent the propagation of supply disturbances and maintain continuity of power as far as possible to non-faulted equipment. High-speed disconnection of each 4.16 kV ESS bus from the offsite supplies prevents the propagation of an internal bus fault from one ESS bus to another. Overcurrent-sensing relays prevent damage to the diesel generator and motors connected to the 4.16 kV ESS buses. Overcurrent and ground sensing relays protect the 4.16 kV buses from faults originating in the 480 V load centers. Similar fault-sensing relays protect the load centers from MCC faults. Voltmeters and ammeters are provided to monitor all parts of the AC system from 500 kV down to 480 V. Control-room alarms monitor the status of the startup, auxiliary, and ESS transformers, circuit breakers, 4.16 kV buses, and 480 V load centers.

Instrumentation

The voltages and currents associated with the AC power distribution system are too high for standard voltmeters and ammeters. Therefore, potential and current transformers are used to transform the voltage and currents down to acceptable levels for the instrumentation. Conventional voltmeters (0-120 V) are used to measure the high voltages associated with the system at the 13.8 kV, 4.16 kV, and 480 V levels. The secondary of the potential transformers is also used as the sensing point for bus and feeder circuit undervoltage and overvoltage relays.

System Interfaces

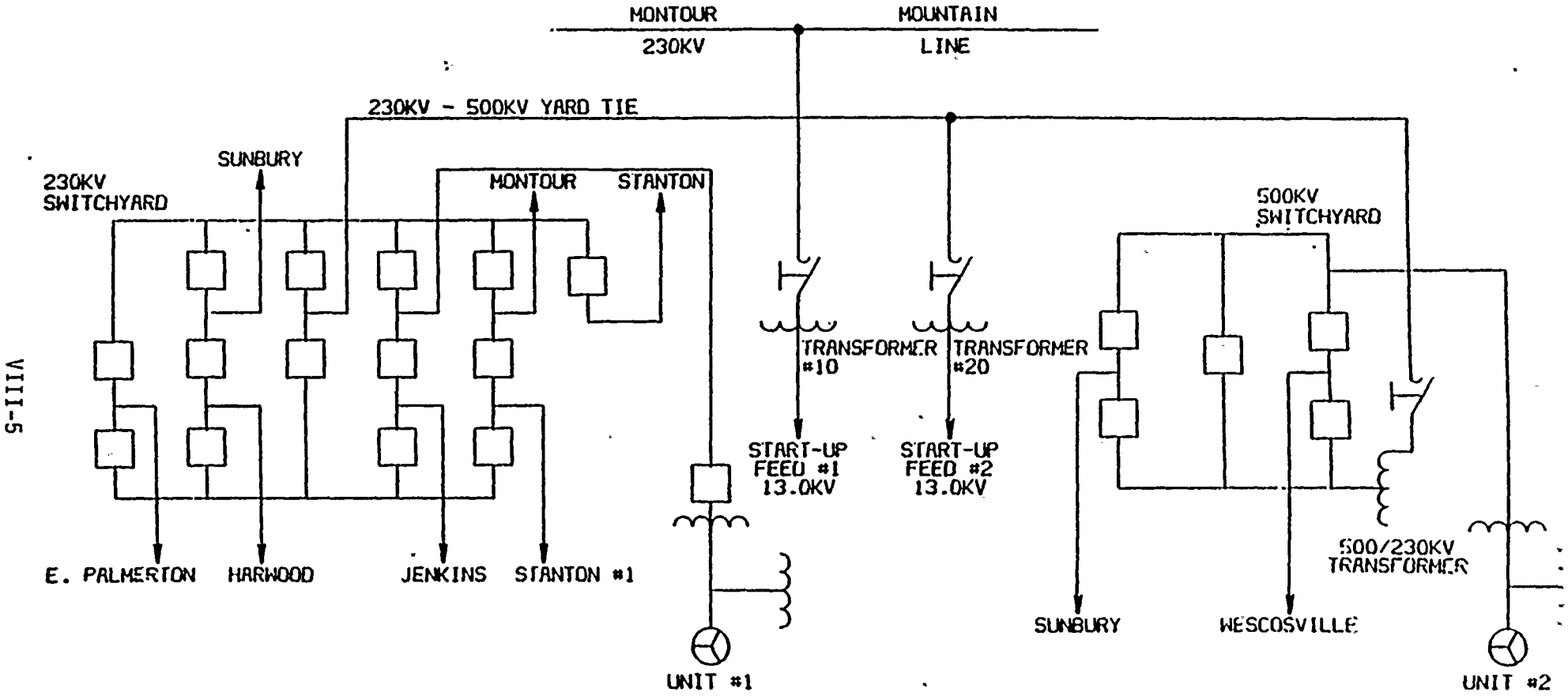
DC Power

The operation of the Class 1E AC power system is supported by the DC power system (see Section B13). The DC system is required to control switch gear breakers and to start and control the diesel generators.

The 125 V DC system is required for diesel starting and operation. It supplies the diesel engine and generator control panels and is used for solenoid control valves, instrumentation, and control circuits. A loss of DC control power is indicated in the main control room.

Table 23. Preferred power supplies and components for 13.8 kv Startup Buses

4.16 kV ESS load center	Preferred startup bus	Breaker from preferred transformer to ESS load center	Breaker from alternate transformer to ESS load center	125 V DC distribution panel	125 V DC load center	Breaker from preferred 13.8 kV bus to ESS transformer
1A201	10 (0A103)	52-20101	52-20109	1D614	1D612	52-10306
1A202	20 (0A104)	52-20209	52-20201	1D624	1D622	52-10412
1A203	10 (0A103)	52-20301	52-20309	1D634	1D632	52-10312
1A204	20 (0A104)	52-20409	52-20401	1D644	1D642	52-10406



VIII-5

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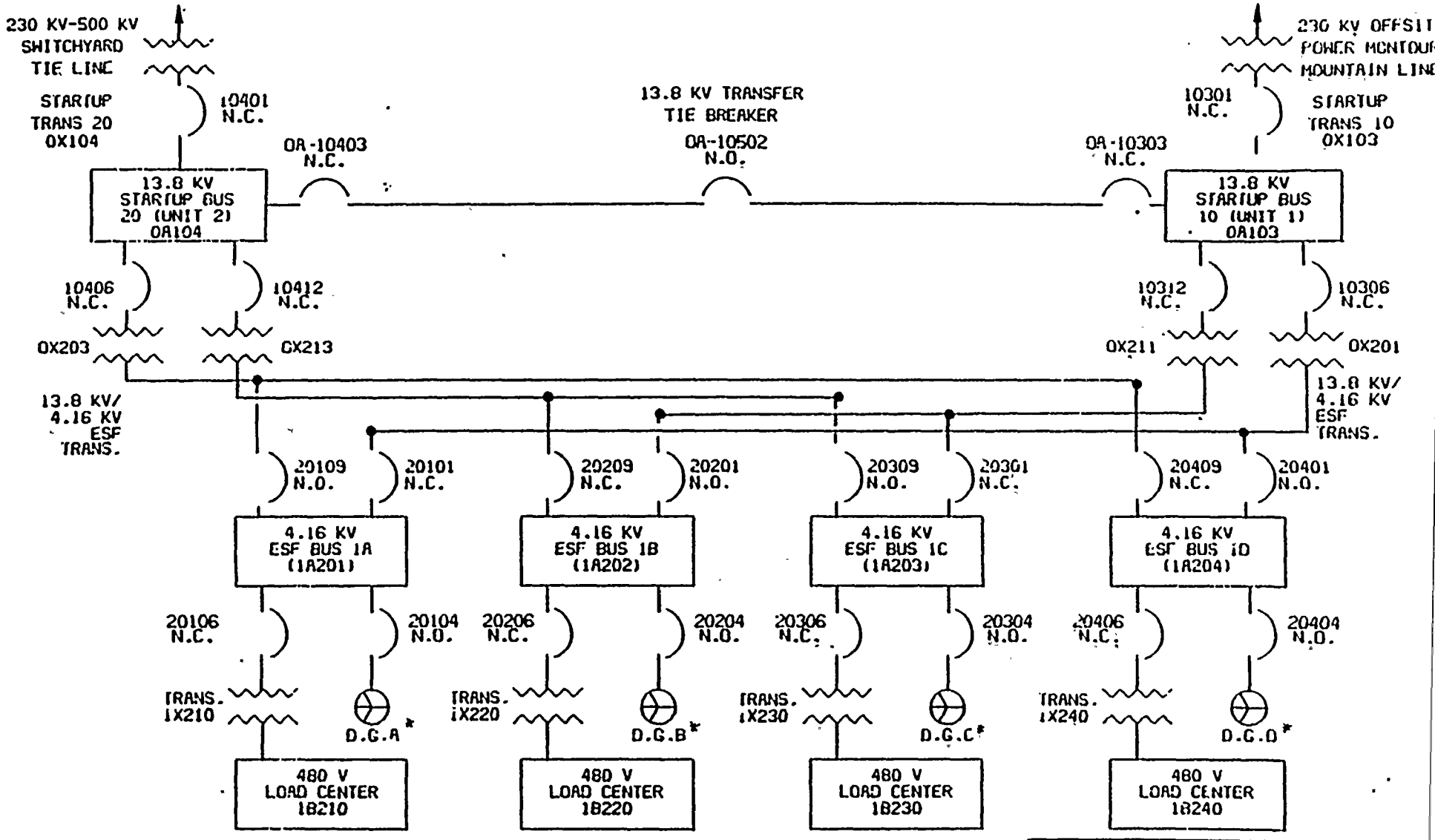
OFFSITE POWER SUPPLY
TO 13.8 KV
STARTUP BUSES

FIGURE 14 REV. 01

CN3194



*: The 'E' diesel can be substituted in place of the preferred diesel.

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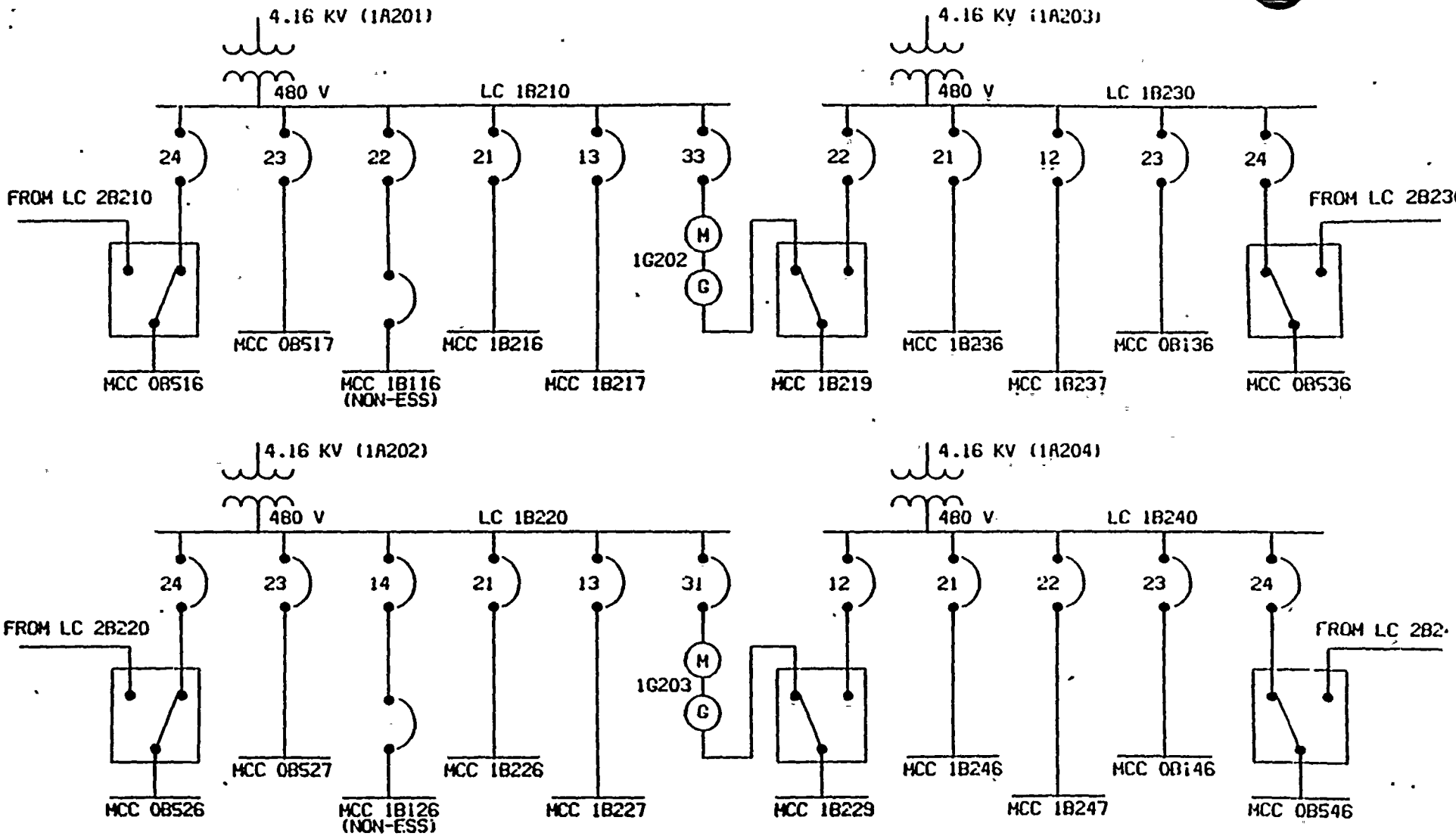
DIAGRAM OF THE
AC POWER DISTRIBUTION

FIGURE 15 REV. 01



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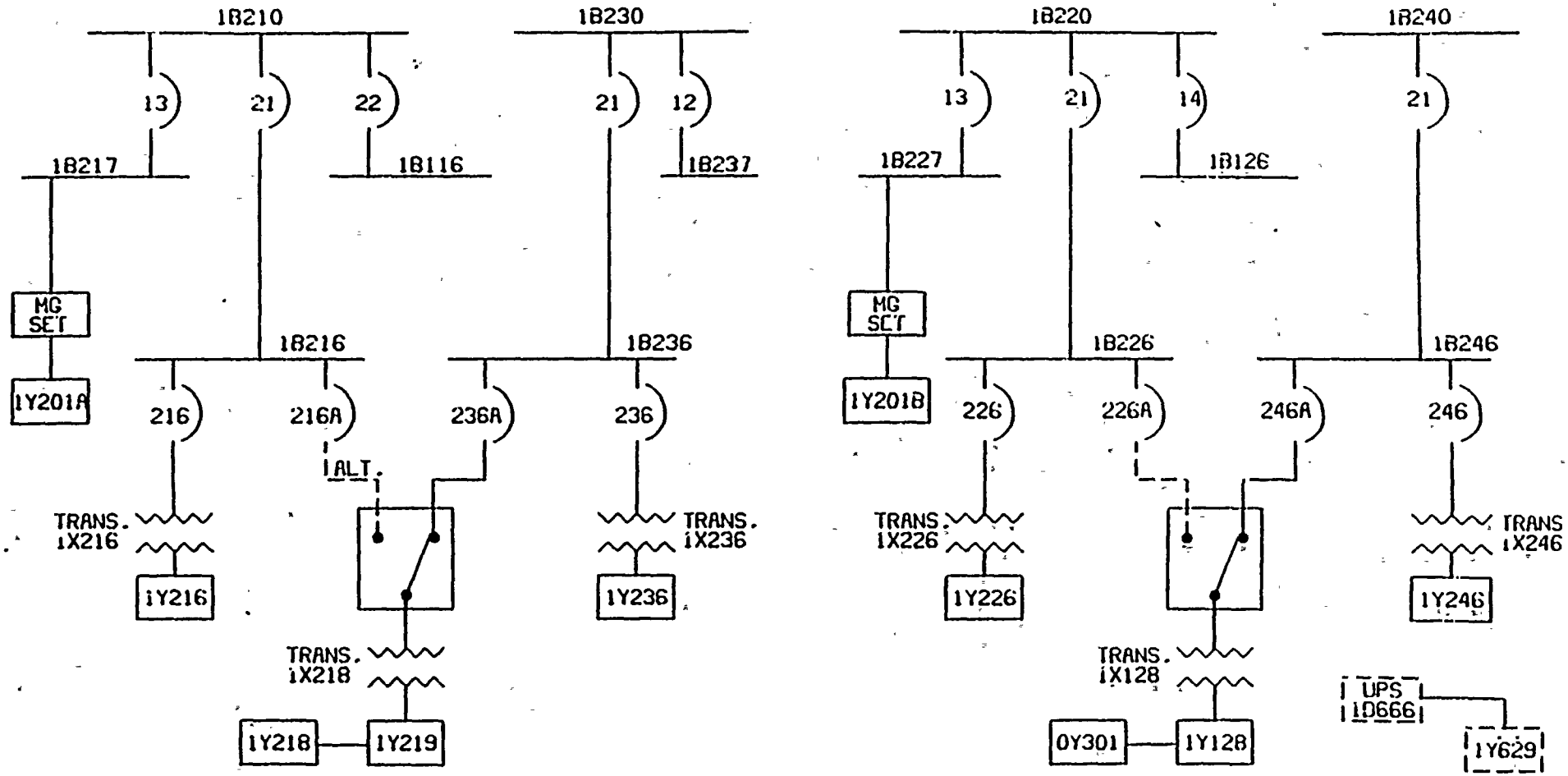
LOADS ON EACH

480 V LOAD CENTER

FIGURE 16 REV. (



VIII-8

SUSQUEHANNA
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120 VOLT
AC POWER
S[redacted]

U S N Y I S T	F S L Q N N T O	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	I E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C G H F	V A L D	F A I L	DESCRIPTION OF EVENT
103	3	3.8.1.1	06/24/83	1117	06/24/83	1117	06/27/83	0406	0.00	64.82	64.82		Y			T-10		1			Y	Y	LOST T-10 XFMR FOR OFF-SITE POWER.
103	1	3.8.1.1	09/07/83	0030	09/07/83	0030	09/09/83	0027	47.95	0.00	47.95		Y			T-10		1			Y	N	T-10 XFMR O/S FOR REPLACEMENT.
103	1	3.8.1.1	09/19/83	0542	09/19/83	0542	09/19/83	1645	11.05	0.00	11.05		Y			T-10		1			Y	N	T-10 OOS TO WORK MONTOUR-MOUNTAIN LINE.
103	1	3.8.1.1	09/20/83	0552	09/20/83	0552	09/20/83	1600	10.13	0.00	10.13		Y			T-10		1			Y	N	T-10 OUT OF SERVICE TO WORK MONTOUR-MOUNTAIN LINE.
103	1	3.8.1.1	10/17/83	1410	10/17/83	1410	10/17/83	1535	1.42	0.00	1.42	Y				T-10		1			N	N	T-10 TAP CHANGER IN MANUAL POSIT. FOR INVESTIGATION.
104	1	3.8.1	09/23/83	0650	09/23/83	0850	09/23/83	1250	4.00	0.00	4.00	Y				1A20209				Y	N	N	1A202-09 BKR RECHECKED OUT FOR PM.
104	1	3.3.3.1	10/17/83	0815	10/17/83	0815	10/17/83	0845	0.50	0.00	0.50			Y		1A201			A		N	N	1A201 BUS UNDERVOLTAGE RELAY INOPERABLE FOR SURV.
104	1	3.3.3.1	10/17/83	0855	10/17/83	0855	10/17/83	0915	0.33	0.00	0.33			Y		1A202			B		N	N	1A202 BUS UNDERVOLTAGE RELAY INOPERABLE FOR SURV.
104	1	3.3.3.1	10/17/83	0920	10/17/83	0920	10/17/83	0935	0.25	0.00	0.25			Y		1A203			C		N	N	1A203 BUS UNDERVOLTAGE RELAY INOPERABLE FOR SURV.
104	1	3.3.3.1	10/17/83	0940	10/17/83	0940	10/17/83	1000	0.33	0.00	0.33			Y		1A204			D		N	N	1A204 BUS UNDERVOLTAGE RELAY INOPERABLE FOR SURV.
104	1	3.3.3	11/17/83	0815	11/17/83	0815	11/17/83	0843	0.47	0.00	0.47			Y		1A201			A		N	N	1A201 BUS UNDERVOLTAGE PROT. O/S FOR SURV. SM-104-009.
104	1	3.3.3	11/17/83	0850	11/17/83	0850	11/17/83	0910	0.33	0.00	0.33			Y		1A202			B		N	N	1A202 BUS UNDERVOLTAGE PROT. O/S FOR SURV. SM-104-010.
104	1	3.3.3	11/17/83	0915	11/17/83	0915	11/17/83	0931	0.27	0.00	0.27			Y		1A203			C		N	N	1A203 BUS UNDERVOLTAGE PROT. O/S FOR SURV. SM-104-011.
104	1	3.3.3	11/17/83	0935	11/17/83	0935	11/17/83	0959	0.40	0.00	0.40			Y		1A204			D		N	N	1A204 BUS UNDERVOLTAGE PROT. O/S FOR SURV. SM-104-012.
104	3	3.8.1.2	12/19/83	2215	12/19/83	2215	12/19/83	2253	0.00	0.63	0.63			Y		1A202				(	N	N	1A202 BUS INOPERABLE FROM OFF-SITE SUPPLY FOR TP-(4-001.
104	3	3.8.1.2	12/22/83	0750	12/22/83	0750	12/22/83	0815	0.00	0.42	0.42			Y		1A202			F		N	N	4KV BUS 1B O/S FOR UNDERVOLTAGE SURV.
104	3	3.8.1.2	12/22/83	0815	12/22/83	0815	12/22/83	0836	0.00	0.35	0.35			Y		1A204			D		N	N	4KV BUS 1D O/S FOR UNDERVOLTAGE SURV.
105	3	3.8.3.2	06/28/83	0845	06/28/83	0845	06/28/83	1630	0.00	7.75	7.75	Y				1B229		2			Y	N	CLEAN MCC1B229 (1ATS229).
### Total ###									77.43	73.97	151.40												

EAC

BEGIN DATE: 01/01/84 END DATE: 12/31/84

UNIT SYS	PLNT COND	TECH. SPEC	OOS DATE	OOS TIME	NOO DATE	NOO TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VALID	FAIL	DESCRIPTION OF EVENT
103	1	3.8.1.1	07/03/84	1410	07/03/84	1410	07/03/84	1526	0.03	1.23	1.27		Y			T-10		1			Y	N	LOST T-10.
103	1	3.8.1.1	08/07/84	0505	08/07/84	0505	08/07/84	0529	0.40	0.00	0.40			Y		T-20		2			Y	N	T-20 DE-ENERGIZED FOR UNIT 2 LOCATION ST31.1.
103	1	3.8.1.1	11/06/84	0835	11/06/84	0835	11/06/84	1200	3.42	0.00	3.42	Y				T-20		2			Y	N	T-20 REMOVED FROM SERVICE FOR OUTAGE.
103	1	3.8.1	11/09/84	1255	11/09/84	1255	11/09/84	1730	4.58	0.00	4.59	Y				T-21		2			Y	N	T-20 REMOVED FROM SERVICE FOR MAINTENANCE ON T-21.
103	1	3.8.1.1	12/07/84	1200	12/07/84	1200	12/07/84	1753	5.88	0.00	5.88		Y			01203		2			N	N	ESS TRANSFORMER 01203 O/S FOR CM TO REWORK LINE SIDE CLUSTER ON BKR 2A201-09.
103	1	3.8.1.1	12/10/84	0615	12/10/84	0615	12/10/84	1715	11.00	0.00	11.00		Y			01203		2			N	N	ESS TRANSFORMER 01203 OUT OF SERVICE FOR CM TO REWORK LINE SIDE CLUSTER ON BKR 2A201-09.
104	5	3.3.3.1	01/11/84	1005	01/11/84	1005	01/11/84	1048	0.00	0.72	0.72			Y		1A203			C		N	N	MD-4KV BUS 1A203 DEGRADED VOLT CHANNEL FUNCTION OUT INOP 'C' D/G.
104	5	3.3.3.1	01/11/84	1050	01/11/84	1050	01/11/84	1115	0.00	0.42	0.42			Y		1A201			A		N	N	MD-4KV BUS 1A201 DEGRADED VOLT CHANNEL FUNCT TEST.
104	1	3.3.3.1	04/03/84	0825	04/03/84	0825	04/03/84	0840	0.25	0.00	0.25			Y		1A201			A		N	N	BUS 1A201 UNDERVOLTAGE START FOR 'A' D.G. INOP FOR SM-104-009.
104	1	3.3.3.1	04/03/84	0845	04/03/84	0845	04/03/84	0905	0.33	0.00	0.33			Y		1A203			C		N	N	BUS 1A203 UNDERVOLTAGE START FOR 'C' D.G. INOP FOR SM-104-011.
104	1	3.3.3.1	04/03/84	0935	04/03/84	0935	04/03/84	0955	0.33	0.00	0.33			Y		1A202			B		N	N	BUS 1A202 UNDERVOLTAGE START FOR 'B' D.G. INOP FOR SM-104-010.
104	1	3.3.3.1	04/03/84	1000	04/03/84	1000	04/03/84	1020	0.33	0.00	0.33			Y		1A204			D		N	N	BUS 1A204 UNDERVOLTAGE START FOR 'D' D.G. INOP FOR SM-104-012.
104	1	3.8.1.1	05/04/84	0810	05/04/84	0810	05/04/84	0840	0.50	0.00	0.50			Y		1A201			A		N	N	BUS 1A201 UNDERVOLTAGE START FOR 'A' D.G. INOP FOR SM-104-009.
104	1	3.8.1.1	05/04/84	0845	05/04/84	0845	05/04/84	0903	0.30	0.00	0.30			Y		1A202			B		N	N	BUS 1A202 UNDERVOLTAGE START FOR 'B' D.G. INOP FOR SM-104-010.
104	1	3.8.1.1	05/04/84	0907	05/04/84	0907	05/04/84	0925	0.30	0.00	0.30			Y		1A203			C		N	N	BUS 1A203 UNDERVOLTAGE START FOR 'C' D.G. INOP FOR SM-104-011.
104	1	3.8.1.1	05/04/84	0929	05/04/84	0929	05/04/84	0954	0.42	0.00	0.42			Y		1A204			D		N	N	BUS 1A204 UNDERVOLTAGE START FOR 'D' D.G. INOP FOR SM-104-012.
104	1	3.8.1.1	05/31/84	0815	05/31/84	0815	05/31/84	0830	0.25	0.00	0.25			Y		1A201			A		N	N	1A201 INOP FOR SM-104-009.
104	1	3.8.1.1	05/31/84	0835	05/31/84	0835	05/31/84	0844	0.15	0.00	0.15			Y		1A202			B		N	N	1A202 INOP FOR SM-104-010.
104	1	3.8.1.1	05/31/84	0845	05/31/84	0845	05/31/84	0856	0.18	0.00	0.18			Y		1A203			C		N	N	1A203 INOP FOR SM-104-011.
104	1	3.8.1.1	05/31/84	0858	05/31/84	0858	05/31/84	0910	0.20	0.00	0.20			Y		1A204			D		N	N	1A204 INOP FOR SM-104-012.
104	1	3.3.3	06/29/84	0930	06/29/84	0830	06/29/84	0844	0.23	0.00	0.23			Y		1A201			A		N	N	SM-104-009 FOR 1A201 - INOPS 1A201.
104	1	3.3.3	06/29/84	0910	06/29/84	0910	06/29/84	0915	0.08	0.00	0.08			Y		1A202			B		N	N	SM-104-010 FOR 1A202 - INOPS 1A202.
104	1	3.3.3	06/29/84	0925	06/29/84	0925	06/29/84	0934	0.15	0.00	0.15			Y		1A203			C		N	N	SM-104-011 FOR 1A203 - INOPS 1A203.
104	1	3.3.3	06/29/84	0945	06/29/84	0945	06/29/84	0953	0.13	0.00	0.13			Y		1A204			D		N	N	SM-104-012 FOR 1A204 - INOPS 1A204.
104	1	3.8.1.1	07/30/84	0814	07/30/84	0814	07/30/84	0819	0.08	0.00	0.08			Y		1A201			A		N	N	'A' DIESEL AUTO START ON 1A201 DISABLED FOR SM-104-009, UV RELAY TESTING.
104	1	3.8.1.1	07/30/84	0819	07/30/84	0819	07/30/84	0828	0.15	0.00	0.15			Y		1A202			B		N	N	'B' DIESEL AUTO START ON 1A202 DISABLED FOR SM-104-010, UV RELAY TESTING.
104	1	3.8.1.1	07/30/84	0828	07/30/84	0828	07/30/84	0835	0.12	0.00	0.12			Y		1A203			C		N	N	'C' DIESEL AUTO START ON 1A203 DISABLED FOR SM-104-011, UV RELAY TESTING.
104	1	3.8.1.1	07/30/84	0835	07/30/84	0835	07/30/84	0842	0.12	0.00	0.12			Y		1A204			D		N	N	'D' DIESEL AUTO START ON 1A204 DISABLED FOR SM-104-012, UV RELAY TESTING.
104	1	3.8.1.1	08/30/84	0824	08/30/84	0824	08/30/84	0830	0.10	0.00	0.10			Y		1A201			A		N	N	'A' DG INOP FOR U1 SM-104-009 MONTHLY FUNCTIONAL.
104	1	3.8.1.1	08/30/84	0830	08/30/84	0830	08/30/84	0838	0.13	0.00	0.13			Y		1A202			B		N	N	'B' DG INOP FOR U1 SM-104-010 MONTHLY FUNCTIONAL.
104	1	3.8.1.1	08/30/84	0838	08/30/84	0838	08/30/84	0845	0.12	0.00	0.12			Y		1A203			C		N	N	'C' DG INOP FOR U1 SM-104-011 MONTHLY FUNCTIONAL.
104	1	3.8.1.1	08/30/84	0845	08/30/84	0845	08/30/84	0853	0.13	0.00	0.13			Y		1A204			D		N	N	'D' DG INOP FOR U1 SM-104-012 FOR MONTHLY FUNCTIONAL.
104	1	3.8.1	09/26/84	0820	09/26/84	0820	09/26/84	0840	0.33	0.00	0.33			Y		1A201			A		N	N	DIESEL GENERATOR 'A' INOPERABLE FOR BUS 1A201 DURING SM-104-009.
104	1	3.8.1	09/26/84	0842	09/26/84	0842	09/26/84	0851	0.15	0.00	0.15			Y		1A202			B		N	N	DIESEL GENERATOR 'B' INOPERABLE FOR BUS 1A202 DURING SM-104-010.
104	1	3.8.1	09/26/84	0852	09/26/84	0852	09/26/84	0901	0.15	0.00	0.15			Y		1A203			C		N	N	DIESEL GENERATOR 'C' INOPERABLE FOR BUS 1A203 DURING SM-104-011.
104	1	3.8.1	09/26/84	0902	09/26/84	0902	09/26/84	0910	0.13	0.00	0.13			Y		1A204			D		N	N	DIESEL GENERATOR 'D' INOPERABLE FOR BUS 1A204 DURING SM-104-012.
104	1	3.6.1.1	10/25/84	0910	10/25/84	0910	10/25/84	0913	0.05	0.00	0.05			Y		1A201			A		N	N	BUS UNDERVOLTAGE RELAYS DEFEATED FOR PERFORMANCE OF SM-104-009 ON BUS 1A201.
104	1	3.8.1.1	10/25/84	0914	10/25/84	0914	10/25/84	0922	0.13	0.00	0.13			Y		1A202			B		N	N	BUS UNDERVOLTAGE RELAYS DEFEATED FOR PERFORMANCE OF SM-104-010 ON BUS 1A202.
104	1	3.8.1.1	10/25/84	0923	10/25/84	0923	10/25/84	0930	0.12	0.00	0.12			Y		1A203			C		N	N	BUS UNDERVOLTAGE RELAYS DEFEATED FOR PERFORMANCE OF SM-104-011 ON BUS 1A203.
104	1	3.3.1/3.8.1	10/25/84	0931	10/25/84	0931	10/25/84	0938	0.12	0.00	0.12			Y		1A204			D		N	N	BUS UNDERVOLTAGE RELAYS DEFEATED FOR PERFORMANCE OF SM-104-012 ON BUS 1A204.
104	1	3.3.3	11/25/84	0740	11/26/84	0740	11/26/84	0755	0.25	0.00	0.25			Y		1A201			A		N	N	1A201 INOP FOR SM-104-009 REMOVES LOW VOLTAGE AUTO START.
104	1	3.3.3	11/26/84	0756	11/26/84	0756	11/26/84	0801	0.08	0.00	0.08			Y		1A202			B		N	N	1A202 INOP FOR SM-104-010 REMOVES LOW VOLTAGE AUTO START.
104	1	3.3.3	11/26/84	0802	11/26/84	0802	11/26/84	0809	0.12	0.00	0.12			Y		1A203			C		N	N	1A203 INOP FOR SM-104-011 REMOVES LOW VOLTAGE AUTO START.
104	1	3.3.3	11/26/84	0810	11/26/84	0810	11/26/84	0816	0.10	0.00	0.10			Y		1A204			D		N	N	1A204 INOP FOR SM-104-012 REMOVES LOW VOLTAGE AUTO START.
[illegible]	1	3.8.1	12/19/84	0800	12/19/84	0800	12/19/84	0820	0.33	0.00	[illegible]			Y		1A201			A		N	N	ESS BUS 1A201 INOP DUE TO 'A' DG UV SURV IN PROGRESS.
[illegible]	1	3.8.1	12/19/84	0822	12/19/84	0822	12/19/84	0830	0.13	0.00	[illegible]			Y		1A202			B		N	N	1A202 'B' ESS BUS INOP DUE TO EM SURV TO DG UV.

103	1	3.8.1	12/19/84	0832	12/19/84	0832	12/19/84	0837	0.08	0.00	0.08	Y	1A203	C	N	N	1A203 'C' ESS SUS INOP FOR EM SURV DG UV.
104	1	3.8.1	12/19/84	0840	12/19/84	0840	12/19/84	0843	0.05	0.00	0.05	Y	1A204	D	N	N	1A204 'D' ESS BUS INOP FOR EM SURV.
105	1	3.8.3.1	10/08/84	0500	10/08/84	0500	10/08/84	1350	8.83	0.00	8.83	Y	15229	2	N	N	SWING BUS M/G SET 1G203 O/S FOR PM - INOPS ATS SWITCH 15229. (PER T.S. INTERPRETATION U-2 T.S.)
106	1	3.8.3.1	11/16/84	0528	11/16/84	0528	11/16/84	1800	12.53	0.00	12.53	Y	15219	1	N	N	A SWING BUS MG SET O/S FOR PM.
*** Total ***																	
									54.07	2.37	56.45						

IIIIIIIIIIIIIIIIIIIIIIIIIIIIII EAC IIIIIIIIIIIIIIIIIIIIIIIIIIIIII

BEGIN DATE: 01/01/85 END DATE: 12/31/85

U S N Y I S T	P C L O N N T O	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDWN TIME (HRS)	TOTAL TIME (HRS)	P M	C M	T E S T	M O D	COMPONENT ID	S Y S	D I V	C H A N	C O M P	V A L D	F A I L	DESCRIPTION OF EVENT
003	1	3.8.1.1	06/17/85	0607	06/17/85	0607	06/17/85	1835	12.47	0.00	12.47	Y				T-10		1			Y	N	LOSS OF ONE OFFSITE POWER SUPPLY (T-10) TO PAINT TOWERS.
003	1	3.8.1.1	06/18/85	0607	06/18/85	0607	06/18/85	1315	7.13	0.00	7.13	Y				T-10		1			Y	N	T-10 OOS FOR TOWER PAINTING.
003	1	3.8.1.1	06/19/85	0633	06/19/85	0633	06/19/85	1720	10.78	0.00	10.78	Y				T-10		1			Y	N	T-10 OOS FOR TOWER PAINTING.
003	1	3.8.1.1	06/20/85	0606	06/20/85	0606	06/20/85	1620	10.33	0.00	10.33	Y				T-10		1			Y	N	T-10 OOS FOR TOWER PAINTING.
003	1	3.8.1.1	06/21/85	0730	06/21/85	0730	06/21/85	1640	9.17	0.00	9.17	Y				T-10		1			Y	N	T-10 O/S FOR TOWER PAINTING.
003	1	3.8.1.1A	06/24/85	0605	06/24/85	0605	06/24/85	1430	8.42	0.00	8.42	Y				T-10		1			Y	N	T-10 O/S FOR TOWER PAINTING.
003	1	3.8.1.1	06/26/85	0604	06/26/85	0604	06/26/85	1730	11.43	0.00	11.43	Y				T-10		1			Y	N	T-10 O/S FOR TOWER PAINTING.
003	1	3.8.1.1	09/30/85	0645	09/30/85	0645	09/30/85	1541	8.93	0.00	8.93		Y			T-10		1			Y	N	LOSS OF ONE SOURCE OF OFF-SITE POWER DUE TO T-10 O/S FOR MAINTENANCE ON MONTOUR-MOUNTAIN 230KV LINE.
104	1	3.8.1.1	01/22/85	0725	01/22/85	0725	01/22/85	0736	0.18	0.00	0.18			Y		1A201			A		N	N	BUS 1A201 O/S FOR PERFORMANCE OF SM-104-009.
104	1	3.8.1.1	01/22/85	0737	01/22/85	0737	01/22/85	0743	0.10	0.00	0.10			Y		1A202			B		N	N	BUS 1A202 O/S FOR PERFORMANCE OF SM-104-010.
104	1	3.8.1.1	01/22/85	0745	01/22/85	0745	01/22/85	0751	0.10	0.00	0.10			Y		1A203			C		N	N	BUS 1A203 O/S FOR PERFORMANCE OF SM-104-011.
104	1	3.8.1.1	01/22/85	0752	01/22/85	0752	01/22/85	0759	0.12	0.00	0.12			Y		1A204			D		N	N	BUS 1A204 O/S FOR PERFORMANCE OF SM-104-012.
104	5	3.8.3.1	03/09/85	0822	03/09/85	0822	03/09/85	1650	0.00	8.47	8.47				Y	1A204			D		Y	N	MCC'S 0B146, 1B246, 1B240 AND 4KV BUS 1A204 OOS FOR OUTAGE.
104	5	3.8.3.1.A	04/11/85	0600	04/11/85	0800	04/11/85	1650	0.00	10.83	10.83				Y	1A201			A		Y	N	1A201 4KV BUS, 1B210 480V L.C., O/S FOR 125V D.C. MOD.
104	5	3.8.1.1.	05/14/85	0838	05/14/85	0838	05/14/85	0845	0.00	0.12	0.12			Y		1A201			A		N	N	SM-104-009 INOPS BUS 1A201 UNDERVOLTAGE RELAY AND 'A' D/G TO BUS 1A201.
104	5	3.8.1.1	05/14/85	0845	05/14/85	0845	05/14/85	0900	0.00	0.25	0.25			Y		1A202			B		N	N	SM-104-010 INOPS BUS 1A202 UNDERVOLTAGE RELAY AND 'B' D/G TO BUS 1A202.
104	5	3.8.1.1	05/14/85	0900	05/14/85	0900	05/14/85	0915	0.00	0.25	0.25			Y		1A203			C		N	N	SM-104-011 INOPS BUS 1A203 UNDERVOLTAGE RELAY AND 'C' D/G TO BUS 1A203.
104	5	3.8.1.1	05/14/85	0915	05/14/85	0915	05/14/85	0930	0.00	0.25	0.25			Y		1A204			D		N	N	SM-104-012 INOPS BUS 1A204 UNDERVOLTAGE RELAY AND 'D' D/G TO BUS 1A204.
104	1	3.3.3-1	06/14/85	1050	06/14/85	1050	06/14/85	1053	0.05	0.00	0.05			Y		1A201			A		N	N	DG 'A' INOP FOR SUPPLY TO BUS 1A201 FOR UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3-1	06/14/85	1054	06/14/85	1054	06/14/85	1100	0.10	0.00	0.10			Y		1A202			B		N	N	DG 'B' INOP FOR SUPPLY TO BUS 1A202 FOR UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3-1	06/14/85	1101	06/14/85	1101	06/14/85	1113	0.20	0.00	0.20			Y		1A203			C		N	N	DG 'C' INOP FOR SUPPLY TO BUS 1A203 FOR UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3-1	06/14/85	1114	06/14/85	1114	06/14/85	1125	0.18	0.00	0.18			Y		1A204			D		N	N	DG 'D' INOP FOR SUPPLY TO BUS 1A204 FOR UNDERVOLTAGE RELAY TESTING.
104	1	3.8.1.1	07/12/85	0915	07/12/85	0915	07/12/85	0925	0.17	0.00	0.17			Y		1A201			A		N	N	'A' DG SUPPLY BKR TO 1A201 INOP DURING SM-104-009.
104	1	3.8.1.1	07/12/85	0925	07/12/85	0926	07/12/85	0936	0.17	0.00	0.17			Y		1A202			B		N	N	'B' DG SUPPLY BKR TO 1A202 INOP DURING SM-104-010.
104	1	3.8.1.1	07/12/85	0937	07/12/85	0937	07/12/85	0946	0.15	0.00	0.15			Y		1A203			C		N	N	'C' DG SUPPLY BKR TO 1A203 INOP DURING SM-104-011.
104	1	3.8.1.1	07/12/85	0947	07/12/85	0947	07/12/85	0956	0.15	0.00	0.15			Y		1A204			D		N	N	'D' DG SUPPLY BKR TO 1A204 INOP DURING SM-104-012.
104	1	3.3.3	08/09/85	0645	08/09/85	0645	08/09/85	0715	0.50	0.00	0.50			Y		1A201			A		N	N	SM-104-009 INOPS LOW VOLTAGE RELAYS ON 1A201 INOPS 'A' DG.
104	1	3.8.3.1	08/09/85	0716	08/09/85	0716	08/09/85	0730	0.23	0.00	0.23			Y		1A202			B		N	N	'B' DG BKR TO 1B BUS O/S FOR SM-104-010.
104	1	3.8.3.1	08/09/85	0735	08/09/85	0735	08/09/85	0800	0.42	0.00	0.42			Y		1A203			C		N	N	'C' DG BKR TO 1C BUS O/S FOR SM-104-011.
104	1	3.8.3.1	08/09/85	0810	08/09/85	0810	08/09/85	0825	0.25	0.00	0.25			Y		1A204			D		N	N	'D' DG BKR TO 1D BUS O/S FOR SM-104-012.
104	1	3.8.1/3.8.3	09/09/85	0830	09/09/85	0830	09/09/85	0840	0.17	0.00	0.17			Y		1A201			A		N	N	ELECT TEST PERFORMING SM-104-009 TESTING UNDERVOLTAGE RELAY OF 1A201.
104	1	3.8.1/3.8.3	09/09/85	0841	09/09/85	0841	09/09/85	0851	0.17	0.00	0.17			Y		1A202			B		N	N	ELECT TEST PERFORMING SM-104-010 TESTING UNDERVOLTAGE RELAY OF 1A202.
104	1	3.8.1/3.8.3	09/09/85	0852	09/09/85	0852	09/09/85	0903	0.18	0.00	0.18			Y		1A203			C		N	N	ELECT TEST PERFORMING SM-104-011 TESTING UNDERVOLTAGE RELAY OF 1A203.
104	1	3.8.1/3.8.3	09/09/85	0904	09/09/85	0904	09/09/85	0917	0.22	0.00	0.22			Y		1A204			D		N	N	ELECT TEST PERFORMING SM-104-012 TESTING UNDERVOLTAGE RELAY OF 1A204.
104	1	3.8.1.1	10/09/85	0725	10/09/85	0725	10/09/85	0740	0.25	0.00	0.25			Y		1A201			A		N	N	1A201 INOP DURING SM-104-009 RELAY SURV.
104	1	3.8.1.1	10/09/85	0741	10/09/85	0741	10/09/85	0757	0.27	0.00	0.27			Y		1A202			B		N	N	1A202 INOP DURING SM-104-010 RELAY SURV.
104	1	3.8.1.1	10/09/85	0758	10/09/85	0758	10/09/85	0810	0.20	0.00	0.20			Y		1A203			C		N	N	1A203 INOP DURING SM-104-011 RELAY SURV.
104	1	3.8.1.1	10/09/85	0811	10/09/85	0811	10/09/85	0830	0.32	0.00	0.32			Y		1A204			D		N	N	1A204 INOP DURING SM-104-012 RELAY SURV.
104	3	3.8.3.1	11/04/85	0855	11/04/85	0855	11/04/85	0900	0.00	0.08	0.08			Y		1A201			A		N	N	SM-104-009 BEING PERFORMED ON 4KV BUS 1A201.
104	3	3.8.3.1	11/04/85	0901	11/04/85	0901	11/04/85	0910	0.00	0.15	0.15			Y		1A202			B		N	N	SM-104-010 BEING PERFORMED ON 4KV BUS 1A202.
104	3	3.8.3.1	11/04/85	0923	11/04/85	0923	11/04/85	0929	0.00	0.10	0.10			Y		1A203			C		N	N	SM-104-011 BEING PERFORMED ON 4KV BUS 1A203.
104	3	3.8.3.1	11/04/85	0930	11/04/85	0930	11/04/85	0940	0.17	0.00	0.17			Y		1A204			D		N	N	SM-104-012 BEING PERFORMED ON 4KV BUS 1A204.
104	1	3.3.3/3.8.1	12/02/85	0800	12/02/85	0800	12/02/85	0805	0.08	0.00	0.08			Y		1A201			A		N	N	BUS 1A201 INOP FOR UV TRANSFER FROM OFFSITE PWR AND DG DURING PERFORMANCE OF SM-104-009.
[illegible]	1	3.3.3/3.8.1	12/02/85	0806	12/02/85	0805	12/02/85	0820	0.23	0.00	0.23			Y		1A202			B		N	N	BUS 1A202 INOP FOR UV TRANSFER FROM OFFSITE PWR AND DG DURING PERFORMANCE OF SM-104-010.

104	1	3.3.3/3.8.1	12/02/85	0823	12/02/85	0823	12/02/85	0835	0.20	0.00	0.20	Y	1A203	C	N N	BUS 1A203 INOP FOR UV TRANSFER FROM OFFSITE PWER AND EG DURING PERFORMANCE OF SM-104-011.
104	1	3.3.3/3.8.1	12/02/85	0836	12/02/85	0836	12/02/85	0846	0.17	0.00	0.17	Y	1A204	D	N N	BUS 1A204 INOP FOR UV TRANSFER FROM OFFSITE PWR AND DG DURING PERFORMANCE OF SM-104-012.
104	1	3.3.3/3.8.1	12/30/85	0745	12/30/85	0745	12/30/85	0755	0.17	0.00	0.17	Y	1A201	A	N N	BUS 1A201 UNDERVOLTAGE TRANSFER INOP DURING PERFORMANCE OF SM-104-009.
104	1	3.3.3/3.8.1	12/30/85	0800	12/30/85	0800	12/30/85	0808	0.13	0.00	0.13	Y	1A202	B	N N	BUS 1A202 UNDERVOLTAGE TRANSFER INOP DURING PERFORMANCE OF SM-104-010.
104	1	3.3.3/3.8.1	12/30/85	0810	12/30/85	0810	12/30/85	0820	0.17	0.00	0.17	Y	1A203	C	N N	BUS 1A203 UNDERVOLTAGE TRANSFER INOP DURING PERFORMANCE OF SM-104-011.
104	1	3.3.3/3.8.1	12/30/85	0825	12/30/85	0825	12/30/85	0835	0.17	0.00	0.17	Y	1A204	D	N N	BUS 1A204 UNDERVOLTAGE TRANSFER INOP DURING PERFORMANCE OF SM-104-012.
105	3	3.4.9.2	08/04/85	0900	08/04/85	0900	08/04/85	2135	0.00	12.58	12.58	Y	1B229	2	Y N	DIV 2 SWING BUS DEENERGIZED.
105	1	3.8.3.1	11/11/85	0530	11/11/85	0530	11/11/85	1510	9.67	0.00	9.67	Y	1B219	1	N N	1B219 SWING BUS MG SET O/S FOR PM.
105	1	3.5.16	11/15/85	1110	11/15/85	1110	11/15/85	1710	6.00	0.00	6.00	Y	1B229	2	N N	DIV 2 SWING BUS MG O/S FOR PM.
### Total ###																
									100.67	33.08	133.75					

UNIT	PLANT ID	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PMT	CMT	MEOD	COMPONENT ID	SYS	DIV	CAN	CMP	VAL	FDL	DESCRIPTION OF EVENT
003	1	3.8.1.1	06/01/86	0842	06/01/86	0842	06/01/86	1015	0.00	1.55	1.55	Y			T-20		2			Y	Y	T-20 FAILURE.
103	1	3.8.1.1	10/10/86	0300	10/10/86	0300	10/11/86	1446	35.77	0.00	35.77	Y			T-20		2			Y	N	T-20 MAINTENANCE - 13.8KV SYSTEM.
104	1	3.8.1.1	01/02/86	1455	01/02/86	1455	01/02/86	1555	1.00	0.00	1.00	Y			1A20401			Y		N	N	BREAKER 1A204-01 - LOSS OF OFFSITE POWER TO BUS 1A204 4160V. BUS IS AVAILABLE. ONE FEEDER BREAKER IS UNAVAILABLE, BUT ALTERNATE FEED IS AVAILABLE AND CLOSED IN.
104	1	3.8.1.1	01/03/86	1047	01/03/86	1047	01/03/86	1147	1.00	0.00	1.00	Y			1A20201		1			N	N	1A202-1 BREAKER. BUS IS AVAILABLE.
104	1	3.3.3/3.8.1	01/30/86	0730	01/30/86	0730	01/30/86	0736	0.10	0.00	0.10		Y		1A201			A		N	N	1A201 INOP BECAUSE OF UV RELAY TESTING.
104	1	3.3.3/3.8.1	01/30/86	0736	01/30/86	0736	01/30/86	0743	0.12	0.00	0.12		Y		1A202			B		N	N	1A202 INOP FOR UV TESTING.
104	1	3.3.3/3.8.1	01/30/86	0743	01/30/86	0743	01/30/86	0753	0.17	0.00	0.17		Y		1A203			C		N	N	1A203 INOP FOR UV RELAY TESTING.
104	1	3.3.3/3.8.1	01/30/86	0753	01/30/86	0753	01/30/86	0804	0.18	0.00	0.18		Y		1A204			D		N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3	02/05/86	0745	02/05/86	0745	02/05/86	0835	0.83	0.00	0.83	Y			1A20209			Y		N	N	BREAKER 1A202-09 O/S (BUS IS AVAILABLE).
104	1	3.8.1	02/05/86	1035	02/05/86	1035	02/05/86	1120	0.75	0.00	0.75	Y			1A20209			Y		N	N	BREAKER 1A202-09 O/S (BUS IS AVAILABLE).
104	3	3.7.1.2	02/18/86	0825	02/18/86	0825	02/19/86	0405	0.00	19.67	19.67	Y			1A201			A		Y	N	1A201 DE-ENERGIZED - ESW PUMP 'A' UNAVAILABLE ETC.
104	5	3.3.3	02/27/86	1100	02/27/86	1100	02/27/86	1550	0.00	4.83	4.83		Y		1A203			Y		Y	N	1A203 INTERMITTENTLY DE-ENERGIZED FOR RELAY CALIBRATIONS.
104	5	3.3.3	02/26/86	0815	02/28/86	0815	02/28/86	0859	0.00	0.73	0.73		Y		1A201			A		N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	5	3.3.3	02/26/86	0900	02/28/86	0900	02/28/86	0920	0.00	0.33	0.33		Y		1A202			B		N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	5	3.3.3	02/28/86	0923	02/28/86	0923	02/28/86	0945	0.00	0.37	0.37		Y		1A203			C		N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	5	3.3.3	02/28/86	0951	02/28/86	0951	02/28/86	1015	0.00	0.40	0.40		Y		1A204			D		N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	5	3.3.3	03/10/86	0941	03/10/86	0941	03/10/86	1012	0.00	0.52	0.52	Y			1A20204			B		N	N	'B' D6 BREAKER UNDERVOLTAGE RELAY O/S FOR PREVENTIVE MAINTENANCE FOR 1A20204.
104	5	3.3.3	03/10/86	1030	03/10/86	1030	03/10/86	1115	0.00	0.75	0.75	Y			1A20201			Y		N	N	UV RELAYS FOR ALTERNATE SOURCE BREAKER FOR 'B' ESS BUS OOS FOR PREVENTIVE MAINTENA.. FOR 1A20201. BUS IS AVAILABLE.
104	5	3.3.3	03/10/86	1250	03/10/86	1250	03/10/86	1335	0.00	0.75	0.75	Y			1A20204			B		N	N	'B' D6 UV RELAYS FOR 'B' ESS BUS BROKE O/S FOR PREVENTIVE MAINTENANCE FOR BKR 1A20204.
104	5	3.3.3	03/10/86	1336	03/10/86	1336	03/10/86	1410	0.00	0.57	0.57	Y			1A20209			Y		N	N	UV RELAYS FOR NORMAL FEEDER BREAKER TO 'B' ESS BUS O/S TO PREVENTIVE MAINTENANCE FL. 1A20209. BUS IS AVAILABLE.
104	5	3.3.3	03/10/86	1411	03/10/86	1411	03/10/86	1448	0.00	0.62	0.62	Y			1A20201			Y		N	N	UV RELAYS FOR 'B' ESS BUS ALTERNATE FEEDER BREAKER O/S FOR PREVENTIVE MAINTENANCE FOR BREAKER 1A20201. BUS IS AVAILABLE.
104	5	3.3.3	03/10/86	1449	03/10/86	1449	03/10/86	1513	0.00	0.40	0.40	Y			1A20209			Y		N	N	UV RELAYS FOR 'B' ESS BUS ALTERNATE FEEDER BREAKER O/S FOR PREVENTIVE MAINTENANCE FOR BREAKER 1A20209. BUS IS AVAILABLE.
104	5	3.3.3	03/12/86	1007	03/12/86	1007	03/12/86	1029	0.00	0.37	0.37	Y			1A20204			Y		N	N	VOLTAGE RELAYS ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20404. BUS IS AVAILABL.
104	5	3.3.3	03/12/86	1030	03/12/86	1030	03/12/86	1050	0.00	0.33	0.33	Y			1A20409			Y		N	N	VOLTAGE RELAYS ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20401. BUS IS AVAILABLE.
104	5	3.3.3	03/12/86	1052	03/12/86	1052	03/12/86	1115	0.00	0.38	0.38	Y			1A20404			Y		N	N	VOLTAGE RELAYS ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20404. BUS IS AVAILABLE.
104	5	3.3.3	03/12/86	1116	03/12/86	1116	03/12/86	1139	0.00	0.38	0.38	Y			1A20409			Y		N	N	VOLTAGE RELAYS ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20403. BUS IS AVAILABL
104	5	3.3.3	03/12/86	1300	03/12/86	1300	03/12/86	1319	0.00	0.32	0.32	Y			1A20401			Y		N	N	VOLTAGE RELAYS ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20401. BUS IS AVAILABLE.
104	5	3.3.3	03/12/86	1319	03/12/86	1319	03/12/86	1337	0.00	0.30	0.30	Y			1A20409			Y		N	N	VOLTAGE RELAY ON 'D' ESS BUS O/S FOR CALIBRATION FOR BKR 1A20409. BUS IS AVAILABLE.
104	5	3.7.1.2	03/31/86	0645	03/31/86	0645	04/01/86	0012	0.00	17.45	17.45		Y		1A202			B		Y	N	1A202 DE-ENERGIZED FOR TESTING.
104	5	3.7.1.2	04/01/86	1335	04/01/86	1335	04/01/86	1400	0.00	0.42	0.42		Y		1A204			D		Y	N	1A204 DE-ENERGIZED FOR TESTING.
104	5	3.7.1.2	04/01/86	1420	04/01/86	1420	04/02/86	0530	0.00	15.17	15.17		Y		1A204			D		Y	N	1A204 DE-ENERGIZED FOR TESTING.
104	5	3.7.1.2	04/02/86	2000	04/02/86	2000	04/03/86	1008	0.00	14.13	14.13		Y		1A201			A		Y	N	1A201 DE-ENERGIZED.
104	5	3.7.1.2	04/03/86	2315	04/03/86	2315	04/04/86	1329	0.00	14.23	14.23		Y		1A203			C		Y	N	1A203 DE-ENERGIZED - ESW PUMP 'C' INOPERABLE ETC.
104	5	3.7.1.2	04/04/86	2310	04/04/86	2310	04/04/86	2350	0.00	0.67	0.67		Y		1A203			Y		N	N	1A203 DE-ENERGIZED - BREAKER 1A203-01 OPENED.
104	3	3.7.1.2	04/07/86	0345	04/07/86	0345	04/07/86	0409	0.00	0.40	0.40		Y		1A20201			Y		N	N	OFFSITE POWER NOT AVAILABLE TO 1A202 - BREAKER 1A202-01 OUT.
104	1	3.3.3/3.8.1	04/28/86	0918	04/28/86	0918	04/28/86	0936	0.30	0.00	0.30		Y		1A201			A		N	N	1A201 INOP FOR UV RELAY TESTING.
104	1	3.3.3/3.8.1	04/28/86	0937	04/28/86	0937	04/28/86	0955	0.30	0.00	0.30		Y		1A203			C		N	N	1A203 INOP FOR UV RELAY TESTING.
104	1	3.3.3/3.8.1	04/28/86	0956	04/28/86	0956	04/28/86	1017	0.35	0.00	0.35		Y		1A204			D		N	N	1A204 INOP FOR UV RELAY TESTING.
104	1	3.3.3/3.8.1	04/28/86	1405	04/28/86	1405	04/28/86	1417	0.20	0.00	0.20		Y		1A202			B		N	N	1A202 INOP FOR UV RELAY TESTING.
104	3	3.0.3	05/28/86	1155	05/28/86	1155	05/28/86	1219	0.00	0.40	0.40		Y		1A201			A		N	N	1A201 UNDERVOLTAGE RELAY TESTING.
3		3.0.3	05/28/86	1220	05/28/86	1220	05/28/86	1239	0.00	0.32	[illegible]		Y		1A202			B		N	N	1A202 UNDERVOLTAGE RELAY TESTING.
		3.0.3	05/28/86	1240	05/28/86	1240	05/28/86	1259	0.00	0.32			Y		1A203			C		N	N	1A203 UNDERVOLTAGE RELAY TESTING.

[illegible]	[illegible]	3.0.3	05/28/86	1300	05/28/86	1300	05/28/86	1318	0.00	0.30	[illegible]	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	06/27/86	0800	06/27/86	0800	06/27/86	0831	0.52	0.00	0.52	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	06/27/86	0835	06/27/86	0835	06/27/86	0858	0.38	0.00	0.38	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	06/27/86	0905	06/27/86	0905	06/27/86	0917	0.20	0.00	0.20	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	06/27/86	0920	06/27/86	0920	06/27/86	0940	0.33	0.00	0.33	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	07/25/86	0807	07/25/86	0807	07/25/86	0816	0.15	0.00	0.15	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	07/25/86	0817	07/25/86	0817	07/25/86	0833	0.27	0.00	0.27	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	07/25/86	0834	07/25/86	0834	07/25/86	0849	0.25	0.00	0.25	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	07/25/86	0850	07/25/86	0850	07/25/86	0901	0.18	0.00	0.18	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	08/25/86	0948	08/25/86	0948	08/25/86	1000	0.20	0.00	0.20	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	08/25/86	1003	08/25/86	1003	08/25/86	1032	0.48	0.00	0.48	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	08/25/86	1035	08/25/86	1035	08/25/86	1048	0.22	0.00	0.22	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.3.3/3.8.1	08/25/86	1055	08/25/86	1055	08/25/86	1110	0.25	0.00	0.25	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	09/23/86	1304	09/23/86	1304	09/23/86	1319	0.25	0.00	0.25	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	09/23/86	1332	09/23/86	1332	09/23/86	1408	0.60	0.00	0.60	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	09/23/86	1411	09/23/86	1411	09/23/86	1430	0.32	0.00	0.32	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	09/23/86	1431	09/23/86	1431	09/23/86	1442	0.18	0.00	0.18	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	10/24/86	0830	10/24/86	0830	10/24/86	0838	0.13	0.00	0.13	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	10/24/86	0840	10/24/86	0840	10/24/86	0850	0.17	0.00	0.17	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	10/24/86	0855	10/24/86	0855	10/24/86	0908	0.22	0.00	0.22	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3	10/24/86	0910	10/24/86	0910	10/24/86	0925	0.25	0.00	0.25	Y	1A204		D	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3/3.3.3	11/24/86	0835	11/24/86	0835	11/24/86	0844	0.15	0.00	0.15	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3/3.3.3	11/24/86	0845	11/24/86	0845	11/24/86	0859	0.23	0.00	0.23	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3/3.3.3	11/24/86	0900	11/24/86	0900	11/24/86	0914	0.23	0.00	0.23	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	1	3.0.3/3.3.3	11/24/86	0915	11/24/86	0915	11/24/86	0925	0.17	0.00	0.17	Y	1A204		B	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
104	2	3.0.3/3.3.3	12/27/86	0750	12/27/86	0750	12/27/86	0822	0.00	0.53	0.53	Y	1A201		A	N	N	1A201 UNDERVOLTAGE RELAY TESTING.
104	2	3.0.3/3.3.3	12/27/86	0823	12/27/86	0823	12/27/86	0845	0.00	0.37	0.37	Y	1A202		B	N	N	1A202 UNDERVOLTAGE RELAY TESTING.
104	2	3.0.3/3.3.3	12/27/86	0846	12/27/86	0846	12/27/86	0905	0.00	0.32	0.32	Y	1A203		C	N	N	1A203 UNDERVOLTAGE RELAY TESTING.
104	2	3.0.3/3.3.3	12/27/86	0906	12/27/86	0906	12/27/86	0926	0.00	0.33	0.33	Y	1A204		B	N	N	1A204 UNDERVOLTAGE RELAY TESTING.
105	1	3.8.3.1	01/22/86	0530	01/22/86	0530	01/22/86	1210	6.67	0.00	6.67	Y	1B229	2		Y	N	1B229 SWING BUS MG SET REPAIRS - 1G203 1S247.
105	5	3.8.3.2	02/19/86	1820	02/19/86	1820	02/19/86	2355	0.00	5.58	5.58	Y	1B229	2		Y	N	SWING BUS 1B229 OOS FOR PM.
105	5	3.8.3.2	03/18/86	0300	03/18/86	0300	03/20/86	2359	0.00	68.98	68.98	Y	1ATS229	2		Y	N	1ATS229 DIV. II OOS FOR PM.
105	1	3.8.3.1	08/12/86	0945	08/12/86	0945	08/12/86	1245	3.00	0.00	3.00	Y	1B219	1		N	N	MAINTENANCE ON MG SET 1G202, 1S246 FOR SWING BUS 1B219.
105	1	3.8.3.1	08/13/86	0715	08/13/86	0715	08/13/86	1330	6.25	0.00	6.25	Y	1B229	2		N	N	MAINTENANCE ON MG SET 1G203, 1S247 FOR SWING BUS 1B229.
105	1	3.8.3.1	10/27/86	0500	10/27/86	0500	10/27/86	1440	9.67	0.00	9.67	Y	1B229	2		N	N	MG SET (1G203, 1S247) OUT OF SERVICE FOR SWING BUS 1B229.
105	1	3.8.3.1	11/17/86	0600	11/17/86	0600	11/17/86	1500	9.00	0.00	9.00	Y	1B229	1		N	N	MG SET (1G202, 1S246) FOR SWING BUS 1B219 QUARTERLY PREVENTIVE MAINTENANCE.
105	1	3.8.3.1	11/21/86	0615	11/21/86	0615	11/21/86	1135	5.33	0.00	5.33	Y	1B229	2		N	N	MG SET (1G203, 1S247) FOR SWING BUS 1B229 MAINTENANCE.
*** Total ***																		
									87.32	173.49	260.81							

############################## EAC ##############################

BEGIN DATE: 01/01/87 END DATE: 12/31/87

UNIT SYST	PENT COND	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	PM	CM	TEST	MOD	COMPONENT ID	SYS	DIV	CHAN	COMP	VAL	FAIL	DESCRIPTION OF EVENT
103	1	3.8.1.1	04/19/87	0735	04/19/87	0735	04/20/87	0858	25.38	0.00	25.38		Y			T-20		2			Y	N	T-20 NOT AVAILABLE BECAUSE OF PCC SWITCHING (SYSTEM 3).
103	1	3.8.1.1	04/21/87	1634	04/21/87	1634	04/21/87	1715	0.68	0.00	0.68		Y			T-20		2			Y	Y	LOSS OF T-20 DUE TO LIGHTNING STRIKES.
103	1	3.8.1.1	07/17/87	0600	07/17/87	0600	07/17/87	1735	11.58	0.00	11.58		Y			01101		1			N	N	ONE POWER SOURCE TO ESS101 TRANSFORMER IS LOST (SYSTEM 3).
104	1	3.3.3	01/19/87	0800	01/19/87	0800	01/19/87	0817	0.28	0.00	0.28			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.3.3	01/19/87	0818	01/19/87	0818	01/19/87	0832	0.23	0.00	0.23			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.3.3	01/19/87	0833	01/19/87	0833	01/19/87	0845	0.20	0.00	0.20			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.3.3	01/19/87	0846	01/19/87	0846	01/19/87	0859	0.22	0.00	0.22			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.3.3	02/20/87	0615	02/20/87	0615	02/20/87	0634	0.32	0.00	0.32			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.3.3	02/20/87	0645	02/20/87	0645	02/20/87	0655	0.17	0.00	0.17			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.3.3	02/20/87	0710	02/20/87	0710	02/20/87	0715	0.08	0.00	0.08			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.3.3	02/20/87	0725	02/20/87	0725	02/20/87	0739	0.23	0.00	0.23			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.3.3	03/20/87	0805	03/20/87	0805	03/20/87	0837	0.53	0.00	0.53			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.3.3	03/20/87	0840	03/20/87	0840	03/20/87	0900	0.33	0.00	0.33			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.3.3	03/20/87	0902	03/20/87	0902	03/20/87	0927	0.42	0.00	0.42			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.3.3	03/20/87	0928	03/20/87	0928	03/20/87	0940	0.20	0.00	0.20			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.3.3	04/20/87	0930	04/20/87	0930	04/20/87	0950	0.33	0.00	0.33			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.3.3	04/20/87	0951	04/20/87	0951	04/20/87	1002	0.18	0.00	0.18			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.3.3	04/20/87	1003	04/20/87	1003	04/20/87	1014	0.18	0.00	0.18			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.3.3	04/20/87	1015	04/20/87	1015	04/20/87	1025	0.17	0.00	0.17			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.0.3	05/20/87	0825	05/20/87	0825	05/20/87	0834	0.15	0.00	0.15			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.0.3	05/20/87	0835	05/20/87	0835	05/20/87	0848	0.22	0.00	0.22			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.0.3	05/20/87	0850	05/20/87	0850	05/20/87	0903	0.22	0.00	0.22			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.0.3	05/20/87	0904	05/20/87	0904	05/20/87	0914	0.17	0.00	0.17			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.8.1.1	05/27/87	0800	05/27/87	0800	05/27/87	0822	0.37	0.00	0.37	Y				1A201-09				Y	Y	N	1A201-09 O/S FOR PM'S.
104	1	3.8.1.1	05/27/87	0850	05/27/87	0850	05/27/87	0915	0.42	0.00	0.42	Y				1A202-09				Y	Y	N	1A202-09 O/S FOR PM'S.
104	1	3.8.1.1	05/26/87	0800	05/28/87	0800	05/28/87	0832	0.53	0.00	0.53	Y				1A204-09				Y	Y	N	1A204-09 O/S FOR PM'S.
104	1	3.8.1.1	05/28/87	0945	05/28/87	0945	05/28/87	1015	0.50	0.00	0.50	Y				1A203-09				Y	Y	N	1A203-09 O/S FOR PM'S.
104	1	3.8.3,3.0.3	06/19/87	0507	06/19/87	0507	06/19/87	0530	0.38	0.00	0.38		Y			1A20(1-4)	Y				N	N	ALL FOUR 4160V BUSES (1A201-1A204) INOP BECAUSE OF THE LOSS OF SWITCHGEAR ROOM COOLING. (ANALYSIS SHOWS THAT EQUIPMENT IN SWITCHGEAR WILL NOT FAIL AS A RESULT OF A DBA AND LOSS OF COOLING.)
104	1	3.0.3	06/22/87	0800	06/22/87	0800	06/22/87	0820	0.33	0.00	0.33			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.0.3	06/22/87	0830	06/22/87	0830	06/22/87	0847	0.28	0.00	0.28			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.0.3	06/22/87	0900	06/22/87	0900	06/22/87	0913	0.22	0.00	0.22			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	1	3.0.3	06/22/87	0925	06/22/87	0925	06/22/87	0938	0.22	0.00	0.22			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
104	1	3.3.3	07/21/87	0807	07/21/87	0807	07/21/87	0853	0.77	0.00	0.77			Y		1A201			A		N	N	4KV BUS UV RELAY TESTING.
104	1	3.3.3	07/21/87	0855	07/21/87	0855	07/21/87	0920	0.42	0.00	0.42			Y		1A202			B		N	N	4KV BUS UV RELAY TESTING.
104	1	3.3.3	07/21/87	0922	07/21/87	0922	07/21/87	0945	0.38	0.00	0.38			Y		1A203			C		N	N	4KV BUS UV RELAY TESTING.
104	1	3.3.3	07/21/87	0946	07/21/87	0946	07/21/87	1013	0.45	0.00	0.45			Y		1A204			D		N	N	4KV BUS UV RELAY TESTING.
104	1	3.3.3	08/20/87	0753	08/20/87	0753	08/20/87	0817	0.40	0.00	0.40			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
104	1	3.3.3	08/20/87	0818	08/20/87	0818	08/20/87	0844	0.43	0.00	0.43			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	1	3.3.3	08/20/87	0905	08/20/87	0905	08/20/87	0916	0.18	0.00	0.18			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
[illegible]	[illegible]	3.3.3	08/20/87	0917	08/20/87	0917	08/20/87	0942	0.42	0.00	[illegible]			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
[illegible]	[illegible]	3.0.3	09/18/87	0915	09/18/87	0915	09/18/87	0933	0.00	0.30	[illegible]			Y		1A201			A		N	N	1A201 OOS FOR UV RELAY TESTING.
[illegible]	[illegible]	3.0.3	09/18/87	0935	09/18/87	0935	09/18/87	0943	0.00	0.13	[illegible]			Y		1A202			B		N	N	1A202 OOS FOR UV RELAY TESTING.
104	5	3.0.3	09/18/87	0945	09/18/87	0945	09/18/87	0956	0.00	0.18	0.18			Y		1A203			C		N	N	1A203 OOS FOR UV RELAY TESTING.
104	5	3.0.3	09/18/87	0957	09/18/87	0957	09/18/87	1004	0.00	0.12	0.12			Y		1A204			D		N	N	1A204 OOS FOR UV RELAY TESTING.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]					Y	N	[illegible]

104	5	3.9.3	10/05/87	1726	10/05/87	1726	10/05/87	1730	0.00	0.07	0.07	Y		1A20401		Y	N N	1A204-01 BREAKER OPERATION CHECK.
104	1	3.7.1.2	10/10/87	0410	10/10/87	0410	10/10/87	2115	17.08	0.00	17.08	Y		1A201	A		Y N	1A201 INOP FOR OUTAGE WORK & OP.
104	1	3.7.1.2	10/11/87	0300	10/11/87	0300	10/11/87	1930	16.50	0.00	16.50	Y		1A203	C		Y N	1A203 INOP FOR OUTAGE WORK & OP.
104	1	3.3.3	10/16/87	0815	10/16/87	0815	10/16/87	0840	0.42	0.00	0.42		Y	1A201	A		N N	1A201 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	0855	10/16/87	0855	10/16/87	0910	0.25	0.00	0.25		Y	1A202	B		N N	1A202 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	0920	10/16/87	0920	10/16/87	0932	0.20	0.00	0.20		Y	1A203	C		N N	1A203 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	0940	10/16/87	0940	10/16/87	0955	0.25	0.00	0.25		Y	1A204	D		N N	1A204 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	1040	10/16/87	1040	10/16/87	1052	0.20	0.00	0.20		Y	1A201	A		N N	1A201 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	1105	10/16/87	1105	10/16/87	1117	0.20	0.00	0.20		Y	1A202	B		N N	1A202 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	1245	10/16/87	1245	10/16/87	1300	0.25	0.00	0.25		Y	1A203	C		N N	1A203 O/S FOR UV RELAY TESTING.
104	1	3.3.3	10/16/87	1301	10/16/87	1301	10/16/87	1310	0.15	0.00	0.15		Y	1A204	D		N N	1A204 O/S FOR UV RELAY TESTING.
104	5	3.3.3	11/01/87	0725	11/01/87	0725	11/01/87	1710	0.00	9.75	9.75		Y	1A2041-4)			N N	IP ON 84% UV RELAYS ON U-BUSES WITH UNIT S/D.
104	1	3.3.3	11/16/87	0745	11/16/87	0745	11/16/87	0758	0.22	0.00	0.22		Y	1A201	A		N N	1A201 O/S FOR UV RELAY TESTING.
104	1	3.3.3	11/16/87	0802	11/16/87	0802	11/16/87	0810	0.13	0.00	0.13		Y	1A202	B		N N	1A202 O'S FOR UV RELAY TESTING.
104	1	3.3.3	11/16/87	0815	11/16/87	0815	11/16/87	0824	0.15	0.00	0.15		Y	1A203	C		N N	1A203 O/S FOR UV RELAY TESTING.
104	1	3.3.3	11/16/87	0828	11/16/87	0828	11/16/87	0833	0.08	0.00	0.08		Y	1A204	D		N N	1A204 O/S FOR UV RELAY TESTING.
104	1	3.8.3.1	12/17/87	0740	12/17/87	0740	12/17/87	0816	0.60	0.00	0.60		Y	1A201	A		N N	UV RELAY TESTING.
104	1	3.8.3.1	12/17/87	0820	12/17/87	0820	12/17/87	0920	1.00	0.00	1.00		Y	1A202	B		N N	UV RELAY TESTING.
104	1	3.8.3.1	12/17/87	0925	12/17/87	0925	12/17/87	0952	0.45	0.00	0.45		Y	1A203	C		N N	UV RELAY TESTING.
104	1	3.8.3.1	12/17/87	0955	12/17/87	0955	12/17/87	1016	0.35	0.00	0.35		Y	1A204	D		N N	UV RELAY TESTING.
105	1	3.5.1	02/10/87	0550	02/10/87	0550	02/10/87	1515	9.42	0.00	9.42	Y		1B219	1		Y N	'A' SWING BUS MG SET OOS FOR PM'S.
105	1	3.5.1R	02/13/87	0730	02/13/87	0730	02/13/87	1635	9.08	0.00	9.08	Y		1B229	2		Y N	1B219, DIVISION 1 SWING BUS OOS FOR PM'S.
105	1	3.8.3.3	02/18/87	1210	02/18/87	1210	02/18/87	1530	3.33	0.00	3.33	Y		1B219	1		Y N	'A' SWING BUS MG OOS FOR INSPECTION AND REPLACEMENT OF RHEOSTAT.
105	1	3.8.3.1	06/03/87	0320	06/03/87	0320	06/03/87	1550	12.50	0.00	12.50	Y		1B229	2		Y N	1B229 OOS FOR MAINTENANCE.
105	1	3.5.1	09/01/87	1920	09/01/87	1920	09/02/87	0400	8.67	0.00	8.67	Y		1B229	2		N N	1B229, DIVISION 2 SWING BUS OOS FOR PM'S.
105	5	3.7.1.2	10/03/87	1315	10/03/87	1315	10/04/87	0200	12.75	0.00	12.75	Y		1B220	B		Y N	1B220 TAKEN O/S FOR OUTAGE WORK (ESW 'B' BYPASS VALVE)
104 Total 111									163.32	10.55	173.87							

EAC

BEGIN DATE: 01/01/88 END DATE: 06/07/88

J S N I I S	F T L O R A T G	TECH. SPEC	OOS DATE	OOS TIME	MOD DATE	MOD TIME	RETURN DATE	RETURN TIME	CRIT TIME (HRS)	SHUTDOWN TIME (HRS)	TOTAL TIME (HRS)	P C T M / M M E O / S G / T	COMPONENT ID	S G C C / Y I H O / S V A M / N P	V F / A A / L I / B L	DESCRIPTION OF EVENT
104	1	3.3.3.1	01/15/88	0810	01/15/88	0810	01/15/88	0829	0.32	0.00	0.32	Y	1A201	A	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.3.3.1	01/15/88	0830	01/15/88	0830	01/15/88	0844	0.23	0.00	0.23	Y	1A202	B	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.3.3.1	01/15/88	0845	01/15/88	0845	01/15/88	0856	0.18	0.00	0.18	Y	1A203	C	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.3.3.1	01/15/88	0857	01/15/88	0857	01/15/88	0909	0.20	0.00	0.20	Y	1A204	D	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.8.1.1	01/18/88	0530	01/18/88	0530	01/18/88	1005	4.58	0.00	4.58	Y	1A20401	Y	N N	MAINTENANCE ON 4KV NORMAL SUPPLY BREAKER - ALTERNATE FEED AVAILABLE.
104	1	3.8.3.1	02/16/88	0800	02/16/88	0800	02/16/88	0817	0.28	0.00	0.28	Y	1A201	A	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.8.3.1	02/16/88	0818	02/16/88	0818	02/16/88	0829	0.18	0.00	0.18	Y	1A202	B	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.8.3.1	02/16/88	0830	02/16/88	0830	02/16/88	0842	0.20	0.00	0.20	Y	1A203	C	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	1	3.8.3.1	02/16/88	0843	02/16/88	0843	02/16/88	0852	0.15	0.00	0.15	Y	1A204	D	N N	4KV BUS UV RELAY TESTING - DG FOR BREAKER.
104	4	3.3.3.1	03/18/88	0740	03/18/88	0740	03/18/88	0905	0.00	1.42	1.42	Y	1A20(1-4)	1	N N	4KV BUS UV RELAY TESTING.
104	1	3.3.3	04/15/88	1300	04/15/88	1300	04/15/88	1320	0.33	0.00	0.33	Y	1A201	A	N N	4KV BUS 1A201 INOP TO PERFORM FUNCTIONAL TEST ON DEGRADED VOLT RELAYS.
104	1	3.3.3	04/15/88	1321	04/15/88	1321	04/15/88	1330	0.15	0.00	0.15	Y	1A202	B	N N	4KV BUS 1A202 INOP TO PERFORM FUNCTIONAL TEST ON DEGRADED VOLT RELAYS.
104	1	3.3.3	04/15/88	1331	04/15/88	1331	04/15/88	1343	0.20	0.00	0.20	Y	1A203	C	N N	4KV BUS 1A203 INOP TO PERFORM FUNCTIONAL TEST ON DEGRADED VOLT RELAYS.
104	1	3.3.3	04/15/88	1344	04/15/88	1344	04/15/88	1352	0.13	0.00	0.13	Y	1A204	D	N N	4KV BUS 1A204 INOP TO PERFORM FUNCTIONAL TEST ON DEGRADED VOLT RELAYS.
104	1	3.3.3	05/16/88	0930	05/16/88	0930	05/16/88	0943	0.22	0.00	0.22	Y	1A201	A	N N	1A201 INOP FOR SURVEILLANCE.
104	1	3.3.3	05/16/88	0944	05/16/88	0944	05/16/88	0957	0.22	0.00	0.22	Y	1A202	B	N N	1A202 INOP FOR SURVEILLANCE.
104	1	3.3.3	05/16/88	0958	05/16/88	0958	05/16/88	1012	0.23	0.00	0.23	Y	1A203	C	N N	1A203 INOP FOR SURVEILLANCE.
104	1	3.3.3	05/16/88	1013	05/16/88	1013	05/16/88	1025	0.20	0.00	0.20	Y	1A204	D	N N	1A204 INOP FOR SURVEILLANCE.
105	1	3.5.1	03/30/88	0730	03/30/88	0730	03/30/88	1520	7.83	0.00	7.83	Y	1B219	1	N N	PM ON SWING BUS M/G SET, (1B219), BUS ENERGIZED.
*** Total ***									15.83	1.42	17.25					