NUCLEAR ENGINEERING CALCULATION COVER SHEET
NEPM-QA-0221-1

1. Page 1 of 138
Total Pages 138

➢2. TYPE: CALC ➢3. NUMBER: EC-053-1012 ➢4. REVISION: 0

*➢5. UNIT 0 *➢6. QUALITY CLASS: Q

➢7. DESCRIPTION: Assessment of SBLC System for Suppression Pool pH Control

8. SUPERSEDED BY:

9. Alternate Number: NA 10. Cycle: NA

11. Computer Code/Model used: NA 12. Discipline: M

➢13. Are any results of this calculation described in the Licensing Documents?

☐ Yes, *Refer to NDAP-QA-0730 and NDAP-QA-0731* ☒ No

➢14. Is this calculation changing any method of evaluation described in the FSAR and using the results to support or change the FSAR? (Refer to PPL Resource Manual for Definition of FSAR)

☐ Yes, *50.59 screen or evaluation required.* ☒ No

➢15. Is this calculation Prepared by an External Organization?

☐ Yes ☒ No

EG771 Qualifications may not be required for individuals from external organizations (see Section 7.4.3).

	Print Name(EG771 Qualification Required)	Signature	Date
➢16. Prepared by:	George M. Kowal	George M. Kowal	9/21/2005
➢17. Reviewed by:	Ronald A. Vazquies	Ronald A. Vazquies	9/21/2005
➢18. Verified by:	Ronald A. Vazquies	Ronald A. Vazquies	9/21/2005
➢19. Approved by:	Dave G. Kostelnik (Qualified per NEPM-QA-0241 and comply with Section 7.8 of NEPM-QA-0221)	David G. Kostelnik	9/21/2005
➢20. Accepted by:	(EG771 Qualification Required) and comply with Section 7.9 of NEPM-QA-0221		

TABLE OF CONTENTS

ATTACHMENTS

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	3 of 138

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	4 of 138

1.0 OBJECTIVE

1.1 Background

With the eventual implementation of the Alternative Source Term (AST), 10 CFR 50.67, the Standby Liquid Control (SBLC) System is being considered for preventing re-evolution of iodine from the suppression pool in the event of a Design Basis Accident (DBA-LOCA). Specifically, NRC Regulatory Guide 1.183 states that the radiological consequence analysis should consider iodine re-evolution if the suppression pool liquid pH is not maintained greater than 7. Maintaining the suppression pool liquid pH greater than 7.0 can be accomplished by the buffering action of boron released to the suppression pool from the SBLC System (see calculation EC-059-1041).

1.2 Statement of Problem

It is proposed to inject boron to the suppression pool via the SBLC System to maintain basic pH in the suppression pool in order to minimize re-evolution of iodine from the suppression pool in the event of a Loss of Coolant Accident (LOCA). However, the system fails to meet all the requirements of a safety-related system in that SBLC is not designed for the single active component failure criteria. Therefore, a failure of a critical component would prevent the system from controlling suppression pool liquid pH by using the buffering action of boron injected to the suppression pool from the SBLC system (via the reactor vessel). The success of the SBLC system is necessary in order to take credit for this pH control function and prevention of iodine re-evolution. The NRC has provided review guidelines for the SBLC system that do not meet single failure criteria or that are not of the expected quality (safety related). This calculation will specifically demonstrate compliance with the requirements identified in the NRC review guideline document.

The evaluation will be accomplished in four steps, as follows:

a) Provide overall assurance the SBLC System meets the quality guidelines (a)-(e) regarding the reliability, redundancy presented in Sections 1.4 and 1.5 below.
b) Identify all active and passive components of the SBLC System under consideration.

c) Screen for (and identify) critical components subject to single failure criteria. (Details are discussed starting in Section 4.3)

d) Substantiate a low risk failure probability for the identified components.

1.3 System Overview

The SBLC System is an independent and diverse backup system to the Control Rod Drive (CRD) System. SBLC shuts down the reactor by injecting a neutron absorbing solution into the reactor coolant, which is circulated through the core. The neutron absorber used in SBLC is an aqueous solution of sodium pentaborate decahydrate, $Na_2B_{10}O_{16}*10H_2O$. Sufficient solution is injected to bring the reactor from maximum rated power conditions to cold subcritical over the entire reactor temperature range, from maximum operating to cold shutdown conditions. SBLC is not required to scram the reactor, or to serve as a backup scram system. There is no requirement for SBLC to be capable of operation when the reactor is shut down by the CRD System.

The SBLC System is listed as a Nuclear Steam Supply System. Based on Regulatory Guide 1.70, the SBLC is identified as a safe shutdown system having a safety-related classification. Safety-related systems provide the actions necessary to assure safe shutdown of the reactor, to protect the integrity of radioactive material barriers, and/or to prevent the release of radioactive material in excess of allowable dose limits. Safe shutdown of the reactor is classified as a nuclear safety function, and thus, the SBLC is classified as having a safety-related function.

The SBLC System consists of two 100% capacity positive displacement triplex type (3-piston) injection pumps which when operating together are capable of delivering sodium pentaborate to the reactor vessel to meet 10CFR50.62 requirements, two 100% capacity explosive actuated injection valves, one storage tank, one test tank, and the piping, valves, instrumentation and controls necessary to inject the solution into the reactor and to test the SBLCS. All equipment in the SBLCS which comes in contact with the neutron absorbing solution is stainless steel for corrosion protection.

1.4 Quality Guidance In Support of AST

To demonstrate that the SBLC System is able to perform its AST (10 CFR 50.67) function (injection of sodium pentaborate into the suppression pool), the System should satisfy, as a minimum, the recommended guidelines listed below (NRC

review guidelines). Meeting these criteria, demonstrates reasonable assurance of the quality of the SSES SBLC System. These guidelines are as follows:

a) The SLC system should be provided with standby AC power supplemented by the emergency diesel generators.

b) The SLC system should be seismically qualified in accordance with Regulatory Guide 1.29 and Appendix A to 10 CFR Part 100.

c) The SLC system should be incorporated into the plant's ASME Code ISI and IST Programs based upon the plant's code of record (10 CFR 50.55a).

d) The SLC system should be incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65.

e) The SLC system should meet 10 CFR 50.49 and Appendix A (GDC 4) to 10 CFR 50.

Therefore, meeting the intent of these guidelines should provide reasonable assurance of the System's ability to support the pH controlling function. Each specific guideline, as it impacts and is supported by the SSES SBLC System, is addressed in detail in Section 4.1 of this evaluation.

1.5 Reliability Requirements in Support of AST

In addition to meeting the quality requirements of the NRC review guidelines, the SBLC system must also meet reliability requirements. The following criteria are provided in the NRC review guidelines if the SBLC system can not perform its AST function due to a single failure of an active component.

Acceptable quality and reliability of the non-redundant active components and/or compensatory actions in the event of failure of the non-redundant active components.

Under this approach, the licensee should provide the following information in justifying the lack of redundancy of active components in the SLC system:

(a) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer and model number. The staff

reviewer will compare this information with performance data for the component from industry data bases and other sources.

(b) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design basis event. Environmental conditions include design basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental conditions associated with the design basis accident to conditions for which the component was designed to determine whether the component is capable of performing its intended function.

(c) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information in the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

(d) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS. The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

(e) The licensee should provide a description if its inspection and testing program including standards, frequency and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

(f) The licensee should also indicate the potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

Each Reliability Requirement, as it impacts and is supported by the SSES SBLC System, is addressed in detail in Section 4.2 of this evaluation.

System, is addressed in detail in Section 4.2 of this evaluation.

2.0 CONCLUSIONS & RECOMMENDATIONS

The results of this calculation show that the use of the SBLC System for preventing re-evolution of iodine from the suppression pool in the event of a Design Basis Accident (DBA-LOCA) meets all of the NRC Guidelines for that application.

3.0 ASSUMPTIONS/DESIGN INPUTS

The following general input data was used in this evaluation:

3.1 SBLC System component data was obtained from References 6.2 through 6.16.
3.2 Performance history of critical components was obtained from References 6.16 through 6.18.
3.3 Other input data as referenced in the respective section(s), or when used.

4.0 METHODOLOGY

By means of the approach presented in Section 1.2, the details of substantiation of using the SBLC System for this application follow.

4.1 Quality Guidance of the SBLC System in Support of 10 CFR 50.67:

As suggested by the "Guidance on the Assessment of a BWR SLC System for pH Control", guideline items (a) through (e) present details of demonstrating reasonable assurance regarding the quality of the SSES SBLC System. These are presented in the same order as listed in Section 1.4 above.

a) The SLC system should be provided with standby AC power supplemented by the emergency diesel generators.

The SBLC pumps, storage tank heaters and instrumentation and controls are powered from or connectable to the standby AC power supply. The pump,

powered from or connectable to the standby AC power supply. The pump,

explosive actuated valve, and instrumentation and controls for loop "A" are powered from load group 1C and those components in loop "B" are powered from load group 1A. **All components in the SBLC System are connected to Division I power,** but the use of two load groups per electrical division provides for electrical separation for the SBLC System.

Reference 6.24 (Drawing E-166, Sheets 1, 2, 5, and 6) show that each SBLC pump and associated equipment is powered from an independent 4.16 kV bus through the preferred AC electrical power to all Class 1E loads. This is shown on Single Line Diagram for the station, Reference 6.8 (E-1, Sheet 1). It shows that the normal power supply for Division I, Channel A and Division I, Channel C is from Engineered Safeguard Transformer 101 (0X201). However, Division I can also be fed by Engineered Safeguard Transformer 103 (0X203). In the event of total loss of offsite power sources, onsite **independent diesel generators** provide the standby safety features loads.

The A pump, 1(2)P208A, (along with power to open squib valve 1(2)48-F004A, and control power for the A instrumentation and controls) is from Division I, Channel C, MCC 1(2)B236, which can be supplied from the **C Diesel**, if offsite power is unavailable.

The B pump, 1(2)P208B (along with power to open squib valve 248-F004B and control power for the B instrumentation and controls) is from Division I, Channel A, MCC 1(2)B217, which can be supplied from the **A Diesel** if offsite power is unavailable. The power to open the squib valve 148-F004B, is from 1B216.

Valves HV-1(2)48-F006 are powered from 1E 480V, MCC 1(2)B236

Both of the SLC storage tank heaters (heater A – 1(2)E219, and heater B – 1(2)E220) are powered from 1E 480V, MCC 1(2)B236.

b) The SLC system should be seismically qualified in accordance with Regulatory Guide 1.29 and Appendix A to 10 CFR Part 100.

Mechanical Components:

The SBLC System is designed to meet the intent of **Regulatory Guide 1.29,** "Seismic Design Classification", Revision 2, 2/76

General Design Criterion 2, "Design Basis for Protection Against Natural Phenomena" (GDC 2), requires that structures, systems, and components

Phenomena" (GDC 2), requires that structures, systems, and components

important to safety be designed to withstand the effects of natural phenomena such as earthquakes without loss of capability to perform their safety functions. The guidance in **Regulatory Guide 1.29** provides an acceptable method of determining seismic classification and applicability. Because the SBLC System forms part of the RCPB, and can be used for reactor shutdown, it is classified by Regulatory Guide 1.29 as **Seismic Category I**. The NRC Safety Evaluation Report, NUREG-0776 Section 9.3.2, lists compliance with Regulatory Guide 1.29 as one of the reasons that the SBLC design is acceptable.

SBLC System Seismic Category I structures and components are analyzed under the loading conditions of the SSE and OBE. Since the two earthquakes vary in intensity, the design of Seismic Category I structures, components, and equipment to resist each earthquake and other loads are based on levels of material stress or load factors, whichever is applicable. Piping and equipment, including support structures, are designed to Seismic Class I earthquake requirements. FSAR Table 3.2-1 contains a detailed breakdown of the SBLC System and the seismic classification.

Electrical Equipment and Instrumentation:

The SBLC Seismic Category 1 electrical and instrumentation and control equipment is designed to meet the intent of IEEE Standard 344-1971, "IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations". (FSAR Section 3.10a.2).

All SBLC electrical and instrumentation and control equipment designated as Seismic Category 1 are designed to resist and withstand the effects of the postulated earthquakes. Seismic Category 1 instrumentation and electrical equipment is designed to withstand the effects of the safe shutdown earthquake (SSE) defined in FSAR Subsection 3.7.1, and to withstand the effects of hydrodynamic loads without functional impairment. The Class 1E equipment is capable of performing all safety-related functions during; (I) normal plant operation, (2) anticipated transients, (3) design basis accidents, and (4) post-accident operation, while being subjected to, and after the cessation of, the accelerations resulting from the SSE at the point of attachment of the equipment to the building or supporting structure.

c) The SLC system should be incorporated into the plant's ASME Code ISI and IST Programs based upon the plant's code of record (10 CFR 50.55a).

The SBLC is designed to meet the design intent of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components".

10CFR50.55a, "Codes and Standards, requires that an inservice inspection program be developed in accordance with ASME Section XI. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Plants" , requires a test program to ensure that all ASME Code Class 1, 2, and 3 pumps and valves will be in a state of operational readiness to perform necessary safety functions throughout the life of the plant. The ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," describes an acceptable method of complying with the requirements of **10CFR50.55a** and NUREG-0800 for a test program to test ASME Code Class 1, 2, and 3 pumps and valves.

Where practical, all ASME Section III Class 1, 2, and 3 pumps are in-service tested in accordance with Subsection IWP of ASME Section XI in order to establish and detect changes in the hydraulic and mechanical reference parameters. The pump test program meets, to the extent practical, the requirements for establishing reference values of IWP-3000 of ASME Section XI. The allowable ranges of in-service test quantities, corrective actions, and bearing temperature tests are in accordance with IWP-3200 and IWP-4300 of ASME Section XI.

SSES Procedure NDAP-QA-0423, commits the plant to ASME IST pump and valve testing as required by Technical Specification 5.5.6, "Inservice Testing Program". This Specification provides controls for inservice testing of ASME Code Class 1, 2, and 3 components. The program includes testing frequencies specified in Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda.

Functional Testing:

Functional testing of the SBLC System is performed by (1) circulating demineralized water with the explosive valves closed and (2) pumping demineralized water from the test tank through the explosive valves into the reactor.

System testing enhances the reliability of the system and demonstrates system

also provides the capability to verify system pumping capability to the reactor when the plant is shut down.

d) The SLC system should be incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65.

The SBLC System is designed to meet the intent of the requirements of **10CFR50.65**, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants". The SBLC Ssystem has been incorporated into the plant's Maintenance Rule Program.

The Commission's determination as stated in Regulatory Guide 1.160, Rev. 1, was that the decision that a maintenance rule was needed arose from the conclusion that proper maintenance is essential to plant safety. PPL has not committed to a particular revision of this regulatory guide.

However, the SBLC System is designed such that periodic surveillance testing and maintenance can be performed on system components. PPL Procedure **NDAP-QA-0413, "SSES Maintenance Rule Program," implements the SSES program for compliance with 10CFR50.65.**

The following table summarizes PP&L's commitment to the SBLC System Maintenance Rule functions. The data for SBLC System is maintained (or viewed) at the following SSES Information System sites:

S:\EPIXDATA\READONLY\FILES\MAINTENANCE RULE DATA or
S:\EPIXDATA\MSAccess\Mntrule.mdb /wrkgrp

FUNCTION NUMBER	FUNCTION	MAINTENANCE RULE FAILURE FUNCTION (MRFF) GUIDANCE
STANDBY LIQUID CONTROL SYSTEM # 53		
01A	Pump A injects sodium pentaborate solution into the reactor as an alternate means of shutting down the reactor independent of the CRD system	Component failures resulting in the loss of capability to inject sodium pentaborate into the reactor vessel.

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	13 of 138

FUNCTION NUMBER	FUNCTION	MAINTENANCE RULE FAILURE FUNCTION (MRFF) GUIDANCE
01B	Pump B injects sodium pentaborate solution into the reactor as an alternate means of shutting down the reactor independent of the CRD system	Component failures resulting in the loss of capability to inject sodium pentaborate into the reactor vessel.
02	Provide containment isolation	Failure of 1(2)48F007 and HV1(2)48F006 to close on demand. LLRT is monitored with the overall containment integrity function in system 59.
03	Components of this system are required to maintain integrity of the reactor coolant pressure boundary	Leakage through a visible indication (i.e. through wall leakage) resulting in loss of reactor coolant fluid from the reactor coolant system boundary.
04	Maintain SLC piping and tank at sufficiently high temperature to keep sodium pentaborate above saturation temperature	Component failures resulting in loss of capability to maintain SLC fluid within the required limits for fluid temperature. Failure of the heat tracing, including failure of the associated breaker 1(2)B236063 (A heater) or 1(2)B236111 (B heater), may cause a MRFF. Reference TS Table 3.1.7-2.
05	Provide SBLC flow and storage tank level indication to the control room	Failures that result in the inability to determine SBLC flow or storage tank level indication (indication is available from 1(2)C601 and the plant computer). Blockage of a bubbler tube may be a MRFF.
06	Provide input to RWCU Isolation logic on SBLC actuation	SBLC logic system component failures resulting in the inability to isolate the RWCU outboard isolation valve, HV1(2)44F004.
07	Provide Containment Isolation valve position indication signal for control room display	Failure that results in the inability to determine the position of HV1(2)48F006 from the control room. Light bulb failures are not considered a MRFF IAW NDAP-QA-0413.
08	Provide an alternate means of reactor vessel makeup via the SLC Boron Tank or demin water cross-tie	Component failures resulting in loss of capability to makeup to the reactor vessel via the SBLC.

e) The SLC system should meet 10 CFR 50.49 and Appendix A (GDC 4) to 10 CFR 50.

The SBLC System is designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation (not accident), maintenance, and testing. (GDC 4)

Table A-1 of licensing topical report NEDE-31096-P, "Anticipated Transients Without Scram; Response to NRC ATWS Rule, 10CFR50.62" notes that NRC guidance for EQ for a new SLC System would be to design for anticipated operational occurrences only, not for accidents. A review of the reactor building post-LOCA temperature response calculation (EC-LOCA-0500) determined that the area in which the SBLC system is located only increases a few degrees during the first few hours post-LOCA. Additionally, the SBLC equipment will not experience significant radiation damage given the short duty time of the SBLC system and the early initiation time for the design basis scenario. The relative humidity and area pressures should remain relatively unchanged. Given that SBLC initiation will occur within the first few hours post-LOCA and the demand time is low, the environment that the SBLC system electrical equipment will experience post-LOCA is not significantly different than the environment that it experiences during normal operation and will be able to successfully fulfill its design basis function.

The SBLC is appropriately protected against dynamic effects, including the effects of missiles that may result from equipment failures and from events and conditions inside the plant. Runs of system piping in the secondary containment which are subject to damage due to possible failure of nearby piping or components of other systems are protected by structural steel or reinforced concrete, or spatial separation (FSAR Sect. 9.3.5, 7.4.1.2).

FSAR Section 3.11 discusses the normal and accident environmental conditions relative to temperature, pressure, humidity, and integrated radiation exposure under which systems and components required for safe shutdown are required to remain functional. Reference 6.2 lists harsh environments of various plant areas, including those where the SBLC is located, and the normal and anticipated accident environmental conditions in these areas. Safety-related equipment is installed in accordance with mechanical and electrical separation requirements. It is also designed and qualified to function properly in the environments listed.

Tornado-generated missiles are the only natural phenomena missiles considered. Protection consists of tornado-resistant buildings with structures and barriers designed to protect against the postulated missiles listed in FSAR Table 3.5-4.

The SBLC is designed to meet the intent of Regulatory Guide 1.46, "Protection Against Pipe Whip Inside Containment", 5/73. (FSAR Section 3.6.2.1.4.5)

General Design Criterion 4, "Environmental and Missile Design Basis" (GDC 4), requires that structures, systems, and components important to safety be appropriately protected against dynamic effects that may result from equipment failures, including the effects of pipe break. Regulatory Guide 1.46 describes an acceptable basis for selecting the design locations and orientations of postulated pipe breaks in designing the SBLC System piping within the reactor containment and for determining the measures that should be taken for restraint against pipe whipping that may result from such breaks.

Pipe whip is an unrestrained pipe movement of either end of the ruptured pipe in any direction about a plastic hinge formed at the nearest pipe whip restraint. Pressurized components in the SBLC System where service temperature exceeds 200°F or service pressure exceeds 275 psig were evaluated as to the potential for pipe whip. Pipe whip restraints are provided for the SBLC injection line inside the primary containment. The plant has been designed in accordance with the criteria of Branch Technical Position ASB 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment" and is documented in Section 3.6 of NUREG-0776, "Safety Evaluation Report Related to the Operation of SSES Units 1 and 2".

4.2 Reliability Requirements in Support of AST

(a) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer and model number.

Through a thorough review of the SBLC System components (Attachment 1) and the system P&IDs (Reference 6.6) single components with no backup or redundant component with a singe power source (SBLC tank heaters) were identified and documented as the single failure candidates (Table 4.4.2).

Characteristics of each non-redundant active component are presented in detail in the respective section where the component is individually discussed.

However, Table 4.2.1 below identifies the non-redundant components and their design characteristics.

Table 4.2.1 – Component Characteristics

Component Name	Component Function	Component System Number (Unit)	Component Model Number	Component Manufacturer
SBLC Manual initiation switch	Initiate system boron injection. Closes contacts that energize the A and B Pumps	HS14804 (U1) HS24804 (U2)	CR 2940 (Reference 6.24, Sh. 1)	General Electric (Reference 6.24, Sh. 1)
SBLC Outboard motor operated stop check valve	Normally CLOSED. Acts as an isolation check valve in the injection line when in the OPEN position.	HV148F006 (U1) HV248F006 (U2)	1 ½ " Yarway Welbond Valve with Limitorque Electric Motor Actuator. Globe stop-check valve. (Reference 6.21, Sh. 1)	Yarway Corp. Blue Bell, PA (Reference 6.21, Sh. 1)
SBLC inside drywell check valve.	Check valve for the SBLC injection line.	148F007 (U1) 248F007 (U2)	1 ½ " Y-Type Check Valve Part No. 74730 (Reference 6.10, Sh. 1)	Borg Warner Nuclear Valve Division Van Nuys, CA (Reference 6.10, Sh. 1)
Locked open manual injection	Stays open to allow boron injection.	148F008 (U1) 248F008 (U2)	1 ½ " Gate Valve, Cres. Part No. 74680	Borg Warner Nuclear Valve Division

valve	Down stream of the above check valve.		(Reference 6.20, Sh. 1)	Van Nuys, CA (Reference 6.20, Sh. 1)
SBLC Storage tank heater "A" (10 kW)	Operates to automatically maintain solution temperature above the precipitation point	1E219 (U1) 2E219 (U2)	Part No. 2D433G0022 Part No. 2D433G0022 (Reference 6.31)	General Electric General Electric (Reference 6.31)
SBLC Storage tank heater "B" (40 kW)	Used to elevate the mixture temperature during chemical addition	1E220 (U1) 2E220 (U2)	Part No. 166B7320P001 Part No.: 2D507G140 (Reference 6.31)	General Electric Wellman Co. (Reference 6.31)

Additional information on SBLC operation and redundancy is provided below.

Operation of the SBLC pumps and the explosive actuated valves that inject the solution into the reactor are controlled from the control room panel by a single manual control switch on panel 1C601 keylocked in the "STOP" position. This is shown on drawing J-802 Sheet 2 (Reference 6.25). The key is removable in the left "STOP" position. The SBLC is initiated by turning the keylock switch to the "START" position. Placing the key switch in the "START" position initiates both "A" and "B" trains of the SBLC. When the SBLC is initiated, both explosive-actuated valves fire. Simultaneously, both SBLC pumps are started and parallel solution injection begins. This is shown on elementary diagram M1-C41-36 Sheets 1, 2, and 3 (Reference 6.26) and M1-C41-31 (Reference 6.27). Concurrently with initiation of the SBLC, a signal is sent to the Reactor Water Cleanup (RWCU) System to isolate the RWCU System from the reactor to prevent the removal and dilution of the neutron absorbing solution. The SBLC pumps may be operated locally for system testing, but actuation of the explosive actuated valves may only be accomplished from the control room.

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	18 of 138

Redundancy has been designed into the electric power system supporting SBLC System components, controls and instrumentation. Justification in support of this statement follows.

Redundancy of SBLC System Components:

The on-site electric power system includes four load groups. The load groups are redundant in that three load groups are capable of ensuring vital functions are maintained in the event of postulated accident. Sufficient independence is provided between redundant load groups to ensure that postulated single failures affect only a single load group and are limited to the extent of total loss of that load group. The remaining redundant load groups remain intact to provide for the containment integrity.

The SBLC pumps, storage tank heaters and instrumentation and controls are powered from or connectable to the standby AC power supply. The pump, explosive actuated valve, and instrumentation and controls for loop "A" are powered from load group 1C and those components in loop "B" are powered from load group 1A. All components in the SBLC are connected to Division I power, but the use of two load groups per electrical division provides for electrical separation for the SBLC System. The only exception is the storage tank heaters which are powered from a common bus for each respective unit.

The SBLC pump circuit is protected or separated from the explosive valve ignition circuit. Protection or separation between these two circuits is required so that a short in the ignition circuit will not affect operation of the pumps.

The ignition circuit for each explosive actuated valve squib is fused to prevent disabling any pump with a short in any squib valve. The fuses are shown on M1-C41-36 (Reference 6.27). Each firing circuit (two per valve) contains a single fuse (C41-F2, F3, F5, F6) which are sized at 2 amps. An electrical short in the ignition circuitry will cause the fuse to fail, isolating the shorted circuit from the balance of the control system.

SBLC System Control:

Controls are provided, in the control room, from which actions can be taken to operate the SBLC System safely under normal conditions. (GDC 19)

Controls for normal operation, monitoring, and testing the SBLC are placed in the main control room. Information is furnished to the operator through meters,

main control room. Information is furnished to the operator through meters,

annunciators, gauges, and indicating lights as to the standby and operational status of the SBLC. Operation of the SBLC from the control room is entirely a manual operation to prevent inadvertent initiation of the system.

Instrumentation and Control:

Criterion XIV of Appendix B to 10CFR50 "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants", requires that measures be established for indicating the operating status of structures, systems and components of the nuclear power plant, such as by tagging valves and switches, to prevent inadvertent operation. **Section 50.55a** of 10CFR50, "Codes and Standards", requires in Paragraph (h) that protection systems meet the requirements set forth in IEEE 279-1971, "IEEE Standard Criteria for Protection Systems for Nuclear Power Generating Stations".
The continuity of the explosive valve circuit is continuously monitored and is annunciated in the control room if the continuity is broken (current flow is interrupted). The level and temperature of the storage tank solution are continuously monitored with the high and low levels and high and low temperature conditions annunciated in the control room. The removal of all other equipment for servicing is manually annunciated and is administratively controlled.

The SBLC System is designed to meet the intent of **Regulatory Guide 1.97**, "Instrumentation for Light-Water-Cooled Nuclear Power Plants To Assess Plant and Environs Conditions During and Following an Accident", Revision 2, 12/80.

General Design Criterion 13, "Instrumentation and Control" (GDC 13), requires that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. General Design Criterion 19, "Control Room" (GDC 19), requires that equipment, including the necessary instrumentation, at appropriate locations outside the control room be provided with the design capability for prompt hot shutdown of the reactor. **Regulatory Guide 1.97** provides an acceptable method for designing the SBLC instrumentation to conform to the requirements of General Design Criteria 13 and 19.

Regulatory Guide 1.97 requires SBLC control room flow indication of 0 to 110%

level instrumentation LI/FI-1(2)4806 (including LE-1(2)4812 and LT-C41-1(2)N001) has a detection range of 0 to 126 inches and 0 to 5000 gallons. The tank size is 5711 gallons (Reference 6.38). Per Reference 6.4 the setpoint volume for High Alarm is at 4897 gallons and Low Alarm at 4587 gallons (which is also the Technical Specification 3.1.7 limit). LE-1(2)4812 and LT-C41-1(2)N001 are not 1E qualified but are fed from a vital UPS bus, 1(2)D666, which meets the requirement that instrumentation be powered from a reliable source. The instrument readouts are real time and continuous. The instrumentation is required to be of **Regulatory Guide 1.97 Type D, Category 2**, design and qualification criteria. Additionally, the instrumentation should be energized from a high reliability power source, but not necessarily standby power, and should be backed up by batteries where momentary interruption is not tolerable. PLA-2222 (Reference 6.28), "Susquehanna Steam Electric Station Conformance to Regulatory Guide 1.97, Rev. 2", describes in Section 4.0 that the SBLC flow and level indication exceeds the range and meets the environmental qualification and power supply requirements for Type D, Category 2 instrumentation. The instrumentation is not required to be seismically qualified, per Regulatory Guide 1.97 Position 1.4.

(b) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

Environmental conditions, including design basis pressure, temperature, relative humidity and radiation fields are presented in Table 4.2.2 below. To provide a clear distinction of environmental conditions, the Normal Operation and DBA Columns have been split into a) conditions internal to the system and b) conditions external to the system. The seismic qualification for each component is discussed in Section 4.5.

Table 4.2.2 – Component Design/Environmental Operating Conditions

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
HS14804 (U1) HS24804 (U2) (Manual initiation switch)	Control Room (Not a harsh environment designation) Reference (6.29, 6.30)	P = 14.7psia T = 75 F RH = 50% Rad = ≤ .5 mR/hr Reference (6.29, 6.30)	P = 14.7psia T = 75 F RH = 50% Rad = ≤ .5 mR/hr Reference (6.29, 6.30)	P = 14.7psia T = 75 F RH = 50% Rad = ≤ .5 mR/hr Reference (6.29, 6.30, FSAR Sect. 6.4.4.1)
HV148F006 (U1) HV148F006 (U2) (First isolation	Reactor Building EL 752' Rooms I-506, II-506 Reference (6.31,	P = 1203 psi T = 570 F RH = N/A (water) Rad = ≥ 100 mR/hr Reference (6.31,	Injection time frame <u>INSIDE SYSTEM</u> P = Reactor static head to1203 psi T = 70/570 F	Injection time frame <u>INSIDE SYSTEM</u> P ≤56 psia T ≤340 F

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	22 of 138

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
check valve)	6.32)	6.32, Sht. 9)	RH = N/A (water) Rad ≥ 100 mR/hr <u>EXTERNAL ENV.</u> P ~ 14.7 psia T = 60/110 F RH = 20/80% Rad = 10 R/hr Reference (6.31, 6.32, FSAR Table 9.3-11)	RH = N/A (water) Rad ≥ 100 mR/hr <u>EXTERNAL ENV.</u> P ~ 14.7 psia T = to 133 F RH = 100% Rad = 6.2×10^4 R/hr Reference (6.31, 6.32, FSAR Table 9.3-11)
148F007 (U1) 248F007 (U2) (Check valve)	Drywell EL 739' Rooms I-400, II-400 Reference (6. 33,	P = 1203 psi T = 570 F RH = N/A (water) Rad = ≥ 100 mR/hr	Injection time frame <u>INSIDE SYSTEM</u> P = Reactor static head to1203 psi	Injection time frame <u>INSIDE SYSTEM</u> P ≤ 56 psia T = 340 F

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	23 of 138

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
	34)	Reference (6.31, 6.32, Sht. 9)	T = 70/570 F RH = N/A (water) Rad = ≥ 100 mR/hr <u>EXTERNAL ENV.</u> P = 0.1-1.5 psig T = 90/150 F RH = 20/90 % Rad = 26.25 R/hr Reference (6.31, 6.33, FSAR Table 9.3-11, 6.40)	RH = N/A (water) Rad = ≥ 100 mR/h <u>EXTERNAL ENV.</u> P ≤ 56 psia T ≤ to 340 F RH = 100% Rad = 7.1×10^6 R/hr Reference (6. 33, FSAR Table 9.3-11)
148F008 (U1) 248F008 (U2)	Drywell EL 738' Rooms I-400, II-400	P = 1203 psi T = 570 F RH = N/A (water) Rad = ≥ 100 mR/hr	Injection time frame <u>INSIDE SYSTEM</u> P = Reactor static	Injection time frame <u>INSIDE SYSTEM</u> P = to 56 psia

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	24 of 138

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
(locked open gate valve)	Reference (6. 33, 34)	Reference (6.31, 6.32, Sht. 9)	head to1203 psi T = 70/570 F RH = N/A (water) Rad = ≥ 100 mR/hr <u>EXTERNAL ENV.</u> P = 0.1-1.5 psig T = 90/150 F RH = 20/90 % Rad = 26.25 R/hr Reference (6.31, 6.33, FSAR Table 9.3-11, 6.40)	T = 85/95 F RH = N/A (water) Rad = ≥ 100 mR/h <u>EXTERNAL ENV.</u> P ≤ 56 psia T ≤ to 340 F RH = 100% Rad = 7.1 x 10^6 R/hr Reference (6. 33, FSAR Table 9.3-11)
1E219 (U1) 2E219 (U2)	Reactor building EL 749' I-513, II-513	<u>Tank Conditions</u> <u>INSIDE TANK</u>	<u>Tank Conditions</u> <u>INSIDE TANK</u>	<u>Tank Conditions</u> <u>INSIDE TANK</u>

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	25 of 138

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
(10 kW heater inside SBLC tank)	Reference (6.32)	P = approx 10' water T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P = -.25 inwg T = 60/100 F RH = 20/80% Rad = 0.1 mR/hr Reference (6. 4, 6.32)	P = approx 10' water T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P ~ 14.7 psia T = 60/100 F RH = 20/80% Rad = 0.1 mR/hr Reference (6. 4, 6.32)	P = approx 10' water T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P ~ 14.7 psia T = 113 F RH = 100% Rad = 100 R/hr Reference (6. 4, 6.32)
1E220(U1) 2E220(U2)	Reactor building EL 749' I-513, II-513	<u>Tank Conditions</u> <u>INSIDE TANK</u> P = approx 10' water	<u>Tank Conditions</u> <u>INSIDE TANK</u> P = approx 10'	<u>Tank Conditions</u> <u>INSIDE TANK</u> P = approx 10' water

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	26 of 138

Component	Location where Component Resides	Design Basis of Component (Conditions of Component as Part of the System)	Normal Operating Mode of Component (Conditions of Component during System Operation)	DBA Conditions of Component Operation
(40 kW heater inside SBLC tank)	Reference (6.32)	T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P = -.25 inwg T = 60/100 F RH = 20/80% Rad = 0.1 mR/hr Reference (6. 4, 6.32)	water T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P ~ 14.7 psia T = 60/100 F RH = 20/80% Rad = 0.1 mR/hr Reference (6. 4, 6.32)	T = 85/95 F RH = N/A (water) Rad = 0.1 mR/hr <u>OUTSIDE TANK</u> P ~ 14.7 psia T = 113 F RH = 100% Rad = 100 R/hr Reference (6. 4, 6.32)

(c) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by appropriate technical review branch responsible for the compo0nent, as requested by the lead SPSB reviewer.

Table 4.2.3 affirms the purchase requirement of the components under 10CFR50, Appendix B criteria and points to the reference where this is confirmed.

Table 4.2.3 – 10CFR50, Appendix B Requirement

Component	Classification	Purchased in accordance with 10CFR 50, App. B	Where referenced
HS14804 (U1) HS24804 (U2)	Q	Yes	Reference (6.15, 6.34)
HV148F006 (U1) HV248F006 (U2)	Q	Yes	Purchase Spec. P-14A and Reference (6.15, 6.35)
148F007 (U1) 248F007 (U2)	Q	Yes	Purchase Spec. P-14BC and Reference (6.15, 6.36)

148F008 (U1) 248F008 (U2)	Q	Yes	Purchase Spec. P-14BC and Reference (6.15, 6.37)
1E219 (U1) 2E219 (U2)	Q	Yes	Reference (6.15, 6.34)
1E220 (U1) 2E220 (U2)	Q	Yes	Reference (6.15, 6.34)

(d) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS. The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

Information has been included in Attachments 2 and 3 of this calculation. The data in Attachment 2 is an extensive search of the EPIX and NPRDS data bases. Attachment 3 contains confirmation of Susquehanna's component operating history.

Other than routine maintenance on the Susquehanna specific components no failures have occurred. Similar results were obtained from the extensive search of EPIX and NPRDS data bases. Therefore, the equipment is reliable.

(e) The licensee should provide a description if its inspection and testing program including standards, frequency and acceptance criteria. The staff reviewer will use this information to evaluate the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

In response to the above, Table 4.2.4 below summarizes the inspection and testing program for the SBLC System and components

Tab;e 4.2.4 – Component Testing and Inspection Program

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
SUS-ISTPLN-100.0 SUS-ISTPLN-200.0	Pump and Valve Inservice Inspection Testing Program	Unit 1&2 IST Pump and Valve Program establishes testing requirements to assess the operational readiness of certain ASME Safety Class 1, 2, and 3 pumps and valves that are required to: a. Shut down the reactor to the safe shutdown condition, b. Maintain the reactor in the safe shutdown condition, or c. Mitigate the consequences of an accident. Tests Required for SBLC	As noted in Test Requirements	#1 #2

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	30 of 138

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
		Valves: **HV1(2)48F006:** Full Stroke Open – Once Every 92 d Stroke Time Open - Once Every 92 d Full Stroke Closed - Once Every 92 d Stroke Time Closed - Once Every 92 d Seat leakage test required by 10 CFR 50 Appendix J –In accordance with owners program. Remote Position Indication - Once every two years		

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	31 of 138

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
		1(2)48F007: Full Stroke Open – Once Every 92 d Full Stroke Closed - Once Every 92 d Seat leakage test required by 10 CFR 50 Appendix J –In accordance with owners program **1(2)48F008** Remote Position Indication - Once every two years		
SO-153-003 SO-253-003	24 - Monthly SBLC Operability	1) demonstrate all heat traced piping is unblocked by pumping from storage tank to test tank 2) demonstrate the capability	All heat traced piping demonstrated unblocked by pumping from storage tank to test tank	#1 #2

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	32 of 138

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
		of SBLCI Systems pumps to individually provide required flow at a specific discharge pressure and fulfilling requirements of Station In-Service Test (IST) Program Plan quarterly testing 2) demonstrate proper opening and closing of SBLC Injection HV-148F006 3) demonstrate proper opening of Injection Check 148F007	Pump A/B Minimum Flow is ≥ 41.2 gpm with a Discharge Pressure of ≥ 1395 psig SBLC Pump A/B Flow within 41.2 and 44.3 gpm with Discharge Pressure within 1395 and 1405 psig	
SO-153-004 SO-253-004	Quarterly SBLC Flow Verification	Demonstrate capability of Standby Liquid Control System pumps to individually provide required flow at a specified discharge pressure, fulfilling requirements of Station Inservice Test (IST)	Pump A/B Minimum Flow is ≥ 41.2 gpm with a Discharge Pressure of ≥ 1395 psig SBLC Pump A/B Flow within 41.2 and 45gpm with Discharge Pressure within	#1 #2

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	33 of 138

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
		Program Plan quarterly testing and TS 3.1.7.	1395 and 1405 psig	
SO-153-015 SO-253-015	Two Year SBLC RPI Checks	Demonstrate proper operation of Remote Position Indicators (RPI's) used in valve exercising testing as required once per two years by Station Inservice Testing (IST) Program Plan	HV-148-F006 RPI **CLOSED** indication acceptable Yes/No HV-148-F006 RPI **INTERMEDIATE** indication acceptable Yes/No HV-148-F006 RPI **OPEN** indication acceptable Yes/No HV-148-F008 RPI **CLOSED** indication acceptable Yes/No HV-148-F008 RPI **INTERMEDIATE** indication acceptable Yes/No HV-148-F008 RPI **OPEN** indication acceptable	#1 #2

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	34 of 138

Test/Inspection Procedure NO.	Title	Purpose	Acceptance Criteria	Unit
			Yes/No	
SE-159-047 SE-259-047	LLRT OF STANDBY LIQUID CONTROL PENETRATION NUMBER X-42 AND CHECK VALVE OPERABILITY TESTS	This procedure describes how to perform the LLRT for the Standby Liquid Control Penetration Number X-42. NDAP-QA-0412 outlines the frequency. Additionally, this procedure covers 24 month check valve operability testing required by the ASME code per TS 5.5.6. Confirm that check valve HV148F006 closes by observing essentially restricted flow through HV148F006 to vent 148005.	A Combined leak rate of less than or equal to 3.3 gpm (12,492 ccm) for all containment isolation valves in hydrostatically tested lines which penetrate the Primary Containment, when tested at 1.10 P_a , 49.5 psig.	#1 #2

(f) The licensee should also indicate the potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome this failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

Compensating actions are discussed in the specific sections for the Hand Switch (HS 1(2)4804), Section 4.5.2, and replacement of the heating element in the Borated Water Storage Tank, Section 4.5.4.

4.3 All Active and Passive Components of the SBLC System

To obtain a complete listing of the SBLC System equipment and components, the SSES's Nuclear Information Management System (NIMS) (Reference 6.16) was queried. Out of a database of **381,572** pieces of equipment and components the search was narrowed to **373** components for the SBLC System. A copy of this data listing is included as Attachment No. 1. This data set was then reviewed in conjunction with the System P&ID (Reference 6.6) for components critical to the SBLC System function. These results are discussed in the subsequent Section 4.4.

4.4 Critical Components Subject to Single Failure Criteria

From the data listed in Attachment No. 1 and the System P&ID nineteen components in each unit's SBLC System were identified as being contributing to (or resulting) in potential single failure. These components are summarized in the following Table 4.4.1. A further assessment

TABLE 4.4.1

SBLC SYSTEM COMPONENTS LIST CONTRIBUTING TO, OR RESULTING IN SINGLE FAILURE

NO	COMP. ID.	SYST. NO.	COMPONENT NAME / FUNCTION	SINGLE FAILURE CRITERIA COMPONENT
			UNIT 1	
1	148011	153A	SBLC INJECTION PUMP A STORAGE TANK SUPPLY VLV	NO
2	148F001	153A	SBLC INJECTION PUMP B STORAGE TANK SUPPLY VLV	NO
3	148F002A	153A	SBLC INJECTION PUMP A SUCTION VLV	NO
4	148F002B	153A	SBLC INJECTION PUMP B SUCTION VLV	NO
5	148F003A	153A	SBLC INJECTION PUMP A DISCHARGE VLV	NO
6	148F003B	153A	SBLC INJECTION PUMP B DISCHARGE VLV	NO
7	148F004A	153A	SQUIB VLV A	NO
8	148F004B	153A	SQUIB VALVE B	NO
9	148F007	153A	CHECK VALVE	YES
10	148F008	153A	STANDBY LIQUID CONTROL INJ ISO VALVE	YES
11	148F033A	153A	CHECK VALVE	NO
12	148F033B	153A	CHECK VALVE	NO
13	1E219	153A	SBLC STORAGE TANK ELECTRIC HEATER A	YES
14	1E220	153A	SBLC STORAGE TANK ELECTRIC HEATER B	YES
15	1P208A	153A	STANDBY LIQ CONTROL PUMP 'A'	NO
16	1P208B	153A	STANDBY LIQ CONTROL PUMP 'B'	N0
17	1T204	153A	STANDBY LIQUID CONTROL STORAGE TANK	NO (PASSIVE)
18	HS14804	153A	SBLC MANUAL INITIATION SWITCH	YES
19	HV148F006	153A	SBLC OB INJECTION VALVE	YES
			UNIT 2	
1	248011	253A	SBLC INJECTION PUMP A STORAGE TANK SUPPLY VLV	NO
2	248F001	253A	SBLC INJECTION PUMP B STORAGE TANK SUPPLY VLV	NO
3	248F002A	253A	SBLC INJECTION PUMP A SUCTION VLV	NO
4	248F002B	253A	SBLC INJECTION PUMP B SUCTION VLV	NO
5	248F003A	253A	SBLC INJECTION PUMP A DISCHARGE VLV	NO
6	248F003B	253A	SBLC INJECTION PUMP B DISCHARGE VLV	NO
7	248F004A	253A	EXPLOSIVE ACTUATED	NO
8	248F004B	253A	EXPLOSIVE ACTUATED	NO
9	248F007	253A	CHECK VALVE	YES
10	248F008	253A	STANDBY LIQUID CONTROL INJ ISO VALVE	YES
11	248F033A	253A	CHECK VALVE	NO
12	248F033B	253A	SBLC PUMP 2P208B DISCHARGE CKV	NO
13	2E219	253A	SBLC STORAGE TANK ELECTRIC HEATER A	YES
14	2E220	253A	SBLC STORAGE TANK ELECTRIC HEATER B	YES
15	2P208A	253A	STANDBY LIQ CONTROL PUMP 'A'	NO
16	2P208B	253A	STANDBY LIQ CONTROL PUMP 'B'	N0
17	2T204	253A	STANDBY LIQUID CONTROL STORAGE TA	NO (PASSIVE)
18	HS24804	253A	SBLC MANUAL INITIATION SWITCH	YES
19	HV248F006	253A	SBLC OB INJECTION VALVE	YES

of components in this table with respect to design attributes such as redundancy, single power source, interlocks and hand operation results in a further reduction to **six** potential single failure components for each unit. A summary Table 4.4.2 of these components is shown below, with the corresponding identification number from Table 4.1 above.

TABLE 4.4.2

Single Failure Criteria Components

NO	COMP. ID.	SYST. NO.	COMPONENT NAME / FUNCTION	SINGLE FAILURE CRITERIA COMPONENT/ ACTIVE (PASSIVE)
			UNIT 1	
9	148F007	153A	CHECK VALVE	YES / ACTIVE
10	148F008	153A	STANDBY LIQUID CONTROL INJ ISO VALVE	YES PASSIVE
13	1E219	153A	SBLC STORAGE TANK ELECTRIC HEATER A	YES / ACTIVE
14	1E220	153A	SBLC STORAGE TANK ELECTRIC HEATER B	YES / ACTIVE
18	HS14804	153A	SBLC MANUAL INITIATION SWITCH	YES / ACTIVE
19	HV148F006	153A	SBLC OB INJECTION VALVE	YES / ACTIVE
			UNIT 2	
9	248F007	253A	CHECK VALVE	YES / ACTIVE
10	248F008	253A	STANDBY LIQUID CONTROL INJ ISO VALVE	YES / PASSIVE
13	2E219	253A	SBLC STORAGE TANK ELECTRIC HEATER A	YES / ACTIVEE
14	2E220	253A	SBLC STORAGE TANK ELECTRIC HEATER B	YES / ACTIVE
18	HS24804	253A	SBLC MANUAL INITIATION SWITCH	YES / ACTIVE
19	HV248F006	253A	SBLC OB INJECTION VALVE	YES / ACTIVE

The components shown in Table 4.4.2 fall under the definition of single failure criteria i.e., "an occurrence that results in the loss of capability of a component to perform its intended safety function." In order to take credit for the application of the SBLC System to the suppression pool pH function these components must be evaluated for their low risk failure probability and judged acceptable. This is done for each component including the guidelines (a)-(e) discussed in Section 4.1 above as well as, the following evaluation criteria:

a) component's design (seismic, ASME, etc.), inspection and procurement program
b) testing and maintenance program
c) industry historical performance of these components
d) SSES plant experience with these components
e) power source

The argument and justification for the low risk of failure of each component is presented in detail in the following Section 4.5.

The argument and justification for the low risk of failure of each component is presented in

4.5 Justification for Low Risk Failure Probability

The argument and justification for the low risk of failure of each component identified in Table 4.4.2 follows.

4.5.1 CHECK VALVE – 1(2)48F007(1)

The possibility of SBLC System Isolation Check Valve 1(2)48- F007 having a single failure (fails closed-preventing flow) when called to service of system injection into the Reactor Vessel is evaluated consequently. The valve is a high reliability component whose potential failure is very low and this premise is justified below.

The objective argument against a single failure (fails closed) probability of the SBLC Injection check valve is based on the in-place safeguards and the quality applied to the valve's operation. First, the valve has been procured as ASME, Section III, Class 1 safety-related component, is periodically tested and inspected, and has demonstrated historical performance with no failures. Second, an extensive search of INPO (EPIX, NPRDS – Attachment No. 2) and Susquehanna (NIMS) databases revealed no failures (to open or close) of this and similar valves. The INPO, EPIX and NPRDS databases were searched on all BWR (including Susquehanna) plants on key words such as: Standby Liquid Control (SBLC), Maintenance Rule applicability and for the particular valve (by function, type and manufacturer). All records reviewed show only requirement for routine maintenance and minor correction to leak rate. The Susquehanna site system engineer likewise confirmed this result through in-plant performance history (Attachment No. 3).

The results of this evaluation show the potential for failure of the valve is very low based on the quality as established by the component's procurement as an ASME, Section III, Class 1 safety-related valve, its periodic testing and inspection (References 6.13 and 6.14), and historical performance of the component (NIMS Data Base Maintenance Record, INPO EPIX, NPRDS).

Table 4.5.1 further summarizes the important attributes, which serve as additional testimony of the valve's reliability against a potential single failure occurrence.

(1) Terminology is used throughout to designate Unit #1 and #2 valves and components.

TABLE 4.51

Valve Component Data Sheet

VALVE NO / ATTRIBUTE	1(2)48-F007	REFERENCES
TYPE	Lift Check – 1 ½ inch Y Type	6.10
MANUFACTURER	Borg - Warner	6.10
NORMAL OPERATION	Valve in closed position. Ultrasonic flow unit FE-1(2)4806 would indicate if valve fails closed on system start.	6.2, 6.3, 6.6, 6.13, 6.14
QUALITY ASSURANCE REQUIREMENT	YES 10CFR50, APPENDIX B	6.15, 6.16
Q CLASS	YES Quality Group A, per RG 1.26	6.15, 6.16
SAFETY CLASSIFICATION	1 - Per ANSI, N212	6.15, 6.16
ASME	ASME Section III, Class 1	6.15, 6.16
ASEC	III, NB	6.15, 6.16
MAINTENANCE RULE	YES	6.15, 6.16
SEISMIC CATEGORY	CATEGORY I, SSE	6.15, 6.16

Although, acknowledging that a single failure possibility exists to open the injection check valve, the above arguments accentuate that the potential for **failure is very low**. This is based on the quality as established by the valve's procurement as a safety-related valve, its testing and inspection and historical performance.

4.5.2 SBLC MANUAL INITIATION SWITCH, HS1(2)4804

As mentioned above, one of the two components identified, the main control room selector switch HS1(2)4804 is also considered for the single failure criteria. Similar to the check valve, the hand switch is likewise a high reliability component whose potential for failure is very low.

In the event that system operation is required, the operator must place Keylock Hand Switch HS-14804, SBLC MANUAL INITIATION on Panel 1C601 to the START position. This switch is of the maintained contact type, and in the START position, acts to close contacts that energize

In the event that system operation is required, the operator must place Keylock Hand Switch

both the "A" and "B" SBLC Pump start relays and the K2 and K6 relays. The pumps will continue to run until stopped by the Control Room operator.

The Hand Switch is a high reliability component at a very accessible location and whose failure is very unlikely. This switch is of the maintained contact type (passive) and is turned on manually. In case of remote possibility of failure of this switch, an available option allows access to the back panel where it could be easily replaced (or bypassed) in enough time to start system initiation.

Table 4.5.2 lists some important attributes, which serve as additional testimony of the switch's reliability against a potential single failure occurrence.

TABLE 4.5.2

Key Locked Hand Switch Component Data Sheet

VALVE NO ATTRIBUTE	HS1(2)4804	REFERENCES
TYPE	Key Locked Hand Switch	6.6, 6.16
MANUFACTURER	General Electric	6.7
NORMAL OPERATION	Maintained contact type switch. Operator must place switch on Panel 1(2)C601 to the START position to energize relays to start pumps.	6.2, 6.3, 6.16
EQ	NO	6.15, 6.16
QUALITY ASSURANCE REQUIREMENT	YES 10CFR50, APPENDIX B	6.15, 6.16
Q CLASS	YES Quality Group A, per RG 1.26	6.15, 6.16
SAFETY CLASSIFICATION	1 - Per ANSI, N212	6.15, 6.16
ASME	No	6.15, 6.16
ASEC	No	6.15, 6.16
MAINTENANCE RULE	YES	6.15, 6.16
SEISMIC CATEGORY	CATEGORY I, SSE	6.15, 6.16

The results show the Hand Switch HS 1(2)4804 is a high reliability component, at a very accessible location and whose failure is very improbable and would not prevent the SBLC System from performing its intended function.

The results show the Hand Switch HS 1(2)4804 is a high reliability component, at a very

4.5.3 STANDBY LIQUID CONTROL INJ ISO VALVE - 1(2)48F008; SBLC OB INJECTION VALVE HV1(2)F006

The possibility of SBLC System Isolation Valves HV 1(2)48-F006 and 1(2)48-F008 experiencing a single failure (fail closed) when called to service is evaluated consequently. Even though the single failure criteria applies to the containment isolation valves, the valves are very high reliability components whose potential failure is very small.

The objective argument against a single failure (fails closed) probability of the SBLC Injection valves is based on the in-place safeguards and the quality applied to the valves' operation. First, the valves have been procured as ASME, Section III, Class 1 safety-related, are periodically tested and inspected, and have demonstrated historical performance of their reliability. Second, from safety consideration, valve HV-1(2)48F006 has a keylock switch and will annunciate on Control Panel C601 if the switch is in CLOSE position or if the valve is NOT FULLY OPEN. Similarly, valve 1(2)48-F008 is LOCKED OPEN and its' position indication is shown on Control Panel C601 .

A detailed search of the NIMS Data Base shows only routine maintenance requirement of the valves and minor corrections to instrumentation. There has not been an incident where either valve closed spuriously or had a false indication of being open or closed.

The results of this evaluation show the potential for failure of the valve is very low based on the quality as established by the component's procurement as an ASME, Section III, Class 1 safety-related valve, its periodic testing and inspection (References 6.13, 6.14), and historical performance of the component (NIMS Data Base Maintenance Record and INPO - EPIX, NPRDS).

Table 4.5 further summarizes the important attributes, which are additional proof of the valves' reliability and safety against a single failure occurrence.

TABLE 4.5.3

VALVE NO / ATTRIBUTE	HV 1(2)48-F006	1(2)48-F008	REFERENCES
TYPE	YARWAY- 1 1/2" MOV	Borg-Warner - 1 1/2" GT	6.7, 6.20, 6.21
NORMAL OPERATION	Position Switch ZS-12. Alarm if valve not fully open (AR-107-D03). Displayed on 1(2)C601 Powered by 1(2)B236.	Locked open manual injection. Position indication displayed on 1(2)C601. Powered by 1(2)Y216.	6.4, 6.6, 6.7, 6.11, 6.12
QUALITY ASSURANCE REQUIREMENT	YES 10CFR50, APPENDIX B	YES 10CFR50, APPENDIX B	6.15, 6.16
Q CLASS	YES Quality Group A, per RG 1.26	YES Quality Group A, per RG 1.26	6.15, 6.16
SAFETY CLASSIFICATION	1 - Per ANSI, N212	1 - Per ANSI, N212	6.15, 6.16
ASME	ASME Section III, Class 1	ASME Section III, Class 1	6.15, 6.16
ASEC	III, NB	III, NB	6.15, 6.16
MAINTENANCE RULE	YES	YES	6.15, 6.16
SEISMIC CATEGORY	CATEGORY I, SSE	CATEGORY I, SSE	6.15, 6.16

Acknowledging the possibility of a single failure to close one of the two SBLC injection valves, the above argument accentuates that the potential for failure is very low. This is based on the quality as established by the valves' procurement as safety-related valves, their testing and inspection, and their historical performance.

4.5.4 SBLC STORAGE TANK ELECTRIC HEATERS A, B – 1(2)E219, 1(2)E220

Table 4.4.2 also lists SBLC Storage Tank Heater A (1(2)E219) and Heater B (1(2)E220) as potential components for single failure. Their function is maintaining a minimum storage tank temperature to prevent the sodium pentaborate solution from precipitating out of solution; thereby, rendering the system incapable of performing its design functions. The heaters are active components and are somewhat redundant which is best explained by their respective function. Storage tank heater "A" is a 10 kW heater powered from 480 VAC MCC 1(2)B236. This heater operates to automatically maintain solution temperature above the precipitation point, and can be removed for maintenance/replacement without draining the storage tank.

active components and are somewhat redundant which is best explained by their respective

Storage Tank Heater "B" is used to elevate the temperature during chemical addition to increase the solubility of the sodium pentaborate in water. This is necessary because the mixing of sodium pentaborate and water is an endothermic reaction, which draws heat from the system. This heater is a 40 kW heater powered from 480 VAC MCC 1(2)B236.

As is evident above, the single failure criteria impacts the heaters since they are powered from the same power source i.e., 480 VAC MCC 1(2)B236.

Since regulatory criteria dictate that SBLC System initiation post LOCA is completed by 24 hours, an option is available for supplying power to the heaters from Diesel Generator A or C (References 6.8 and 6.9) on loss of the AC Bus. However, should backup power not be available for the first 24 hours, the need for maintaining the minimum storage tank temperature is still necessary to prevent sodium pentaborate from precipitating out of solution; thereby rendering the system not applicable of performing the AST function. Therefore, a calculation was performed to determine the transient cool-down rate of the tank's inventory over a 24 hour period with the heaters off. The solution temperature at 24 hours confirmed it is still within design limits.

The stepped approach of the Calculation is presented as follows:

Assumptions/Input:

Input data for the Storage Tank's normal operating temperature limits were obtained from References 6.2 through 6.5. These were used in setting the initial conditions.

- With the heater control switch in AUTO, the 'A' heater is controlled by a temperature indicating controller to maintain tank temperature between 85°F and 95°F.
- The high temperature alarm activates at a tank temperature of 110°F, increasing and the low temperature alarm activates at 80°F, decreasing. The low temperature alarm set at 80°F ensures action can be taken prior to tank temperature decreasing below the saturation temperature of the solution.
- Technical Specification 3.1.7 requires a minimum sodium pentaborate concentration of 13.6 weight percent limit. From Figure 3.1.7.2 of the Technical Specification at that concentration an acceptable operating range temperature of 66°F is required.

The SBLC Storage Tank geometry and dimensions were obtained from Reference 6.22.

It was determined a standard electrical analogy method for transient conduction is applicable for this situation. Equations and parameters used were obtained from Reference 6.23, Sections 34 and 35.

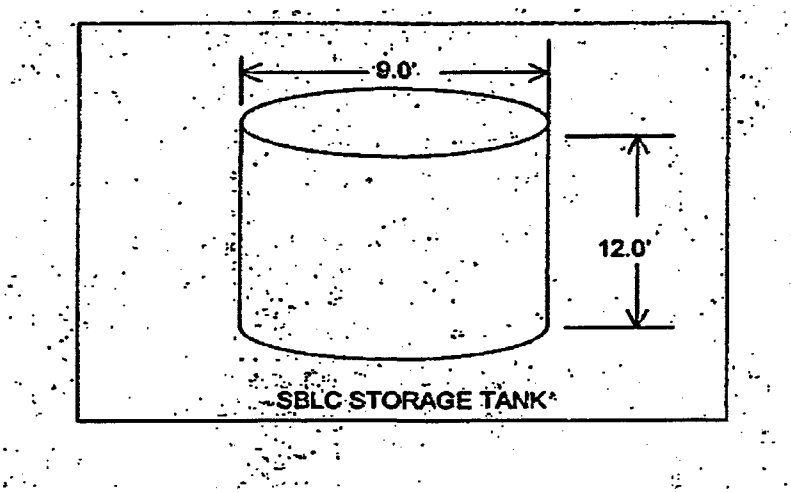
The tank's sodium pentaborate solution was assumed to have properties of ordinary water.

for this situation. Equations and parameters used were obtained from Reference 6.23, Sections 34 and 35.

Methodology:

Using the above input and assumptions, conservative evaluations were performed to determine temperature decay (cool-down) in the Standby Liquid Control System Storage Tank in the event of loss of both heaters.

First, the geometry and dimensions of the tank used in the analysis is illustrated in the sketch below: Data is obtained from References 6.22 and 6.41.



Tank ID = 9 ft
Tank OD = 9.03 ft
Wall thickness = 3/16"
Water level = 4587 gal
= 115.6" = 9.63 ft (low)
Water level = 4897 gal
= 123.5" = 10.3 ft (high)
Tank insulation = 1"
Calcium silicate

Second, the approach referenced for transient conduction is obtained from Reference 6.23 and is included below. The method used to determine the time dependent fluid temperature in the tank is the Lumped Parameter Electrical Analogy Method which is described below.

LUMPED PARAMETER ELECTRICAL ANALOGY METHOD

$$T_t = T_\infty + (T_o - T_\infty) \exp(-t/C_e R_e) \qquad (1)$$

Where:

$C_e = c_p \rho V$

$R_e = 1/hA_s$

T_t = medium temperature at time ~t, °F
T_o = initial medium temperature, °F
T_∞ = bulk outside ambient temperature, °F
T_t = medium temperature at time ~t, °F

T_s = surface temperature, °F
k = thermal conductivity, Btu/(hr-ft- °F)
t =time, hr
ρ = mass density, lb/ft3 = 62.3
C_p = specific heat, Btu/lbm- °F = 0.999
L_c = characteristic length, ft (= V/A_s)
V = volume, ft^3
A_s = surface area, ft^2
h = film coefficient, Btu/(hr-ft^2- °F)
= $0.29\{(T_s - T_\infty)/L_c\}^{0.25}$ (for a vertical cylinder geometry), (applicable for GrPr = 10^4 to 10^9)

First, the confirmation of the Rayleigh Number (GrPr product) has to be made in order to permit the use of the cylinder film coefficient.

The Prandtl Number is defined as follows:

$$Pr = c_p\mu/k$$

Where μ = viscosity, lb/hr-ft

And the Grashof Number is,

$$Gr = (L_c^3 g\beta\rho^2 (T_s - T_\infty))/\mu^2$$

Where g = gravitational acceleration, ft/hr^2
β = volumetric coefficient of expansion, 1/ °R

Assuming conservative conditions for T_s = 95°F and T_∞ = 60°F, the Grashof Number is conservatively determined using T_∞ (60°F), (Reference 6.23, Appendix 35.C)

Pr = 0.72
$g\beta\rho^2/\mu^2 = 2.58 \times 10^6$ (interpolated)
$L_c^3 = (V/A_s)^3 = (\pi r^2 h/2\pi rh)^3 = (r/2)^3 = ((9.03\ ft/2)/2)^3 = 11.5\ feet^3$

Note that the surface area of the top and bottom of the tank are neglected. The bottom of the tank is connected to concrete and will insulate the tank from heat loss. Additionally, the water does not go to the top of the tank therefore the inside lid of the tank will be exposed to air. The heat transfer through the lid will be very small and is neglected.

Therefore, the Rayleigh Number (GrPr product) is,

$$GrPr = 11.5x(2.58 \times 10^6)x(95 - 60)x\ 0.72 = 7.48\ E+08$$

Therefore, the Rayleigh Number (GrPr product) is,

In addition to confirming the Rayleigh number, Reference 6.23 states that $d/L \geq 35/(Gr)^{0.25}$. This confirmation is performed below.

$9.03/2.26 \geq 35/(1.04 \times 10^{9})^{0.25}$ OR $4.0 \geq 0.2$

Which satisfies the criteria of using the above film coefficient: $0.29\{(T_s - T_\infty)/L_c\}^{0.25}$

Utilizing Equation 1 above i.e., $T_t = T_\infty + (T_o - T_\infty) \exp(-t/R_eC_e)$, with the following input, a parametric study of the tank temperature with time was estimated.

From above.

$C_e = c_p\rho V$ (Equivalent thermal resistance)
$R_e = 1/hA_s$ (Equivalent thermal resistance)

The following range of values were used in the analysis,

T_o = initial medium (sodium pentaborate) temperature, °F
= range of 95°F to 80°F (95°F taken conservatively as the upper normal operating temperature)

T_∞ = bulk outside ambient temperature, °F
= range of 80°F to 60°F (assumed)

V = minimum volume, ft^3 = 4587 gal x 0.13368 ft^3/gal (see above calculation and sketch)
= **613** ft^3

Note the minimum tank volume was conservatively used since it lowers the amount of mass to be cooled.

A_s = surface area, ft^2 = 6.28x4.515'x9.633' (see above calculation and sketch above)
= **273** ft^2

$h = 0.29\{(T_s - T_\infty)/L_c\}^{0.25}$ (Variable h) (Reference 6.23, page 35-5)
(the medium temperature is assumed to be the surface temperature).
Also, a constant heat transfer coefficient of 2.0 Btu/hr-ft- °F was also used for some cases

Therefore, substituting values

$C_e = c_p\rho V = (0.999)\ (62.3)\ (613) =$ **38,151**

Therefore, substituting values

$R_e = 1/hA_s = 1 / (0.29\{(T_s - T_\infty)/L_c)\}^{0.25}) (273) = 1 / 79.2 \{(T_s - T_\infty)/ L_c)\}^{0.25}$
$= 1/79.2 ((T_s - T_\infty)/2.26)^{.25} = 1/64.6(T_s - T_\infty)^{0.25} = \mathbf{0.0155(T_s - T_\infty)^{-0.25}}$
Or

$C_e \times R_e = (38,151)(0.0155(T_s - T_\infty)^{-0.25}) = 591.3(T_s - T_\infty)^{-0.25}$

Substituting the above parameters into Equation 1,

$T_t = T_\infty + (T_o - T_\infty) \exp(-t/C_e R_e)$

$= T_\infty + (T_o - T_\infty) \exp(-t / (591.3 / (T_s - T_\infty)^{0.25})$

$= T_\infty + (T_o - T_\infty) \exp(-t(.00169(\{(T_s - T_\infty)\}^{0.25})))$ (2)

Equation (2) above was used to produce the transient results of temperature in the tank using the transient film coefficient.

Note that for all cases the tank insulation was conservatively neglected since the insulation will limit the temperature decrease.

4.5.4.1 Constant Heat Transfer Coefficient Analysis:

Given the uncertainty of the air flow patterns around the tank a case was run with a constant heat transfer coefficient. A value of 6.0 Btu/hr ft^2 °F was chosen since it is representative of a heat transfer coefficient for a 15 mph wind speed. This value will obviously bound any conditions that would exist in the reactor building.

The calculation was performed in a manner similar to the methodology described above except the value of R_e simply became

$R_e = 1/hA_s = 1/(6)(273) = 6.105 \times 10^{-4}$

A number of parametric runs were performed for the variable input values discussed in Section 4.5.4 above. The results were generated using an EXCEL spreadsheet and are presented below in Table 4.5.4. The spreadsheet results are included as Attachment 5. Table 4.5.4 results use the variable (h) and a constant (h) = 6.0 Btu/hr- ft^2. Only the two most challenging cases are presented.

TABLE 4.5.4 -Cool-down Temperatures Using a **Variable and Constant(h)**

TIME (hr)	**Variable (h)** 80 Inside , 60 Outside	**Constant (h) (h = 6.0)** 80 Inside , 60 Outside
0	80	80
0.5	79.96429	79.57518
1	79.92868	79.15938
1.5	79.89316	78.75241
2	79.85774	78.35409
2.5	79.82242	77.96422
3	79.78718	77.58264
3.5	79.75204	77.20917
4	79.717	76.84363
4.5	79.68205	76.48585
5	79.64719	76.13567
5.5	79.61242	75.79293
6	79.57774	75.45747
6.5	79.54316	75.12913
7	79.50867	74.80777
7.5	79.47427	74.49324
8	79.43996	74.18539
8.5	79.40574	73.88407
9	79.37161	73.58916
9.5	79.33757	73.30051
10	79.30362	73.01799
11	79.23566	72.47083
12	79.16836	71.94667
13	79.10141	71.44453
14	79.03481	70.96351
15	78.96855	70.5027
16	78.90264	70.06126
17	78.83707	69.63837
18	78.77184	69.23326
19	78.70695	68.84518
20	78.6424	68.4734
21	78.57817	68.11726
22	78.51428	67.77608
23	78.45072	67.44924
24	78.38748	67.13614

It is evident above that the initial and outside temperature conditions are very impacting. The most rapid cool down occurs with the assumption of a constant film coefficient (h = 6.0). However, the Technical Specification limit (66 ^{o}F) is not exceeded over the entire 24 hours with either coefficient.

5.0 RESULTS

Acknowledging that a single failure of one of the components listed in Table 4.4.2 is remotely possible, the above arguments accentuate that the potential for **failure is very low.** This is based on the quality as established by the components' procurement as safety-related valves, their testing and inspection, their historical performance and as in the case of the heaters, availability of redundant power sources.

6.0 REFERENCES

6.1 RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors", Regulatory Guide, U.S. N.R.C.
6.2 TM-OP-053-ST, "Standby Liquid Control", Systems Training Student Text, Rev. 03, 4/25/02.
6.3 DBD-042, "Standby Liquid Control System", Rev. 2.
6.4 AR-107-001, "CRD, SLC, DRYWELL SUMPS 1C601," Annunciator Procedure.
6.5 OP-153-001, "Standby Liquid Control System", Rev. 21.
6.6 Drawing M-(2)148, "Unit 1 P&ID, Standby Liquid Control," Rev. 34.
6.7 Drawing D107315, Sht.3, 4, 7, 8, Schematic Diagram-"Standby Liquid Control System", Rev. 17
6.8 Drawing D107150, Sht. 1, Susquehanna S.E.S. Unit 1 & 2, "Single Line Diagram Station", Rev. 30.
6.9 Drawing D107159, Sht. 1, "Single Line Meter & Relay Diagram , 125VDC, 250VDC & 120VAC Systems", Unit 1 & 2,Rev. 23.
6.10 Drawing FF110470, Sh. 1001, "Valve Assembly lift Check - 1 1/2 inch Y Type." Borg - Warner Corp.
6.11 Proc. No. CL-153-0011, "Standby Liquid Control System", Electrical , Rev. 7.
6.12 Proc. No. CL-153-0013, "Standby Liquid Control System", Mechanical - Containment, Rev. 4.
6.13 SO-153-003, "24 Month SBLC Operability", Rev. 20.
6.14 SO-153-004, "Quarterly SBLC Flow Verification", Rev 30.
6.15 Susquehanna Station FSAR Table 3.2-1.
6.16 Susquehanna Station Nuclear Information Management System (NIMS).
6.17 Susquehanna Station Site Performance & Maintenance History – System Engineer Ian C. Missien).
6.18 INPO computer available databases, EPIX and NPRDS.
6.19 Deleted.
6.20 Drawing 74680 (FF110470), "Valve Assembly - 1 'lz inch Gate. Cres." Borg - Warner Corp.
6.21 Drawing FF110140, Sht. 1001,"1 1/2" Yarway Welbond Valve With Limitorque Electric Motor Actuator- Stop Check Design." Rev. 8.
6.22 Drawing FF121010, Sh. 2801, 2802, Standby Liquid Control Storage Tank, General Electric Co.
6.23 Lindeburg, Michael R., "Mechanical Engineering Reference Manual for the PE Exam", Eleventh Edition. Professional Publications. Inc., Belmont, CA.
6.24 Drawing D107315, Sht. 1, 2, 5, 6 Schematic Diagram-"Standby Liquid Control System".
6.25 Drawing D107315, Sht. 2, "Emerg. Core Clg. Benchboard, 1C601", Unit 1.
6.26 Drawing M1-C41-36, "Elem. Diag.-Standby Liquid Control", Sht. 1, 2, 3.
6.27 Drawing M1-C41-31, "FCO.-Standby Liquid Control", Sht. 1.
6.28 PLA 2222, "Conformance to Regulatory Guide 1.97, Rev. 2", (93309710001).
6.29 Calculation EC-030-1007, " Transient Temperature Response of CS with HVAC – Normal and Accident Conditions".
6.30 Drawing A-512, "Shielding and Radiation Zoning Drawing, Control Building, EL 729'-1".
6.31 NIMS Data Base

6.29 Calculation EC-030-1007, " Transient Temperature Response of CS with HVAC – Normal and

6.32 Drawing C-1815, Sheet 9, "SSES Unit 1& 2 Reactor Building Equipment Qualification Harsh Environment Zones.

6.33 Drawing C-1815, Sheet 1, "SSES Unit 1& 2 Primary Containment Equipment Qualification Harsh Environment Zones

6.34 General Electric's "Nuclear Products Quality Assurance Manual".

6.35 Yarway's "Nuclear Products Quality Assurance Manual"

6.37 Borg-Warner's "Nuclear Products Quality Assurance Manual"

6.38 Drawing J-653, Sheet 53, Rev. 7, "SBLC Storage Tank".

6.39 Email from Ian Missien (site engineer) based on a walkdown and measurement of the insulation thickness.

6.40 Calculation EC-RADN-1004, " Equipment Qualification Radiation Doses for Selected Zones Due to Hydrogen Injection", Appendix G. (Values in this calculation estimated based on TID)

6.41 Drawing J-653 Sheet 53 (PPL Drawing #A-103785, Sheet 53) "SBLC Storage Tank".

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	1 of 8

ATTACHMENT NO. 1

SBLC UNIT 1 AND UNIT2 COMPONENT LIST

SLC STANDBY LIQUID CONTROL COMPONENT LIST

COMPONENT	SYST NO.	SYSTEM	UNIT NO
NXL01-U1	153	SLC STANDBY LIQUID CONTROL	1
FO14813	153	SLC STANDBY LIQUID CONTROL	1
FO14814	153	SLC STANDBY LIQUID CONTROL	1
FV14814	153	SLC STANDBY LIQUID CONTROL	1
NXF01-U1	153	SLC STANDBY LIQUID CONTROL	1
148013	153	SLC STANDBY LIQUID CONTROL	1
SPDCB101H23	153A	SLC STANDBY LIQUID CONTROL	1
148F002A	153A	SLC STANDBY LIQUID CONTROL	1
148F014	153A	SLC STANDBY LIQUID CONTROL	1
FI14814	153A	SLC STANDBY LIQUID CONTROL	1
HSS14802	153A	SLC STANDBY LIQUID CONTROL	1
JBD-178	153A	SLC STANDBY LIQUID CONTROL	1
LIC411R601	153A	SLC STANDBY LIQUID CONTROL	1
PIC411R003	153A	SLC STANDBY LIQUID CONTROL	1
SPJCD107H9	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2015	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H2001	153A	SLC STANDBY LIQUID CONTROL	1
1T207A	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H19	153A	SLC STANDBY LIQUID CONTROL	1
PI148R003-R2	153A	SLC STANDBY LIQUID CONTROL	1
1T207B	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H17	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2010	153A	SLC STANDBY LIQUID CONTROL	1
148F002B	153A	SLC STANDBY LIQUID CONTROL	1
148F003B	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H9	153A	SLC STANDBY LIQUID CONTROL	1
148015	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H31	153A	SLC STANDBY LIQUID CONTROL	1
SPHCD131H3	153A	SLC STANDBY LIQUID CONTROL	1
SPJBD1045H2000	153A	SLC STANDBY LIQUID CONTROL	1
SPJCD107H10	153A	SLC STANDBY LIQUID CONTROL	1
IC-PI148207B-	153A	SLC STANDBY LIQUID CONTROL	1
148005	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H2	153A	SLC STANDBY LIQUID CONTROL	1
DCA-106	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H29	153A	SLC STANDBY LIQUID CONTROL	1
LG14803	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H14	153A	SLC STANDBY LIQUID CONTROL	1
ZS14806	153A	SLC STANDBY LIQUID CONTROL	1
TAHL14810	153A	SLC STANDBY LIQUID CONTROL	1
SPHBD101H2008	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H6	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H36	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2050	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2012	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H20	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H16	153A	SLC STANDBY LIQUID CONTROL	1
LISHL14812	153A	SLC STANDBY LIQUID CONTROL	1
DCB-101	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H44	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H8	153A	SLC STANDBY LIQUID CONTROL	1
HS14808B	153A	SLC STANDBY LIQUID CONTROL	1
HV148F006/ACT	153A	SLC STANDBY LIQUID CONTROL	1

| HS14808B | 153A | SLC STANDBY LIQUID CONTROL | 1 |
| HV148F006/ACT | 153A | SLC STANDBY LIQUID CONTROL | 1 |

PI148R003-R1	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H1	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H1	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H34	153A	SLC STANDBY LIQUID CONTROL	1
FI14806	153A	SLC STANDBY LIQUID CONTROL	1
SPJBD1045H2001	153A	SLC STANDBY LIQUID CONTROL	1
XY14806	153A	SLC STANDBY LIQUID CONTROL	1
148010	153A	SLC STANDBY LIQUID CONTROL	1
148F031	153A	SLC STANDBY LIQUID CONTROL	1
1E219	153A	SLC STANDBY LIQUID CONTROL	1
DCA-206	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H32	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H24	153A	SLC STANDBY LIQUID CONTROL	1
1P208B	153A	SLC STANDBY LIQUID CONTROL	1
148F017	153A	SLC STANDBY LIQUID CONTROL	1
148F015	153A	SLC STANDBY LIQUID CONTROL	1
TSHLC411N003	153A	SLC STANDBY LIQUID CONTROL	1
TEC411N006	153A	SLC STANDBY LIQUID CONTROL	1
SPHCD131H1	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H4	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H33	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H11	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H8	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H17	153A	SLC STANDBY LIQUID CONTROL	1
148016	153A	SLC STANDBY LIQUID CONTROL	1
TSHL14810	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H7	153A	SLC STANDBY LIQUID CONTROL	1
HS14806	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H21	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2016	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H12	153A	SLC STANDBY LIQUID CONTROL	1
PI148207A	153A	SLC STANDBY LIQUID CONTROL	1
JBD181H1	153A	SLC STANDBY LIQUID CONTROL	1
JBD-1045	153A	SLC STANDBY LIQUID CONTROL	1
HS14804	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H4	153A	SLC STANDBY LIQUID CONTROL	1
FT14806	153A	SLC STANDBY LIQUID CONTROL	1
DCB-201	153A	SLC STANDBY LIQUID CONTROL	1
1T203	153A	SLC STANDBY LIQUID CONTROL	1
1E220	153A	SLC STANDBY LIQUID CONTROL	1
148F033A	153A	SLC STANDBY LIQUID CONTROL	1
XYC411M600A	153A	SLC STANDBY LIQUID CONTROL	1
148012	153A	SLC STANDBY LIQUID CONTROL	1
HV148F006	153A	SLC STANDBY LIQUID CONTROL	1
FICC411R004	153A	SLC STANDBY LIQUID CONTROL	1
148F003A	153A	SLC STANDBY LIQUID CONTROL	1
148F001	153A	SLC STANDBY LIQUID CONTROL	1
148009	153A	SLC STANDBY LIQUID CONTROL	1
148008	153A	SLC STANDBY LIQUID CONTROL	1
148002	153A	SLC STANDBY LIQUID CONTROL	1
TICC411R002	153A	SLC STANDBY LIQUID CONTROL	1
TE14810	153A	SLC STANDBY LIQUID CONTROL	1
SPHCD131H2	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H4	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H30	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2008	153A	SLC STANDBY LIQUID CONTROL	1
HS14808A	153A	SLC STANDBY LIQUID CONTROL	1

HS14808A	153A	SLC STANDBY LIQUID CONTROL	1

PI148207B	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H2005	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H3	153A	SLC STANDBY LIQUID CONTROL	1
PSV148F029A	153A	SLC STANDBY LIQUID CONTROL	1
ZS14808L	153A	SLC STANDBY LIQUID CONTROL	1
148003	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H14	153A	SLC STANDBY LIQUID CONTROL	1
148F004B	153A	SLC STANDBY LIQUID CONTROL	1
148F024	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H35	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H10	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H22	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H5	153A	SLC STANDBY LIQUID CONTROL	1
IC-PI148207A-	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2013	153A	SLC STANDBY LIQUID CONTROL	1
148018	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H15	153A	SLC STANDBY LIQUID CONTROL	1
148F012	153A	SLC STANDBY LIQUID CONTROL	1
FE14806	153A	SLC STANDBY LIQUID CONTROL	1
148F033B	153A	SLC STANDBY LIQUID CONTROL	1
148F021	153A	SLC STANDBY LIQUID CONTROL	1
148F018	153A	SLC STANDBY LIQUID CONTROL	1
148017	153A	SLC STANDBY LIQUID CONTROL	1
XA14804	153A	SLC STANDBY LIQUID CONTROL	1
PCV14811B	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H18	153A	SLC STANDBY LIQUID CONTROL	1
PIC411R600	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H2006	153A	SLC STANDBY LIQUID CONTROL	1
PT148N004-R2	153A	SLC STANDBY LIQUID CONTROL	1
PT148N004-R1	153A	SLC STANDBY LIQUID CONTROL	1
LAHL14801	153A	SLC STANDBY LIQUID CONTROL	1
1P208A	153A	SLC STANDBY LIQUID CONTROL	1
148F026	153A	SLC STANDBY LIQUID CONTROL	1
148F025	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H8	153A	SLC STANDBY LIQUID CONTROL	1
LIC411R001	153A	SLC STANDBY LIQUID CONTROL	1
PSV148F029B	153A	SLC STANDBY LIQUID CONTROL	1
148004	153A	SLC STANDBY LIQUID CONTROL	1
PCV14811C	153A	SLC STANDBY LIQUID CONTROL	1
TAHL14803	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H2	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H1	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H28	153A	SLC STANDBY LIQUID CONTROL	1
PCV14811A	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H10	153A	SLC STANDBY LIQUID CONTROL	1
1T204	153A	SLC STANDBY LIQUID CONTROL	1
LE14812	153A	SLC STANDBY LIQUID CONTROL	1
JBD-181	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H11	153A	SLC STANDBY LIQUID CONTROL	1
148F016	153A	SLC STANDBY LIQUID CONTROL	1
148F011	153A	SLC STANDBY LIQUID CONTROL	1
148F008	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H19	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2011	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H2002	153A	SLC STANDBY LIQUID CONTROL	1
LSHLC411N600	153A	SLC STANDBY LIQUID CONTROL	1
HCD-131	153A	SLC STANDBY LIQUID CONTROL	1

LSHLC411N600	153A	SLC STANDBY LIQUID CONTROL	1
HCD-131	153A	SLC STANDBY LIQUID CONTROL	1

HCB105H7	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H9	153A	SLC STANDBY LIQUID CONTROL	1
HCB-105	153A	SLC STANDBY LIQUID CONTROL	1
LI/FI14806	153A	SLC STANDBY LIQUID CONTROL	1
148019	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H16	153A	SLC STANDBY LIQUID CONTROL	1
XYC411M600B	153A	SLC STANDBY LIQUID CONTROL	1
HCB105H3	153A	SLC STANDBY LIQUID CONTROL	1
SPHCB105H2000	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H40	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H3	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2014	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2002	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H1000	153A	SLC STANDBY LIQUID CONTROL	1
PTC411N004	153A	SLC STANDBY LIQUID CONTROL	1
148011	153A	SLC STANDBY LIQUID CONTROL	1
JBD178H1	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H43	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H37	153A	SLC STANDBY LIQUID CONTROL	1
148F027	153A	SLC STANDBY LIQUID CONTROL	1
LTC411N001	153A	SLC STANDBY LIQUID CONTROL	1
SPDCA106H42	153A	SLC STANDBY LIQUID CONTROL	1
ESC411K600	153A	SLC STANDBY LIQUID CONTROL	1
1C011	153A	SLC STANDBY LIQUID CONTROL	1
148F007	153A	SLC STANDBY LIQUID CONTROL	1
148007	153A	SLC STANDBY LIQUID CONTROL	1
148006	153A	SLC STANDBY LIQUID CONTROL	1
148001	153A	SLC STANDBY LIQUID CONTROL	1
ZS14808U	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H45	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H39	153A	SLC STANDBY LIQUID CONTROL	1
148F004A	153A	SLC STANDBY LIQUID CONTROL	1
SPDCB101H2009	153A	SLC STANDBY LIQUID CONTROL	1
NXF01-U2	253	SLC STANDBY LIQUID CONTROL	2
248013	253	SLC STANDBY LIQUID CONTROL	2
FV24814	253	SLC STANDBY LIQUID CONTROL	2
2CB253	253	SLC STANDBY LIQUID CONTROL	2
2CB254	253	SLC STANDBY LIQUID CONTROL	2
FO24814	253	SLC STANDBY LIQUID CONTROL	2
FO24813	253	SLC STANDBY LIQUID CONTROL	2
NXL01-U2	253	SLC STANDBY LIQUID CONTROL	2
248F025	253A	SLC STANDBY LIQUID CONTROL	2
2T203	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5026	253A	SLC STANDBY LIQUID CONTROL	2
248004	253A	SLC STANDBY LIQUID CONTROL	2
SPJCD207H1	253A	SLC STANDBY LIQUID CONTROL	2
LSHLC412N600	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5022	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H52	253A	SLC STANDBY LIQUID CONTROL	2
SPHCB205H56	253A	SLC STANDBY LIQUID CONTROL	2
SPHCD231H4	253A	SLC STANDBY LIQUID CONTROL	2
SPJCD207H2	253A	SLC STANDBY LIQUID CONTROL	2
248F033A	253A	SLC STANDBY LIQUID CONTROL	2
2T207A	253A	SLC STANDBY LIQUID CONTROL	2
SPHCB205H54	253A	SLC STANDBY LIQUID CONTROL	2
FI24814	253A	SLC STANDBY LIQUID CONTROL	2
2T207B	253A	SLC STANDBY LIQUID CONTROL	2

2T207B	253A	SLC STANDBY LIQUID CONTROL	2

HCB205H54	253A	SLC STANDBY LIQUID CONTROL	2
ZS24806	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5	253A	SLC STANDBY LIQUID CONTROL	2
2T204	253A	SLC STANDBY LIQUID CONTROL	2
LE24812	253A	SLC STANDBY LIQUID CONTROL	2
248003	253A	SLC STANDBY LIQUID CONTROL	2
248017	253A	SLC STANDBY LIQUID CONTROL	2
248F017	253A	SLC STANDBY LIQUID CONTROL	2
2E219	253A	SLC STANDBY LIQUID CONTROL	2
HSS24802	253A	SLC STANDBY LIQUID CONTROL	2
TSHLC412N003	253A	SLC STANDBY LIQUID CONTROL	2
LI/FI24806	253A	SLC STANDBY LIQUID CONTROL	2
PI248207A	253A	SLC STANDBY LIQUID CONTROL	2
SPHBD6010H9004	253A	SLC STANDBY LIQUID CONTROL	2
SPHBD6010H9001	253A	SLC STANDBY LIQUID CONTROL	2
SPHCD231H2	253A	SLC STANDBY LIQUID CONTROL	2
2P208B	253A	SLC STANDBY LIQUID CONTROL	2
248001	253A	SLC STANDBY LIQUID CONTROL	2
248F021	253A	SLC STANDBY LIQUID CONTROL	2
248F024	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2604	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H61	253A	SLC STANDBY LIQUID CONTROL	2
LISHL24812	253A	SLC STANDBY LIQUID CONTROL	2
PTC412N004	253A	SLC STANDBY LIQUID CONTROL	2
248005	253A	SLC STANDBY LIQUID CONTROL	2
SPHCD231H1	253A	SLC STANDBY LIQUID CONTROL	2
TEC412N006	253A	SLC STANDBY LIQUID CONTROL	2
ZS24808U	253A	SLC STANDBY LIQUID CONTROL	2
TAHL24803	253A	SLC STANDBY LIQUID CONTROL	2
248006	253A	SLC STANDBY LIQUID CONTROL	2
248F007	253A	SLC STANDBY LIQUID CONTROL	2
ESC412K600	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2611	253A	SLC STANDBY LIQUID CONTROL	2
HS24808A	253A	SLC STANDBY LIQUID CONTROL	2
PIC412R600	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2618	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2620	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H58	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H9001	253A	SLC STANDBY LIQUID CONTROL	2
SPHBD6010H9003	253A	SLC STANDBY LIQUID CONTROL	2
SPJCD207H9004	253A	SLC STANDBY LIQUID CONTROL	2
SPJCD207H9006	253A	SLC STANDBY LIQUID CONTROL	2
248019	253A	SLC STANDBY LIQUID CONTROL	2
HBD-6010	253A	SLC STANDBY LIQUID CONTROL	2
FT24806	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5001	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5002	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H60	253A	SLC STANDBY LIQUID CONTROL	2
TICC412R002	253A	SLC STANDBY LIQUID CONTROL	2
TSHL24810	253A	SLC STANDBY LIQUID CONTROL	2
XA24804	253A	SLC STANDBY LIQUID CONTROL	2
XYC412M600B	253A	SLC STANDBY LIQUID CONTROL	2
248009	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5021	253A	SLC STANDBY LIQUID CONTROL	2
FE24806	253A	SLC STANDBY LIQUID CONTROL	2
PCV24811A	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H53	253A	SLC STANDBY LIQUID CONTROL	2

PCV24811A	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H53	253A	SLC STANDBY LIQUID CONTROL	2

HS24808B	253A	SLC STANDBY LIQUID CONTROL	2
PIC412R003	253A	SLC STANDBY LIQUID CONTROL	2
248F012	253A	SLC STANDBY LIQUID CONTROL	2
248F027	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H51	253A	SLC STANDBY LIQUID CONTROL	2
JBD281H1	253A	SLC STANDBY LIQUID CONTROL	2
LG24803	253A	SLC STANDBY LIQUID CONTROL	2
248F001	253A	SLC STANDBY LIQUID CONTROL	2
2E220	253A	SLC STANDBY LIQUID CONTROL	2
248F004B	253A	SLC STANDBY LIQUID CONTROL	2
JBD-278	253A	SLC STANDBY LIQUID CONTROL	2
PSV248F029B	253A	SLC STANDBY LIQUID CONTROL	2
PT248N004-R1	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2602	253A	SLC STANDBY LIQUID CONTROL	2
SPHCD231H3	253A	SLC STANDBY LIQUID CONTROL	2
248002	253A	SLC STANDBY LIQUID CONTROL	2
248008	253A	SLC STANDBY LIQUID CONTROL	2
248F002A	253A	SLC STANDBY LIQUID CONTROL	2
SPHBD6010H9002	253A	SLC STANDBY LIQUID CONTROL	2
HCB-205	253A	SLC STANDBY LIQUID CONTROL	2
HV248F006	253A	SLC STANDBY LIQUID CONTROL	2
HV248F006/ACT	253A	SLC STANDBY LIQUID CONTROL	2
JBD-2045	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2608	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H19	253A	SLC STANDBY LIQUID CONTROL	2
SPHCB205H58	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H4	253A	SLC STANDBY LIQUID CONTROL	2
248016	253A	SLC STANDBY LIQUID CONTROL	2
248F004A	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5020	253A	SLC STANDBY LIQUID CONTROL	2
248007	253A	SLC STANDBY LIQUID CONTROL	2
248F026	253A	SLC STANDBY LIQUID CONTROL	2
HS24804	253A	SLC STANDBY LIQUID CONTROL	2
HS24806	253A	SLC STANDBY LIQUID CONTROL	2
PSV248F029A	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2601	253A	SLC STANDBY LIQUID CONTROL	2
SPJBD2045H9001	253A	SLC STANDBY LIQUID CONTROL	2
PCV24811C	253A	SLC STANDBY LIQUID CONTROL	2
2P208A	253A	SLC STANDBY LIQUID CONTROL	2
TE24810	253A	SLC STANDBY LIQUID CONTROL	2
248F031	253A	SLC STANDBY LIQUID CONTROL	2
2C011	253A	SLC STANDBY LIQUID CONTROL	2
FICC412R004	253A	SLC STANDBY LIQUID CONTROL	2
HCD-231	253A	SLC STANDBY LIQUID CONTROL	2
JBD278H1	253A	SLC STANDBY LIQUID CONTROL	2
LIC412R001	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5003	253A	SLC STANDBY LIQUID CONTROL	2
248010	253A	SLC STANDBY LIQUID CONTROL	2
TAHL24810	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2619	253A	SLC STANDBY LIQUID CONTROL	2
SPJCD207H9003	253A	SLC STANDBY LIQUID CONTROL	2
248012	253A	SLC STANDBY LIQUID CONTROL	2
248F011	253A	SLC STANDBY LIQUID CONTROL	2
248F018	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H3	253A	SLC STANDBY LIQUID CONTROL	2
LAHL24801	253A	SLC STANDBY LIQUID CONTROL	2
PI248207B	253A	SLC STANDBY LIQUID CONTROL	2

LAHL24801	253A	SLC STANDBY LIQUID CONTROL	2
PI248207B	253A	SLC STANDBY LIQUID CONTROL	2

SPJBD2045H9000	253A	SLC STANDBY LIQUID CONTROL	2
PT248N004-R2	253A	SLC STANDBY LIQUID CONTROL	2
248011	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5023	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5024	253A	SLC STANDBY LIQUID CONTROL	2
248018	253A	SLC STANDBY LIQUID CONTROL	2
248F002B	253A	SLC STANDBY LIQUID CONTROL	2
248F003B	253A	SLC STANDBY LIQUID CONTROL	2
248F033B	253A	SLC STANDBY LIQUID CONTROL	2
JBD-281	253A	SLC STANDBY LIQUID CONTROL	2
LTC412N001	253A	SLC STANDBY LIQUID CONTROL	2
PI248R003-R2	253A	SLC STANDBY LIQUID CONTROL	2
IC-PI248207A-	253A	SLC STANDBY LIQUID CONTROL	2
248015	253A	SLC STANDBY LIQUID CONTROL	2
248F003A	253A	SLC STANDBY LIQUID CONTROL	2
248F015	253A	SLC STANDBY LIQUID CONTROL	2
248F016	253A	SLC STANDBY LIQUID CONTROL	2
DCD-220	253A	SLC STANDBY LIQUID CONTROL	2
HCB205H1	253A	SLC STANDBY LIQUID CONTROL	2
PCV24811B	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H2600	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H56	253A	SLC STANDBY LIQUID CONTROL	2
XYC412M600A	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2606	253A	SLC STANDBY LIQUID CONTROL	2
IC-PI248207B-	253A	SLC STANDBY LIQUID CONTROL	2
248F008	253A	SLC STANDBY LIQUID CONTROL	2
PI248R003-R1	253A	SLC STANDBY LIQUID CONTROL	2
SPDCA206H2607	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H5025	253A	SLC STANDBY LIQUID CONTROL	2
XY24806	253A	SLC STANDBY LIQUID CONTROL	2
ZS24808L	253A	SLC STANDBY LIQUID CONTROL	2
SPDCB201H57	253A	SLC STANDBY LIQUID CONTROL	2
SPHCB205H60	253A	SLC STANDBY LIQUID CONTROL	2
SPDCD220H1	253A	SLC STANDBY LIQUID CONTROL	2

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	1 of 44

ATTACHMENT NO. 2

EPIX, NPRDS VALVE DATA

Equipment Performance and Information Exchange 4.0

Failure Summary Report

Generation Date 3/17/2005

EPIX 4.0

Failure Summary Report

Key	Direct Cause or Contributor
Specific Model: 3243-26-1	General Cause: mechanical process

[Next]

Susquehanna 2 Failure Number : 306

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :306

02/09/1997 2:35:00 AM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected:	SLC STANDBY LIQUID CONTROL System
Key :	Accumulators, tanks, air receivers 2T204 unaffected by failure *After* 4701 days in service *Site Common Name:* STANDBY LIQUID CONTROL STORAGE TA *Manufacturer:* Alpha Tank & Metals Mfg. *Model:* 3243-26-1 *Generic Model:* 3243-26-1 Application :Boron Injection Tank Type (Parts List) :Liquid, Unpressurized
	SLC STANDBY LIQUID CONTROL System
Supporting :	Indicators, recorders, gauges LI/FI24806 high output/indication *After* 187 days in service *Site Common Name:* SBLC TANK LEVEL AND FLOW *Manufacturer:* International Instruments Div/ Sigma *Model:* 9270-D1N-0-2-VB *Generic Model:* 9270-D1N-0-2-VB Parameter Measured/Input Signal :Flow Type (Primary Function) (Parts List) :Indicator
Component Causing Failure:	SLC STANDBY LIQUID CONTROL
Supporting :	Transmitters, detectors, elements LTC412N001 high output, but available *After* 4701 days in service

high output, but available

Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev] [Next]

Susquehanna 2 Failure Number : 307

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :307

02/22/1997 12:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4714 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting : Indicators, recorders, gauges LI/FI24806

[illegible]
SLC STANDBY LIQUID CONTROL System

high output/indication
After 200 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4714 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84
Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup
Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 308

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :308

03/08/1997 1:30:00 AM - No plant effect, from power operation. No generation capability was lost. A *Rosemount Controls Systems model* 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4728 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting : Indicators, recorders, gauges LI/FI24806
high output/indication
After 214 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4728 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev] [Next]

Susquehanna 2 Failure Number : 309

Bookmarks: Abstract Contact Equipment Details

Abstract

Bookmarks: Abstract Contact Equipment Details

Susquehanna 2- Failure Number :309

02/09/1997 2:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key :
Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4701 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting :
Indicators, recorders, gauges LI/FI24806
high output/indication
After 187 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting :
Transmitters, detectors, elements LTC412N001
high output, but available
After 4701 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure:
LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84
Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken

restored normal lineup
Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev] [Next]

Susquehanna 2 Failure Number : 310

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :310

04/12/1997 12:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System
Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4763 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System
Supporting : Indicators, recorders, gauges LI/FI24806
high output/indication
After 249 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL
Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4763 days in service

high output, but available

Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 311

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :311

05/01/1997 4:54:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System
Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4782 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System
Supporting : Indicators, recorders, gauges LI/FI24806

Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

high output/indication
After 268 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4782 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84
Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup
Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev] [Next]

Susquehanna 2 Failure Number : 312

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :312

05/17/1997 3:30:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected:	SLC STANDBY LIQUID CONTROL System
Key :	Accumulators, tanks, air receivers 2T204 unaffected by failure *After* 4798 days in service *Site Common Name:* STANDBY LIQUID CONTROL STORAGE TA *Manufacturer:* Alpha Tank & Metals Mfg. *Model:* 3243-26-1 *Generic Model:* 3243-26-1 Application :Boron Injection Tank Type (Parts List) :Liquid, Unpressurized
	SLC STANDBY LIQUID CONTROL System
Supporting :	Indicators, recorders, gauges LI/FI24806 high output/indication *After* 284 days in service *Site Common Name:* SBLC TANK LEVEL AND FLOW *Manufacturer:* International Instruments Div/ Sigma *Model:* 9270-D1N-0-2-VB *Generic Model:* 9270-D1N-0-2-VB Parameter Measured/Input Signal :Flow Type (Primary Function) (Parts List) :Indicator
Component Causing Failure:	SLC STANDBY LIQUID CONTROL
Supporting :	Transmitters, detectors, elements LTC412N001 high output, but available *After* 4798 days in service *Site Common Name:* SBLC STORAGE TANK LEVEL TRANSMITTER *Manufacturer:* Rosemount Controls Systems *Model:* 1151DP4E22T0002PB *Generic Model:* 1151DP4E22T0002PB Parameter Measured/Input Signal : Level Principle of Operation (Parts List) : Positive Displacement Type (Primary Function) : Transmitter
Causes of Component Failure:	LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84 **Due to:** mechanical process, clogged / blocked **Function restored by:** operator actions taken restored normal lineup **Recurrence Prevented by:** preventive maintenance interval changed preventive maintenance program revised
Associated Maintenance:	None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 313

Bookmarks: Abstract Contact Equipment Details

Abstract

Bookmarks: Abstract Contact Equipment Details

Susquehanna 2- Failure Number :313

06/03/1997 9:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key :
Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4815 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized

SLC STANDBY LIQUID CONTROL System

Supporting :
Indicators, recorders, gauges LI/FI24806
high output/indication
After 301 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting :
Transmitters, detectors, elements LTC412N001
high output, but available
After 4815 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure:
LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken

Function restored by:

restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 314

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :314

06/30/1997 12:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System
Key :
Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4842 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System
Supporting :
Indicators, recorders, gauges LI/FI24806
high output/indication
After 328 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL
Supporting :
Transmitters, detectors, elements LTC412N001
high output, but available
After 4842 days in service

high output, but available
After 4842 days in service

Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev] [Next]

Susquehanna 2 Failure Number : 315

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :315

07/31/1997 11:29:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4873 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting : Indicators, recorders, gauges LI/FI24806

Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

high output/indication
After 359 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4873 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - clogged/blocked - inservice since 3/28/84
Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup
Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 316

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :316

09/02/1997 12:00:00 PM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G System Engineer 570-542-3443 3443 jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key : Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4906 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting : Indicators, recorders, gauges LI/FI24806
high output/indication
After 392 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting : Transmitters, detectors, elements LTC412N001
high output, but available
After 4906 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - blocked tube - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

|Top| |Prev| |Next|

Susquehanna 2 Failure Number : 317

Bookmarks: Abstract Contact Equipment Details

Abstract

Bookmarks: Abstract Contact Equipment Details

Susquehanna 2- Failure Number :317

11/24/1997 10:00:00 AM - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

DORN*JERRY G	System Engineer	570-542-3443	3443	jgdorn@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System

Key :
Accumulators, tanks, air receivers 2T204
unaffected by failure
After 4989 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System

Supporting :
Indicators, recorders, gauges LI/FI24806
high output/indication
After 475 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL

Supporting :
Transmitters, detectors, elements LTC412N001
high output, but available
After 4989 days in service
Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure: LTC412N001 tube sblc storage tank level transmitter - bubbler tube - blocked tube - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken

Function restored by:

restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance: None

[Top] [Prev]

Susquehanna 2 Failure Number : 820

Bookmarks: Abstract Contact Equipment Details

Abstract

Susquehanna 2- Failure Number :820

05/20/1999 - No plant effect, from power operation. No generation capability was lost. A Rosemount Controls Systems model 1151DP4E22T0002PB (1151DP4E22T0002PB), failure caused the event. SLC STANDBY LIQUID CONTROL accumulators, tanks, air receivers, 2T204- unaffected by failure; transmitters, detectors, elements, LTC412N001- high output, but available; indicators, recorders, gauges, LI/FI24806- high output/indication.

Contact

MISSIEN*IAN C	System Engineer	570-542-3396	3396	icmissien@pplweb.com

Equipment Details

Components Affected: SLC STANDBY LIQUID CONTROL System
Key :
Accumulators, tanks, air receivers 2T204
unaffected by failure
After 5531 days in service
Site Common Name: STANDBY LIQUID CONTROL STORAGE TA
Manufacturer: Alpha Tank & Metals Mfg.
Model: 3243-26-1
Generic Model: 3243-26-1
Application :Boron Injection Tank
Type (Parts List) :Liquid, Unpressurized
SLC STANDBY LIQUID CONTROL System
Supporting :
Indicators, recorders, gauges LI/FI24806
high output/indication
After 1017 days in service
Site Common Name: SBLC TANK LEVEL AND FLOW
Manufacturer: International Instruments Div/ Sigma
Model: 9270-D1N-0-2-VB
Generic Model: 9270-D1N-0-2-VB
Parameter Measured/Input Signal :Flow
Type (Primary Function) (Parts List) :Indicator

Component Causing Failure: SLC STANDBY LIQUID CONTROL
Supporting :
Transmitters, detectors, elements LTC412N001
high output, but available
After 5531 days in service

high output, but available

Site Common Name: SBLC STORAGE TANK LEVEL TRANSMITTER
Manufacturer: Rosemount Controls Systems
Model: 1151DP4E22T0002PB
Generic Model: 1151DP4E22T0002PB
Parameter Measured/Input Signal : Level
Principle of Operation (Parts List) : Positive Displacement
Type (Primary Function) : Transmitter

Causes of Component Failure:

LTC412N001 tube sblc storage tank level transmitter - bubbler tube - blocked tube - inservice since 3/28/84

Due to:
mechanical process, clogged / blocked

Function restored by:
operator actions taken
restored normal lineup

Recurrence Prevented by:
preventive maintenance interval changed
preventive maintenance program revised

Associated Maintenance:

None

⚠ Warning: Do not use the Browser Back, Forward, Stop, Refresh or Home buttons on this page.

EPIX/NPRDS General Text Search

Look for "SBLC" AND "ISOLATION CHECK VALVE" In NPRDS Go

Search Tips

Documents 1 to 2 of 2 matching the query *""SBLC" AND "ISOLATION CHECK VALVE""*.

1. **92~QUAD CITIES 1~Valves, dampers**
   Abstract: **SBLCS Cntmnt Isol Check Valve~1-1101-16~Internal Leakage~Standby Liquid Control-GE~System Function/Operation Unaffected~Resulted in No Significant Effect~Crane Co~3888-XU*
   http://www.inpo.org/databases/nprds/185/cweqad1185708.htm - size 6333 bytes - 11/13/1992 5:00:00 PM GMT

2. **92~HOPE CREEK 1~Valves, dampers**
   Abstract: **SBLCS Cntmnt Isol Check Valve~1BHV-029~Internal Leakage~Standby Liquid Control-GE~System Function/Operation Unaffected~Resulted in No Significant Effect~Rockwell Int/ Flow Control Div~1.5-36274T1*
   http://www.inpo.org/databases/nprds/164/peghcs1164209.htm - size 5909 bytes - 10/7/1992 5:00:00 PM GMT

Equipment Performance and Information Exchange 4.0

Failure Summary Report

Generation Date 3/17/2005

EPIX 4.0

Failure Summary Report

Key	Direct Cause or Contributor
Component Type: Valves, dampers	**Component Type:** Valves, dampers

Nine Mile Point 2 Failure Number : 351

Bookmarks: Abstract Contact Equipment Details

Abstract

Nine Mile Point 2- Failure Number :351

03/07/2000 3:20:00 PM - Outage impacted, from refueling. No generation capability was lost. A Velan Inc model B303-6W14MS (B303-6W14MS), failure caused the event. Standby Liquid Control System valves, dampers, 2SLS*V10- internal leakage when fully seated.

Contact

Tanguay, Thomas System Engineer 315-349-4428 TanguayT@nimo.com

Equipment Details

Component Causing Failure: Standby Liquid Control System

Key : Valves, dampers 2SLS*V10
internal leakage when fully seated
After 4906 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Velan Inc
Model: B303-6W14MS
Generic Model: B303-6W14MS
Body Material : Austenitic Stainless STL-316
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 2SLS*V10 none identified by investigation

Due to:
mechanical process, foreign material

Function restored by:
operator actions taken
repaired device (beyond recalibration)

Recurrence Prevented by:
actions to prevent recurrence not needed

Associated Maintenance: None

INPO Equipment Performance and Information Exchange 4.0 Production Read Only

Equipment Performance and Information Exchange 4.0

Failure Summary Report

Generation Date 3/17/2005

EPIX 4.0
Failure Summary Report

Manufacturer: Crane Co
Unit: Dresden 2
Generic Model Number: 3888
MR System: Standby Liquid Control

[Next]

Dresden 2 Failure Number : 245

Bookmarks: Abstract Contact Equipment Details

Abstract

Dresden 2- Failure Number :245

03/09/1998 10:30:00 AM - No plant effect, from refueling. No generation capability was lost. A Crane Co model 3888XU (3888), failure caused the event. Standby Liquid Control valves, dampers, 2-1101-15- internal leakage when fully seated.

Contact

Daniel Oakley	LLRT System Engineer	815 942-2920	3708	daniel.oakley@ucm.com

Equipment Details

Component Causing Failure: Standby Liquid Control

Key : Valves, dampers 2-1101-15
internal leakage when fully seated
After 10288 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Crane Co
Model: 3888XU
Generic Model: 3888
Body Material : Austenitic Stainless STL-Other
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 1/2 to 1.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 2-1101-15 none identified by investigation

Due to:
equipment age - invalid cause after 09/01/2001, normal, expected aging - invalid cause after 09/01/2001

Function restored by:
replaced device

Recurrence Prevented by:
actions to prevent recurrence not needed

Associated Maintenance: Unplanned

Manufacturer: Rockwell Int/ Flow Control Div
Unit: Hatch 1
Generic Model Number: 36274
MR System: SBLC

Manufacturer: Rockwell Int/ Flow Control Div
Generic Model Number: 36274

|Top| |Prev| |Next|

Hatch 1 Failure Number : 60

Bookmarks: Abstract Contact Equipment Details

Abstract

Hatch 1- Failure Number :60

03/13/1999 12:00:00 PM - No plant effect, from cold shutdown. No generation capability was lost. A Rockwell Int/ Flow Control Div model 36274 (36274), failure caused the event. SBLC valves, dampers, 1C41-F006- internal leakage when fully seated.

Contact

TROUNG, THI SYS ENG 912 537 1395 2468

Equipment Details

Component Causing Failure: SBLC

Key : Valves, dampers 1C41-F006
internal leakage when fully seated
After 4781 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Rockwell Int/ Flow Control Div
Model: 36274
Generic Model: 36274
Body Material : Austenitic Stainless STL-316
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 1/2 to 1.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 1C41-F006 spring(s) loss of compression - inservice since 2/8/86

Due to:
equipment age - invalid cause after 09/01/2001, normal, expected aging - invalid cause after 09/01/2001

Function restored by:
repaired device (beyond recalibration)
replaced piece part

Recurrence Prevented by:
actions to prevent recurrence not needed

Associated Maintenance: None

Manufacturer: Velan Inc **Generic Model Number:** B303-6W14MS
Unit: Nine Mile Point 2 **MR System:** Standby Liquid Control System

|Top| |Prev| |Next|

Nine Mile Point 2 Failure Number : 351

Nine Mile Point 2 Failure Number : 351

Bookmarks: Abstract Contact Equipment Details

Abstract

Nine Mile Point 2- Failure Number :351

03/07/2000 3:20:00 PM - Outage impacted, from refueling. No generation capability was lost. A Velan Inc model B303-6W14MS (B303-6W14MS), failure caused the event. Standby Liquid Control System valves, dampers, 2SLS*V10- internal leakage when fully seated.

Contact

Tanguay, Thomas	System Engineer	315-349-4428	TanguayT@nimo.com

Equipment Details

Component Causing Failure: Standby Liquid Control System
Key : Valves, dampers 2SLS*V10
internal leakage when fully seated
After 4906 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Velan Inc
Model: B303-6W14MS
Generic Model: B303-6W14MS
Body Material : Austenitic Stainless STL-316
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 2SLS*V10 none identified by investigation
Due to:
mechanical process, foreign material

Function restored by:
operator actions taken
repaired device (beyond recalibration)
Recurrence Prevented by:
actions to prevent recurrence not needed

Associated Maintenance: None

Manufacturer: Velan Inc
Unit: Browns Ferry 3
Generic Model Number: W7234B13MS
MR System: Standby Liquid Control-GE

|Top| |Prev| |Next|

Browns Ferry 3 Failure Number : 200

Bookmarks: Abstract Contact Equipment Details

Abstract

Browns Ferry 3- Failure Number :200

03/26/2002 - No plant effect, from refueling. No generation capability was lost. A Hancock Mfg Co Inc model 5580 (5580), Velan Inc model W7234B13MS (W7234B13MS), Atwood & Morrill Co. Inc./Xomox model 11462 (11462), Velan Valve Corp model B107144B02AA (B107144B02AA), Anchor/Darling Valve Co. model 900/w9223821a (900/W9223821A), Anchor / Darling Co. model 900/W9223821A (900/W9223821A), failure

5580 (5580), Velan Inc model W7234B13MS (W7234B13MS), Atwood & Morrill Co. Inc./Xomox model 11462

caused the event. High Pressure Coolant Injection-GE valves, dampers, 3-CKV-073-0609- internal leakage when fully seated; Standby Liquid Control-GE valves, dampers, 3-CKV-063-0526- internal leakage when fully seated; Feedwater-GE valves, dampers, 3-CKV-003-0554- internal leakage when fully seated; Main Steam-GE valves, dampers, 3-FCV-001-0056- internal leakage when fully seated; Reactor Water Cleanup-GE valves, dampers, 3-CKV-069-0629- internal leakage when fully seated; valves, dampers, 3-CKV-069-0628- internal leakage when fully seated.

Contact

Fredrick Nilsen	LLRT Component Engineer	256-729-2958	2958	fjnilsen@tva.gov

Equipment Details

Component Causing Failure: Feedwater-GE
Key : Valves, dampers 3-CKV-003-0554
internal leakage when fully seated
After 9156 days in service
Industry Common Name: *Fdwtr Cntmnt Check Valve
Manufacturer: Atwood & Morrill Co. Inc./Xomox
Model: 11462
Generic Model: 11462
Body Material : Carbon Steel
Function/Application : Flow Control (incl temp control)
Nominal Inlet Size (Range) : 20 to 39.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 3-CKV-003-0554 none identified by investigation
Due to:
mechanical process, leakage
Function restored by:
repaired device (beyond recalibration)
Recurrence Prevented by:
supplemental testing performed

Component Causing Failure: High Pressure Coolant Injection-GE
Key : Valves, dampers 3-CKV-073-0609
internal leakage when fully seated
After 9156 days in service
Industry Common Name: Primary Cntmnt Isol Valve
Manufacturer: Hancock Mfg Co Inc
Model: 5580
Generic Model: 5580
Body Material : Carbon Steel
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 3-CKV-073-0609 none identified by investigation
Due to:
mechanical process, leakage
Function restored by:
repaired device (beyond recalibration)
Recurrence Prevented by:
supplemental testing performed

repaired device (beyond recalibration)
Recurrence Prevented by:

Component Causing Failure:
Key :
Main Steam-GE
Valves, dampers 3-FCV-001-0056
internal leakage when fully seated
After 2375 days in service
Industry Common Name: Primary Cntmnt Isol Valve
Manufacturer: Velan Valve Corp
Model: B107144B02AA
Generic Model: B107144B02AA
Body Material : Carbon Steel
Function/Application : Shutoff/Isolation/Stop
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : Electric Motor/Servo (MOV)
Type (Parts List) : Gate

Causes of Component Failure:
3-FCV-001-0056 none identified by investigation
3-FCV-001-0056 seat
Due to:
mechanical process, leakage
Function restored by:
tested and restored to service
Recurrence Prevented by:
engineering analysis performed

Component Causing Failure:
Key :
Reactor Water Cleanup-GE
Valves, dampers 3-CKV-069-0628
internal leakage when fully seated
After 840 days in service
Site Common Name: Primary Cntmnt Isol Valve
Manufacturer: Anchor / Darling Co.
Model: 900/W9223821A
Generic Model: 900/W9223821A
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 4 to 11.99 IN
Operator : None
Program : Appendix J LLRT program
SubType : Check-Swing
Type (Parts List) : Check

Causes of Component Failure:
3-CKV-069-0628 seat
Due to:
mechanical process, leakage
Function restored by:
replaced piece part
Recurrence Prevented by:
supplemental testing performed

Component Causing Failure:
Key :
Reactor Water Cleanup-GE
Valves, dampers 3-CKV-069-0629
internal leakage when fully seated
After 840 days in service
Site Common Name: Primary Cntmnt Isol Valve
Manufacturer: Anchor/Darling Valve Co.
Model: 900/w9223821a
Generic Model: 900/W9223821A
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 4 to 11.99 IN
Operator : None

Nominal Inlet Size (Range) : 4 to 11.99 IN
Operator : None

Program : Appendix J LLRT program
Service : Clean water
SubType : Check-Swing
Type (Parts List) : Check
Use : System, line, or component isolation check

Causes of Component Failure:
3-CKV-069-0629 seat
Due to:
mechanical process, leakage
Function restored by:
replaced piece part
Recurrence Prevented by:
supplemental testing performed

Component Causing Failure:
Key :
Standby Liquid Control-GE
Valves, dampers 3-CKV-063-0526
internal leakage when fully seated
After 9156 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Velan Inc
Model: W7234B13MS
Generic Model: W7234B13MS
Body Material : Carbon Steel
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 1/2 to 1.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure:
3-CKV-063-0526 none identified by investigation
Due to:
mechanical process, leakage
Function restored by:
recalibrated/adjusted device
Recurrence Prevented by:
supplemental testing performed

Associated Maintenance:
Unplanned

[Top] [Prev] [Next]

Browns Ferry 3 Failure Number : 272

Bookmarks: Abstract Contact Equipment Details

Abstract

Browns Ferry 3- Failure Number :272

03/01/2004 - No plant effect, from refueling. No generation capability was lost. A Crane Valve Prod/Crane Co Fr Chapman model CD-06005-8-06 (CD-06005-8-06), Velan Inc model W7234B13MS (W7234B13MS), Velan Valve Corp model B107144B02AA (B107144B02AA), Anchor/Darling Valve Co. model 900/w9223821a (900/W9223821A), Anchor / Darling Co. model 900/W9223821A (900/W9223821A), Pittsburgh - Des Moines Steel Co (PDM) model A (A), General Electric Company model F01 (F01), failure caused the event. High Pressure Coolant Injection-GE valves, dampers, 3-FCV-073-0026- internal leakage when fully seated; Standby Liquid Control-GE valves, dampers, 3-CKV-063-0526- internal leakage when fully seated; Radwaste-GE valves, dampers, 3-FCV-077-0002A- internal leakage when fully seated; Main Steam-GE valves, dampers, 3-FCV-001-0056- internal leakage when fully seated; Reactor Water Cleanup-GE valves, dampers, 3-CKV-069-0629- internal leakage when fully seated; valves, dampers, 3-CKV-069-0628- internal leakage when fully seated; Primary Containment-GE containment penetrations, air locks, hatches, 3-STRU-303-DW/HEAD- loss of pressure boundary function; containment penetrations, air locks, hatches, 3-EPEN-100-0101C- loss of pressure boundary function.

leakage when fully seated; Primary Containment-GE containment penetrations, air locks, hatches, 3-STRU-

Contact

Frederick Nilsen Containment Leak Rate Program Engineer 256-729-2958 fjnilsen@tva.gov

Equipment Details

Component Causing Failure: High Pressure Coolant Injection-GE
Key :
Valves, dampers 3-FCV-073-0026
internal leakage when fully seated
After 9862 days in service
Industry Common Name: *HPCI Suct From Supp Pool Isol Valve
Manufacturer: Crane Valve Prod/Crane Co Fr Chapman
Model: CD-06005-8-06
Generic Model: CD-06005-8-06
Body Material : Carbon Steel
Function/Application : Shutoff/Isolation/Stop
Nominal Inlet Size (Range) : 12 to 19.99 IN
Operator : Electric Motor/Servo (MOV)
Type (Parts List) : Gate

Causes of Component Failure:

3-FCV-073-0026 wedge

Due to:
management, delayed implementation of corrective actions
resource management, *resources not available or insufficient*
Function restored by:
repaired device (beyond recalibration)
Recurrence Prevented by:
overhauled or refurbished equipment

Component Causing Failure: Main Steam-GE
Key :
Valves, dampers 3-FCV-001-0056
internal leakage when fully seated
After 3081 days in service
Industry Common Name: Primary Cntmnt Isol Valve
Manufacturer: Velan Valve Corp
Model: B107144B02AA
Generic Model: B107144B02AA
Body Material : Carbon Steel
Function/Application : Shutoff/Isolation/Stop
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : Electric Motor/Servo (MOV)
Type (Parts List) : Gate

Causes of Component Failure:

3-FCV-001-0056 disc

3-FCV-001-0056 mechanical stop(s)
3-FCV-001-0056 seat
Due to:
design, inadequate original design
management, delayed implementation of corrective actions
resource management, resources not available or insufficient

resource management, resources not available or insufficient

Function restored by:
repaired device (beyond recalibration)
tested and restored to service
Recurrence Prevented by:
administrative controls applied or evaluated
established plan for replacement of components

Component Causing Failure: Primary Containment-GE
Key : Containment penetrations, air locks, hatches 3-EPEN-100-0101C
loss of pressure boundary function
After 11596 days in service
Site Common Name: Recirc Pump Power Electrical Penetration
Manufacturer: General Electric Company
Model: F01
Generic Model: F01
Subcategory (Parts List) : Electrical

Causes of Component Failure: 3-EPEN-100-0101C sealant

Due to:
equipment aging - nonmetallic parts, abnormal or accelerated wear
Function restored by:
tested and restored to service
Recurrence Prevented by:
engineering analysis performed

Component Causing Failure: Primary Containment-GE
Key : Containment penetrations, air locks, hatches 3-STRU-303-DW/HEAD
loss of pressure boundary function
After 11596 days in service
Site Common Name: Drywell Head
Manufacturer: Pittsburgh - Des Moines Steel Co (PDM)
Model: A
Generic Model: A
Subcategory (Parts List) : Other

Causes of Component Failure: 3-STRU-303-DW/HEAD gasket/seal/o-ring(s)

Due to:
equipment aging - metallic parts, normal wear

Function restored by:
installed temporary alternative to device function
Recurrence Prevented by:
engineering analysis performed
written instructions or documents revised

Component Causing Failure: Radwaste-GE
Key : Valves, dampers 3-FCV-077-0002A
internal leakage when fully seated
After 9862 days in service
Site Common Name: Primary Cntmnt Isol Valve
Manufacturer: Velan Inc
Model: B10-064B-2TS
Generic Model: 0064B
Body Material : Carbon Steel
Function/Application : Shutoff/Isolation/Stop
Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : Pneumatic (Diaphragm or Cylinder) (AOV)

Nominal Inlet Size (Range) : 2 to 3.99 IN
Operator : Pneumatic (Diaphragm or Cylinder) (AOV)

Type (Parts List) : Gate

Causes of Component Failure:

3-FCV-077-0002A disc

3-FCV-077-0002A seat

Due to:
equipment aging - metallic parts, normal wear

Function restored by:
modified the design

Recurrence Prevented by:
design changes implemented

Component Causing Failure: Reactor Water Cleanup-GE

Key : Valves, dampers 3-CKV-069-0628
internal leakage when fully seated
After 1546 days in service
Site Common Name: Primary Cntmnt Isol Valve
Manufacturer: Anchor / Darling Co.
Model: 900/W9223821A
Generic Model: 900/W9223821A
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 4 to 11.99 IN
Operator : None
Program : Appendix J LLRT program
SubType : Check-Swing
Type (Parts List) : Check

Causes of Component Failure:

3-CKV-069-0628 bonnet

Due to:
installation, improper assembly
installation, inadequate assembly or installation instructions

Function restored by:
recalibrated/adjusted device
tested and restored to service

Recurrence Prevented by:
supplemental checks or inspections performed

Component Causing Failure: Reactor Water Cleanup-GE

Key : Valves, dampers 3-CKV-069-0629
internal leakage when fully seated
After 1546 days in service
Site Common Name: Primary Cntmnt Isol Valve
Manufacturer: Anchor/Darling Valve Co.
Model: 900/w9223821a
Generic Model: 900/W9223821A
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 4 to 11.99 IN
Operator : None
Program : Appendix J LLRT program
Service : Clean water
SubType : Check-Swing
Type (Parts List) : Check
Use : System, line, or component isolation check

Causes of Component Failure:

3-CKV-069-0629 seat insert

Due to:

Failure:

3-CKV-069-0629 seat insert

equipment aging - nonmetallic parts, abnormal or accelerated wear

Function restored by:
repaired device (beyond recalibration)
Recurrence Prevented by:
overhauled or refurbished equipment

Component Causing Failure: Standby Liquid Control-GE
Key : Valves, dampers 3-CKV-063-0526
internal leakage when fully seated
After 9862 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Velan Inc
Model: W7234B13MS
Generic Model: W7234B13MS
Body Material : Carbon Steel
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 1/2 to 1.99 IN
Operator : None
Type (Parts List) : Check

Causes of Component Failure: 3-CKV-063-0526 disc

3-CKV-063-0526 spring(s)
Due to:
management, delayed implementation of corrective actions
Function restored by:
repaired device (beyond recalibration)
Recurrence Prevented by:
overhauled or refurbished equipment

Associated Maintenance: Planned

Manufacturer: Velan Valve Corp | **Generic Model Number:** P122ON4
Unit: Duane Arnold 1 | **MR System:** Standby Liquid Control

[Top] [Prev]

Duane Arnold 1 Failure Number : 167

Bookmarks: Abstract Contact Equipment Details

Abstract

Duane Arnold 1- Failure Number :167

11/03/1999 - No plant effect, from cold shutdown. No generation capability was lost. A Velan Valve Corp model P122ON4 (P122ON4), failure caused the event. Standby Liquid Control valves, dampers, V26-0008- internal leakage when fully seated.

Contact

Bowman, Bob Project Engineering, Mechanical 319-851-7729 n/a

Equipment Details

Component Causing Failure: Standby Liquid Control
Key : Valves, dampers V26-0008

Component Causing Failure: Standby Liquid Control
Key : Valves, dampers V26-0008

internal leakage when fully seated
After 9380 days in service
Industry Common Name: *SBLCS Cntmnt Isol Check Valve
Manufacturer: Velan Valve Corp
Model: P122ON4
Generic Model: P122ON4
Body Material : Austenitic Stainless STL-316
Function/Application : One-Way Flow
Nominal Inlet Size (Range) : 1/2 to 1.99 IN
Operator : Mechanical (Differential-Press Open/Spring-Force Close)
Type (Parts List) : Check

Causes of Component Failure: V26-0008 Not yet determined

Due to:
equipment aging - metallic parts, normal wear mechanical process, leakage

Function restored by:
repaired device (beyond recalibration)

***Recurrence* Prevented by:**
actions to prevent recurrence not needed

Associated Maintenance: Planned

=NPRDS=

Failure Report with Unit Information

Go to: System Information || Component Information || Failure Information || Failure Narrative

G. Size (Inlet):

Unit Information

Utility:	Commonwealth Edison Company
Unit:	DRESDEN 3
NSSS:	General Electric

System Information

Return to Top

System:	Standby Liquid Control-GE
Utility System:	1100

Component Information

Return to Top

Component:	Valves, dampers
Utility Component ID:	3-1101-15
Application:	*SBLCS Cntmnt Isol Check Valve
Data Start Date:	07/01/1974
In-Service Date:	10/05/1971
Out-of-Service Date:	
Manufacturer:	Crane Co
Mfr Model ID:	3888
Mfr Model No:	3888XU
Mfr Serial No.	
Drawing No.	PID-M-364
Safety Class	S

Engineering Characteristics

A. Type:	Check
B. Operator:	None
C. Function/Application:	One-Way Flow
D. Body Material:	Austenitic Stnls Stl-Other
F. Nominal Inlet Size (Range):	1/2 to 1.99 IN
1.500 IN	
H. Maximum Design Pressure:	1500.000 PSIG
J. Maximum Design Temperature:	575.000 DEGF

User Data/Comments

Data/Comments 1:	G, M

User Data/Comments

Data/Comments 2:	C, G
Data/Comments 3:	USAS B16.5
Data/Comments 4:	G0
Data/Comments 5:	3-1101-15

Failure Information

Return to Top

Discovery Date:	02/19/1991
Discovery Time:	12:00
End Date:	12/12/1991
Plant Effect:	G - Resulted in No Significant Effect
System Affected:	PCA - Standby Liquid Control-GE
System Effect:	D - Degraded Train/Channel
Severity Level:	K - Degraded
Failure Mode:	IL - Internal Leakage
Failure Detection:	B - Maintenance/Test
Failure Cause Category:	J - Other Devices
Failure Cause Description:	AB - Foreign Material/Substance (incld AJ before 4/94) BG - Corrosion
Corrective Action:	AG - Repair Component/Part
Documentation:	N - Other Documents or Records are Not Available
LER Report Number:	

Failure Narrative

Return to Top

UNIT WAS IN A REFUELING OUTAGE WITH THE STANDBY LIQUID CONTROL (SBLC) TRAIN IN TEST . THE SBLC INBOARD INJECTION CHECK VALVE WAS BEING LOCAL LEAK RATE TESTED (LLRT) AND FAILED AT 40 SCFH . THIS WAS NOT LLRT TESTED THE LAST REFUELING OUTAGE AND HAD TO BE TESTED DURING THIS CURRENT OUTAGE . THE TRAIN WAS DEGRADED BUT THE FAILURE HAD NO EFFECT ON THE UNIT .

THE FAILURE WAS DUE TO A BUILD UP OF CORROSION AND MATERIAL ON THE VALVE SEAT .

THE VALVE WAS DISASSEMBLED AND CLEANED AND WAS THEN SUCCESSFULLY RETESTED . (WR D96746)

Contact at Time of Failure

Return to Top

John Reid 815-942-2920 x2380

=NPRDS=

Failure Report with Unit Information

Go to: System Information || Component Information || Failure Information || Failure Narrative

G. Size (Inlet):

Unit Information

Utility:	Commonwealth Edison Company
Unit:	QUAD CITIES 1
NSSS:	General Electric

System Information

Return to Top

System:	Standby Liquid Control-GE
Utility System:	1100

Component Information

Return to Top

Component:	Valves, dampers
Utility Component ID:	1-1101-16
Application:	*SBLCS Cntmnt Isol Check Valve Primary Cntmnt Isol Valve
Data Start Date:	07/01/1974
In-Service Date:	10/07/1971
Out-of-Service Date:	
Manufacturer:	Crane Co
Mfr Model ID:	3888
Mfr Model No:	3888-XU
Mfr Serial No.	
Drawing No.	M-40
Safety Class	S

Engineering Characteristics

A. Type:	Check
B. Operator:	None
C. Function/Application:	One-Way Flow
D. Body Material:	Austenitic Stnls Stl-316
F. Nominal Inlet Size (Range):	1/2 to 1.99 IN
1.500 IN	
H. Maximum Design Pressure:	900.000 PSIG
J. Maximum Design Temperature:	1125.000 DEGF

User Data/Comments

Temperature:	1125.000 DEGF

Data/Comments 1:	A, B, F
Data/Comments 2:	F, 4
Data/Comments 3:	LLRT

Failure Information

Return to Top

Discovery Date:	11/13/1992
Discovery Time:	12:00
End Date:	06/10/1994
Plant Effect:	G - Resulted in No Significant Effect
System Affected:	PCA - Standby Liquid Control-GE
System Effect:	E - System Function/Operation Unaffected
Severity Level:	K - Degraded
Failure Mode:	IL - Internal Leakage
Failure Detection:	B - Maintenance/Test
Failure Cause Category:	K - Unknown (included Code X prior to 4/94)
Failure Cause Description:	AD - Normal Wear (included AH before 4/94) AK - Valve Seat Condition (code added 4/94)
Corrective Action:	AH - Replace Part(s)
Documentation:	N - Other Documents or Records are Not Available
LER Report Number:	

Failure Narrative

Return to Top

UNIT SHUTDOWN FOR REFUELING . DURING LOCAL LEAK RATE TEST , STANDBY LIQUID CONTROL (SBLC) OUTBOARD ISOLATION VALVE (1 OF 2) FAILED TO MAINTAIN REQUIRED LEAK RATE INTEGRITY . VALVE LEAKED BY AT 16 . 0 SCFH . REQUIRED ACTION LIMIT IS 10 . 0 SCFH . THESE CHECK VALVES ARE DESIGNED TO ISOLATE THE REACTOR FROM ANY LINE BREAK IN THE SBLC SYSTEM TO PREVENT LOSS OF VESSEL INVENTORY WHILE THE VESSEL IS AT PRESSURE . DUE TO SATISFACTORY INTEGRITY OF THE INBOARD ISOLATION CHECK VALVE , LEAKAGE DEGRADED ONLY ABILITY OF THIS CHECK VALVE TO ISOLATE THE VESSEL , THE ISOLATION CAPABILITY OF THE LINE WAS NOT DEGRADED . UNIT WAS NOT AFFECTED BECAUSE A SAFETY EVALUATION WAS PERFORMED WHICH ALLOWED CONTINUED OPERATION AT THE MEASURED LEAK RATE OF 16 . 0 SCFH UNTIL THE NEXT SCHEDULED OUTAGE .

ON DISASSEMBLY THE DISC WAS FOUND NOT SEATING PROPERLY AND THE DISC WAS SCORED WHERE IT CONTACTED THE SEAT . ROOT CAUSE IS UNKNOWN . SUSPECTED CAUSES INCLUDE NORMAL WEAR AND EROSION .

THE IN-BODY SEATS WERE LAPPED . THE DISC AND DISC GUIDE WERE REPLACED . THE VALVE WAS REASSEMBLED AND INSTALLED . A LOCAL LEAK RATE TEST WAS PERFORMED AND PASSED AT 2 . 9 SCFH . (Q04090)

Contact at Time of Failure

Return to Top

Kristal Moore 309-654-2241 x3070

=NPRDS=

Failure Report with Unit Information

Go to: System Information || Component Information || Failure Information || Failure Narrative

G. Size (Inlet):

Unit Information

Utility:	Public Service Electric and Gas Company
Unit:	HOPE CREEK 1
NSSS:	General Electric

System Information

Return to Top

System:	Standby Liquid Control-GE
Utility System:	BH

Component Information

Return to Top

Component:	Valves, dampers
Utility Component ID:	1BHV-029
Application:	*SBLCS Cntmnt Isol Check Valve
Data Start Date:	12/20/1986
In-Service Date:	06/28/1986
Out-of-Service Date:	
Manufacturer:	Rockwell Int/ Flow Control Div
Mfr Model ID:	36274
Mfr Model No:	1.5-36274T1
Mfr Serial No.	
Drawing No.	P&ID M-48-1
Safety Class	S

Engineering Characteristics

A. Type:	Check
B. Operator:	None
C. Function/Application:	One-Way Flow
D. Body Material:	Austenitic Stnls Stl-316
F. Nominal Inlet Size (Range): 1.500 IN	1/2 to 1.99 IN
H. Maximum Design Pressure:	1525.000 PSIG
J. Maximum Design Temperature:	575.000 DEGF

User Data/Comments

Data/Comments 1:	S

User Data/Comments

Data/Comments 2:	A, F
Data/Comments 3:	ASME III
Data/Comments 4:	R3

Failure Information

Return to Top

Discovery Date:	10/07/1992
Discovery Time:	12:00
End Date:	10/18/1992
Plant Effect:	G - Resulted in No Significant Effect
System Affected:	PCA - Standby Liquid Control-GE
System Effect:	E - System Function/Operation Unaffected
Severity Level:	K - Degraded
Failure Mode:	IL - Internal Leakage
Failure Detection:	B - Maintenance/Test
Failure Cause Category:	H - Age/Normal Usage
Failure Cause Description:	AD - Normal Wear (included AH before 4/94)
Corrective Action:	AG - Repair Component/Part
Documentation:	N - Other Documents or Records are Not Available
LER Report Number:	

Failure Narrative

Return to Top

THE PLANT WAS IN MODE 5 , REFUELING OUTAGE 4 , WHEN THE INSERVICE TEST GROUP REPORTED THE STANDBY LIQUID CONTROL (SBLC) SYSTEM INBOARD CONTAINMENT ISOLATION CHECK VALVE , 1 OF 2 , FAILED THE LOCAL LEAK RATE TEST (LLRT) DEGRADING THE CONTAINMENT FUNCTION OF THE VALVE . THERE WAS NO SIGNIFICANT AFFECT ON THE OPERATION OF THE SYSTEM OR PLANT .

THE VALVE INTERNALS HAD LIGHT DEPOSITS OF DIRT THAT PREVENTED PROPER VALVE SEATING . THE DIRT WAS ATTRIBUTED TO NORMAL WEAR .

THE SEAL WELD WAS CUT , THE VALVE DISASSEMBLED , INSPECTED , CLEANED INTERNALS , PERFORMED BLUE CHECK , INSTALLED INTERNALS AND REWELDED PER CODE JOB PACKAGE , SATISFACTORILY TESTED AND RETURNED TO SERVICE . (92-09-42) ; WO-921007215

Contact at Time of Failure

Return to Top

Benjamin Tashjian 609-339-5582

=NPRDS=

Failure Report with Unit Information

Go to: System Information || Component Information || Failure Information || Failure Narrative

G. Size (Inlet):

Unit Information

Utility:	Commonwealth Edison Company
Unit:	DRESDEN 2
NSSS:	General Electric

System Information

Return to Top

System:	Standby Liquid Control-GE
Utility System:	1100

Component Information

Return to Top

Component:	Valves, dampers
Utility Component ID:	2-1101-4
Data Start Date:	07/01/1974
In-Service Date:	01/07/1970
Out-of-Service Date:	03/15/1994
Manufacturer:	Crane Co
Mfr Model ID:	47-1/2
Mfr Model No:	47.5U
Mfr Serial No.	
Drawing No.	PID-M-33
Safety Class	S

Engineering Characteristics

A. Type:	Globe
B. Operator:	Manual
C. Function/Application:	Shutoff/Isolation/Stop
D. Body Material:	Carbon Steel
F. Nominal Inlet Size (Range):	2 to 3.99 IN
2.500 IN	
H. Maximum Design Pressure:	150.000 PSIG
J. Maximum Design Temperature:	500.000 DEGF

User Data/Comments

Data/Comments 1:	F, N
Data/Comments 2:	A, F

User Data/Comments

Data/Comments 1:	F, N

Data/Comments 4:	S0
Data/Comments 5:	1101-4

Failure Information

Return to Top

Discovery Date:	10/07/1990
Discovery Time:	12:00
End Date:	12/17/1990
Plant Effect:	G - Resulted in No Significant Effect
System Affected:	PCA - Standby Liquid Control-GE
System Effect:	C - Loss of One or More Train/Channel Functions
Severity Level:	J - Complete
Failure Mode:	FC - Failed to Close
Failure Detection:	B - Maintenance/Test
Failure Cause Category:	J - Other Devices
Failure Cause Description:	BF - Flow Obstruction (included BM before 4/94) BE - Dirty
Corrective Action:	AG - Repair Component/Part
Documentation:	N - Other Documents or Records are Not Available
LER Report Number:	

Failure Narrative

Return to Top

UNIT WAS IN COLD SHUTDOWN WITH STANBBY LIQUID CONTROL (SBLC) TRAIN IN TEST . MAINTENANCE AND OPERATIONS PERSONNEL WERE PERFORMING AN OPERABILITY TEST , WHEN SBLC VALVE 1101-4 , WHICH IS NORMALLY OPEN WOULD NOT GO CLOSED . THE VALVE WAS TRIED A SECOND TIME WITH NO SUCCESS . THE TRAIN ISOLATION FUNCTION WAS LOST BUT THERE WAS NO PLANT AFFECT .

THE FAILURE TO THE VALVE WAS DUE TO BUILD UP OF BORON IN THE INTERNAL PARTS OF THE VALVE . THIS BUILD UP OF BORON PREVENTED THE VALVE FROM OPERATING AS INTENDED .

THE VALVE WAS REMOVED , CLEANED AND WHILE THE VALVE WAS DISASSEMBLED THE PACKING WAS ALSO REPLACED . THE VALVE WAS REINSTALLED AND SUCCESSFULLY TESTED FOR OPERABILITY . THE VALVE WAS THEN RETURNED TO SERVICE . (WR 88244)

Contact at Time of Failure

Return to Top

John Reid 815-942-2920 x2380

=NPRDS=

Failure Report with Unit Information

Go to: System Information || Component Information || Failure Information || Failure Narrative

G. Size (Inlet):

Unit Information

Utility:	PP&L, Inc.
Unit:	SUSQUEHANNA 1
NSSS:	General Electric

System Information

Return to Top

System:	Standby Liquid Control-GE
Utility System:	153A

Component Information

Return to Top

Component:	Valves, dampers
Utility Component ID:	148F031
Data Start Date:	06/08/1983
In-Service Date:	06/08/1983
Out-of-Service Date:	03/15/1994
Manufacturer:	Aloyco Div./Walworth Co.
Mfr Model ID:	
Mfr Model No:	N-226-SP
Mfr Serial No.	
Drawing No.	P&ID-M-148
Safety Class	S

Engineering Characteristics

A. Type:	Gate
B. Operator:	Manual
C. Function/Application:	Shutoff/Isolation/Stop
D. Body Material:	Austenitic Stnls Stl-316
F. Nominal Inlet Size (Range):	2 to 3.99 IN
3.000 IN	
H. Maximum Design Pressure:	100.000 PSIG
J. Maximum Design Temperature:	150.000 DEGF

User Data/Comments

Data/Comments 1:	X
Data/Comments 2:	F, 4

User Data/Comments

Data/Comments 1: X

Data/Comments 3:	ASME-SEC.III
Data/Comments 4:	W0
Data/Comments 5:	C41-1F031

Failure Information

Return to Top

Discovery Date:	08/12/1986
Discovery Time:	12:00
End Date:	09/10/1986
Plant Effect:	G - Resulted in No Significant Effect
System Affected:	PCA - Standby Liquid Control-GE
System Effect:	D - Degraded Train/Channel
Severity Level:	K - Degraded
Failure Mode:	FC - Failed to Close
Failure Detection:	B - Maintenance/Test
Failure Cause Category:	K - Unknown (included Code X prior to 4/94)
Failure Cause Description:	BB - Mechanical Damage (included BK before 4/94) BC - Out of Mechanical Adjustment
Corrective Action:	AG - Repair Component/Part
Documentation:	N - Other Documents or Records are Not Available
LER Report Number:	

Failure Narrative

Return to Top

ON AUGUST 12 , 1986 , THERE WAS SODIUM PENTABORATE SOLUTION LEAKING FROM THE STANBY LIQUID CONTROL (SBLC) STORAGE TANK INTO THE SBLC TEST TANK . TEST TANK OUTLET VALVE 148F031 WAS FOUND TO BE LEAKING THROUGH ALLOWING SBLC TANK LEVEL TO RISE .

AFTER INVESTIGATION IT WAS DETERMINED THE CAUSE OF THIS EVENT WAS DUE TO THE BOTTOM SIDE OF THE VALVE DISC MAKING CONTACT WITH THE BOTTOM OF THE VALVE BODY . ACTUAL ROOT CAUSE UNKNOWN .

GROUND THE VALVE DISC AND PERFORMED BLUE CHECK ON VALVE BODY UNTIL NO CONTACT WAS NOTED . STROKED VALVE AND VERIFIED NO BONNET GASKET LEAK AT SYSTEM OPERATING PRESSURE . VALVE RETURNED TO SERVICE .

Contact at Time of Failure

Return to Top

Terry Constance 610-774-7608

PP&L CALCULATION SHEET			
Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	1 of 14

ATTACHMENT NO. 3

Susquehanna - Valve Operating Experience

Kowal, George M

From: Missien, Ian C
Sent: Monday, March 21, 2005 3:59 PM
To: Kowal, George M
Cc: Vazquies, Ronald Allen; Maertz, Gerald G
Subject: Standby Liquid Control (SLC) Outboard Containment Isolation Valve, 1(2)48F007

Mr. Kowal,

The SLC O/B Containment Isolation Valves, 1(2)48F007 have performed very well for PPL Susquehanna, LLC. A review of work history on these valves shows no failures. Typically, the leakage rates for these valves is nil (0-10 cc/min). Reference SE-1(2)59-047 (LLRT of Penetration X-42) and the work history in NIMS via the CMPINFO screen.

Ian C. Missien
254-3396

1P208A — **STANDBY LIQ CONTROL PUMP 'A'**

Parent ID:				Unit :	1	Fail Code:	2B
Sys:	153A			Area :	29	Maint Rule:	1
Manufacturer:	UNION PMP	ASME:	Y	Elev :	749	Criticality:	1
Model No.:	2X3 TD-60 TRIPLEX	ASEC:	III	Act. Elev:	750.5	Duty Cycle:	
Part No.:	TBD	Q:	Q	Room :	I-513	Environment:	
Serial No.:	284222	EQ:	N	Bldg :	RX		
Install Date:	26-JAN-1996	Comp. Type:	PUMP	Col/Line :	7S26.5/4WT		
		Design Status:	ASBLT	Azimuth :			

Loc:

Description:

Related Components

Relationship	ID	Name	Component Type
IS BLOCKED BY	1B236081	STANDBY LIQUID CONTROL INJECTION PUMP A 1P208A BKR	SUBPNL
IS POWERED BY	1B236081	STANDBY LIQUID CONTROL INJECTION PUMP A 1P208A BKR	SUBPNL

Design Characteristics

Category	Name	Value	Unit
NOM	MOTOR SPEED	NULL	Revolutions
NOM	POWER RATING	40	hp
NOM	SCAFFOLDING HEIGHT	0.0	foot
NOM	VOLTAGE	460	volt AC

Physical Characteristics

Category	Name	Value	Unit
N/A	MOTOR TYPE	NULL	n/a
N/A	MANUFACTURER	NULL	n/a
N/A	MODEL NUMBER	NULL	n/a
N/A	SERIAL NUMBER	NULL	n/a
N/A	MOTOR FRAME	NULL	n/a
N/A	ORIENTATION	NULL	n/a
NOM	STATOR FULL LOAD AMPS	NULL	Amp
NOM	MOTOR LOCKED ROTOR AMPS	NULL	Amp
N/A	MOTOR PHASE	NULL	n/a
N/A	STATOR INSUL THERMAL CLASS	NULL	n/a
N/A	MOTOR ENCLOSURE TYPE	NULL	n/a
N/A	MOTOR SERVICE FACTOR	NULL	n/a
N/A	MOTOR TEMPERATURE RISE	NULL	n/a
N/A	MOTOR SPACE HEATERS (Y/N)	NULL	n/a
N/A	OIL COOLING COILS	NULL	n/a
N/A	UPPER OR OB BEARING TYPE.	NULL	n/a
N/A	LOWER OR IB BEARING TYPE	NULL	n/a
N/A	UPPER OR OB BEARING NO.	NULL	n/a
N/A	LOWER OR IB BEARING NO.	NULL	n/a
N/A	UPPER OR OB BEARING CAPACITY.	NULL	n/a
N/A	LOWER OR IB BEARING CAPACITY	NULL	n/a
NOM	DC MOTOR FIELD AMPS	NULL	Amp
NOM	DC MOTOR WINDING AMPS	NULL	Amp

Lube Points

Lube Location	Lube Component	Catalog Name	Catalog No.	Quantity	U/M
BEARINGS	MOTOR	ALVANIA RL #2	0000935656		?
PAC	GR	HARMONY 68 AW (DRUM)	0091202198		?

Lube Location | Lube Component | Catalog Name | Catalog No. | Quantity | U/M
BEARINGS | MOTOR | ALVANIA RL #2 | 0000935656 | | ?

Lube Points

CRANKCASE	CRANKCASE	HARMONY 68 AW (DRUM)	0091202198	?

Design Documents

ID	Sheet	Rev.	Latest Rev.	AE No.	AE Sheet	AE Rev.	Description
D107315	1	19	N	E-166	1	19	SCHEMATIC DIAGRAM STANDBY LIQUID CONTROL S
E106179	5	26	Y	M-29-5	1	26	PLANT DESIGN DRAWING REACTOR BLDG AREA 29
E106253	1	27	N	M-148	1	27	P&ID STANDBY LIQUID CONTROL
IOM5	1	2	N	M1-C41-21	1	2	TRIPLEX POWER PUMPS TD-60 OR STANDBY LIQUI

Groups

Type	Name	Description
IST	IST PROGRAM GROUP	
ISTP	IST UNIT 1 PUMP GROUP	
NSEFEG	1A SLC PMP FEG	
NSEFEG	1B236	
REPORT	NPRDS REPORTABLE GROUP	

Comments

Design:

Physical: 1P208A

Manufacturer:

Additional Comments

Type	Comment Text

1431007 | **?**

Parent ID:			Unit : 1		Fail Code: 1B
Sys:	153A		Area : 26		Maint Rule: 1
Manufacturer:	BORG WAR	ASME: Y	Elev : 739		Criticality: 1
Model No.:	?	ASEC: III,NB	Act. Elev: 739		Duty Cycle:
Part No.:	TBD	Q: Q	Room : I-400		Environment:
Serial No.:		EQ: N	Bldg : CNTMT		
Install Date:	08-MAR-1996	Comp. Type: CK	Col/Line :		
		Design Status: ASBLT	Azimuth : 15	170	

Loc:

Description:

Design Characteristics

Category	Name	Value	Unit
N/A	PIPE CLASS	DCA	n/a
N/A	PIPE LINE ID	106	n/a
NORM	PRESSURE	1005	psi
N/A	PIPE SCHEDULE	80S	n/a
N/A	BONNET ATTACHMENT	SLWLD	n/a
NOM	SCAFFOLDING HEIGHT	7.0	foot
NOM	SIZE	1.50	inch
NORM	TEMPERATURE	547	deg F
N/A	VALVE TO PIPE ATTACHMENT	SOCKET WELD	n/a
N/A	VALVE CLASS	CCA	n/a
N/A	VALVE OPERATOR TYPE	SPRING OPERATED	n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	VALVE BODY MATERIAL	SA182-F316	n/a
N/A	VALVE TRIM MATERIAL	STELL	n/a
NOM	STEM OUTSIDE DIAMETER	0	inch
NOM	STUFFING BOX INSIDE DIAMETER	0	inch
NOM	STUFFING BOX DEPTH	NULL	inch
NOM	LEAKOFF PORT DEPTH	NULL	inch
N/A	LEAKOFF ACTIVE	NULL	n/a
NOM	LANTERN RING HEIGHT	NULL	inch
NOM	STUD OUTSIDE DIAMETER	NULL	inch
NOM	NUT SIZE	NULL	inch
NOM	CRANE "B" FACTOR	NULL	n/a
NOM	GLAND LENGTH	NULL	inch
N/A	NUMBER OF STUDS	NULL	n/a
NOM	LOWER BUSHING HEIGHT	NULL	inch
NOM	UPPER BUSHING HEIGHT	NULL	inch
NOM	PACKING SET HEIGHT (REPACK)	0	inch
NOM	NUMBER OF WASHERS/STUD	NULL	n/a
N/A	VALVE PACKING TYPE (REPACK)	NULL	n/a
NOM	PACKING STRESS	1	lbs
N/A	PACKING CONFIGURATION (REPACK)	NULL	n/a
N/A	TRANSFER RATIO (REPACK)	0	n/a
N/A	PACKING COEFFICIENT OF FRICTION (REPACK)	0	n/a
N/A	LOWER BUSHING CAT #	NULL	n/a
N/A	UPPER BUSHING CAT #	NULL	n/a
N/A	PRIMARY PACKING CAT #	NULL	n/a
N/A	FLAT WASHER CAT #	NULL	n/a

N/A	UPPER BUSHING CAT #	NULL	n/a
N/A	PRIMARY PACKING CAT #	NULL	n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	LIVE LOAD WASHER CAT #	NULL	n/a
N/A	LANTERN RING CAT #	NULL	n/a
NOM	PACKING SET HEIGHT (RETORQUE)	0	inch
NOM	PACKING STRESS (RETORQUE)	1	psi
N/A	TRANSFER RATIO (RETORQUE)	0	n/a
N/A	PACKING COEFFICIENT OF FRICTION (RETORQUE)	0	n/a

Lube Points

Lube Location	Lube Component	Catalog Name	Catalog No.	Quantity	U/M

Design Documents

ID	Sheet	Rev.	Latest Rev.	AE No.	AE Sheet	AE Rev.	Description
E106253	1	27	N	M-148	1	27	P&ID STANDBY LIQUID CONTROL
IOM216	1	8	N	P14B-58	1	8	1 & 1 1/2 & 2 INCH STAINLESS GATE & Y TYPE
FF110470	1001	3	Y	P14B-10	1	3	ASSEMBLY 1 1/2 INCH Y TYPE LIFT CHECK VALV

Groups

Type	Name	Description
COND	ENVIRONMENTAL CONDITION GROUP 6	100 - 140 DEGREES F/HIGH HUMIDITY
COND	RADIOLOGICAL CONDITION ZONE 5 GROUP	DOSE RATE >100 mrem/hr.
IST	IST PROGRAM GROUP	
NSEFEG	Primary Containment Isolation Valves	
NSEPEG	UNIT 1 SLC SYS PEG	
REPORT	NPRDS REPORTABLE GROUP	
SURV	LOCAL LEAK RATE TESTING GROUP	Pre & Post LLRT required IAW NDAP-QA-0412
SURV	VALVE ISI	CATAGORIES A and C apply

Requirements

Requirement	Source	Type	Level
LEAK RATE TESTING REQUIRED (LLRT/ILRT)	LEAK RATE TESTING PROGRAM	LEAK RATE TESTING	Design

Zone Associations

Zone	Name	Status	Type	Zone Use	Comment
RAD5	RADIATION ZONE V		RAD	IN	

Comments

Design:

Physical: 148F007

Manufacturer:

Eng. Notes:

Additional Comments

Type	Comment Text

143F003 STANDBY LIQUID CONTROL INJ ISO

Parent ID:				Unit :	1	Fail Code:	1B
Sys:	153A			Area :	26	Maint Rule:	1
Manufacturer:	BORG WAR	ASME:	Y	Elev :	738	Criticality:	1
Model No.:	P/N 74680	ASEC:	III,NB	Act. Elev:	742	Duty Cycle:	
Part No.:	TBD	Q:	Q	Room :	I-400	Environment:	
Serial No.:	17977	EQ:	N	Bldg :	CNTMT		
Install Date:	26-JAN-1996	Comp. Type:	GT	Col/Line :			
		Design Status:	ASBLT	Azimuth :	15 175		

Loc:

Description: STANDBY LIQUID CONTROL INJ ISO

Design Characteristics

Category	Name	Value	Unit
N/A	PIPE CLASS	DCA	n/a
N/A	PIPE LINE ID	106	n/a
NORM	PRESSURE	1005	psi
N/A	PIPE SCHEDULE	80S	n/a
N/A	BONNET ATTACHMENT	SLWLD	n/a
NOM	SCAFFOLDING HEIGHT	0.0	foot
NOM	SIZE	1.50	inch
NORM	TEMPERATURE	547	deg F
N/A	VALVE TO PIPE ATTACHMENT	SOCKET WELD	n/a
N/A	VALVE CLASS	CCA	n/a
N/A	VALVE OPERATOR TYPE	HAND OPERATED	n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	VALVE BODY MATERIAL	SA182-F316	n/a
NOM	SUGGESTED NUT TORQUE	85.0	ft-lbs
N/A	VALVE STEM MATERIAL	SA564-630	n/a
N/A	VALVE TRIM MATERIAL	STELL	n/a
NOM	STEM OUTSIDE DIAMETER	0.875	inch
NOM	STUFFING BOX INSIDE DIAMETER	1.375	inch
NOM	STUFFING BOX DEPTH	1.625	inch
NOM	LEAKOFF PORT DEPTH	NULL	inch
N/A	LEAKOFF ACTIVE	NULL	n/a
NOM	LANTERN RING HEIGHT	NULL	inch
NOM	STUD OUTSIDE DIAMETER	0.000	inch
NOM	NUT SIZE	1.25	inch
NOM	CRANE "B" FACTOR	NULL	n/a
NOM	GLAND LENGTH	NULL	inch
N/A	NUMBER OF STUDS	0	n/a
NOM	LOWER BUSHING HEIGHT	0.312	inch
NOM	UPPER BUSHING HEIGHT	NULL	inch
NOM	PACKING SET HEIGHT (REPACK)	1.25	inch
NOM	NUMBER OF WASHERS/STUD	NULL	n/a
N/A	VALVE PACKING TYPE (REPACK)	COMPOSITE	n/a
NOM	PACKING STRESS	4000	lbs
N/A	PACKING CONFIGURATION (REPACK)	52	n/a
N/A	TRANSFER RATIO (REPACK)	.85	n/a
N/A	PACKING COEFFICIENT OF FRICTION (REPACK)	.05	n/a
N/A	LOWER BUSHING CAT #	NULL	n/a
N/A	UPPER BUSHING CAT #	NULL	n/a

(REPACK)
N/A LOWER BUSHING CAT # NULL n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	PRIMARY PACKING CAT #	00910218476	n/a
N/A	FLAT WASHER CAT #	NULL	n/a
N/A	LIVE LOAD WASHER CAT #	NULL	n/a
N/A	LANTERN RING CAT #	NULL	n/a
NOM	PACKING SET HEIGHT (RETORQUE)	0	inch
NOM	PACKING STRESS (RETORQUE)	1	psi
N/A	TRANSFER RATIO (RETORQUE)	0	n/a
N/A	PACKING COEFFICIENT OF FRICTION (RETORQUE)	0	n/a

Lube Points

Lube Location	Lube Component	Catalog Name	Catalog No.	Quantity	U/M

Design Documents

ID	Sheet	Rev.	Latest Rev.	AE No.	AE Sheet	AE Rev.	Description
E106253	1	27	N	M-148	1	27	P&ID STANDBY LIQUID CONTROL
IOM216	1	8	N	P14B-58	1	8	1 & 1 1/2 & 2 INCH STAINLESS GATE & Y TYPE
FF110470	801	13	Y	P14B-8	1	13	ASSEMBLY 1 1/2 INCH GATE VALVE

Groups

Type	Name	Description
COND	ENVIRONMENTAL CONDITION GROUP 6	100 - 140 DEGREES F/HIGH HUMIDITY
COND	RADIOLOGICAL CONDITION ZONE 5 GROUP	DOSE RATE >100 mrem/hr.
NSEFEG	UNIT 1 SLC SYS FEG	

Zone Associations

Zone	Name	Status	Type	Zone Use	Comment
RAD5	RADIATION ZONE V		RAD	IN	

Comments

Design: BUSHING INCLUDED IN PACKING SET

Physical: BUSHING INCLUDED IN PACKING SET

Manufacturer:

Eng. Notes:

Additional Comments

Type	Comment Text
OPS LOCATIO	LOC1: AZ175 R742'
OPERATIONS	(FC)

HV148F006 — SBLC OB INJECTION VLV

Parent ID:			Unit : 1		Fail Code: 1B
Sys:	153A		Area : 29		Maint Rule: 1
Manufacturer:	YARWAY CORP	ASME: Y	Elev : 749		Criticality: 1
Model No.:	N/A	ASEC: III,NB	Act. Elev: 752		Duty Cycle:
Part No.:	N/A	Q: Q	Room : I-506		Environment:
Serial No.:		EQ: N	Bldg : RX		
Install Date:	08-MAR-1996	Comp. Type: MOV	Col/Line : 1S25/14WT		
		Design Status: ASBLT	Azimuth :		

Loc:

Description: SLC ISO VLV

Related Components

Relationship	ID	Name	Component Type
IS BLOCKED BY	1B236064	SBLC OB INJECTION VLV HV-148F006 BKR	SUBPNL
IS POWERED BY	1B236064	SBLC OB INJECTION VLV HV-148F006 BKR	SUBPNL

Design Characteristics

Category	Name	Value	Unit
NOM	MOTOR SPEED	NULL	Revolutions
N/A	PIPE CLASS	DCA	n/a
N/A	PIPE LINE ID	106	n/a
NORM	PRESSURE	1005	psi
N/A	PIPE SCHEDULE	80S	n/a
N/A	BONNET ATTACHMENT	SLWLD	n/a
NOM	SIZE	1.50	inch
NORM	TEMPERATURE	547	deg F
N/A	VALVE TO PIPE ATTACHMENT	SOCKET WELD	n/a
N/A	VALVE CLASS	CCA	n/a
N/A	VALVE OPERATOR TYPE	MOTOR OPERATED	n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	ACTUATOR ORDER NO.	3A6681A	n/a
N/A	ACTUATOR SIZE	SMB-000	n/a
N/A	VALVE BODY MATERIAL	SA182-F316	n/a
NOM	REMAINING GLAND TAKE-UP	.3125	inch
N/A	FLAT WASHER INSTALLED (Y/N)	Y	n/a
N/A	LIVE LOADED (Y/N)	Y	n/a
N/A	MOTOR TYPE	NULL	n/a
N/A	MANUFACTURER	NULL	n/a
N/A	MODEL NUMBER	NULL	n/a
N/A	SERIAL NUMBER	NULL	n/a
N/A	MOTOR FRAME	NULL	n/a
N/A	ORIENTATION	NULL	n/a
NOM	STATOR FULL LOAD AMPS	NULL	Amp
NOM	MOTOR LOCKED ROTOR AMPS	NULL	Amp
N/A	MOTOR PHASE	NULL	n/a
N/A	STATOR INSUL THERMAL CLASS	NULL	n/a
N/A	MOTOR ENCLOSURE TYPE	NULL	n/a
N/A	MOTOR SERVICE FACTOR	NULL	n/a
N/A	MOTOR TEMPERATURE RISE	NULL	n/a
N/A	MOTOR SPACE HEATERS (Y/N)	NULL	n/a
N/A	OIL COOLING COILS	NULL	n/a

N/A	MOTOR TEMPERATURE RISE	NULL	n/a
		NULL	n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	UPPER OR OB BEARING TYPE.	NULL	n/a
N/A	LOWER OR IB BEARING TYPE	NULL	n/a
N/A	UPPER OR OB BEARING NO.	NULL	n/a
N/A	LOWER OR IB BEARING NO.	NULL	n/a
N/A	UPPER OR OB BEARING CAPACITY.	NULL	n/a
N/A	LOWER OR IB BEARING CAPACITY	NULL	n/a
NOM	DC MOTOR FIELD AMPS	NULL	Amp
NOM	DC MOTOR WINDING AMPS	NULL	Amp
NOM	MOTOR VOLTAGE	460	volt
NOM	MOTOR HORSEPOWER	.17	hp
NOM	MOTOR START TORQUE	5	ft-lbs
NOM	MOTOR RUN TORQUE	1	ft-lbs
NOM	MOTOR SPEED	850	rpm
NOM	MOTOR DUTY RATING	15M	n/a
NOM	MOTOR INSUL TYPE/CLASS	B	n/a
NOM	MOTOR FRAME	M48	n/a
NOM	MOTOR FULL LOAD AMPS	1	Amp
NOM	MOTOR LOCKED ROTOR AMPS	2	Amp
NOM	MOTOR TEMPERATURE	40	deg C
NOM	SUGGESTED NUT TORQUE	59.0	ft-lbs
NOM	POWER RATING	0.17	hp
MIN	LOWEST ALLOWED TORQUE SWITCH SETTING	1.5	n/a
MAX	HIGHEST ALLOWED TORQUE SWITCH SETTING	2.5	n/a
NOM	SPRING PACK GAP	.305	inch
NOM	SPRING PACK NUMBER OF WASHERS	17	n/a
N/A	VALVE STEM MATERIAL	SA564-630	n/a
NOM	SPRING PACK WASHER THICKNESS	.065	n/a
N/A	VALVE TRIM MATERIAL	STELL	n/a
NOM	TORQUE SWITCH ACTUAL OPEN SETTINGS	1.5	n/a
NOM	TORQUE SWITCH ACTUAL CLOSE SETTINGS	1.5	n/a
NOM	MOTOR PINION TEETH	22	n/a
NOM	WORM GEAR TEETH	23	n/a
NOM	MTR PINION TO WSG RATIO	1.04	n/a
NOM	VOLTAGE	460	volt AC
NOM	STEM OUTSIDE DIAMETER	0.937	inch
NOM	STUFFING BOX INSIDE DIAMETER	2.062	inch
NOM	STUFFING BOX DEPTH	2.125	inch
NOM	LEAKOFF PORT DEPTH	N/A	inch
N/A	LEAKOFF ACTIVE	N/A	n/a
NOM	LANTERN RING HEIGHT	N/A	inch
NOM	STUD OUTSIDE DIAMETER	0.75	inch
NOM	NUT SIZE	1.25	inch
NOM	CRANE "B" FACTOR	91	n/a
NOM	GLAND LENGTH	NEED	inch
N/A	NUMBER OF STUDS	2	n/a
NOM	LOWER BUSHING HEIGHT	.437	inch
NOM	UPPER BUSHING HEIGHT	N/A	inch
NOM	PACKING SET HEIGHT (REPACK)	1.25	inch
NOM	NUMBER OF WASHERS/STUD	3	n/a
N/A	VALVE PACKING TYPE (REPACK)	COMPOSITE	n/a
NOM	PACKING STRESS	4000	lbs
N/A	PACKING CONFIGURATION (REPACK)	37	n/a
N/A	TRANSFER RATIO (REPACK)	.85	n/a
N/A	PACKING COEFFICIENT OF FRICTION (REPACK)	.05	n/a
N/A	LOWER BUSHING CAT #	0091219152	n/a
N/A	UPPER BUSHING CAT #	N/A	n/a
N/A	PRIMARY PACKING CAT #	0091218662	n/a

N/A LOWER BUSHING CAT # 0091219152 n/a
N/A UPPER BUSHING CAT # N/A n/a

Physical Characteristics

Category	Name	Value	Unit
N/A	FLAT WASHER CAT #	0091219132	n/a
N/A	LIVE LOAD WASHER CAT #	0091217318	n/a
N/A	LANTERN RING CAT #	N/A	n/a
N/A	GRAPHITE WASHER CAT #	N/A, NEEDS CUT	n/a
NOM	PACKING SET HEIGHT (RETORQUE)	1.25	inch
NOM	PACKING STRESS (RETORQUE)	4000	psi
N/A	TRANSFER RATIO (RETORQUE)	.85	n/a
N/A	PACKING COEFFICIENT OF FRICTION (RETORQUE)	.05	n/a

Lube Points

Lube Location	Lube Component	Catalog Name	Catalog No.	Quantity	U/M

Design Documents

ID	Sheet	Rev.	Latest Rev.	AE No.	AE Sheet	AE Rev.	Description
D107315	4	14	N	E-166	4	14	SCHEMATIC DIAGRAM STANDBY LIQUID CONTROL S
E106253	1	27	N	M-148	1	27	P&ID STANDBY LIQUID CONTROL
IOM270-1	1	2	N	P14A-32	1	2	5500 SERIES MOTORIZED VALVES FOR STANDBY L
PF110140	1001	8	Y	P14A-10	1	8	1 1/2 INCH YARWAY WELBOND VALVE WITH LIMIT
PF121010	3602	14	N	M1-C41-36	2	14	ELEMENTARY DIAGRAM STANDBY LIQUID CONTROL

Groups

Type	Name	Description
IST	IST PROGRAM GROUP	
NSEFEG	1B236	
NSEFEG	Primary Containment Isolation Valves	
NSEFEG	UNIT 1 SLC SYS FEG	
REPORT	NPRDS REPORTABLE GROUP	
SURV	LOCAL LEAK RATE TESTING GROUP	Pre & Post LLRT required IAW NDAP-QA-0412
SURV	VALVE ISI	CATAGORIES A and C apply

Requirements

Requirement	Source	Type	Level
10.1 LIMITORQUE SMB AND SB MOV ACTUATOR INSTALLATION	EQ PROGRAM	EQAR-084	Design
10.1 T&B CRIMPED WIRE JOINT INSTALLATION	EQ PROGRAM	EQAR-091	Design
10.1 TERMINAL BLOCK INSTALLATION	EQ PROGRAM	EQAR-089	Design
10.2 T&B CRIMPED WIRE JOINT MAINTENANCE	EQ PROGRAM	EQAR-091	Design
10.2 TERMINAL BLOCK MAINTENANCE	EQ PROGRAM	EQAR-089	Design
10.2.1 LIMITORQUE SMB AND SB MOV ACTUATOR MAINTENANCE	EQ PROGRAM	EQAR-084	Design
10.3 T&B CRIMPED WIRE JOINT CONFIGURATION	EQ PROGRAM	EQAR-091	Design
10.3 TERMINAL BLOCK CONFIGURATION	EQ PROGRAM	EQAR-089	Design
10.3.1 LIMITORQUE SMB, SB 460VAC MOV ACTUATOR CONFIGURATION	EQ PROGRAM	EQAR-084	Design
10.7 LIMITORQUE SMB AND SB MOV ACTUATOR PROCUREMENT	EQ PROGRAM	EQAR-084	Design
10.7 T&B CRIMPED WIRE JOINT PROCUREMENT	EQ PROGRAM	EQAR-091	Design
10.7 TERMINAL BLOCK PROCUREMENT	EQ PROGRAM	EQAR-089	Design
LEAK RATE TESTING REQUIRED (LLRT/ILRT)	LEAK RATE TESTING PROGRAM	LEAK RATE TESTING	Design

Design Documents

Comments

Design: SLC ISO VLV

Physical: LAST REPACKED 3/28/04 CRRCHW TORQUED TO 58 FT/LBS. ALL RINGS ARE .3125" TALL. GRAPHITE WASHER WILL NEED CUT. A NEW STEM WAS INSTALLED U1-13RIO.
UPDATED 3/28/04 BY CHT

Additional Comments

Type Eng. Notes:	Comment Text
OPERATIONS	(FC) SUBHEADING: SBLC
OPS LOCATIO	LOC1: I-506 R752'

HS14804 — SBLC MANUAL INITIATION

Parent ID:	1C601			Unit :	1	Fail Code:	1B
Sys:	153A			Area :	12	Maint Rule:	1
Manufacturer:	?	ASME:	N	Elev :	729	Criticality:	1
Model No.:		ASEC:		Act. Elev:	732.5	Duty Cycle:	
Part No.:	?	Q:	Q	Room :	C-409	Environment:	
Serial No.:		EQ:	N	Bldg :	CONT		
Install Date:	18-OCT-2000	Comp. Type:	S	Col/Line :			
		Design Status:	ASBLT	Azimuth :			

Loc:

Description:

CL-153-C011

Design Characteristics

Category	Name	Value	Unit
N/A	CONTACT ACTION 1 & 2 OPERATIONS	NULL	n/a
MAX	DEVICE RANGE MAX	NULL	TBD
MIN	DEVICE RANGE MIN	NULL	TBD
NOM	DEVICE SETPOINT	NULL	TBD
MAX	PROCESS RANGE MAX	NULL	TBD
MIN	PROCESS RANGE MIN	NULL	TBD
TOL(+)	PROCESS RANGE TOL(+)	NULL	TBD
TOL(-)	PROCESS RANGE TOL(-)	NULL	TBD
NOM	PROCESS SETPOINT NOM	NULL	TBD
TOL(+)	PROCESS SETPOINT TOL(+)	NULL	TBD
TOL(-)	PROCESS SETPOINT TOL(-)	NULL	TBD
N/A	SETPOINT REVISION DATE	NULL	n/a
TOL(-)	DEVICE SETPOINT TOLERANCE TOL(-)	NULL	TBD
TOL(+)	DEVICE SETPOINT TOLERANCE TOL(+)	NULL	TBD

Lube Points

Lube Location	Lube Component	Catalog Name	Catalog No.	Quantity	U/M

Design Documents

ID	Sheet	Rev.	Latest Rev.	AE No.	AE Sheet	AE Rev.	Description
D107315	1	19	N	E-166	1	19	SCHEMATIC DIAGRAM STANDBY LIQUID CONTROL S
D107315	1	20	Y	E-166	1	20	SCHEMATIC DIAGRAM STANDBY LIQUID CONTROL S
E106253	1	27	N	M-148	1	27	P&ID STANDBY LIQUID CONTROL
E162128	2	15	N	J-802	2	15	LAYOUT EMERGENCY CORE COOLING BENCHBOARD 1

Groups

Type	Name	Description
NSEFEG	UNIT 1 SLC SYS FEG	

Comments

Design:

Physical: HS14804

Manufacturer: This record created to support data loading purposes only.

Additional Comments

Type	Comment Text

Type	Comment Text

Design Documents

Additional Comments

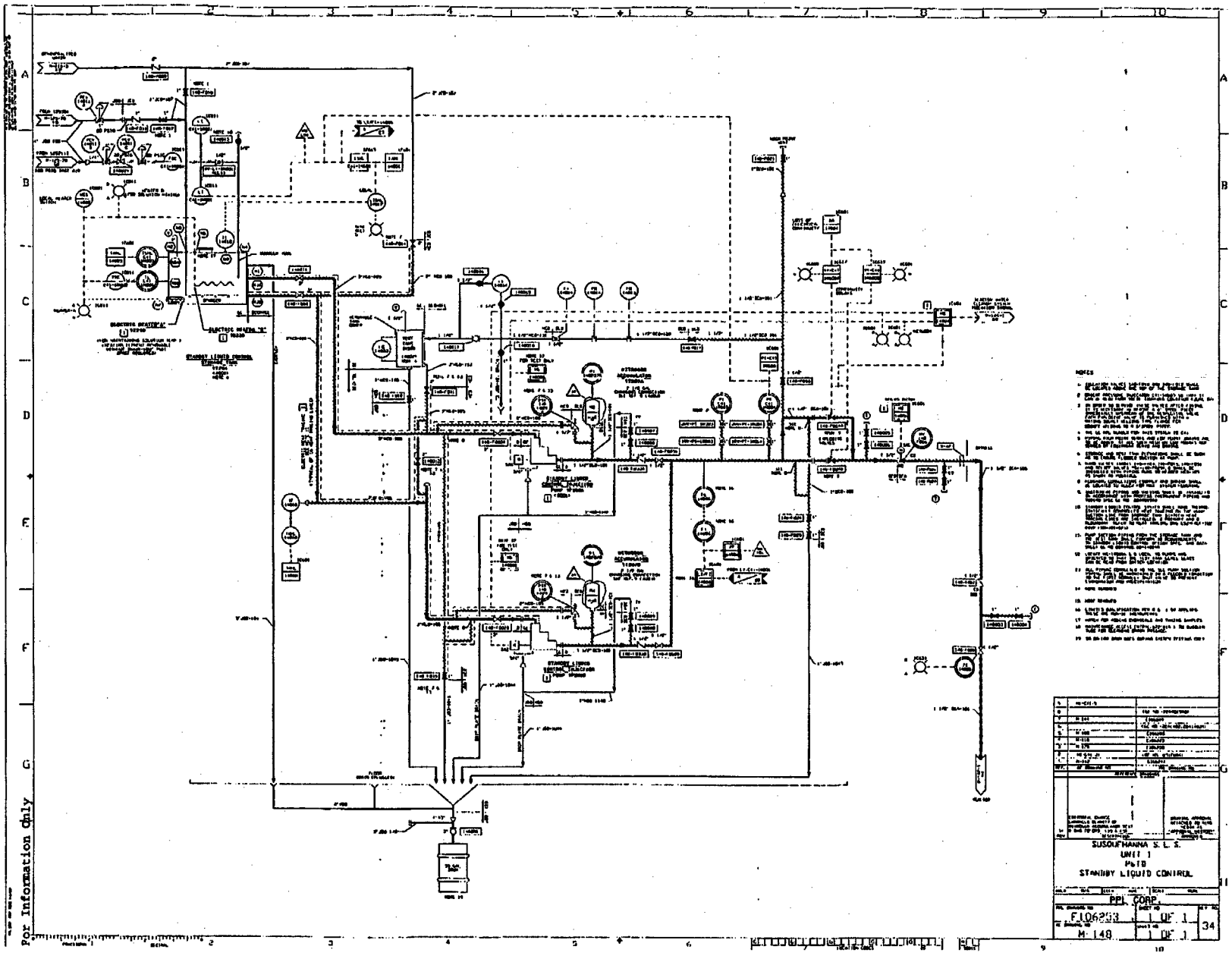
Type	Comment Text
OPS LOCATIO	LOC1: 1C601

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	1 of 18

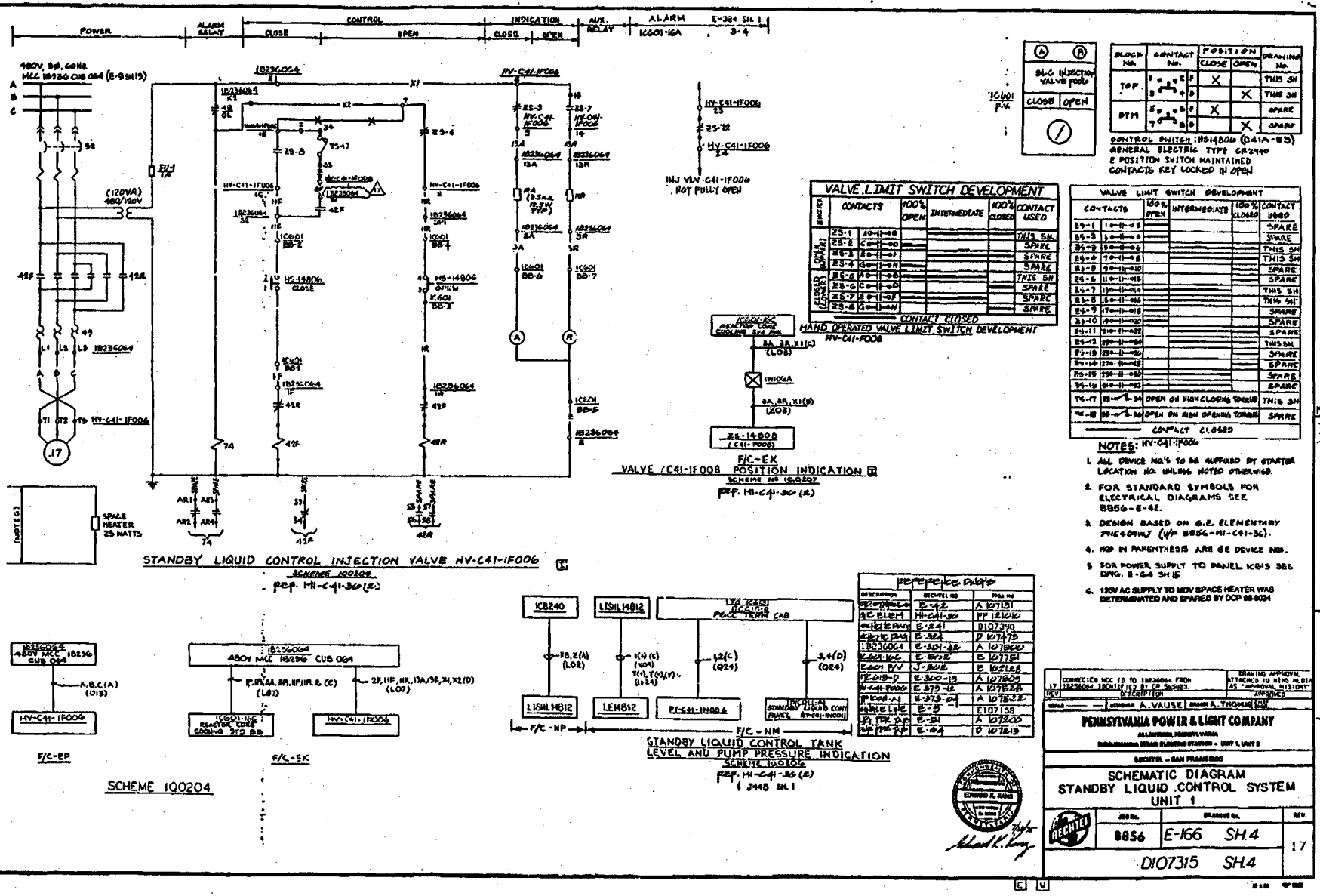
ATTACHMENT NO. 4

Input Data - Drawings

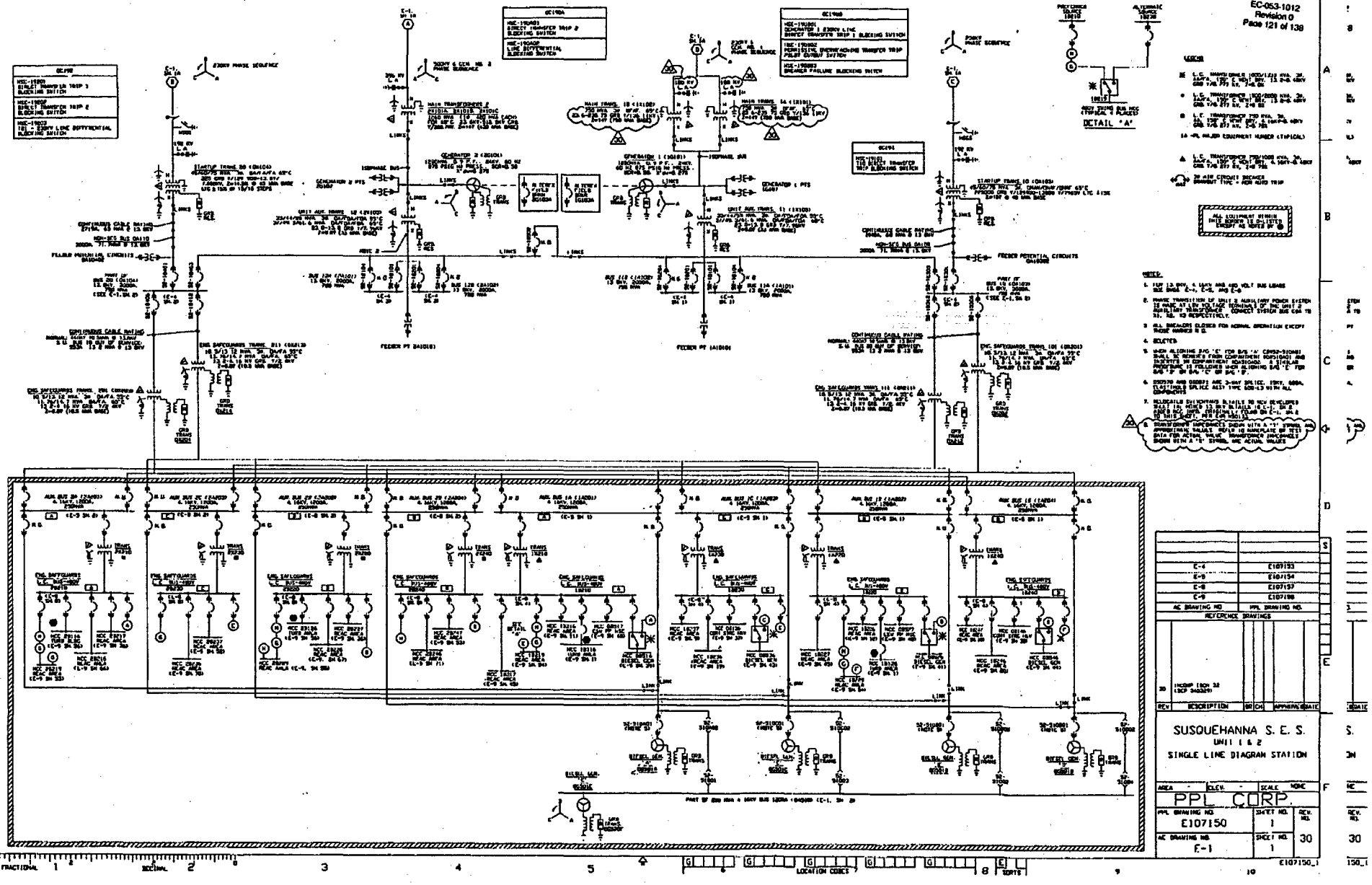


Ref. 6.6

Ref. 6.7



Ref 6.8



EC-053-1012
Revision 0
Page 121 of 138

E-4	E107153
E-5	E107154
E-8	E107157
E-9	E107158
AC DRAWING NO.	PPL DRAWING NO.

REFERENCE DRAWINGS

REV.	DESCRIPTION	BY	CH	APPROVED	DATE

SUSQUEHANNA S. E. S.
UNIT 1 & 2
SINGLE LINE DIAGRAM STATION

AREA - ELEV. - SCALE NONE

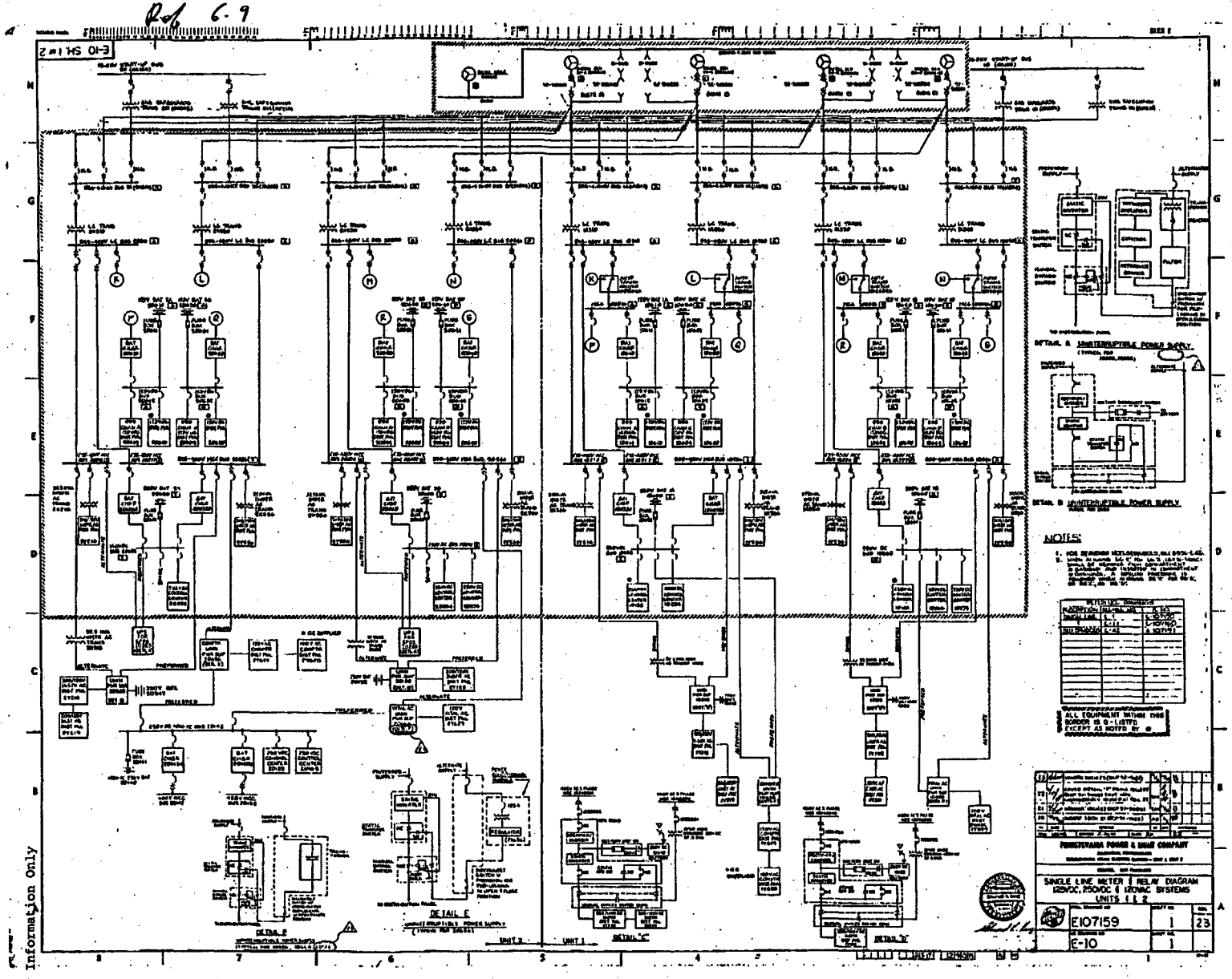
PPL CORP.

PPL DRAWING NO.	SHEET NO.	REV. NO.
E107150	1	
AC DRAWING NO.	SHEET NO.	
E-1	1	30

E107150_1

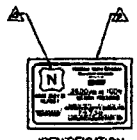
For Information Only

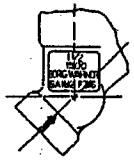
Ref 6.9

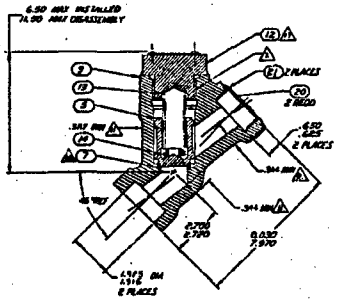


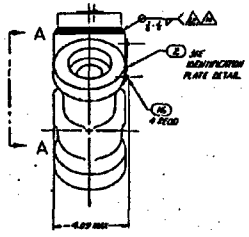
For Information Only

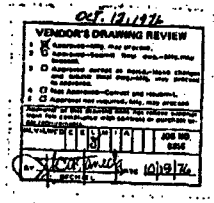
Ref 6.10

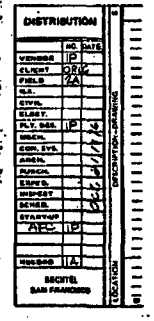












21	AB	NO. 357 SERIES		RFC, PRESS SENSITIVE
20	2	71	POLYETHYLENE	CAPLUG
19	AB			NEGLIGE
18				
17	2			SCREW, DRIVE
16	4			SCREW, DRIVE
15				
14	1	71634		SEAT, SPRING
13	1	71638		SPRING
12	1	71393		BONNET
11				
10	1	73845-15		BODY, ASSEMBLY
9	1	73845-M		BODY, MACHINED
8	1	71218		BODY, FORGING
7	1	73164		SEAT, BODY
6	1	71183-M		DISC, BLANK
5	1	71638		DISC, MACHINED
4	1	71639		DISC, CLOTHING
3				
2	1	72905		PLATE, IDENTIFICATION
1	1	72345		PLATE, MARKING

BECHTEL ITEM NO.	BECHTEL EQUIPMENT NO.	BECHTEL PURCHASE ORDER NO.
19.1.2	1½"-CCA-CK	8856-P-10-BC
19.2.2	1½"-CFA-CK	
20.1.2	1½"-CCA-CK	
20.2.2	1½"-CCA-CK	
21.1.2	1½"-CCA-CK	
21.2.2	1½"-CCA-CK	

SUSQUEHANNA STEAM ELECTRIC STATION FP110470
UNITS 1 AND 2
PENNSYLVANIA POWER AND LIGHT COMPANY

FP110470 SH 1001 Rev. 3
8856-PABC-10-3

CERTIFIED BY: C. Beck DATE: 10-5-76

VALVE ASSY, LIFT CHECK- 1½ IN, Y TYPE, CRES, SW
74730

For Information Only

Ref C.20

IDENT PLATE DETAIL

SECTION A-A

SEE PLATE IDENT DETAIL

SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 AND 2
PENNSYLVANIA POWER AND LIGHT COMPANY

TABULATION

BECHTEL ITEM NO.	BECHTEL EQUIPMENT NO.	BECHTEL PURCHASE ORDER NO.
11. 1. 2	1½-GEA-GY	8856-P-14-BC
11. 2. 2	1½-GEA-GI	

VALVE ASSEMBLY — 1½ INCH GATE, CRFS.

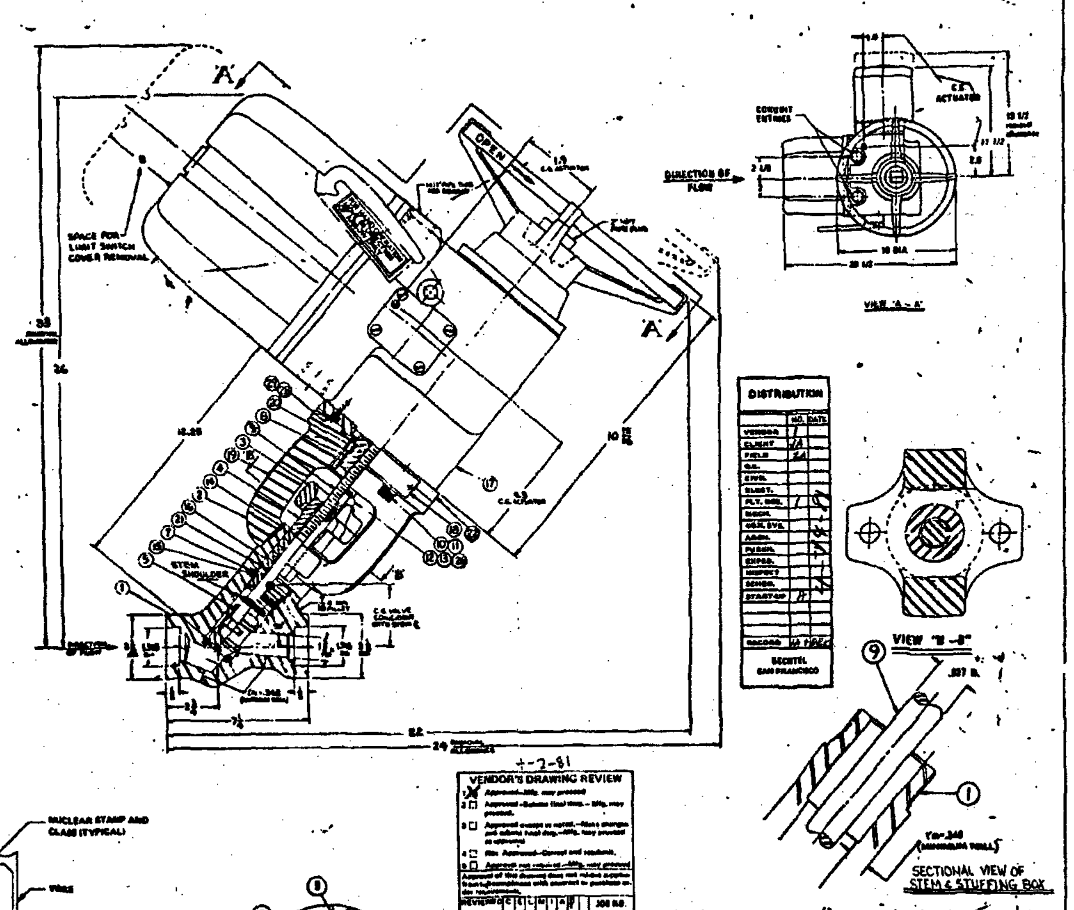
74680 6E

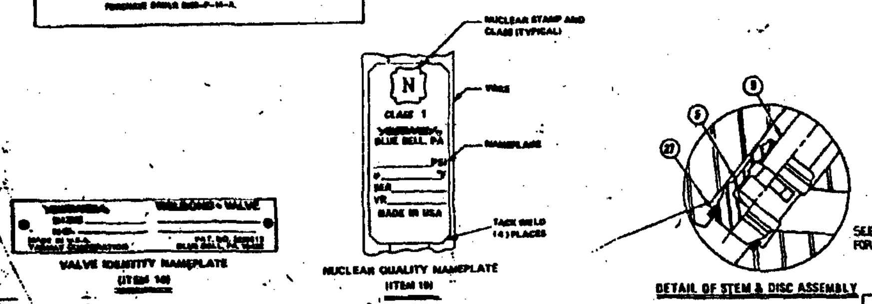
Ref 6.21

ITEM	QTY.	NAME OF PART	MATERIAL SPECIFICATION
1	1	BODY (SEE NOTE 1)	ASME SA182 GRADE F316
2	1	YOKE	ASME SA217 WC9
3	1	GLAND	ASME SA182 GRADE [illegible]
4	1	SPLIT GLAND BUSHING	AISI 304
5	1	DISC (SEE NOTE 1)	AMS 5382 (STELLITE 31) (7a)
7	1	BACK SEAT BUSHING (SEE NOTE 1)	ASME SA479 GRADE [illegible]
8	1	YOKE BUSHING	ASTM B371 ALLOY 694
9	1	STEM	ASME SA564 GRADE 630 ✱
10	4	SOCKET HEAD CAP SCREW	STEEL
11	4	LOCK WASHER	STEEL
12	2	HEX NUT	ASME SA194 GRADE 2H
13	2	GLAND BOLT	ASME SA193 GRADE B7
14	1	YOKE PIN	AISI 420
15	1	GASKET	ASME SB127
16	1 SET	PACKING	JOHN CRANE 187-I
17	1	ACTUATOR ELECTRIC	LIMITORQUE SMB-000
18	1	YARWAY NAMEPLATE	AISI 302
19	1	NUCLEAR NAMEPLATE	AISI 302
20	1	YOKE BUSHING PIN	AISI 420
21	1	PACKING SUPPORT RING	AISI 316
22	1	ADAPTER PLATE	AISI 1018
26	2	WASHER	STEEL
27	1	SEAT (SEE NOTE 4)	AMS 5387 (STELLITE 6)
28	4	SOCKET HEAD CAP SCREW	STEEL
29	4	LOCK WASHER	STEEL

✱ STEM SHOULDER MATERIAL IS AWS-RCoCr-A (STELLITE 6) AS SHOWN. ✱ AMS 5385 (STELLITE 21) IS AN ACCEPTABLE ALTERNATIVE.

NOTE 1: THIS ITEM IS A PRESSURE RETAINING PART.
NOTE 2: VALVE CENTER OF GRAVITY IS COINCIDENT WITH STEM CENTER LINE.
NOTE 3: MINIMUM WALL THICKNESS LISTED IS PER A.S.M.E. BOILER AND PRESSURE VESSEL CODE, SECTION 3.
NOTE 4: SEAT IS VACUUM BRAZED TO BODY.
NOTE 5: HYDROSTATIC SEAT TEST PRESSURE [illegible] PSI. HYDROSTATIC SHELL TEST PRESSURE [illegible] PSI.
NOTE 6: LIMITORQUE ACTUATOR EQUIPPED WITH FOUR (4) TRAIN LIMIT SWITCH ASSEMBLY.
NOTE 7: DIMENSIONS SHOWN ARE FOR LIMITORQUE SMB-000 ACTUATOR WITH A MARATHON NO. 300 FIVE POINT TERMINAL STRIP IN THE LIMIT SWITCH COMPARTMENT.
NOTE 8: APPROXIMATE WEIGHT - [illegible] LBS.
NOTE 9: FLOW COEFFICIENT (Cv) = 40.
NOTE 10: SEAT LEAKAGE TEST SHALL NOT EXCEED [illegible] PER INCH OF NOMINAL VALVE SIZE & DURATION OF TEST TO BE HELD TO 5 MIN.
NOTE 11: NON-DESTRUCTIVE EXAMINATION REQUIRED:-
UT VALVE BODY
LP SOCKET WELD ENDS, BACKSEAT BUSHING AND DISC SEALING SURFACE.
NOTE 12: VALVE DESIGN AND MANUFACTURE SHALL BE IN ACCORDANCE WITH ASME B & P VESSEL CODE, SEC. III, NUCLEAR POWER PLANTS COMPONENT AND BECHTEL PURCHASE ORDER [illegible]-P-14-A.





4-2-81
VENDOR'S DRAWING REVIEW
BY [signature] DATE 4/8/81
BECHTEL

SEE DWG. 013-953913-00 FOR CERTIFICATION DATA

FF-110140 SH1001 REV. 8

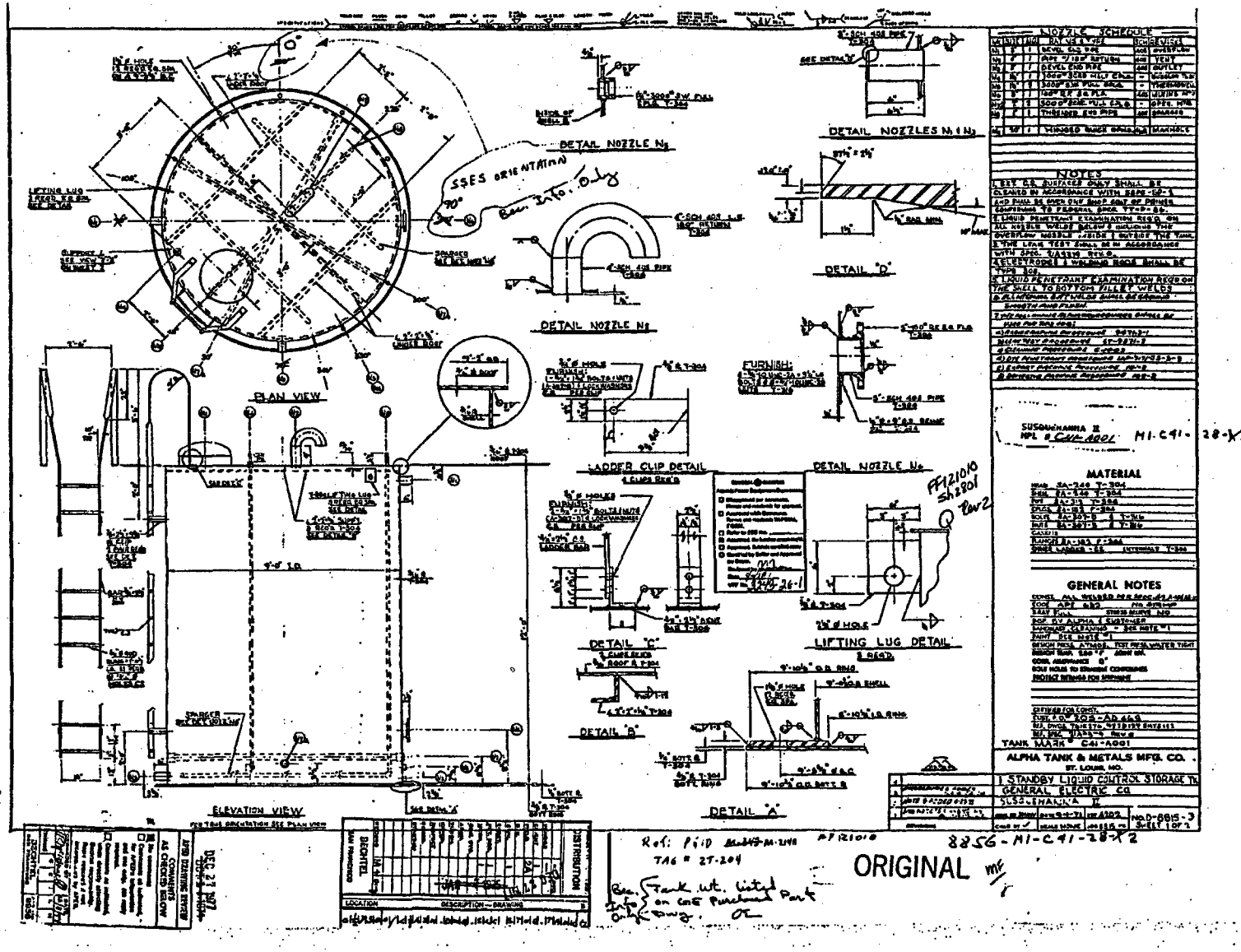
REV	DESCRIPTION	DR	CH		APPROVED	DATE
8	INCORP. DCN 10 (ES-[illegible])	[illegible]	—	[illegible]	[signature]	[illegible]

1-1/2" YARWAY WELBOND VALVE WITH LIMITORQUE ELECTRIC MOTOR ACTUATOR
FIGURE NO. 55618-F316M
STOP-CHECK DESIGN

WFM | SCALE NONE | DATE 12 MAR. 76

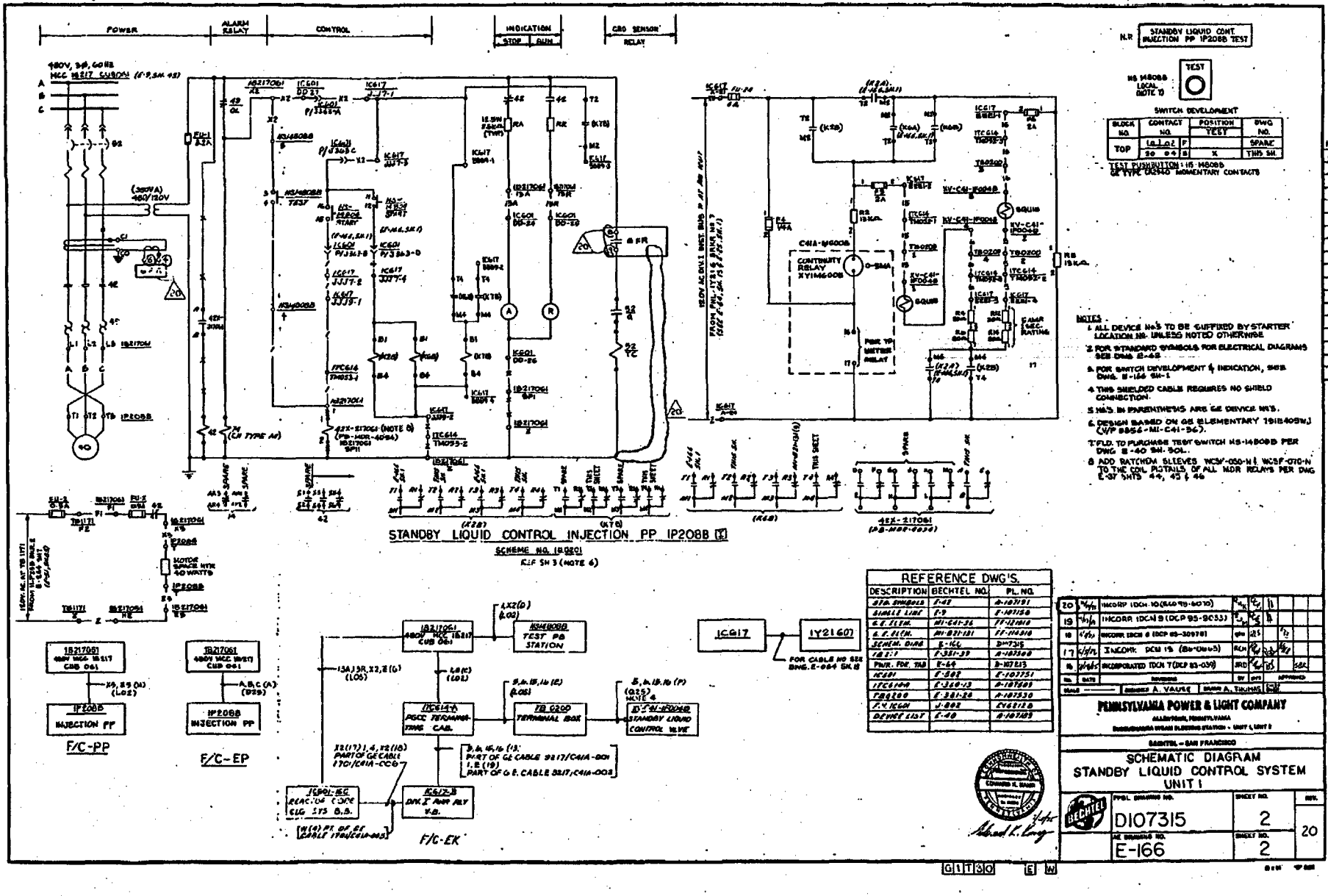
YARWAY CORPORATION BLUE BELL, PA 19422
013 | 845123 | 9

Ref C.22

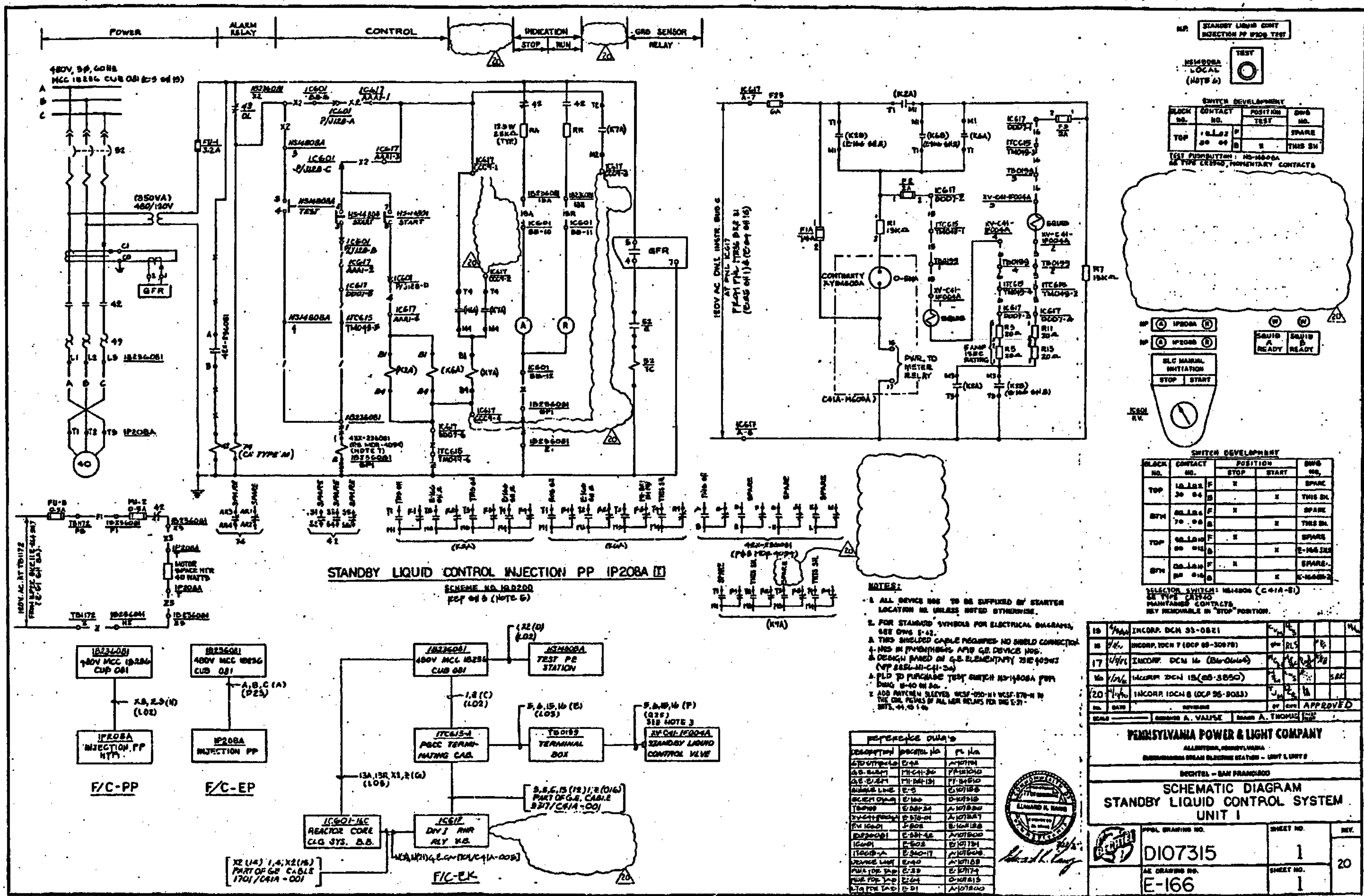


For Information Only

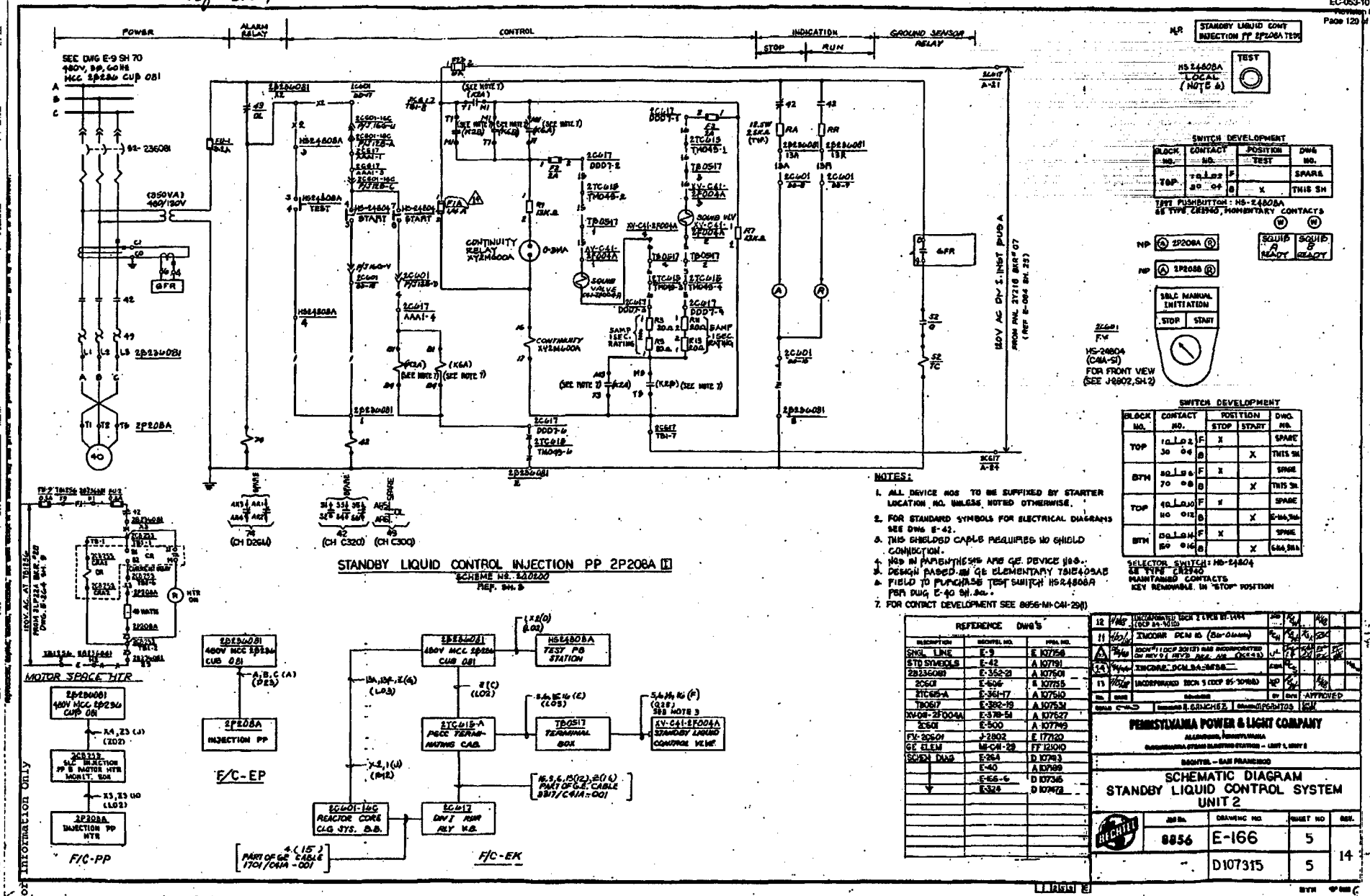
Ref 6.24



Ref 6.24

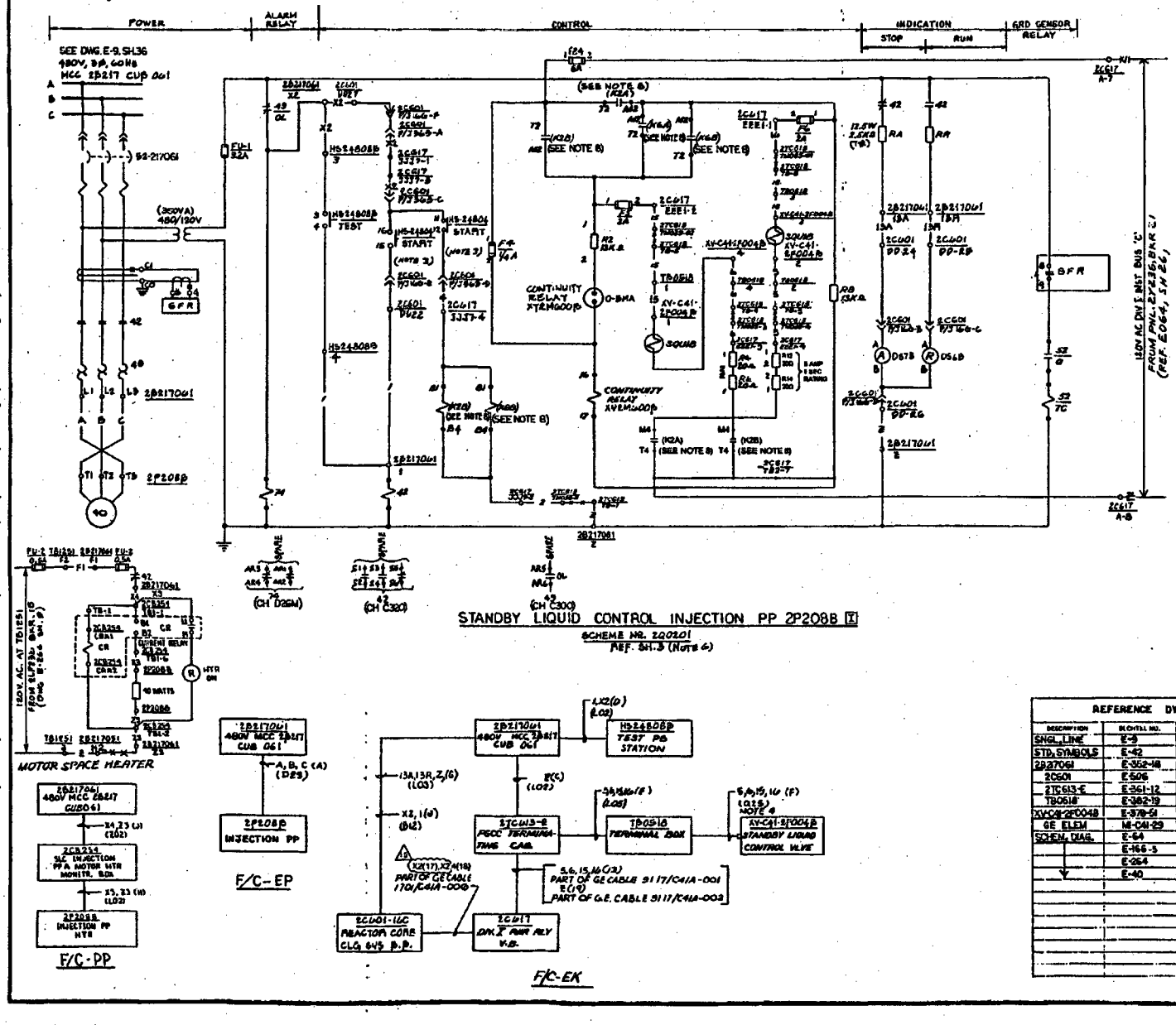


Ref 2.24



Ref 6.24

EC-053-1012
Revision 0
Page 130 of 138



NOTES:

1. ALL DEVICE NO.'S TO BE SUFFIXED BY STARTER LOCATION NO. UNLESS NOTED OTHERWISE.
2. FOR STANDARD SYMBOLS FOR ELECTRICAL DIAGRAMS SEE DWG E-42.
3. FOR SWITCH DEVELOPMENT & INDICATION, SEE DWG E-166, SH.5.
4. THIS SHIELDED CABLE REQUIRES NO SHIELD CONNECTION.
5. NOS IN PARENTHESIS ARE GE DEVICE NOS.
6. DESIGN BASED ON GE ELEMENTARY 7815409AB (WP 8256-MI-C41-23)
7. FIELD TO PURCHASE TEST SWITCH HS24808B PER DWG E-40 SH 3a.
8. FOR CONTACT DEVELOPMENT SEE 8856-MI-C41-2501

REFERENCE DWG'S

DESCRIPTION	ELECTRICAL NO.	MECHANICAL NO.
SNGL. LINE	E-5	E 107158
STD. SYMBOLS	E-42	A 107191
2B217061	E-352-18	A 107501
2C601	E-506	B 107735
2TC613-E	E-361-12	A 107510
TB0618	E-382-19	A 107534
XV-C41-2F004B	E-378-61	A 107627
GE ELEM	MI-C41-29	FF121090
SCHEM. DIAG.	E-64	D 107215
	E-166-3	D 107315
	E-264	D 107413
	E-40	A 107189

REV.	DESCRIPTION	APPROVED
15	ADDED WIRE NUMBERS AND GE L.INC CODES FOR GE CABLE 1701/C41A-006 AS A RESOLUTION TO CVR 333071.	

DRAWING APPROVAL ATTACHED TO MMS MEDIA AS "APPROVAL HISTORY"

DRAWN C.G. | DESIGNED R. SANCHEZ | TRACED M. SANTOS | CHKD

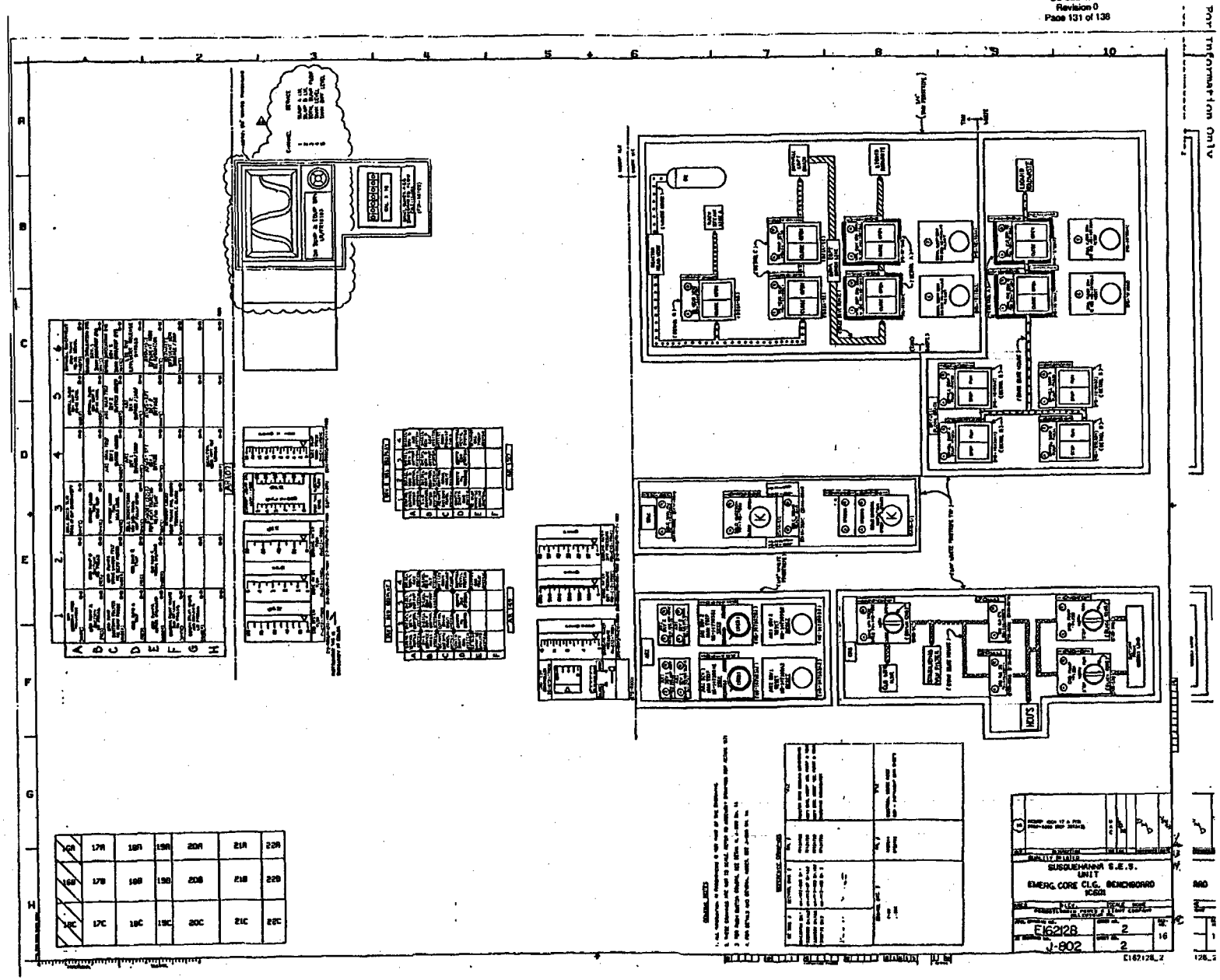
PENNSYLVANIA POWER & LIGHT COMPANY
ALLENTOWN, PENNSYLVANIA
SUSQUEHANNA STEAM ELECTRIC STATION – UNIT 1, UNIT 2

BECHTEL – SAN FRANCISCO

SCHEMATIC DIAGRAM
STANDBY LIQUID CONTROL SYSTEM
UNIT 2

PPL DWG. NO.	SHEET NO.	REV.
D107315	6	15
AE DWG. NO. E-166	SHEET NO. 6	

Ref 6.26



Ref. 6.26

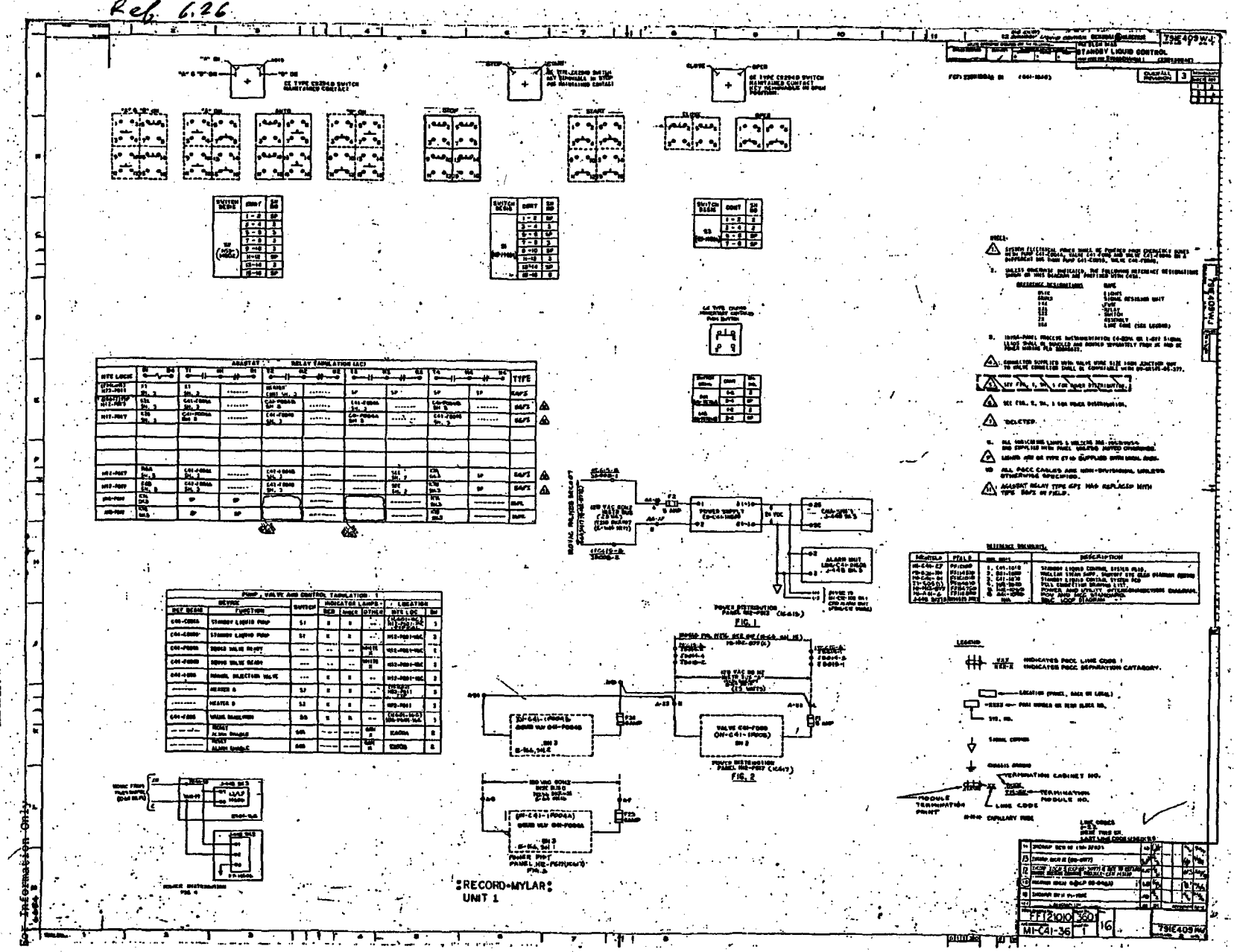
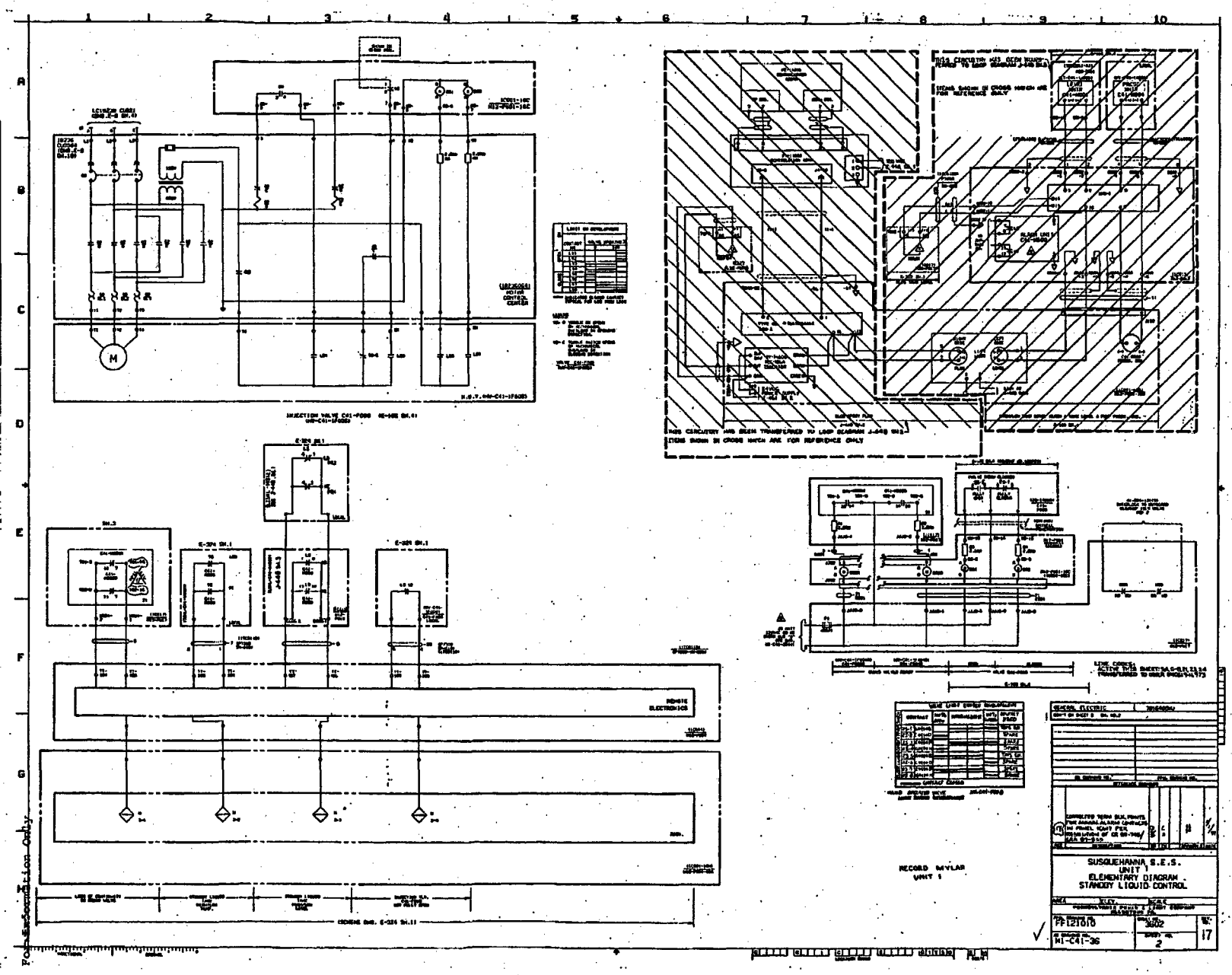
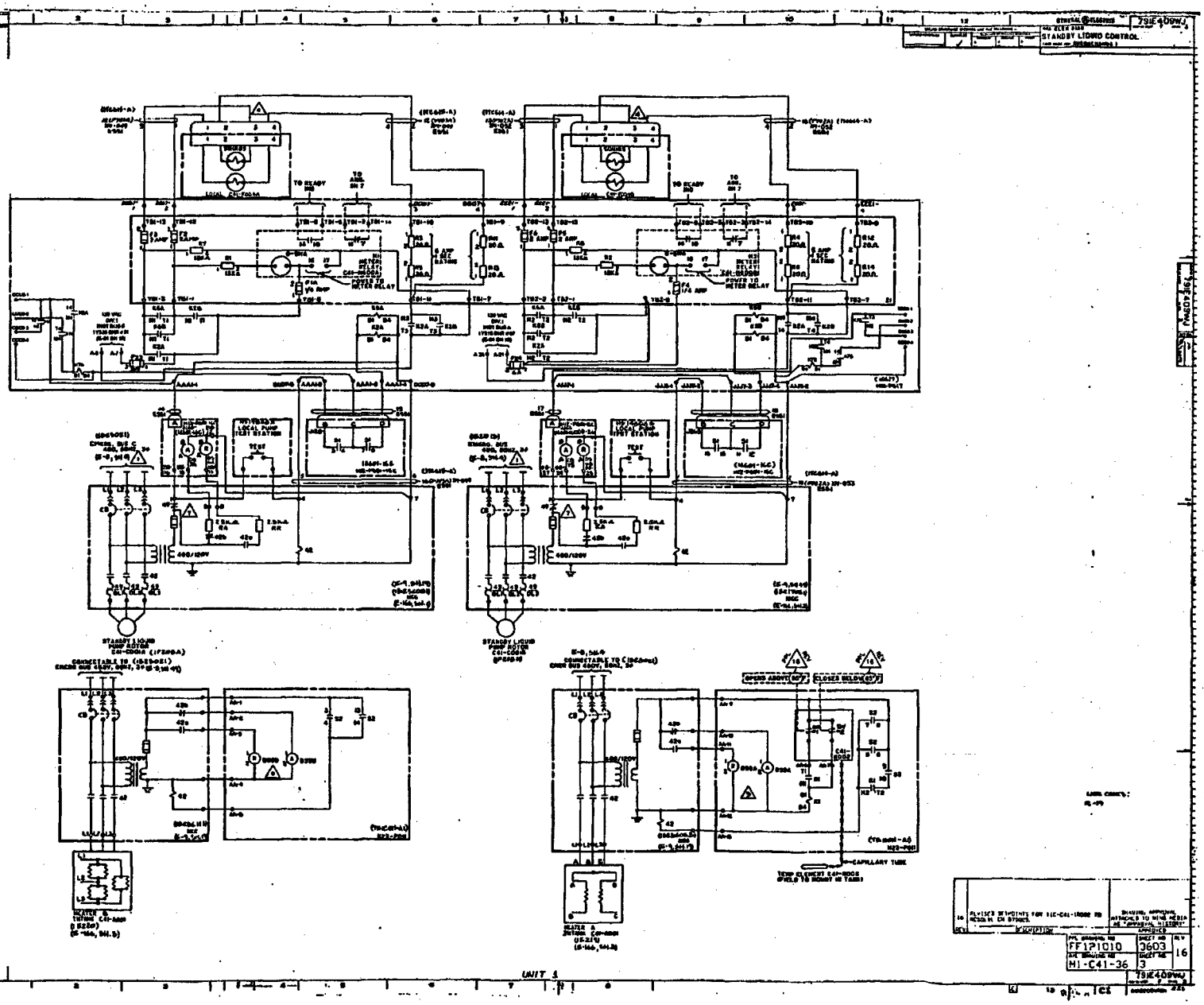


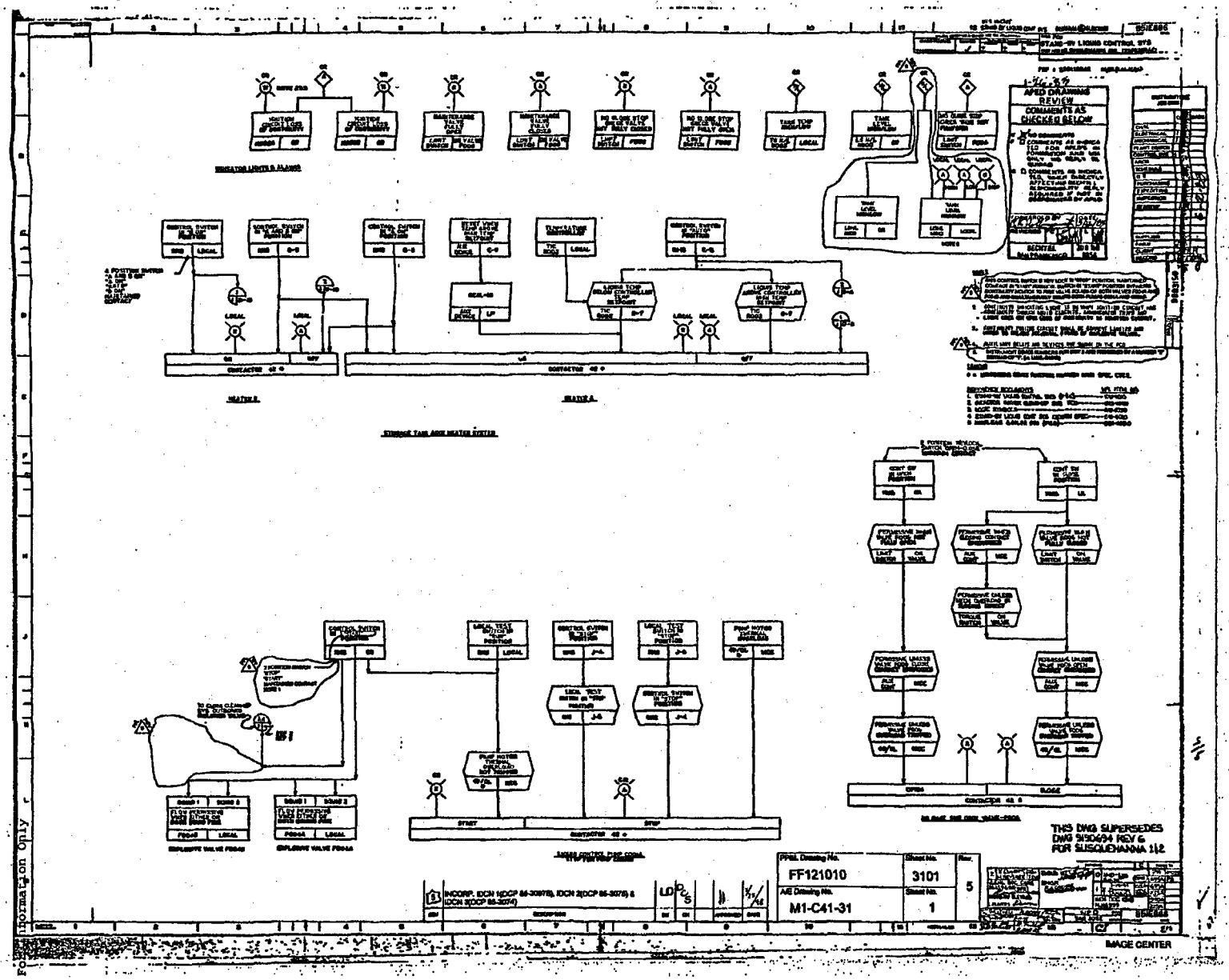
FIG. 1

FIG. 2

RECORD-MYLAR
UNIT 1


SUSQUEHANNA S.E.S.
UNIT 1
ELEMENTARY DIAGRAM
STANDBY LIQUID CONTROL
RECORD MYLAR
UNIT 1
For Construction Only





PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	1 of 3

ATTACHMENT NO. 5

EXCEL Spreadsheet Results

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	2 of 3

RESULTS OF COOLING FOR WATER TEMPERATURE AT 80F AND AMBIENT AT 60F
(VARIABLE film coefficient)

t	T∞	To	To - T∞	(Ts - T∞)^.25	.00169*E4	EXP(-tF4)	Tt
0	60	80	20	2.114743	0.003574	1	80
0.5	60	80	20	2.114743	0.003574	0.998215	79.96429
1	60	80	20	2.113798	0.003572	0.996434	79.92868
1.5	60	80	20	2.112855	0.003571	0.994658	79.89316
2	60	80	20	2.111913	0.003569	0.992887	79.85774
2.5	60	80	20	2.110972	0.003568	0.991121	79.82242
3	60	80	20	2.110033	0.003566	0.989359	79.78718
3.5	60	80	20	2.109094	0.003564	0.987602	79.75204
4	60	80	20	2.108157	0.003563	0.98585	79.717
4.5	60	80	20	2.107222	0.003561	0.984102	79.68205
5	60	80	20	2.106287	0.00356	0.982359	79.64719
5.5	60	80	20	2.105354	0.003558	0.980621	79.61242
6	60	80	20	2.104422	0.003556	0.978887	79.57774
6.5	60	80	20	2.103491	0.003555	0.977158	79.54316
7	60	80	20	2.102561	0.003553	0.975433	79.50867
7.5	60	80	20	2.101633	0.003552	0.973713	79.47427
8	60	80	20	2.100706	0.00355	0.971998	79.43996
8.5	60	80	20	2.09978	0.003549	0.970287	79.40574
9	60	80	20	2.098856	0.003547	0.968581	79.37161
9.5	60	80	20	2.097932	0.003546	0.966879	79.33757
10	60	80	20	2.09701	0.003544	0.965181	79.30362
11	60	80	20	2.096089	0.003542	0.961783	79.23566
12	60	80	20	2.094242	0.003539	0.958418	79.16836
13	60	80	20	2.092407	0.003536	0.95507	79.10141
14	60	80	20	2.090578	0.003533	0.95174	79.03481
15	60	80	20	2.088753	0.00353	0.948428	78.96855
16	60	80	20	2.086933	0.003527	0.945132	78.90264
17	60	80	20	2.085118	0.003524	0.941854	78.83707
18	60	80	20	2.083307	0.003521	0.938592	78.77184
19	60	80	20	2.081502	0.003518	0.935348	78.70695
20	60	80	20	2.0797	0.003515	0.93212	78.6424
21	60	80	20	2.077904	0.003512	0.928909	78.57817
22	60	80	20	2.076112	0.003509	0.925714	78.51428
23	60	80	20	2.074325	0.003506	0.922536	78.45072
24	60	80	20	2.072542	0.003503	0.919374	78.38748

PP&L CALCULATION SHEET

Dept.	PROJECT	Calc. No.	EC-053-1012
Date	Assessment of SBLC	Rev. No.	0
Designed By G.Kowal	System for Suppression		
Checked By	Pool pH Control	Sh. No.	3 of 3

RESULTS OF COOLING FOR WATER TEMPERATURE AT 80F AND AMBIENT AT 60F
(CONSTANT film coefficient)

t	T∞	To	To - T∞	(Ts - T∞)	.04294*E4	EXP(-tF4)	Tt
0	60	80	20	20	0	1	80
0.5	60	80	20	20	0.02147	0.978759	79.57518
1	60	80	20	19.57518	0.04294	0.957969	79.15938
1.5	60	80	20	19.15938	0.06441	0.93762	78.75241
2	60	80	20	18.75241	0.08588	0.917704	78.35409
2.5	60	80	20	18.35409	0.10735	0.898211	77.96422
3	60	80	20	17.96422	0.12882	0.879132	77.58264
3.5	60	80	20	17.58264	0.15029	0.860458	77.20917
4	60	80	20	17.20917	0.17176	0.842181	76.84363
4.5	60	80	20	16.84363	0.19323	0.824292	76.48585
5	60	80	20	16.48585	0.2147	0.806783	76.13567
5.5	60	80	20	16.13567	0.23617	0.789646	75.79293
6	60	80	20	15.79293	0.25764	0.772873	75.45747
6.5	60	80	20	15.45747	0.27911	0.756457	75.12913
7	60	80	20	15.12913	0.30058	0.740389	74.80777
7.5	60	80	20	14.80777	0.32205	0.724662	74.49324
8	60	80	20	14.49324	0.34352	0.709269	74.18539
8.5	60	80	20	14.18539	0.36499	0.694204	73.88407
9	60	80	20	13.88407	0.38646	0.679458	73.58916
9.5	60	80	20	13.58916	0.40793	0.665025	73.30051
10	60	80	20	13.30051	0.4294	0.6509	73.01799
11	60	80	20	13.01799	0.47234	0.623541	72.47083
12	60	80	20	12.47083	0.51528	0.597333	71.94667
13	60	80	20	11.94667	0.55822	0.572227	71.44453
14	60	80	20	11.44453	0.60116	0.548175	70.96351
15	60	80	20	10.96351	0.6441	0.525135	70.5027
16	60	80	20	10.5027	0.68704	0.503063	70.06126
17	60	80	20	10.06126	0.72998	0.481919	69.63837
18	60	80	20	9.638373	0.77292	0.461663	69.23326
19	60	80	20	9.233261	0.81586	0.442259	68.84516
20	60	80	20	8.845176	0.8588	0.42367	68.4734
21	60	80	20	8.473404	0.90174	0.405863	68.11726
22	60	80	20	8.117257	0.94468	0.388804	67.77608
23	60	80	20	7.776079	0.98762	0.372462	67.44924
24	60	80	20	7.449242	1.03056	0.356807	67.13614

Ce x Re = 23.29119

1/CeRe = 0.042935

23.29119