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10 CFR 50.90

W3F1-2017-0018

February 27, 2017

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Supplement to License Amendment Request to Revise Technical Specification 3/4.3.2 to Relocate Surveillance Frequency Requirements for Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the Surveillance Frequency Control Program (SFCP)
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

References:

1. W3F1-2016-0055, License Amendment Request to Revise Technical Specification 3/4.3.2 to Relocate Surveillance Frequency Requirements for Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the Surveillance Frequency Control Program (SFCP), September 1, 2016 [ADAMS Accession Number ML16245A359].

2. Waterford Steam Electric Station, Unit 3 - Request for Additional Information Regarding License Amendment Request to Revise Technical Specification 3/4.3.2 to Relocate Surveillance Frequency Requirements for Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the Surveillance Frequency Control Program (SFCP) (CAC No. MF8325), December 27, 2016 [ADAMS Accession Number ML16354A10].

3. W3F1-2017-0010, Response to NRC Request for Additional Information Regarding License Amendment Request to Revise Technical Specification 3/4.3.2 to Relocate Surveillance Frequency Requirements for Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the Surveillance Frequency Control Program (SFCP) [ADAMS Accession Number ML17032A516].

Dear Sir or Madam:

By letter dated September 1, 2016 (Reference 1), Entergy Operations, Inc. (Entergy) requested an amendment to revise Technical Specification 3/4.3.2 for Waterford 3. Per Reference 3, Entergy provided response to the NRC Request for Additional Information (Reference 2) on January 26, 2017.

On February 16, 2017, a teleconference was conducted between members of Entergy and the NRC staff to discuss supplemental information needed to complete the review. The questions posed by the NRC during this teleconference were provided in a memorandum dated February 21, 2017. This supplement to the license amendment provides Entergy's responses to those questions.

This letter contains no new commitments.

If you have any questions or require additional information, please contact the Regulatory Assurance Manager, John P. Jarrell, at (504) 739-6685.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 27, 2017.

Sincerely,

Donald R Bunton FOR MIKE CHISUM WF3 VP

MRC/JPJ/mmz

Attachments:
1. Further Clarifications Pertaining to Entergy Response of January 26, 2017 Regarding License Amendment Request to Revise Technical Specification 3/4.3.2 to Relocate Surveillance Frequency Requirements for Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the Surveillance Frequency Control Program (SFCP).
2. Control Wiring Diagrams and Schematics Related to ESFAS SPV Trip Hardening Modification.

cc: Mr. Kriss Kennedy, Regional Administrator
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Attachment 1

to

W3F1-2017-0018

**Further Clarifications Pertaining to Entergy Response of January 26, 2017
Regarding License Amendment Request to
Relocate Surveillance Frequency Requirements for
Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the
Surveillance Frequency Control Program (SFCP)**

Waterford 3 Steam Electric Station
Further Clarifications Pertaining to Entergy Response of January 26, 2017
Regarding License Amendment Request to
Relocate Surveillance Frequency Requirements for
Engineered Safety Features Actuation System (ESFAS) Subgroup Relays to the
Surveillance Frequency Control Program (SFCP)

Question 1

In order to assess compliance to IEEE 279, Clause 4.10, the staff requests that the licensee explain operation of the MSIVs and the CSAS valves. The explanation should describe the total number of affected valves, the total number of solenoid valves per affected valve, the arrangement of the hydraulic dump piping/tubing to dump the hydraulic fluid indicating the operation of the solenoid valves, and the total number and combinations of solenoid valves required to actuate each of the affected valves. Please indicate the nomenclature of the valves corresponding to the schematic sketches included within the LAR and the January 26, 2017, response.

Entergy Response to Question 1

Schematics and Control Wiring Diagrams (CWDs) for the components described below are provided in Attachment 2. Draft CWDs showing the ESFAS Single Point Vulnerability (SPV) Modification for Train A are also provided. The drafts are still in draft/revision mode and therefore final review and incorporation has not been completed.

The response to this question provides a clarification to the answer provided for RAI-1 in letter W3F1-2017-0010. In that letter, Attachment 1, page 2 of 11, 2nd paragraph, the statement "redundant MSIV solenoid dump valves (SV-1A and SV-2A)" is made. The word "redundant" should be removed. On page 3 of 11, 2nd paragraph, the statement, "at least one solenoid dump valve SV-1A or SV-2A" is made. The word "or" should be replaced with "and." On page 4 of 11, 2nd paragraph, the statement "Energization of one of the dump valves has the direct effect of draining the hydraulic fluid" is made. The words "one of" should be removed.

ESFAS Relays Identified as SPV

ESFAS Train A K305 currently closes Main Steam Isolation Valve (MSIV) A (MS-124A), Main Feedwater Isolation Valve (MFIV) A (FW-184A), Main Feedwater Regulating Valve (MFRV) A (FW-173A), and Startup Feedwater Regulating Valve (SUFWRV) A (FW-166A). After the modification, both ESFAS Train A K305 and K105 actuation are required for the valve actuations.

ESFAS Train B K305 currently closes MSIV A (MS-124A), MFIV A (FW-184A), MFRV A (FW-173A), and SUFRV A (FW-166A). There is no modification planned during this refueling outage. The removal of the Single Point Vulnerability associated with Main Steam Isolation Signal (MSIS) and (Containment Spray Actuation Signal) CSAS in ESFAS Train B should be corrected at a later date. After the Train B modification, both ESFAS Train B K305 and K105 actuation are required for the valve actuations.

ESFAS Train A K313 currently closes MSIV B (MS-124B), MFIV B (FW-184B), MFRV B (FW-173B), and SUFWRV A (FW-166B). After the modification, both ESFAS Train A K313 and K105 actuation are required for the valve actuations.

ESFAS Train B K313 currently closes MSIV B (MS-124B), MFIV B (FW-184B), MFRV B (FW-173B), and SUFWRV B (FW-166B). There is no modification planned during this refueling outage. The removal of the Single Point Vulnerability associated with MSIS and CSAS in ESFAS Train B should be corrected at a later date. After the modification, both ESFAS Train B K313 and K105 actuation are required for the valve actuations.

ESFAS Train A K114 currently closes Containment Component (CCW) Return Header Inside Containment Isolation, CC-710 (Penetration 24). After the modification, both ESFAS Train A K114 and K306 actuation are required for the valve actuation.

ESFAS Train B K114 currently closes Containment CCW Return Header Outside Containment Isolation, CC-713 (Penetration 24). There is no modification planned during this refueling outage. The removal of the Single Point Vulnerability associated with MSIS and CSAS in ESFAS Train B should be corrected at a later date. After the modification, both ESFAS Train B K114 and K306 actuation are required for the valve actuation.

MSIVs (MS-124A and MS-124B)

Each MSIV is a vertical type gate valve with a parallel-split valve disc and a cam expanding mechanism to seat the disc. The seats are pressed into the valve body to ensure flexibility and allow for differential thermal growth. As an isolation valve, it is designed for fast closing and tight shutoff. Each valve is operated by a cylinder with nitrogen pressure in the upper portion and hydraulic fluid in the lower portion. Energy required to close the valve is contained in the form of compressed nitrogen. This acts in the same manner as a mechanical spring with the added advantage of being able to monitor spring integrity, energy, and functionality. No energy exterior to the actuator is required to affect the valve closure. The nitrogen is not consumed or vented from the actuator at any time. The MSIV is held open by the hydraulic pressure. To prevent damage to the actuator piston to stem connection, the MSIV must not be opened under hydraulic pressure with less than the minimum design basis nitrogen pressure (closed) in the upper portion of the cylinder. The impact of the piston being separated from the stem would be the inability to open the MSIV. Closure time of the MSIV is dependent on nitrogen pressure, the differential pressure across the valve disc, and flow resistance through the dump valves.

The MSIV can perform closure during a single active failure. Redundant dump valves, controlling the hydraulic fluid for each MSIV, are provided so that the MSIV can remain operable with the failure of any one dump valve. Each dump valve is powered from a redundant dc power supply and has two integral solenoids both of which must be energized to open and drain hydraulic fluid from the lower portion of the MSIV cylinder. Redundant MSISs are provided to the dump valves of each MSIV. The opening and closing of the redundant solenoid valves can be tested during normal plant operation.

As seen on CWD-1646, ESFAS Train A K305 deenergizes (opens) SV-1A, MS-ISV-0124-A1, and SV-2A, MS-ISV-0124-A3. Both of these solenoid valves are required to open to align the two poppet valves which make up Dump Valve A. CWD-1647 shows ESFAS Train B K305 deenergizes (opens) SV-1B, MS-ISV-0124-A2, and SV-2B, MS-ISV-0124-A4. Both of these

solenoid valves are required to open to align the two poppet valves which make up Dump Valve B. See SD-MS-15, Figure 15 which uses Emdrac 5817-10438 as a reference. Emdrac 5817-10438 is listed as proprietary information.

MFIVs (FW-184A and FW-184B)

The MFIVs are controlled by hydraulic actuators. These actuators utilize a hydraulic/pneumatic control system with accumulators in conjunction with 3-way SOVs and 4-way hydraulic valves to control hydraulic pressure within the actuator and thus open and close the valves. The valve accumulators are precharged with nitrogen and then hydraulic fluid is added to achieve the desired operating pressure. Eleven gallon accumulators with integral piston stop tubes have been installed to provide a controlled volume in which to measure the nitrogen pressure. Both accumulators are required to actuate during FWLB/MSLB conditions for rapid valve closure.

The 4-way hydraulic valves which control the flowpath of hydraulic fluid within the actuator assembly are air operated. Solenoid operated valves control the air to the hydraulic 4-way valves, to direct hydraulic fluid flow. The MFIVs are designed to fail-as-is on a loss of electrical power or air supply. Therefore, air accumulators are installed to ensure valve closure after a loss of instrument air. These accumulators are approximately 0.045 cubic feet each and have an allowable leakage rate of 13.33 psi per hour to ensure the valves can be closed within 1.5 hours from accident initiation.

The 4-way hydraulic valves are designated as M, M1, N and N1. The M and M1 valves are used to control the valve direction of motion (open or close). N and N1 valves align or block the accumulators. Each of the 4-way hydraulic valves has 2 solenoid valves for a total of 8 solenoid valves. The M and N valves' solenoids are powered from the same side as the MFIV designator (MFIV A M and N solenoid valves powered from A side) and M1 and N1 are powered from the opposite side (MFIV A M1 and N1 solenoid valves powered from the B side). All of the valves have to be operable for the MFIV to be operable due to both accumulators are required for rapid closure. During testing, only one accumulator is used to protect the MFIVs. During the normal open alignment, the N and N1 valves are aligned such that the accumulators are ported to the hydraulic system so that minimum valve motion is needed to align the accumulators to the top of the MFIV actuator piston and close the valve.

FW-184A and FW-184B				
Vendor #	FW-184A UNID	FW-184B UNID	Open Solenoid	Close Solenoid
M	FW ISV0184A5	FW ISV0184B5	B	A
M1	FW ISV0184A8	FW ISV0184B8	B1	A1
N	FW ISV0184A6	FW ISV0184B6	D (Align)	C (Block)
N1	FW ISV0184A7	FW ISV0184B7	D1 (Align)	C1 (Block)
A	FW ISV0184AA2	FW ISV0184BB2		
A1	FW ISV0184AB2	FW ISV0184BA2		
B	FW ISV0184AA1	FW ISV0184BB1		
B1	FW ISV0184AB1	FW ISV0184BA1		
C	FW ISV0184AA3	FW ISV0184BB3		
C1	FW ISV0184AB3	FW ISV0184BA3		
D	FW ISV0184AA4	FW ISV0184BB4		
D1	FW ISV0184AB4	FW ISV0184BA4		

MFRVs (FW-173A and FW-173B)

The MFRVs are required to pass a design flow rate of 18500 gpm to the steam generators. These valves modulate according to system demand. Their failure position is As-Is. They are closed on receipt of an MSIS signal (safety related function) and steam generator Hi Level as a backup to the MFIVs. The valves are air operated and are equipped with an instrument air accumulator, designed to supply air pressure to the actuators after a loss of instrument air. The accumulators are approximately 10565 cubic feet, are sized for 1.5 hours of supply pressure, and have an allowable leakage rate of 23.7 psig per hour.

The valves can be operated manually by means of a Manual/Automatic control station (M/A station) (FW-IHIC1111 for valve FW-173A and FW-IHIC1121 for valve FW-173B). These M/A stations are located in the Control Room on CP-1. Manual control can also be assumed by the operator through the Master Control Station, FW-IFIC1111 or FW-IFIC1121, which is located in the Control Room on CP-1. Automatic control is used during normal operations by the valve position program of each of the Feedwater Control System (FWCS) as a function of the system FLOW DEMAND signal. The valves also close on a steam generator Hi Level and/or a MSIS which is part of ESFAS.

The MFRVs are designed to close in less than 6 seconds (including one second for instrument response) in the event of a MSIS, as a backup to the MFIVs (FW-184A(B)). Two in-series solenoid valves (one Channel A and one Channel B) are energized to close and vent the air from the E/P transducer to the valve positioner so that a zero signal is sent to the positioner. This results in shifting the ‘air volume booster/quick exhaust’ valve. Air is admitted to the top of the piston (closing side) and quick exhausted from the bottom (opening side) and therefore closes the MFRV. An accumulator in each pneumatic system is provided to ensure sufficient air pressure is available to close the valve.

SUFWRVs (FW-166A and FW-166B)

The SUFWRVs are required to pass a design flow rate of 2300 gpm to the steam generators. These valves modulate according to system demand. Their failure position is Closed. They are closed on receipt of an MSIS signal (safety related function) and steam generator Hi Level as a backup to the MFIVs. The valves are air operated.

The valves can be operated manually by means of a Manual/Automatic control station (M/A station) (FW-IHIC1105 for valve FW-166A and FW-IHIC1106 for valve FW-166B). These M/A stations are located in the Control Room on CP-1. Manual control can also be assumed by the operator through the Master Control Station, FW-IFIC1111 or FW-IFIC1121, which is located in the Control Room on CP-1. Automatic control is used during normal operations by the valve position program of each of the FWCS as a function of the system FLOW DEMAND signal. The valves also close on a steam generator Hi Level and/or a MSIS which is part of ESFAS.

The SUFWRVs automatically close in less than 6 seconds (including one second for instrument response) following a MSIS, regardless of controller status. The valves can be isolated by closing FW-163A(B) and FW-169A(B).

CC-710, CC-713, and CC-641

These Butterfly isolation valves fail open to protect against inadvertent damage to the RCPs. The Butterfly isolation valves are equipped with an air accumulator to provide closure capability. The Butterfly valves have manual override capability from the main control room. CSAS is considered a containment isolation signal for the purpose of valve actuation mode.

As seen on CWD-846, ESFAS Train A K114 energizes solenoid CC ISV0710 to close CC-710. ESFAS Train B K114 energizes solenoid CC ISV713 to close CC-713, the outside valve of this containment penetration. CC-641 is also actuated to close by ESFAS Train B K114, which is the CCW to Containment Outside Containment Isolation.

Question 2

In Attachment 2 to the licensee response dated January 26, 2017 (ADAMS Accession No. ML17026A370), Entergy included the "Generic Diagram of System Configuration After Change" which shows that a test switch is available for each relay (i.e. relays K105 and K305). Can the test switches for individual relays be used for testing? If not please explain why not. The license amendment has addressed the single point vulnerability. However the proposed modification has two contacts in series that are needed to actuate the solenoid valve and dump the hydraulic fluid to affected valve when needed. The staff is concerned that if one of the contacts is not adequately tested and fails open, the associated solenoid valve will not actuate and completion of the safety function could be impacted, depending on the overall design. Please explain how the reliability of the safety function is not adversely affected as a result of this modification that adds a second relay contact in the circuit to operate the solenoid valves. This information is required to assess compliance to GDC 20, Protection System Functions, and GDC 21, Protection System Reliability and Testability.

Entergy Response to Question 2

Existing Test Switches

The existing design includes a Test Panel for manually testing the relays. The four existing test switches provide for selection of any single ESFAS subgroup relay for deenergization (testing) by means of a series of four rotary switches (SS-2, SS-3, SS-4, and SS-5) interconnected such that only one position on one switch is effective at a given time. Depressing an "Initiate Actuation" pushbutton (SS-1) on the Test Panel will then energize a single test relay. The normally closed contact of the test relay is in series with a single ESFAS subgroup relay coil. The normally closed contact of the test relay opens and deenergizes the ESFAS subgroup relay coil.

ESFAS	Test Relay	Associated Subgroup Relay
MSIS	K605	K305
	K613	K313
	K805	K105
CSAS	K814	K114
	K606	K306

Test Switch Modification (Permissive Enable Test Switch SS-6)

Modifications to the test circuit must be made in order to fully test the permissive function (achieve full actuation of the end device). As stated in the response to RAI-2 in W3F1-2017-0010, a new switch will be added during the trip hardening modification to provide a "gang operated" function to achieve full actuation of the end device. This is a Permissive Enable Test Switch which is used for MSIS And CSAS Permissive Enable testing. This switch includes 5 positions: "K305/K105," "OFF," "K313/K105," "OFF," and "K114/K306."

MSIS Testing

The three positions used in MSIS testing are designated "K305/K105", "OFF", and "K313/K105." When the permissive test switch is in the "OFF" position, simultaneous actuation of the Primary relay (K305 or K313) and the Permissive relay (K105) will not occur. Thus, with the switch in the "OFF" position, it is possible to test K305 only (SS-4 Position 33), K313 only (SS-4 Position 36), or the Permissive K105 only (SS-4 Position 32). The "Initiate Actuation" pushbutton must also be depressed.

In order to actuate both the Primary relay K305 and the Permissive relay K105, the Permissive Test Switch (SS-6) is placed in position "K305/K105"and the appropriate position is selected on SS-4. For example, simultaneous actuation of K305 and K105 (full component actuation) can be performed by placing SS-4 in Position 32 (K105 Test), moving the Permissive test switch from the "OFF" position to the "K305/K105" Position, then depressing the Initiate Actuate Pushbutton. It is possible to achieve the same end by placing SS-4 in Position 33 (K305 Test), moving the SS-6 Permissive switch from the "OFF" position to the "K305/K105 Position," then depressing the "Initiate Actuate" pushbutton. Simultaneous actuation of K313 and K105 (full component actuation) can be similarly tested in two ways: 1) Placing SS-4 in Position 32 (K105 Test), moving the Permissive test switch SS-6 from the "OFF" position to the "K313/K105" Position, then depressing the "Initiate Actuate" Pushbutton; or, 2) Placing SS-4 in Position 36 (K313 Test), moving the SS-6 Permissive Test Switch from the "OFF" position to the "K313/K105 Position," then depressing the "Initiate Actuate" pushbutton.

CSAS Testing

The two positions used for CSAS Permissive testing are designated "K114/K306" and "OFF." In order to de-energize both the Primary (K114) and the Permissive relay (K306) when K114 is selected for testing with the rotary switches on the test panel (SS-5, Position 50), the Permissive Test Switch SS-6 will be placed in the "K114/K306" position. The "Initiate Actuate" pushbutton must be depressed. De-energizing both the primary and permissive relay in this manner will result in actuation of CC-710 (Train A) or CC-713 and CC-641 (Train B) from the CSAS relay. When it is desired to test only the Permissive relay (K306), the Permissive relay will be selected on the rotary test switches (SS-5, Position 45), the Permissive Test Switch SS-6 will be placed in the "OFF" position, and the "Initiate Actuate" pushbutton depressed. Testing of the Primary relay (K114) only will require selecting the K114 position (SS-5 Position 50), placing the Permissive Test Switch in the "OFF" position, and depressing the "Initiate Actuate" pushbutton. In this manner, the permissive will not actuate.

Test Relays

The test relays that are shown on Attachment 2, page 2 of 7 of W3F1-2017-0010 are the test relays that are actuated by both the existing test switches and the new test switch. As described above, these relays are used in conjunction with the SS-6 Permissive Test Switch for testing component actuation of the MSIS or the CSAS. In addition, these same test relays can be used to actuate an individual primary or permissive relay if the SS-6 Permissive Test Switch is placed in the “OFF” position. However, as stated in W3F1-2017-0010 RAI-1, this test will only de-energize one relay, either the Primary or the Permissive, and will not result in the actuation of the associated end device. Therefore, this single relay test does not constitute testing of the “actuation device” or “actuated equipment” as defined by RG 1.22.

Reliability of the Safety Function

Trip hardening is a term to define a method of diminishing the likelihood of an inadvertent component actuation caused by single point vulnerability. The use of K105 and K306 as Permissive relays in the MSIS and CSAS actuation functions for these critical components will diminish the likelihood of inadvertent component actuation caused by a single failure (e.g. loss of ESFAS power supply pair, Component Actuation (Subgroup) Relay failure, ESFAS trip leg power supply circuit breaker opening, a short across the subgroup relays) within the Auxiliary Relay Cabinet (ARC) while having an insignificant impact on failure to actuate on demand.

Implementation of this change reduces the likelihood of certain accidents previously evaluated in the UFSAR. In that regard, implementation of this change is not adverse. However, to achieve the trip hardening objective, an additional trip relay is added to the trip path. The additional trip relay must also respond to the initiating signal to achieve a successful ESFAS response. The additional component, like the existing components in the trip path, can fail to actuate when needed. The additional components are designed to the same standards and safety classifications are the existing components.

The change scope is limited to that described above. There are no changes to any other ESFAS component actuation relays, the ESFAS actuation logic, or upstream Plant Protection System (PPS) logic. With the exception of the trip hardening of the three cited relays to improve reliability, ESFAS functionality remains identical to that described in the FSAR. Since all hardware required for safety is located in the Train A and Train B ARCs, there is no change to the qualification envelope or environment. Nor are any devices being used for a purpose they are not qualified to perform. From an actuation logic perspective, the permissive relay coil is connected in parallel with the existing primary relay coil, therefore, there is no net change to response time from either the MSIS function or CSAS functions as defined in the Waterford Technical Requirements Manual Table 3.3-5, ESFAS Response Times.

Additional immunity from inadvertent actuation will be provided by selecting the main and permissive relays from different actuation groups. That is, the existing "primary" actuation relay will be on one of the two ESFAS trip legs in each cabinet, and the newly designated "permissive" relay will be powered from the other trip leg, as defined in the discussion below. This provides immunity from power supply pair failure, power supply breaker failure, or shorting across the relay coils on either trip leg within the ARC.

Although no new failure modes are introduced, the addition of a permissive relay arranged in an "and" configuration with a primary relay such that where formerly only one relay was required to actuate now requires two relays to actuate needs to address probability of failure to actuate (fail "on"). In addition, this change could potentially contribute to an increase in the consequences of an accident is by preventing or postponing legitimate ESFAS actuation, thus preventing accident mitigation.

The existing configuration requires only one actuation relay per train respond to its respective ESF actuation signal. The one actuation relay is actuated by one specific ESF trip leg. Failure of the specific trip leg would result in failure of the actuation relay to respond. The proposed activity adds a permissive relay to the second of two available trip paths. The resulting configuration requires successful actuation of both trip paths and subsequent actuation of both primary and permissive subgroup relays. However, successful actuation of the Safety Injection System, Recirculation System, Containment Spray System (with exception of the valves addressed in this evaluation), and the Containment Isolation System, respectively, require exactly the same scheme: the successful actuation of BOTH trip paths and their associated subgroup relays for successful system actuation. In that regard, this modification does not increase the probability of actuation failure of affected MSIS or CSAS components any more than the probability of actuation failure of SIS, RAS, CSAS, or CIS components as already described in the UFSAR. Nor does it change the failure modes of affected MSIS or CSAS components as already described in the UFSAR. There is no change to the failure modes as described in the UFSAR and there is no increase in malfunction of the trip paths described in the UFSAR. Legitimate ESFAS actuation in response to events crediting the ESFAS is therefore unchanged.

This proposed modification has no effect on response time, since the permissive relays are electrically in parallel with the primary relays from an actuation logic perspective.

Question 3

Please respond to the following items to assess compliance with GDC 20 and GDC 21:

a. Please provide a summary of the results of the previous tests on Main Steam Isolation Valves (MSIVs) and Containment Spray Actuation Signal (CSAS) valves. The summary should address the total number of tests, number of tests that were not successful on the first try, and the reason for each test failure.

Entergy Response to Question 3.a.

Surveillance Procedure OP-903-095, “ESFAS Subgroup Relay Test – Shutdown,” provides instructions to perform "not-testable-at-power" portions of the ESFAS subgroup relay functional test as required by TS Surveillance Requirement (SR) 4.3.2.1.

Surveillance Procedure OP-903-033, “Cold Shutdown IST Valve Tests,” provides instructions to perform cold shutdown testing of specific valves listed in the WF3 Inservice Testing Plan, which is referenced by the WF3 Inservice Testing Program, and those valves specified in TS SR 4.6.3.3 which are not tested quarterly. This procedure performs the

ESFAS time response testing of MS-124A(B) and FW-184A(B) in accordance with TS SR 4.3.2.3 and 4.7.1.6.

Surveillance Procedure OP-903-036, “Containment Spray Actuation Signal Test,” provides instructions to perform Engineered Safety Features Response Time testing for components actuated by CSAS.

Surveillance Procedure OP-903-092, “Main Steam Isolation Actuation Signal Test,” Provides instruction to perform portions of Engineered Safety Features response time testing for components actuated by MSIS. This tests valves FW-173A(B), FW-166A(B).

A search of the PM history for Waterford 3 was performed. The PM performed per OP-903-095 has been credited a total of 37 times. The PM performed per OP-903-033 has been credited a total of 32 times. The PM performed per OP-903-036 has been credited a total of 19 times (combined for Trains A and B) and once for Train A and once for Train B (following the surveillance task being broken into separate trains). The PM performed per OP-903-092 has been credited a total of 19 times. Since these procedures actuate some of the same valves, they are sometimes performed together and therefore the valves may only be stroked once to satisfy the requirement of each procedure.

It is unknown exactly how many times the ESFAS relays have been actuated for testing in the history of Waterford 3. It is possible that relays/valves have been actuated several times during the performance of a single PM when as-found testing of the valve is necessary. The numbers above provide minimums for each procedure.

The history search revealed that for relays K305, K313, K114, there have been no failures during testing. K105 and K306 have not previously been tested because these relays are categorized as spares.

b. Please explain how the operation of each relay contact is verified as part of testing. If the contact operation is not verified, then how is a latent failure identified?

Entergy Response to Question 3.b.

When performing the surveillance procedure, the appropriate Test Module test switch and permissive switches are aligned to test the desired relay and the “Initiate Actuation” pushbutton is depressed and held. The indications for the components that are required to be actuated per the respective test are observed and results documented in the procedure. Therefore, the operation of the used relay contact is verified by verification that the associated end device has actuated.

c. Has there been any inadvertent actuation of the MSIVs or CSAS due to single point vulnerability in the design? If so, please provide a brief reason for failure and associated corrective action.

Entergy Response to Question 3.c.

There is no history of inadvertent actuation of the components (MS-124, FW-184, FW-173, FW-166, CC-710, CC-713, or CC-641) associated with the relays (K114, K305, and K313) that are being trip hardened by the ESFAS SPV Trip Hardening Modification due to SPV.

Based on a work order search of Waterford 3 issues with MDR 7000 series relays over the last 27 years, 9 applicable failures were identified (none of the failures were associated with the relays listed in the previous paragraph). Of those nine failures, no repeating failure has been observed on the same component. The last failure occurred 11 years ago on 02/01/2006 when ESFERELK108A, CHARGING PUMP A SIAS ACTUATION RELAY, failed to actuate while attempting an ESFAS start of charging pump A during performance of OP-903-094, ESFAS SUBGROUP RELAY TEST – OPERATING. The K108A relay was replaced and it retested satisfactorily.

The conditions identified were:

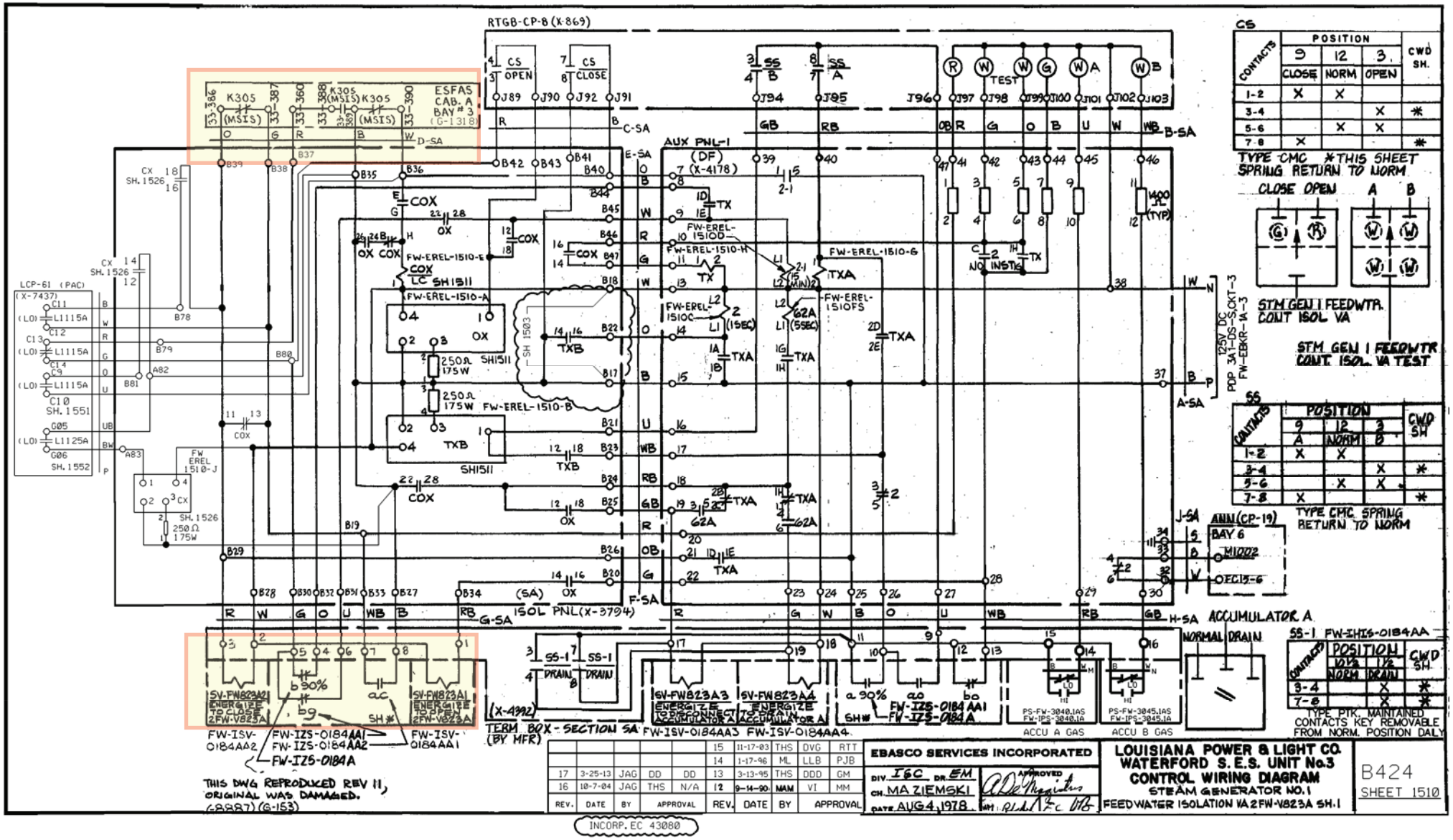
Date	Work Order	Original Work Document	Relay	Issue	Associated System	Resolution and Cause (if determined)
06/27/1989	50023850	MAI 263549	ESFERELK310B	Relay is apparently binding up and will not actuate.	EFW/BD	Replaced Relay
12/09/1991	50037764	MAI 278363	ESFERELK112B	Relay did not drop out. (Terry Turbine Steam Supply Valve EFAS-2).	EFW/MS	Replaced Relay
10/30/1992	50042416	MAI 283242	ESFERELK311B	Replace Relay		Relay Replaced. It was determined to be bad.
10/28/1995	50057508	MAI 299736	ESFERELK203B	Relay failed to actuate. (H2 Analyzer Isolation).	CIAS	Found J-3 in Bay#5 Connector being stressed. Installed strain relief and reworked connector. Cause of failure - aging.
06/13/1997	50667269	MAI 310604	ESFERELK305A	Relay failed to deenergize and actuate FW-173A and FW-166A.	FW	Troubleshot and FOR DC Power Tag OOS.
04/15/1998	50071626	MAI 315612	ESFERELK108B	Charging Pump B , Relay contacts.	CVC	Replaced Relay
04/27/1999	50078465	MAI 403920	ESFERELK101B	CFC B and D failed to start. Relay failed to operate.	CFC	Replaced Relay
10/08/2002	21258	MAI 439979	ESFERELK110A	Contact 4E-4F did not change state during OP-903-068, Section 7.3) (LPSI A).	SI	Replaced Relay
02/01/2006	60213	WR 45676	ESFERELK108A	K108A failed to actuate while attempting to perform OP-903-094, Section 7.4 (Charging Pump A).	CVC	Replaced Relay

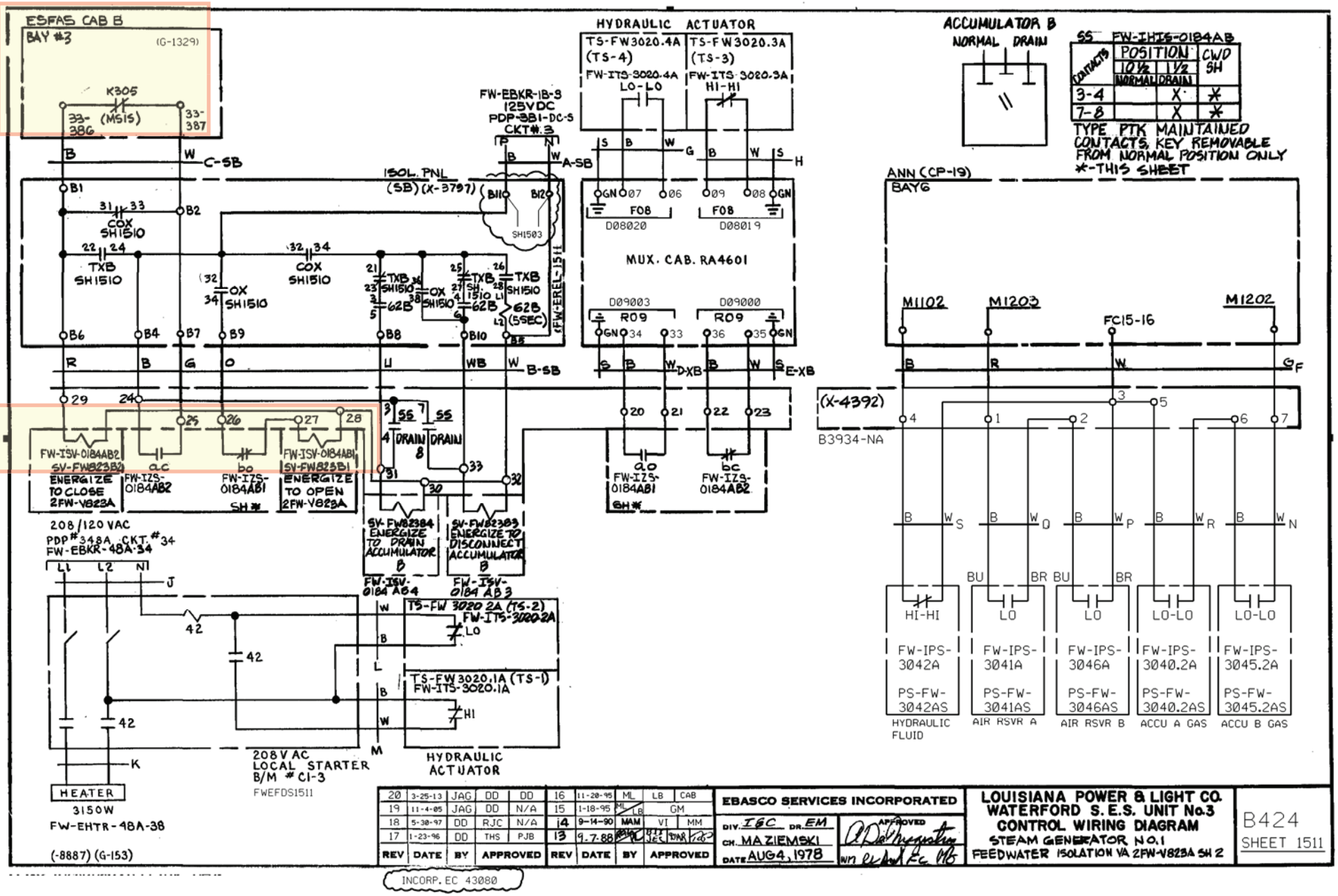
Attachment 2

to

W3F1-2017-0018

Control Wiring Diagrams and Schematics Related to ESFAS SPV Trip Hardening Modification


RTGB-CP-8 (X-869)
AUX PNL-1 (DF) (X-4178)
LCP-61 (PAC) (X-7437)
ESFAS CAB. A BAY # 3 (G-1318)
K305 (MSIS)
K305 (MSIS)
K305 (MSIS)
CS
POSITION
CLOSE
NORM
OPEN
CWD SH.
TYPE CMC *THIS SHEET SPRING RETURN TO NORM
CLOSE OPEN A B
STM GEN 1 FEEDWTR. CONT ISOL VA
STM GEN 1 FEEDWTR CONT. ISOL. VA TEST
SS
TYPE CMC SPRING RETURN TO NORM
ANN(CP-19) BAY 6
SS-1 FW-IHIS-0184AA
TYPE PTK. MAINTAINED CONTACTS KEY REMOVABLE FROM NORM. POSITION DAILY
ISOL PNL(X-3794)
ACCUMULATOR A
NORMAL DRAIN
TERM BOX - SECTION 5A (BY MFR)
FW-ISV-0184AA2
FW-IZS-0184AA1
FW-IZS-0184AA2
FW-IZS-0184A
FW-ISV-0184AA1
THIS DWG REPRODUCED REV 11, ORIGINAL WAS DAMAGED. (8887) (G-153)
EBASCO SERVICES INCORPORATED
LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO.1
FEEDWATER ISOLATION VA 2FW-V823A SH.1
B424
SHEET 1510
INCORP. EC 43080

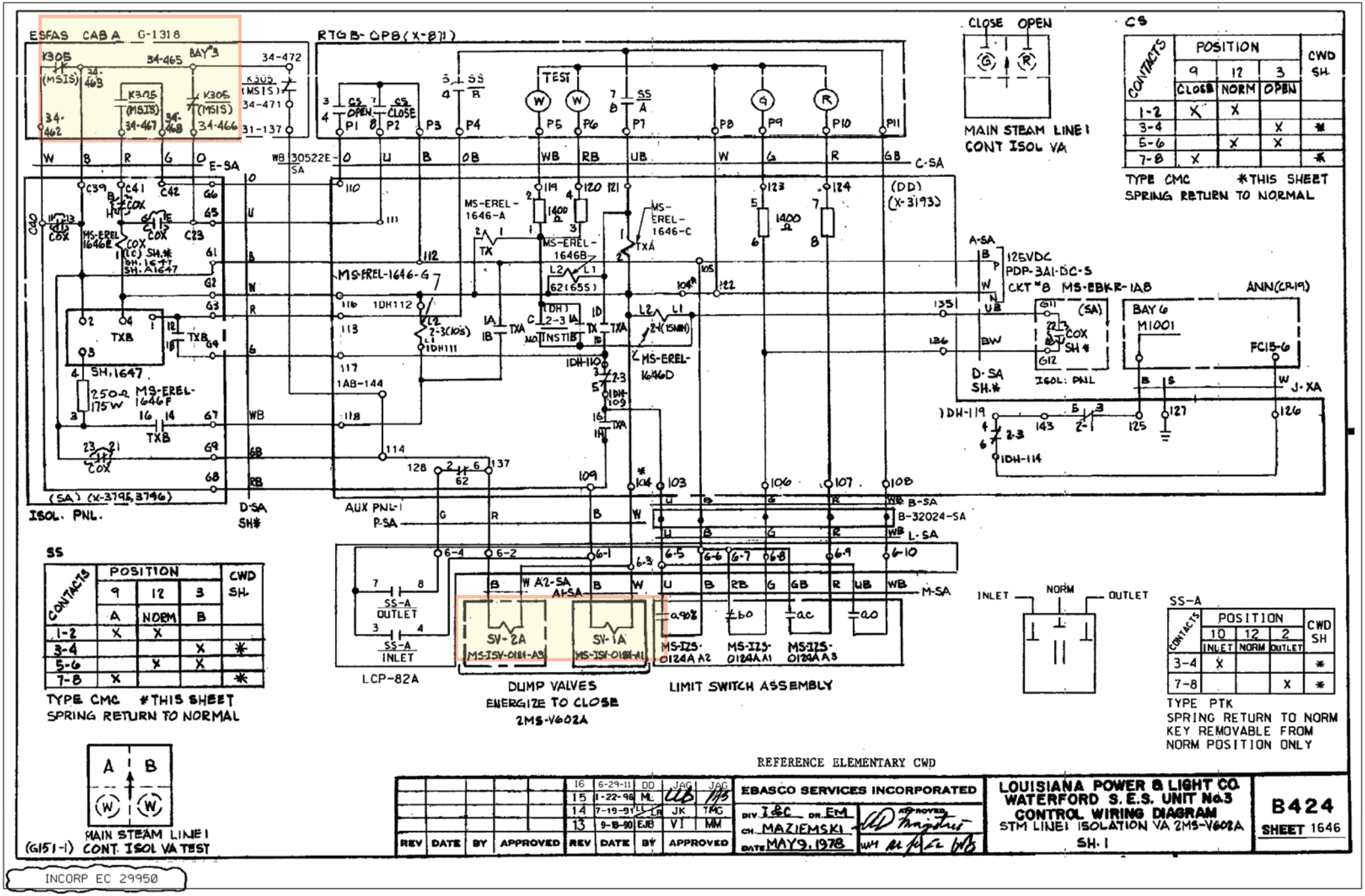


REV	DATE	BY	APPROVED
20	3-25-13	JAG	DD DD
19	11-4-05	JAG	DD N/A
18	5-30-97	DD	RJC N/A
17	1-23-96	DD	THS PJB
16	11-20-95	ML	LB CAB
15	1-18-95	ML LB	GM
14	9-14-90	MAM	VI MM
13	9-7-88		

EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MA ZIEMSKI
DATE AUG 4, 1978
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO.1
FEEDWATER ISOLATION VA 2FW-V823A SH 2

B424
SHEET 1511



CS

CONTACTS	POSITION 9	12	3	CWD SH.
	CLOSE	NORM	OPEN	
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

TYPE CMC *THIS SHEET
SPRING RETURN TO NORMAL

SS

CONTACTS	POSITION 9	12	3	CWD SH.
	A	NORM	B	
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

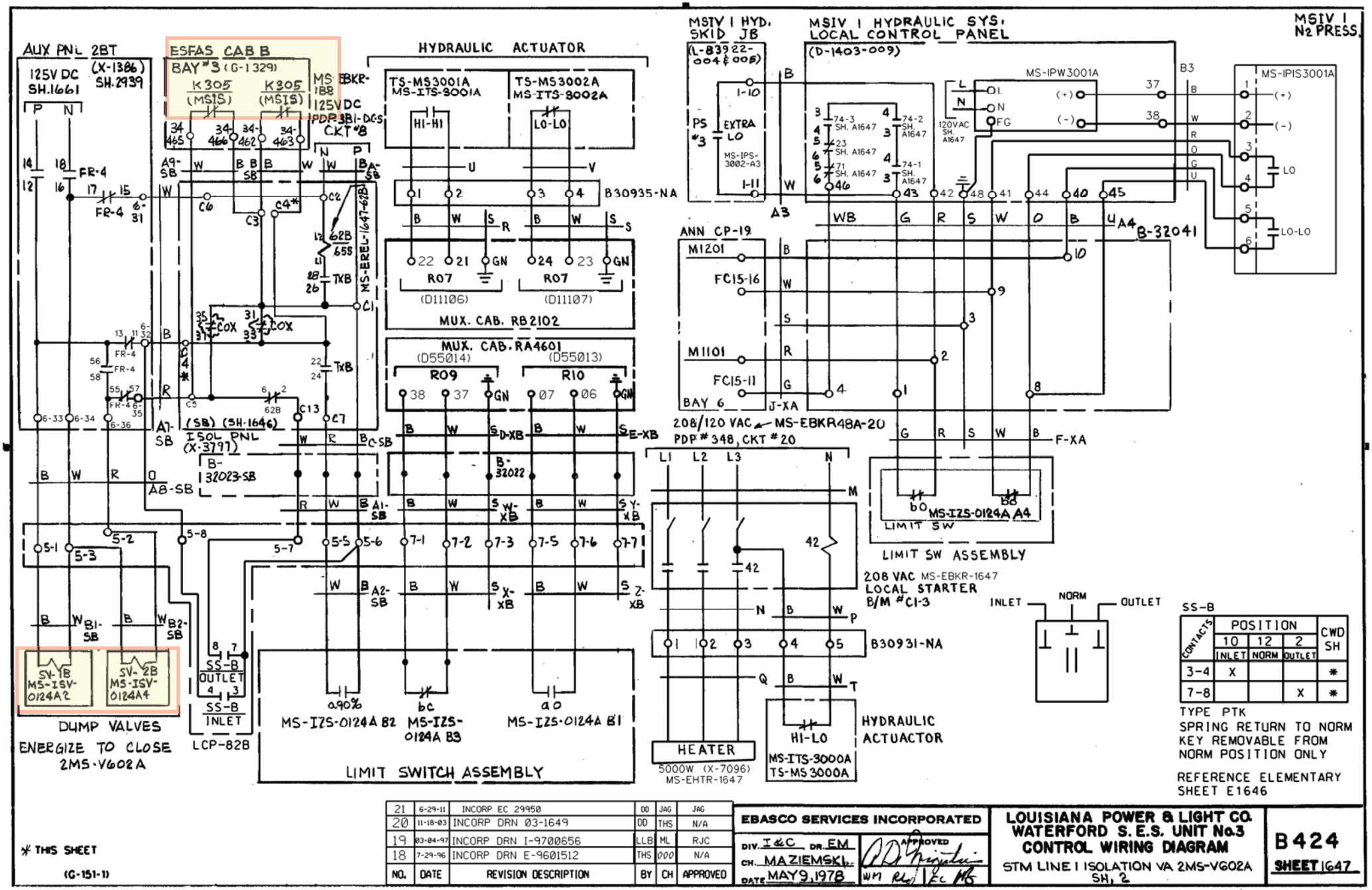
TYPE CMC *THIS SHEET
SPRING RETURN TO NORMAL

SS-A

CONTACTS	POSITION 10 INLET	12 NORM	2 OUTLET	CWD SH
3-4	X			*
7-8			X	*

TYPE PTK
SPRING RETURN TO NORM
KEY REMOVABLE FROM
NORM POSITION ONLY

REV	DATE	BY	APPROVED
16	6-29-11	DD	JAG
15	1-22-98	ML	JAG
14	7-19-91	LL LR	JK TMG
13	9-18-90	EJB	VT MM



NO.	DATE	REVISION DESCRIPTION	BY	CH	APPROVED
21	6-29-11	INCORP EC 29950	DD	JAG	JAG
20	11-18-03	INCORP DRN 03-1649	DD	THS	N/A
19	03-04-97	INCORP DRN I-9700656	LLB	ML	RJC
18	7-29-96	INCORP DRN E-9601512	THS	DDD	N/A

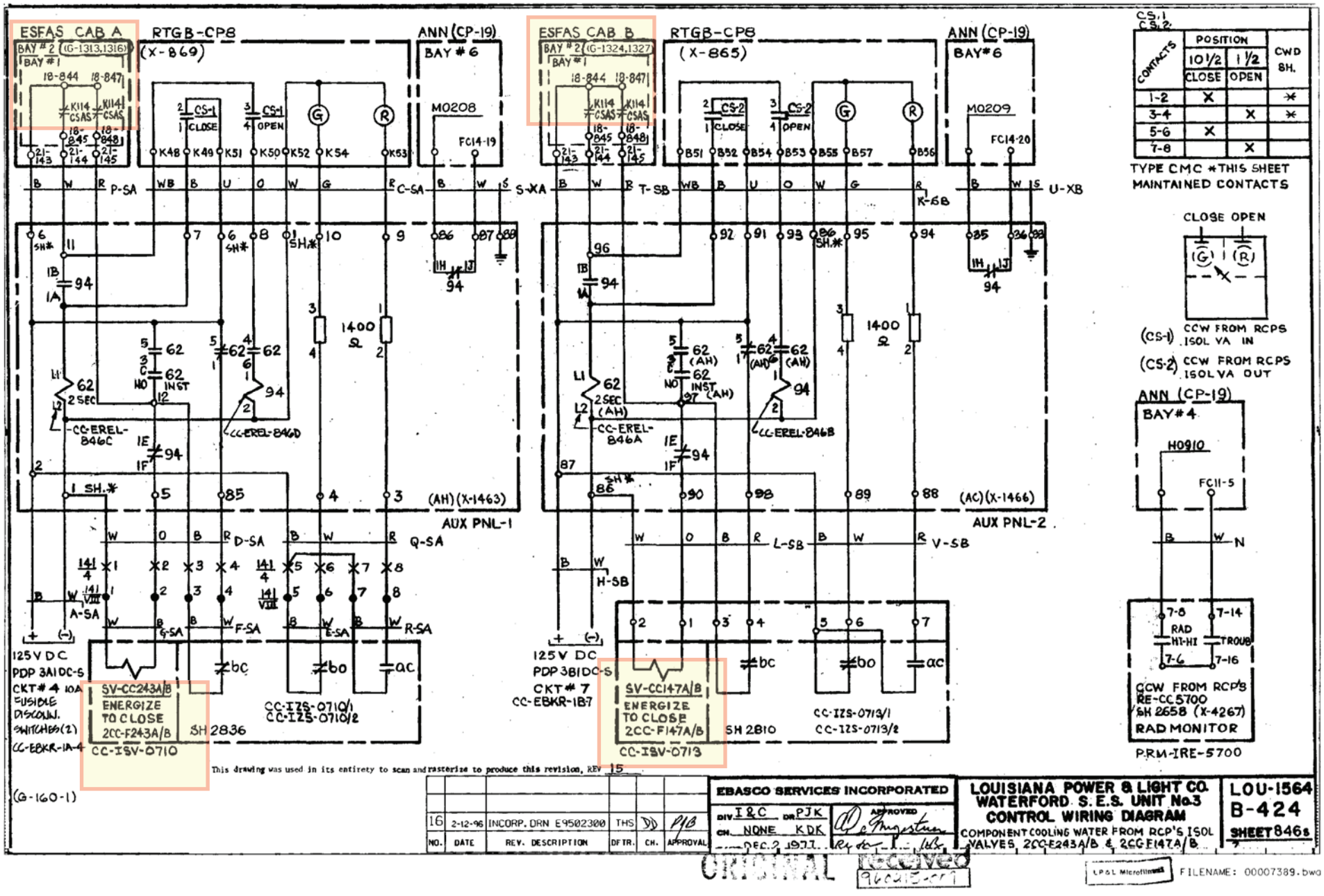
EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MAZIEMSKI
DATE MAY 9, 1978
APPROVED

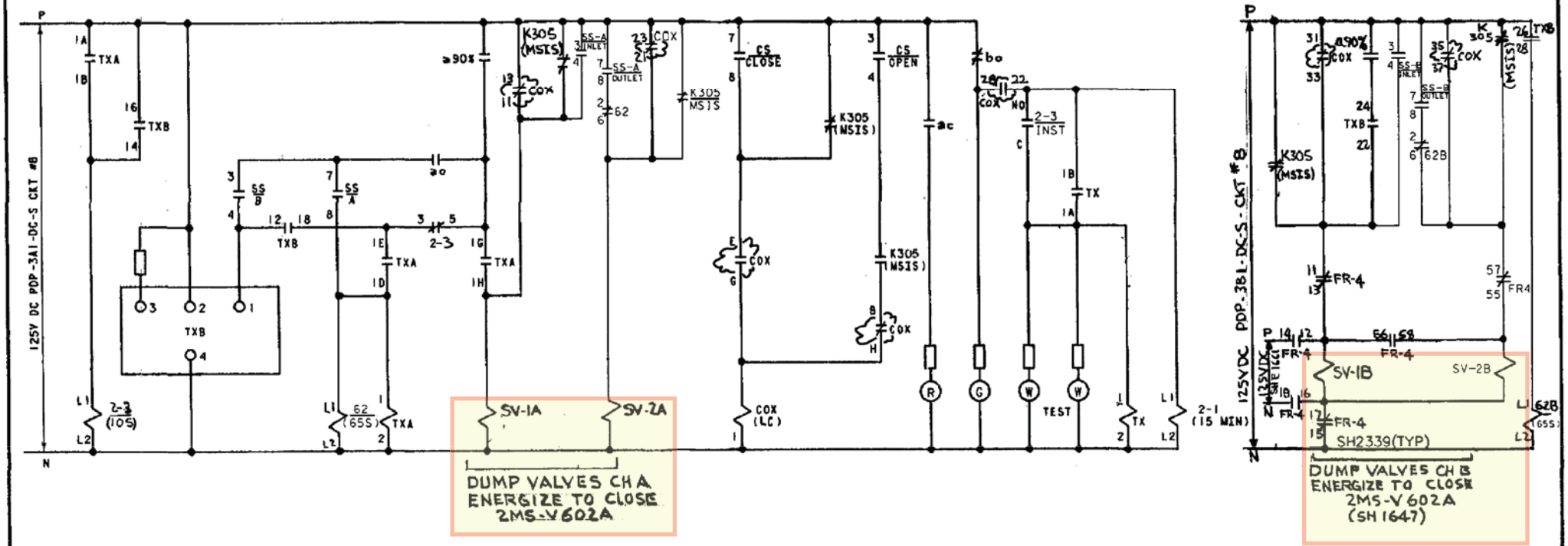
LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STM LINE I ISOLATION VA 2MS-V602A
SH. 2

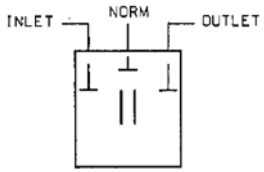
B424
SHEET 1647

* THIS SHEET

(G-151-1)


ESFAS CAB A
RTGB-CP8
(X-869)
ANN (CP-19)
BAY # 6
ESFAS CAB B
RTGB-CP8
(X-865)
ANN (CP-19)
BAY# 6
CS.1
CS.2
CONTACTS
POSITION
10 1/2 CLOSE
1 1/2 OPEN
CWD 8H.
1-2
3-4
5-6
7-8
TYPE CMC *THIS SHEET
MAINTAINED CONTACTS
CLOSE OPEN
(CS-1) CCW FROM RCPS ISOL VA IN
(CS-2) CCW FROM RCPS ISOL VA OUT
ANN (CP-19)
BAY# 4
H0910
FC11-5
CCW FROM RCP'S
RE-CC5700
SH 2658 (X-4267)
RAD MONITOR
PRM-IRE-5700
AUX PNL-1
AUX PNL-2
125V DC
PDP 3A1DC-S
CKT# 4 10A
FUSIBLE
DISCONN.
SWITCHES(2)
CC-EBKR-1A-4
125V DC
PDP 3B1DC-S
CKT# 7
CC-EBKR-1B7
SV-CC243A/B
ENERGIZE
TO CLOSE
2CC-F243A/B
CC-ISV-0710
SV-CC147A/B
ENERGIZE
TO CLOSE
2CC-F147A/B
CC-ISV-0713
CC-IZS-0710/1
CC-IZS-0710/2
CC-IZS-0713/1
CC-IZS-0713/2
SH 2836
SH 2810
(G-160-1)
This drawing was used in its entirety to scan and rasterize to produce this revision, REV 15
EBASCO SERVICES INCORPORATED
LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
COMPONENT COOLING WATER FROM RCP'S ISOL VALVES, 2CC-E243A/B & 2CC-E147A/B
LOU-1564
B-424
SHEET 846s
16 2-12-96 INCORP. DRN E9502300 THS DD P/B
NO. DATE REV. DESCRIPTION DFTR. CH. APPROVAL
ORIGINAL
Received
FILENAME: 00007389.bwa



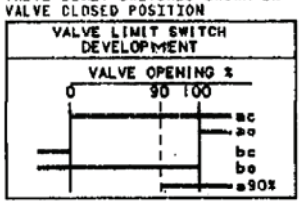


SS-A, SS-B

CONTACTS	POSITION 10 INLET	POSITION 12 NORM	POSITION 2 OUTLET	CWD SH
3-4	X			*
7-8			X	*

TYPE PTK
SPRING RETURN TO NORM
KEY REMOVABLE FROM
NORM POSITION ONLY

NOTE
VALVE LIMIT SWITCHES SHOWN IN VALVE CLOSED POSITION



SS(RTGB)

CONTACTS	POSITION 9 A	POSITION 12 NORM	POSITION 3 B	CWD SH.
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

SPRING RETURN TO NORMAL

CS(RTGB)

CONTACTS	POSITION 9 CLOSE	POSITION 12 NORM	POSITION 3 OPEN	CWD SH.
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

SPRING RETURN TO NORMAL
* -THIS SHEET

REV	DATE	CH	APPROVED
6	6-29-11	DD	JAG JAG
5	7-22-91	LL	DK DMG
4	10/31/90	EJB	VI MM
3	11-17-89	DMS	MZM
2	7-12-88		
1	9-7-85	RE	WH

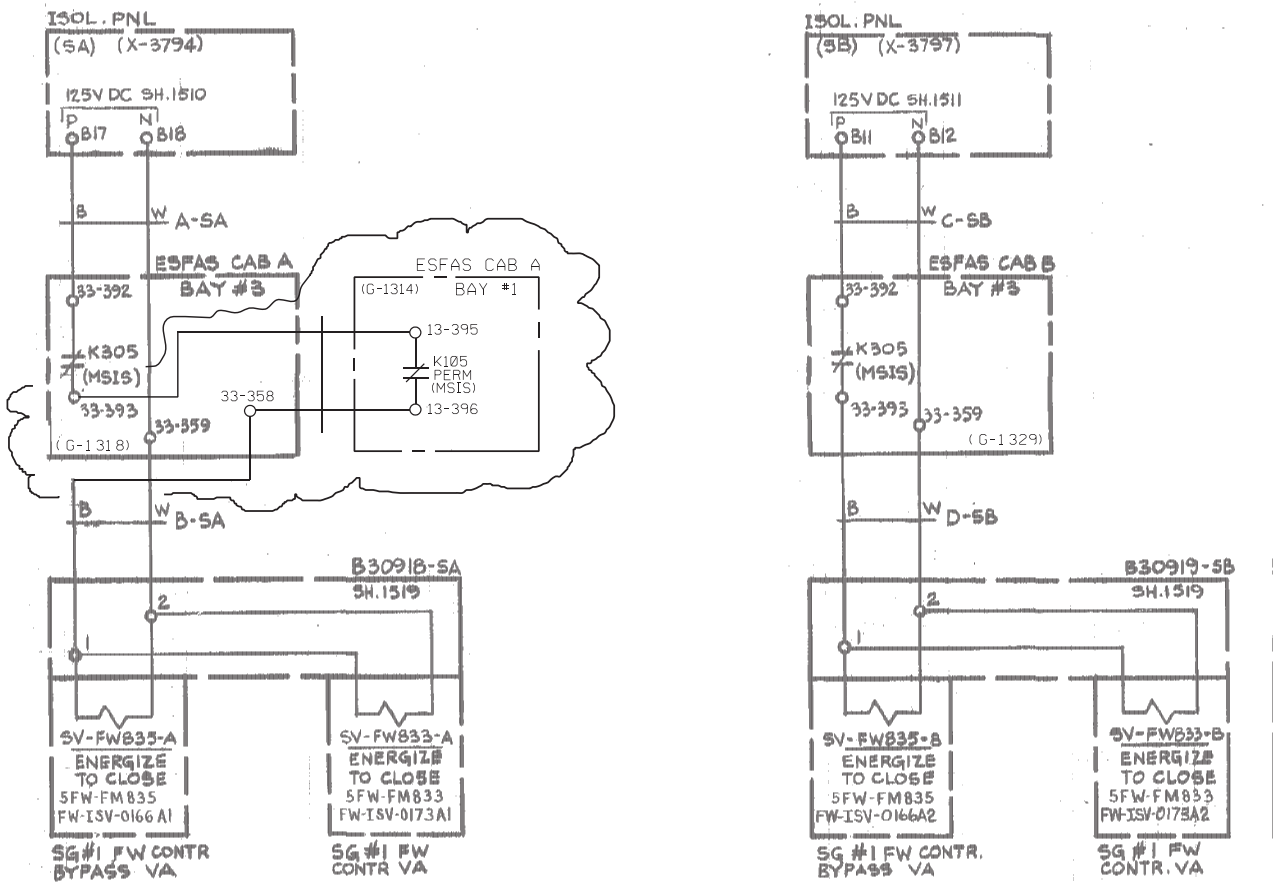
EBASCO SERVICES INCORPORATED
DIV I & C DR DS
CH S. LIN
DATE SEPT. 3, 1980
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT NO.3
CONTROL WIRING DIAGRAM
STM LINE I ISOLATION VA 2MS-V602A

B424
SHEET E1646

(G-151-1)

INCORP EC 29950



WORK THIS DRAWING IN CONJUNCTION WITH EC44990

(G-153-2)

REV	DATE	BY	APPROVED
8			
7			
6			
5	-17	-	-

REV	DATE	BY	APPROVED
4	1-17-96	ML	LLB PJB
3	9-14-90	MAM	VI MM
2	4-2-84		
1	1-27-84		

EBASCO SERVICES INCORPORATED

DIV. I&C DR. D.L.

CH. S. LIN

DATE MAY 7, 1982

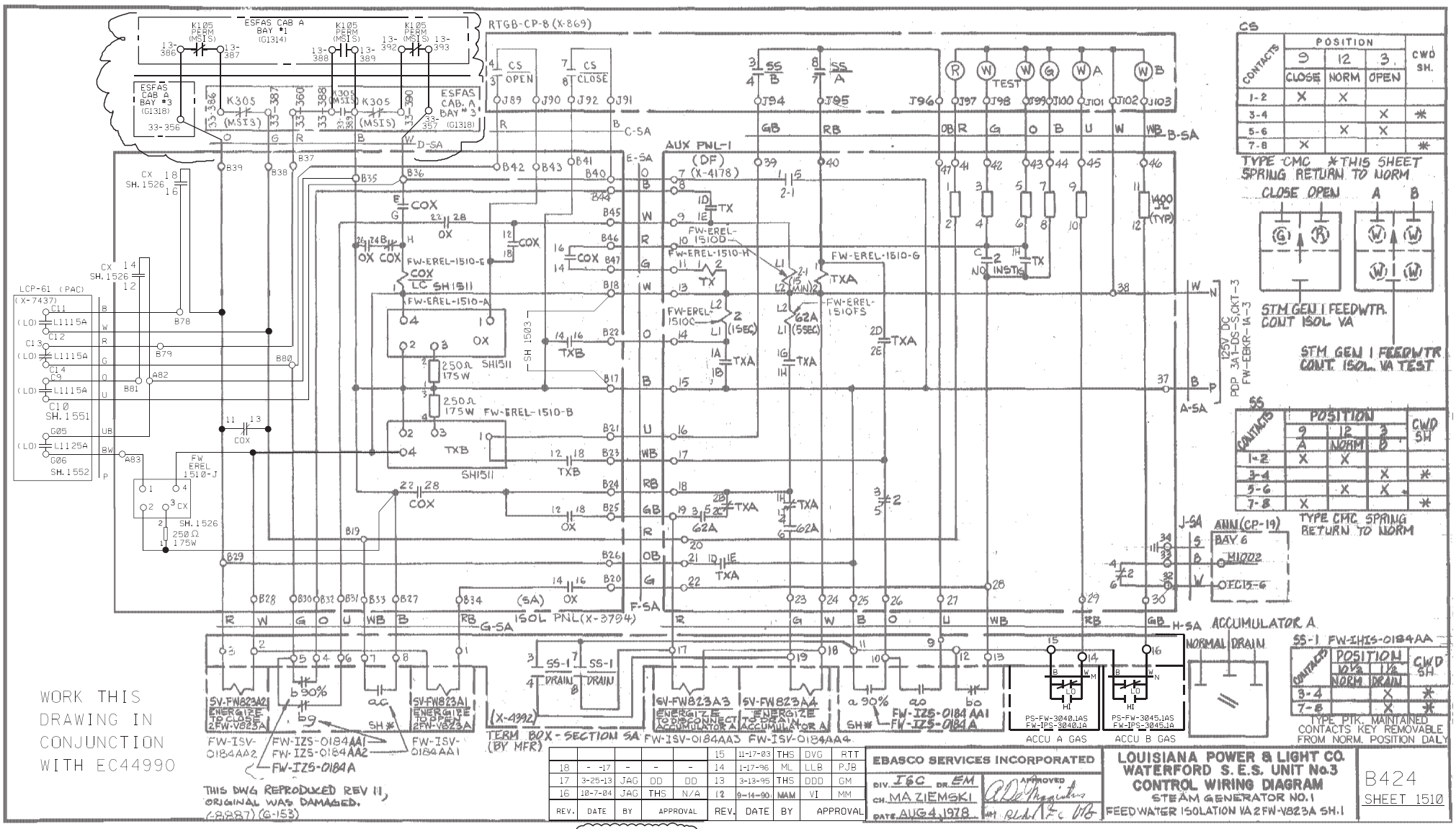
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
FEEDWATER CONTROL SYSTEM NO.1
SH. 4

B424

SHEET 1503

INCORP. EC 44990

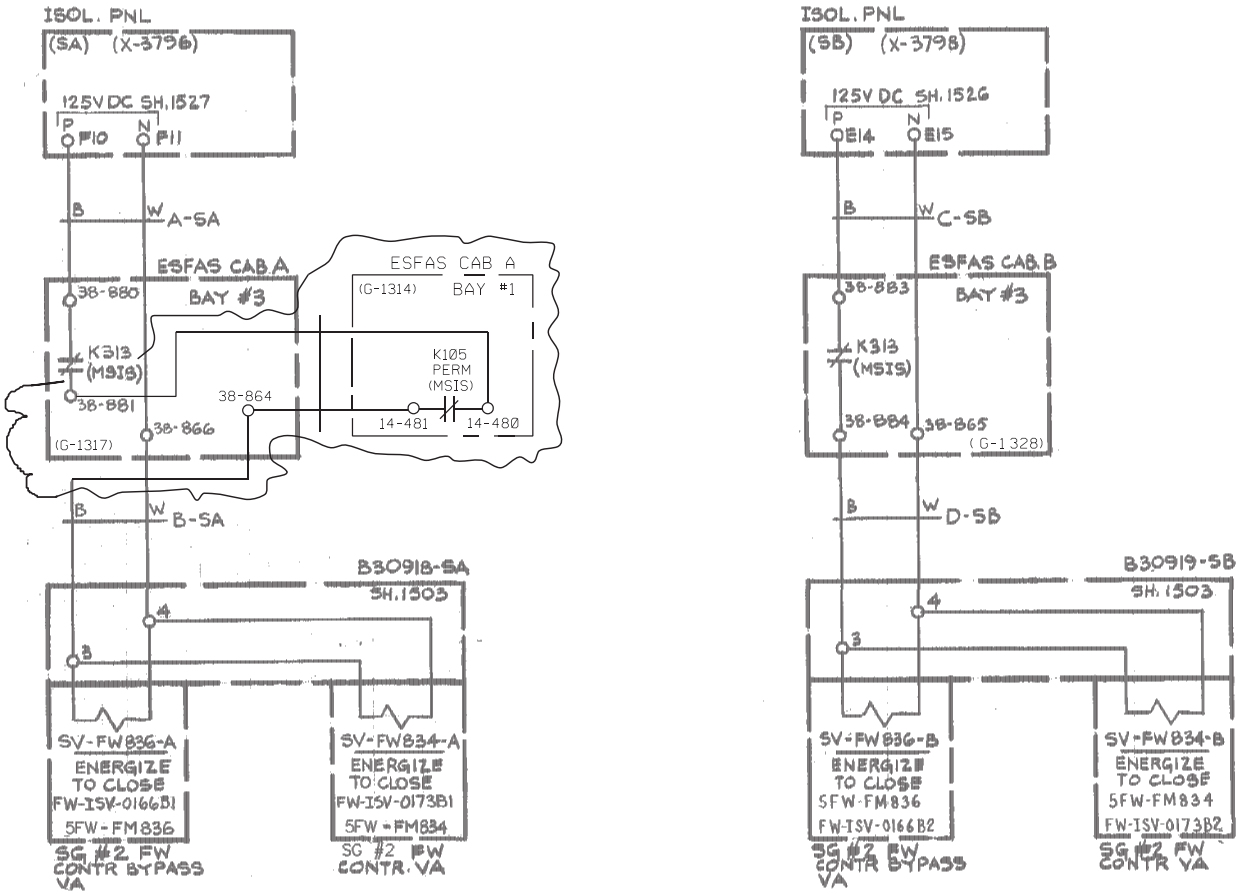


REV.	DATE	BY	APPROVAL	REV.	DATE	BY	APPROVAL
18	- -17	-	- -	15	11-17-03	THS	DVG RTT
17	3-25-13	JAG	DD DD	14	1-17-96	ML	LLB PJB
16	10-7-04	JAG	THS N/A	13	3-13-95	THS	DDD GM
				12	9-14-90	MAM	VI MM

EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MAZIEMSKI
DATE AUG 4, 1978
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO.1
FEEDWATER ISOLATION VA 2FW-V823A SH.1

B424
SHEET 1510



WORK THIS
DRAWING IN
CONJUNCTION
WITH EC44990

REV	DATE	BY	APPROVED
8			
7			
6	- -17	-	- -
5	1-24-96	DD	THS PJB

REV	DATE	BY	APPROVED
4	9-13-80	DLH	VI MM
3	7-31-84	VB	
2	6-18-84	VB	
1	1-27-84		

EBASCO SERVICES INCORPORATED

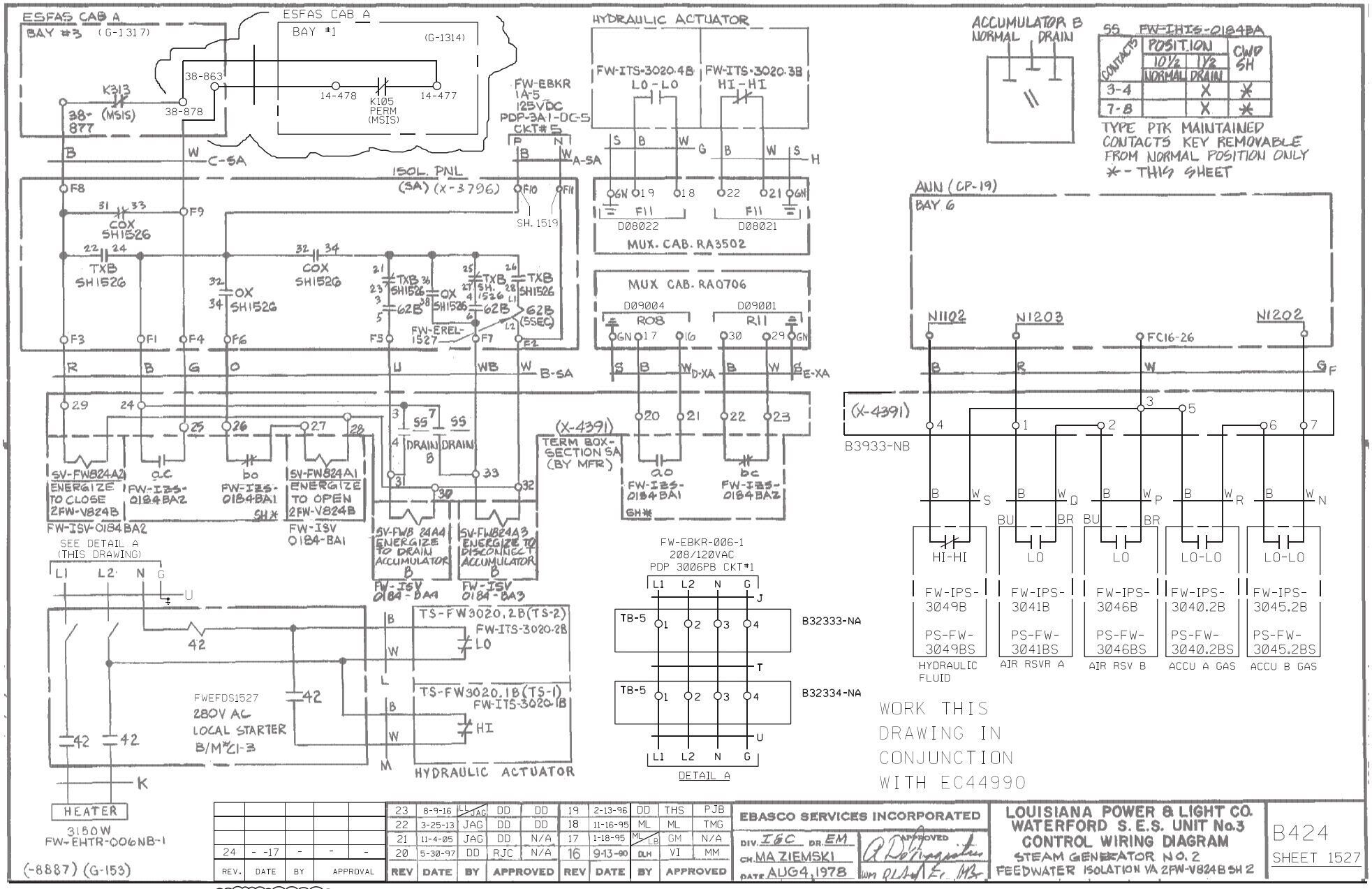
DIV. I&C DR. DL
CH. S. LIN
DATE MAY 7, 1982
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
FEEDWATER CONTROL SYSTEM NO. 2
SH. 4

B424
SHEET 1519

(G-153-2)

INCORP. EC 44990



REV.	DATE	BY	APPROVAL
24	- -17	-	- -

REV	DATE	BY	APPROVED
23	8-9-16	JAG	DD DD
22	3-25-13	JAG	DD DD
21	11-4-05	JAG	DD N/A
20	5-30-97	DD	RJC N/A

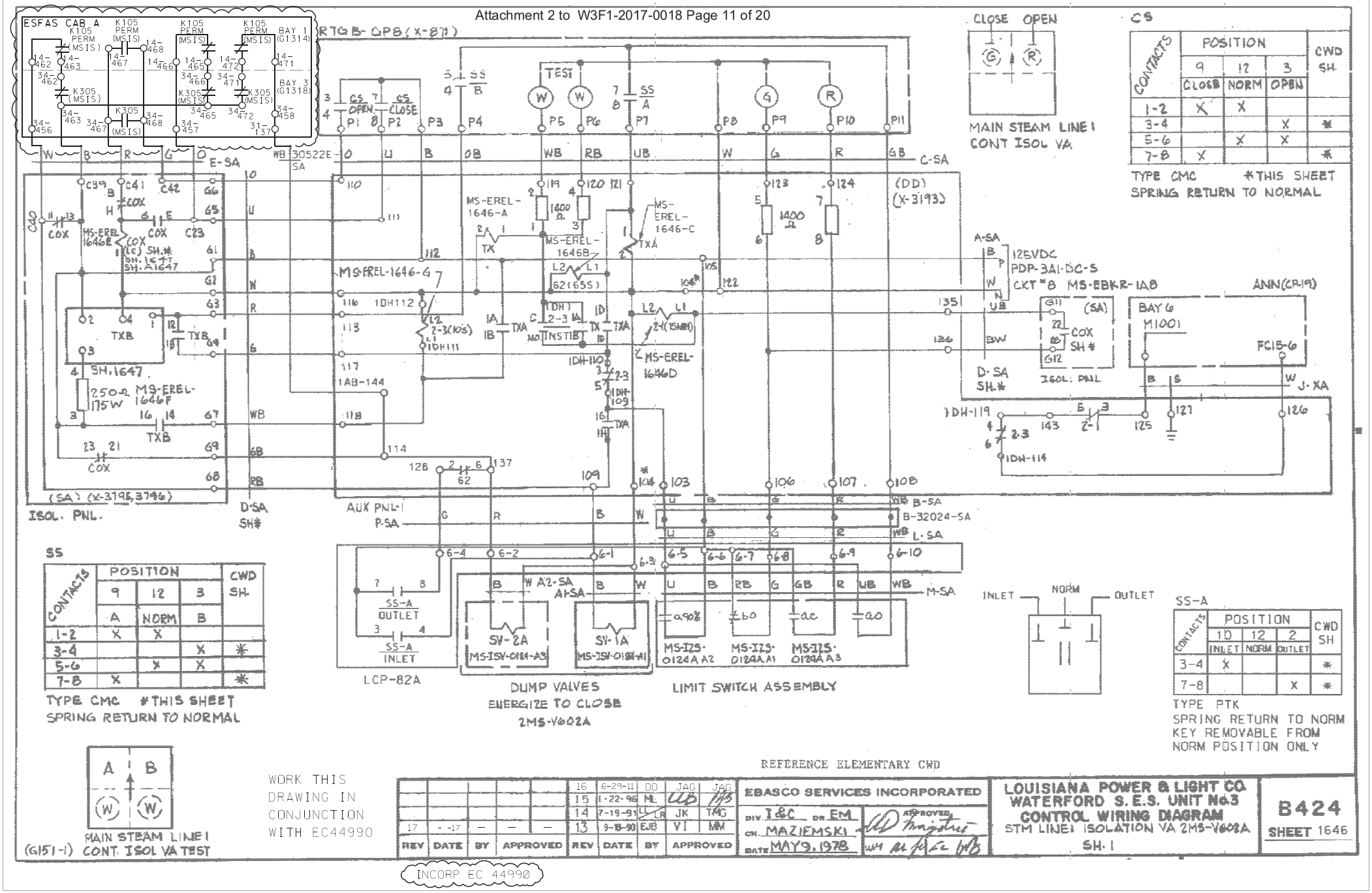
REV	DATE	BY	APPROVED
19	2-13-96	DD	THS PJB
18	11-16-95	ML	ML TMG
17	1-18-95	ML/LB	GM N/A
16	9-13-90	DLH	VI MM

EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MA ZIEMSKI
DATE AUG 4, 1978
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S. E. S. UNIT No. 3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO. 2
FEEDWATER ISOLATION VA 2FW-V824B SH 2

B424
SHEET 1527

INCORP EC 44990



CS

CONTACTS	POSITION 9	POSITION 12	POSITION 3	CWD SH.
	CLOSE	NORM	OPEN	
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

TYPE CMC *THIS SHEET
SPRING RETURN TO NORMAL

SS

CONTACTS	POSITION 9	POSITION 12	POSITION 3	CWD SH.
	A	NORM	B	
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

TYPE CMC *THIS SHEET
SPRING RETURN TO NORMAL

SS-A

CONTACTS	POSITION 10 INLET	POSITION 12 NORM	POSITION 2 OUTLET	CWD SH
3-4	X			*
7-8			X	*

TYPE PTK
SPRING RETURN TO NORM
KEY REMOVABLE FROM
NORM POSITION ONLY

A B
(W) (W)
MAIN STEAM LINE 1
(G151-1) CONT. ISOL VA TEST

WORK THIS DRAWING IN CONJUNCTION WITH EC44990

REFERENCE ELEMENTARY CWD

REV	DATE	BY	APPROVED
17	- -17	—	—
16	6-29-11	DD	JAG
15	1-22-96	ML	
14	7-19-91	LL LR	JK
13	9-18-90	EJB	VT

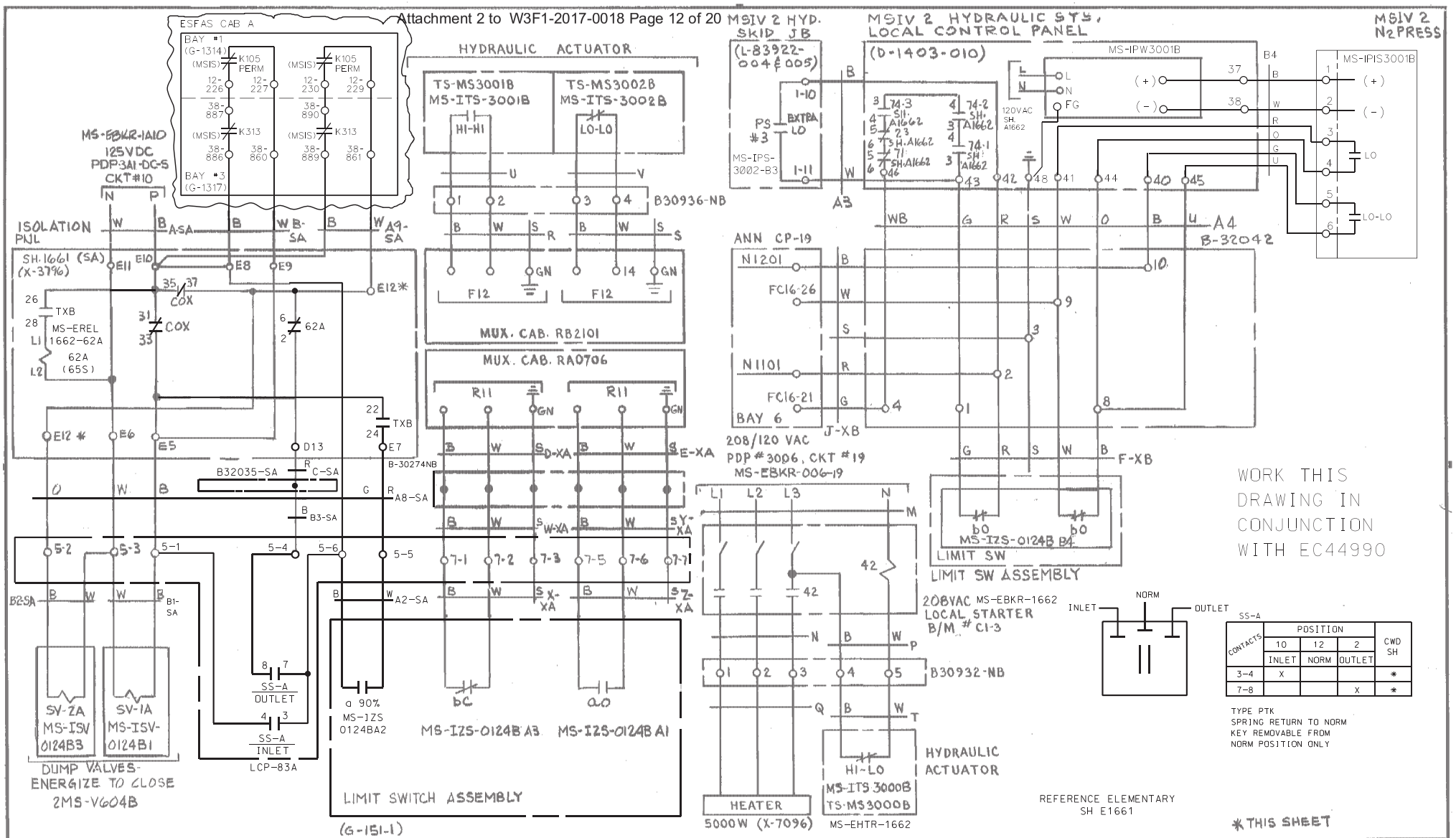
REV	DATE	BY	APPROVED
			JAG
			TMG
			MM

INCORP EC 44990

EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MAZIEMSKI
DATE MAY 9, 1978
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STM LINE 1 ISOLATION VA 2MS-V602A
SH. 1

B424
SHEET 1646

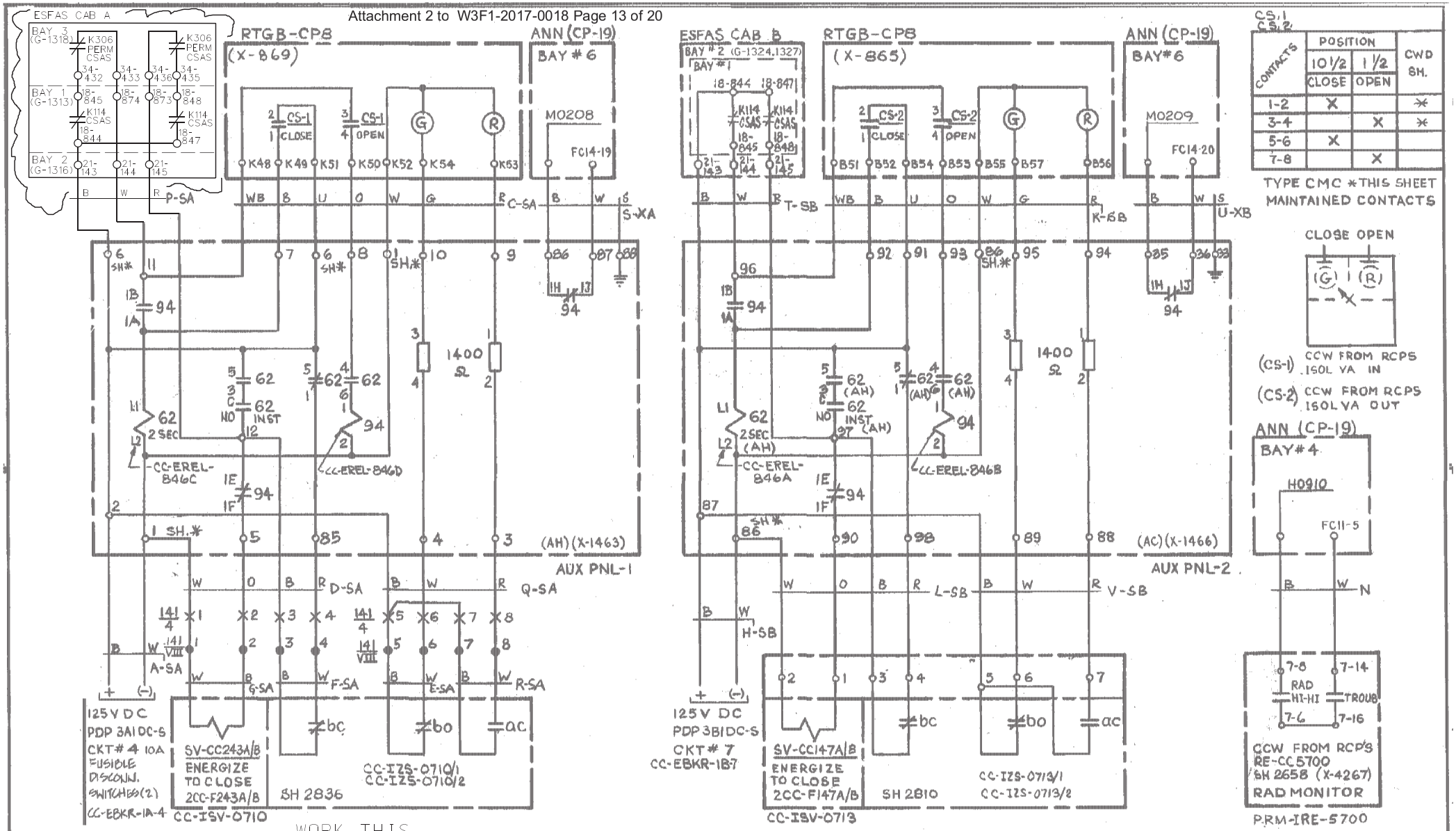


NO.	DATE	REVISION DESCRIPTION	BY	CH	APPROVED	NO.	DATE	REVISION DESCRIPTION	BY	CH	APPROVED
23	- -17	INCORP. EC 44990	-	-	-	20	03-04-97	INCORP. DRN I-9700657	LLB	ML	RC
22	06-29-11	INCORP. EC 29950	JG	DD	DD	19	1-18-96	INCORP. DRN E-9502300	THS	DD	PJB
21	11-18-03	INCORP. DRN 03-1650	DD	THS	DVG	18	11-29-95	INCORP. DRN I-9405527	CAB	DD	

EBASCO SERVICES INCORPORATED
DIV. I&C DR. EM
CH. MAZIEMSKI
DATE MAY 9, 1978
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
STM LINE 2 ISOLATION VA 2MS-V604B SH. 2

B424
SHEET 1662



(G-160-4)

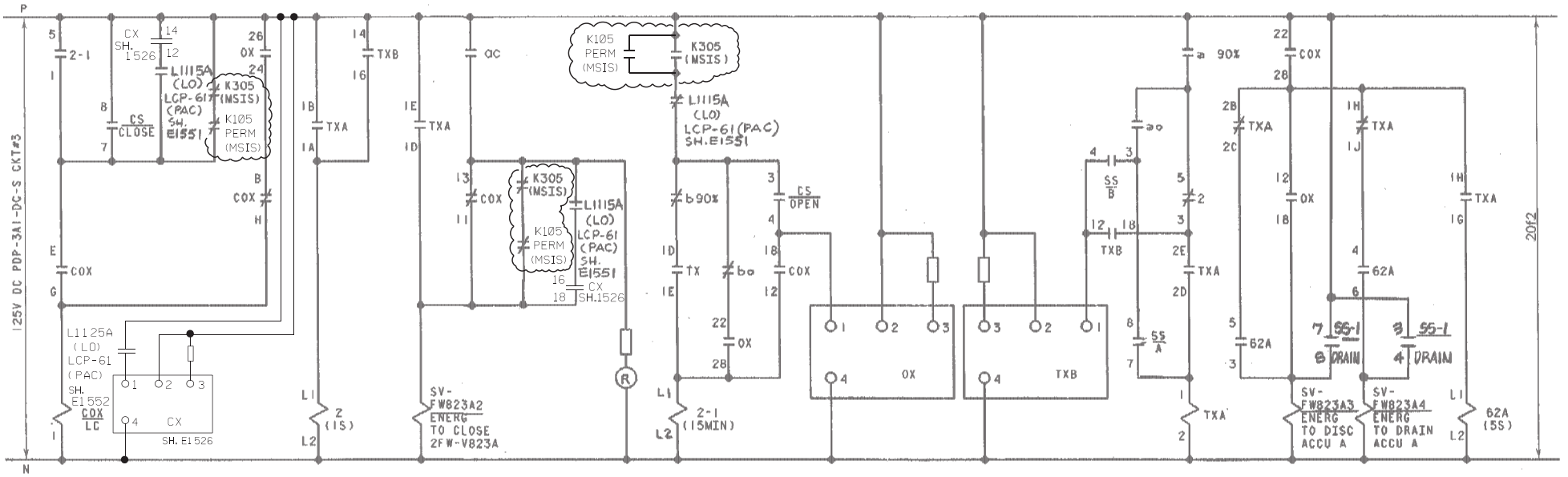
WORK THIS DRAWING IN CONJUNCTION WITH EC44990

NO.	DATE	REV. DESCRIPTION	DFTR.	CH.	APPROVAL
17		INCORP EC 44990			
16	2-12-96	INCORP. DRN E9502300	THS	DD	PJB

EBASCO SERVICES INCORPORATED
DIV. I&C DR. PJK
CH. NONE KDK
DATE DEC 2 1977
APPROVED

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No.3
CONTROL WIRING DIAGRAM
COMPONENT COOLING WATER FROM RCP'S ISOL VALVES, 2CC-E243A/B & 2CC-F147A/B

B424
SHEET 846



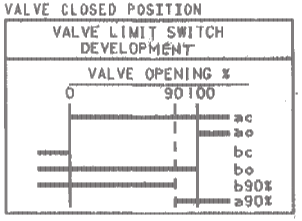
WORK THIS DRAWING IN CONJUNCTION WITH EC44990

SS-1 FW-THIS-0184AA

CONTACTS	POSITION 10½ NORM	POSITION 1½ DRAIN	CWD SH
3-4		X	*
7-8		X	*

TYPE PTK. MAINTAINED CONTACTS KEY REMOVABLE FROM NORMAL POSITION ONLY

NOTE
VALVE LIMIT SWITCHES SHOWN IN VALVE CLOSED POSITION



SS (RTGB)

CONTACTS	9 A	12 NORM	3 B	CWD SH.
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

SPRING RETURN TO NORMAL

CS (RTGB)

CONTACTS	9 CLOSE	12 NORM	3 OPEN	CWD SH.
1-2	X	X		
3-4			X	*
5-6		X	X	
7-8	X			*

SPRING RETURN TO NORMAL
* THIS SHEET

REV.	DATE	BY	APPROVAL
6	- -17		
5	11-15-03	THS	DVG RTT
4	10-31-00	JN	VI MM
3	9-7-00		
2	3-7-85		WM
1	9-3-82	SL	WM

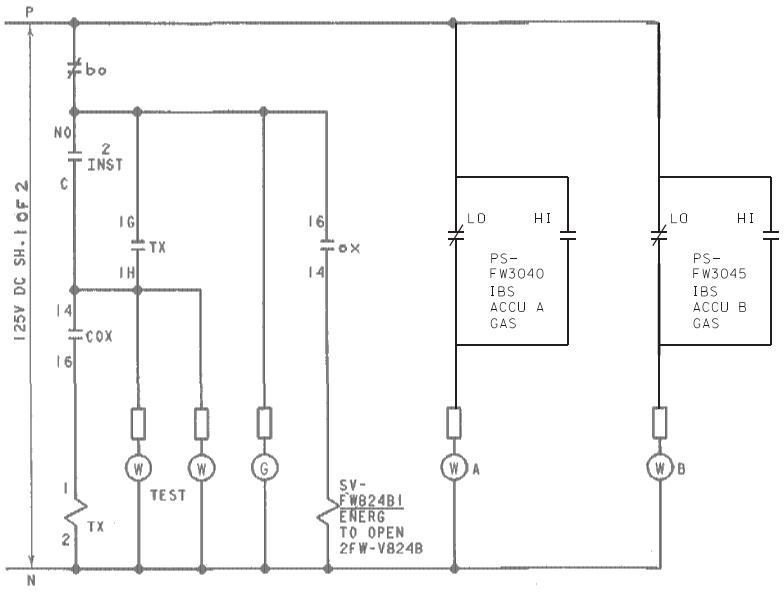
INCORP EC 44990

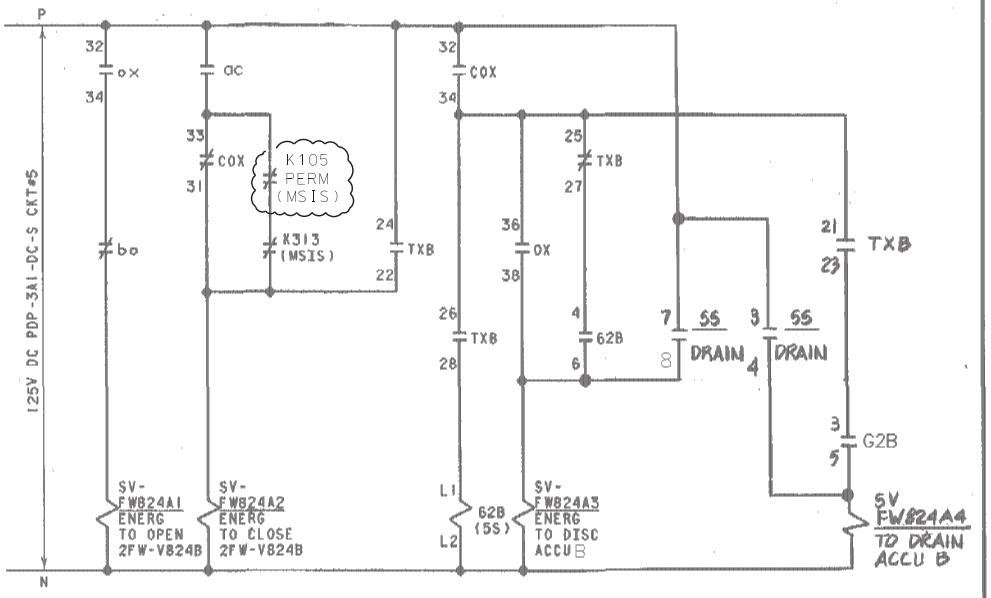
EBASCO SERVICES INCORPORATED
DIV I & C DR DS
CH S. LIN
DATE SEPT. 3, 1980
APPROVED

WATERFORD S.E.S. UNIT NO.3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO.1
FW ISOLATION VA 2FW-V823A

B424
SH. E1510-1

(G-153)





WORK THIS DRAWING IN CONJUNCTION WITH EC44990

SS FW-IHIS-O 184BA

CONTACTS	POSITION 10½ NORM	POSITION 12 DRAIN	CWD SH
3-4		X	*
7-8		X	*

TYPE PTK. MAINTAINED CONTACTS. KEY REMOVABLE FROM NORMAL POSITION ONLY. *-THIS SHEET

REV	DATE	DR	CH	APPR'D
6	-17			
5	10-8-04	DD	THS	N/A

INCORP EC 44990

REV	DATE	CH	APPROVED
4	10-31-90	JN	VI MM
3	9-7-88		
2	3-7-85		
1	9-3-82	SL	

EBASCO SERVICES INCORPORATED

DIV I & C DR LF

CH S. LIN

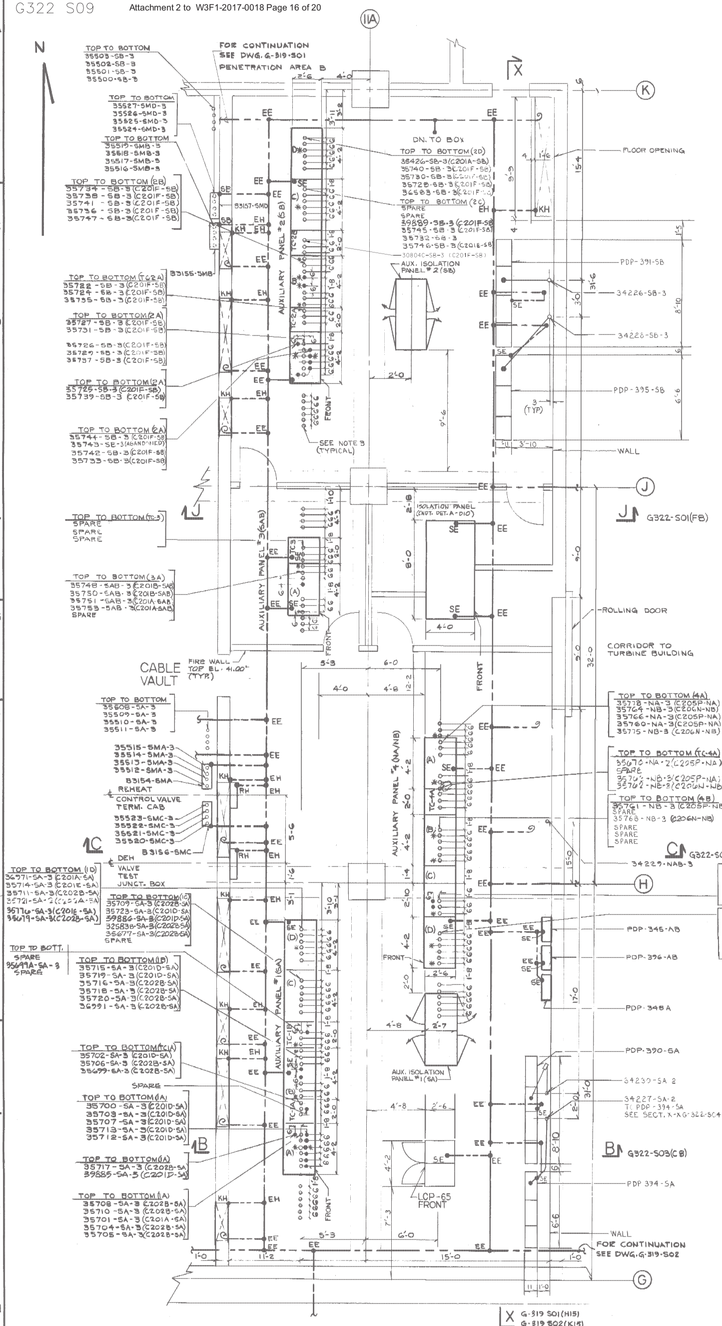
DATE SEPT. 3, 1980

APPROVED

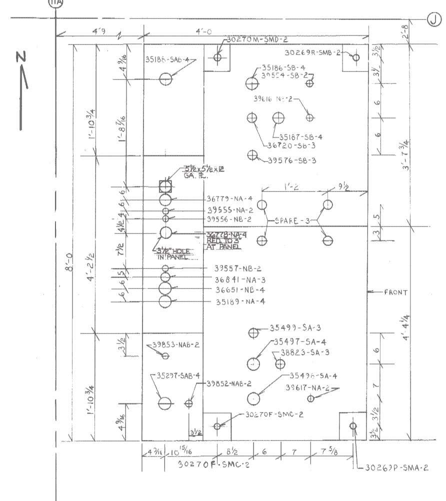
LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT NO. 3
CONTROL WIRING DIAGRAM
STEAM GENERATOR NO. 2
FW ISOLATION VA 2FW-V824B

B424
SH. E1526-2

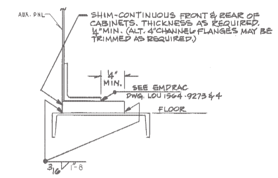
(G-153)



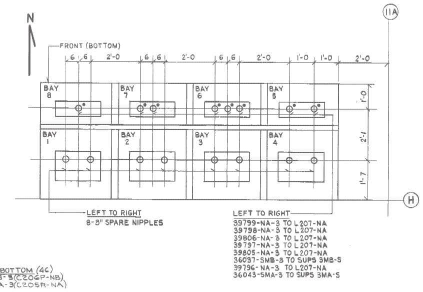
RELAY ROOM EL. 35.00'
EQUIPMENT LOCATION PLAN (G-319-S01,S02)
SCALE: 1/4"=1'-0



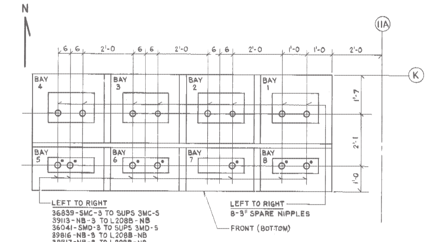
ISOLATION PANEL TOP CONDUIT ENTRY (G4)
(NOT TO SCALE)



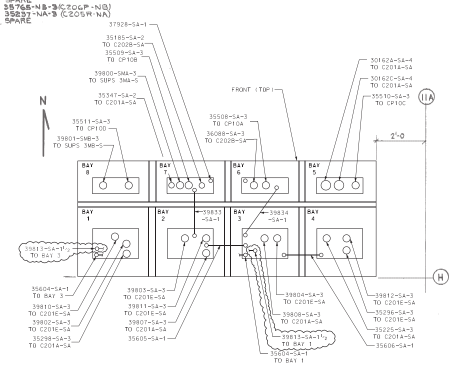
DETAIL 'A' (N.T.S)
(SEE NOTE 4)



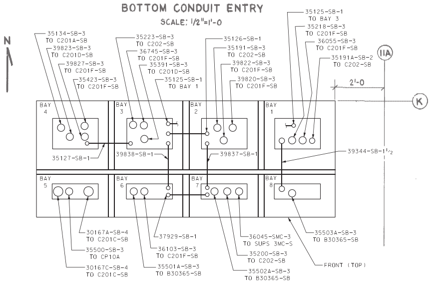
ESFAS 3A-S EL. 21.00
BOTTOM CONDUIT ENTRY
SCALE: 1/2"=1'-0



ESFAS 3B-S EL. 21.00'
BOTTOM CONDUIT ENTRY
SCALE: 1/2"=1'-0



ESFAS 3A-S
TOP CONDUIT ENTRY
G-320-S02
SCALE: 1/2"=1'-0



ESFAS 3B-S
TOP CONDUIT ENTRY
G-320S01

SYMBOLS

- ● SLEEVES TO BE ADDED. EXACT LOCATION TO BE VERIFIED BY FIELD
- SLEEVES TO BE CORE DRILLED BY FIELD
- O EXISTING SLEEVES (SPARE)
- * SLEEVES COVERED OR PARTIALLY COVERED BY AUX. PANEL CABINET MEMBERS. IF USED, SLEEVES SHALL BE BUSHED WITH T & B "INSULINERS" OR EQUIVALENT. GROUNDING SHALL BE ACCOMPLISHED BY GROUNDING THE SLEEVE BELOW THE FLOOR OR THROUGH GROUNDING OF THE SLEEVE EXTENSION. IF UNUSED, SLEEVES SHALL BE PLUGGED AT THE BOTTOM OF THE SLEEVE ONLY. NOT AT THE TOP.

NOTES:

1. FOR NOTES & SYMBOLES SEE DWG. G-338.
2. ALL FLOOR PENETRATIONS ARE 3" NIPPLES.
3. PLUG ALL FLOOR PENETRATIONS LOCATED OUTSIDE OF AUXILIARY PANELS. CAP ALL SPARES.
4. SHIMS SHALL BE INSTALLED PER DETAIL "A" AS REQUIRED TO RAISE AUX. PNLS. TO PREVENT THEM FROM RESTING ON FLOOR SLEEVES.
5. CONDUITS 36775-NA-4, 39651-NB-4 AND 35189-NA-4 SHALL BE TERMINATED AT THE ISOLATION PANEL USING A COUPLING AND A COUPLING WITH AN INSULATED BUSHING INSIDE THE PANEL. THE COUPLING SHALL BE TACK WELDED TO THE PANEL FRAMING.
6. CONDUITS 30270F-SMC-2, 30267P-SMA-2 ... SHALL BE TERMINATED AT THE ISOLATION PANEL USING A PETER'S HUB WHICH SHALL BEAR AGAINST TWO SECTIONS OF ANGLE FRAMING.
7. PLATE CENTERED OVER SPARE KNOCKOUT IN NON-SAFETY SECTION SHALL BE LOCATED OUTSIDE THE PANEL AND TACK WELDED TO IT.

REFERENCE DRAWINGS

LIST OF DRAWINGS	LOU-1564-125
BILL OF MATERIAL	B-284
CONTROL ROOM ARRANGEMENT	G-318
CABLE VAULT-COND TRAYS & GRDG. SH.1	G-319-S01
CABLE VAULT-COND TRAYS & GRDG. SH.2	G-319-S02
ELEC. EQUIP. ROOM COND & TRAYS SH.1	G-321-S01
ELEC. EQUIP. ROOM COND & TRAYS SH.2	G-321-S02
GROUNDING NOTES	B-351
ELEC. EQUIP. ROOM SH.2	G-344-S02
CABLE VAULT & ELECT.EQUIP.RM.	G-322-S01-S04
ELECTRICAL EQUIPMENT ROOM ARRANGEMENT & GROUNDING SH.1	G-320-S01
ELECTRICAL EQUIPMENT ROOM ARRANGEMENT & GROUNDING SH.2	G-320-S02
REACTOR AUX BLDG. EL.+7.00' CONDUIT, TRAYS & GROUNDING SH.1	G-317-S01
REACTOR AUX BLDG. EL.+7.00' CONDUIT, TRAYS & GROUNDING SH.2	G-317-S02

SMP-1350R1
DCN-E-1155, DCN-E-859R1, DCN-E-828, DCN-E-986, FCR-E-2924R2
DCN-E-3783, DCN-E-3908, FCR-E-2346, DCN-E-428, DCN-E-419, FCR-E-1316, FCR-E-1466, FCR-E-1624, FCR-E-1607, FCR-E-963, 927R1, 819, 748, DCN-NY-E-208
FCR-E-2342R1, FCR-E-2272R1, FCR-E-927, FCR-E-1309
INCORP DCN'S, FCR'S & NCR'S — REF. ONLY

STATE OF LOUISIANA — DONALD SANDIFORTH, Reg. No. 10551, REGISTERED PROFESSIONAL ENGINEER IN ELECTRICAL ENGINEERING

REDRAWN & REVISED FROM G-319-S02-R5

WORK THIS DRAWING IN CONJUNCTION WITH EC44990

NO.	DATE	REVISION	BY	CH.	APPROVED
10		INCORP EC 44990			
9	6-25-01	INCORP DRN E9800855 (C1) DRN E9900846 (I7,H7,J7) DRN 00-1117 (J1,K3)	DD	RJC	DB
8	8-21-97	INCORP DRN E9601742	THS	RJC	DB
7	3-10-93	INCORP DRN E-9200327	LLB	ML	DB
6	4/8/91	THIS DRAWING WAS USED IN IT'S ENTIRETY TO SCAN AND RASTERIZE TO PRODUCE THIS REVISION	JPQ	PK	SAB

LOUISIANA POWER & LIGHT COMPANY
WATERFORD S.E.S. UNIT NO. 3
1977 - 1165 MW INSTALLATION
CABLE VAULT & ELECTRICAL EQUIPMENT ROOM
SECTIONS & DETAILS SH.9

EBASCO SERVICES INCORPORATED

SCALE AS NOTED — APPROVED — DATE 9-14-78
DIV. ELEC
DR. J. TOMASTSKY
CH. J. BLANCHE

G322 S09

FIG. 07 BASIC STARTUP FEEDWATER REGULATING VALVE PNEUMATIC ONE-LINE DIAGRAM

REF 1564-B-430-SHT V05

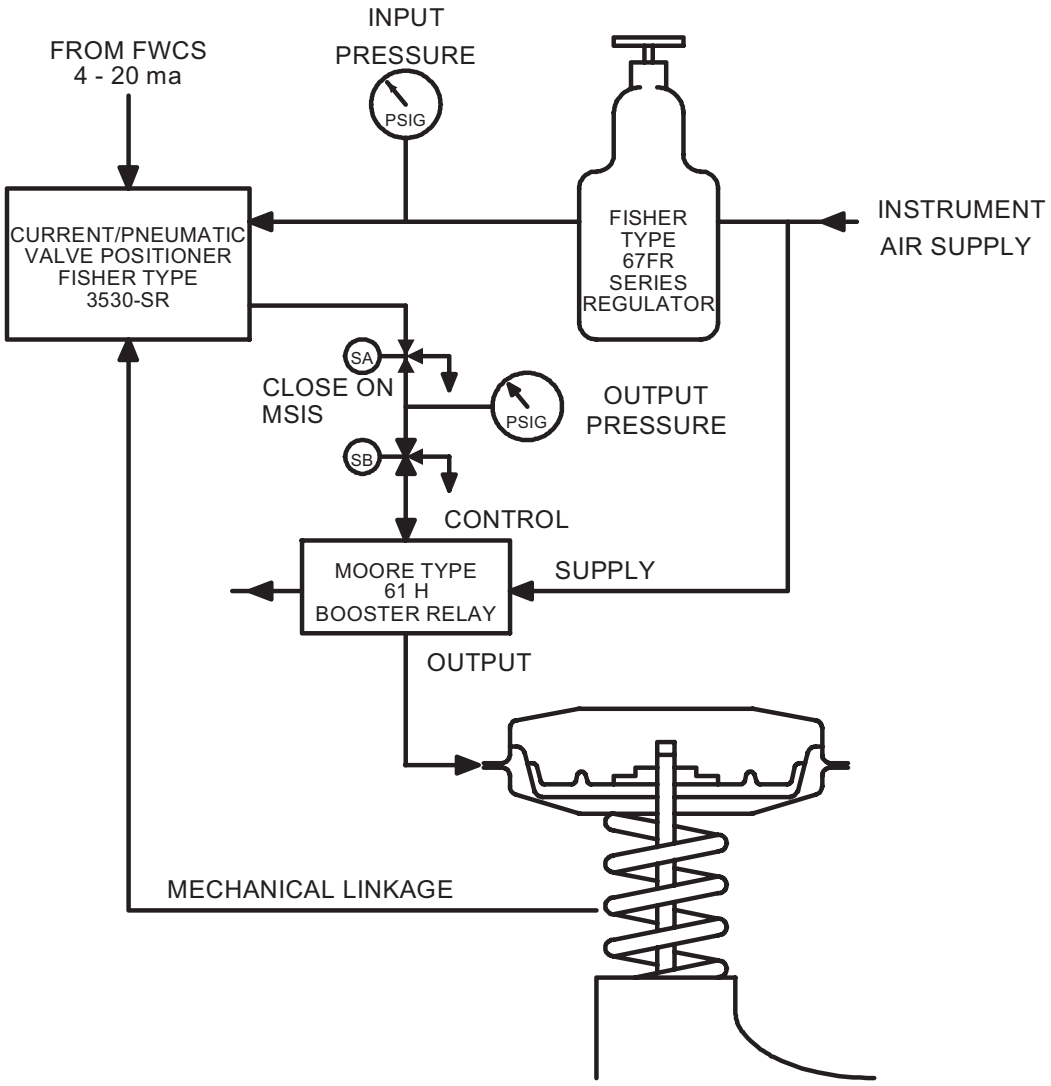
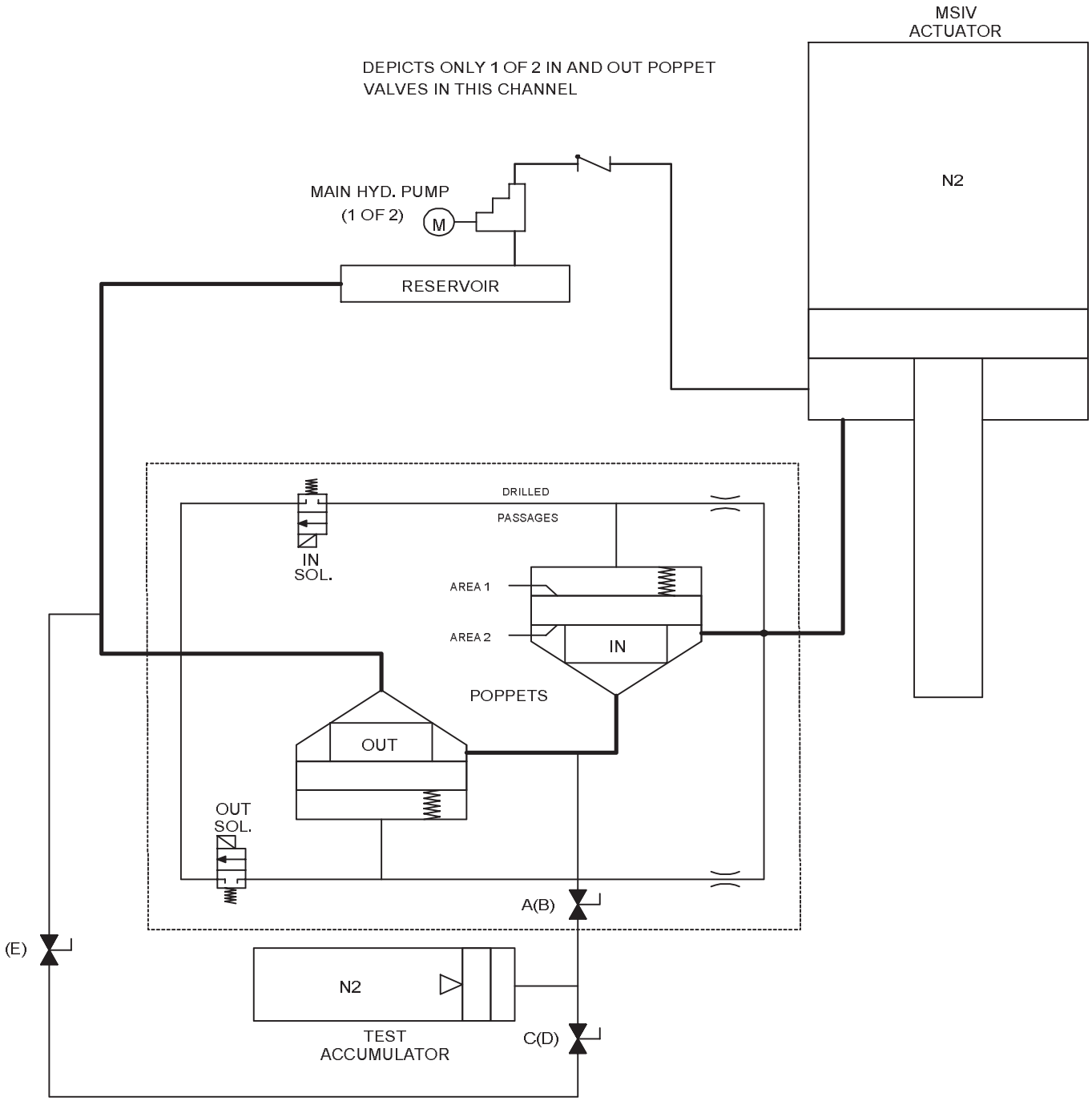


FIG. 15 MSIV DUMP VALVE FUNCTIONAL DIAGRAM

(REF. 5817-10438)

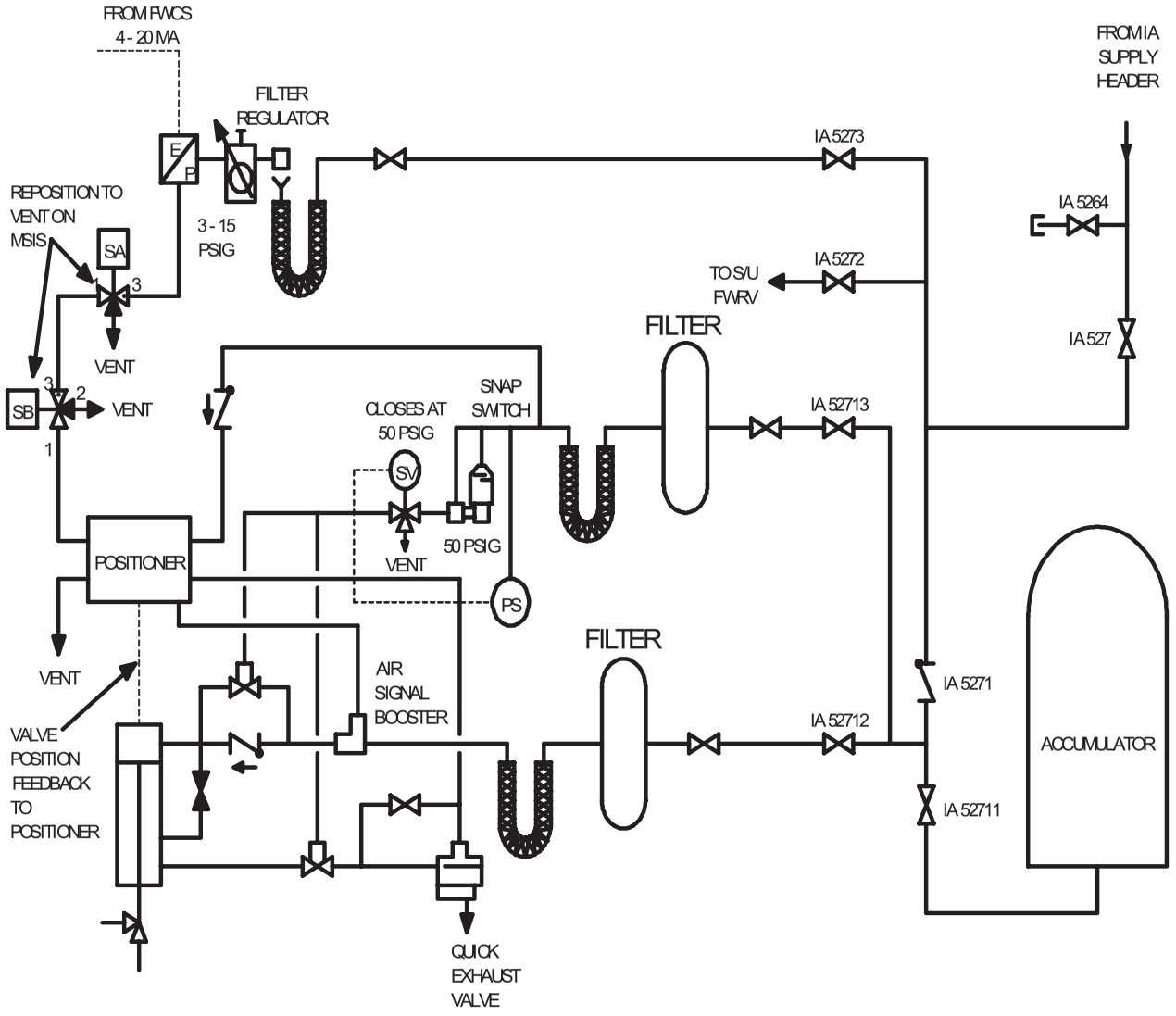


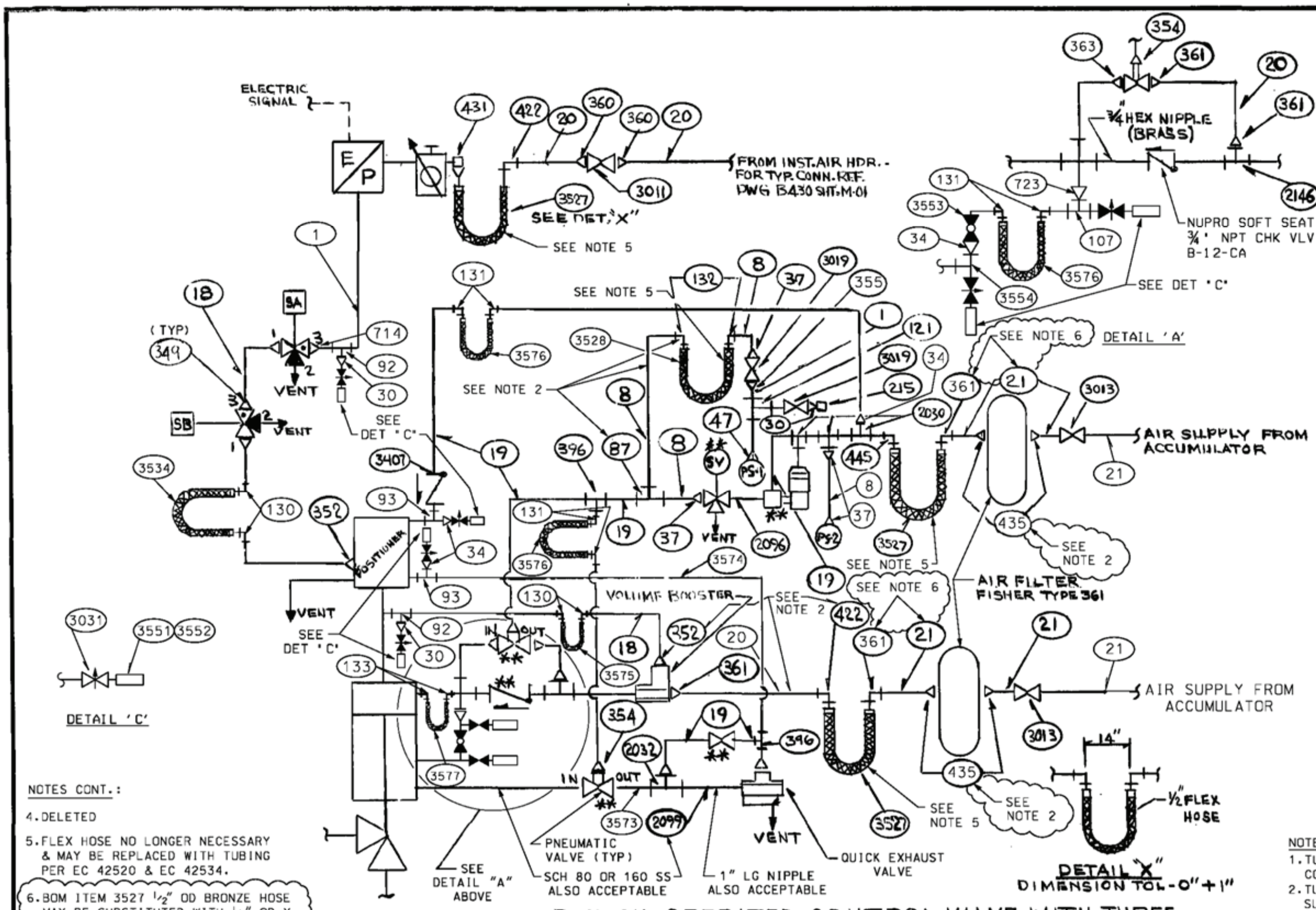
REVISION 1

SD-MS-15

FIG. 06, FEEDWATER REGULATING VALVE PNEUMATIC DIAGRAM

REF. 1564-B-430 SHT V05





NOTES CONT.:

4. DELETED

5. FLEX HOSE NO LONGER NECESSARY & MAY BE REPLACED WITH TUBING PER EC 42520 & EC 42534.

6. BOM ITEM 3527 ½" OD BRONZE HOSE MAY BE SUBSTITUTED WITH ½" OD X 42" SS FLEXIBLE HOSE FOR FW173A & FW173B VALVES.
BOM ITEM NO. 361 FITTING MAY BE SUBSTITUTED WITH SS PARTS FOR FW173A & FW173B VALVES.
BOM ITEM NO. 21 MAY BE ELIMINATED TO ACCOMMODATE SS HOSE TO AIR FILTER FOR FW173A & FW173B VALVES.

PISTON OPERATED CONTROL VALVE WITH THREE SOLENOID VALVES, E/P TRANSDUCER AND POSITIONER DETAIL "B"

BILL OF MATERIAL

ITEM No.	QTY	ITEM No.	QTY
1	A/R	361	5
8	A/R	363	1
18	A/R	393	1
19	A/R	396	2
20	A/R	723	1
21	A/R	422	2
30	3	431	1
37	4	445	1
47	1	107	1
87	1	2030	3
121	1	2032	1
132	2	2096	2
215	1	2099	1
349	3	2146	1
352	1	3013	2
354	2	3019	2
355	1	3527	3
360	2	3528	1
3407	1	435	4
3011	1	34	4
92	2	3551	6
93	2	3552	6
3031	6	3553	1
3573	1	3554	1
3574	1		
3534	1	130	4
3575	1	131	6
3576	3	133	2
3577	1		

*SWITCH BY EBASCO
** BY VLV. MFR.

VALVE TAG No.	PRESS. SW. TAG No PS-1	PS-2
5FW-FM-833	PS-FW-1112	PS-FW-1111
5FW-FM-834	PS-FW-1122	PS-FW-1121

NOTES:
1. TUBING TO BE SUPPORTED WITHIN 3" OF FLEX HOSE CONNECTION.
2. TUBING & FITTING ARRANGEMENTS/SELECTIONS ARE SUBJECT TO VARIATION PER FIELD ROUTING REQUIREMENTS.
3. PER SPEER 9401194. BRASS & COPPER TUBING & FITTINGS MAY BE REPLACED WITH EQUIVALENT S/S PARTS ON THE FOLLOWING VALVES: 5FW-FM833 & 5FW-FM834
CONT.

REV.	DATE	BY	APPROVAL		REV	DATE	BY	APPROVED		REV	DATE	BY	APPROVED	
10	6-16-14	JG	DD	DD	8	3-27-13	JG	DD	DD	4	11/17/92	ML	LLB	DG
9	5-11-14	JG	DD	DD	7	1-30-13	JG	DD	DD	3	12-6-90	TCG	VI	MM
					6	10-11-95	ML	LLB	MG	2	10/20/84	[illegible]	[illegible]	[illegible]
					5	6-20-95	THS	DDD	N/A	1	8-29-83	[illegible]	[illegible]	[illegible]

INCORP. EC 44721

EBASCO SERVICES INCORPORATED
NEW YORK
DIV. I&C DR. RB
SCALE [illegible] CH. [illegible]
DATE 5-31-82
APPROVED [illegible]

LOUISIANA POWER & LIGHT CO.
WATERFORD S.E.S. UNIT No. 3
INSTRUMENT INSTALLATION DETAILS

B430
SHEET-V-05
SHT. 2