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10 CFR 50.90

W3F1-2017-0010

January 26, 2017

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

Subject: 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)
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. W3F1-2016-0070, Responses to Request for Additional Information Regarding the Risk-Informed Surveillance Requirements License Amendment Request (LAR) Waterford Steam Electric Station, Unit 3 (Waterford 3), March 3, 2016 [ADAMS Accession Number ML16063A532].

Dear Sir or Madam:

Per Reference 1, Entergy Operations, Inc. (Entergy) requested an amendment to revise Technical Specification 3/4.3.2 for Waterford 3. Subsequently, the NRC has requested additional information to aid in their review (Reference 2). This letter provides the response to the NRC request for additional information.

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 January 26, 2017.

Sincerely,

MRC/JPJ/mmz

Attachments:
1. Response to NRC Request for Additional Information Regarding 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).
2. Circuit Diagrams ESFAS SPV Trip Hardening Modification

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Attachment 1

to

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)**

Waterford 3 Steam Electric Station
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)

Request for Additional Information (RAI) -1

The NRC staff understands that the current circuit design does not permit inservice testability, and that the current design was granted an exception to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 21, "Protection system reliability and testability," and Institute of Electrical and Electronics Engineers (IEEE) 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," by invoking Section D.4 of Regulatory Guide (RG) 1.22, "Periodic Testing of Protection System Actuation Functions" (ADAMS Accession No. ML083300530), as supported by References 7, 8, and 9 in the application dated September 1, 2016. The current exception does not apply to the proposed design, which contains two contacts in each circuit, such that actuation of any one of the relays will not result in an ESFAS component actuation. If a spurious actuation of one relay during testing does not result in an ESFAS actuation, then the proposed design would permit inservice testability, and testing of the relays need not be limited to periods of cold shutdown. Demonstrate that the existing relay, within the proposed new configuration, will meet the surveillance requirements of GDC 21 and IEEE 279-1971, or fully justify why the surveillance of this existing relay should be granted an exception to GDC 21 and IEEE 279-1971 via the criteria outlined in RG 1.22, Section D.4.

Entergy Response to Request RAI-1

The following discussion addresses this RAI by discussing the operation of Main Steam Isolation Valve (MSIV) MS-124A of the Main Steam Isolation Signal (MSIS) portion of the ESFAS Single Point Vulnerability (SPV) Trip Hardening Modification. The same conclusion relative to the RG 1.22 exception can be drawn for MSIS Train B and both trains of the Containment Spray Actuation Signal (CSAS) portions of the circuitry.

One of the Main Steam (MS) system safety functions is to isolate the Steam Generators from the non-safety portions of the MS system during emergency conditions by automatic closure of the Main Steam Isolation Valves (MSIVs). The automatic closure of the MSIVs occurs during MSIS. The MSIS is a signal generated by the ESFAS as a result of low steam generator pressure or high containment pressure. The MSIS actuates MSIVs, MS sampling valves, main feedwater isolation valves and emergency feedwater control valves. The current circuit design to close the MSIV utilizes normally closed contacts from the K305 relay shown in Figure 1 as it de-energizes during a MSIS.

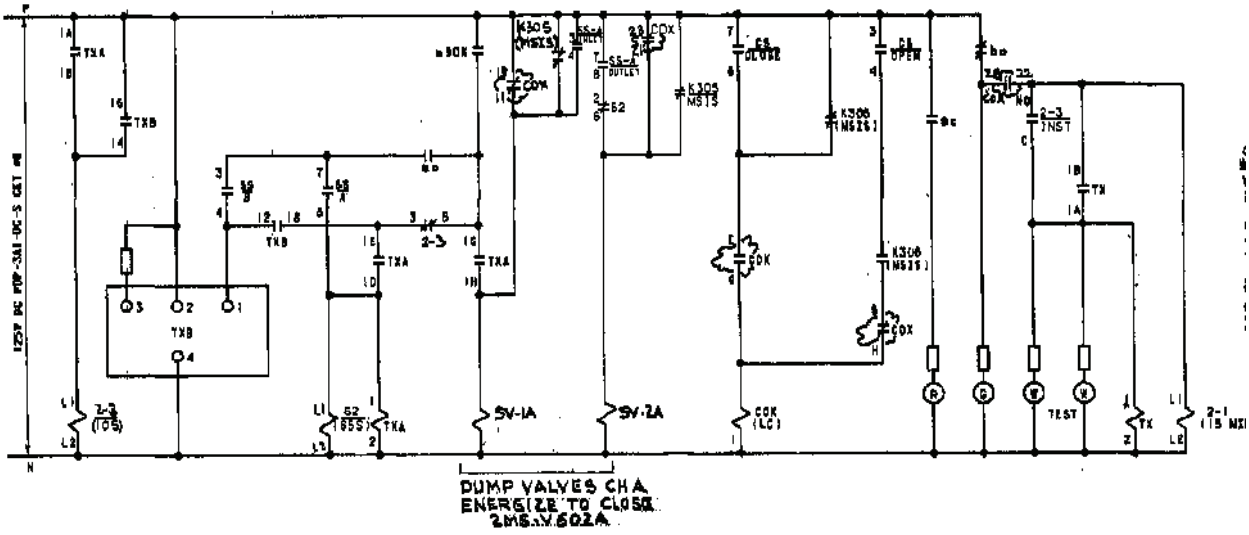


Figure 1 (Portion of Drawing B424, Sheet E1646)

The ESFAS actuation logic de-energizes the ESFAS subgroup relays upon ESFAS function actuation. The contacts from these relays provide a close signal to the MSIVs and associated feed train components. However, currently, a subgroup relay failure, ESFAS Auxiliary Relay Cabinet (ARC) power supply failure, a short circuit failure around the subgroup relay, or opening of a power supply circuit breaker may also de-energize one or more subgroup relays, depending on the nature of the failure, resulting in an unwanted and unwarranted closure of the MSIV(s) and associated feedwater train valves. If the Unit is at power when closure of a single MSIV occurs, then an asymmetric steam generator transient (ASGT) will occur, requiring intervention by the Delta TC algorithm in the Core Protection Calculator System (CPCS) to maintain the DNBR Safety Limit, resulting in a CPC Auxiliary Trip (reactor trip) on Low DNBR and High Local Power Density. If both MSIVs are affected (K305 and K313), then there will be a complete loss of heat sink, and the RCS pressure safety limit will be approached, requiring a reactor trip on High Pressurizer Pressure, or, at the very least, a Reactor Power Cutback.

The existing surveillance for the closure of the MSIV is performed during cold shutdown condition in accordance with OP-903-095 “ESFAS Subgroup Relay Test – Shutdown.” The MSIV in test is verified open and initial test conditions are first satisfied. By selecting the specified test position on the test module and depressing the pushbutton, normally energized relay K305 will de-energize, allowing its contacts to change state (all ESFAS actuation positions are in the de-energized state) energizing the redundant MSIV solenoid dump valves (SV-1A and SV-2A) to drain the hydraulic fluid, resulting in rapid MSIV closure. The acceptance criterion for the OP-903-095 surveillance test is verification that the MSIV is closed.

The proposed design change will provide trip hardening of MSIS. This change consists of connecting the contacts of a presently unassigned MSIS relay (K105) in series (for normally closed contact actuation) or parallel (for normally open contact actuation) with those from MSIS relays K305 and K313. In the case for the MSIV as described above, the addition of normally closed contacts from the K105 relay will be installed in series with the K305 relay’s normally closed contacts to energize the MSIV solenoid dump valves as shown in Figure 2.

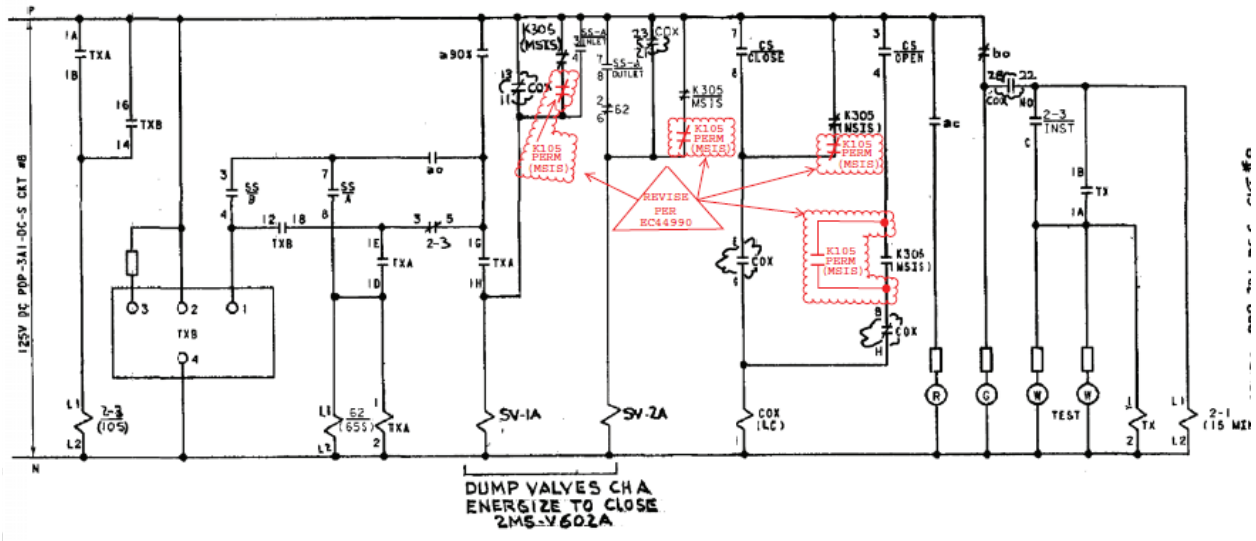


Figure 2 (Portion of Drawing B424, Sheet E1646, showing modification)

General Design Criterion (GDC) 21 requires that the protection system be designed to permit periodic testing of its functioning when the reactor is in operation. In current designs the ability of the protection system to initiate the operation of safety systems depends on the proper performance of actuation devices; therefore, these devices are to be tested. RG 1.22 describes acceptable methods of including the actuation devices in the periodic tests of the protection system during reactor operation. It does not address the frequency of such testing. RG 1.22 states that the preferable method of implementing GDC 21 is to design the protection system such that the actuation devices and actuated equipment are periodically tested with the protection system during reactor operation.

RG 1.22 defines “actuation devices” as a component or assembly of components that directly controls the motive power (electricity, compressed air, etc.) for actuated equipment, and cites the following examples of an actuation device: a circuit breaker, a relay, and a valve (and its operator) used to control compressed air to the operator of a containment isolation valve. In the case of MSIV MS-124A, the actuation device consists of the K105 and K305 relays, at least one solenoid dump valve SV-1A or SV-2A, and the power to the circuit.

RG 1.22 defines “actuated equipment” as a component or assembly of components that performs or directly contributes to the performance of a protective function such as reactor trip, containment isolation, or emergency coolant injection, and cites the following examples of actuated equipment: an entire control rod and its release mechanism, a containment isolation valve and its operator, and a safety injection pump and its prime mover. In this case, the MSIV MS-124A is the actuated equipment.

RG 1.22 states in the case where testing the operation of the entire group of actuated equipment associated with a protective function may damage plant equipment or disrupt reactor operation, acceptable methods of including the actuation devices in periodic tests of the protection system include option (3), designing the system such that operation of the actuated equipment requires the operation of more than one actuation device, with each actuation device being individually testable.

Testing of the function of the ESFAS (the protection system) to perform actuation of the MSIV includes testing of the actuation device (K105 and K305 relays, solenoid dump valve, and electrical power to the circuit) and actuated equipment (the MSIV).

The post trip hardening modification required surveillance will be performed similarly to the existing surveillance that is performed on the above circuit with the exception that the test position will be selected to de-energize both the K305 and K105 relays, resulting in energization of the solenoid dump valves, and subsequent MSIV closure. Closure of the MSIV while the reactor is at power is not desirable due to the increase in plant risk. Energization of one of the dump valves has the direct effect of draining the hydraulic fluid from the MSIV actuator, therefore this cannot be performed when the reactor is at power. De-energization of both relays simultaneously has the effect of energization of the solenoid valves, therefore this cannot be performed when the reactor is at power. The design does not include the allowance for testing the complete actuation device while preventing the operation of the MSIV.

The test circuitry includes a test positon for selection of either of these relays individually. This test will only de-energize one relay and will not result in the actuation (closure) of the MSIV via the dump valves. This can be performed online; however, this test does not constitute testing of the actuation device. Testing the circuit online only verifies the relay contact changes state and would not actuate the solenoid dump valves to provide the necessary closure of the MSIV.

Additionally, surveillance testing of either the K305 or K105 relays independently could adversely affect the Unit if the other relay is in the failed state (de-energized) or its contact is mispositioned at the time of the test. System design does not allow for non-intrusive identification of a de-energized relay. Testing the state of the relays online using intrusive means, such as lifting leads, introduces the likelihood of an inadvertent plant transient due to human error.

RG 1.22 allows exceptions in cases where testing actuated equipment at power could cause unsafe plant conditions/operations as long as sufficient justification is provided. The guidance states that where actuated equipment is not tested during reactor operation, it should be shown that: a. There is not practicable system design that would permit operation of the actuated equipment without adversely affecting the safety or operability of the plant; b. The probability that the protection system will fail to initiate the operation of the actuated equipment is, and can be maintained, acceptably low without testing the actuated equipment during reactor operation; and c. The actuated equipment can be routinely tested when the reactor is shut down.

For the reasons stated above, there is no practicable system design that permits operation of the MSIV when the reactor is at power without adversely affecting the safety and operability of the plant. The MSIVs and each MSIV's associated actuation device (K305, K105, the solenoid dump valves, and the electrical circuit) will continue to be tested in accordance with the SFCP (at least once per 18 months and during each cold shutdown condition unless tested within the previous 62 days), therefore the probability that the ESFAS will fail to initiate the operation of the actuated equipment is, and can be maintained, acceptably low without testing the MSIV during reactor operation. The MSIV will be routinely tested when the reactor is shut down (in accordance with the SFCP).

RAI-2

The LAR, in part, supports the hardening of the ESFAS single-point vulnerability (SPV) by adding an additional contact in the Feedwater and Main Steam Isolation actuation by Main Steam Isolation Signal and Component Cooling Water Containment Isolation Valve Closure actuation by Containment Spray Actuation Signal. Provide circuit diagrams of both the current configuration and proposed modification, which demonstrate that the configuration will meet the requirements of IEEE 279-1971 as it applies to the likelihood of spurious actuation during testing. Specifically:

a. Demonstrate that the power supply to these relays (with the new contact wiring) is independent of the power to the existing relays that are wired in the circuits to ensure trip hardening due to SPV.

b. If the direct current (DC) power source is interconnected at one or more points, then explain how the power supply independence is maintained (e.g., is the power floating or grounded).

c. Have any new features (e.g., a toggle switch) been added to the circuit design to facilitate testing?

Entergy Response to Request RAI-2

Circuit diagrams of both the current configuration and proposed modification are provided in Attachment 2.

The modification is designed such that each redundant relay is powered from the alternate power bus such that no failure on the alternate bus results in a loss of power to the redundant pair. A short circuit, ground, or open breaker will not de-energize the redundant pair. This is shown in Attachment 2, page 1 (Generic Diagram of System Configuration After Change), page 2, (drawing G1321), and page 3 (drawing G1322). This therefore demonstrates that the power supply to these relays is independent of the power to the existing relays which ensures that the circuits are trip hardened from SPVs.

Power supplies for ESFAS utilize a floating Direct Current (DC) output system which provides reliability and alarm indication for ground fault conditions. The floating DC output of the power supply utilizes a high resistance ground detection scheme for reference such that if the system is grounded at a single point, that becomes the system reference; therefore, the ground would have no effect on the function of the relays. The floating output on each power supply (4 total) is shown in Attachment 2, page 2 (Drawing G1321) and page 3 (Drawing G1322). The system is equipped with ground detection and will alert operators to a grounded condition. A description of the ground detector is provided on Attachment 2, page 4 (Ground Detector Description) and a diagram is provided on page 5 (Ground Detection from Circuit TD-C490.0645_0_003-1). A schematic of the ground detection connection to the power supply is provided on Attachment 2, page 6. Ground detection is provided by connecting both busses to ground through a very high resistance (essentially ungrounded – typical of all ground detection schemes). When a ground is present, the imbalance causes a high voltage to ground on one side and 0 volts on the other. Depending on the scheme, a relay picks up or drops out to alarm for the ground.

In order to facilitate testing, the new design takes advantage of existing test switches in the control room to test each relay individually. A new switch has been added to provide a “gang operated” function to achieve full actuation of the end device. The new gang operated switch (S6) is shown on Attachment 2, page 7 (drawing 1564-6347).

RAI-3

In the LAR, the licensee states that the relocation of the surveillance requirements from technical specifications to a licensee-controlled program allowed under Amendment No. 249 dated July 26, 2016 (ADAMS Accession No. ML 16159A419), will be reviewed by NRC staff as a result of the modification; however, the modification itself can be completed pursuant to 10 CFR 50.59, "Changes, tests and experiments," without NRC review. In addition, the LAR states, in part that "[p]art of this revision is needed to support the ESFAS Single Point Vulnerability (SPV) Trip Hardening Modification." Clarify the relationship between the licensee-evaluated modification and the LAR. In addition, clarify the relationship between Amendment No. 249 and the current LAR.

Entergy Response to Request RAI-3

An evaluation pursuant to 10 CFR 50.59 “Changes, Tests, and Experiments” was performed to evaluate the changes to the ESFAS that are necessary to implement the ESFAS SPV Trip Hardening Modification. The LAR, letter W3F1-2016-0055, states that the hardware changes to the ESFAS will be implemented in accordance with 10 CFR 50.59.

The following questions from the 10 CFR 50.59 evaluation are pertinent to the following discussion:

Question 1: Does the proposed change result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the UFSAR?

Question 4: Does the proposed change result in more than a minimal increase in the consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the UFSAR?

Based on the justifications detailed in the 10 CFR 50.59 evaluation, none of the questions resulted in a conclusion of "yes." However, the results of Questions 1 and 4 are dependent on the approval of the LAR submitted under Letter W3F1-2016-0055.

The 10 CFR 50.59 evaluation concluded that testing of the relays would not result in a more than minimal increase in the frequency of occurrence of an accident or consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the UFSAR as long as testing is not performed during power operation. Continuing to perform testing of the new configuration in accordance with the SFCP (at least once per 18 months and during each cold shutdown condition unless tested within the previous 62 days) assures the likelihood of an accident or consequences of malfunction are not increased, because inadvertent actuation during testing resulting from a failed “off” relay will not result in an accident described in the UFSAR. This information is also stated in Reference 1, Attachment 1, Section 3.0 (paragraph 5) and Section 5.2 (response to question 1, paragraph 4).

Due to the fact that there is still potential to cause unsafe plant conditions/operations and subsequent occurrence of an accident described in Chapter 15 of the Waterford 3 UFSAR, it is the position of Waterford 3 that sufficient justification is provided in Reference 1 and the response to RAI-1 to invoke the exception allowed by RG 1.22 for cases where testing actuated equipment at power could cause unsafe plant conditions/operations.

As stated in Reference 1, Attachment 1, Section 2.0, the following six items are requested to be changed in TS 3/4.3.2:

1. Table Notation (1) will be deleted. Prior to Amendment 249, this annotated the actuation subgroup relays that are tested on a staggered test basis. This staggered test basis surveillance frequency is now included in the SFCP, which is referenced in the table. The note is now redundant and is therefore not needed. The “Channel Functional Test” column in the body of Table 4.3-2 will be renumbered accordingly.

2. Table Notation (2) will be renumbered to (1). The “Channel Functional Test” column in the body of Table 4.3-2 will be renumbered accordingly.

3. Table Notation (3) will be renumbered to (2) and revised to delete the second sentence. The frequency for the relays that are not tested during power operation will be included in the SFCP. There will be no change to the first sentence. The “Channel Functional Test” column in the body of Table 4.3-2 will be renumbered accordingly.

4. Table Notation (4) will be renumbered to (3). The “Channel Functional Test” column in the body of Table 4.3-2 will be renumbered accordingly.

5. Table Notation (5) will be deleted. The information in this note is a component of the surveillance frequency for the Control Valve Logic and will be included in the SFCP. References to Table Notation (5) in the “Channel Functional Test” column in the body of Table 4.3-2 will be deleted accordingly.

6. Table Notation (6) will be deleted. Prior to Amendment 249, this annotated that the Safety Injection Actuation System actuation subgroup relays are tested on a staggered test basis, with the exemption of K110, K410, and K412, and that these relays are exempt from testing on a staggered test basis. These frequencies will be included in the SFCP, which is referenced in the table. The note is now redundant and therefore not needed. References to Table Notation (6) in the “Channel Functional Test” column in the body of Table 4.3-2 will be deleted accordingly.

Item 3, the revision to Table Notation (3), given that it references the K114, K305, and K313 relays, supports the ESFAS modification. The remaining relays are not affected by the ESFAS modification; however it is appropriate to relocate the entire content of the sentence requested to be deleted from the note to the SFCP. The reason and justification for relocation is provided in the answer to RAI-4.

The reasons behind the requests for the remaining revisions are not related to the ESFAS modification. As stated in Reference 1, Attachment 1, Section 1.0 (fourth paragraph), changes to other items in the Table Notation are proposed in order to remove information that has been

included in the SFCP and to remove redundancy between the table and the notation. Following approval of Amendment 249, it was identified that these notes required revision. The following information is provided as amplifying information to that provided above and in Reference 1:

Item 1: Prior to Amendment 249, this note stated “Each train or logic channel shall be tested at least every 62 days on a STAGGERED TEST BASIS.” The note referred to a monthly surveillance frequency (“M”) in the table for the functional test of the actuation subgroup relays for several functional units. Amendment 249 revised the note to state “Each train or logic channel shall be tested in accordance with the Surveillance Frequency Control Program” and revised the “M” frequency in the table to “SFCP.” This is because the amendment to change the TS to implement the SFCP generally replaced all references to specific frequencies in the TS (such as monthly) to reference the SFCP. It was overlooked that the revisions to the note and table in conjunction with each other became redundant. This item has been added to this LAR as a clean/up administrative item to correct this redundancy. The change to this note is not being requested to support the ESFAS modification.

Item 5: Prior to Amendment 249, the frequency for the functional test for the control valve logic was provided in the table as “SA” (semiannually). Amendment 249 replaced the “SA” frequency with “SFCP.” Note 5 provides amplifying information to ensure that the test be performed during each cold shutdown if not performed in the previous 6 months. The event of cold shutdown does not drive or require the performance of the surveillance; the driver for the surveillance is that routine functional testing of the control valve logic to verify functional reliability is required to be performed at an appropriate frequency to ensure the safety system will function when necessary. This frequency has been determined to be on a semiannual basis. The note ensures that it gets performed during the time when the plant is shut down to minimize the number of times that the surveillance would be performed during operation, which would be more intrusive on plant operations, given that the typical operating cycle is 18 months. It does not meet the exclusion criteria specified in TSTF-425; therefore, it is appropriate that this note be deleted from the TS. The information contained in this note was included in the SFCP following implementation of Amendment 249. The change to this note is not being requested to support the ESFAS modification.

Item 6: The reason for this change is the same as the reason for the change to Item 1. Prior to Amendment 249, this note stated “Each train shall be tested, with the exemption of relays, K110, K410 and K412, at least every 62 days on a STAGGERED TEST BASIS. Relays K110, K410, and K412 shall be tested at least every 62 days but will be exempt from the STAGGERED TEST BASIS.” The note referred to a monthly surveillance frequency (“M”) in the table for the functional test of the actuation subgroup relays for the Safety Injection actuation System. Amendment 249 revised the note to state “Each train shall be tested, with the exemption of relays, K110, K410 and K412, in accordance with the Surveillance Frequency Control Program. Relays K110, K410, and K412 shall be tested in accordance with the Surveillance Frequency Control Program.” As in the case with item 1, this revision to the note as a result of Amendment 249 has rendered it redundant, and therefore this item has been added to this LAR as a clean/up administrative item to correct this redundancy. The change to this note is not being requested to support the ESFAS modification

RAI-4

The license amendment would edit the second sentence of Note 3 of the Table Notation of the current TS Table 4.3-2. The second sentence of the Note currently states "[r]elays K109, K114, K202, K301, K305, K308 and K313 are exempt from testing during power operation but shall be tested in accordance with the Surveillance Frequency Control Program (SFCP) and during each COLD SHUTDOWN condition unless tested within the previous 62 days." The LAR proposes to remove this sentence and relocate all of the surveillance requirements, including testing during COLD SHUTDOWN, to the SFCP, based on the adoption of TSTF-425 as approved in Amendment No. 249. However, TSTF-425, as implemented in Amendment No. 249, requires that a surveillance requirement may not be relocated to the SFCP if it falls into one of the four exclusion categories. The text "unless tested within the previous 62 days" seems to meet the exclusion criteria for frequencies, which are event-driven but have a time component for performing the surveillance on a one-time basis once the event occurs. Explain why this text does not meet these exclusion criteria for TSTF-425, and why this text may be relocated to the SFCP.

Entergy Response to Request RAI-4

Relays K109, K114, K202, K301, K305, K308 and K313 are a subset of a larger group of all actuation subgroup relays in the various functional units of the ESFAS. The surveillance requirement to perform channel functional tests are required for all actuation subgroup relays to verify functional reliability (to ensure the safety system will function when necessary). For the bulk of the relays, this surveillance has historically been performed with a frequency of monthly, on a staggered test basis (these relays are not listed using their specific plant identification in the TS). The testing of the relays listed in Note 3 do not have to be performed during power operation, therefore they do not have a surveillance frequency of monthly.

For the relays listed in Note 3, the surveillance frequency is that they are tested at least once per 18 months and during each cold shutdown condition unless tested within the previous 62 days. What this means is that the relays are required, at a minimum, to be tested every 18 months. The event (mode) of cold shutdown does not drive/require the performance of the surveillance; rather, the surveillance is required per the routine requirement to verify functional reliability. This 18 month frequency coincides with the 18 month fuel cycle, i.e., the plant will be in cold shutdown for refueling, and so the test is performed at that time (when it is safe to operate the equipment actuated when the relay is tested). Sometimes the plant will be in a cold shutdown at a time that is outside of the 18 month fuel cycle, as in the case where an equipment malfunction requires a forced outage to repair the equipment. Given that this circumstance provides an added opportunity to perform this surveillance, this note is added as amplifying information to ensure that this surveillance gets performed during cold shutdown when it is possible. The statement “unless tested within the previous 62 days” is included to eliminate the need to unnecessarily perform the surveillance a second time soon after it has just been performed, such as would be the case if the plant were in a refueling outage and the surveillance had been performed as scheduled, and then an equipment problem forced an outage where cold shutdown condition was required soon after restart following the refueling outage. In this instance, an opportunity would have presented itself to test the relay again during the forced outage, but it would not be necessary to perform the surveillances very close together. It was determined that if the test had been performed in the past 62 days, that this would be a reasonable amount of time to not require that the test be performed again, and therefore this timeframe was included in the surveillance frequency.

This portion of Note 3 was previously addressed by Entergy in Reference 3, which was the response to RAIs for the TSTF-425 LAR (Amendment 249). Entergy's response to RAI-8 indicated that this portion of Note 3 met the exclusion criteria specified by TSTF-425. Based on the justification provided in the previous paragraph, the response provided in Reference 3 is no longer Entergy's position; therefore, Entergy believes that Note 3 does not meet the exclusion criteria specified by TSTF-425.

RAI-5
Section 1.0 of the LAR states, in part:

> Additional subgroup relays that are being added to the ESFAS as part of the modification will be subject to the same testing frequency. The note [Note 3 of the current TS Table 4.3-2] will be revised in order to remove information that is being included in the licensee-controlled SFCP. Following completion of the ESFAS SPV Trip Hardening Modification, the additional relays will be added to the SFCP to the group that is not tested during power operation.

In order to establish this frequency and then relocate this frequency to the SFCP, please provide the following information:

a) Please confirm that the LAR proposes to include the surveillance testing of the new relays in Table 4.3-2 and the SFCP with an initial frequency of once per 18 months and during each COLD SHUTDOWN condition unless tested within the previous 62 days. Section 50.36(c)(2)(ii) of 10 CFR states, "A technical specification limiting condition for operation of a nuclear reactor must be established for each item meeting one or more of the following criteria." Section 50.36(c)(2)(ii)(C) of 10 CFR, Criterion 3 states "a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier." Explain why the additional subgroup relays being added meet or do not meet 10 CFR 50.36(c)(2)(ii) and 10 CFR 50.36(c)(2)(ii)(C) Criterion 3 for which a TS must be established.

b) The surveillance frequency of the existing relays was granted as an exception to GDC 21 and IEEE 279-1971 through invoking Section D.4 of RG 1.22, as supported by References 7, 8, and 9 in the application. The proposed design contains two contacts in each circuit, such that actuation of any one of the relays will not result in an ESFAS component actuation. Therefore, justify that the surveillance frequency of the new relays, which would be the same as the existing relays, should be granted this same exception to GDC 21 and IEEE 279-1971.

Entergy Response to Request RAI-5
The following two paragraphs provide the response to part a) of RAI-5. The response to part b) of RAI-5 is provided in the response to RAI-1.

As currently amended, Table 4.3-2 requires that a channel functional test be performed on all actuation subgroup relays that are contained in the functional units listed in the table, as required by 10 CFR 50.36(c)(2)(ii)(C); i.e., the TS SR is already established. The individual actuation subgroup relays are not all listed (using their plant identification) in the TS. The frequency at which the test is performed is per the SFCP, as stated in the table. The specific frequencies are provided in the SFCP.

As stated in Reference 1 and in the response to RAI-4, the second sentence of note 4 of Table 4.3-2 is the surveillance frequency for those relays listed in the note, and it therefore is included in the LAR to revise the note to delete the second sentence and include this frequency in the SFCP for those specific relays. The remaining actuation subgroup relays (not specifically listed) have historically had a surveillance frequency of monthly, on a staggered test basis; this frequency is included in the SFCP.

Another way of stating this is that all actuation subgroup relays are required to be tested per 10 CFR 50.36; this is stated in the body of Table 4.3-2. The frequency at which each individual relay is tested is not necessarily the same, but since the frequencies are included in the SFCP, the individual relays are no longer required to be listed in the TS.

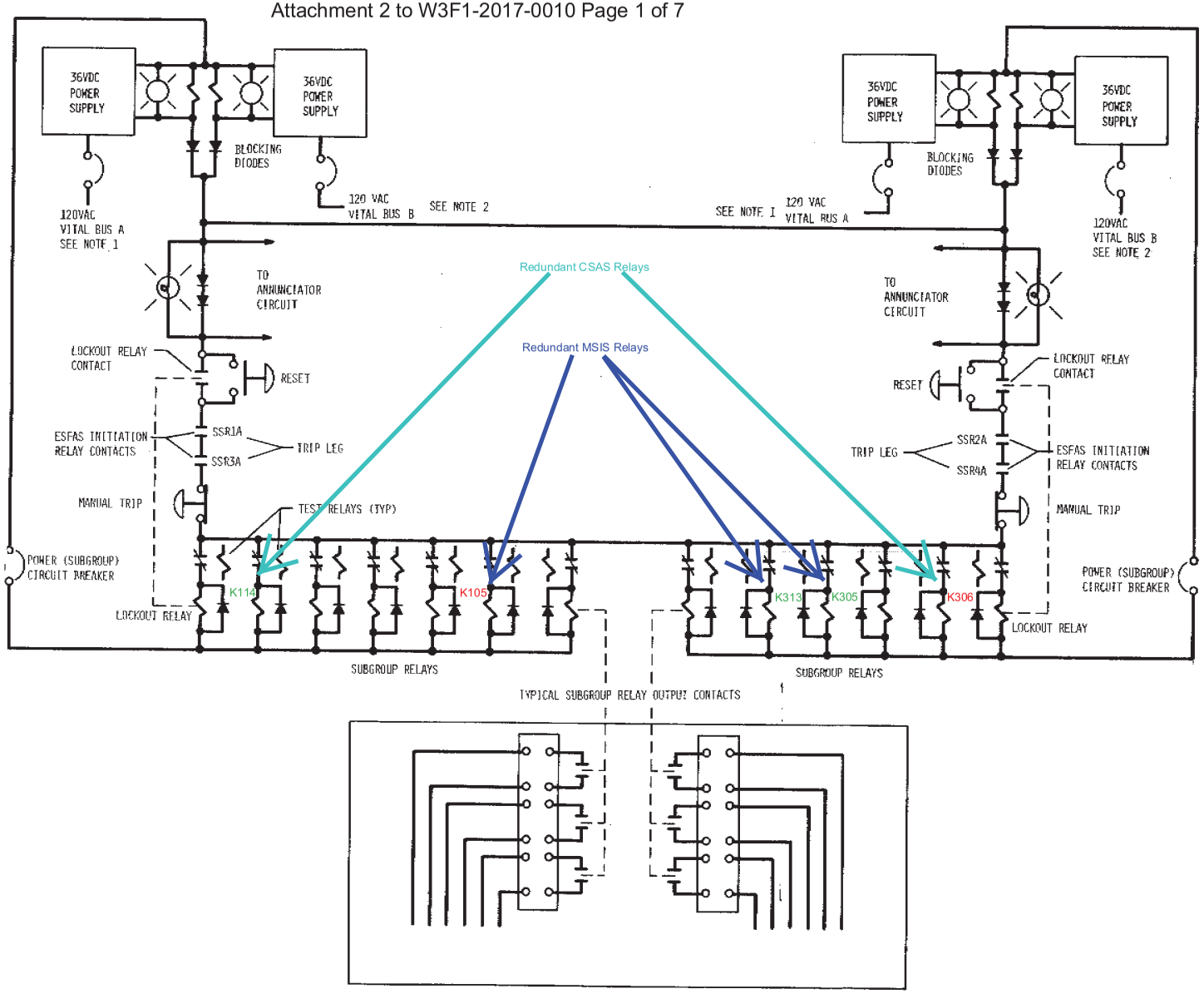
The ESFAS modification includes the addition of two new actuation subgroup relays, K306 and K105. Following modification, K306 will be included by design in the group of relays that are part of functional unit 2, Containment Spray, and K105 will be included in the group of relays that are part of functional unit 4, Main Steam Line Isolation. These relays will therefore be required by TS to be included in the channel functional test performed for their respective functional units. Since the SFCP allows for licensee-control of the surveillance frequencies, an appropriate frequency for performance of this surveillance will be determined in accordance with the program. Given that it is desired to test these new relays at the same frequency that the existing actuation subgroup relays for their respective functional units are being tested, they will be included in the group that is not tested during power operation as identified in the SFCP, with the surveillance frequency of “once per 18 months and during each COLD SHUTDOWN condition unless tested within the previous 62 days.”

Attachment 2

to

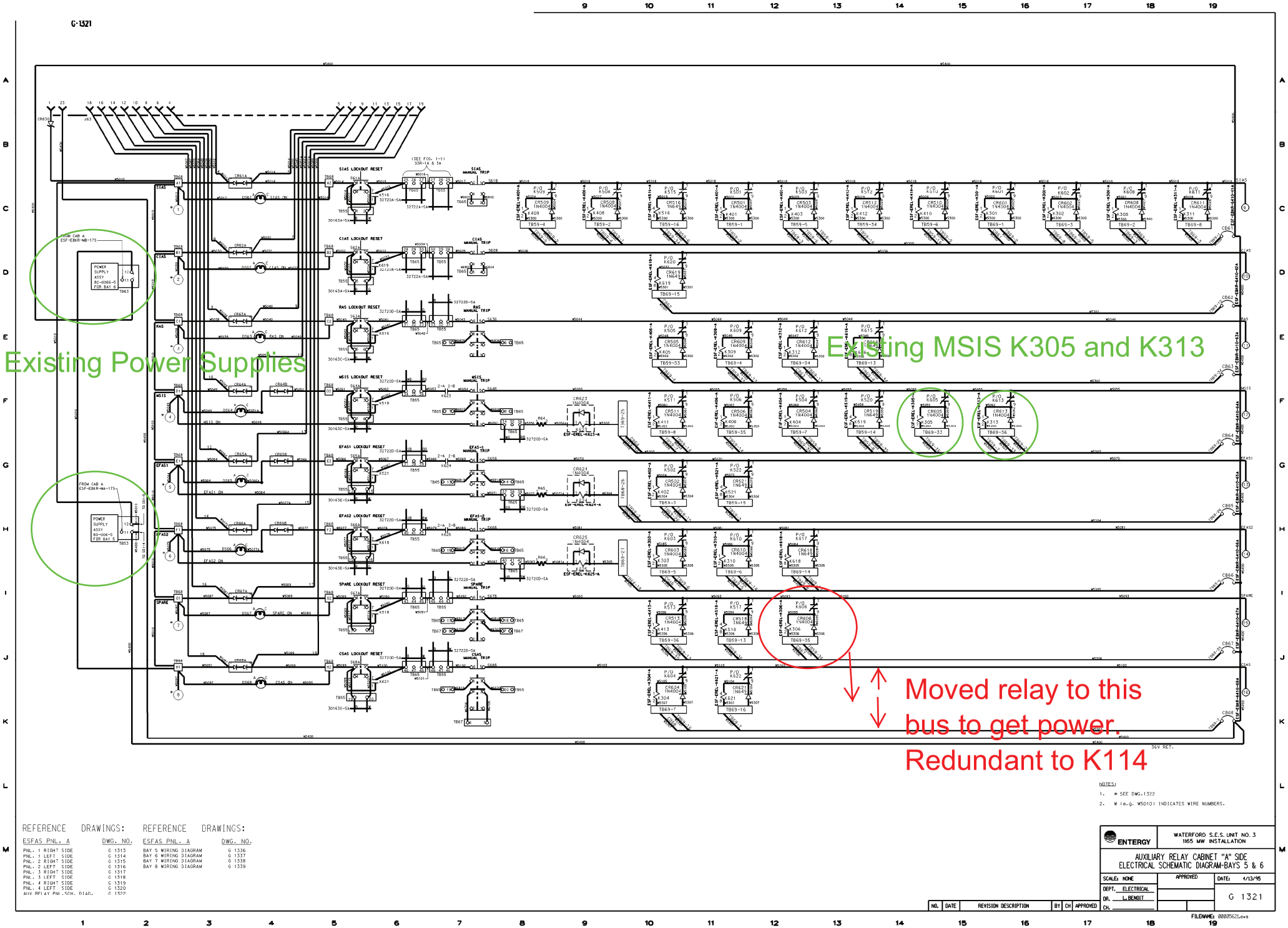
W3F1-2017-0010

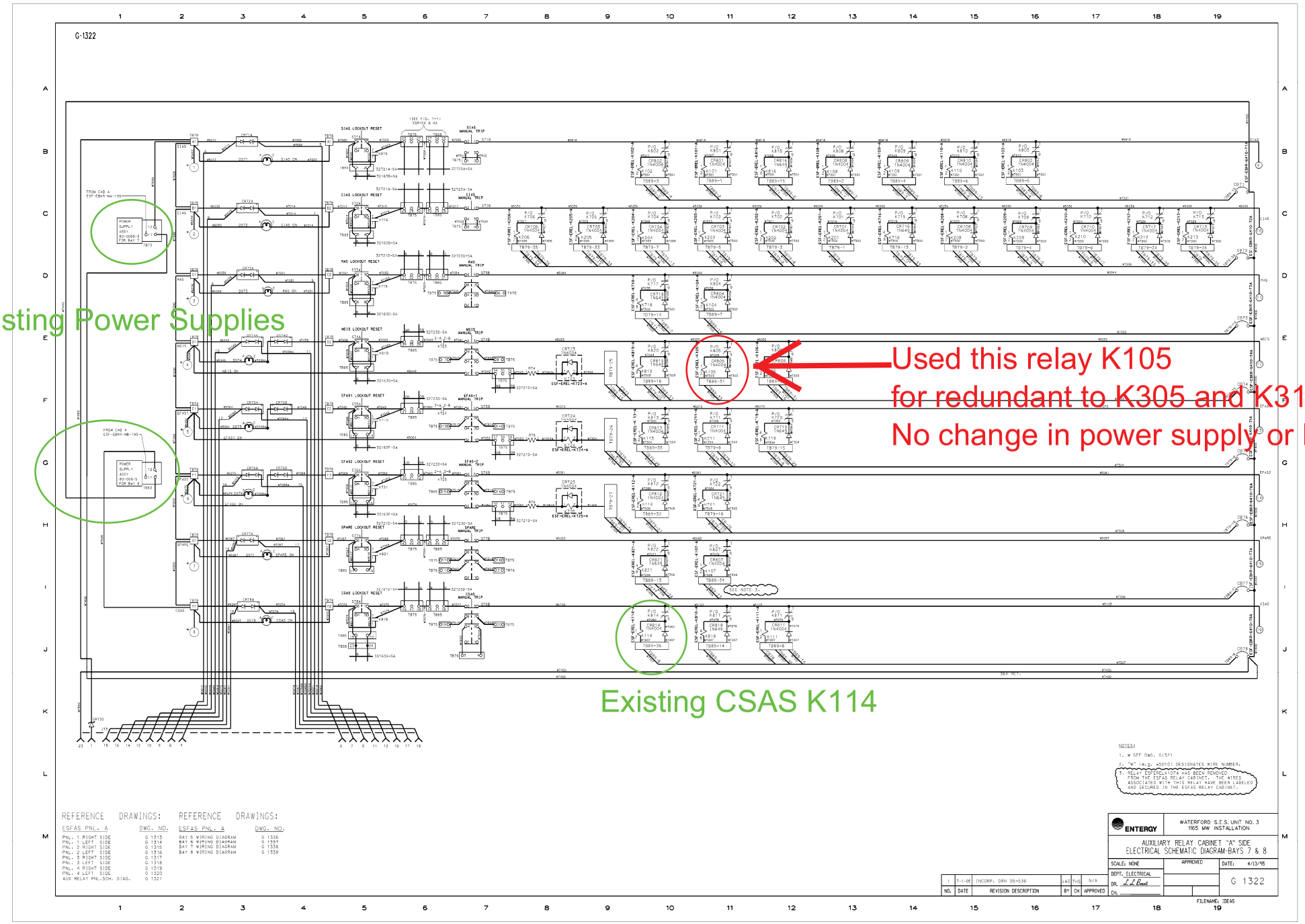
Circuit Diagrams
ESFAS SPV Trip Hardening Modification



NOTE:
1. FOR CABINET "B" SUBSTITUTE "VITAL BUS C" FOR "VITAL BUS A".
2. FOR CABINET "B" SUBSTITUTE "VITAL BUS D" FOR "VITAL BUS B".

Generic Diagram of System Configuration After Change
(ESFAS Auxiliary Relay Cabinet Simplified Schematic Diagram for a Typical Actuation Signal)


G-1321
Existing Power Supplies
Existing MSIS K305 and K313
Moved relay to this bus to get power. Redundant to K114
NOTES:
1. * SEE DWG.1322
2. W (e.g. W5010) INDICATES WIRE NUMBERS.
REFERENCE DRAWINGS:
ESFAS PNL. A DWG. NO.
PNL. 1 RIGHT SIDE G 1313
PNL. 1 LEFT SIDE G 1314
PNL. 2 RIGHT SIDE G 1315
PNL. 2 LEFT SIDE G 1316
PNL. 3 RIGHT SIDE G 1317
PNL. 3 LEFT SIDE G 1318
PNL. 4 RIGHT SIDE G 1319
PNL. 4 LEFT SIDE G 1320
AUX RELAY PNL.SCH. DIAG. G 1322
REFERENCE DRAWINGS:
ESFAS PNL. A DWG. NO.
BAY 5 WIRING DIAGRAM G 1336
BAY 6 WIRING DIAGRAM G 1337
BAY 7 WIRING DIAGRAM G 1338
BAY 8 WIRING DIAGRAM G 1339
ENTERGY
WATERFORD S.E.S. UNIT NO. 3
1165 MW INSTALLATION
AUXILIARY RELAY CABINET "A" SIDE
ELECTRICAL SCHEMATIC DIAGRAM-BAYS 5 & 6
SCALE: NONE
APPROVED
DATE: 4/13/95
DEPT. ELECTRICAL
DR. L. BENOIT
CH.
G 1321
NO. DATE REVISION DESCRIPTION BY CH APPROVED
FILENAME: 00025621.ewa

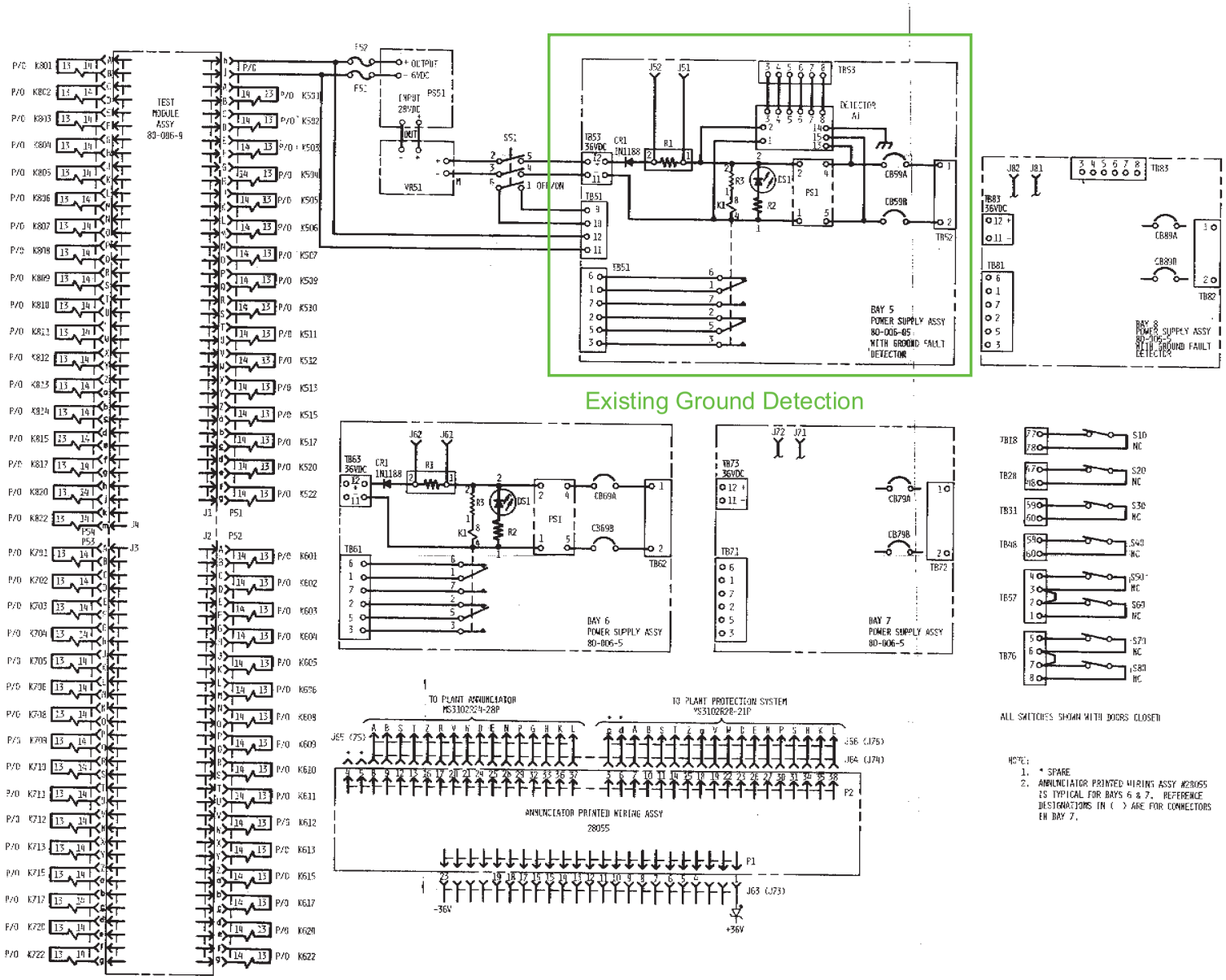

Existing Power Supplies
Used this relay K105
for redundant to K305 and K313.
No change in power supply or bus.
Existing CSAS K114
G-1322
AUXILIARY RELAY CABINET "A" SIDE
ELECTRICAL SCHEMATIC DIAGRAM-BAYS 7 & 8
WATERFORD S.E.S. UNIT NO. 3
1165 MW INSTALLATION
ENTERGY
REFERENCE DRAWINGS:
ESFAS PNL. A
DWG. NO.
PNL. 1 RIGHT SIDE G 1313
PNL. 1 LEFT SIDE G 1314
PNL. 2 RIGHT SIDE G 1315
PNL. 2 LEFT SIDE G 1316
PNL. 3 RIGHT SIDE G 1317
PNL. 3 LEFT SIDE G 1318
PNL. 4 RIGHT SIDE G 1319
PNL. 4 LEFT SIDE G 1320
AUX RELAY PNL.SCH. DIAG. G 1321
REFERENCE DRAWINGS:
ESFAS PNL. A
DWG. NO.
BAY 5 WIRING DIAGRAM G 1336
BAY 6 WIRING DIAGRAM G 1337
BAY 7 WIRING DIAGRAM G 1338
BAY 8 WIRING DIAGRAM G 1339
NOTES:
1. ✱ SEE DWG. G1321
2. "W" (e.g. W0701) DESIGNATES WIRE NUMBER.
3. RELAY ESFEREL41074 HAS BEEN REMOVED FROM THE ESFAS RELAY CABINET. THE WIRES ASSOCIATED WITH THIS RELAY HAVE BEEN LABELED AND SECURED IN THE ESFAS RELAY CABINET.
SCALE: NONE
APPROVED
DATE: 4/13/95
DEPT. ELECTRICAL
DR. J. L. Ewart
CH.
G 1322
FILENAME: IDEAS
1 7-1-05 INCORP. DRN 05-536 JAC THS N/A
NO. DATE REVISION DESCRIPTION BY CH APPROVED

Ground Detector Description

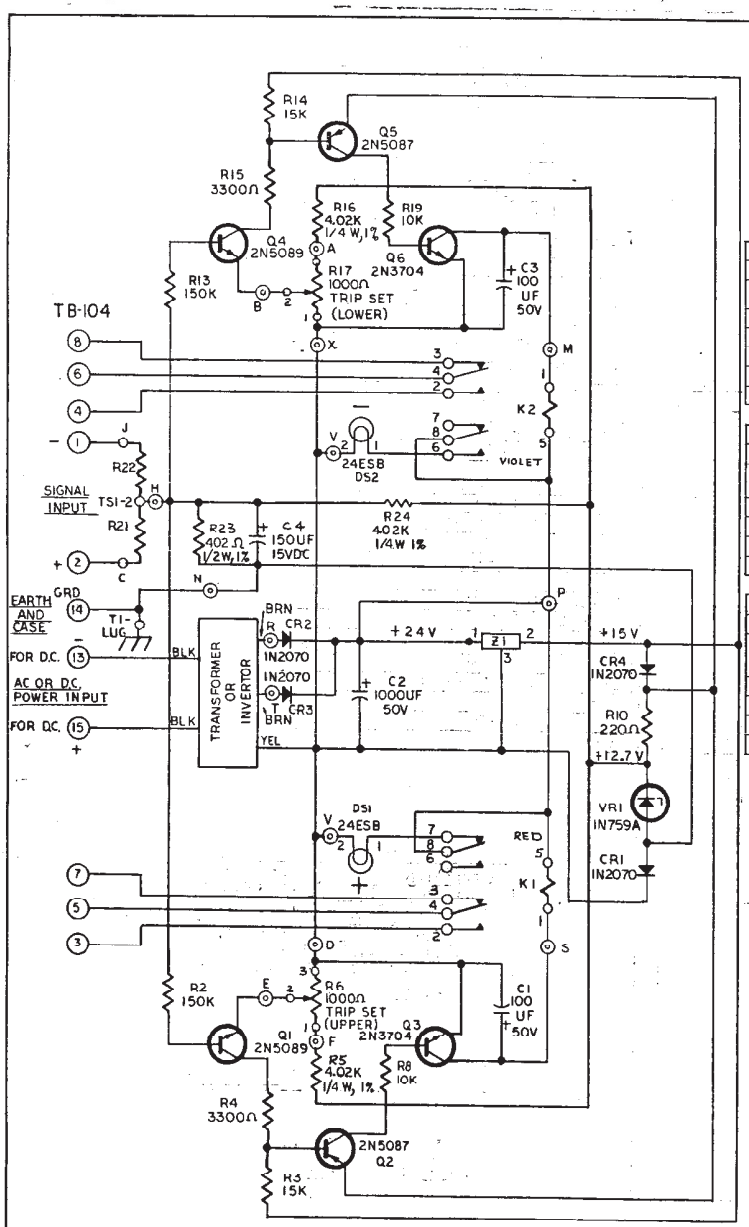
The power supplies in bays 5 and 8 are provided with a ground detector. Each ground detector monitors the leakage to the cabinet from the positive and negative output terminals of the floating power supply.

The ground detector has provisions for selecting allowable leakage resistances. For the Auxiliary Relay Cabinet, the allowable leakage resistance is 100K. When the leakages increase beyond this preset limit, the ground detector indicates the excessive leakage by means of an indicator lamp – one for the positive and one for the negative-terminal leakage. At the same time, a relay for each polarity will trip and provide an annunciator alarm signal.

The following page shows the ground detection from Circuit TD-C490.0645_0_003-1.



Ground Detection from Circuit TD-C490.0645_0_003-1
(ESFAS Auxiliary Relay Cabinet, Schematic Diagram)



ALL RES. ARE 1/2W, 5% UNLESS NOTED.

117VAC PRIME POWER / E1	
WIRE LIST "A"	
FROM 1000-055	TO PR-2000
T1-BLK	TERM 15
T1-BLK	TERM 13
T1-YEL	BD-X
T1-BRN	BD-R
T1-BRN	BD-T

125VDC PRIME POWER / E10			
WIRE LIST "B"			
FROM 1012-119	TO PR-2000	AWG	COLOR
INV-18	TERM 15	22	WHT/BLK
INV-17	TERM 13	22	BLK.
INV-15	BD-X	22	YEL.
INV-14	BD-R	22	BRN.
INV-16	BD-T	22	BRN.

24VDC (ISO) PRIME POWER / E12			
WIRE LIST "C"			
FROM 1024-613	TO PR-2000	AWG	COLOR
E17	TERM 15	22	RED
E18	TERM 13	22	BLK.
E8	BD-R	22	YEL.
E9	BD-X	22	WHT.

48VDC (ISO) PRIME POWER / E11			
WIRE LIST "D"			
FROM 1042-567	TO PR-2000	AWG	COLOR
E17	TERM 15	22	RED
E18	TERM 13	22	BLK.
E8	BD-R	22	YEL.
E9	BD-X	22	WHT.

WIRING LIST					
FROM	TO	AWG	FROM	TO	AWG
R6-Y (3)	BD-D	—	TB104-4	K2-2	18
R6-R (2)	BD-E	—	K2-1	BD-M	24
R6-G (1)	BD-F	—	K1-5	BD-P	RED 24
R17-Y (1)	BD-D	—	K2-5	BD-P	VIO. 24
R17-R (2)	BD-B	—	TB104-2	BD-C	24
R17-G (3)	BD-A	—	TB104-1	BD-J	24
			T1-LUG	TB104-14	18
			TB104-7	K1-3	
			5	K1-4	
			3	K1-2	
			8	K2-3	
K1-1	BD-S	24	TB104-6	K2-4	18
DS1-2	BD-V	—			—
DS1-1	K1-7	—	T1-LUG	BD-N	—
DS2-1	K2-6	—	K1-5	K1-8	—
DS1-2	DS2-2		K2-5	K2-8	—

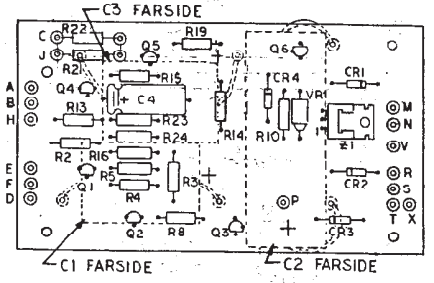
INPUT RESISTORS 1/2 W, 1%, RN65D		
SIGNAL	R21 & R22	PART NO.
125VDC	60.4KΩ	4710-468
12VDC	5.76 Ω	4710-346
24VDC	10KΩ	4710-377
48VDC	20KΩ	4710-417
250VDC	(2)-301KΩ IN PARALLEL	4710-550

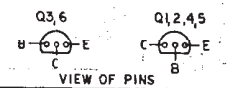
R6 R17
Y--G-- 3
R--R-- 2
G--Y-- 1

A-1025-032
K1,2
NC
NC

1011-237
M1

POWER INPUT SELECTION CHART	
INPUT	USE DIVICE
117VAC 60HZ	A1000-055 TRANSFORMER
125 VDC	A-1012-119 DC TO AC INVERTER
48VDC	A-1042-567 DC TO AC INVERTER





REV	DESCRIPTION	CHK	APPR
M	DCO 2298 GFR 9-MAR-83		
L	DCO 1633, AW 6-2-82		
K	DCO PR 050 KAA 10-2-79		
J	DCO PR-044 GJB 2-5-79		
H	DCO PR-28 CRC 82577		
G	DCO PR-1 HG 5 21 74		
F	DCO TR-183 HG 4-22-74		
E	DCO RA-294, EA 3-20-72		
D	DCO RA274 CW 11871		
C	DCO RA-257, EA 7-30-71		
B	DCO-RA-194 CW 3-24-71		
A	DCO ET-104 dtd 8-7-70		

REVISIONS M

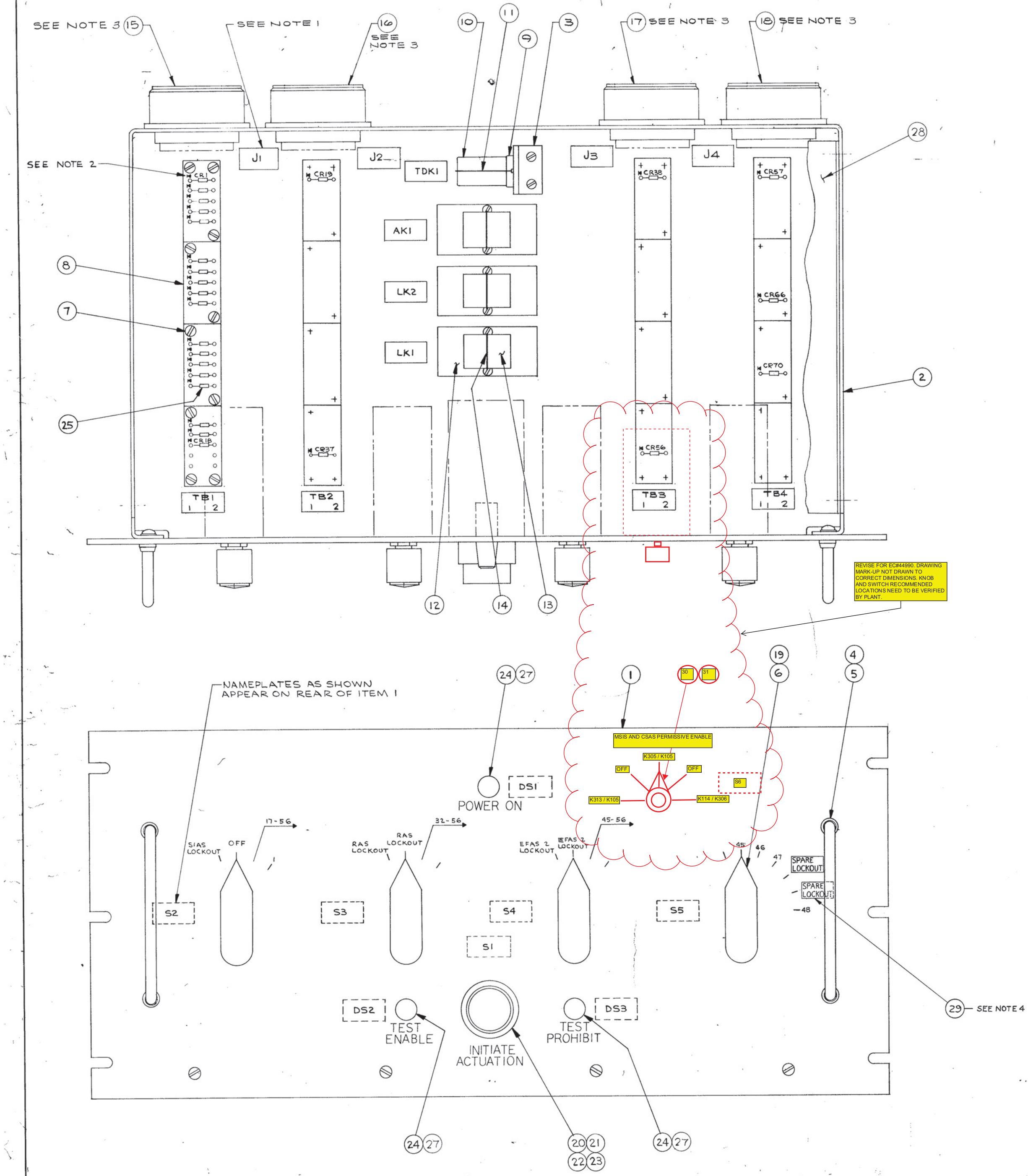
D.C. POTENTIAL GROUND DETECTOR

PR 2000

ROCHESTER INSTRUMENT SYSTEMS, INC.
275 NORTH UNION STREET ROCHESTER, NEW YORK 14605

CUSTOMER		NEXT ASSY	QTY
CUSTOMER P.O.		S/N A-1012-116	
R.I.S.E. S.O.	REL DATE	DRAWN Lucien Alvarez Jr. 2-6-70	
NAT'L	FINISH	CHECKED 2-9-70	CHECKED
DIMENSIONS ARE IN INCHES TOLERANCES DECIMAL ± .005 FRACTION ± 1/64 OR AS INDICATED		APPROVED E.J. HANES 2/5/70	

SCALE NONE
SHT 1 OF 1
DWG NO. C-1011-237
REV M



REVISE FOR EC#44990

BILL OF MATERIAL			
ITEM	QUAN	DESCRIPTION	MATERIAL
1	1	FRONT PANEL, TEST MODULE	80-006-7
2	1	CHASSIS, TEST MODULE	80-006-8
3	1	RELAY MTG. BRACKET	80-006-8-1
4	4	FERRULE	CTC # 1211-1
5	2	HANDLE	CTC # 1282-1
6	4	KNOB	RAYTHEON #125-7-2G
7	40	STANDOFF	AMATOM #9224SS140
8	4	TERMINAL BOARD 4 SECTION	NEVRON PLASTICS
9	1	RELAY SOCKET	POTTER BRUM. #27E327
10	1	TIME DELAY RELAY	" " #R1460F6Z4E3
11	1	RETAINING SPRING	" " #20C266
12	3	RELAY SOCKET	" " #27E166
13	3	RELAY	" " #KHS17D12-6
14	3	RETAINING SPRING	ALLIED CONTL # 3040-2
15	1	CONNECTOR	MS3102 R36-10P
16	1	CONNECTOR	" -10 PW
17	1	CONNECTOR	" -10PX
18	1	CONNECTOR	" -10 PY
19	4	ROTARY SWITCH, GRAYHILL	#59M18-06-1-20N-C
20	1	CONTACT BLOCK	CUTLER-HAM. # 10250T2
21	1	CONTACT BLOCK	" " # 10250T3
22	1	CONTACT BLOCK	" " # 10250T55
23	1	PUSHBUTTON OPERATOR	" " # 10250T109
24	3	LAMPHOLDER, SLOAN	856-R-MB-1 3/4 RED
25	70	DIODE	IN 4004
26	AR	WIRE, #22 AWG, STRANDED SINGLE CONDUCTOR	
27	3	LAMP, LED, CHICAGO MINIATURE	CM4-8002
28	1	COVER, TEST MODULE	80-006-13
29	2	NAMEPLATE	EM# 5868-28064
30	1	SWITCH, ROTARY	GRAYHILL # 44M45-04-1-08N
31	1	KNOB, SKIRTED	PANEL PRODUCTS # 70-5-2G

NOTES:

1. NAMEPLATES TO BE 1/8 THK. 3 PLY LAMICOID # 7025 PLATE WITH BLACK SURFACES AND WHITE CORE. ALL CHARACTERS TO BE CONDENSED GOTHIC ENGRAVED WITH A ROUNDED OR SQUARE END CUTTER. PLATES TO HAVE A 1/64 BEVEL ALL AROUND. PLATE TO BE 1/2 x 1 WITH 1/8 HIGH CHARACTERS. NAMEPLATES TO BE FASTENED IN PLACE APPROX. AS SHOWN USING SCOTCH-GRIP INDUSTRIAL ADHESIVE # 847, OR #1099.
2. STARTING AT TB1, TERMINAL BOARDS SHALL BE CONSECUTIVELY MARKED CR1 THRU CR70, ALSO MARK SYMBOL AS SHOWN. CHARACTERS TO BE 1/8 HIGH, BLACK, PERMANENT MARKINGS.
3. FOR CONNECTIONS BETWEEN TEST MODULE & CABINET ASSY SEE CABINET SCHEMATIC (REF: 5868-80-006-12, SHEET 2).
4. ATTACH ITEM # 29 TO FRONT OF TEST MODULE USING ADHESIVE SPECIFIED IN NOTE #1, APPROX. WHERE SHOWN, TAKING CARE TO COVER EXISTING ENGRAVING

LOUISIANA POWER & LIGHT
WATERFORD UNIT № 3
C.E. SPECIFICATION № 9270-ICE-3002

AS BUILT
R C McCombs 12-27-76

SHEET NO.	REVISION LETTER
2	B
1	C

DRAWING SHEET REVISION STATUS

Engineering Change Mark-up	EC #: 44990	Page 1 of 1
DOC #: 1564-6347	SHT # 0	REV 1
Before View ☐	Control Room Drawing: ☐	
Supersedes Mark-up from EC #:	Issued per ECN #:	
Art Mason Prepared By:	4/29/2016 Date	IAS Reviewer Name (Optional)

	REVISIONS	DATE	BY
C	REVISED PER ECO 13850	10/20/81	
B	REVISED PER ECO 13676	9/11/81	
A	RELEASED PER ECO 5724	12/27/76	

ACCO ELECTRO-MECH DIVISION
10 RESEARCH DRIVE, STRATFORD, CONNECTICUT 06497

AUX RELAY CABINET - TEST MODULE ASSY

DATE	SCALE	JOB
6-21-74	FULL	80-006
DRAWN BY: SOUTHARD	CHECKED	DRAWING NUMBER
Q.A.	APPROVED: K.N.R.	5868-80-006-9

SHT 1 OF 2