NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Waterford Steam Electric Station Unit 3	0 5 0 0 0 3 8 2	1 OF 1 0

TITLE (4) Blown Undervoltage Circuit Fuse
Replacement Results in Technical Specification 3.0.3 Entry

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
0 3	2 1	8 8	8 8	— 0 0 5	— 0 0	0 4	2 0	8 8	N/A	0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
C.R. Gaines, Event Analysis and Reporting Supervisor	AREA CODE 5 0 4 — 4 6 4 - 3 1 3 7

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ABSTRACT

At approximately 0900 hours on March 21, 1988, Waterford Steam Electric Station Unit 3 was operating at 100% power when a Maintenance technician inadvertently allowed two wire connections to short while replacing a voltmeter selector switch, causing a fuse of the 'B' train 4160V undervoltage (UV) relay coil to blow. Replacement of this fuse requires temporarily disabling all three channels of undervoltage protection for the 'B' train 4160V safety bus. Since these relays are delta connected, the blown fuse reduced the UV actuation to a 1/1 rather than the designed 3/3 logic. Since operation in this mode is not desirable and the design of the installed test circuitry would not allow the daily functional test to be performed, the Resident Inspector was briefed and TS 3.0.3 was entered for six minutes while the fuse was replaced.

The application of TS 3.3.2 Action Requirements 12 and 17 to this circuit is impractical since repairing one channel has the effect of rendering all three channels inoperable. A change to the TS is being pursued to correct this deficiency. This condition would not preclude a diesel start due to a Safety Injection Actuation Signal (SIAS). During this event there was a 290 minute period when a single failure could have caused a spurious ESF actuation and six minutes without UV protection on one safety bus. The 'A' safety bus was operable throughout the event.

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

NARRATIVE

At approximately 0900 hours on March 21, 1988, Waterford Steam Electric Station Unit 3 was operating at 100% power when a Maintenance technician inadvertently allowed two wire connections to short while replacing a voltmeter selector switch (see Figure 1) (EIIS Identifier EA-EIS), 4KV-EM-3B-12A, causing the phase 'A' fuse for the primary winding of a 4160/120 VAC potential transformer (see Figure 1) (EIIS Identifier EA-XPT) to blow. The transformer supplies power to the 3B3-S 4160V Bus (EIIS Identifier EA-BU) undervoltage protection circuitry. The blown fuse caused two of the three undervoltage (UV) relays (EIIS Identifier EC-RLY), 27-2/B3 and 27-3/B3 (see Figure 1), and two of the three degraded voltage (DV) relays (EIIS Identifier EC-RLY), 27-2E/B3 and 27-3E/B3 (see Figure 1), to drop out, which resulted in actuation of the respective contacts (see Figure 2) (EIIS Identifier EJ-CNTR). This provided 125VDC power to the 27-2X and 27-3X relays (see Figure 2) (EIIS Identifier EJ-RLY). These DC energized relays, in conjunction with the 27-1X relay of phase C, provide 3 out of 3 coincidence logic to send an emergency start signal (see Figure 3) to the 'B' Emergency Diesel Generator (LDG) (EIIS Identifier EK-GEN) upon an undervoltage or degraded voltage condition in the 3B3-S 4160V bus. Since these relays were energized as a result of the blown fuse, they would not have prevented an emergency start of the 'B' EDG, but they effectively reduced the undervoltage signal coincidence logic to 1 out of 1 for phase C.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Technical Specification (TS) 3.3.2 Action Requirement 17 allows continued operation in modes one, two, or three with one inoperable undervoltage channel provided the channel is placed in the "tripped" condition within one hour. If this is not possible, Action Requirement 12 states that the inoperable undervoltage channel is to be restored within 48 hours or the plant be in hot standby within 6 hours and cold shutdown in the following 30 hours. The action requirements do not specify what action to take if more than one channel is inoperable; thus, the conservative interpretation would require TS 3.0.3 be entered. TS 3.0.3 provides the action to take when a Limiting Condition for Operation (LCO) is not met and requires action to be initiated within one hour to shut down and cool down the plant. Since the 120 VAC undervoltage and degraded voltage channel relays are delta connected, the blown fuse caused two of the three relays of both UV and DV channels to deenergize and since this condition resulted in the corresponding DC relays 27-2X and 27-3X being energized, undervoltage protection was still provided by the phase 'C' channel. Since there is no functional difference in having one or two of these DC relays energized, it was considered that the two channels were still operable and in fact were operating in this case. Subsequent conversations with knowledgeable members of the NRC staff confirmed that the relays would be considered operable in such a situation.

The failure of these relays would have prevented performance of the daily Functional Test per TS 4.3.2. TS 4.3.2 requires daily surveillances of each DC energized relay and specifies use of the installed test switches which test and reset those relays in a predetermined sequence. Since two of these relays were energized, the remaining relay could not be tested due to the failure. Although the tripped channels could be considered operable in this case, the extension allowed by TS 4.0.2 would have expired six hours after the daily surveillance was due, necessitating entry into TS 3.0.3 and subsequent plant shutdown since the channels not tested would have to be declared inoperable per TS 4.0.3. Thus TS 3.0.3 would have been entered in approximately sixteen hours if the fuse was not replaced.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Since it was not clear how the action requirements of TS 3.3.2 should apply in this case, the daily functional test could not be performed, and operation in this mode is not desirable due to exposure to inadvertent Engineered Safeguards Features (ESF) actuations from a single failure, it was evident that the fuse should be replaced as soon as practicable. As soon as job preparation could be completed and plant conditions were stabilized, the fuse block was pulled and TS 3.0.3 was entered for six minutes while the blown fuse was replaced. Prior to performing this work, the NRC Resident Inspector was briefed by the Assistant Operations Superintendent. This briefing concentrated on the technical details and planned compensatory actions while UV protection was disabled rather than Technical Specification or reportability implications.

Since its routine surveillance was due, EDG 'B' was operationally tested satisfactorily by procedure OP-903-068, "Emergency Diesel Generator Operability Verification," at 1019 hours. Additionally, a reactor shutdown was commenced at 1124 hours due to rising temperature on the Upper Thrust Bearing (UTB) of 2B Reactor Coolant Pump (RCP) (EIIS Identifier AB-P). The diesel test and the reactor shutdown were unrelated to the concurrent event involving the blown fuse. Mode 3 was entered at 1324 hours. TS 3.0.3 was entered at 1345 hours and exited at 1351 hours.

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

If one or more D.C. undervoltage relays do become inoperable and cannot be placed in the "tripped" position, there are three major effects on the plant. First, the diesel will not receive a start signal due to undervoltage. Second, the sequencer will not reset on an undervoltage. The sequencer causes the diesel to be sequentially loaded after a loss of the normal power supply. Third, loads on the affected safety bus will not trip on an undervoltage condition. The Safety Injection Actuation Signal (SIAS) start features for the diesel and sequencer are not affected, but a SIAS will not cause the affected safety bus loads to trip without an undervoltage signal. This was the condition which existed for six minutes while the failed fuse was replaced. In order to compensate for this condition, the on-shift licensed operators were briefed and stationed to manually trip the running ESF Bus loads, start the EDG, and start the sequencer if a loss of normal power to the ESF Bus occurred.

The root cause of this event was cognitive personnel error by a First Line Maintenance Supervisor since he rescheduled the voltmeter selector switch replacement without performing an adequate review of the work package. The work was originally scheduled to be completed during bus maintenance in the second refueling outage when the buswork including the UV protection circuitry would be deenergized. This job was rescheduled for completion prior to the outage in order to reduce the outage workload. Personnel responsible for this decision did not adequately consider the potential effects of slips during the job, or consider actions to minimize the effects of such slips such as removing the three fuses which isolate the 3B3-S voltmeter selector switch prior to the job.

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

A contributing cause was the inadvertent shorting of the two wire connections. The wires shorted as the technician was removing insulating tape to reterminate the wires. Additionally, the manner in which TS 3.3.2 is currently written does not allow for replacement of undervoltage channel circuit components without requiring entry into TS 3.0.3 or obtaining approval from the NRC for temporary relief from the action statement to effect repairs. It is now understood that voluntary entry in TS 3.0.3 is considered unacceptable for performance of corrective maintenance; therefore, TS 3.3.2 action requirements have been rewritten to improve their clarity and specificity and will be submitted for approval. Proper work practices on energized circuits and the responsibility for supervisory evaluation of scheduled work instructions were discussed with the Maintenance personnel involved in this incident.

During this event there was a 290 minute period in which a single failure could have caused a spurious ESF actuation including tripping safety bus loads and sequencing them onto the EDG. Since only one bus would have been affected, a reactor trip or other severe transient should not have been caused by such an event, and no ESF functions would be disabled. The response to an actual loss of offsite power would not have been adversely affected by this condition.

There was also a six minute period in which no UV protection was available for the 'B' 4160V safety bus. This period was very short, the probability of a loss of power was very low, and operators were prepared to take manual actions if required. The 'A' safety bus was operable throughout the event. Thus, there was no significant degradation in plant safety as a result of these conditions.

SIMILAR EVENTS

None

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

PLANT CONTACT

C.R. Gaines, Event Analysis & Reporting Supervisor, 504/464-3137

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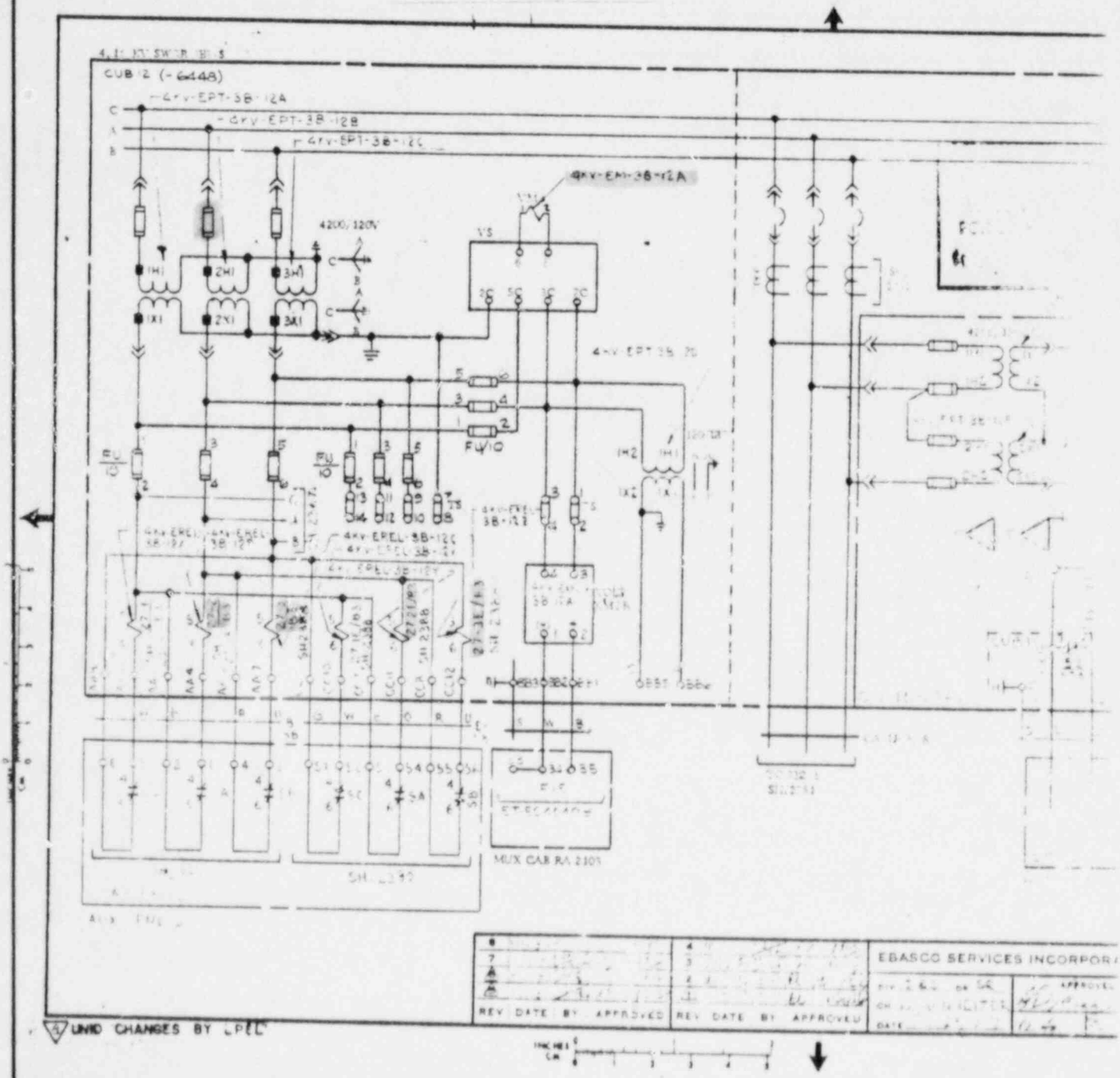
TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

FIGURE 1



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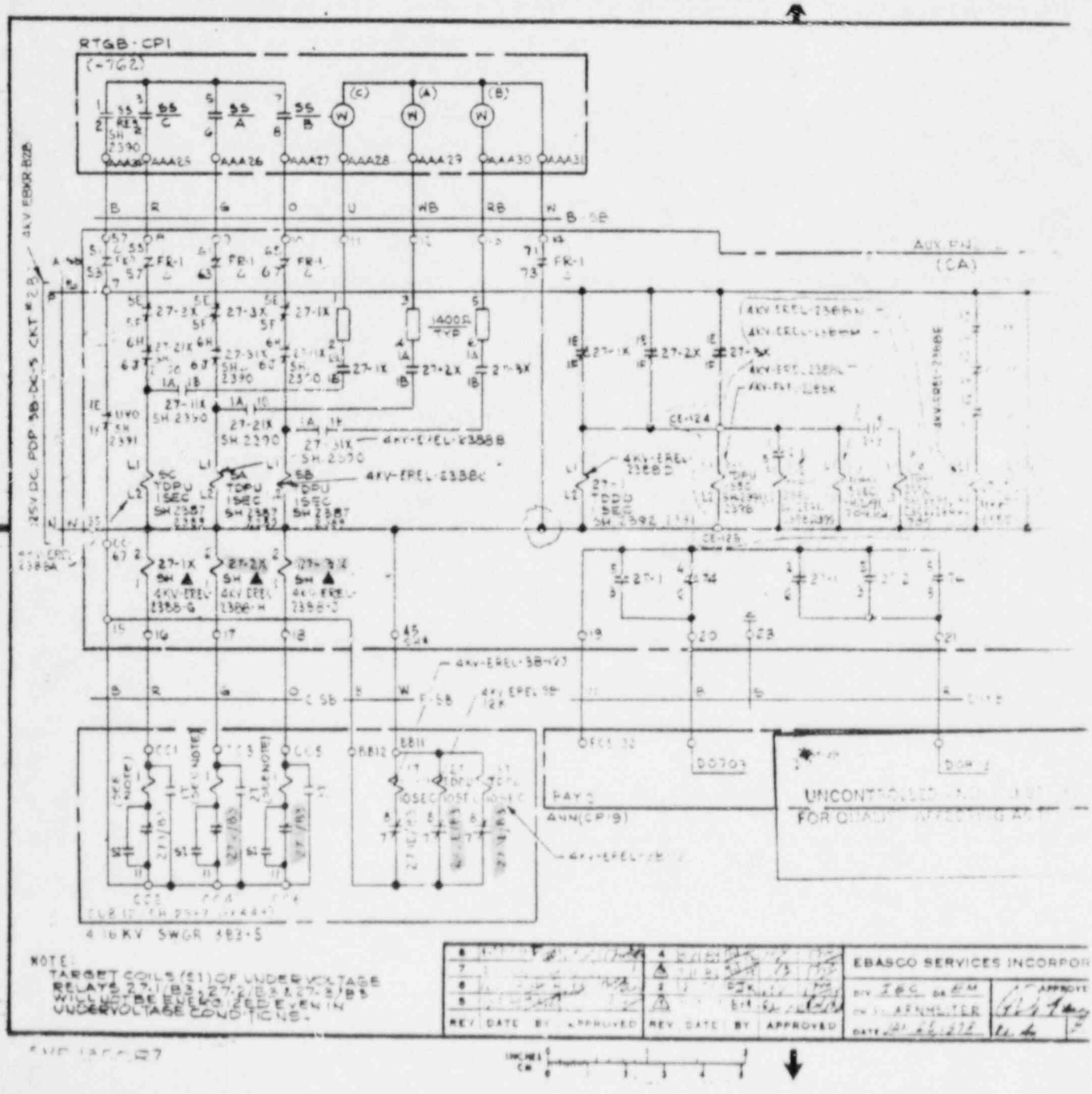
TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

FIGURE 2



NOTE:
TARGET COILS (E1) OF UNDERVOLTAGE RELAYS 27-1(B3), 27-2(B3) & 27-3(B3) WILL NOT BE ENERGIZED DURING UNDERVOLTAGE CONDITIONS.

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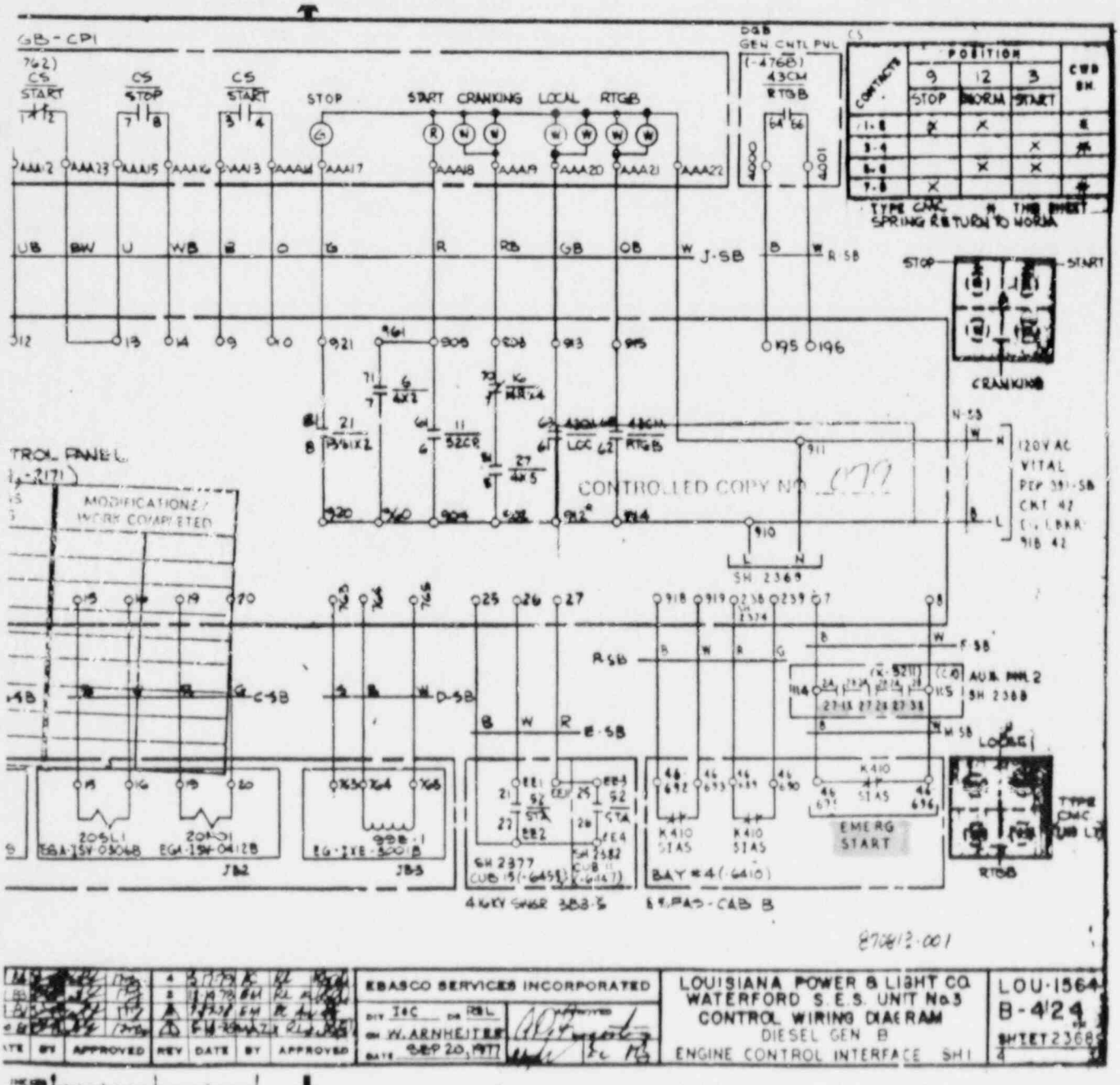
TEXT (If more space is required, use additional NRC Form 366A's) (17)

FIGURE 3



Ref: 10CFR50.73(a)(2)(i)

LOUISIANA POWER & LIGHT / WATERFORD 3 SES • P.O. BOX B • KILLONA, LA 70066-0751

MIDDLE SOUTH UTILITIES SYSTEM

April 20, 1988

W3A88-0042
A4.05
QA

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

SUBJECT: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Reporting of Licensee Event Report

Attached is Licensee Event Report Number LER-88-005-00 for Waterford Steam Electric Station Unit 3. This Licensee Event Report is submitted pursuant to 10CFR50.73(a)(2)(i).

Very truly yours,

N.S. Carns
Plant Manager - Nuclear

NSC/WEM:rk

Attachment

cc: R.D. Martin, NRC Resident Inspectors Office, INPO Records Center (J.T. Wheelock), E.L. Blake, W.M. Stevenson, D.L. Wigginton

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