

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-322/87-09

Docket No. 50-322

License No. NPF-19

Licensee: Long Island Lighting Company
P.O. Box 618, North Country Road
Wading River, New York 11792

Facility Name: Shoreham Nuclear Power Station

Meeting At: NRC, Region I King of Prussia, Pennsylvania

Meeting Conducted: On April 4, 1987

Reporting Inspector: *C. J. Anderson*
F. Vautitz, Reactor Engineer

5-15/87
date

Approved by: *C. J. Anderson*
C. J. Anderson, Chief, Plant Systems Section

5/15/87
date

Meeting Summary: Management Meeting at Region I office on April 4, 1987 to discuss the Loss of Offsite Power Event of March 18, 1987. The licensee discussed the event including the cause and correction action to prevent future occurrences.

Details

1.0 Participants

1.1 Long Island Lighting Company (LILCO)

J. Leonard, Jr.	Vice President, Nuclear Operation
S. Skorupski	Assistant Vice President, Nuclear Operation
W. Steiger, Jr.	Plant Manager
E. Youngling	Manager, Nuclear Engineering Department
L. Britt	Director, Licensing & Regulatory Affairs
R. Purcell	Manager, Outage/Modification

1.2 United States Nuclear Regulatory Commission

W. Johnston	Acting Director, Division of Reactor Safety (DRS)
L. Bettenhausen	Acting Deputy Director, DRS
J. Durr	Chief, Engineering Branch (EB), DRS
R. Lo	Project Manager, Nuclear Reactor Regulation
C. Anderson	Chief, Plant System Section (PSS), EB, DRS
J. Wiggins	Chief, Project Section 1B, Division of Reactor Projects
P. Eselgroth	Chief, Test Program Section, Operations Branch, DRS

Observer: T. J. Pappas, Esquire Kirkpatrick, Lockhart, Hill, Christopher & Phillips

2.0 Purpose

This meeting was held at the request of NRC Region I to allow the licensee the opportunity to present their understanding of the event and corrective actions to prevent future occurrences.

3.0 Presentation and Discussion

The Acting Director of the Division of Reactor Safety, opened the meeting by stating that the reason for the meeting was a concern that Losses of Offsite Power had been occurring more frequently at Nuclear Power Facilities. The NRC wanted to be assured that the licensee understood the root cause of the event and to determine that the licensee's management was involved to assure that adequate correction action would be taken to prevent future occurrences. The Vice President of Nuclear Operations welcomed the opportunity to present their understanding of the event and their corrective actions.

The licensee's staff made a slide presentation of the following:

- * Plant Condition Prior to Event
- * Event Chronology
- * Operator Response
- * Incident Investigation
- * Immediate Cause of Event
- * Root Causes
- * Corrective Actions
- * Summary

The licensee's slides presented at the meeting are attached to this report. The licensee also presented the installation status of the new emergency diesel generators.

4.0 Concluding Statements

The NRC staff thanked the licensee for their presentation. The staff stated that the licensee understood the root cause of the event. The licensee's corrective actions appeared appropriate.

PLANT CONDITION PRIOR TO EVENT

- o OC5 REFUEL MODE TO REPLACE 'N' SOURCES
21 FT. OF WATER ABOVE REACTOR FLANGE; I.E., CAVITY FULL
- o ELECTRICAL LINE UP PRIOR TO EVENT NORMAL EXCEPT FOR BUS 103
OUT OF SERVICE FOR MAINTENANCE & MODIFICATIONS
- o ACTIVITIES IN PROGRESS
 - BUS 103 MODIFICATIONS TO INSTALL SPARE SWITCHGEAR CUBICLE
FOR COLT ENGINE 4KV SUPPLY
 - BREAKER MAINTENANCE ON CONDENSATE PUMP BREAKER COMPLETE
AND CONDENSATE PUMP WAS BEING TESTED

NOTE: PLANT MODIFICATIONS MADE TO TIE-IN THE COLT DIESELS
AT THE 1ST REFUELING OUTAGE WHICH IMPACT UPON STATION
OPERATION ARE ONLY DONE IN THE SHUTDOWN CONDITION.

EXAMPLES:

- CORE BORING ELECTRICAL PENETRATIONS IN MAIN
CONTROL ROOM FLOOR AND RELAY ROOM & SWITCHGEAR WALLS
- INSTALLING FALSE FLOOR FOR CONDUIT RUNS IN CORRIDOR
- INSTALLING CONDUIT, CONTROL PANELS IN RELAY ROOM
AND MAIN CONTROL ROOM
- MODIFICATIONS TO EMERGENCY SWITCHGEAR BUSES

EVENT CHRONOLOGY

- o 'A' CONDENSATE PUMP IS BUMPED (TIME 0146)
- o NSST TRIPS ON PRIMARY DIFFERENTIAL PROTECTION (TIME 0146)
- o RSST TRIPS ON PRIMARY DIFFERENTIAL PROTECTION (TIME 0146)
- o REACTOR SCRAM (TIME 0146)
- o EDG 101 & 102 AUTO START AND SUPPLY THEIR BUSES
- o EDG 103 OUT OF SERVICE FOR MAINTENANCE
- o ALL PLANT SYSTEMS RESPOND AS DESIGNED

OPERATOR RESPONSE

- O OPERATORS PERFORM EMERGENCY SHUTDOWN PROCEDURE
- O OPERATORS PERFORM LOSS OF OFFSITE POWER EMERGENCY PROCEDURE
- O WATCH ENGINEER DIRECTS A FIELD INSPECTION OF INPLANT EQUIPMENT
- O VERIFICATION OF INTEGRITY AND AVAILABILITY OF OFFSITE DISTRIBUTION POWER SYSTEM IS CONFIRMED WITH THE SYSTEM OPERATOR
- O "A" CONDENSATE PUMP MOTOR WAS PUT IN PULL-TO-LOCK AND THE CB RACKED OUT
- O RSST PRIMARY PROTECTION RELAYS WERE RESET AT 0200
- O RSST WAS RE-ENERGIZED AT 0202
- O BUSES 11, 12, 1B RE-ENERGIZED FROM THE RSST BY 0204
- O UNUSUAL EVENT DECLARATION; UE-7, LOSS OF OFFSITE POWER (TIME - 0215)
- O NOTIFICATIONS MADE TO PLANT MANAGEMENT AND GOVERNMENT OFFICIALS
- O UE-7 TERMINATED (TIME - 0500)

INCIDENT INVESTIGATION

- o INCIDENT INVESTIGATION STARTED AT 0530 BY MANAGEMENT PERSONNEL IN RESPONSE TO WATCH ENGINEER'S CALLOUT
- o NSST & RSST CIRCUIT AND RELAY CHECKS WERE CONDUCTED BY 0800
- o INVESTIGATION IDENTIFIED TRANSFORMER DIFF. CIRCUIT SECONDARY SIDE CT'S WERE SHORTED (TIME - 0930)
- o THE SHORTED CT'S WERE PART OF THE STATION MODIFICATION FOR BUS 103 THEREFORE:
 - REVIEW OF STATION DESIGN OUTPUT PACKAGE (PROGRAM WAS FOLLOWED SATISFACTORILY)
 - REVIEW OF STATION MODIFICATION PROCEDURE (PROCEDURE WAS FOLLOWED SATISFACTORILY)

IMMEDIATE CAUSE OF EVENT

- 0 SHORTING OF BUS 103 CT CIRCUITRY (PUT UP SLIDE)
- 0 BOTH NSST AND RSST DIFF. PROT. RELAY CIRCUITS WERE AFFECTED BY SHORTING ALL THE CTs ON BUS 103
- 0 "A" CONDENSATE PUMP BUMPED
- 0 THE "SENSED" CT CURRENT, TRIPPED ØC NSST DIFFERENTIAL PROTECTION RELAY
- 0 NSST DIFF. RELAY ACTIVATED - LOCKING OUT THE NSST
- 0 LOCKOUT OF THE NSST INITIATED A FAST TRANSFER TO THE RSST
- 0 THE "SENSED" CT CURRENT, TRIPPED ØA, ØB, ØC RSST DIFF. PROTECTION RELAYS
- 0 RSST DIFF. RELAYS ACTIVATED - LOCKING OUT THE RSST
- 0 LOSS OF OFFSITE POWER

ROOT CAUSE

o PROCEDURAL DEFICIENCY

- BECAUSE INSTRUCTIONS IN THE STATION MODIFICATION PROCEDURE WERE INSUFFICIENT ON HOW TO SHORT OUT THE CTs FOR THE BUS WORK.

o How

- INTERPRETATION OF DOP INSTRUCTIONS BY THE ENGINEER ON CT SHORTING WAS INCORRECT; SINCE, THE VENDOR'S BUS WIRING DIAGRAM REFERENCED IN THE DOP DID NOT DESCRIBE THE PROTECTIVE CIRCUIT DESIGN IN ITS ENTIRETY. NEITHER THE DOP NOR THE STATION MOD PROCEDURE DEFINED WHICH BUS CTs SHOULD HAVE BEEN SHORTED AND WHICH NEED NOT BE SHORTED TO PROTECT THE BUS DURING HI POT TESTING PER THE MANUFACTURER'S RECOMMENDATION.
- ENGINEER ASSUMPTIONS ON CT CONFIGURATION WERE WRONG
- TECHNICAL REVIEW OF THE PROCEDURE DID NOT DETECT THE DEFICIENCY

IMMEDIATE CORRECTIVE ACTIONS

- o REMOVED SHORTING PINS FROM DIFF. CIRCUIT CT'S (TIME 1000)
- o NSST DIFF. RELAYS CHECKED AND SETPOINTS VERIFIED
- o RSST DIFF. RELAYS CHECKED AND SETPOINTS VERIFIED
- o "A" CONDENSATE PUMP MEGGER TESTED AND SATISFACTORY
- o "A" CONDENSATE PUMP SUPPLY BREAKER PROT. RELAY & CIRCUIT CHECKED AND SATISFACTORY

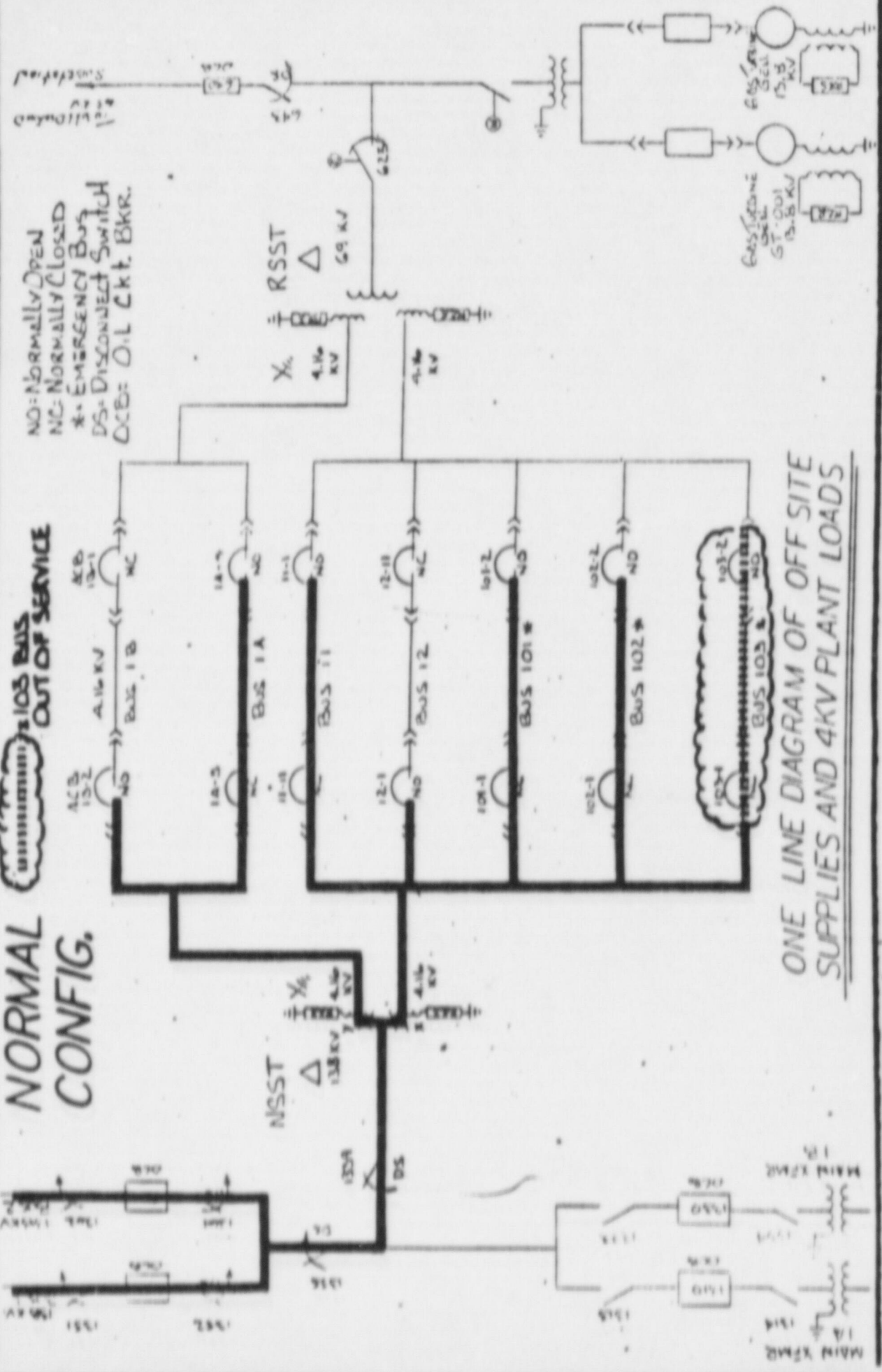
CORRECTIVE ACTIONS
TO PREVENT
FUTURE OCCURRENCES

- 0 RE-EMPHASIZE REQUIREMENT TO PROVIDE SPECIFIC DETAILS ON IMPLEMENTATION REQUIREMENTS IN DOP
- 0 IMPROVE TECHNICAL REVIEW OF STATION MODIFICATIONS BY INCLUSION OF A PROCEDURE CHECKSHEET (SLIDE)
- 0 ASSURE TECHNICAL REVIEWER IS INDEPENDENT OF ORIGINATOR(S)
- 0 CHECKLIST FOR STATION MODIFICATION TECHNICAL REVIEW TO ENSURE THAT THE ACTUAL IMPLEMENTATION OF THIS MODIFICATION WILL NOT ADVERSELY EFFECT THE SAFE OR DESIGNED OPERATION OF THE PLANT
- 0 DEVELOP LESSON PLAN AND CONDUCT TRAINING SESSION ON CONFIGURATION CONTROL FOR MAINTENANCE, TEST AND MODIFICATION PERSONNEL WHO COULD CHANGE PLANT CONFIGURATION

NORMAL CONFIG.

BUS 105 OUT OF SERVICE

NO: NORMALLY OPEN
 NC: NORMALLY CLOSED
 * : EMERGENCY BUS
 DS: DISCONNECT SWITCH
 OCB: OIL Ckt. BKR.



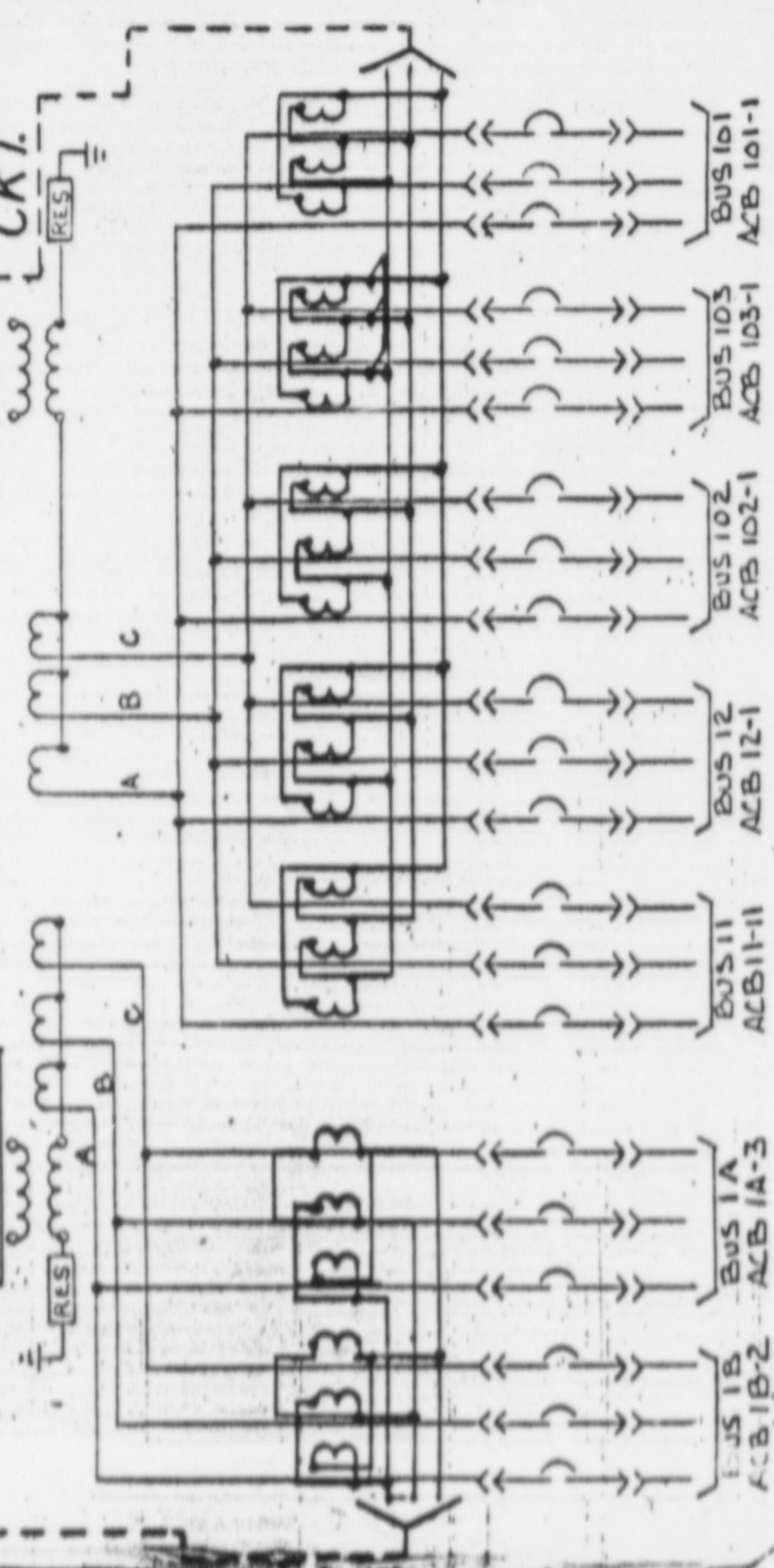
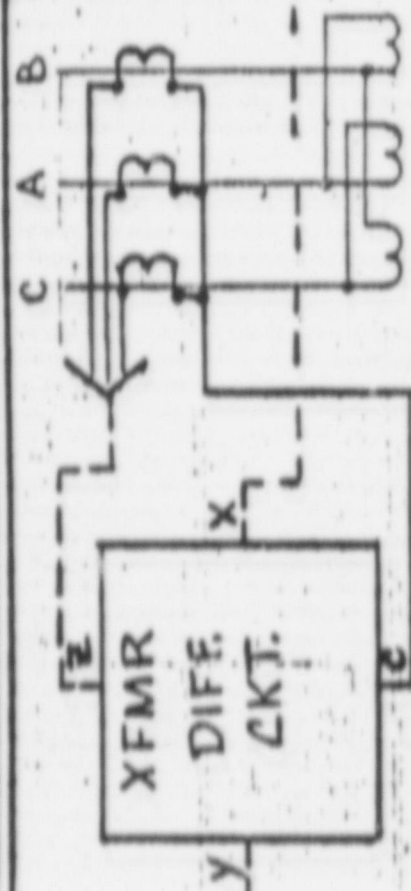
ONE LINE DIAGRAM OF OFF SITE SUPPLIES AND 4KV PLANT LOADS

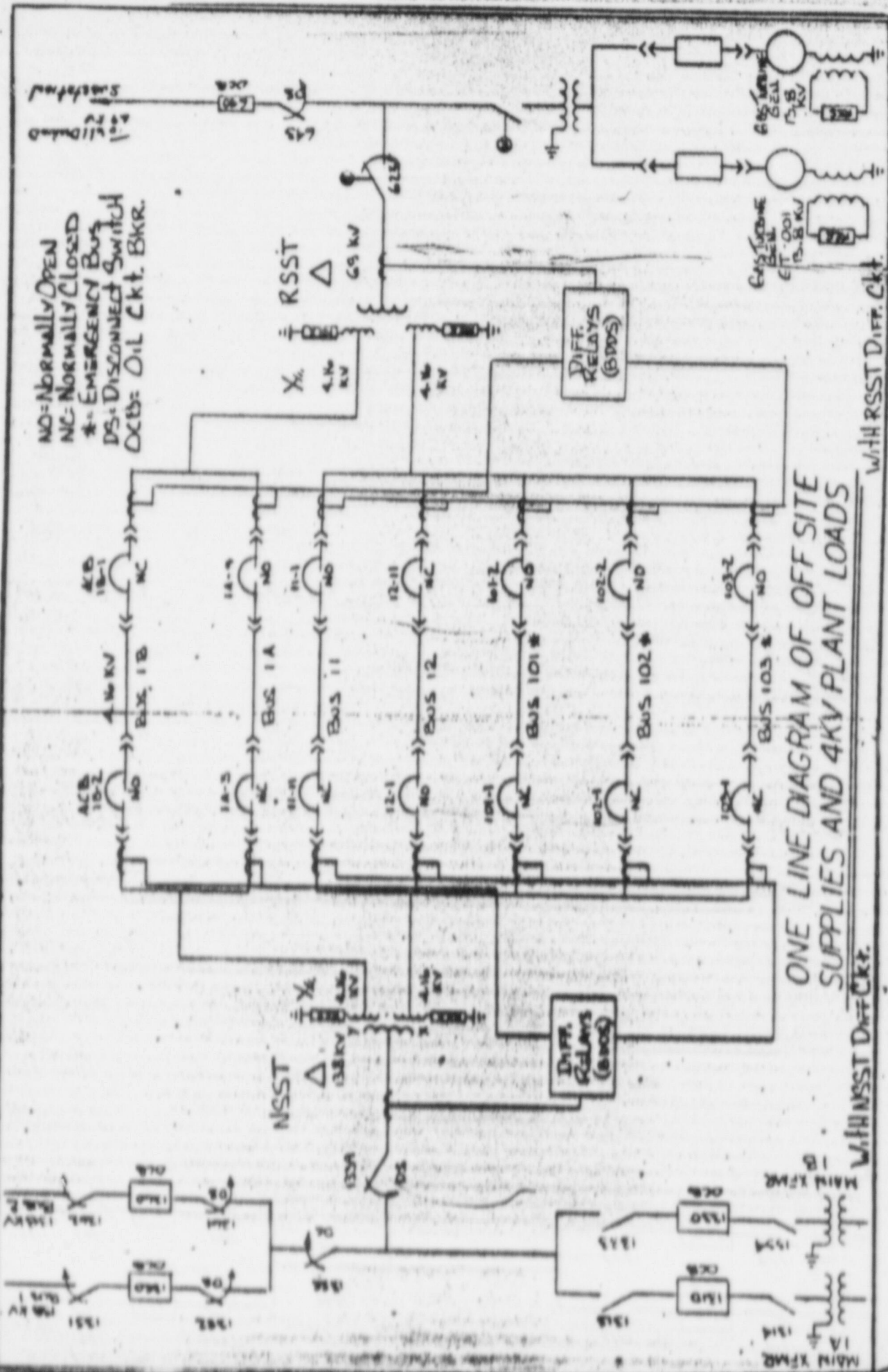
PRIMARY WINDINGS
1/2 SECONDARY
Y WINDINGS
X = SECONDARY
X WINDINGS
C: COMMON

NSST
3PHASE
DIAG.

DIFF.
CKT.

FOR
NSST CT JUMPERS
ON
NSST DIFF.
CKT.



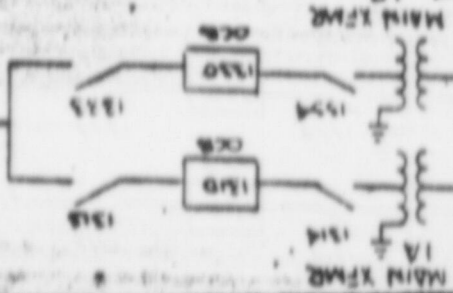
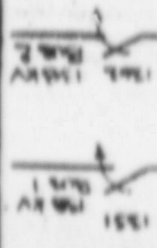


NO=Normally Open
 NC=Normally Closed
 E=EMERGENCY BUS
 DS=DISCONNECT SWITCH
 OCB= OIL Ckt. BKR.

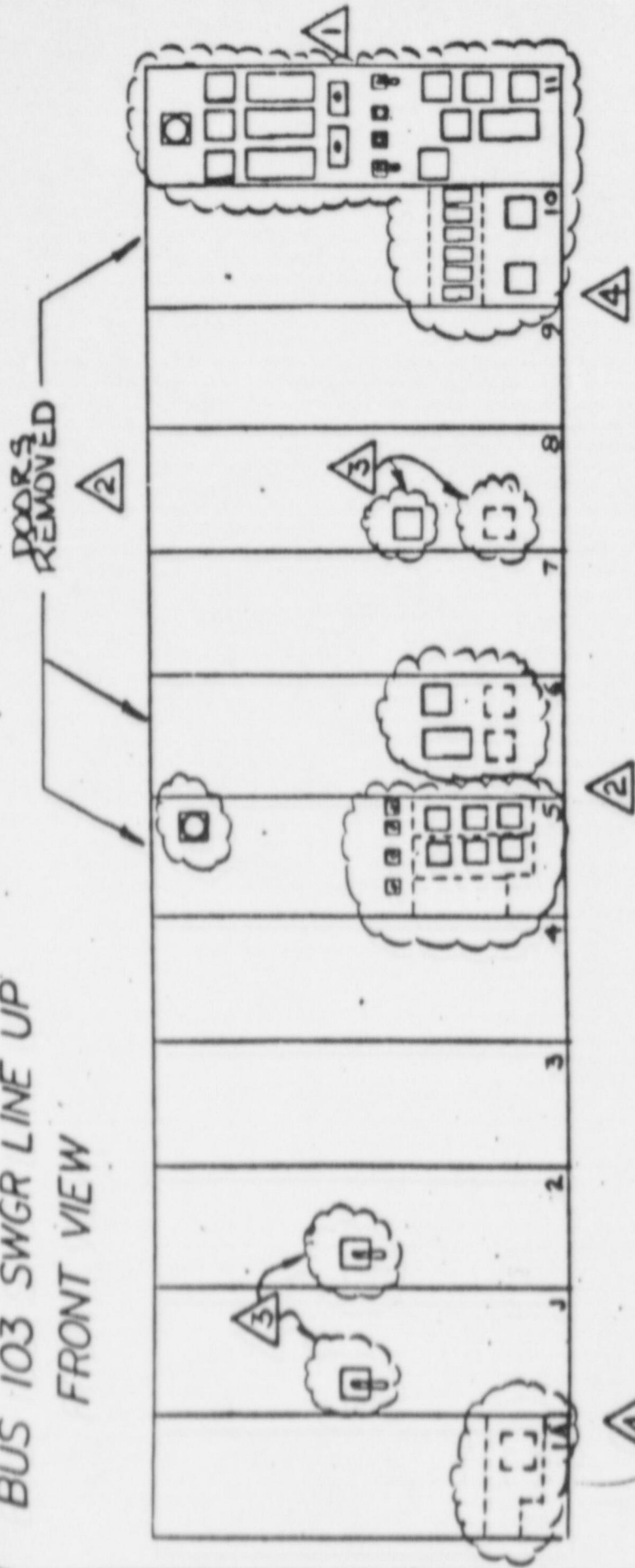
ONE LINE DIAGRAM OF OFF SITE
 SUPPLIES AND 4KV PLANT LOADS

WITH RSST DIFF. CKT.

WITH NSST DIFF. CKT.



BUS 103 SWGR LINE UP
FRONT VIEW



- 1: NEW CUBICLE 103-11 ADDED TO BUS 103 LINE UP.
- 2: ALL THE DEVICES WERE REMOVED FROM THE DOORS IN CUB. 103-5, 103-6, 103-10 TO FACILITATE CUTTING, GRINDING, & WELDING.
- 3: RELAYING DEVICES REPLACED ON DOORS 103-1, 103-2, 103-8.
- 4: STIFFENERS AND FUTURE TIE-IN DEVICES ADDED TO DOORS 103-1A, 103-10