U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-346/81-13

Docket No. 50-346 License No. NPF-3

Licensee: Toledo Edison Company
Edison Plaza, 300 Madison Avenue
Toledo, OH 43652

Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection At: Oak Harbor, OH

Inspection Conducted: July 1-31, 1981

Inspectors: L. A. Reyes — L. McGregor for:

W. G. Rogers — L. McGregor for:

T. N. Tambling (July 6-8, 1981) — T. N. Tambling

J. D. Smith (July 6-8, 1981) — J. D. Smith 8-27-81

Approved By: L. G. McGregor, Acting Chief
Reactor Projects 2B — L. McGregor 8/26/81

Inspection Summary

Inspection on July 1-31, 1981 (Report No. 50-346/81-13)
Areas Inspected: Routine safety inspection of followup on previous inspection findings, operational safety verification, monthly maintenance observation, monthly surveillance observation, LER followup, circular followup, plant trip on June 24 and July 30, 1981, partial loss of NNI on June 30, 1981, license modification of primary coolant system pressure isolation valves and control rod drive mechanism repairs. The inspection involved a total of 291 inspector-hours onsite by four NRC inspectors including 74 inspector-hours onsite during off-shifts.
Results: Of the ten areas inspected, no items of noncompliance or deviations were identified in nine areas, one item of noncompliance was identified in the other area (failure to log the operation of valves as per requirement of the ASME code).

DETAILS

1. Persons Contacted

*T. Murray, Station Superintendent
B. Beyer, Assistant Station Superintendent
S. Quennoz, Assistant Station Superintendent
P. Carr, Maintenance Engineer
*D. Huffman, Administrative Coordinator
D. Miller, Operations Engineer
D. Briden, Chemist and Health Physicist
J. Hickey, Training Supervisor
L. Simon, Operations Supervisor
G. Daft, Operations QA Manager
*J. Greer, QC Supervisor

*Denotes those attending the exit interview on July 23, 1981.

The inspectors also interviewed other licensee employees, including members of the technical, operations, maintenance, I&C training and health physics staff.

2. Followup on Previous Inspection Findings

(Closed) Noncompliance (50-346/81-05-02): Instrumentation to accumulate pump test data do not meet the requirements of the ASME Section XI. The inspector reviewed the calibration records for all the instruments that did not meet the requirements and verified that they were replaced and calibrated with new instruments that meet the ASME Section XI code requirements.

(Closed) Unresolved Item (50-346/80-23-01): Bulletin No. 80-06. Two supplemental responses to the Bulletin dated March 27, 1981 and May 21, 1981, were submitted. All valves have been tested. Facility Change 77-513 was completed. A letter dated July 22, 1981 (Serial No. 732) transmitted to NRR a description of the modification performed on Valves FW-779 and FW-780.

3. Operational Safety Verification

The inspector observed control room operations, reviewed applicable logs and conducted discussions with control room operators during the month of July. The inspector verified the operability of selected emergency systems, reviewed tagout records and verified proper return to service of affected components. Tours of Auxiliary buildings, containment and the turbine building were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, and excessive vibrations and to verify that maintenance requests had been initiated for equipment in need of maintenance. The inspector by observation and direct interview verified that the physical security plan was being implemented in accordance with the station security plan.

The inspector observed plant housekeeping/cleanliness conditions and verified implementation of radiation protection controls. During the month of July, the inspector walked down the accessible portions of the Emergency Diesel Generator systems to verify operability. The inspector also witnessed portions of the radioactive waste system controls associated with radwaste shipments and barreling.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under technical specifications, 10 CFR, and administrative procedures.

On July 7, 1981, while conducting a routine plant tour, the inspector noticed that Valves DO-81 and DO-82 were operated. Davis-Besse Station Surveillance Procedure ST 5099.11 provides a mechanism for logging the operational checks of passive valves and requires that each time a passive valve is operated it shall be recorded. Contrary to the procedural requirements the operation of Valves DO-81 and DO-82 was not logged. An entry in the log was made after the inspector contacted the shift supervisor.

Subsequent to the inspection finding the licensee issued Memo M81-1416 to all operations personnel to remind them of the procedural requirements. A modification to the procedure has been implemented to allow the use of the locked valve log to be used as record of passive valve operation. The inspection showed that action had been taken to correct the identified item of noncompliance and to prevent recurrence. The inspector has no further questions on this item of noncompliance.

One item of noncompliance was identified.

4. Monthly Maintenance Observation

Station maintenance activities of safety related systems and components listed below were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides and industry codes or standards and in conformance with technical specifications.

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and, fire prevention controls were implemented.

Work requests were reviewed to determine status of outstanding jobs and to assure that priority is assigned to safety related equipment maintenance which may affect system performance.

The following maintenance activities were observed/reviewed:

Control Rod Drive 5-8 Replacement
Auxiliary Feedwater Pump 1-2 Governor Repairs

Following completion of maintenance on the Control Rod Drive and Auxiliary Feedwater systems, the inspector verified that these systems had been returned to service properly.

No items of noncompliance or deviations were identified.

5. Monthly Surveillance Observation

The inspector observed technical specifications required surveillance testing on the Safety Features Actuation System (ST 5030.01) and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with technical specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The inspector also witnessed portions of the following test activities:

Containment Spray Monthly Test (ST 5062.01)
Startup Transformer 02 Deluge Test (ST 5016.02)
Auxiliary Feedwater System Train 2 Monthly Test (ST 5071.01)
Low Pressure Injection and Containment Spray System Leak Rate Test (ST 5051.03)

No items of noncompliance or deviations were identified.

6. Licensee Event Reports Followup

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with technical specifications.

78-115 Procedure Deficiency for a Loss of Coolant Accident in coincidence with a Steam Feed and Rupture Control System Actuation.

78-117 Failure to conduct a Firewatch On Inoperable Firewall.

78-123 Entering Hot Shutdown Operation (Mode 4) with Hot Containment Spray Pump Breakers Racked Out.

78-124 Main Steam Safety Relief Valve Below Technical Specification Setpoint.

79-03 Emergency Ventilation Damper Inoperable Due to Leaking Pheumatic Operator.

79-02 Auxiliary Feedwater Steam Valve MS106 Would Not Open.

79-05 BWST Level Bistable Tripped Causing an ECCS Lineup in Recirculation Mode.

79-06 Inoperable Fire Detection Alarm Point F-018.

79-08 Containment Recirculation Fan 1-1 Failed to Start.

79-09 Loss of Power to Vital Bus Y2.

79-18 Main Steam Safety Valves Lifted Below Their Setpoint Range.

81-22 Holes In Fire Walls With No Temporary Plugs or Fire Watch.

81-29 RCP 1-2 Shutdown Due to High Seal Return Temperature.

81-33 Containment Hydrogen Gas Annalyzer Inoperable Due to Lack of Zero Gas.

No items of noncompliance or deviations were identified.

7. IE Circular Followup

For the IE Circulars listed below, the inspector verified that the Circular was received by the licensee management, that a review for applicability was performed, and that if the circular were applicable to the facility, appropriate corrective actions were taken or were scheduled to be taken.

81-07 Control of Radioactively Contaminated Material.

No items of noncompliance or deviations were identified.

8. Plant Trip on June 24, 1981

a. Background

On June 24, 1981, Davis-Besse was operating at approximately 74% power. Power level was limited due to reactor coolant pump 1-2 which was shutdown on May 12, 1981, when seal return temperatures exceeded 165°F. Uninterruptable instrument power panel YAU was on alternate source due to problems with the static switch.

Control rod drive breaker logic test, ST 5030.12, was in progress with the "A" control rod drive breaker deenergized.

At approximately 1:27 p.m., construction personnel erecting scaffolding for Facility Change 80-137, inadvertently caused a mechanical shock to nonessential breaker NAAE2. The mechanical shock caused the ground fault relay to activate and trip the breaker.

The loss of E2 bus deenergized the power supply, E23, to the related instrumentation distribution panel YAR which is the alternate supply to uninterruptable instrument power panel YAU. Since YAU was on its alternate supply, YAU was also deenergized.

The loss of power to YAU resulted in a loss of station annunciators, computer peripherals, both saturation meters, No. 2 bus for the control rod drive breakers, the diesel fire pump control panel and AC power to "Y" bus of non-nuclear instrumentation. The loss of power to the control rod drive breaker resulted in a reactor scram.

b. Sequence of Events

Approximate Time	Event
1:20 p.m.	Control Rod Drive (CRD) breaker "A" opened per CRD breaker trip logic test ST 5030.12.
1:24 p.m.	13.8 kv breaker HAAE2 tripped by actuation of ground fault protective relay.
	480 volt E2 bus deenergized 480 volt motor control center (MCC) deenergized, 120 volt uninterruptable instrument bus YAU deenergized due to inverter YVA being in manual bypass on the alternate source (YAR). (See Figure 1)
	YAU supplies the following loads: Control Rod Drive Bus 2 Control Room Annunciators Computer Peripherals Diesel Fire Pump Panel NNI-Y Bus AC Integrated Control System Y AC Bus
	Control rods drop into the core because breaker "A" was open prior to loss of power to "B" breaker.
	Makeup pump No. 1 tripped due to loss of power to the low level interlock of the makeup tank. Makeup pump No. 2 continued in operation.
	Makeup suction valve starts cycling between the borated water storage tank and the makeup tank.

1:25 p.m.	Operators manually initiated the steam feedwater rupture control system.
1:26 p.m.	Partial computer indication restored. Incore thermocouples temperature readings display in the control room.
1:30 p.m.	NRC Emergency Notification System and Region III Incident Response Center activated.
1:31 p.m.	Operators selected NNI-Y instruments when it was incorrectly determined that NNI-X AC was lost. This determination was made based on the NNI DC power supplies which were improperly labeled. Because of a dual dependency in the design, the saturation meter with the NNI-X inputs went dark while the saturation meter with NNI-Y inputs displayed what appeared to be a correct subcooling margin. Because the NNI temperature input signal fails to midscale during a loss of power and the pressure input signal was never lost, the saturation meter with the NNI-Y inputs displayed a subcooling margin of 100° which is expected immediately after a reactor trip.
1:36 p.m.	Reenergized 480 volt bus E2 from alternate source. Power restored to NNI-Y AC, YAU, YAR, computer and annunciators. Deluge system actuated in the boric acid evaporator room. Auxiliary feedwater pump No. 2 exhibited control problems. Local control for governor established. Steam line safety valve failed to totally reseat.

c. Station Annunciators

The loss of control room annunciators hindered the response to the transient. The station annunciators are per initial design powered only from YAU. YBU is a backup supply to the audible signal (horn) only. The licensee has implemented Facility Change 81-188 which provides power to the control room annunciators from YAU and YBU. The modification provides an automatic transfer from the primary source (YAU) to the backup source (YBU). The inspector witnessed the acceptance test conducted for this modification. This modification will alleviate the loss of assessment condition experienced during the June 24 event.

d. Auxiliary Feedpumps

During the event, the operators manually initiated the steam feedwater rupture control system. After the auxiliary feedpumps started, no indication was received for auxiliary feedpump No. 1 because the instruments are powered from YAU. Auxiliary feedpump No. 2 indicated improper control. The operators used the steam generator level indication to control the auxiliary feedpumps. Both auxiliary feedpumps were checked locally and were operating satisfactorily. The auxiliary feedwater pumps flow is scheduled to be modified so it is powered from the essential buses. This is an item required by TMI lessons learned and is currently scheduled for completion during the 1982 refueling outage. Auxiliary feedwater pump 1-2 turbine governor had a loose set screw on the governor coupling and a bend speed stop pin.

Repairs were completed by replacing the governor and adjusting the set screw. The inspectors followed through the repair activities.

e. Saturation Meters

During the plant trip, the saturation meter that was labeled as having inputs from the non-nuclear instrumentation (NNI) "X" side lost its display. The saturation meter having inputs from the "Y" side indicated a subcooling margin of 100°. Since the power loss was to the "Y" side an investigation was initiated to explain the response of the saturation meters during the transient. The investigation revealed that the design of the saturation meters had a dual dependency in that both "X" and "Y" power was required in order for the saturation meters to read correctly. The licensee corrected the wiring configuration to eliminate the dual dependency. A test was conducted under Revision 1 to Procedure MC 7500.26 "T-Sat Meter Post Implementation Test." The control grade saturation meters are required to be upgraded to safety grade as part of the TMI lessons learned. This modification is currently scheduled for the 1982 refueling outage.

f. NNI DC Power Supplies

As a result of IE Bulletin No. 79-27 and the order issued on the Crystal River III transient of February 26, 1980, the NNI DC power

supplies were modified so the loss of either YAU or YBU bus will not result in a loss of NNI DC power. The labels for these power supplies were not changed to reflect their configuration. The labels on the power supplies have been corrected and other labels in the control room were clarified to provide assurance that the source of power to these NNI equipment is easily identified.

g. Indicating Lights for Loss of NNI Power

Prior to the June 24 plant trip, a loss of NNI power was identified by the annunciators of the core flood tank system. These annunciators were used as the symptom to initiate the use of the emergency procedure. Subsequent to the plant trip the licensee installed indicating lights in the control room panels to provide direct indication of status of NNI X-AC, X-DC, Y-AC and Y-DC. This modification assures indication of the NNI power supply status even if the control room annunciators are lost.

h. Westinghouse I T H Relays

Breaker HAAE2 has a Westinghouse I T H relay for ground fault protection. This protective relay was activated by the mechanical shock during the construction of scaffolding. An investigation of the relay setpoint determined that the gap setting of the relay was closer than the vendor specified tolerance. All I T H relays have been removed and inspected by the licensee. The gap on all relays has been verified and proper current settings for relay pickup and dropout are adjusted to vendor specifications. In addition, the licensee has increased the number of posted signs that indicate the breakers are sensitive to mechanical shock. The inspection and adjustments of the I T H relays have been emphasized in the Preventative Maintenance Program for these relays.

i. Main Steam Safety Valve

Main Steam Safety Valve SP17B4 did not properly reset after lifting during the plant trip. The valve was replaced with a spare and was sent to the vendor for repairs. The inspector witnessed the setpoint adjustments conducted on the main steam safety valves on No. 1 main steam line.

j. Fire Protection System

During the loss of power to the diesel fire pump control panel the diesel fire pump started as designed. Upon reenergization of E2 the deluge system actuated in the boric acid evaporator room. An investigation of this system actuation identified a wiring error in a local panel. This wiring error was in the vendor's installation portion of the system. The conditions of the system were reenacted prior to and after the realignment of the wires. The test proved the wiring error was the cause of the system's abnormal behavior.

k. Makeup Pumps

During the plant trip, makeup pump No. 1 tripped due to a loss of power to the low level interlock. Makeup pump No. 2 continued operating. The makeup suction valve started cycling because a dual dependency in the design resulted in the valve logic receiving both a high and low level signal. The licensee has initiated Facility Change 81-208 to correct the makeup suction valve logic. The inspector will followup the completion of this facility change. (50-346/81-13-01)

l. Other Corrective Action

On July 8, 1981, the licensee submitted a letter (Serial No. 1-211) documenting the short and long term corrective actions to be taken as a result of the June 24, 1981 plant trip. This letter also documented the corrective action to be taken as a result of the loss of NNI that occurred on June 30, 1981. (See Paragraph 9) The licensee submitted LER 81-37 which documents the reportable component failures that occurred during the June 24, 1981 trip.

In May 1981, Toledo Edison Company conducted a reorganization of the Nuclear Engineering and Construction Division, which established the Facility Engineering Department on the Davis-Besse site. The Nuclear Engineering Department has assumed the responsibilities relative to conceptual/preliminary engineering design criteria. This assignment will continue regardless of the organization which does the detailed engineering. Part of this assignment is to provide specific detailed channelization requirements to all design agents and the review of detailed engineering designs for dual dependency to assure proper channelization of power supplied. The pre-service testing of control grade modification will be increased.

When the existing Bailey 855 computer is replaced, redundant power supplies to the replacement computer will be provided.

The licensee has a previous commitment to the Order on the Crystal River III event, to provide redundant power to all AC NNI instrumentation. This Facility Change (80-096) is scheduled for implementation during the 1982 refueling outage.

In addition of the review conducted to determine if dual dependency problems existed in the above mentioned systems, the licensee also reviewed the control grade anticipatory reactor trip system. No dual dependency was identified.

No items of noncompliance or deviations were identified.

9. Partial Loss of Non-Nuclear Instrumentation on June 30, 1981

On June 30, 1981, while in coldshutdown, the unit experienced a loss of NNI-Y AC. Investigation of the event revealed that the neutral line of some NNI-Y power supplies in the Bailey cabinet was interconnected

with the neutral line of the cabinet fan. The cabinet fan neutral line was connected through a double switch to breaker YAR 15. Upon deenergization the cabinet fan by opening breaker YAR 15 a loss of NNI-Y AC will be experienced because of the neutral being switched open. The plant neutral is common to the control room annunciators as well as the cooling fan, therefore, when the neutral was opened the annunciators were inoperative.

The licensee investigated all Bailey cabinets with multiple power feeds and determined that the problem was present on the NNI-X, NNI-Y and ICS cabinets.

The wiring corrections were completed on the NNI-X and NNI-Y cabinets.

A test was conducted under Procedure MC 7500.47 "NNI and ICS Neutral Verification." The test results were satisfactory.

The same test was conducted on the ICS cabinet after the wiring modifications were completed. The test results were satisfactory with the exemption of the indication for neutron error. This item was referred to Nuclear Engineering for resolution. There are no control functions associated with this meter. Neutron error is also indicated in a separate meter in the control room.

The licensee will continue the ongoing review and update of the Bailey system schematics.

No items of noncompliance or deviations were identified.

10. Plant Trip on July 30, 1981

Following the plant trip on July 30, 1981, the inspector ascertained the status of the reactor and safety systems by observation of control room indicators and discussions with licensee personnel concerning plant parameters, emergency system status and reactor coolant chemistry. The inspector verified the establishment of proper communications and reviewed the corrective actions taken by the licensee.

During the plant trip, auxiliary feedwater Pump No. 2 exhibited erratic control while in the automatic mode. The operators control the steam generator level in manual mode. The licensee replaced the governor on auxiliary feedwater pump and sent the erratic governor to the vendor for inspection. All other systems responded as expected.

The plant remained shutdown for the rest of the month to perform repairs in the turbine to condenser boot seal.

No items of noncompliance or deviations were identified.

11. License Modification Concerning Primary Coolant System Pressure Isolation Valves (TI 2515/56)

While reviewing Procedure ST 5051.14 "Decay Heat Check Valve Leak Test," the inspector found that the acceptance criteria on this procedure does

not reflect the requirements of Technical Specification 4.4.6.2.2. The acceptance criteria equation considered acceptable is:

$$\text{Leakrate at functional pressure} = \text{Leakrate at test pressure} \times \sqrt{\frac{\text{Functional}}{\text{test pressure}}}$$

In addition, the maximum leakrate allowable for leakrate measurements in excess of one gallon per minute is:

$$\text{Maximum allowable leakrate at functional pressure} = \frac{\text{Last reading of the leakrate at functional pressure}}{2} + 2.5$$

Functional pressure is defined as 2155 psig.

The inspector will followup the revision to this procedure. (50-346/81-13-02)

No items of noncompliance or deviations were identified.

12. Control Rod Drive Mechanism Repairs

On June 25, 1981, during an attempt to return the unit to power operation (Mode 1) from hot standby (Mode 3), control rod 5-8 would not respond to withdrawal signals from the diamond control station.

Investigation of malfunction between the demand station and the stator of control rod 5-8 revealed nothing abnormal. The unit was placed in cold shutdown on June 27, 1981, to allow for an investigation for a mechanical malfunction.

The control rod drive assembly of control rod 5-8 was disassembled and removed from the reactor under the direction of a B & W Service Representative. Inspection of these components revealed a broken leaf spring and indications of jamming between the leadscrew and the buffer spring assembly from a broken leaf spring piece.

The pieces were all recovered, the torque tube (galled during disassembly) and the leadscrew nut of which the leaf spring is a component, were replaced. The control rod drive mechanism was reassembled into the reactor and after proper surveillance testing control rod 5-8 was returned to service.

Reporting requirements were satisfied by the submittal of LER 80-38.

No items of noncompliance or deviations were identified.

13. Exit Interview

The inspector met with licensee representatives denoted in Paragraph 1) throughout the month and at the conclusion of the inspection.

During the exit interview the inspector expressed concerns related to the timeliness of issuing Drawing Change Notices (DCN). During the review of the equipment performance during the June 24, 1981 trip, it was determined that the copies of control drawings did not reflect modifications performed to the makeup system and the saturation meters. These modifications were completed during the 1980 refueling outage. The adequacy of Drawing Controls was the subject of an audit by QA. Audit Findings Reports (AFR's) 755-1, 755-2, 755-3 and 755-4 have been issued. These AFR's are at the present time awaiting final resolution.

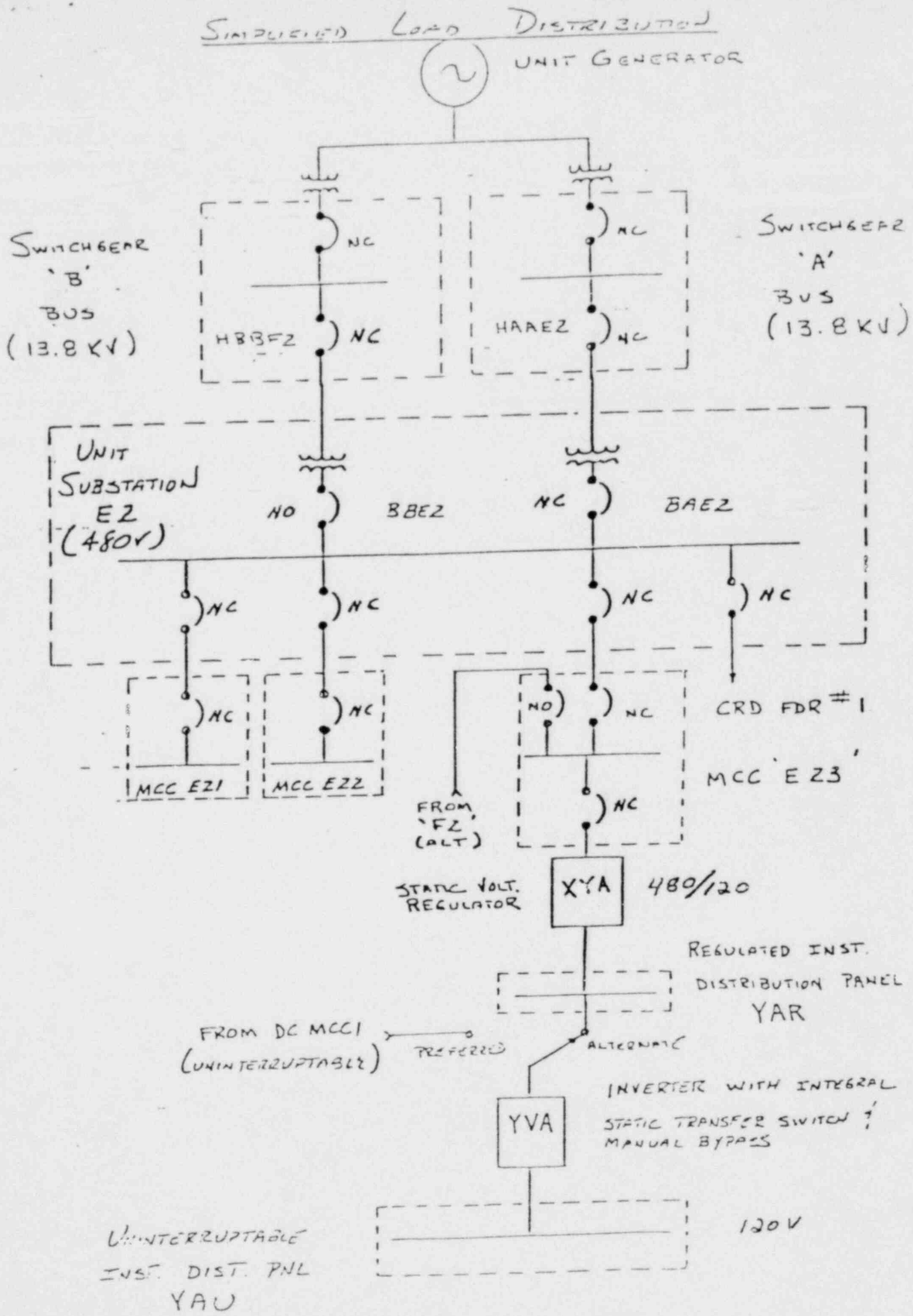
SIMPLIFIED LOAD DISTRIBUTION
UNIT GENERATOR
SWITCHGEAR 'B' BUS (13.8 KV)
SWITCHGEAR 'A' BUS (13.8 KV)
NC
HBBFZ
HAAEZ
UNIT SUBSTATION EZ (480V)
NO
BBEZ
BAEZ
MCC EZ1
MCC EZ2
CRD FDR #1
MCC EZ3
FROM 'FZ' (ALT)
STATIC VOLT. REGULATOR
XYA
480/120
REGULATED INST. DISTRIBUTION PANEL
YAR
FROM DC MCC1 (UNINTERRUPTABLE)
PREFERRED
ALTERNATE
INVERTER WITH INTEGRAL STATIC TRANSFER SWITCH & MANUAL BYPASS
YVA
UNINTERRUPTABLE INST. DIST. PNL
YAU
120V

FIGURE 1