

Inter-Office Memorandum

Date April 21, 1979
TSG-089



Subject TMI-2 Criteria for Loss of Off-Site
BOP Electrical Power

To W. R. Cobean

Location Three Mile Island

*V. Stello
for INFO*

North

The attached criteria is forwarded for use in designing the plant modifications associated with providing electrical power to vital BOP loads in the event of a loss of normal off-site power.

A handwritten signature in cursive script, appearing to read "D. K. Croneberger".

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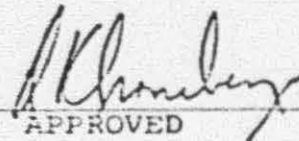
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THREE MILE ISLAND UNIT 2
CRITERIA FOR LOSS OF OFF-SITE
BOP ELECTRICAL POWER

(REV. 0)


APPROVED

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CRITERIA FOR LOSS OF OFF-SITE BOP ELECTRICAL POWER

1.0 SCOPE

This document provides criteria for the installation of additional equipment to provide electrical power to BOP buses in the event of failure of the normal off-site sources to the BOP buses. Work on these modifications is already in progress and this document attempts to reflect existing plans as well as future efforts.

2.0 CIRCULATING WATER PUMP HOUSE BUSES 2-5 AND 2-6

- 2.1 The present cooling scheme of steaming with steam generator "A" and one of the proposed cooling schemes for solid water cooling with steam generator "A" require the operation of at least one Circulating Water Pump.
- 2.2 Based on the "Criteria for General Modifications to the BOP Electrical System," only Circulating Water Pumps CW-P-1A and/or 1C (as supplied by bus 2-5) should be used for cooling systems associated with steam generator "A".
- 2.3 The normal power for the circulating water pumps on bus 2-5 is supplied via auxiliary transformer 2B. The high side of this transformer is connected to 230 kv substation bus No. 8 (on site). This bus can be supplied via two 230 kv lines from the north and via one 230 kv line and one 500 kv line from the south. Power can also be supplied via a normally open bus tie from the even numbered plant buses.
- 2.4 In order to operate the circulating water pumps and associated auxiliaries in the event of loss of normal off-site power, a new 13.8 kv line supplied from the 115 kv network is being installed. The 115 kv network is backed by combustion turbines and can be energized independently of the 230 kv network, in the event of a system collapse.
- 2.5 The new 13.8 kv feed will be connected to bus 2-5 via a 10 MVA 13.8 kv to 4.16 kv transformer. Circulating water pump 1E will be disconnected, and its breaker will be used to connect the new supply. The existing pump breaker protective relaying will be adjusted or disabled as necessary to allow operation of this new feed.
- 2.6 Connection of this new feeder onto the bus will be done manually using the existing breaker control switch in the control room. Operating procedures shall direct that the normal supply breakers for buses 2-5 and 2-6, the bus 2-5 to 2-6 tie breaker, the bus 2-7 to 2-8 tie breaker and the bus 2-72 to 2-82 tie breaker shall be open and that no voltage is present on bus 2-5 before closing the new supply breaker. Electrical interlocks shall be provided such that the new supply breaker cannot be closed if either the normal supply breaker for bus 2-5 and/or 2-6 is closed.

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- 2.6 Starting of the required loads shall be manually controlled from the Unit 2 control room (using existing breaker control switches).
- 2.7 Return to normal power shall be controlled manually by first opening the new supply breaker and then closing the normal supply breaker (running pumps will be tripped by ^(existing) undervoltage relaying and will have to manually restarted).
- 2.8 Procedures shall direct that the appropriate Met-Ed dispatchers are informed any time that ^{the} new supply is put into (and taken out of) service.

3.0 TURBINE BUILDING BUSES 2-3 AND 2-4

- 3.1 The present cooling scheme of steaming with steam generator "A", and all proposed cooling systems using both steam generators, use existing and new equipment powered from turbine building buses. At present, the principal loads include one 900 HP condensate pump, two new 700 HP pumps for water solid steam generator cooling, the 200 HP secondary closed cycle cooling water pumps, and the new temporary fuel handling/auxiliary building charcoal filter fans and heaters (new buses 2-38 and 2-48).
- 3.2 Based on the "Criteria for General Modifications to the BOP Electrical System," loads associated with cooling steam generator "A" should be connected to odd numbered BOP buses and loads associated with cooling steam generator "B" should be connected to even numbered buses.
- 3.3 The normal power for the turbine building buses is supplied via the two auxiliary transformers. The high side of these transformers is connected to the 230 kv substation buses. These buses are supplied by three 230 kv lines and one 500 kv line.
- 3.4 In order to operate the critical turbine plant loads in the event of loss of off-site power, two new 2500 kw diesel generators are being installed. These diesels are being designated as the "gray" and "white" diesels. The "gray" diesel will be connected to bus 2-3; the "white" diesel will be connected to bus 2-4. The connection will be made using existing condensate booster pump motor breakers. It is intended that these diesels shall energize all 480 volt unit substations and motor control centers supplied from buses 2-3 and 2-4.
- 3.5 These diesels are intended to back up the off-site power sources for a minimum of 2 years in support of the various new systems. The diesels should be operational prior to completion of any of the new vital BOP systems.
- 3.6 Relaying exists to disconnect large motor loads from the 4.16 kv buses. New controls shall be added to disconnect large 480 volt

- 3.6 loads, if necessary, to open the off-site supply breakers, and (Cont) to automatically start the diesels upon loss of the normal power supplies and connect them to the BOP buses. (The existing bus transfer scheme shall be left intact.) The loading of individual loads shall be manually controlled from the Unit 2 control room. (Certain new loads may temporarily be controlled from outside of the control room.) Return to normal off-site power shall be done manually by first opening the diesel breaker and then closing the off-site supply breaker.
- 3.7 Controls and indication for the diesel generators initially will be located locally at the diesel generators. In the long term, basic controls, indicators and alarms shall be duplicated in the Unit 2 control room.
- 3.8 The diesel generators are located out of doors in self-contained enclosures. The foundations and arrangement of the diesels shall ensure satisfactory operation of the diesels under all typical adverse weather conditions for this area.
- 3.9 One 5000 gallon fuel oil tank is being installed to supply each diesel generator. These tanks will provide sufficient oil for approximately one day of full load operation of each diesel. Arrangements shall be made for a minimum fuel oil supply on-site to operate both diesel generators for the time required to obtain fuel resupply (under normal conditions) plus four days (to allow for weather bad enough to delay normal delivery). Equipment shall be provided to transfer fuel from the on-site storage and delivery vehicles to the 5000 gallon tanks under all weather conditions.
- 3.10 Suitable fire protection shall be provided for the diesel generators. This shall include fire detection devices in the area of the diesels and oil storage tanks, a fire suppression system for each diesel generator unit and fire walls around each of the 5000 gallon oil storage tanks.
- 3.11 In the long term, the following alarms, indications and controls shall be provided in the Unit 2 control room, as a minimum:
- a) Low starting air pressure
 - b) Low day tank level
 - c) Low storage tank level
 - d) High jacket water temperature
 - e) High lube oil temperature
 - f) Other miscellaneous alarms
 - g) Engine generator trouble shutdown
 - h) Diesel generator not ready for auto start
 - i) Generator volts
 - j) Generator watts
 - k) Line current
 - l) Manual start
 - m) Manual stop
 - n) Diesel breaker open/close

- 3.12 Prior to October 1979, keep-warm systems shall be installed, if not already provided, in each diesel generator, in order to ensure reliable cold weather starting.
- 3.13 In addition to the new diesel generators, it may be feasible to energize at least the odd numbered BOP buses from the new 13.8 off-site line. This would be accomplished by opening the 230 kv disconnect switch supplying the auxiliary transformer and then feeding the turbine building BOP buses via the 4.16 kv cable and bus connected to the auxiliary transformer secondary. The feasibility of this connection shall be reviewed and documented for future consideration.