SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER AND LIGHT COMPANY

PENNSYLVANIA ELECTRIC COMPANY

DOCKET NO. 50-320

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 2

Introduction

By letter dated April 28, 1980 (Reference 1), the Metropolitan Edison Company (licensee) proposed changes to the Recovery Mode technical specifications for Three Mile Island Unit 2 (TMI-2) dealing with the Balance of Plant (BOP) diesel generators and the 13.2 kv circuit from the Middletown Junction Substation. The proposed changes would remove the operability requirements for the BOP diesel generators and the 13.2 kv circuit imposed by the Order of the Director of the Office of Nuclear Reactor Regulation on February 11, 1980, (45 F.R. 11282) in the form of proposed Technical Specifications and would change the allowable out-of-service time for the Class 1E diesel generators to allow adequate time for the performance of the manufacturer's recommended annual preventive maintenance operations.

Following the March 28, 1979, accident at TMI-2, it became apparent that the preferred cooling modes for the reactor included the use of a significant amount of plant equipment that did not have access to back-up power supplies. This was also true for the plant modifications proposed to provide alternate methods of core cooling. Therefore, in order to provide back-up power capability to these core cooling systems, two additional diesel generators and a separate external 13.2 kv

transmission line were installed at the site. A description of these alternate core cooling modes and associated systems and back-up power supplies as well as the staff's safety evaluation can be found in Appendix B to NUREG-0557 "Evaluation of Long-Term Post-Accident Core Cooling of Three Mile Island Unit II." The operability requirements for these additional diesel generators and the 13.2 kv transmission line were imposed by the Director's Order of February 11, 1980.

Summary

The licensee has requested NRC staff approval of proposed design changes which would allow the removal of the two BOP diesel generators and the 13.2 kv transmission line. The proposed changes would ultilize the same combustion turbines, located in the proximity of Three Mile Island, that now provide the back-up power source via the 13.2 kv line. The difference being that the 230 kv grid system would be utilized instead of the 13.2 kv line (via the 115 kv grid system). We have found that the licensee's proposal provides an equivalent degree of protection as that afforded by the approved existing system and have therefore granted their request to modify the existing system accordingly.

Evaluation

The TMI-2 BOP power system was devised as a short-term solution to the problem of providing loss-of-offsite-power protection for three non-safety related 4160 volt busses. These busses (i.e. 2-3, 2-4, and 2-5) were selected because of existing loads as well as their capacity for new loads that would be required in the various

proposed alternate methods of core cooling. The licensee proposed the existing system to fulfill the loss-of-offsite-power protective function. The existing system has a dedicated non-Class 1E diesel generator for bus 2-3 (Gray System) and another for bus 2-4 (White System). The major load required on bus 2-5 is the 2250 horsepower circulating water pump. Given a loss of offsite power, the starting requirements of this motor were such that a sufficiently sized additional diesel generator was not a viable short-term option. The licensee therefore proposed the use of local combustion turbines with black-start capability and a new low voltage (13.2 kv) transmission line to bring the power to the site.

Upon a year's reflection and accompanying engineering analyses of the BOP power system (as currently structured), the licensee has proposed a new BOP power system configuration. This new configuration replaces the two BOP diesel generators and the 13.2 kv transmission line with the existing 230 kv grid system. This means re-energizing a portion of the 230 kv grid system (that which normally feeds offsite power to TMI) by use of the combustion turbines. This eliminates the need to switch to other sources and can be accomplished well before any need for restoration of motive power would exist.

This proposed design change places no new restrictions on the required BOP in-plant loads beyond any that now exist and, in fact, provides an overall upgrade in loss-of-offsite-power protection. This upgrade is realized in the following ways:

1. unlimited versus limited capacity,
2. operator action consists of coordination with system dispatcher only versus also dispatching operators to man the BOP diesels,

3. proven reliability of the 230 kv grid and its components versus the unproven non-Class 1E diesel generators, and
4. familiarity with existing equipment versus new equipment never tested/operated in the actual mode required given loss of offsite power. (This is due to the fact that no testing is allowed which could even possibly provide a perturbation in the core cooling function.)

The licensee's proposal to use three separate, redundant and independent sets of combustion turbines (by priority) located in three separate geographical locations and the 115/230 kv grid configuration which allows multiple transmission paths from each generating site to the TMI switchyard (all under remote supervisory control of the grid system dispatcher) provides a system that assures the timely reinstatement of power to the TMI site absent major physical destruction of the transmission system. The postulation of such major physical damage goes well beyond the required design bases of such systems and is therefore not considered further in this evaluation.

The subject of modifying the TMI-2 BOP power system was first presented to the staff in Reference 2. This request concerned only removal of the BOP diesel generators and thereby required physical modification to the onsite distribution system to allow the 13.2 kv line to provide power to all three BOP buses. Our evaluation of this proposal is documented in Reference 3 in which we found the concept acceptable but required additional details of the in-plant modifications in order to give final approval. Reference 4 expanded the licensee's modification request to include the 13.2 kv line. This would be done in such a manner that the modification to the

onsite distribution system would no longer be needed (i.e. the design configuration herein evaluated). Therefore, we conclude that the Reference 2 request and the Reference 3 set of questions are superseded and replaced by Reference 4 and this evaluation and that nothing further is required.

As part of our systems review of this proposed design modification, we requested two sets of procedures be included in the licensee's submittal. The two sets of procedures include the TMI-2 Emergency Procedure 2202-2.1 Station Blackout and four grid system dispatcher procedures covering two different paths for the preferred source of back-up power and one each for the second and third priority sources. Procedure 2202-2.1 has been reviewed and approved pursuant to the requirements of proposed Technical Specification 6.8.2. The four grid dispatcher procedures are not covered by the above formal program; however, we have reviewed these procedures and have found them to be acceptable.

We have reviewed the revisions to the proposed Technical Specification and have concluded that they accurately reflect the modified system, are consistent with existing requirements to provide back-up power capability and also provide for an annual maintenance program for the diesel generators that was inadvertently left out of the existing requirements. We, therefore, find the proposed Technical Specifications to be acceptable and require that they become effective coincident with the removal of the BOP diesel generators and the 13.2 kv transmission line.

Environmental Consideration

We have determined that the modification does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further

concluded that the modification involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR Section 51.5(d) (4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this modification.

Conclusion

Based upon our review of BOP power system modification, the attendant Technical Specifications and emergency procedures, and our findings that the proposed system provides an overall upgrade in loss-of-offsite-power protection, we find the licensee's request to be acceptable and grant the request to make said modifications. The measures authorized in connection with this evaluation will assure the continued maintenance of the facility in a safe, stable, long-term cooling condition, as discussed above. Based on these considerations, we have concluded that: (1) the modification does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the modified manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this modification will not be inimical to the common defense and security or to the health and safety of the public.

REFERENCES

1. Letter to B. J. Snyder, USNRC, from R. C. Arnold, Met. Ed/GPU, Technical Specification Change Request No. 22, dated April 28, 1980, (TLL 186).

2. Letter to J. T. Collins, USNRC, from R. F. Wilson, Met. Ed/GPU, requesting removal of the two BOP diesel generators, dated March 4, 1980.

3. Letter to R. C. Arnold, Met. Ed, from J. T. Collins, USNRC, granting approval of the concept for removal of the BOP diesel generators, dated March 28, 1980.

4. Letter to J. T. Collins, USNRC, from R. F. Wilson, Met. Ed/GPU, requesting removal of 13.2 kv power line, dated March 28, 1980.

Replace the following pages of the Recovery Operations Plan with the enclosed pages as indicated. The revised pages contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completemess.

Pages

4.8-1
4.8-2
4.8-3

4.8 ELECTRICAL POWER SYSTEMS

4.8.1 A.C. SOURCES

4.8.1.1.1 Each of the required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availablity.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day fuel tank.

2. Verifying the fuel level in the fuel storage system.

3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.

4. Verifying the Class 1E diesels start from ambient condition and accelerate to at least 900 rpm (ie 60 Hz on the generator) in less than or equal to 10 seconds.

5. Verifying each Class 1E diesel generator is synchronized; loaded to greater than or equal to 3000 kw, and operates for greater than or equal to 60 minutes.

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

b. At least once per 92 days by verifying that a sample of diesel fuel obtained in accordance with ASTM-D270-63, from the fuel storage tank is within the acceptable limits specified in Table 1 of ASTM D975-74 when checked for viscosity, water and sediment.

A.C. SOURCES (Continued)

4.8.1.1.4 Deleted.

4.8.2 ONSITE POWER DISTRIBUTION SYSTEMS

A.C. DISTRIBUTION

4.8.2.1 The specified A.C. busses shall be determined OPERABLE with tie breakers open between redundant busses at least once per 7 days by verifying correct breaker alignment and indicated power availability.

D.C. DISTRIBUTION

4.8.2.3.1 Each D.C. bus train shall be determined OPERABLE and energized with tie breakers open at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.3.2 Each 250/125-volt battery bank and charger shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying that:

1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks.

2. The pilot cell specific gravity, corrected to 77°F and full electrolyte level, is greater than or equal to 1.20.

3. The pilot cell voltage is greater than or equal to 2.13 volts.

4. The overall battery voltage is greater than or equal to 250/125 volts.

FACILITY OPERATING LICENSE NO. DPR-73

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Replace the following pages of the proposed Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Pages

3.8-1
3.8-2
3.8-3

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 A.C. SOURCES

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system.

b. Two separate and independent Class 1E diesel generators each with:

1. A separate day fuel tank containing a minimum volume of 500 gallons of fuel.

2. A separate fuel storage system containing a minimum volume of 19,000 gallons of fuel.

3. A separate fuel transfer pump.

APPLICABILITY: RECOVERY MODE.

ACTION:

a. With either an offsite circuit or diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1 and 4.8.1.1.2.a.4 in accordance with the applicable row in the Testing Frequency Matrix of Table 3.8-1; restore the full complement of the above required A.C. electrical power sources to OPERABLE status within 72 hours, except when performing the Annual Preventive Maintenance Outage at which time 7 days shall be allowed.

b. With one offsite circuit and one diesel generator or two offsite circuits or two diesel generators of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1 and 4.8.1.1.2.a.4 in accordance with the applicable two rows in the Testing Frequency Matrix of Table 3.8-1; restore at least one of the inoperable sources to OPERABLE status in accordance with the Restoration Time Matrix of Table 3.8-2. Restore the full complement of the above required A.C. electrical power sources to OPERABLE status within 72 hours from the time of initial loss.

TABLE 3.8-1

TESTING FREQUENCY MATRIX

Inoperable Component	Component Testing Frequencies			
	a_1	a_2	b_1	b_2
a_1	X	*	*	*
a_2	*	X	*	*
b_1	*	*	X	*
b_2	*	*	*	X

Key: *Within 4 hours and every 12 hours thereafter
a_1 Offsite power circuit No. 1
a_2 Offsite power circuit No. 2
b_1 Class 1E diesel generator (Red)
b_2 Class 1E diesel generator (Green)

TABLE 3.8-2

RESTORATION TIME MATRIX

		Restore One Component (Hours)	Restore Other Component (Hours)
Combination of Two Inoperable Components	aa	24	72
	ab	12	72
	bb	12	72

Note: a and b above correspond to components described in Specification 3.8.1.1 items a and b respectively.

3.8.2 ONSITE POWER DISTRIBUTION SYSTEMS

A.C. DISTRIBUTION

3.8.2.1 The following A.C. electrical busses shall be OPERABLE and energized with tie breakers open (unless closed in accordance with procedures approved pursuant to Specification 6.8.2) between redundant busses:

4160	volt Emergency Bus # 2-1E and 2-3E
4160	Volt Emergency Bus # 2-2E and 2-4E
4160	Volt Busses # 2-3, 2-4, and 2-5
480	volt Emergency Bus # 2-11E, 2-12E and 2-31E
480	volt Emergency Bus # 2-21E, 2-22E and 2-41E
480	volt Busses # 2-31, 2-41, 2-32, 2-42, 2-35, 2-45, 2-36, 2-46, 2-38 and 2-48
120	volt A.C. Vital Bus # 2-1V
120	volt A.C. Vital Bus # 2-2V
120	volt A.C. Vital Bus # 2-3V
120	volt A.C. Vital Bus # 2-4V

APPLICABILITY: RECOVERY MODE.

ACTION:

With less than the above complement of A.C. busses OPERABLE, restore the inoperable bus to OPERABLE status within 8 hours.