ENCLOSURE 1

EVALUATION OF LICENSEE'S COMPLIANCE WITH CATEGORY "A" ITEMS OF NRC RECOMMENDATIONS RESULTING FROM TMI-2 LESSONS LEARNED

INDIANA AND MICHIGAN ELECTRIC CO.
DONALD C. COOK NUCLEAR POWER PLANT
UNIT NOS. 1 AND 2

Date: March 20, 1980

I. INTRODUCTION

By letters dated October 24[1], November 26[2], December 19[3], 26[4], 1979, January 15[5], 18[6], and 31[7], March 10[8], 1980, Indiana and Michigan Electric Co. (licensee) submitted commitments and documentation of actions taken at D. C. Cook Nuclear Power Plant to implement our requirements resulting from TMI-2 Lessons Learned. To expedite our review of the licensee's actions, members of the staff met with the licensee's staff on February 22, 1980. This report is an evaluation of the licensee's efforts to implement each Category "A" item which was to have been completed by January 1980.

II. EVALUATION

Each of the Category "A" requirements applicable to PWRs is identified below. The staff's requirements are set forth in Reference 9; the acceptance criteria is documented in Reference 10. The numbered designation of each item is consistent with the identifications used in NUREG-0578. Lessons Learned items 2.1.7(a), and 2.1.9 are being reviewed separately and are not addressed in this report.

2.1.1 EMERGENCY POWER SUPPLY

Pressurizer Heater

The Westinghouse Owner's Group analysis has determined that the minimum requirements to maintain subcooling, in a four loop plant with a pressurizer volume of 1800 cubic feet is 150 kw of heater capacity. Two backup heater groups are each rated at 700 kw. Two 345 kw banks are energized from separate emergency 480 volt buses which in turn are energized from redundant diesel generators upon loss of offsite power. These heater groups can be connected to the buses in 345 kw banks.

The station emergency and abnormal operating procedures have been revised to direct the operator to check and restore the pressurizer heaters following safety injection or loss of offsite power. The pressurizer heater groups are connected to the emergency buses through safety grade circuit breakers.

The licensee has satisfied the short term Lessons Learned requirements for pressurizer heaters.

Pressurizer Relief and Block Valves

Three power-operated relief valves (PORV's) for each pressurizer are pneumatically operated from the instrument air system upon actuation of solenoid control valves. The instrument air system is supplied from the two station air compressors which are energized from redundant 600 volt buses. These buses can be switched over to emergency power. Two PORV's have backup accumulators which contain approximately 170 stored operations. The

solenoid valves for these two PORV's are energized from redundant 250 volt plant batteries.

The motor operated block valves for the two PORV's are equipped with air accumulators and are energized from redundant emergency 600v buses. These buses are energized from onsite diesel generators automatically upon loss of offsite power. The PORV's and their associated block valves are connected to emergency buses through safety grade circuit breakers.

Pressurizer Level Indicators

Three pressurizer level transmitter instrument channels indicate level in the control room. These three level instrument channels are independently powered from three vital instrument panels which are inverter fed from redundant 250 volt plant batteries.

The licensee has satisfied the short term Lessons Learned requirements of emergency power supplies for the pressurizer power-operated relief valves/ block valves and pressurizer level indicators.

2.1.2 PERFORMANCE TESTING FOR PWR RELIEF AND SAFETY VALVES

All PWR licensees are required to functionally test reactor coolant system relief and safety valves to demonstrate operability under expected operating conditions. The Category "A" requirement is for the licensee to commit to perform an appropriate test program.

The licensee has referenced the Electric Power Research Institute's (EPRI) "Program Plan for the Performance Verification of PWR Safety/Relief Valves and Systems," as the program description and schedule to meet this requirement.

2.1.3.a DIRECT INDICATION OF POWER-OPERATED RELIEF VALVES AND SAFETY VALVES FOR PWRs

NUREG-0578 requires PWR licensees to provide positive position indication for reactor coolant system relief and safety valves.

The licensee is using the existing stem mounted position indication on the power operated relief valves (PORVs) and has installed an acoustical system (designed by Technology for Energy Corp. (TEC)) to monitor the position of the safety valves. D. C. Cook is in compliance with Lessons Learned requirements for this item.

2.1.3.b INSTRUMENTATION FOR INADEQUATE CORE COOLING (SUBCOOLING METER)

The licensee has installed a digital subcooling monitor (designed by Babcock and Wilcox) that chooses the highest reading of 8 core exit thermocouples (T/Cs) and 8 hot and cold leg RTDs and the lowest value of two safety grade wide range pressure sensors to calculate and display the margin of subcooling.

The licensee is also using the plant computer to display the margin of subcooling in °F on an analog trend device in the control room. The computer uses the lowest input (safety grade wide range pressure sensor) and four different temperature inputs to calculate the margin of subcooling. These four methods of temperature calculations are: the hottest in-core thermocouple (T/C), the average of the T/Cs excluding the hottest and coldest T/C, the hottest cold leg or hot leg RTD, and the average RTD including the hottest and coldest reading. If any of these four margins is less than the setpoint, an alarm is initiated.

Both systems meet the short term Lessons Learned requirements for this item. OIE will confirm that procedures are in place for backup methods of determining saturation margin by use of steam tables.

2.1.4 CONTAINMENT ISOLATION

All containment isolation valves (CIVs) in non-essential systems that were originally designed to close upon receipt of an automatic isolation signal meet the Lessons Learned position on diversity. Diversity is provided on these valves (with the exception of main steam isolation valves (MSIV)) by use of a safety injection signal, which has diverse input. Diverse parameters are also used to initiate MSIV closure.

The licensee has identified all essential and non-essential systems. A basis for selection of each essential system was provided. The licensee has identified several non-essential systems that are not automatically isolated by the containment isolation signals. They have submitted justification for all non-essential valves not on automatic isolation.

The staff concludes that sufficient isolation provisions have been provided for all non-essential penetrations. Those penetrations with normally closed manual isolation valves will be locked closed and administratively controlled such that at any time they are open during plant operation, a dedicated person will be assigned to close it immediately in the event of an emergency or when the operation is complete. The licensee has submitted a revision to their technical specifications so that the letdown orifice isolation valves are classified as containment isolation valves. As a result of this reclassification, these valves will be required to be leak-tested in accordance with Appendix J requirements and operability tested.

The D. C. Cook design precludes the automatic reopening of any containment isolation valve upon reset of the isolation signal. All automatic CIVs are controlled by "three-position" valve control switches with seal-in relays.

D. C. Cook has no valve control switches which control the reopening of more than one containment isolation valve.

D. C. Cook Units 1 and 2 are in compliance with short term Lessons Learned requirements for containment isolation. OIE will verify that procedures are in place that require manual isolation valves to be locked closed and administratively controlled as specified above.

OIE will verify that administrative or operating procedures require manual isolation valves in non-essential systems to be locked closed. These valves should be administratively controlled such that at any time they are open during plant operation, a dedicated person is assigned to close it immediately in the event of an emergency or when the operation is complete.

2.1.5.a DEDICATED H_2 CONTROL PENETRATIONS

Each unit has two electric hydrogen recombiners inside the containment which are operable from the control room. Therefore, dedicated H_2 control penetrations are not needed for this facility.

2.1.5.c REVIEW OF PROCEDURES AND BASES FOR ACTUATION OF THE H_2 RECOMBINERS

The licensee has reviewed the procedures for hydrogen sampling and recombiner actuation in light of the TMI accident and has included the shielding and personnel exposure limitations as part of the shielding review of Item 2.1.3.b. OIE will review these procedures and verify that plant operators have been instructed in their use.

2.1.6.a INTEGRITY OF SYSTEMS OUTSIDE CONTAINMENT

A leakage reduction program has been developed and implemented for the Cook nuclear plants. Systems were selected so that inability to use any system not included would not preclude any possible option for cooling the core nor preclude the use of any safety system. Lists of systems included and of systems excluded were provided. Leak rate measurements were made and reported for conditions both before and after leakage reduction actions. A preventive maintenance program has been established; it consists largely of periodic leak testing, regular surveillance for leaks and repair as soon as practicable. No fixed criteria for leakage have been established but leakage is to be maintained as low as practical. Helium leak testing is being performed by a qualified contractor so no special training or equipment is needed. Cook is in compliance with Lessons Learned requirements.

OIE will perform the following followup actions:

1. Verify that leakage reduction measures have been taken.

2. Review the "Plant Manager Instruction" and the leakage control procedures for adequacy.

3. Periodically (at least annually) review records and inspect the plant to ensure that leakage continues to be kept as low as practicable.

2.1.6.b DESIGN REVIEW OF PLANT SHIELDING AND ENVIRONMENTAL QUALIFICATIONS

A design review was conducted using the NRC-specified source terms. Detailed dose rate maps were developed but no formal report was written. The systems considered as sources were those that would handle high levels of radioactivity (SI, CS, RHR, charging and sampling); letdown and the waste gas system were not included because letdown is isolated and will not be used in an accident. Care was taken to ensure the consideration of all sources including field-run piping and sample lines. The vital areas were identified. Only the control room and the technical support center require continuous occupancy and little access to other areas is necessary. The emergency power supplies, the motor control cabinets and the sample analysis stations are accessible. No major shield modifications are needed. The radiation environmental qualification review of safety equipment is in progress and will be reported by April 15, 1980. Cook will be in essential compliance with the Lessons Learned requirements when environmental qualification is complete. OIE will verify that the Environmental Qualification review is completed by April 15, 1980.

2.1.7.b AUXILIARY FEEDWATER FLOW INDICATION TO STEAM GENERATORS

The auxiliary feedwater flow measurement system, one for each of the four steam generators, indicate flow in the control room. Each instrument channel is powered from a separate vital instrument bus. Four steam generator water level instruments for each steam generator readout in the control room to provide diversity and satisfy the single failure criterion.

The design of the auxiliary feedwater flow indication channel is such that restability is a feature. The feedwater flow indications to each steam generator are tested every 31 days and calibrated during each refueling outage. Each auxiliary feedwater flow channel provides an indication of feed flow with an accuracy of $\pm$ 5.5%.

The licensee has satisfied the short term Lessons Learned requirements for auxiliary feedwater flow indication.

2.1.8.a IMPROVED POST-ACCIDENT SAMPLING CAPABILITY

A design review was conducted. Minor modification, primarily extension of sample lines, have been made to permit sampling both containment atmosphere and reactor coolant. Samples can be obtained within one hour. Procedural controls and shielding are provided to prevent overexposures in sample collection and in sample analysis. Sample analysis can be completed within one hour after the samples are taken. Analysis results will include radioisotopic analysis of both RC and containment atmosphere samples. Containment atmosphere also will be analyzed for hydrogen concentration. RC will be analyzed for boron, chloride and pH (gas analysis cannot be performed with the interim method). The analysis facilities will be functional after an accident and backup facilities are available. Minor modifications made to permit post accident sampling meet appropriate safety design requirements. D. C. Cook is in compliance with the Lessons Learned requirements for this item.

OIE will perform the following followup actions.

1. Review the interim post-accident sampling and analysis procedures for adequacy.

2. Verify that the reported minor modifications have been made and that the equipment is available.

2.1.8.b INCREASED RANGE OF RADIATION MONITORS

Interim methods have been developed for monitoring high level releases. The necessary modifications have been made and the procedures are effective. Existing portable monitoring instruments are used. Provisions have been made for monitoring releases via the auxiliary building stack and via the steam lines. The interim method for monitoring noble gas releases is adequately described. Provisions are made for using any of 3 kinds of instruments. The interim method exceeds the range requirement; Cook can monitor releases exceeding a megacurie per second. The portable instruments are battery powered and can meet the 7-day criterion. The auxiliary building stack is monitored for noble gases by gamma radiation measurements from the sample line. Methods for monitoring high-level iodine and particulate effluents and for monitoring releases from the steam lines have been developed and are adequate to meet short term Lessons Learned requirements.

D. C. Cook is in compliance with Lessons Learned requirements for this item.

OIE will verify that the equipment for monitoring effluents has been installed and will review post-accident effluent monitoring procedures.

2.1.8.c IMPROVED IN-PLANT IODINE INSTRUMENTATION

In-plant iodine monitoring is performed with NMC CAMs and Eberline PINE-IA monitors. Both systems are portable. All vital areas can be monitored. Both systems include shielding to control background radiation and both use single channel analyzers. Normally (TEDA impregnated) charcoal cartridges are used but silver zeolite cartridges are available for use when needed. A backup low background counting facility is available. The air sampling equipment can be powered by this normal AC or (backup) DC. Cook is in compliance with the Lessons Learned position.

OIE will verify that the described air monitoring equipment is in the plant and review the procedures for adequacy.

REACTOR COOLANT SYSTEM VENTS

The licensee has provided the design for the reactor coolant system vent and has addressed all of the clarification items in the NRC's October 30 letter. We have reviewed the licensee's response and find the design to be in conformance with Lessons Learned requirements.

2.2.1.a SHIFT SUPERVISOR RESPONSIBILITIES

The shift supervisor responsibilities at the D. C. Cook plant have been revised to conform to the Lessons Learned position.

OIE will review the plant procedures which specify responsibilities of the shift supervisor and verify that they are in force.

2.2.1.b SHIFT TECHNICAL ADVISOR

D. C. Cook has implemented the shift technical advisor program. The STA is on shift and will report to the control room within 10 minutes. He is to have no other duties during accident conditions except to act as advisor to the shift supervisor. D.C. Cook is in compliance with short term Lessons Learned requirements for this item.

2.2.1.c SHIFT AND RELIEF TURNOVER PROCEDURES

Shift and relief turnover procedures are conducted such that they conform to the Lessons Learned requirements. A directive has been issued by the licensee requiring plant management to review the effectiveness of the turnover procedure at least once a week.

2.2.2.a CONTROL ROOM ACCESS

Procedures have been implemented at the D. C. Cook plant to effectively limit access to the control room. A key card system is in effect and in addition the shift supervisor has the authority to control access and to limit the number of people in the control room at all times.

2.2.2.b ONSITE TECHNICAL SUPPORT CENTER

The interim onsite technical support center (TSC) has been established in the shift operating engineer's office adjacent to the control room and the conference room located on the level above the control room. This area is readily available to the document center where pertinent plant records and drawings of plant area, layouts, systems, and equipment are available. Procedure PMP 2080 EPP.028 provides plans for engineering/management support and staffing of the TSC.

Radiation equipment for monitoring airborne contamination and direct radiation is available in the TSC. Three communication links exist between the TSC and the control rooms: a dedicated telephone link, the regular station telephone, and a public address system. Dedicated communication between the TSC and NRC Operations Center in Bethesda has been established.

The licensee has prepared procedures which call for direct communications (telephone) between knowledgeable individuals in both the control room and TSC to ensure the reliable and timely transmittal of plant information to the interim TSC. Procedures have been implemented to provide plans for performing accident assessment functions in the TSC and the control room should the interim TSC become uninhabitable.

The Indiana and Michigan Electric Company has satisfied the short term Lessons Learned requirements for onsite technical support center.

2.2.2.c ONSITE OPERATIONAL SUPPORT CENTER

The licensee has designated the basement of the administration building as the on-site operational support center. Communications' equipment between this area and the control room is available. Procedure PMP 2080.EPP.029 which describes the activation, manning, and use of the operational support center has been implemented.

The Indiana and Michigan Electric Company has satisfied the short term Lessons Learned requirements for the onsite operational support center.

REFERENCES

1. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR dated 10/24/79, File No. AEP:NRC:00253.

2. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR, dated 11/26/79, File No. AEP:NRC:00253A.

3. Letter, R. S. Hunter, AEP, to H. Denton, Director, NRR, dated 12/19/79, File No. AEP:NRC:00253B.

4. Letter, R. S. Hunter, AEP, to H. Denton, Director, NRR, dated 12/26/79, File No. AEP:NRC:00253C.

5. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR, dated 1/15/80, File No. AEP:NRC:00253D.

6. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR, dated 1/18/80, File No. AEP:NRC:00334.

7. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR, dated 1/31/80, File No. AEP:NRC:00334A.

8. Letter, John E. Dolan, AEP, to H. Denton, Director, NRR dated March 10, 1980, File No. AEP:NRC:00334B.

9. NUREG-0578.

10. Letter, Director, NRR to AEP dated 10/30/79, Subject, "Clarification of NUREG-0578 Requirements".

ENCLOSURE 2

ATTENDANCE
MEETING - D. C. COOK
LESSONS LEARNED

Name	Affiliation
N. Anderson	NRC Lessons Learned Team
J. F. Burdoin	NRC Lessons Learned Team
M. B. Fields	NRC Lessons Learned Team
J. Kerrigan	NRC Lessons Learned Team
N. E. DuBry	NRC OIE, Region III
J. G. Feinstein	NUS Corp.
E. A. Smarrella	Indiana & Michigan Electric Co.
R. S. Lease	Indiana & Michigan Electric Co.
R. Masse	NRC - Senior Resident Inspector
D. Wigginton	NRC/DOR
S. J. Milioti	AEPSC
J. G. DelPercio	AEPSC
R. L. Shoberg	AEPSC
G. M. Gurican	AEPSC
C. A. Willis	NRC/DOR
S. Grimes	AEPSC