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U.S. NUCLEAR REGULATORY COMMISSION

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TO: Mr. Edson G. Case

FROM: Indiana & Michigan Power Company
New York, N. Y.
John Tillinghast

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(2-P)

RJL 6/8/77

ENCLOSURE

Consists of summary of their presentations at the 5/1/77 meeting re: design of the local shutdown panels & procedures for the units and called to address staff questions arising from the fire protection site visit..........

(9-P)

DO NOT REMOVE

ACKNOWLEDGED

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NRC FORM 195 (2-76)

INDIANA & MICHIGAN POWER COMPANY

P. O. BOX 18
BOWLING GREEN STATION
NEW YORK, N. Y. 10004

June 1, 1977

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
DPR No. 58
CPPR No. 61

Regulatory Docket File

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Case:

On May 11, 1977 representatives of American Electric Power Service Corporation and Indiana & Michigan Power Company met with the NRC staff in Bethesda, Maryland to discuss the design of the local shutdown panels and procedures for the above captioned units. The meeting was called to address staff questions arising from the fire protection site visit to the Donald C. Cook Nuclear Plant on April 19-22, 1977.

At the conclusion of the meeting, we were asked to formally submit a summary of our presentations. This summary is attached and follows in the same order as the original presentations.

Very truly yours,

John Tillinghast
Vice President

JT:mam

Sworn and subscribed to before me on the 1st day of June 1977 in New York County, New York

Kathleen Barry
Notary Public

KATHLEEN BARRY
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cc: G. Charnoff
R. J. Vollen
P. W. Steketee
R. Walsh
R. C. Callen
R. W. Jurgensen - Bridgman
R. S. Hunter

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SUMMARY OF MAY 11 MEETING BETWEEN NRC STAFF AND REPRESENTATIVES OF AEPSC AND I&M POWER COMPANY

Design Philosophy

On receipt of NRC IE Bulletin 75-04A in April of 1975, which required that the plant be brought to a Cold Condition instead of Hot Shutdown Condition upon an incident similar to the TVA Brown's Ferry incident, a review was made of shutdown capability. This review started from the viewpoint of "What is required beyond the Hot Shutdown (HSD) Panel systems to bring the plant to Cold Conditions?" It was determined that the only addition was the Residual Heat Removal system.

The ability to locally take over control of these systems at various plant locations was then reviewed. For the purpose of this expanded review the following assumptions were used as a design premise.

a. Normal off-site power available.

b. Any component or function required for shutdown must be able to be operated without the use of or reliance on the control room, cable vault or Hot Shutdown Panel.

c. Non-interference with protection grade instrumentation.

d. Return to service of a minimum of system equipment and controls.

Example: 1 pump operational, valve lineup and either indication of flow and/or pressure or manual control of these variables whichever was necessary.

The following systems and equipment were determined to be required to be in operation to bring the plant to cold conditions. The list is not in order of priority as to which is returned to service first.

System Name	System Conditions Monitored	System Needed For
Reactor Trip Breakers		Noncriticality
Non-Essential Service Water	Flow	Air Compressor Cooling
Control Air System	Pressure	Valve Operation

System Name	System Conditions Monitored	System Needed For
Essential Service Water	Flow	Component Cooling Water System Cooling, Backup Source for Auxiliary Feedwater
Component Cooling Water	Flow	Residual Heat Removal System Cooling, Pump Bearing Cooling for various pumps.
Residual Heat Removal	Flow	Bring Unit From Hot to Cold Conditions
Chemical Volume & Control Charging System	Flow, RCS Pressure & Level	Boration, RCS Pressure Control, RC Pump operation
Auxiliary Feedwater	Flow, Steam Generator & Condensate Storage tank level, Main Steam Pressure	Heat Removal to conditions for Residual Heat Removal Initiation
Main Steam Pressure Relief Valves	Main Steam Pressure	Heat Removal to conditions for Residual Heat Removal Initiation
Chemical Volume & Control Letdown	Flow	Option which allows better RCS pressure control
Boric Acid Transfer		Option which allows better boration control
RC Pump Seal Injection		Option which allows better cooldown temperature control plus RCS boration mixing
Containment Ventilation		Economic Option to maintain containment temperatures

To meet the design assumptions, various modification procedures for valves and breakers were developed which would allow the operators to separate the equipment from the control room and cable vault circuits and realign it for local manual operation. Also designed were a series of Local Shutdown Instrumentation (LSI) panels which would allow the operator to transfer control of Chemical Volume and Control Charging and Letdown, Auxiliary Feedwater and Main Steam pressure relief to these local stations for manual control of the systems. These procedures and LSI stations were designed to enable plant personnel, upon loss of controlability from the main control room, to take over and manually control the system regardless of the status of the normal controls.

Instrumentation and Control Provisions

In order to affect a safe and orderly unit shutdown from locations away from the main control room and Hot Shutdown Panel, local indication of the various essential system parameters is required.

At the Donald C. Cook Nuclear Plant, local indication has been provided and is available for an emergency shutdown at various locations in the Auxiliary Building, Turbine Building and Containment Instrument Room. A listing of the above-mentioned local indicators appear on Attachment A.

The majority of local indicators for pressure, level and flow are simple bourdon tubes or differential diaphram type measuring elements requiring no outside source of power to provide local indication. This is especially true for instrumentation located outside the reactor containment building.

The remaining local indication for systems located inside the reactor containment building is provided using electrical power supplies totally independent from those used in the Main Control Room. This is done so that in the event of a fire in the control room or cable vault the availability of power for the local shutdown indicators will not be jeopardized.

Certain indicators are housed in three instrument enclosures per unit called Local Shutdown Instrumentation (LSI) Cabinets. Provided on these LSI Cabinets are wide range steam generator level indicators, RCS charging and letdown indicators, a pressurizer level indicator and a RCS pressure indicator. Below each local indicator is a Remote/Local transfer switch which, when placed in the "Local" position, will transfer electrical power to its associated process transmitter from the normal supply to the emergency power supply.

In all cases local indicators have been located in close proximity to the equipment to be operated.

Additional local shutdown capabilities consist of manual valve control stations. Wherever possible, local controls for manual valve operation have been grouped together to minimize the manpower requirements to affect an emergency shutdown.

The control of valve position during a local shutdown can be broken up into two groups, that is, those valves required to be either full open or full closed and those required to be modulated. Valves such as those which serve as containment isolation barriers, letdown isolation valves, excess letdown isolation valves, charging flow isolation valves as well as valves in the NESW, ESW, and CCW cooling water systems are valves which will be placed in either the full open or full closed position. Those valves which are required to be modulated are regulating valves for charging flow control, RCP seal water control, letdown pressure control, excess letdown pressure control and RHR heat exchanger discharge and bypass valves.

The aforementioned valves are either motor operated or pneumatically operated. In the case of motor operated valves no additional shutdown provisions were necessary to enable an operator to locally control the valve position. A manually overriding handwheel is provided on such valves. For those valves which are pneumatically positioned, modifications were required to provide local shutdown capability. These modifications consisted of providing a means of bypassing whatever electrically operated devices (whether it be solenoid valves and/or I/P converters) existed in the path of the valve positioning air supply.

Since the design assumptions require that electrical power from the Main Control not be relied upon, local valve control is based upon the initial condition that electrical power will not be available. Whether power is available or not, an operator's first action is to strip the power leads to each solenoid to render it de-energized (for I/P converters that is not necessary; I/P's are to be completely bypassed pneumatically). All solenoids associated with control valves required for local shutdown are of the three-way,de-energize to vent type and are mounted in "Gangs" on solenoid racks. The exhaust ports of the solenoids are routed to their associated

"bypass station" where an air supply header equipped with an individual shutoff valve and flexible hose with quick connect coupler is provided for each valve. All valves are clearly identified with tags so that an operator can easily identify the valve he wishes to operate, de-energize the associated solenoid, makeup the quick connect coupling and apply air to position the control valve by opening the supply air header shutoff valve.

For those valves to be modulated a similar bypass station is provided using a hand operated bleed-type pressure regulator.

Electrical Considerations

The basic approach taken in divorcing key equipment from the control room is one of:

1. De-energizing control power to avoid spurious operations.

2. Re-connecting locally where necessary and re-energize.

This approach is possible because our general practice is to run control power through the actuate device and have only master control switches and automatic actuation contacts in the control room. In some instances for key equipment this practice was not adhered to and therefore to accommodate the remote shutdown capacity, circuits were modified appropriately.

Off-site power was assumed available through the 34 KV reserve feed or 69 kV emergency source. All 4 kV and 600v circuit breakers required to retain this supply would be verified, re-positioned where necessary, and then have their control fuses pulled.

Separation from the control room is obtained by determinating the cables going into the control room at the actuating device (circuit breaker, motor control center or solenoid valve).

Motor control center powered motors are secured by turning off the molded case circuit breakers. Control cables are then de-terminated and jumpers are applied. Equipment is then switched off and on from the circuit breaker. This is possible because the MCC's are self-contained with each starter having its own internal control power source.

Critical instrumentation which would normally be control room centered is duplicated with indicators and power supplies mounted locally. Circuits are switched locally to provide complete electrical isolation from the control room. These instruments are powered from a special 120 V AC distribution panel powered from a 600 volt bus through a 600/120 V transformer.

LOCAL SHUTDOWN PROCEDURE

An alternate emergency shutdown and cooldown procedure was written which provides instructions for remotely shutting the reactor down, placing the reactor in a hot standby condition and ultimately bringing the unit to a cold shutdown assuming loss of normal and preferred alternate methods. The basic philosophy for the procedure can be summarized as follows:

1. The procedure is written to be used in parallel with the normal shutdown and cooldown procedures. When an operation can be performed using alternate methods or systems, these steps are listed in order of preference prior to resorting to establishing local control. An illustration of this are the procedure steps for controlling T_{ave}:

   a. Normal Method 1 - control T_{ave} using steam dump system to condenser.

   b. Normal Method 2 - manual remote operation from control room of steam generator atmospheric power operated relief valves.

   c. Preferred Alternate Method - manual remote operation from hot shutdown panel of steam generator atmospheric power operated relief valves using steam generator pressure indication to determine T_{ave}.

   d. Emergency Alternate Method (Local Shutdown) - manual local operation from installed controller for each steam generator power operated relief valve using local steam generator pressure indication to determine T_{ave}.

2. Preventive steps will be performed after the reactor has been tripped and auxiliary power transferred from the main to the normal reserve source regardless

of need to prevent undesired opening and releasing of main and reserve auxiliary power feed breakers.

3. The equipment for which provisions have been made for local control are listed by system, referencing the required modification procedure and providing any required restart procedure. The specific procedures for modifying components for local control will be mounted at the component so that it will be readily available when the need arises.

4. As a preventive measure, standby essential equipment will be modified for local manual control as time and manpower becomes available so that if the running component fails due to the fire its standby component can quickly be placed in service locally.

The implementation of the above philosophy was illustrated at the meeting by reference to specific examples from the actual procedure itself (OHP.4023.001.001.).

Attachment A

I. Local Indicators

A.	Auxiliary MDFP	Disch.	(FFS-254)
B.	Auxiliary MDFP	Disch.	(FFS-255)
C.	Auxiliary MDFP	Disch.	(FFS-256)
D.	Auxiliary MDFP	Disch.	(FFS-257)
E.	Auxiliary TDFP	Disch	(FFS-258)
F.	RHR PP "E" Discharge		(IFC-315)
G.	RHR PP "W" Discharge		(IFC-325)
H.	Main Steam Pressure		(MPI-10)
I.	Holdup Tank "N" Level		(QLA-610)
J.	Holdup Tank "M" Level		(QLA-620)
K.	Holdup Tank "S" Level		(QLA-630
L.	NESW PP Discharge		(WDS-901)
M.	Control Air 20 PSI Hdr. Pressure		(XPI-20)
N.	Control Air 50 PSI Hdr. Pressure		(XPI-50)
O.	Control Air 85 PSI Hdr. Pressure		(XPI-85)
P.	Condensate Storage Tank Level		(CLI-110)
Q.	ESW to CCW Heat Exchanger "E"		(WFI-731)
R.	ESW to CCW Heat Exchanger "W"		(WFI-735)
S.	CCW PP "E" discharge		(CFI-410)
T.	CCW PP "W" Discharge		(CFI-420)

II. Local Shutdown Indication Cabinets

A. LSI Cabinet No. 1

A.1 Steam Generator No. 1 Level (BLI-110)

A.2 Steam Generator No. 4 Level (BLI-140)

B. LSI Cabinet No. 2

B.1 Steam Generator No. 2 Level (BLI- 120)

B.2 Steam Generator No. 3 Level (BLI-130)

C. LSI Cabinet No. 3

C.1 Charging Flow (QFI-200)

C.2 Letdown Flow (QFI-301)

C.3 Pressurizer Level (NLI-151)

C.4 R.C.S. Loop No. 1 Pressure (NPS-122)