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October 21, 1980

Mr. A. Bournia
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: LaSalle County Station Units 1 and 2
Stuck Open Relief Valve Analysis
NRC Docket Nos. 50-373/374

Dear Mr. Bournia:

Enclosed for your information and use are the justifications for two of the assumptions utilized in the pool-temperature analysis of a Stuck Open Relief Valve (SORV) occurring at full reactor power operation.

Enclosure 1 provides the justification for a manual scram occurring at a pool temperature of 110°F (TS1). Enclosure 2 provides the justification for the use of the main condenser as a heat sink.

These justifications are provided in response to an informal request made during a telephone conversation held on September 15, 1980 between Messrs. N. Su (NRC), A. Bournia (NRC), and B. Shelton (CECo.), et. al. representing Commonwealth Edison.

If you have any further questions, please direct them to this office.

Very truly yours,

L. O. DelGeorge

L. O. DelGeorge
Nuclear Licensing Administrator

Enclosure

cc: RIII Resident Inspector - LSCS (w/o Encl.)

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Manual Scram

As identified by the Mark II Owners Group (reference 1), it is assumed that a manual scram of the reactor occurs when the suppression pool temperature reaches TS3 for the transient analysis of a stuck open relief valve at power. TS3 is defined as the maximum allowable suppression pool temperature while maintaining the reactor critical.

Commonwealth Edison Company concurs with this assumption for LaSalle County. TS3 for LaSalle County is 110°F.

In the unlikely event that a relief valve sticks open at LaSalle County, the operator would be alerted to this by both primary and secondary alarms and plant parameter displays.

The following primary alarms/displays would indicate an open valve immediately after the valve opened:

1) the SRV LEAK DETECTOR alarm,
2) the ADS/SRV OPEN position alarm, and
3) the ADS/SRV OPEN position indicator.

The following secondary alarms, displays would identify changes in the plant due to steam discharging through the open valve:

1) the continuous display Pool-Temperature recorder/indicator would shown an increasing pool temperature,
2) the pool temperature monitoring system would alarm at TS1 (100°F), and

3) power meters would indicate a generator load decrease with no change in reactor power.

The above primary and secondary alarms/displays are those that are representative of a stuck-open relief valve (SORV). These alarms/displays provide the operator both immediate and unambiguous indications of a stuck open relief valve and high pool temperature.

In order to clarify what information the operator sees and actions he must perform, the following event sequence is provided. This event sequence has been chosen to maximize the severity of the transient. Initial conditions are the same as those utilized by the Mark II Owners Group (reference 1).

A Safety/Relief Valve (SRV) spuriously opens and sticks open. Immediately the ADS/SRV OPEN alarm sounds, the ADS/SRV OPEN indication light for the specific valve turns on, and the SRV LEAK DETECTOR alarm sounds.[1] Since it is assumed that the pool temperature is just below TS1, at the outset of the

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[1] The ADS/SRV OPEN alarm and ADS/SRV OPEN indication light are triggered by position switches which provide a positive valve position indication. The SRV LEAK DETECTOR alarm is triggered by discharge pipe thermocouples. The 4/15/80 letter from D. L. Peoples (CECo) to D. G. Eisenhut (NRC) on the NTOL Action Plan provides additional information on the switches and thermocouples.

transient, the pool temperature monitoring system will alarm immediately after the valve opens and the displayed temperature will begin to increase.[2]

Since steam is being diverted from the Turbine-Generator, the generator load will decrease while a constant reactor power is maintained. The operator at this time (<1 min after initiation of event) has a clear set of "symptoms" that indicate a stuck-open relief valve has occurred. Operating procedures require the following operator actions:

1) Attempt to close the relief valve remote manually by placing the control switch to open, then back to auto.
2) If the relief valve cannot be closed, transfer auxiliary power to transformer 142.
3) Adjust reactor water level as necessary to minimize the effect of void collapse.
4) Shutdown the reactor as follows:
    a) Reduce the recirculation flow to minimum by closing the recirculation flow control valves.
    b) SCRAM the reactor.
    c) Place the reactor mode switch to shutdown.

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[2] The pool temperature monitoring system has been designed to meet the requirements of NUREG-0487 and a description of the system is provided in Chapter 6 of the LaSalle Design Assessment Report (DAR).

After scram the pool temperature monitor would continue to show an increasing temperature and an alarm would sound when TS3 was reached.

From the above description, it can be seen that the operator has sufficient information via alarms and displays to immediately identify a SORV. It can also be seen that the only function the operator must perform is to scram the reactor if the valve cannot be closed.

Due to the clear identification of a SORV and the minimal operator action required the reactor will be scrammed prior to the bulk pool temperature reaching 110°F.

Commonwealth Edison Company has provided diverse primary and secondary alarms/displays and an extensive pool temperature monitoring system that will provide an immediate identification of a SORV. Commonwealth Edison Company plant operating procedures provide for and require specific actions be taken in the event of a SORV. Commonwealth Edison Company has therefore justified that a manual scram at TS3 (110°F) is a conservative assumption for the evaluation of pool temperature transients involving a stuck-open relief valve at power.

Reference: Letter plus enclosure dated April 18, 1980 from R. H. Buchholz (GE) to John F. Stolz (NRC) on Mark II Containment Program "Assumptions for Use in Analyzing Mark II BWR Suppression Pool Temperature Response to Plant Transients Involving Safety/ Relief Valve Discharge."

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Main Condenser

The Mark II Owners Group (reference 1) utilizes the main condenser in the transient analysis of a stuck-open relief valve (SORV) at power with only one residual heat removal system of the two redundant systems available.

Commonwealth Edison Company has evaluated both Mark I operating experience and LaSalle County transient analyses and has concluded that the main condenser will be available in the unlikely event that a relief valve sticks open during reactor full power operation. Therefore, Commonwealth Edison Company concurs with the Mark II Owners Group position.

The use of the main condenser as a heat sink requires that the bypass system be available, the circulating water system function, and that the main steam isolation valves (MSIV) remain open.

These three requirements are addressed as follows:

The only active components of the bypass system are five (5) hydraulically operated control valves which are capable of being opened by remote manual operation. Each of these valves has individual piping to its injection point in the main condenser.

Decay heat immediately following scram is less than 10% of the initial core power. Only two out of the five valves are required to meet the decay heat load [total bypass capability (5 valves) is 25% of the reactor heated steam flow].

The bypass system as described in FSAR section 10.4.4.1.2 is designed to control reactor pressure:

a. during the reactor heatup to rated pressure while the turbine generator is being brought up to speed and synchronized,

b. during power operation when the reactor steam generation exceeds the transient turbine steam requirements, and

c. during reactor cooldown.

Both a and b above provide on-line operability checks to assure that the bypass system is operable.

On-line assurance of operability and redundancy of components (2 required of 5) ensures the availability of the bypass system in the unlikely event that a relief valve sticks open at reactor full power operation.

The circulating water system function is to remove heat from the main condenser. It does so by taking water from the cooling lake, passing it through the main condenser, and returning it to the cooling lake.

The only primary active components used to achieve the above function are the three 1/3 capacity circulating water pumps.

All three pumps are in use when the reactor is at full power and therefore all pumps must be in operation when the SORV is postulated to occur. The failure of one pump will not degrade the circulating water system below what is needed to supply a sufficient amount of water for the removal of the decay heat that will be bypassed (through the bypass valves) to the main condenser.

The assured operability of the pumps/system and the redundancy provided by the pumps ensures the availability of circulating water to the condenser in the unlikely event that a relief valve sticks open at reactor full power operation.

In order to determine whether the main steam isolation valves remain open, the event sequence must be evaluated. The following event sequence for a SORV occuring at reactor full power has been chosen to maximize the severity of the transient. The initial conditions are the same as those utilized by the Mark II Owners Group (reference 1).

A Safety/Relief Valve (SRV) spuriously opens and sticks open.

As described in the event sequence for manually scramming the reactor with a SORV at reactor full power, the alarms sound and automatic controls adjust the generator load to the decrease in steam flow. Prior to the pool temperature reaching TS3 (110°F) the operator scrams the reactor by placing the reactor mode switch into "shutdown". This procedure maintains the MSIV's open when the reactor pressure falls below the low pressure MSIV closure setpoint.