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July 12, 1979

United States Nuclear Regulatory Commission
Attention: B. H. Grier, Director
Region I
631 Park Avenue
King of Prussia, Pennsylvania 19406

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334
License No. DPR-66
Response To IE Bulletin 79-06A

Dear Mr. Grier:

Enclosed is a supplement to the Duquesne Light Company response to I&E Bulletin No. 79-06A, Revision 1. It includes additional information to clarify and expand upon the original response, and complies to the requirements imposed by the NRC in the bulletin. Duquesne Light Company reserves the right to change procedures without prior notification to the NRC to that proposed by the Westinghouse owners group when these procedures are accepted by the NRC.

Very truly yours,

C.N. Dunn RAI

C. N. Dunn
Vice President, Operations

Attachment

cc: United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Division of Reactor Operations Inspection
Washington, D. C. 20555

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DUQUESNE LIGHT COMPANY
Beaver Valley Power Station
Unit No. 1

SUPPLEMENTAL RESPONSE TO IE BULLETIN NO. 79-06A
REVISION 1

Item 2

BVPS Operating procedures that relate to the potential for void formation, based on insight gained from TMI-2, have been revised and approved. The following is a list of the procedures that have been revised:

1. ECCS Actuation
2. Loss of Reactor Coolant
   a. Pressurizer Vapor Space Break
   b. Reactor Coolant Water Break
3. Loss of Secondary Coolant
4. Steam Generator Tube Rupture
5. Total Loss of Feedwater
6. Loss of Offsite Power (Station Blackout)
7. Total Loss of Reactor Coolant System Flow
8. Inadvertent Safety Injection.

A summary of the revisions is as follows:

A. When accident or transient conditions require the initiation of the emergency core cooling system, whether it be automatic or manual, the operators are instructed to pay particular attention to the relationship between Reactor Coolant System pressure and temperature. The instruction states that voids may exist when the Reactor Coolant System pressure is at or below saturation pressure for the corresponding loop hot leg or core exit thermocouple temperatures, and that an increase in source and intermediate range flux level may be a result of void formation.

B. The operator is required to verify proper operation of all safeguard systems including safety injection and auxiliary feedwater. Normal programmed level is to be reestablished and maintained in all available steam generators to provide a secondary heat sink. The safety injection system is also required to deliver maximum available flow to the Reactor Coolant System for water inventory makeup and core cooling until 50F subcooling conditions exist. This not only prohibits void formation but also will collapse any voids that have been formed. A figure showing the pressure/temperature relationship for 50F subcooling and saturation conditions is provided. The operator is required to observe the following instrumentation to determine if safe conditions exist:

   1. Reactor Coolant System pressure
   2. Reactor Coolant System temperatures (hot)
   3. Pressurizer level
   4. Steam Generator levels

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Item 2 (continued)

C. In addition to the requirements of B above, the operator is instructed to enhance core cooling if forced flow in the Reactor Coolant System is lost and cannot be reestablished by establishing and maintaining the following conditions to enhance natural circulation:

1. Pressurizer level greater than or equal to 50% or increasing
2. Pressurizer pressure greater than or equal to 2000 psig
3. Steam Generator level in the narrow range in at least one steam generator

The procedures also provide the following guidance to determine that natural circulation exists:

1. RCS Delta-T as determined by wide range T-Hot and T-Cold less than or equal to full load Delta-T
2. RCS hot leg or core exit thermocouple temperatures constant or decreasing, and
3. Steam Generator pressure constant or decreasing at a rate equivalent to the rate of decrease of RCS hot leg temperatures while maintaining steam generator level with continuous feed.

Item 3

Procedural revisions and approvals requiring manual initiation of safety injection at the pressurizer pressure setpoint of 1845 psig have been completed.

Item 6

Procedural revisions and approvals to implement the requirements of Action No. 6 have been completed.

Item 7A

Operating and training procedures have been reviewed. A checklist requiring certain conditions to be met prior to overriding safety injection has been added to the emergency operating procedures. The checklist is consistent with the requirements of Item 7B2 below. All licensed operators will be familiar with the revised procedures prior to plant startup. Since the BVPS training program utilizes the approved operating procedures, all subsequent training will contain the revisions mentioned above.

Item 7B

Operating procedures relating to the automatic initiation of the high pressure injection system (Hi-head Safety Injection/Charging Pumps in the BVPS design) regardless of cause specify that the following action be taken:

1. If the low pressure injection system (Lo-head Safety Injection Pumps in the BVPS design) is providing cooling water to the core, both high pressure and low pressure injection systems must remain in operation not only for 20 minutes, but for approximately 14.5 hours (870 minutes), through the transition from cold leg to simultaneous cold leg and hot leg recirculation.

2. Operating procedures have been revised to specify that if the high pressure injection system has been automatically actuated because of a low pressure condition, it must remain in operation for 20 minutes and until 50F subcooling has been achieved. After 50F subcooling has been achieved, termination of high pressure injection operation prior to 20 minutes is only permissible if it has been determined that continued operation would result in an unsafe plant condition, e.g. pressure/temperature considerations for the vessel integrity.

Item 7C

In the event of high pressure injection initiation, the revised procedures do not instruct the operator to shut any Reactor Coolant Pump down until conditions exist which could jeopardize the integrity of the pump seals. Such is the case when cavitation is evident (high vibration and RCS pressure less than 1250 psig). Until that time, all three Reactor Coolant Pumps would be in operation (BVPS is a three-loop plant with one pump in each loop). When these conditions are evident, one sacrificial pump is required to remain in operation until it is clearly not providing forced flow or component cooling water is no longer available to it. Running of Reactor Coolant Pumps without component cooling water will result in failure of the pum· motors, and this failure can compromise the capability to cool the plant down in an orderly fashion. All licensed operators will be familiar with the revised procedures prior to plant startup.

Item 7D

Approved operating procedures require the operator to observe the following indications in addition to pressurizer level to be used in determining the condition of the plant:

1. Pressurizer pressure
2. Reactor Coolant System temperatures (hot and average)
3. Secondary steam pressure
4. Steam Generator levels
5. Containment pressure
6 Radiation monitors in the containment and Condenser air ejectors
7. Steamline flow

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Item 8

The review of alignment requirements and procedures controlling manipulation of safety related valves has been completed. The results of this review verify that present requirements are more than adequate to assure the proper operation of engineered safety features. The only revisions to procedures necessary are those which are resultant from the positive approach of requiring all manual valves in the direct flow path of these systems which do not have indication in the Control Room to be locked in position.

Although Technical Specifications may not require periodic surveillance of locked valves, existing station procedures do require surveillance in the same manner that was done prior to locking these valves in position.

Item 9

The systems designed to transfer potentially radioactive gases and liquids out of containment are: the non-aerated vent system, primary drains transfer, reactor containment sump, containment ventilation, and containment vacuum. Each is detailed below:

1. Non-Aerated Vent System

   Designed to transfer non-aerated vents from the Pressurizer Relief Tank and the Primary Drains Tank through the Pressurizer Relief Tank Trip Valves [TV-DG-109A1,A2] to the Gaseous Waste System through the Boron Recovery Degasifier. [TV-DG-109A1,A2] will trip closed on a CIA and require manual operator action to open them after the CIA has been reset.

2. Primary Drains Transfer Tank

   Transfers non-aerated drains and valve stem leakoffs from [DG-TK-1] to the Boron Recovery Evaporators through Containment Isolation Trip Valves [TV-DG-108A,108B]. [TV-DG-108A,108B] will trip closed on a CIA and require manual operator action to open them after the CIA has been reset.

3. The Reactor Containment Sump

   The reactor containment sump is pumped through [TV-DA-100A,100B] to the north sump in the Auxiliary Building where it can be subsequently pumped to the high level waste system for further processing or the low level waste system for discharge. [TV-DA-100A,100B] will trip closed on a CIA and require manual operator action to open them after the CIA has been reset.

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Item 9 (continued)

4. The Containment Ventilation System

The containment ventilation systems are designed to be used only during station shutdown for refueling or maintenance. While at power, these systems are not in use. There is no potential for an inadvertent release through these systems while in an operational mode.

5. The Containment Vacuum System

The majority of equipment in the containment vacuum system is located outside of the containment. The lines penetrating the containment are isolated by Trip Valves [TV-CV-101A,B], [TV-CV-102], [TV-CV-150B,C] and [TV-LM-100A1,A2]. All of these valves will trip closed on a CIA and require manual operator action to open them after the CIA has been reset.

The non-aerated vents and drains are at all times contained within the systems mentioned. They receive their final processing and disposition in either the gaseous waste system or the liquid waste system.

These systems, from their initial design and construction, have been built to preclude the possibility of an inadvertent release occuring. These systems are at all times operated in conformance with the approved operating procedures.

Upon reviewing these discharge and operating procedures in the light of the recent events at TMI-2, Duquesne Light Company feels confident that these systems can continue to be operated according to the approved operating procedures and when operated in this manner, inadvertent releases will not occur.

The basis upon which Duquesne Light Company can state with assurity that there will be no inadvertent discharge due to the inoperability of the containment isolation trip valves spoken of in the preceeding is, the valves trip closed on a CIA signal, these valves fail closed, and thus will remain closed, unless the operator initiates positive actions to open them.

Item 10A

It is the responsibility of the Shift Supervisor to be continuously aware of the status of all systems and equipment and of all intended operations which may in any way affect the reactor or result in the release of any radioactivity. The Shift Supervisor reviews the cover page of the applicable maintenance procedure and/or Technical Specification when granting written permission to remove a piece of equipment from service for maintenance or testing to ascertain if a demonstration of operability of redundant equipment is required prior to or during the outage of the equipment requested. The Shift Supervisor is responsible for the safe and efficient operation of the station within the limits of the technical specifications. The Shift Supervisor determines if the demonstration of operability of redundant equipment is required by adhering to the following statements in the technical specifications:

Item 10A (continued)

1. Surveillance Requirements shall be applicable during the Operational modes or other conditions specified for individual Limiting Conditions for Operation unless otherwise stated in an individual surveillance requirement.

2. Performance of a Surveillance Requirement within the specified time interval shall constitute compliance with the Operability requirements for a Limiting Condition for Operation and associated Action statements unless otherwise required by the specification.

3. The provisions of this specification (2 above) set forth the criteria for determination of compliance with the Operability requirements of the Limiting Conditions for Operation. Under this criteria, equipment, systems, or components are assumed to be Operable if the associated surveillance activities have been satisfactorily performed within the specified time interval. Nothing in this provision is to be construed as defining equipment, systems or components Operable, when such items are found or known to be inoperable although still meeting the surveillance requirements.

Item 10C

The level of authority required prior to removing or returning systems to service is the Nuclear Shift Supervisor. If the demonstration of operability of redundant equipment is required, existing procedures state that the fact should be recorded in the Shift Supervisor's log and carried over to each successive Shift Supervisor's log until the equipment has been returned to service.

Item 11A

Station procedures to meet the requirements of Action No. 11 have been approved.

Item 11B

Since the OPX network linking our facility with the NRC Operations Center and Region I Office has been installed, it will be used in lieu of our previous response.

Item 12

Existing procedures require the use of the installed hydrogen recombiners for removal of hydrogen from the containment. It is impossible to predict in advance what the conditions may be following an unforseen accident, and therefore a procedure will be written after the accident, based on existing conditions, to remove the bubble if one is formed and cannot be removed with existing procedural methods. See the attached pages.

Item 12 (continued)

If a hydrogen bubble forms in the reactor coolant system, positive steps must be taken to control and dissipate the bubble. The optimum method for controlling and dissipating a bubble depends on plant conditions. If a bubble ever does form, a temporary operating procedure reflecting on plant conditions should be written to deal with the removal of the bubble. The following are modes available for the removal of a hydrogen bubble from the Reactor Coolant System:

1. Hydrogen can be stripped from the reactor coolant to the pressurizer vapor space by pressurizer spray operation if the reactor coolant pump is operating.

2. Hydrogen in the pressurizer vapor space can be vented by power operated relief valves to the pressurizer relief tank.

3. Hydrogen can be removed from the reactor coolant system by the letdown line and stripped in the volume control tank where it enters the waste gas system.

4. In the event of a LOCA, hydrogen would vent with the steam to the containment.

If for some reason a non-condensible gas bubble becomes situated somewhere in the primary coolant systems, there are many options for continued core cooling and removing the bubble.

With a gas bubble located in the upper head, several methods of core cooling are unaffected. The steam generator can be used to remove decay heat using reactor coolant pump forced flow or natural circulation. The safety injection system can be used to cool the core while venting through the pressurizer power operated relief valve. Core cooling by any of these methods can proceed indefinitely if the primary coolant pressure is held constant. If a lower system pressure is desired, a controlled depressurization will allow the bubble to grow slowly until it uncovers the top of the hot legs.

This controlled depressurization can be performed in two ways:

1. If the reactor coolant pumps can be operated, depressurization can be performed with a steam bubble in the pressurizer. Depressurization would be through the pressurizer power operated relief valve. Extra control is achieved with the pressurizer heaters and sprays if available. As the bubble grows to the top of the hot leg, small bubbles are carried through the system. Degassing is done with the spray line and/or the Chemical and Volume Control System. The steam generators will carry away decay heat.

Item 12 (continued)

2. If the reactor coolant pumps cannot be operated or their operation is undesirable, the pressurizer can be made water solid with the safety injection pumps running and the power operated relief valve and/or vent valve open. Depressurization is controlled by judicious use of the various valves, lines and pumps available in the safety injection system and by adjusting the pressurizer relief valve and/or vent valve.

   As the bubble grows to the top of the hot leg, it slides across the hot leg and up into the steam generators. As depressurization continues the gas bubbles grow in the steam generators and upper head but the core remains covered and cooled by safety injection water. If there is enough gas, the pressurizer surge line would eventually be "uncovered". Some of the gas would burp into the pressurizer and out the valve. This burping process would continue until the system were at the desired pressure. At that time the current cooling mode could be continued or the system could be placed in an RHR mode (special care is needed for operation).

Note that a gas bubble cannot be located in the steam generator with the reactor coolant pumps running. If a gas bubble forms in the steam generator during natural circulation, the reactor coolant pumps could be turned back on for degassing or safety injection flow could be initiated with the power operated relief valve open.

Also note that the gas bubbles cannot uncover the core in the above depressurization schemes because it will always tend to float to the top of the system and it cannot compress water.