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TOLEDO EDISON

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Docket No. 50-346

License No. NPF-3

Serial No. 1-136

Mr. James G. Keppler
Regional Director, Region III
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

Attached is Toledo Edison's required 30 day response to IE Bulletin 80-12 dated May 9, 1980, as applicable to Davis-Besse Nuclear Power Station Unit 1.

Yours very truly,

RPC/SNB/ljk

Attachment

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

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ITEM 1:

Review the circumstances and sequence of events at Davis-Besse as described in Enclosure 1.

RESPONSE:

Enclosure 1 was reviewed and one error was discovered. The decay heat pump suction was not isolated by a containment isolation actuation as stated in Page 2. The decay heat line was isolated by the loss of 120 VAC power to the pressure switch relay which isolates the decay heat isolation valve DH-12. Also the decay heat cooldown line was isolated by the closure of DH-1518 from the interlock with the Safety Features Actuation System (SFAS) actuated suction valve DH-2734.

Toledo Edison also does not agree with the statement in Enclosure 1 that the two out of four SFAS logic was a major contributor to the event. The two out of four logic is more reliable and provides better testability than the one out of two taken twice logic.

A two out of four logic is functionally failed if three or all four input channels cannot trip properly. A one out of two taken twice logic is functionally failed if two or more input channels (in certain combination) cannot trip properly. Since the former requires one more channel to fail, it is more reliable from the safety standpoint.

The two out of four system provides better testability than the one out of two taken twice system. Per the Davis-Besse Unit 1 Technical Specifications, if one channel of a two out of four system fails, it will be placed in a tripped condition. However, one additional channel can be bypassed for testing or maintenance. In a one out of two taken twice system, if one channel fails, operation may proceed until performance of the next required channel functional test, provided the channel is put in tripped condition. No additional channel can be bypassed for testing without experiencing a half or full trip of the system.

ITEM 2:

Review your facility(ies) for all DHR degradation events experienced, especially for events similar to the Davis-Besse incident.

RESPONSE:

The April 19, 1980 event was the only occurrence at Davis-Besse Unit 1 of an extended loss of DHR capability. The following is a list of previous occurrences of minor interruptions of decay heat flow at Davis-Besse Unit 1.

DATE	LER NUMBER	SUMMARY
5/27/77	NP-32-77-02	While tightening a loose connection in a junction box, a momentary short caused DH-11 to close. The decay heat pump was shutdown for twelve minutes.
5/28/77	NP-32-77-03	While performing an SFAS surveillance test, DH-11 stroked closed due to a test procedure error. The decay heat pump was shutdown for three minutes.
6/12/77	NP-32-77-05	While performing an SFAS surveillance test, the procedure modification was not followed and DH-11 stroked closed. The decay heat pump was shutdown for three minutes.
7/12/77	NP-32-77-09	While inspecting an SFAS output signal lead, the I&C mechanic discovered a loose connection. While tightening the lead, he caused several closures of DH-11. Decay heat flow was interrupted for one minute the first time and sixteen minutes the second time.
9/7/77	NP-33-77-74	Due to a design problem in the interlock circuit, DH-12 closed when transferred to its alternate power supply. The operator started the redundant pump in a low pressure injection mode. Decay heat flow was less than 2800 gpm for only a few seconds. DH-12 was reopened and normal decay heat lineup restored.
5/28/78	NP-33-78-72	An inadvertent bumping of a control switch caused a shutdown of the decay heat pump. The pump was restarted within two minutes.
6/15/78	NP-33-78-81	Improper electrical switching caused several interruptions of decay heat flow. Total time the flow was below the minimum required was less than two minutes.
4/18/80	NP-32-80-05	The decay heat pump was intentionally shutdown until the source of leakage in the system was determined. The pump was shutdown for 29 minutes during which RCS temperature reached a maximum of 103°F

DATE	LER NUMBER	SUMMARY
5/28/80	NP-33-80-53	After completion of a field change to SFAS Channel 4, the operational test caused DH-11 to close. The decay heat pump was shutdown for approximately two minutes.
5/31/80	NP-33-80-54	A surveillance test being performed by I&C personnel caused a loss of decay heat flow indication. The decay heat pump was shutdown for approximately eight minutes until the testing was determined to have caused the loss in indication.

As evidenced by the above list, most of these occurrences were caused by an inadvertent closure of the decay heat isolation valves DH-11 or DH-12. Davis-Besse Unit 1 was initially designed to operate with the power removed from DH-11 and DH-12 while on decay heat to prevent these inadvertent closures. However, License Condition 2.c.(3).(j) requires the power remain on these valves while on decay heat, and that only one decay heat pump be operated at a time. This condition should be resolved shortly after the first refueling outage and power will be removed from these valves on future refueling outages. An expeditious NRC approval of the technical specification change requested (submitted March 20, 1978) will help enhance the reliability of the decay heat removal system by allowing the system to be operated as designed.

ITEM 3:

Review the hardware capability of your facility(ies) to prevent DHR loss events, including equipment redundancy, diversity, power source reliability, instrumentation and control reliability, and overall reliability during the refueling and cold shutdown modes of operation.

RESPONSE:

Davis-Besse is designed with complete redundancy in the dual purpose decay heat/low pressure injection pumps. The pumps are physically located in separate rooms, with separate power supplies powered independent essential busses and diesel generators. Separate essential power supplies feed all the redundant active components. All auxiliary support systems are redundant and independent to ensure a single failure (except for the inadvertent closure of DH11 or DH12 in Modes 4, 5, or 6) cannot render both trains inoperable. However, power will be removed from these valves as discussed in Item 2 to preclude this condition. When the unit is in Modes 1 through 3, both portions of these redundant systems are required by technical specifications to be operable.

When the unit is shutdown, portions of these systems must be made inoperable to allow corrective and preventative maintenance on these components. Davis-Besse Unit 1 maintains as a minimum the requirements of the Technical Specifications during shutdown conditions. These technical specifications require:

T.S. NUMBER	REQUIREMENT
3.9.8	At least one DHR pump in operation
3.1.1.2	Reactor Coolant System (RCS) flow greater than 2800 GPM when boron change in progress
3.1.2.1, 3.1.2.5, 3.1.2.6	Operable boron injection flowpath
3.1.28	Operable borated water source
3.3.2.1	Operable SFAS - containment radiation
3.8.1.2, 3.8.2.2, 3.8.2.4	Minimum operable electrical power sources

Therefore, even though the unit is designed with independent and redundant components, the maintenance required to ensure the reliability of the systems requires at times that redundancy be reduced when the unit is shutdown. Even though the redundancy is not maintained to totally exclude the possibility of a loss of the DHR system, sufficient diverse methods are available to maintain adequate core cooling. See the response to Item 6 for further details.

ITEM 4:

Analyze your procedures for adequacy of safeguarding against loss of redundancy and diversity of DHR capability.

RESPONSE:

The response to this item is contained in Item 6 response.

ITEM 5:

Analyze your procedures for adequacy of responding to DHR loss events. Special emphasis should be placed upon responses when maintenance or refueling activities degrade the DHR capability.

RESPONSE:

The "Loss of DHR Emergency Procedure", EP 1202.32, was revised in February, 1980, to include the total loss of decay heat transients identified in the B&W "Inadequate Core Cooling DHR System Mode of Operation" Specification 69-1106921-00. This includes a description of all possible RCS conditions at which a loss of DHR may occur. The two cases added to the procedure and the RCS conditions possible are:

CASF 1: Loss of core cooling during DHR via DHR system.

Part I RCS pressure boundary intact, filled or drained

Part II RCS pressure boundary not intact, reactor vessel head detensioned

Part III Reactor vessel head removed, fuel transfer canal filled or empty

CASE 2: Loss of RCS inventory during heat removal via DHR system.

Part I RCS boundary intact or reactor vessel head detensioned

Part II Reactor vessel head removed

The procedure was modified to include required operator response times for the reactor water level established and to include alternative flowpaths to supply water to the core if both decay heat pumps are inoperable. Possible causes for the loss of DHR such as a loss of power, loss of net positive suction head, valve operator failure, or inadvertent closure, and a system rupture are identified and corrective action discussed. The procedure is written to emphasize keeping the core covered at all times to assure adequate core cooling.

The procedure as is now written adequately delineates the loss of DHR transients and corrective actions required.

As a result of the April 19, 1980 occurrence, procedure modifications were completed to give additional guidance on venting the decay heat system if air is drawn into the piping, and a reference added to a manual method of obtaining incore temperatures if the computer is unavailable. Five procedures were modified to assure the power is removed from DH9A and DH9B when the unit is in Modes 5 or 6. Also a modification was made to the Instrument AC System Procedure SP 1107.09 to allow the inverters to be supplied from the DC Bus when the normal feed for the regulated rectifiers from motor control centers E12A or F12A are to be de-energized.

ITEM 6:

Until further notice, or until Technical Specifications are revised to resolve the issues of this Bulletin, you should:

a. Implement as soon as practical administrative controls to assure that redundant or diverse DHR methods are available during all modes of plant operation. (Note: When in a refueling mode with water in the refueling cavity and the head removed, an acceptable means could include one DHR train and a readily accessible source of borated water to replenish any loss of inventory that might occur subsequent to the loss of the available DHR train.)

b. Implement administrative controls as soon as practical, for those cases where single failures or other actions can result in only one DHR train being available, requiring an alternate means of DHR or expediting the restoration of the lost train or method.

RESPONSE:

Administrative controls already exist to ensure redundant low pressure injection/decay heat systems while the unit is in Modes 1 through 3 per Technical Specification 3.5.2. Technical Specifications require at least one low pressure injection/decay heat string be operable at all times while the unit is in Modes 4, 5, or 6 and the station administrative procedures reflect this requirement. The redundancy in decay heat/low pressure injection systems is not required due to the diverse means available to maintain adequate core cooling while the unit is in Modes 4, 5, or 6.

Adequate diverse methods already exist at Davis-Besse Unit 1 to ensure a means is established to keep the core covered prior to reaching inadequate core cooling conditions.

If the RCS pressure boundary is intact and the decay heat system becomes inoperable, the RCS can be refilled if drained and either or both steam generators used for long term decay heat removal per EP 1202.32, "Loss of Decay Heat Removal Emergency Procedure". Either natural circulation or a reactor coolant pump can provide adequate RCS flow.

If the RCS pressure boundary is not intact, water can be injected into the RCS to ensure the core remains covered. The loss of the decay heat system while in Modes 4, 5, or 6 is not an occurrence which requires an immediate equipment or operator response and therefore administrative controls should not require complete and immediate redundancy. The B&W analyses supporting inadequate core cooling guidelines of December, 1979 (69-1106921-00 and 86-1105508-1) specify even for the worst case conditions (the RCS level is at the reactor vessel flange, and the unit has been shutdown for only 48 hours) it would be at least 2-1/4 hours after the loss of all decay flow before inadequate core cooling would exist. This is more than adequate time to start the decay heat pump or to establish an injection flowpath.

Numerous diverse methods exist at Davis-Besse to inject water into the RCS. The high pressure injection pumps, makeup pumps or borated water recirculation pump can be aligned to inject water into the RCS if both decay heat/low pressure injection pumps are inoperable. The borated water storage tank is located at a higher elevation than the reactor core. This allows a gravity feed (as per EP 1202.32) of makeup water even if no pumps are available. The flowpath can be into the decay heat injection lines, reverse flow through the decay heat cooldown line, through either high pressure injection pump, or through either makeup pump. Even during the complicated loss of power event at Davis-Besse on April 19, 1980, the operators were carefully monitoring RCS level and were prepared to gravity feed the RCS from the borated water storage tank if the RCS level dropped.

If the refueling canal is full, the borated water storage tank may not be available for gravity flow but the over 300,000 gallons of water in the canal will maintain adequate core cooling. No diverse methods are required to fill the RCS since the water is already available to cool the core.

Even though Toledo Edison believes adequate diverse decay heat removal methods exist at Davis-Besse, additional administrative controls will be issued to establish methods to ensure adequate core cooling. A special order will be issued to require whenever possible the redundant decay heat system not be intentionally removed from service in Modes 4, 5, or 6 unless:

1) At least one steam generator is available for decay heat removal

/or/

2) The refueling canal is filled to a minimum of elevation 588'0" (approximately 200,000 gallons total volume)

/or/

3) The decay heat pump can be restored to service or a gravity flowpath to the RCS can be established within four hours.

The special order will also request expediting the restoring of redundant or diverse methods if a component failure causes an inadvertent loss of alternative methods.