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Charles M. Dugger
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Waterford 3

W3F1-2000-0010
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PR

January 31, 2000

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Technical Specification Change Request NPF-38-206 Revision 1
Emergency Feedwater System

Gentlemen:

In a meeting between Entergy Operations, Incorporated and NRC Staff personnel, specific areas of the Technical Specification Change Request (TSCR) NPF-38-206 submitted by Letter W3F1-98-0080 dated May 28, 1998 for the Emergency Feedwater System (EFW), were discussed for clarification. This correspondence contains the questions presented during the discussion and their associated responses. Entergy is hereby submitting a revision to the May 28, 1998 TSCR with the enclosed attachments. The attachments are based on the meeting's discussions. Entergy requests the NRC Staff review and approve this revision of the TSCR.

Enclosure One includes the questions and the responses that were originally presented to the Waterford 3 Staff prior to the meeting. Enclosure Two includes the follow-up questions and the responses presented to the Waterford 3 Staff by the NRC Staff during the meeting.

Please replace the previous submittal's Attachments 'A' (Existing Specification), 'B' (Proposed Marked-Up Specification), and 'C' (Proposed Specification) with the enclosed Attachments.

A001

Entergy has concluded this change is bounded by the No Significant Hazards Consideration Determination submitted in the May 28, 1998 license amendment request; therefore, it remains applicable.

This submittal does not contain any commitments.

Should you have any questions or comments concerning this request, please contact Arthur E. Wemett at (504) 739-6692.

Very truly yours,

C.M. Dugger
Vice President, Operations
Waterford 3

CMD/AEW/ssf
Enclosures: Enclosure One
Enclosure Two
Attachments: Affidavit
NPF-38-206 Revision 1

cc: E.W. Merschoff, NRC Region IV
N. Kalyanam, NRC-NRR
J. Smith
N.S. Reynolds
NRC Resident Inspectors Office
Louisiana DEQ/Surveillance Division
American Nuclear Insurers

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of	)	
	)	
Entergy Operations, Incorporated	)	Docket No. 50-382
Waterford 3 Steam Electric Station	)	

AFFIDAVIT

Charles Marshall Dugger, being duly sworn, hereby deposes and says that he is Vice President Operations - Waterford 3 of Entergy Operations, Incorporated; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached Technical Specification Change Request NPF-38-206, Revision 1; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

Charles Marshall Dugger
Vice President Operations - Waterford 3

STATE OF LOUISIANA)
) ss
PARISH OF ST. CHARLES)

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 31st day of January, 2000.

Notary Public

My Commission expires at death.

NPF-38-206 Revision 1

ATTACHMENT A

EXISTING SPECIFICATIONS

PLANT SYSTEMS

EMERGENCY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 At least three independent steam generator emergency feedwater pumps and associated flow paths shall be OPERABLE with:

a. Two feedwater pumps, each capable of being powered from separate OPERABLE emergency busses, and

b. One feedwater pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one emergency feedwater pump inoperable, restore the required emergency feedwater pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With two emergency feedwater pumps inoperable be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

c. With three emergency feedwater pumps inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump to OPERABLE status as soon as possible.

SURVEILLANCE REQUIREMENTS

4.7.1.2 The emergency feedwater system shall be demonstrated OPERABLE:

a. At least once per 31 days by:

1. Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 92 days on a STAGGERED TEST BASIS by:

1. Verifying that each motor-driven pump develops a discharge pressure of greater than or equal to 1298 psig on recirculation flow.

2. Verifying that the turbine-driven pump develops a discharge pressure of greater than or equal to 1342 psig on recirculation flow when the steam generator pressure is greater than 750 psig. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3.

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months during shutdown by:

1. Verifying that each automatic valve in the flow path actuates to its correct position upon receipt of an emergency feedwater actuation test signal.

2. Verifying that each pump starts automatically upon receipt of an emergency feedwater actuation test signal.

d. Following any cold shutdown of 30 days or longer or whenever feedwater line cleaning through the emergency feedwater line has been performed, by verifying, by means of a flow test, the normal flow path from the condensate storage pool through each emergency feedwater ump to each of the steam generators. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 for the turbine-driven pump.

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM

The OPERABILITY of the emergency feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350°F from normal operating conditions in the event of a total loss-of-offsite power.

Each electric-driven emergency feedwater pump is capable of delivering a total feedwater flow of 350 gpm at a pressure of 1163 psig to the entrance of the steam generators. The steam-driven emergency feedwater pump is capable of delivering a total feedwater flow of 700 gpm at a pressure of 1163 psig to the entrance of the steam generators. This capacity is sufficient to ensure that adequate feedwater flow is available to remove decay heat and reduce the Reactor Coolant System temperature to less than 350°F when the shutdown cooling system may be placed into operation.

The surveillance requirement to verify the minimum pump discharge pressure on recirculation flow ensures that the pump performance curve has not degraded below that used to show that the pumps meet the above flow requirements and is consistent with the requirements of ASME Section XI.

3/4.7.1.3 CONDENSATE STORAGE POOL

The OPERABILITY of the condensate storage pool (CSP) with the minimum water volume ensures that sufficient water is available (173,500 gallons) to cool the Reactor Coolant System to shutdown cooling entry conditions following any design basis accident. Additional makeup water is stored in the wet cooling tower (WCT) basins providing the capability to maintain HOT STANDBY conditions for at least an additional 2 hours prior to initiating shutdown cooling. The total makeup capacity also provides sufficient cooling for 24 hours until shutdown cooling is initiated in the event the ultimate heat sink sustains tornado damage concurrent with the tornado event. The CSP contained water volume limit (91% indicated in MODES 1, 2, and 3) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 170,000 gallons of water is available in the CSP for the emergency feedwater system and that 3,500 gallons of water is available in the CSP for use by the component cooling water makeup system. The CSP contained water volume limit (11% indicated in MODE 4) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 3,500 gallons of water is available in the CSP for the component cooling water makeup system. If natural circulation is required, the combined capacity (WCT and CSP) is sufficient to maintain the plant at HOT STANDBY for 4 hours, followed by a cooldown to shutdown cooling entry conditions assuming the availability of only onsite power or only offsite power, and the worst single failure (loss of a diesel generator or atmospheric dump valve). This requires approximately 275,000 gallons and complies with BTP RSB 5-1.

NPF-38-206 Revision 1

ATTACHMENT B

PROPOSED MARKED-UP SPECIFICATIONS

PLANT SYSTEMS

EMERGENCY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

(EFW)

3.7.1.2 ~~At least~~ three ~~independent steam generator~~ emergency feedwater pumps and ~~associated~~ flow paths shall be OPERABLE ~~with~~:

two

a. Two feedwater pumps, each capable of being powered from separate OPERABLE emergency busses, and

b. One feedwater pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

INSERT TS 3.7.1.2 ACTIONS

a. With one emergency feedwater pump inoperable, restore the required emergency feedwater pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With two emergency feedwater pumps inoperable be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

c. With three emergency feedwater pumps inoperable, immediately initiate corrective action to restore at least one emergency feedwater pump to OPERABLE status as soon as possible.

SURVEILLANCE REQUIREMENTS

4.7.1.2 The emergency feedwater system shall be demonstrated OPERABLE:

a. At least once per 31 days by: ← INSERT SR 4.7.1.2.a

1. Verifying that each valve (manual, power-operated, or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 92 days on a STAGGERED TEST BASIS by: INSERT SR 4.7.1.2.b

1. Verifying that each motor-driven pump develops a discharge pressure of greater than or equal to 1298 psig on recirculation flow.

2. Verifying that the turbine-driven pump develops a discharge pressure of greater than or equal to 1342 psig on recirculation flow when the steam generator pressure is greater than 750 psig. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3.

INSERT TS 3.7.1.2 ACTIONs

a. With one steam supply to the turbine-driven EFW pump inoperable, restore the steam supply to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one EFW pump inoperable for reasons other than those described in Action (a) and/or one flow path inoperable (but capable of delivering 100% flow), restore the EFW pump and/or flow path to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

c. With two EFW pumps inoperable and/or one flow path inoperable (not capable of delivering 100% flow), be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

d. With three EFW pumps inoperable and/or both flow paths not capable of delivering 100% flow, immediately initiate action to restore one EFW pump and one flow path to OPERABLE status. LCO 3.0.3 and all other LCO required ACTIONs requiring MODE changes are suspended until EFW is capable of delivering 100% flow to one steam generator.

INSERT SR 4.7.1.2.a

verifying that each manual, power-operated, and automatic valve in each water flow path and in both steam supply flow paths to the turbine-driven EFW pump steam turbine, that is not locked, sealed, or otherwise secured in position, is in its correct position.

INSERT SR 4.7.1.2.b

testing the EFW pumps pursuant to Specification 4.0.5. This Surveillance requirement is not required to be performed for the turbine driven EFW pump until 24 hours after exceeding 750 psig in the steam generators.

INSERT 4.7.1.2.c NOTE

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months ~~during shutdown~~ by:

1. Verifying that each automatic valve in the flow path actuates to its correct position upon receipt of an ~~emergency feedwater~~ EFW actuation ~~test~~ actual or simulated signal.

2. Verifying that each pump starts automatically upon receipt of an ~~emergency feedwater~~ EFW actuation ~~test~~ actual or simulated signal.

d. Following any cold shutdown of 30 days or longer or whenever feedwater line cleaning through the emergency feedwater line has been performed, by verifying, by means of a flow test, the normal flow path from the condensate storage pool through each emergency feedwater pump to each of the steam generators. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 for the turbine-driven pump.

INSERT 4.7.1.2.d

INSERT SR 4.7.1.2.c NOTE

NOTE: This surveillance requirement is not required to be performed for the turbine-driven EFW pump until 24 hours after exceeding 750 psig in the steam generators.

INSERT SR 4.7.1.2.d

Prior to entering MODE 2, whenever the plant has been in MODE 4, 5, 6, or defueled, for 30 days or longer, or whenever feedwater line cleaning through the emergency feedwater line has been performed, by verifying flow from the condensate storage pool through both parallel flow legs to each steam generator.

BASES

INSERT BASES

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM

The OPERABILITY of the emergency feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350°F from normal operating conditions in the event of a total loss-of-offsite power.

Each electric-driven emergency feedwater pump is capable of delivering a total feedwater flow of 350 gpm at a pressure of 1163 psig to the entrance of the steam generators. The steam-driven emergency feedwater pump is capable of delivering a total feedwater flow of 700 gpm at a pressure of 1163 psig to the entrance of the steam generators. This capacity is sufficient to ensure that adequate feedwater flow is available to remove decay heat and reduce the Reactor Coolant System temperature to less than 350°F when the shutdown cooling system may be placed into operation.

The surveillance requirement to verify the minimum pump discharge pressure on recirculation flow ensures that the pump performance curve has not degraded below that used to show that the pumps meet the above flow requirements and is consistent with the requirements of ASME Section XI.

3/4.7.1.3 CONDENSATE STORAGE POOL

The OPERABILITY of the condensate storage pool (CSP) with the minimum water volume ensures that sufficient water is available (173,500 gallons) to cool the Reactor Coolant System to shutdown cooling entry conditions following any design basis accident. Additional makeup water is stored in the wet cooling tower (WCT) basins providing the capability to maintain HOT STANDBY conditions for at least an additional 2 hours prior to initiating shutdown cooling. The total makeup capacity also provides sufficient cooling for 24 hours until shutdown cooling is initiated in the event the ultimate heat sink sustains tornado damage concurrent with the tornado event. The CSP contained water volume limit (91% indicated in MODES 1, 2, and 3) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 170,000 gallons of water is available in the CSP for the emergency feedwater system and that 3,500 gallons of water is available in the CSP for use by the component cooling water makeup system. The CSP contained water volume limit (11% indicated in MODE 4) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 3,500 gallons of water is available in the CSP for the component cooling water makeup system. If natural circulation is required, the combined capacity (WCT and CSP) is sufficient to maintain the plant at HOT STANDBY for 4 hours, followed by a cooldown to shutdown cooling entry conditions assuming the availability of only onsite power or only offsite power, and the worst single failure (loss of a diesel generator or atmospheric dump valve). This requires approximately 275,000 gallons and complies with BTP RSB 5-1.

INSERT BASES
(page 1 of 3)

The OPERABILITY of the emergency feedwater (EFW) system ensures the Reactor Coolant System can be cooled down to shutdown cooling (SDC) system entry conditions from normal operating conditions.

The EFW system consists of two (50% capacity) motor-driven pumps (A and B), one (100% capacity) steam turbine-driven pump (AB) and two diverse flow paths. One flow path supplies steam generator #1 and the second flow path supplies steam generator #2. A flow path consists of the piping, valves and components from the common pump discharge header through two parallel legs to the respective steam generator. Each parallel leg contains an isolation valve and a flow control valve. One flow path supplying one steam generator is capable of cooling the unit to SDC entry conditions. Either of the two parallel legs in a steam generator flow path is capable of supplying 100% of the flow required for the heat removal safety function. Both parallel legs in a flow path are required for OPERABILITY of a flow path. Both steam supplies are required for OPERABILITY of the turbine-driven EFW pump.

The limiting accident for EFW flow is the feedwater line break (FWLB) which requires 575 gpm be delivered to the intact steam generator at a pressure of 1102 psig (lowest main steam safety valve set pressure plus 3%). The two motor-driven EFW pumps combined are capable of delivering 575 gpm at a pressure of 1102 psig to the entrance of the steam generators and the turbine-driven EFW pump is capable of delivering 575 gpm at a pressure of 1102 psig to the entrance of the steam generators. The EFW system is operated for emergency situations, during surveillance testing, and infrequently during shutdown conditions to fill the steam generators.

The flow control and isolation valves in the parallel flow legs are fail open pneumatic valves. Safety-related nitrogen accumulators serve as a backup to the instrument air system for these pneumatic valves. Each nitrogen accumulator supplies a pair of EFW valves (one flow control valve and one isolation valve in separate parallel flow legs to the same steam generator). With a nitrogen accumulator inoperable, for example, the associated flow path would be considered inoperable (but still capable of delivering 100% of the required EFW flow) and therefore ACTION "b" would be implemented and would provide an allowed outage time of 72 hours for this condition. Specification 3.6.3 would also be implemented for the affected isolation valve.

Limiting Conditions for Operation

The LCO requires three EFW pumps and two flow paths be OPERABLE to ensure the EFW system will perform the design safety function to mitigate the consequences of accidents that could result in overpressurization of the reactor coolant system pressure boundary. Three independent EFW pumps, utilizing two flow paths, ensure availability of residual heat removal capability for all events. This is accomplished by powering two pumps from independent emergency busses. The third EFW pump is powered by a steam-driven turbine supplied with steam from a source not isolated by the closure of the MSIVs.

ACTIONs

a. If one of the two steam supplies to the turbine-driven EFW pump steam turbine is inoperable, action must be taken to restore OPERABLE status within 7 days. The 7 day completion time is reasonable based on the redundant OPERABLE steam supply to the turbine-driven EFW pump steam turbine, the availability of redundant OPERABLE motor-driven EFW pumps, and the low probability of an event requiring the inoperable steam supply to the turbine-driven EFW pump.

b. With one EFW pump inoperable for reasons other than those described in ACTION (a), action must be taken to restore OPERABLE status within 72 hours. This condition includes the loss of two steam supply lines to the turbine-driven EFW pump. The 72 hour completion time is reasonable, based on the redundant capabilities afforded by the EFW system, the time needed for repairs, and the low probability of a design basis event occurring during this period. Two EFW pumps remain to supply feedwater to the steam generators.

With one flow path inoperable, but still capable of delivering 100% of the required EFW flow, action must be taken to restore the flow path to OPERABLE status within 72 hours. This condition includes the loss of a nitrogen accumulator in one flow path. The 72 hour completion time is reasonable based on the remaining OPERABLE flow path to the other steam generator and the capability of the inoperable flow path to deliver 100% of the required EFW flow to the affected steam generator.

c. With two of the required EFW pumps inoperable and/or one flow path inoperable such that it is not capable of delivering 100% of the required EFW flow the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within the following 6 hours. The allowed completion time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

d. ACTION (d) indicates that all required MODE changes or power reductions are suspended until the EFW system is capable of delivering 100% of the required EFW flow to one steam generator.

With three EFW pumps inoperable and/or two flow paths not capable of delivering 100% of the required EFW flow in MODEs 1, 2, and 3, the unit is in a seriously degraded condition with no safety-related means for conducting a cooldown. In such a condition, the unit should not be perturbed by any action, including a power change, that might result in a trip. The seriousness of this condition requires that action be started immediately to restore one EFW pump and one flow path to OPERABLE status as soon as possible. While other plant conditions may require entry into LCO 3.0.3, the ACTIONs required by LCO 3.0.3 do not have to be completed when the EFW system is not capable of delivering 100% of the required flow to at least one steam generator, because they could force the unit into a less safe condition.

Surveillance Requirements

a. Verifying the correct alignment for manual, power operated, and automatic valves in the EFW water and steam supply flow paths provides assurance that the proper flow paths exist for EFW operation. This Surveillance Requirement (SR) does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves. This SR does not require any testing or valve manipulations; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position.

b. The SR to verify pump OPERABILITY pursuant to Specification 4.0.5 ensures that the requirements of ASME Code, Section XI, are met and provides reasonable assurance that the pumps are capable of satisfying the design basis accident flow requirements. Because it is undesirable to introduce cold EFW into the steam generators while they are operating, testing is typically performed on recirculation flow. Such in-service tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance.

This SR is modified to indicate the SR should be deferred until suitable test conditions have been established. This deferral is required because there is an insufficient steam pressure to perform post maintenance activities which may need to be completed prior to performing the required turbine-driven pump SR. This deferral allows the unit to transition from MODE 4 to MODE 3 prior to the performance of this SR and provides a 24 hour period once a steam generator pressure of 750 psig is reached to complete the required post maintenance activities and SR. If this SR is not completed within the 24 hour period or fails, then the appropriate ACTION must be entered.

c. The SR for actuation testing ensures that EFW can be delivered to the appropriate steam generator in the event of any accident or transient that generates EFAS and/or MSIS signals, by demonstrating that each automatic valve in the flow path actuates to its correct position and that the EFW pumps will start on an actual or simulated actuation signal. This Surveillance covers the automatic flow control valves, automatic isolation valves, and steam admission valves but is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 18 month frequency is acceptable, based on the design reliability and operating experience of the equipment.

This SR is modified to indicate that the SR should be deferred until suitable test conditions have been established. This deferral is required because there is an insufficient steam pressure to perform post maintenance activities which may need to be completed prior to performing the required turbine-driven pump SR. This deferral allows the unit to transition from MODE 4 to MODE 3 prior to the performance of this SR and provides a 24 hour period once a steam generator pressure of 750 psig is reached to complete the required post maintenance activities and SR. If this SR is not completed within the 24 hour period or fails, then the appropriate ACTION must be entered.

d. The SR for flow testing ensures that the EFW system is aligned properly by verifying the flow paths from the condensate storage pool (CSP) to each steam generator before entering MODE 2 operation after being in MODE 4, 5, 6, or defueled, for 30 days or longer, or whenever feedwater line cleaning through the emergency feedwater line has been performed. Various combinations of pumps and valves may be used such that all flow paths (and flow legs) are tested at least once during the Surveillance. OPERABILITY of EFW flow paths must be verified before sufficient core heat is generated that would require the operation of the EFW System during a subsequent shutdown. The frequency is reasonable, based on engineering judgment, and other administrative controls to ensure that flow paths remain OPERABLE. To further ensure EFW system alignment, the OPERABILITY of the flow paths is verified following extended outages to determine that no misalignment of valves has occurred. This SR ensures that the flow paths from the CSP to the steam generators are properly aligned.

NPF-38-206 Revision 1

ATTACHMENT C

PROPOSED SPECIFICATIONS

PLANT SYSTEMS

EMERGENCY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 Three emergency feedwater (EFW) pumps and two flow paths shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTION:

a. With one steam supply to the turbine-driven EFW pump inoperable, restore the steam supply to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one EFW pump inoperable for reasons other than those described in Action (a) and/or one flow path inoperable (but capable of delivering 100% flow), restore the EFW pump and/or flow path to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

c. With two EFW pumps inoperable and/or one flow path inoperable (not capable of delivering 100% flow), be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

d. With three EFW pumps inoperable and/or both flow paths not capable of delivering 100% flow, immediately initiate action to restore one EFW pump and one flow path to OPERABLE status. LCO 3.0.3 and all other LCO required ACTIONs requiring MODE changes are suspended until EFW is capable of delivering 100% flow to one steam generator.

SURVEILLANCE REQUIREMENTS

4.7.1.2 The emergency feedwater system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each manual, power-operated, and automatic valve in each water flow path and in both steam supply flow paths to the turbine-driven EFW pump steam turbine, that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 92 days on a STAGGERED TEST BASIS by testing the EFW pumps pursuant to Specification 4.0.5. This Surveillance requirement is not required to be performed for the turbine driven EFW pump until 24 hours after exceeding 750 psig in the steam generators.

SURVEILLANCE REQUIREMENTS (Continued)

c. At least once per 18 months by:

NOTE: This surveillance requirement is not required to be performed for the turbine-drive EFW pump until 24 hours after exceeding 750 psig in the steam generators.

1. Verifying that each automatic valve in the flow path actuates to its correct position upon receipt of an actual or simulated actuation signal.

2. Verifying that each EFW pump starts automatically upon receipt of an actual or simulated actuation signal.

d. Prior to entering MODE 2, whenever the plant has been in MODE 4, 5, 6, or defueled, for 30 days or longer, or whenever feedwater line cleaning through the emergency feedwater line has been performed, by verifying flow from the condensate storage pool through both parallel flow legs to each steam generator.

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM

The OPERABILITY of the emergency feedwater (EFW) system ensures the Reactor Coolant System can be cooled down to shutdown cooling (SDC) system entry conditions from normal operating conditions.

The EFW system consists of two (50% capacity) motor-driven pumps (A and B), one (100% capacity) steam turbine-driven pump (AB) and two diverse flow paths. One flow path supplies steam generator #1 and the second flow path supplies steam generator #2. A flow path consists of the piping, valves and components from the common pump discharge header through two parallel legs to the respective steam generator. Each parallel leg contains an isolation valve and a flow control valve. One flow path supplying one steam generator is capable of cooling the unit to SDC entry conditions. Either of the two parallel legs in a steam generator flow path is capable of supplying 100% of the flow required for the heat removal safety function. Both parallel legs in a flow path are required for OPERABILITY of a flow path. Both steam supplies are required for OPERABILITY of the turbine-driven EFW pump.

The limiting accident for EFW flow is the feedwater line break (FWLB) which requires 575 gpm be delivered to the intact steam generator at a pressure of 1102 psig (lowest main steam safety valve set pressure plus 3%). The two motor-driven EFW pumps combined are capable of delivering 575 gpm at a pressure of 1102 psig to the entrance of the steam generators and the turbine-driven EFW pump is capable of 575 gpm at a pressure of 1102 psig to the entrance of the steam generators. The EFW system is operated for emergency situations, during surveillance testing, and infrequently during shutdown conditions to fill the steam generators.

The flow control and isolation valves in the parallel flow legs are fail open pneumatic valves. Safety-related nitrogen accumulators serve as a backup to the instrument air system for these pneumatic valves. Each nitrogen accumulator supplies a pair of EFW valves (one flow control valve and one isolation valve in separate parallel flow legs to the same steam generator). With a nitrogen accumulator inoperable, for example, the associated flow path would be considered inoperable (but still capable of delivering 100% of the required EFW flow) and therefore ACTION "b" would be implemented and would provide an allowed outage time of 72 hours for this condition. Specification 3.6.3 would also be implemented for the affected isolation valve.

Limiting Conditions for Operation

The LCO requires three EFW pumps and two flow paths be OPERABLE to ensure the EFW system will perform the design safety function to mitigate the consequences of accidents that could result in overpressurization of the reactor coolant system pressure boundary. Three

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM (cont'd)

independent EFW pumps, utilizing two flow paths, ensure availability of residual heat removal capability for all events. This is accomplished by powering two pumps from independent emergency busses. The third EFW pump is powered by a steam-driven turbine supplied with steam from a source not isolated by the closure of the MSIVs.

ACTIONs

a. If one of the two steam supplies to the turbine-driven EFW pump steam turbine is inoperable, action must be taken to restore OPERABLE status within 7 days. The 7 day completion time is reasonable based on the redundant OPERABLE steam supply to the turbine-driven EFW pump steam turbine, the availability of redundant OPERABLE motor-driven EFW pumps, and the low probability of an event requiring the inoperable steam supply to the turbine-driven EFW pump.

b. With one EFW pump inoperable for reasons other than those described in ACTION (a), action must be taken to restore OPERABLE status within 72 hours. This condition includes the loss of two steam supply lines to the turbine-driven EFW pump. The 72 hour completion time is reasonable based on the redundant capabilities afforded by the EFW system, the time needed for repairs, and the low probability of a design basis event occurring during this period. Two EFW pumps remain to supply feedwater to the steam generators.

   With one flow path inoperable, but still capable of delivering 100% of the required EFW flow, action must be taken to restore the flow path to OPERABLE status within 72 hours. This condition includes the loss of a nitrogen accumulator in one flow path. The 72 hour completion time is reasonable based on the remaining OPERABLE flow path to the other steam generator and the capability of the inoperable flow path to deliver 100% of the required EFW flow to the affected steam generator.

c. With two of the required EFW pumps inoperable and/or one flow path inoperable such that it is not capable of delivering 100% of the required EFW flow the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within the following 6 hours. The allowed completion time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

d. ACTION (d) indicates that all required MODE changes or power reductions are suspended until the EFW system is capable of delivering 100% of the required EFW flow to one steam generator.

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM (cont'd)

With three EFW pumps inoperable and/or two flow paths not capable of delivering 100% of the required EFW flow in MODEs 1, 2, and 3, the unit is in a seriously degraded condition with no safety-related means for conducting a cooldown. In such a condition, the unit should not be perturbed by any action, including a power change, that might result in a trip. The seriousness of this condition requires that action be started immediately to restore one EFW pump and one flow path to OPERABLE status as soon as possible. While other plant conditions may require entry into LCO 3.0.3, the ACTIONs required by LCO 3.0.3 do not have to be completed when the EFW system is not capable of delivering 100% of the required flow to at least one steam generator, because they could force the unit into a less than safe condition.

Surveillance Requirements

a. Verifying the correct alignment for manual, power operated, and automatic valves in the EFW water and steam supply flow paths provides assurance that the proper flow paths exist for EFW operation. This Surveillance Requirement (SR) does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves are verified to be in the correct position prior to locking, sealing, or securing. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position.

b. The SR to verify pump OPERABILITY pursuant to Specification 4.0.5 ensures that the requirements of ASME Code Section XI are met and provides reasonable assurance that the pumps are capable of satisfying the design basis accident flow requirements. Because it is undesirable to introduce cold EFW into the steam generators while they are operating, testing is typically performed on recirculation flow. Such in-service tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance.

This SR is modified to indicate the SR should be deferred until suitable test conditions have been established. This deferral is required because there is an insufficient steam pressure to perform post maintenance activities which may need to be completed prior to performing the required turbine-driven pump SR. This deferral allows the unit to transition from MODE 4 to MODE 3 prior to the performance of the SR and provides a 24 hour period once a steam generator pressure of 750 psig is reached to complete the required post maintenance activities and SR. If this SR is not completed within the 24 hour period or fails, then the appropriate ACTION must be entered.

3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM (cont'd)

c. The SR for actuation testing ensures that EFW can be delivered to the appropriate steam generator in the event of any accident or transient that generates EFAS and/or MSIS signals, by demonstrating that each automatic valve in the flow path actuates to its correct position and that the EFW pumps will start on an actual or simulated actuation signal. This Surveillance covers the automatic flow control valves, automatic isolation valves, and steam admission valves but is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 18 month frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. The 18 month frequency is acceptable, based on the design reliability and operating experience of the equipment.

This SR is modified to indicate that the SR should be deferred until suitable test conditions have been established. This deferral is required because there is an insufficient steam pressure to perform post maintenance activities which may need to be completed prior to performing the required turbine-driven pump SR. This deferral allows the unit to transition from MODE 4 to MODE 3 prior to the performance of the SR and provides a 24 hour period once a steam generator pressure of 750 psig is reached to complete the required post maintenance activities and SR. If this SR is not completed within the 24 hour period or fails, then the appropriate ACTION must be entered.

d. The SR for flow testing ensures that the EFW system is aligned properly by verifying the flow paths from the condensate storage pool (CSP) to each steam generator before entering MODE 2 operation after being in MODE 4, 5, 6, or defueled, for 30 days or longer, or whenever feedwater line cleaning through the emergency feedwater line has been performed. Various combinations of pumps and valves may be used such that all flow paths (and flow legs) are tested at least once during the Surveillance. OPERABILITY of EFW flow paths must be verified before sufficient core heat is generated that would require the operation of the EFW System during a subsequent shutdown. The frequency is reasonable, based on engineering judgment, and other administrative controls to ensure that flow paths remain OPERABLE. To further ensure EFW system alignment, the OPERABILITY of the flow paths is verified following extended outages to determine that no misalignment of valves has occurred. This SR ensures that the flow paths from the CSP to the steam generators are properly aligned.

3/4.7.1.3 CONDENSATE STORAGE POOL

The OPERABILITY of the condensate storage pool (CSP) with the minimum water volume ensures that sufficient water is available (173,500 gallons) to cool the Reactor Coolant System to shutdown cooling entry conditions following any design basis accident. Additional makeup water is stored in the wet cooling tower (WCT) basins providing the capability to maintain HOT STANDBY conditions for at least an additional 2 hours prior to initiating shutdown cooling. The total makeup capacity also provides sufficient cooling for 24 hours until shutdown cooling is initiated in the event the ultimate heat sink sustains tornado damage concurrent with the tornado event. The CSP contained water volume limit (91% indicated in MODES 1, 2, and 3) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 170,000 gallons of water is available in the CSP for the emergency feedwater system and that 3,500 gallons of water is available in the CSP for use by the component cooling water makeup system. The CSP contained water volume limit (11% indicated in MODE 4) includes an allowance for water not usable because of vortexing and instrumentation uncertainties. This provides an assurance that a minimum of 3,500 gallons of water is available in the CSP for the component cooling water makeup system. If natural circulation is required, the combined capacity (WCT and CSP) is sufficient to maintain the plant at HOT STANDBY for 4 hours, followed by a cooldown to shutdown cooling entry conditions assuming the availability of only onsite power or only offsite power, and the worst single failure (loss of a diesel generator or atmospheric dump valve). This requires approximately 275,000 gallons and complies with BTP RSB 5-1.

NPF-38-206 Revision 1

ENCLOSURE ONE

Question #1: Discuss the amendment request's possible impact on station blackout commitments relative to EFW.

Answer #1: No commitments are impacted by the requested amendment. In accordance with NUMARC 87-00, as endorsed by Regulatory Guide 1.155, it is not required to assume additional independent failures other than those causing the station blackout event in the course of the transient.

Question #2: Provide additional 24 hours justification to perform surveillances on the turbine driven emergency feedwater pump.

Answer #2: After discussions with the system engineer and a review of the past time requirements for required calibrations and surveillances, it has been decided to revise the TSCR for an allowed 24 hours versus 48 hours. The 24 hours allowance is in accordance with the actions in NUREG-1432 Revision 1.

Question #3A: With regard to the proposed TS 3.7.1.2 Action b, describe circumstances when the EFW flow path would be considered inoperable, but capable of supplying 100% flow requirements.

Answer #3A: The capability to supply 100% flow remains available with any single flow control or isolation valve inoperable, nitrogen accumulator inoperable, or loss of direct current (DC) power (DC power is the power supply to the EFW isolation and flow control valves) in any flow path. The design of the flow control and isolation valves in the flow path is to fail open on a loss of power or motive force for operation (motive force is provided by instrument air and/or nitrogen). If a single valve in the flow path is inoperable (for example, mechanical binding), the valves in the associated parallel leg of the same flow path will ensure 100% flow capability remains available to supply the associated steam generator. In addition, if any component is declared out-of-service (the results of which can include the isolation of one parallel leg in a flow path) the logic of the Emergency Feedwater System will ensure flow or will isolate the remaining parallel leg as necessary.

Question #3B: With regard to the proposed TS 3.7.1.2 Action b, describe the EFW System response for Feedwater Line Break (FWLB) and Main Steam Line Break (MSLB) events, assuming a degraded flow path on the affected steam generator.

Answer #3B: This response only addresses a single failure of either instrument air or nitrogen to a single valve. The single accumulator failure is addressed in Enclosure Two. The non-intact steam generator's ability to be automatically isolated will be maintained during either a FWLB event or a MSLB event. The Emergency Feedwater System logic will require the isolation and flow control valves in the degraded flow path to receive closed signals. If a containment isolation valve on one parallel leg is declared inoperable, actions in accordance with TS 3.6.3 will be implemented. The intact steam generator will be provided flow based on the requirements the Emergency Feedwater System logic flow control demands dependent on steam generator level. The intact steam generator's isolation and flow control valves will respond to signals from the control logic to maintain the steam generator as a heat sink for the reactor coolant system. If one EFW pump is inoperable per TS 3.7.1.2 Action b, then the remaining two EFW pumps provide adequate flow.

Question #3C: With regard to the proposed TS 3.7.1.2 Action b, describe the EFW response for FWLB and MSLB assuming a degraded flow path on the intact steam generator.

Answer #3C: This response only addresses a single failure of either instrument air or nitrogen to a single valve. The single accumulator failure is addressed in Enclosure Two. The intact steam generator's ability to receive 100% flow will be maintained during either a FWLB or a MSLB based on the requirements of the Emergency Feedwater System logic flow control demands dependent upon steam generator levels. The intact steam generator's isolation and flow control valves will respond to signals from the control logic to maintain the steam generator as a heat sink for the reactor coolant system. With a flow control valve in

one parallel leg to the intact steam generator inoperable but capable of 100% flow, operator action may be required to prevent overfilling the steam generator. This is described in more detail in the response to Question 1 in Enclosure 2.

Question #3D: With regard to proposed TS 3.7.1.2 Action b, what is the impact on risk of a 72 hour time limit for an inoperable flow path with the capability of delivering 100% flow during various accidents when EFW is required?

Answer #3D: There is a negligible change in the core damage frequency resulting from an inoperable flow path for 72 hours that is capable of providing 100% flow. The change in core damage frequency for a flow control valve inoperable and closed (the worst condition) is less than 1E-9. This is because the steam generators remain capable of cooling the RCS with multiple and redundant flow paths to provide water to the steam generators.

NPF-38-206 Revision 1

ENCLOSURE TWO

The following questions were follow-ups to the meeting that Waterford 3 committed to answer.

Question #1: If an accumulator is declared inoperable and a loss of off-site power should occur, what is the response of the system? Please address the possibility of steam generator overfill and the resultant cooldown.

Answer #1: The scenario for this event is an isolation valve in a parallel leg and one flow control valve in the opposite leg of a single flow path have lost the availability of nitrogen as the backup motive force for positioning the valves. A loss of off-site power occurs resulting in the primary motive force (instrument air) for positioning the valves to be unavailable. This results in the flow control valve in one parallel leg in the flow path to a steam generator failing to the open position and the isolation valve in the second parallel leg of the flow path would remain closed due to implementation of TS 3.6.3. Since both the flow control and isolation valves in one parallel leg of the flow path to a steam generator would be full open during this emergency feedwater demand event, there is a potential for overfill of the steam generator.

To assess the significance of this concern, an evaluation was performed to determine the time required to fill the steam generator at the expected emergency feedwater flow rates. For the postulated loss of off-site power scenario, the maximum EFW flow would be 1420 gpm since the steam generator pressure would remain relatively high (approximately 1000 psia). The time required to fill the steam generator from the High Steam Generator Level pre-trip alarm, 85.4% narrow range, to the steam generator outlet nozzle was calculated to be greater than 13 minutes. The ANSI/ANS-58.8-1984, "American National Standard Time Response Design Criteria for Nuclear Safety Related Operator Actions-September 14, 1984", gives guidance on the allowable operator action times during accidents. There are associated annunciators with the above level setpoint informing the operators of the condition. The guidance indicates operator action after an annunciator can be credited with a time delay of 2 minutes to 6 minutes. Thus, since the time required to overfill the steam generator at full EFW flow is much greater than the time allowed for operator action, credit for operator action closing the isolation valve or reducing EFW flow is relied upon to prevent steam generator overfill.

A higher EFW flow rate (therefore a shorter time to overfill the steam generator) of up to approximately 2300 gpm would be expected during a design basis main steam line break because of the lower pressure in the

intact steam generator. This flow rate results in more than 8 minutes to overfill the steam generator from the Steam Generator Hi Level Alarm setpoint level, which is still greater than the ANSI standard for operator action times.

The evaluation is conservative in that there is additional time needed to fill the steam generator from the 27.4% narrow range level, where the EFW pumps are started, to the High Steam Generator Level pre-trip level alarm setpoint of 85.4% narrow range. Also, there are annunciators (one per EFW train), EFW Flow (Hi-Hi), that would alert the Operator if the flow rate exceeds 1100 gpm to a SG.

In support of the above operator action time, the following describes an actual event that occurred at Waterford 3 where prompt action was taken to control EFW flow to a steam generator. The event scenario consisted of a manual trip of the reactor due to a main feedwater problem. Shortly after the trip steam generator narrow range levels reached the emergency feedwater actuation setpoint of 27.4% resulting in an automatic actuation of the EFW system to restore level. This was an expected response to a reactor trip due to steam generator level shrink. Operators noticed that steam generator #1 level was rising at a rate higher than expected and steam generator pressures were not recovering as expected. Continuing investigation by the operators noted that EFW flow to steam generator #1 was approximately 800 gpm (much higher than expected) with the steam generator level at approximately 62% wide range and that the steam generator's associated EFW backup flow control valve was open. This flow condition was recognized as abnormal for the observed equipment indication. Manual control of the EFW flow control valves was performed to maintain steam generator #1's level in a band of 50% narrow range to 70% narrow range. The time from the reactor trip to recognition by the operators and subsequent action was approximately two minutes. The specific event and operator response time substantiates reliance on operator action to prevent overfill of the steam generator.

In addition to overfill of the steam generator, the potential impact on core reactivity during a main steam line break (MSLB) with maximum EFW flow to a single steam generator was evaluated. Maximum EFW flow is assumed to be delivered to the intact steam generator during a MSLB to maximize the Reactor Coolant System cooldown. The resultant total positive reactivity addition (assuming a negative moderator temperature coefficient) attributed to the maximum EFW flow of approximately 2300 gpm concurrent with the MSLB event was negligible as compared to that

positive reactivity which would be added by blowdown of the steam generator.

The effect on structural integrity of a cooldown due to maximum EFW flow on reactor coolant system components would be bounded by the cooldown attributed to a MSLB. In either event an engineering evaluation to determine the effects of the excessive cooldown on the structural integrity of the reactor coolant system is required prior to exceeding 200°F and 500 psia on a startup after the event. This requirement is located in the Technical Specification 3.4.8.1.

Question #2 Concerning the proposed Technical Specification 3.7.1.2 Action b which allows 72 hours to restore an inoperable (but capable of supplying 100% flow) flow path to OPERABLE status. If a second flow path is declared inoperable, but also capable to supply 100% flow, is it required to enter Technical Specification 3.0.3?

Answer #2 Presently entry into Technical Specification 3.0.3 will be necessary if two flow paths are declared inoperable and each capable of supplying 100% flow. In the BASES section this is described as part of the justification for the allowance of 72 hours in the event one flow path is declared inoperable, but capable of supplying 100% flow. Although the change in risk for two flow paths being inoperable but capable of 100% flow is expected to be small, an explicit analysis and update of the TS change request would be required. Entergy may submit a change request for review and approval in the future or during the review and approval of improved technical specifications.