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10 CFR 50.90

2130-03-20270
December 23, 2003

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Oyster Creek Generating Station
Facility Operating License No. DPR-16
NRC Docket No. 50-219

Subject: Technical Specification Change Request No. 289 – Core Spray System Technical Specification Clarification and Water Volume Location Change

References:
1) Operating License No. DPR-16 Technical Specification Amendment No. 21, dated February 4, 1977
2) Operating License No. DPR-16 Technical Specification Amendment No. 45, dated January 25, 1980
3) Operating License No. DPR-16 Technical Specification Amendment No. 153, dated September 5, 1991
4) Operating License No. DPR-16 Technical Specification Amendment No. 204, dated March 17, 1999
5) Operating License No. DPR-16 Technical Specification Amendment No. 231, dated September 10, 2002

Pursuant to 10 CFR 50.90, AmerGen Energy Company, LLC hereby requests changes to the Technical Specifications included in Oyster Creek Operating License No. DPR-16. These changes add clarity to the specifications and modify the location of stored water during periods of core spray system inoperability. Also included are editorial and pagination changes as necessary to accommodate the proposed changes.

AmerGen Energy Company, LLC requests approval of the proposed amendment by October 15, 2004, to support the 1R20 refueling outage. Once approved, the amendment will be implemented within 60 days.

This proposed change to the Technical Specifications has undergone a review in accordance with Section 6.5 of the Oyster Creek Technical Specifications. No new regulatory commitments are established by this letter.

A001

We are notifying the State of New Jersey of this application for changes to the Technical Specifications by transmitting a copy of this letter and its attachments to the designated State Official.

If any additional information is needed, please contact Dave Robillard at (610) 765-5952.

I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,

12-23-03
Executed On

Michael P. Gallagher
Director, Licensing & Regulatory Affairs
AmerGen Energy Company, LLC

Enclosures:
(1) Oyster Creek Technical Specification Change Request No. 289, Evaluation of Proposed Changes
(2) Oyster Creek Technical Specification Change Request No. 289, Markup of Proposed Technical Specification Page Changes
(3) Oyster Creek Technical Specification Change Request No. 289, Proposed Technical Specification Pages

cc: H. J. Miller, Administrator, USNRC Region 1
P. S. Tam, USNRC Senior Project Manager, Oyster Creek
R. J. Summers, USNRC Senior Resident Inspector, Oyster Creek
File No. 03091

ENCLOSURE 1

Oyster Creek Technical Specification Change Request No. 289

Evaluation of Proposed Changes

1.0 DESCRIPTION

It is proposed that section 3.4.A and 3.5.A.2 of the Oyster Creek Technical Specifications (TS) be changed to clarify requirements for inoperable components and allow meeting the water availability requirement during periods of core spray system inoperability (e.g., when the plant is shutdown) in an alternate manner. Additionally, changes are proposed to add consistency of verification requirements within the specification and provide more definitive Bases for the specifications.

2.0 PROPOSED CHANGES

TS Sections 3.4.A and 3.5.A.2 are revised to add clarity of presentation, more detail in operational constraints due to equipment inoperabilities, and a change in the water volume requirement when the core spray system is inoperable (i.e., torus draining). The Bases for TS Sections 3.4.A and 3.5.A.2 have been revised to provide additional information regarding the requirements and the basis for the technical changes. Specific changes are as follows:

Existing TS Sections 3.4.A.1 and 3.4.A.2 have been combined into the proposed TS Section 3.4.A.1.

Existing Specification 3.4.A.6 is maintained in the proposed section 3.4.A.2.

The requirements in existing TS Sections 3.4.A.3, 3.4.A.4, 3.4.A.5, 3.4.A.7, 3.4.A.8 and 3.4.A.9 have been incorporated in the proposed Table 3.4.1.

The requirements in TS Sections 3.4.A.10 are presented in proposed section 3.4.A.4. The water volume requirement of 360,000 gallons is maintained. However, the volume of available water can be located between the Condensate Storage Tank (CST) and the torus versus the current requirement of maintaining this water in the CST only. Component operability verification has been added as further assurance of availability as currently exists in other sections of this specification. Also, the specification has been revised to clarify that at least "two redundant core spray systems" are operable in the reduced availability mode as is permitted by the existing specification.

Existing TS Section 3.5.A.2 is revised to be consistent with the proposed section 3.4.A.4.

The Bases for TS Section 3.4 is revised to reflect the proposed changes.

Editorial, format and pagination changes have been included as necessary to support the proposed changes. These changes are administrative and have no impact on the requirements.

3.0 BACKGROUND

TS Section 3.4.A provides operability requirements for the Core Spray System. The requirements provide for a period of allowed operation for specific component/system inoperabilities. Additionally, requirements are specified for maintenance and modification of systems and components including draining of the torus. TS Section 3.5.A.2 provides for draining of the torus as pertains to Primary Containment. The existing requirements in section 3.4.A are written in a paragraph format that adds a degree of complexity that can be eliminated by adopting a tabular presentation that presents operational restraints and conditions in a table organized by operational mode.

TS Section 3.4.A.10 allows the core spray system to be inoperable provided a number of provisions are satisfied including maintaining a specific water level in the Condensate Storage Tank (CST). This requirement is also repeated in Section 3.5.A.2. Maintaining the required level in the CST imposes water management constraints that complicate outage scheduling and water transfer operations. The proposed change maintains the water volume requirement but allows the total volume of water to be contained in either the torus or CST or a combination of both. Verification of component operability is added to further assure availability as in similar specifications.

4.0 TECHNICAL ANALYSIS

The purpose of the Core Spray System is to provide for the removal of the decay heat from the core following a postulated Loss-of-Coolant Accident (LOCA), so that fuel clad melting is prevented for the entire spectrum of postulated LOCAs. The Core Spray System consists of two loops (commonly referred to as system 1 and system 2). Each loop consists of two main pumps, two booster pumps, two parallel isolation valves (outside the drywell), two check valves in parallel (inside the drywell), a spray sparger, and associated piping, instrumentation and controls. The Fire Protection System is connected to each of the two Core Spray System loops. The purpose of this connection is to provide a backup supply of cooling water to the core spray spargers.

The two core spray system loops have sufficient redundancy of active components to ensure adequate core cooling will be accomplished following a design basis LOCA, while considering a single active failure. The redundant components in each loop are powered from separate emergency power sources so that each loop will function with a failure of one emergency diesel generator. The core cooling requirements will ensure the acceptance criteria of 10 CFR 50.46 will be met. The system is required to deliver flow from one main pump and one booster pump from one loop, plus one main pump from the other loop under the worst case LOCA conditions.

The TS provide system operability requirements during all modes of operation as well as operational restraints and required actions should system operability fall below that required. Section 3.4.A and section 3.5.A.2 address these requirements for the core spray system. The proposed changes to these sections and the evaluation of the changes are as follows:

Existing TS Sections 3.4.A.1 and 3.4.A.2 have been combined into the proposed TS Section 3.4.A.1. This change is editorial and no change to the requirements is made. The core spray system is required to be operable at all times with irradiated fuel in the reactor vessel and a minimum volume of 82,000 ft^3 of water in the torus is required. Exceptions to the requirements are presented in Table 3.4.1, which is referenced in the combined statement 3.4.A.1.

The requirements in existing TS Sections 3.4.A.3, 3.4.A.4, 3.4.A.5, 3.4.A.7, 3.4.A.8 and 3.4.A.9 have been incorporated in the proposed Table 3.4.1. The Table is organized by operational mode and presents conditions that may exist, limitations on operation, and additional conditions that must be met. Existing specifications 3.4.A.3 and 3.4.A.4 allow continued plant operation for a limited time interval in the event system components become inoperable. The allowable period for plant operation is based on the availability of redundant components and the number of these components that exist as presented in the existing Bases section of 3.4. These allowable periods of continued plant operation are maintained in the proposed change. The proposed Table 3.4.1 is presented in Attachment 1. The Table has been annotated with bracketed, bold-faced references to the existing TS requirements to demonstrate where these requirements have been captured. No changes have been made to the existing requirements in the TS other than editorial and format. Information has been added to clarify certain conditions and requirements as follows:

A statement requiring both Emergency Diesel Generators to be operable is added to those sections allowing limited plant operation in the Run or Startup mode with inoperable core spray components. The statement is added to provide clarity, as the underlying assumption in existing specifications 3.4.A.3 and 3.4.A.4 is that both diesel generators are operable. Existing specification 3.4.A.5 governs the event of one inoperable diesel generator and requires all core spray components powered from the operable diesel generator be operable. This bounds any operational allowance provided in existing TS sections 3.4.A.3 and 3.4.A.4. Consequently, these sections have no standing in the event of one inoperable diesel generator.

Statements are added concerning two or more inoperable components in the core spray system to clarify the requirements. Existing TS do not preclude consideration of multiple components being inoperable; however, required actions in this event are not clearly delineated. Existing TS Section 3.4.A.4 allows continued operation for a period of 15 days in the event "one of the redundant active loop components in the core spray system becomes inoperable." This refers to one of the four (two in each loop) components available. In the event that two or more active loop components in the same loop become inoperable the reactor may remain in operation for a period of 15 days provided no two components are redundant. Specification 3.4.A.4.c provides the necessary action (operation limited to 7 days) if two of the four redundant active loop components become inoperable. Conservatively, if two or more non-redundant active loop components are inoperable involving both loops operation is limited to 7 days.

The existing requirements for fire protection system operability are expanded to provide the required level of availability. The basis for this requirement is to provide a backup supply of cooling water to the core spray spargers. The fire protection system is not safety related nor does it meet single failure criteria. Therefore, operability for the purposes of these specifications is defined as one diesel driven fire pump capable of providing water to the core spray system. This level of operability meets the design basis of providing a backup supply of cooling water as stated in the OC Updated Final Safety Analysis Report. Operability of the fire protection system for the purposes of the existing TS section 3.4 is independent of the requirements of the Fire Protection Program.

The requirements in existing TS Sections 3.4.A.3.b and 3.4.A.4.b have been consolidated in the proposed section 3.4.A.3. Table 3.4.1 references section 3.4.A.3 where applicable. The existing TS requires a reduction in APLHGR to assure the core spray system can provide LOCA mitigation in accordance with 10 CFR 50, Appendix K.

The requirements in TS Section 3.4.A.10 are maintained in the proposed section 3.4.A.4 except for the CST level requirement. The water volume requirement of 360,000 gallons is maintained. However, the total volume of available water can be located between the CST and the torus versus the current requirement of maintaining this water in the CST. The amount of water required is based on establishing a water source for the core spray pumps in the event of a leak from the reactor while insufficient water is available in the torus. This can occur during periods of partial or complete draining of the torus thereby rendering the core spray system completely inoperable due to no water available at the pump suction. The quantity of water (360,000 gallons) is based on the torus water level needed to cover the core spray pump suction allowing water transfer to the core spray spargers. The basis for the water level requirement in the CST is to provide the capability of transferring the water to a core spray pump through a manually operated valve and providing water to the reactor with the core spray pump in the event of a reactor leak. As the leak from the reactor fills the torus, the water in the CST (360,000 gallons at 35 feet) fills the torus through the reactor leak to the drywell and ultimately to the torus. This amount of water establishes the capability of using a core spray pump to transfer water from the torus to the core spray spargers. The required amount of water in the CST assumes the torus is completely drained. Any water in the torus reduces the required level in the CST by an equal amount since the required volume of water is available to establish water at the suction of the core spray pumps. Therefore, the combination of the water volume in the CST and the water volume in the torus must be at least 360,000 gallons regardless of where the water is. The proposed change maintains the water volume requirement but allows the water to be contained in the torus or the CST or a combination of the two. Additionally, the proposed specification 3.4.A.4.e (1) has been revised to clarify that at least two redundant "core spray" systems are operable in the reduced availability mode as is permitted by the existing specification.

In order to support the proposed change a calculation (Reference 4) was performed to evaluate the water volume acceptability and the time required to reach the water level safety limit of 4'8" above the Top of the Active Fuel (TAF) from various water level conditions in the reactor cavity. The calculation assumes the torus is completely drained and that a Control Rod Drive (CRD) is dropped during maintenance representing the largest leak from the vessel as postulated in the analysis for the existing TS.

The results confirm that 360,000 gallons of water provides sufficient volume to assure operability of a core spray pump to transfer water from the torus to the reactor vessel. This volume of water flooded into the drywell and draining to the torus through the downcomers will fill the torus to a level of 7.5 feet. This level of water provides a positive suction for the core spray pumps and sufficient Net Positive Suction Head (NPSH) to assure pump operability. The required NPSH is 21feet as determined from the pump curve and 21.5 feet is available with the torus level at 7.5 feet assuming a water temperature of 140°F.

Leakage from the vessel was evaluated based on dropping a CRD from the bottom of the vessel with no credit taken for seating of the control rod blade. The basis for the existing TS conservatively assumed a 1300 gpm leak rate. However, this calculation assumes the water level is at its highest level (the reactor cavity is flooded) and calculates the initial leak rate as 1092 gpm that decreases to 453 gpm as the level lowers to the Reactor Pressure Vessel (RPV) head flange. For conservatism the calculation assumes the leak rate is a constant 1092 gpm down to the RPV head flange and a constant leak rate of 453 gpm from that point on. The results show the time to drain down from a flooded condition to various levels as follows:

LEVEL	TIME
Flooded Condition to the RPV Head Flange (26' TAF)	326 minutes
RPV Head Flange to Low Level Alarm (12'2" TAF)	55 minutes
Low Level Alarm to Low Level Scram (11'3" TAF)	4 minutes
Low Level Scram to Double Low Level (7'2" TAF)	24 minutes
Double Low Level to Triple Low Level (4'8" TAF)	10 minutes

Various indications of a leak from the reactor would be available to the operator. If the reactor was in a flooded condition a loss of level in the fuel pool and reactor cavity would be apparent to personnel on the refuel floor. A number of alarms would occur including fuel pool low level if the fuel pool gates are removed (calculation assumes gates installed), drywell sump high level, reactor low level, reactor low level scram, reactor low-low level alarm, and Reactor Pressure System actuation. If it is assumed that the operator is not alerted until the reactor low level alarm, 38 minutes is available for the operator to initiate corrective action prior to the level reaching the safety limit (4'8" TAF). The action required in the event the torus is drained is to realign the core spray system to use water from the CST, which requires manual operation of one valve. This will establish water flow from the CST to the core spray system and ultimately to the torus. The required available water volume (360,000 gallons) is sufficient to assure core spray pump operability and decay heat removal from the core.

This calculation assumes that the full volume of water in the reactor vessel is available. Therefore, specification 3.4.A.4.e(1) has been clarified to require that at least one recirculation loop discharge valve and its associated suction valve be in the full open position. A clarification has also been added to the TS Bases regarding this requirement. Specification 3.5.A.2.e(1) has been similarly revised to maintain consistency between the specifications.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

AmerGen Energy Company, LLC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed revision to Technical Specifications (TS) 3.4.A and 3.5.A 2 reformats and clarifies existing requirements. Additionally the change allows the required water volume for core spray system operability to be located in the torus, condensate storage tank, or a combination of both, in order to provide operational flexibility in water management and outage work scheduling. No changes to plant systems are involved. The requirements in the existing TS are maintained in the proposed change and no changes have been made to specified time periods or required actions that currently exist.

   The change to allow operational flexibility in water management is consistent with the current TS and only affects the location of the required water volume. Since the current requirement for the torus to be mechanically intact is maintained, water located in either the torus or the CST will serve to assure core cooling capability is maintained as before. All other requirements for allowing the core spray system to be inoperable are maintained in the proposed change. Additionally, a reanalysis of the initiating event confirms the current water volume requirement is adequate and demonstrates the ability to mitigate the previously evaluated event within the time constraints of the previous evaluation.

   Therefore, the proposed changes do not significantly increase the probability of occurrence or the consequences of any accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated.

   Response: No

The proposed revision to Technical Specifications (TS) 3.4.A and 3.5.A 2 reformats and clarifies existing requirements. Additionally the change allows the required water volume for core spray system operability to be located in the torus, condensate storage tank, or a combination of both, in order to provide operational flexibility in water management. The requirements in the existing TS are retained in the proposed change and no changes have been made to specified time periods or required actions that currently exist.

The proposed change does not introduce any new accident precursors and does not involve any alterations to plant systems or components. The changes are mainly editorial with one change that allows the storage of water in an additional location to that previously specified. The additional location allowed is the intended destination of the stored volume of water in the CST, as currently specified, in the event that core spray operability is required.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety.

Response: No

The proposed revision to Technical Specifications (TS) 3.4.A and 3.5.A 2 reformats and clarifies existing requirements. Additionally the change allows the required water volume for core spray system operability to be located in the torus, condensate storage tank, or a combination of both, in order to provide operational flexibility in water management and outage work scheduling. No changes to plant systems are involved. The requirements in the existing TS are maintained in the proposed change and no changes have been made to specified time periods or required actions that currently exist.

The proposed change allows the required water volume to establish core spray system operability to be located in an additional location. The additional location allowed is the intended destination of the stored volume of water in the CST, as currently specified, in the event that core spray operability is required. The total volume of water required is not changed and the time available for mitigating actions is more than sufficient to assure the continued ability to provide decay heat removal.

Therefore; the proposed changes do not involve a significant reduction in a margin of safety.

5.2 Applicable Regulatory Requirements/Criteria

The purpose of the TS with regard to the Core Spray System is to assure compliance with 10 CFR 50.46 in providing emergency core cooling capability. The core spray system in conjunction with other systems provides the primary means of removing energy from the reactor core in the event of a reactor emergency. The evaluation of the capability of the Emergency Core Cooling Systems (ECCS) to perform their function meets the criteria of 10 CFR 50, Appendix K.

TS Amendment No. 21 with the associated Safety Evaluation Report (SER) provided the controls and conditions necessary to allow the core spray system to be inoperable with fuel in the vessel. These conditions and controls were further modified in TS Amendment No. 45 with the associated SER to allow the core spray system to be inoperable without having to remove the reactor head, fuel pool gates and the separator–dryer pool gates.

TS Amendment No. 153 and the associated SER modified the core spray system specifications to include a reduction of the APLHGR to assure compliance with 10 CFR 50.46 in allowed operational conditions of inoperable equipment. TS Amendment No. 231 with the associated SER provided verification versus demonstration of system or component operability.

TS Amendment No. 204 with the associated SER revised the CST level requirement (but not the volume of water required) to account for the volume of water not available to the pump suction from the CST.

The proposed change maintains the provisions of the above requirements with the exception of the CST level requirement. The change maintains the requirement to have a total water volume of 360,000 gallons available between the level in the CST and the level of water in the torus. This availability of water satisfies the intent of the CST level requirement that is no longer needed.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22 (c) (9).

Therefore, pursuant to 10 CFR 51.22 (b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 PRECEDENT

AmerGen Energy Company, LLC, performed a review to identify any other plants with a similar Technical Specification requirements and none were identified.

8.0 REFERENCES

(1) Oyster Creek Updated Final Safety Analysis Report, Update 13.

(2) Oyster Creek Operating License and Technical Specifications, License No. DPR-16.

(3) Oyster Creek Operating License and Technical Specifications, License No. DPR-16, Amendment Nos. 21, 45, 153, 204, and 231.

(4) Exelon Nuclear Calculation, Draindown Due to Dropped CRD & Adequacy of Stored Water for Core Spray, Calculation No. C-1302-212-E310-126, Revision 1.

ATTACHMENT 1
ANNOTATED TABLE 3.4.1

Run or Startup Mode (except for low power physics testing)		
Condition	Requirement	Provided:
Any active loop component becomes inoperable. -OR- Two or more active loop components in the same loop (System 1 or System 2) are inoperable provided no two components are redundant. [3.4.A.4.c] [3.4.A.4]	The Reactor may remain in operation for a period not to exceed 15 Days. [3.4.A.4]	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis. [3.4.A.4.a] Specification 3.4.A.3 is met unless only a core spray booster pump is inoperable. [3.4.A.4.b]
One Emergency Diesel Generator is inoperable. [3.4.A.5]	The Reactor may remain in operation for a period not to exceed 7 Days. (Refer to Section 3.7.C.2)	All core spray equipment connected to the OPERABLE emergency diesel generator is OPERABLE. [3.4.A.5]
One core spray loop (System 1 or System 2) or its core spray header delta-P instrumentation becomes inoperable. OR Both of the redundant components in a loop (System 1 or System 2) are inoperable. [3.4.A.3]	The Reactor may remain in operation for a period not to exceed 7 Days. [3.4.A.3]	Both Emergency Diesel Generators are OPERABLE. The remaining loop (System 1 or System 2) has no inoperable components and is verified daily to be OPERABLE.[3.4.A.3.a] Specification 3.4.A.3 is met. [3.4.A.3.b]
Two of the four redundant active loop components in the core spray system not in the same loop (System 1 or System 2) are inoperable. OR Two or more non-redundant active loop components are inoperable in both loops (System 1 and System 2). [3.4.A.4.c]	The Reactor may remain in operation for a period not to exceed 7 Days. [3.4.A.3]	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis.[3.4.A.4.a & b] Specification 3.4.A.3 is met. [3.4.A.4.b]

Shutdown or Refuel Mode		
Conditions	Requirement	Provided
Maintenance or modifications of core spray systems, their power supplies, or water supplies. [3.4.A.7]	Maintain reduced core spray system availability as follows: 1.At least one core spray pump, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent the pump and any necessary valves can be started or operated from the control room or from local control stations. [3.4.A.7.a] 2.The Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. [3.4.A.7.b] 3.Verify the systems in 1 & 2 above are OPERABLE on a weekly basis. [3.4.A.7.c]	The Reactor is maintained in the COLD SHUTDOWN CONDITION or in the REFUEL MODE with the reactor coolant system maintained at less than 212 °F and vented. -AND- No work is performed on the reactor vessel and connected systems that could result in lowering the reactor water level to less than 4'8" above the top of the active fuel. [3.4.A.7]
Maintenance or modifications of core spray systems, their power supplies, or water supplies while work is in progress having the potential to lower reactor water level below 4'8" TAF. -OR- The Reactor is in the startup mode for Low power physics testing. [3.4.A.8]	Maintain reduced core spray system availability as follows: 1.At least one core spray pump in each loop, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves in each loop can be started or operated from the control room or from local control stations. [3.4.A.8.a] 2.Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. [3.4.A.8.b] 3.Verify the systems in 1 & 2 above are OPERABLE every 72 hours. [3.4.A.8.c]	The Reactor is: In the REFUEL MODE with the reactor coolant system maintained at less than 212°F. -OR- In the STARTUP MODE for the purpose of low power physics testing. [3.4.A.8]
The requirements for maintenance or modification can not be met. [3.4.A..9]	Initiate work to meet the requirements. [3.4.A.9]	Specification 3.4.A.2 is met. [3.4.A.6]

ENCLOSURE 2

Oyster Creek Technical Specification Change Request No. 289

Proposed Technical Specification Changes (Mark-up)

This enclosure consists of the current Oyster Creek Technical Specification pages marked up to show the proposed changes. The pages included in this enclosure are:

PAGES

3.4-1
3.4-2
3.4-3
3.4-4
3.4-5
3.4-6
3.4-7
3.4-8
3.5-2

INSERTS

INSERT 1

1. The Core Spray System shall be OPERABLE at all times with irradiated fuel in the reactor vessel with an absorption chamber water volume of at least 82,000 ft^3 except as specified in Table 3.4.1, or as noted below.

2. If Specification 3.4.A.1 is not met the reactor shall be PLACED IN the COLD SHUTDOWN CONDITION and no work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8"above TOP OF ACTIVE FUEL.

INSERT 2

Table 3.4.1

Run or Startup Mode (except for low power physics testing)		
Condition	Requirement	Provided:
Any active loop component becomes inoperable. -OR- Two or more active loop components in the same loop (System 1 or System 2) are inoperable provided no two components are redundant.	The Reactor may remain in operation for a period not to exceed 15 Days.	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis. Specification 3.4.A.3 is met unless only a core spray booster pump is inoperable.
One Emergency Diesel Generator is inoperable.	The Reactor may remain in operation for a period not to exceed 7 Days. (Refer to Section 3.7.C.2)	All core spray equipment connected to the OPERABLE emergency diesel generator is OPERABLE.
One core spray loop (System 1 or System 2) or its core spray header delta-P instrumentation becomes inoperable. -OR- Both of the redundant components in a loop (System 1 or System 2) are inoperable.	The Reactor may remain in operation for a period not to exceed 7 Days.	Both Emergency Diesel Generators are OPERABLE. The remaining loop (System 1 or System 2) has no inoperable components and is verified daily to be OPERABLE. Specification 3.4.A.3 is met.

Two of the four redundant active loop components in the core spray system not in the same loop (System 1 or System 2) are inoperable. -OR- Two or more non-redundant active loop components are inoperable in both loops (System 1 and System 2).	The Reactor may remain in operation for a period not to exceed 7 Days.	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis. Specification 3.4.A.3 is met.
Shutdown or Refuel Mode		
Conditions	Requirement	Provided
Maintenance or modifications of core spray systems, their power supplies, or water supplies.	Maintain reduced core spray system availability as follows: 1.At least one core spray pump, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent the pump and any necessary valves can be started or operated from the control room or from local control stations. 2.The Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. 3.Verify the systems in 1 & 2 above are OPERABLE on a weekly basis.	The Reactor is maintained in the COLD SHUTDOWN CONDITION or in the REFUEL MODE with the reactor coolant system maintained at less than 212°F and vented -AND- No work is performed on the reactor vessel and connected systems that could result in lowering the reactor water level to less than 4'8" above the TOP OF ACTIVE FUEL.

Maintenance or modifications of core spray systems, their power supplies, or water supplies while work is in progress having the potential to lower reactor water level below 4'8" TAF. -OR- The Reactor is in the startup mode for low power physics testing.	Maintain reduced core spray system availability as follows: 1.At least one core spray pump in each loop, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves in each loop can be started or operated from the control room or from local control stations. 2.Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. 3.Verify the systems in 1 & 2 above are OPERABLE every 72 hours.	The Reactor is: In the REFUEL MODE with the reactor coolant system maintained at less than 212°F. -OR- In the STARTUP MODE for the purpose of low power physics testing.
The requirements for maintenance or modification can not be met.	Initiate work to meet the requirements.	Specification 3.4.A.2 is met.

INSERT 3

3. In the event of inoperable active loop components the APLHGR of all the rods in any fuel assembly, as a function of average planar exposure, at any axial location shall not exceed 90% of the limits given in Specification 3.10.A. The action to bring the core to 90% of the APLHGR Limits must be completed within two hours after the component has been determined to be inoperable.

INSERT 4

Verify the pump and components are OPERABLE, as described, on a weekly basis.

INSERT 5

Verify the pumps and components are OPERABLE, as described, on a weekly basis.

3.4 EMERGENCY COOLING

Applicability: Applies to the operating status of the emergency cooling systems.

Objective: To assure operability of the emergency cooling systems.

Specifications:

A. Core Spray System

INSERT 1

1. The core spray system shall be operable at all times with irradiated fuel in the reactor vessel, except as otherwise specified in this section.

2. The absorption chamber water volume shall be at least 82,000 ft.^{3} in order for the core spray system to be considered operable.

INSERT 2

3. If one core spray system loop or its core spray header delta P instrumentation becomes inoperable during the run mode, the reactor may remain in operation for a period not to exceed 7 days provided: → move to Table 3.4.1

   a. The remaining loop has no inoperable components and is verified daily to be operable and,

   b. The average planar linear heat generation rate (APLHGR) of all the rods in any fuel assembly, as a function of average planar exposure, at any axial location shall not exceed 90% of the limits given in Specification 3.10.A. The action to bring the core to 90% of the APLHGR Limits must be completed within two hours after the system has been determined to be inoperable. → move to INSERT 3

4. The reactor may remain in operation for a period not to exceed 15 days if one of the redundant active loop components in the core spray system becomes inoperable during the run mode provided: → move to Table 3.4.1

   a. In the event of an inoperable core spray booster pump, the other core spray booster pump in the loop is verified daily to be operable.

   b. In the event of an inoperable core spray main pump, the other core spray main pump in the loop is verified daily to be operable and the APLHGR of all the rods in any fuel assembly, as a function of average planar exposure, at any axial location shall not exceed 90% of the limits given in Specification 3.10.A. The action to bring the core to 90% of the APLHGR Limits must be completed within two hours after the component has been determined to be inoperable. → move to INSERT 3

   c. If two of the redundant active loop components become inoperable, the limits of Specification 3.4.A.3 shall apply. → move to Table 3.4.1

5. During the period when one diesel is inoperable, the core spray equipment connected to the OPERABLE diesel shall be OPERABLE.

move to Table 3.4.1

6. If Specifications 3.4.A.3, 3.4.A.4, and 3.4.A.5 are not met, the reactor shall be PLACED IN the COLD SHUTDOWN CONDITION. If the core spray system becomes inoperable, the reactor shall be PLACED IN the COLD SHUTDOWN CONDITION and no work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the TOP OF the ACTIVE FUEL.

move to INSERT 1

7. If necessary to accomplish maintenance or modifications to the core spray systems, their power supplies or water supplies, reduced system availability is permitted when the reactor is: (a) maintained in the COLD SHUTDOWN CONDITION or (b) in the REFUEL MODE with the reactor coolant system maintained at less than 212°F and vented, and (c) no work is performed on the reactor vessel and connected systems that could result in lowering the reactor water level to less than 4'8" above the TOP OF the ACTIVE FUEL. Reduced Core Spray System Availability is minimally defined as follows:

move to Table 3.4.1

a. At least one core spray pump, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves can be started or operated from the control room or from local control stations.

b. The fire protection system is OPERABLE, and

c. These systems are verified to be OPERABLE as described in Specification 3.4.A.7.a above on a weekly basis.

8. If necessary to accomplish maintenance or modifications to the core spray systems, their power supplies or water supplies, reduced system availability is permitted when the reactor is in the REFUEL MODE with the reactor coolant system maintained at less than 212°F or in the STARTUP MODE for the purposes of low power physics testing. Reduced core spray system availability is defined as follows:

move to Table 3.4.1

a. At least one core spray pump in each loop, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves in each loop can be started or operated from the control room or from local control stations.

b. The fire protection system is OPERABLE and,

c. Each core spray pump and all components in 3.4.A.8a are verified to be OPERABLE every 72 hours.

~~9. If Specifications 3.4.A.7 and 3.4.A.8 cannot be met, the requirements of Specification 3.4.A.6 will be met and work will be initiated to meet minimum operability requirements of 3.4.A.7 and 3.4.A.8.~~ Move to Table 3.4.1

Insert 3 → ~~10.~~ 4 The core spray system is not required to be operable when the following conditions are met:

a. The reactor mode switch is locked in the "refuel" or "shutdown" position.

b. (1) There is an operable flow path capable of taking suction from the condensate storage tank and transferring water to the reactor vessel, and

(2) The fire protection system is operable, to the extent that one diesel driven fire pump is capable of providing water to the core spray system, and

(3) These systems are verified to be OPERABLE on a weekly basis.

c. The reactor coolant system is maintained at less than 212° F and vented (except during reactor vessel pressure testing).

d. At least one core spray pump, and system components necessary to deliver rated core spray flow to the reactor vessel, must remain operable to the extent that the pump and any necessary valves can be started or operated from the control room or from local control stations, and the torus is mechanically intact. ← Insert 4

e. (1) No work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the top of the active fuel and ~~the condensate storage tank level is greater than thirty five (35) feet (360,000 gallons)~~. At least two redundant core spray systems including core spray pumps and system components must remain operable as defined in d. above. Insert 5

there is a minimum of 360,000 gallons of water available between the torus and condensate storage water tank inventories.

OR

(2) The reactor vessel head, fuel pool gate, and separator-dryer pool gates are removed and the water level is above elevation 117 feet.

At least one recirculation loop discharge valve and its associated suction valve shall be in the full open position.

NOTE: When filling or draining the reactor cavity ~~from the condensate storage tank and draining the reactor cavity to the condensate storage tank, the 35 foot limit does not apply provided there is sufficient amount of water to complete the flooding operation~~. a sufficient water inventory (between the condensate storage tank and the reactor cavity) to complete the flooding operation shall be maintained. The 360,000 gallons of water minimum requirement in (1) above does not apply during the filling and draining operation provided there is a sufficient amount of water to complete the flooding operation.

B. Automatic Depressurization System

1. Five electromatic relief valves, which provide the automatic depressurization and pressure relief functions, shall be operable when the reactor water temperature is greater than 212° F and pressurized above 110 psig, except as specified in 3.4.B.2 and during Reactor Vessel Pressure Testing consistent with Specifications 1.39 and 3.3.A.(i).

← NEXT PAGE

2. If at any time there are only four operable electromatic relief valves, the reactor may remain in operation for a period not to exceed 3 days provided the motor operated isolation and condensate makeup valves in both isolation condensers are verified daily to be operable.

3. If Specifications 3.4.B.1 and 3.4.B.2 are not met; reactor pressure shall be reduced to 110 psig or less, within 24 hours.

4. The time delay set point for initiation after coincidence of low-low-low reactor water level and high drywell pressure shall be set not to exceed two minutes.

C. Containment Spray System and Emergency Service Water System

1. The containment spray system and the emergency service water system shall be operable at all times with irradiated fuel in the reactor vessel, except as specified in Specifications 3.4.C.3, 3.4.C.4, 3.4.C.6 and 3.4.C.8.

2. The absorption chamber water volume shall not be less than 82,000 ft^3 in order for the containment spray and emergency service water system to be considered operable.

3. If one emergency service water system loop becomes inoperable, its associated containment spray system loop shall be considered inoperable. If one containment spray system loop and/or its associated emergency service water system loop becomes inoperable during the run mode, the reactor may remain in operation for a period not to exceed 7 days provided the remaining containment spray system loop and its associated emergency service water system loop each have no inoperable components and are verified daily to be operable.

4. If a pump in the containment spray system or emergency service water system becomes inoperable, the reactor may remain in operation for a period not to exceed 15 days provided the other similar pump is verified daily to be operable. A maximum of two pumps may be inoperable provided the two pumps are not in the same loop. If more than two pumps become inoperable, the limits of Specification 3.4.C.3 shall apply.

5. During the period when one diesel is inoperable, the containment spray loop and emergency service water system loop connected to the operable diesel shall have no inoperable components.

Move to next Page

6. If primary containment integrity is not required (see Specification 3.5.A), the containment spray system may be made inoperable.

7. If Specifications 3.4.C.3, 3.4.C.4, 3.4.C.5 or 3.4.C.6 are not met, the reactor shall be placed in cold shutdown condition. If the containment spray system or the emergency service water system becomes inoperable, the reactor shall be placed in the cold shutdown condition and no work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the top of the active fuel.

8. The containment spray system may be made inoperable during the integrated primary containment leakage rate test required by Specification 4.5, provided that the reactor is maintained in the cold shutdown condition and that no work is performed on the reactor or its connected systems which could result in lowering the reactor level to less than 4'8" above the top of the active fuel.

D. Control Rod Drive Hydraulic System

1. The control rod drive (CRD) hydraulic system shall be operable when the reactor water temperature is above 212°F except as specified in 3.4.D.2 and 3.4.D.3 below.

2. If one CRD hydraulic pump becomes inoperable when the reactor water temperature is above 212°F, the reactor may remain in operation for a period not to exceed 7 days provided the second CRD hydraulic pump is operating and is checked at least once every 8 hours. If this condition cannot be met, the reactor water temperature shall be reduced to less than 212°F.

3. During reactor vessel pressure testing, at least one CRD pump shall be operable.

E. Core Spray and Containment Spray Pump Compartments Doors

The core spray and containment spray pump compartments doors shall be closed at all times except during passage in order to consider the core spray system and the containment spray system operable.

F. Fire Protection System

1. The fire protection system shall be operable at all times with fuel in the reactor vessel except as specified in Specification 3.4.F.2.

2. If the fire protection system becomes inoperable during the run mode, the reactor may remain in operation provided both core spray system loops are operable with no inoperable components.

NEXT PAGE

Bases:

This specification (system 1 and system 2) assures operability of the emergency core cooling system to provide adequate core cooling. The Oyster Creek ECCS has two core spray loops, each containing a core spray sparger, and redundant active loop components consisting of two main pumps, ~~and~~ two booster pumps. Specification 3.4.A.1 insures the availability of

two parallel isolation valves (outside the drywell) and two check valves in parallel (inside the drywell).

core cooling to meet the ECCS acceptance criteria in 10CFR50.46 utilizing the MAPLHGR limits provided in Section 3.10. These limits are from calculations[1] that include models and procedures which are specified in 10CFR50 Appendix K. A core spray flow of at least 3400 gpm (1 main and 1 booster pump) from 1 loop plus 2200 gpm (1 main pump) from the other loop at a vessel pressure of 110 psig is used in the calculation. Core spray loop 2 would be required to deliver 3640 gpm if loop 2 is relied upon as the two pump contributor and 2360 gpm if loop 2 is the single pump contributor, since loop 2 has flow losses through cracks in the core spray sparger.

Table 3.4.1 ~~Specification 3.4.A.3~~ allows continued operation with one core spray loop inoperable for a limited period of time. An evaluation of data presented in Reference 5 shows that flow from a single core spray sparger, main and booster pumps delivering 3400 gpm (3640 gpm for loop 2) at a vessel pressure of 110 psig, will meet 10 CFR 50.46 criteria with a 10% reduction in MAPLHGR Limits specified in Section 3.10. At 90% of the APLHGR, each core spray system is capable of supplying the required minimum bundle flow rate to ensure core cooling (References 6 and 7). Two hours is allowed for a reduction in the APLHGR limit which is consistent with two hours provided by Specification 3.10.A.3 to return an exceeded APLHGR to within the prescribed limit.

Under the APLHGR operational constraints of Specification 3.4.A.3 the operable core spray loop meets all Appendix K requirements except for the case of a core spray line break inside the drywell in the operable loop. As a result, reactor operation is permitted for a period not to exceed seven days. The allowed time out of service for the redundant core spray loop is justified based on the low probability of the event, the direct operator indication of a Core Spray System pipe break, and emergency procedures which provide for additional cooling water through the fire system.

The probability of a pipe break between the reactor vessel and the core spray check valve in the operable core spray loop (approx. 28 feet of 6 inch pipe) compared to the total pipe in the reactor coolant pressure boundary is very small. The probability of a core spray line break in conjunction with the other core spray loop out of service, which in itself is a low probability, is so small that it does not constitute an unacceptable risk. In the extremely unlikely event that this LOCA scenario were to occur, the operators are provided with a specific visual and audible alarm alerting them of a "Core Spray System I (II) Pipe Break" (one for each core spray loop). These alarms are initiated by differential pressure detectors on each core spray loop. In such a case the core spray line break would occur above the top of the active fuel allowing the core to be re-flooded from the fire protection system through the intact core spray loop.

In addition, a small break LOCA in the operable core spray loop prior to a larger break will be detected by the drywell unidentified leakage system (drywell sump) even before it is detected by the core spray alarm system. This will provide the operators with additional time to respond.

Therefore, the out-of-service time for one of the two core spray loops, as evaluated as per the guidelines in Reference 8, has been conservatively selected to be 7 days.

Table 3.4.1 ~~Specification 3.4.A.4~~ allows continued operation with one redundant active loop component inoperable for a limited period of time. Each core spray loop contains redundant active components based upon Reference 1 or 5, as appropriate. Therefore, with the loss of one of these components, the system as a whole (both loops) can tolerate an additional single failure of one of its active components and still perform the intended function and meet 10 CFR 50.46 criteria. If a redundant active component fails, a fifteen day period is allowed for repairs, based on 1 out of 4 components being required. ~~3.4.A.4.b insures that~~ The 1 out of 4 requirement is maintained by assuring no two inoperable components are redundant.

Table 3.4.1 ~~Specification 3.4.A.5~~ ensures that if one diesel is out of service for repair, the core spray components fed by the other diesel must be OPERABLE. Since each diesel will provide power to components for both core spray loops, the required flow specified in the bases for Specification 3.~~1~~4.A.1 will be met.

When the reactor is in the shutdown or refueling mode and the reactor coolant system is less than 212°F and vented and no work is being performed that could result in lowering the water level to less than 4'8" above the core, the likelihood of a leak or rupture leading to uncovering of the core is very low. The only source of energy that must be removed is decay heat and one day after shutdown this heat generation rate is conservatively calculated to be not more than 0.6% of rated power. Sufficient core spray flow to cool the core can be supplied by one core spray pump or one of the two fire protection system pumps under these conditions. When it is necessary to perform repairs on the core spray system components, power supplies or water sources, ~~Specification 3.4.A.7~~ Table 3.4.1 permits reduced cooling system capability to that which could provide sufficient core spray flow from two independent sources. Manual initiation of these systems is adequate since it can be easily accomplished within 15 minutes during which time the temperature rise in the reactor fuel will not reach 2200°F.

In order to allow for certain primary system maintenance, which will include control rod drive repair, LPRM removal/installation, reactor leak test, etc., (all performed according to approved procedure), Table 3.4.1 ~~Specification 3.4.A.8~~ requires the availability of an additional core spray pump in an independent loop, while this maintenance is being performed. The likelihood of the core being uncovered is still considered to be very low, however, the requirement of a second core spray pump capable of full rated flow and the 72 hour OPERABILITY verification of both core spray pumps is specified.

Specification 3.4.A.~~10~~4 allows the core spray system to be inoperable in the cold shutdown or refuel modes if the reactor cavity is flooded and the spent fuel pool gates are removed and a source of water supply to the reactor vessel is available, as specified in 3.4.A.4.b.1 which may include the core spray pump, a condensate pump through the feedwater system, or other defined path from the Condensate Storage Tank capable of providing the required make up capability. Water would then be available to keep the core flooded.

The relief valves of the automatic depressurization system enable the core spray system to provide protection against the small break in the event the feedwater system is not active.

The requirement in Specification 3.4.A.4.e(1) to maintain at least one recirculation loop discharge valve and its associated suction valve in the full open position assures that an adequate flow path exists from the annular space, between the pressure vessel wall and the core shroud, to the core region.

The containment spray system is provided to remove heat energy from the containment in the event of a loss-of-coolant accident. Actuation of the containment spray system in accordance with plant emergency operating procedures ensures that containment and torus pressure and temperature conditions are within the design basis for containment integrity, EQ, and core spray NPSH requirements. The flow from one pump in either loop is more than ample to provide the required heat removal capability(2). The emergency service water system provides cooling to the containment spray heat exchangers and, therefore, is required to provide the ultimate heat sink for the energy release in the event of a loss-of-coolant accident. The emergency service water pumping requirements are those which correspond to containment cooling heat exchanger performance implicit in the containment cooling description. Since the loss-of-coolant accident while in the cold shutdown condition would not require containment spray, the system may be deactivated to permit integrated leak rate testing of the primary containment while the reactor is in the cold shutdown condition.

The core spray main pump compartments and containment spray pump compartments were provided with water-tight doors(4). Specification 3.4.E ensures that the doors are in place to perform their intended function.

Similarly, since a loss-of-coolant accident when primary containment integrity is not required would not result in pressure build-up in the drywell or torus, the containment spray system may be made inoperable under these conditions.

References

1. NEDC-31462P, "Oyster Creek Nuclear Generating Station SAFER/CORECOOL/GESTR-LOCA Loss-of-Coolant Accident Analysis," August 1987.

2. Licensing Application, Amendment 32, Question 3

3. (Deleted)

4. Licensing Application, Amendment 18, Question 4

5. GPUN Topical Report 053, "Thermal Limits with One Core Spray Sparger" December 1988.

6. NEDE-30010A, "Performance Evaluation of the Oyster Creek Core Spray Sparger", January 1984.

7. Letter and enclosed Safety Evaluation, Walter A. Paulson (NRC) to P. B. Fiedler (GPUN), July 20, 1984.

8. APED-5736, "Guidelines for Determining Safe Test Intervals and Repair Times for Engineered Safeguards", April 1969.

2. Maintenance and repair, including draining of the suppression pool, may be performed provided that the following conditions are satisfied:

a. The reactor mode switch is locked in the refuel or shutdown position.

b. (1) There is an OPERABLE flow path capable of taking suction from the condensate storage tank and transferring water to the reactor vessel, and

(2) The fire protection system is ~~OPERABLE~~ to the extent that one diesel driven fire pump is capable of providing water to the core spray system, and

(3) These systems are verified to be OPERABLE on a weekly basis.

c. The reactor coolant system is maintained at less than 212° F and vented.

d. At least one core spray pump, and system components necessary to deliver rated core spray flow to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves can be started or operated from the control room or from local control stations, and the torus is mechanically intact. Insert 4

e. (1) No work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the TOP OF the ACTIVE FUEL and ~~the condensate storage tank level is greater than thirty five (35) feet (360,000 gallons)~~. At least two redundant core spray systems including core spray pumps and system components must remain OPERABLE as defined in d. above. Insert 5

there is a minimum of 360,000 gallons of water available between the torus and condensate storage tank water inventories

or

(2) The reactor vessel head, fuel pool gate, and separator-dryer pool gates are removed and the water level is above elevation 117 feet.

At least one recirculation loop discharge valve and its associated suction valve shall be in the full open position.

NOTE: When filling or draining the reactor cavity, ~~from the condensate storage tank and draining the reactor cavity to the condensate storage tank, the 35 foot limit does not apply provided there is sufficient amount of water to complete the flooding operation.~~

a sufficient water inventory (between the condensate storage tank and the reactor cavity) to complete the flooding operation shall be maintained. The 360,000 gallons of water minimum requirement in (1) above does not apply during the filling and draining operation provided there is a sufficient amount of water to complete the flooding operation

ENCLOSURE 3

Oyster Creek Technical Specification Change Request No. 289

Proposed Technical Specification Pages

<u>New Pages</u>

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3.4 EMERGENCY COOLING

Applicability: Applies to the operating status of the emergency cooling systems.

Objective: To assure operability of the emergency cooling systems.

Specifications:

A. Core Spray System

1. The Core Spray System shall be OPERABLE at all times with irradiated fuel in the reactor vessel with an absorption chamber water volume of at least 82,000 ft^3 except as specified in Table 3.4.1, or as noted below.

2. If Specification 3.4.A.1 is not met the reactor shall be PLACED IN the COLD SHUTDOWN CONDITION and no work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8"above TOP OF ACTIVE FUEL.

Table 3.4.1

Run or Startup Mode (except for low power physics testing)		
Condition	Requirement	Provided:
Any active loop component becomes inoperable. -OR- Two or more active loop components in the same loop (System 1 or System 2) are inoperable provided no two components are redundant.	The Reactor may remain in operation for a period not to exceed 15 Days.	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis. Specification 3.4.A.3 is met unless only a core spray booster pump is inoperable.
One Emergency Diesel Generator is inoperable.	The Reactor may remain in operation for a period not to exceed 7 Days. (Refer to Section 3.7.C.2)	All core spray equipment connected to the OPERABLE emergency diesel generator is OPERABLE.

Run or Startup Mode (except for low power physics testing)		
Condition	Requirement	Provided:
One core spray loop (System 1 or System 2) or its core spray header delta-P instrumentation becomes inoperable. -OR- Both of the redundant components in a loop (System 1 or System 2) are inoperable.	The Reactor may remain in operation for a period not to exceed 7 Days.	Both Emergency Diesel Generators are OPERABLE. The remaining loop (System 1 or System 2) has no inoperable components and is verified daily to be OPERABLE. Specification 3.4.A.3 is met.
Two of the four redundant active loop components in the core spray system not in the same loop (System 1 or System 2) are inoperable. -OR- Two or more non-redundant active loop components are inoperable in both loops (System 1 and System 2).	The Reactor may remain in operation for a period not to exceed 7 Days.	Both Emergency Diesel Generators are OPERABLE. The Redundant active loop components within the same loop as the inoperable components are verified OPERABLE on a daily basis. Specification 3.4.A.3 is met.

Shutdown or Refuel Mode		
Condition	Requirement	Provided:
Maintenance or modifications of core spray systems, their power supplies, or water supplies.	Maintain reduced core spray system availability as follows: 1.At least one core spray pump, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent the pump and any necessary valves can be started or operated from the control room or from local control stations. 2.The Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. 3.Verify the systems in 1 & 2 above are OPERABLE on a weekly basis.	The Reactor is maintained in the COLD SHUTDOWN CONDITION or in the REFUEL MODE with the reactor coolant system maintained at less than 212°F and vented. -AND- No work is performed on the reactor vessel and connected systems that could result in lowering the reactor water level to less than 4'8" above the TOP OF ACTIVE FUEL.

Shutdown or Refuel Mode		
Condition	Requirement	Provided:
Maintenance or modifications of core spray systems, their power supplies, or water supplies while work is in progress having the potential to lower reactor water level below 4'8" TAF. -OR- The Reactor is in the startup mode for low power physics testing.	Maintain reduced core spray system availability as follows: 1.At least one core spray pump in each loop, and system components necessary to deliver rated core spray to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves in each loop can be started or operated from the control room or from local control stations. 2.Fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system. 3.Verify the systems in 1 & 2 above are OPERABLE every 72 hours.	The Reactor is: In the REFUEL MODE with the reactor coolant system maintained at less than 212°F. -OR- In the STARTUP MODE for the purpose of low power physics testing.
The requirements for maintenance or modification can not be met.	Initiate work to meet the requirements.	Specification 3.4.A.2 is met.

3. In the event of inoperable active loop components the APLHGR of all the rods in any fuel assembly, as a function of average planar exposure, at any axial location shall not exceed 90% of the limits given in Specification 3.10.A. The action to bring the core to 90% of the APLHGR Limits must be completed within two hours after the component has been determined to be inoperable.

4. The core spray system is not required to be operable when the following conditions are met:

   a. The reactor mode switch is locked in the "Refuel" or "Shutdown" position.

   b. (1) There is an operable flow path capable of taking suction from the condensate storage tank and transferring water to the reactor vessel, and

      (2) The fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system, and

      (3) These systems are verified to be OPERABLE on a weekly basis.

c. The reactor coolant system is maintained at less than 212 °F and vented (except during reactor vessel pressure testing).

d. At least one core spray pump, and system components necessary to deliver rated core spray flow to the reactor vessel, must remain operable to the extent that the pump and any necessary valves can be started or operated from the control room or from local control stations, and the torus is mechanically intact. Verify the pump and components are OPERABLE, as described, on a weekly basis.

e. (1) No work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the TOP OF the ACTIVE FUEL and there is a minimum of 360,000 gallons of water available between the torus and condensate storage tank water inventories. At least two redundant core spray systems including core spray pumps and system components must remain operable as defined in d. above. At least one recirculation loop discharge valve and its associated suction valve shall be in the full open position. Verify the pumps and components are OPERABLE, as described, on a weekly basis.

OR

(2) The reactor vessel head, fuel pool gate, and separator-dryer pool gates are removed and the water level is above elevation 117 feet. When filling or draining the reactor cavity, a sufficient water inventory (between the condensate storage tank and the reactor cavity) to complete the flooding operation shall be maintained. The 360,000 gallons of water minimum requirement in (1) above does not apply during the filling and draining operation provided there is a sufficient amount of water to complete the flooding operation.

B. Automatic Depressurization System

1. Five electromatic relief valves, which provide the automatic depressurization and pressure relief functions, shall be operable when the reactor water temperature is greater than 212°F and pressurized above 110 psig, except as specified in 3.4.B.2 and during Reactor Vessel Pressure Testing consistent with Specifications 1.39 and 3.3.A.(i).

2. If at any time there are only four operable electromatic relief valves, the reactor may remain in operation for a period not to exceed 3 days provided the motor operated isolation and condensate makeup valves in both isolation condensers are verified daily to be operable.

3. If Specifications 3.4.B.1 and 3.4.B.2 are not met; reactor pressure shall be reduced to 110 psig or less, within 24 hours.

4. The time delay set point for initiation after coincidence of low-low-low reactor water level and high drywell pressure shall be set not to exceed two minutes.

C. Containment Spray System and Emergency Service Water System

1. The containment spray system and the emergency service water system shall be operable at all times with irradiated fuel in the reactor vessel, except as specified in Specifications 3.4.C.3, 3.4.C.4, 3.4.C.6 and 3.4.C.8.

2. The absorption chamber water volume shall not be less than 82,000 ft^3 in order for the containment spray and emergency service water system to be considered operable.

3. If one emergency service water system loop becomes inoperable, its associated containment spray system loop shall be considered inoperable. If one containment spray system loop and/or its associated emergency service water system loop becomes inoperable during the run mode, the reactor may remain in operation for a period not to exceed 7 days provided the remaining containment spray system loop and its associated emergency service water system loop each have no inoperable components and are verified daily to be operable.

4. If a pump in the containment spray system or emergency service water system becomes inoperable, the reactor may remain in operation for a period not to exceed 15 days provided the other similar pump is verified daily to be operable. A maximum of two pumps may be inoperable provided the two pumps are not in the same loop. If more than two pumps become inoperable, the limits of Specification 3.4.C.3 shall apply.

5. During the period when one diesel is inoperable, the containment spray loop and emergency service water system loop connected to the operable diesel shall have no inoperable components.

6. If primary containment integrity is not required (see Specification 3.5.A), the containment spray system may be made inoperable.

7. If Specifications 3.4.C.3, 3.4.C.4, 3.4.C.5 or 3.4.C.6 are not met, the reactor shall be placed in cold shutdown condition. If the containment spray system or the emergency service water system becomes inoperable, the reactor shall be placed in the cold shutdown condition and no work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the top of the active fuel.

8. The containment spray system may be made inoperable during the integrated primary containment leakage rate test required by Specification 4.5, provided that the reactor is maintained in the cold shutdown condition and that no work is performed on the reactor or its connected systems which could result in lowering the reactor level to less than 4'8" above the top of the active fuel.

D. Control Rod Drive Hydraulic System

1. The control rod drive (CRD) hydraulic system shall be operable when the reactor water temperature is above 212°F except as specified in 3.4.D.2 and 3.4.D.3 below.

2. If one CRD hydraulic pump becomes inoperable when the reactor water temperature is above 212°F, the reactor may remain in operation for a period not to exceed 7 days provided the second CRD hydraulic pump is operating and is checked at least once every 8 hours. If this condition cannot be met, the reactor water temperature shall be reduced to less than 212°F.

3. During reactor vessel pressure testing, at least one CRD pump shall be operable.

E. Core Spray and Containment Spray Pump Compartments Doors

The core spray and containment spray pump compartments doors shall be closed at all times except during passage in order to consider the core spray system and the containment spray system operable.

F. Fire Protection System

1. The fire protection system shall be operable at all times with fuel in the reactor vessel except as specified in Specification 3.4.F.2.

2. If the fire protection system becomes inoperable during the run mode, the reactor may remain in operation provided both core spray system loops are operable with no inoperable components.

Bases:

This specification assures operability of the emergency core cooling system to provide adequate core cooling. The Oyster Creek ECCS has two core spray loops (system 1 and system 2); each containing a core spray sparger and redundant active loop components consisting of two main pumps, two booster pumps, two parallel isolation valves (outside the drywell) and two check valves in parallel (inside the drywell). Specification 3.4.A.1 insures the availability of core cooling to meet the ECCS acceptance criteria in 10 CFR 50.46 utilizing the MAPLHGR limits provided in Section 3.10. These limits are from calculations(1) that include models and procedures which are specified in 10 CFR 50 Appendix K. A core spray flow of at least 3400 gpm (1 main and 1 booster pump) from 1 loop plus 2200 gpm (1 main pump) from the other loop at a vessel pressure of 110 psig is used in the calculation. Core spray loop 2 would be required to deliver 3640 gpm if loop 2 is relied upon as the two pump contributor and 2360 gpm if loop 2 is the single pump contributor, since loop 2 has flow losses through cracks in the core spray sparger.

Table 3.4.1 allows continued operation with one core spray loop inoperable for a limited period of time. An evaluation of data presented in Reference 5 shows that flow from a single core spray sparger, main and booster pumps delivering 3400 gpm (3640 gpm for loop 2) at a vessel pressure of 110 psig, will meet 10 CFR 50.46 criteria with a 10% reduction in MAPLHGR Limits specified in Section 3.10. At 90% of the APLHGR, each core spray system is capable of supplying the required minimum bundle flow rate to ensure core cooling (References 6 and 7). Two hours is allowed for a reduction in the APLHGR limit which is consistent with two hours provided by Specification 3.10.A.3 to return an exceeded APLHGR to within the prescribed limit.

Under the APLHGR operational constraints of specification 3.4.A.3 the operable core spray loop meets all Appendix K requirements except for the case of a core spray line break inside the drywell in the operable loop. As a result, reactor operation is permitted for a period not to exceed seven days. The allowed time out of service for the redundant core spray loop is justified based on the low probability of the event, the direct operator indication of a Core Spray System pipe break, and emergency procedures which provide for additional cooling water through the fire system.

The probability of a pipe break between the reactor vessel and the core spray check valve in the operable core spray loop (approx. 28 feet of 6 inch pipe) compared to the total pipe in the reactor coolant pressure boundary is very small. The probability of a core spray line break in conjunction with the other core spray loop out of service, which in itself is a low probability, is so small that it does not constitute an unacceptable risk. In the extremely unlikely event that this LOCA scenario were to occur, the operators are provided with a specific visual and audible alarm alerting them of a "Core Spray System I (II) Pipe Break" (one for each core spray loop). These alarms are initiated by differential pressure detectors on each core spray loop. In such a case the core spray line break would occur above the top of the active fuel allowing the core to be re-flooded from the fire protection system through the intact core spray loop.

In addition, a small break LOCA in the operable core spray loop prior to a larger break will be detected by the drywell unidentified leakage system (drywell sump) even before it is detected by the core spray alarm system. This will provide the operators with additional time to respond.

Therefore, the out-of-service time for one of the two core spray loops, as evaluated as per the guidelines in Reference 8, has been conservatively selected to be 7 days.

Table 3.4.1 allows continued operation with one redundant active loop component inoperable for a limited period of time. Each core spray loop contains redundant active components based upon Reference 1 or 5, as appropriate. Therefore, with the loss of one of these components, the system as a whole (both loops) can tolerate an additional single failure of one of its active components and still perform the intended function and meet 10 CFR 50.46 criteria. If a redundant active loop component fails, a fifteen day period is allowed for repairs, based on 1 out of 4 components being required. The 1 out of 4 requirement is maintained by assuring no two inoperable components are redundant.

Table 3.4.1 ensures that if one diesel is out of service for repair, the core spray components fed by the other diesel must be OPERABLE. Since each diesel will provide power to components for both core spray loops, the required flow specified in the bases for Specification 3.4.A.1 will be met.

When the reactor is in the shutdown or refueling mode and the reactor coolant system is less than 212°F and vented and no work is being performed that could result in lowering the water level to less than 4'8" above the core, the likelihood of a leak or rupture leading to uncovering of the core is very low. The only source of energy that must be removed is decay heat and one day after shutdown this heat generation rate is conservatively calculated to be not more than 0.6% of rated power. Sufficient core spray flow to cool the core can be supplied by one core spray pump or one of the two fire protection system pumps under these conditions. When it is necessary to perform repairs on the core spray system components, power supplies or water sources, Table 3.4.1 permits reduced cooling system capability to that which could provide sufficient core spray flow from two independent sources. Manual initiation of these systems is adequate since it can be easily accomplished within 15 minutes during which time the temperature rise in the reactor fuel will not reach 2200°F.

In order to allow for certain primary system maintenance, which will include control rod drive repair, LPRM removal/installation, reactor leak test, etc., (all performed according to approved procedure), Table 3.4.1 requires the availability of an additional core spray pump in an independent loop, while this maintenance is being performed. The likelihood of the core being uncovered is still considered to be very low, however, the requirement of a second core spray pump capable of full rated flow and the 72 hour OPERABILITY verification of both core spray pumps is specified.

Specification 3.4.A.4 allows the core spray system to be inoperable in the cold shutdown or refuel modes if the reactor cavity is flooded and the spent fuel pool gates are removed and a source of water supply to the reactor vessel is available as specified in 3.4.A.4.b.1 which may include the core spray pump, a condensate pump through the feedwater system, or other defined path from the condensate storage tank capable of providing the required makeup capability. Water would then be available to keep the core flooded.

The requirement in Specification 3.4.A.4.e(1) to maintain at least one recirculation loop discharge valve and its associated suction valve in the full open position assures that an adequate flow path exists from the annular space, between the pressure vessel wall and the core shroud, to the core region.

The relief valves of the automatic depressurization system enable the core spray system to provide protection against the small break in the event the feedwater system is not active.

The containment spray system is provided to remove heat energy from the containment in the event of a loss-of-coolant accident. Actuation of the containment spray system in accordance with plant emergency operating procedures ensures that containment and torus pressure and temperature conditions are within the design basis for containment integrity, EQ, and core spray NPSH requirements. The flow from one pump in either loop is more than ample to provide the required heat removal capability (2). The emergency service water system provides cooling to the containment spray heat exchangers and, therefore, is required to provide the ultimate heat sink for the energy release in the event of a loss-of-coolant accident. The emergency service water pumping requirements are those which correspond to containment cooling heat exchanger performance implicit in the containment cooling description. Since the loss-of-coolant accident while in the cold shutdown condition would not require containment spray, the system may be deactivated to permit integrated leak rate testing of the primary containment while the reactor is in the cold shutdown condition.

The core spray main pump compartments and containment spray pump compartments were provided with water-tight doors(4). Specification 3.4.E ensures that the doors are in place to perform their intended function.

Similarly, since a loss-of-coolant accident when primary containment integrity is not required would not result in pressure build-up in the drywell or torus, the containment spray system may be made inoperable under these conditions.

References

1. NEDC-31462P, "Oyster Creek Nuclear Generating Station SAFER/CORECOOL/GESTR-LOCA Loss-of-Coolant Accident Analysis," August 1987.

2. Licensing Application, Amendment 32, Question 3

3. (Deleted)

4. Licensing Application, Amendment 18, Question 4

5. GPUN Topical Report 053, "Thermal Limits with One Core Spray Sparger" December 1988.

6. NEDE-30010A, "Performance Evaluation of the Oyster Creek Core Spray Sparger", January 1984.

7. Letter and enclosed Safety Evaluation, Walter A. Paulson (NRC) to P. B. Fiedler (GPUN), July 20, 1984.

8. APED-5736, "Guidelines for Determining Safe Test Intervals and Repair Times for Engineered Safeguards", April 1969.

2. Maintenance and repair, including draining of the suppression pool, may be performed provided that the following conditions are satisfied:

a. The reactor mode switch is locked in the refuel or shutdown position.

b. (1) There is an OPERABLE flow path capable of taking suction from the condensate storage tank and transferring water to the reactor vessel, and

(2) The fire protection system is OPERABLE to the extent that one diesel driven fire pump is capable of providing water to the core spray system, and

(3) These systems are verified to be OPERABLE on a weekly basis.

c. The reactor coolant system is maintained at less than 212°F and vented.

d. At least one core spray pump, and system components necessary to deliver rated core spray flow to the reactor vessel, must remain OPERABLE to the extent that the pump and any necessary valves can be started or operated from the control room or from local control stations, and the torus is mechanically intact. Verify the pump and components are operable, as described, on a weekly basis.

e. (1) No work shall be performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the TOP OF the ACTIVE FUEL and there is a minimum of 360,000 gallons of water available between the torus and condensate storage tank water inventories. At least two redundant core spray systems including core spray pumps and system components must remain operable as defined in d. above. At least one recirculation loop discharge valve and its associated suction valve shall be in the full open position. Verify the pumps and components are operable, as described, on a weekly basis

or

(2) The reactor vessel head, fuel pool gate, and separator-dryer pool gates are removed and the water level is above elevation 117 feet. When filling or draining the reactor cavity, a sufficient water inventory (between the condensate storage tank and the reactor cavity) to complete the flooding operation shall be maintained. The 360,000 gallons of water minimum requirement in (1) above does not apply during the filling and draining operation provided there is a sufficient amount of water to complete the flooding operation.