June 24, 1997

LICENSEE: ENTERGY OPERATIONS, INC.

FACILITY: Waterford Steam Electric Station, Unit 3

SUBJECT: SUMMARY OF MEETING WITH ENTERGY OPERATIONS, INC. ON THE CONTAINMENT ISOLATION SYSTEMS DESIGN

On March 21, 1997, members of the Nuclear Regulatory Commission (NRC) staff met with representatives of Entergy Operations, Inc. (EOI) at Rockville, Maryland to discuss the design and licensing basis of certain essential containment isolation systems at Waterford Steam Electric Station, Unit 3 (Waterford 3). EOI provided a broad scope overview of their belief for the containment isolation requirements for Waterford 3. The requirements for the Containment Spray, Component Cooling Water to the Containment Fan Coolers, Safety Injection Systems, and Chemical and Volume Control System were discussed. EOI indicated that certain isolation valves did not have a safety function to close to meet the containment isolation requirements at Waterford 3. In addition, remote manual operation of certain isolation valves were discussed. The NRC staff indicated that it did not agree with licensee's interpretation of the requirements and additional discussions with EOI will be required to further understand EOI's position on the issue. The staff and EOI agreed to hold further discussions after EOI had enough time to prepare its position in more details on each system.

A list of Attendees is provided in Enclosure 1. A copy of EOI's presentation is provided in Enclosure 2.

ORIGINAL SIGNED BY:
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Office of Nuclear Reactor Regulation

Docket No. 50-382

DF01

Enclosures: 1. List of Attendees
2. EOI's Presentation

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NUCLEAR REGULATORY COMMISSION
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MEETING ATTENDEES

NRC	EOI
Chandu Patel	Early Ewing - EOI/Waterford 3
William Beckner	David Viener - EOI/Waterford 3
John Kudrick	Bryon Ford - EOI/NS&L
Troy Pruett - RIV (via Telecom)	Paul L. Caropino - EOI/Waterford 3
Greg Werner - RIV (via Telecom)	Tim J. Gaudet - EOI/Waterford 3

ENCLOSURE 1

Containment Isolation for Essential Systems

Waterford 3

Entergy

March 21, 1997

ENCLOSURE 2

Agenda

• Introduction	T. Gaudet
• W3 Containment Isolation Design and Licensing Basis	P. Caropino
• Issue Resolution	B. Ford
• Future Actions	D. Viener

Purpose of the Meeting

- Describe the design and licensing basis for the W3 containment isolation of certain "essential" systems
- Discuss issues relating to the W3 containment isolation of certain "essential" systems
  - Safety function of certain valves
  - Remote manual ability of certain valves
  - Affect on previous NRC correspondence
- Describe the plans for future changes in the design and testing of the systems

Systems to Be Discussed

- Containment Spray (CS)
- Component Cooling Water (CCW) to the Containment Fan Coolers (CFCs)
- Safety Injection (HPSI and LPSI)
- Chemical and Volume Control System (CVCS) Charging System

W3 Containment Isolation Design and Licensing Basis

Containment Spray (CS)

The FSAR identifies that each penetration flow path has the following:

- Check valve inside containment
- Air operated valve outside containment (auto open and remote manual to close)
- Closed water filled system outside containment

This is a GDC 56 Penetration

Containment Spray (CS)

- FSAR Table 6.2-32 describes the isolation features associated with the valves (125 A&B)
  - Penetrations are essential
  - Valve actuation is pneumatic
  - Loss of air OPENS the valves
  - Post accident position is OPEN
  - Actuation signals open the valves
  - Appendix J Type C testing is not required because the system(s) are connected to closed water filled system(s) outside containment (FSAR Table 6.2-43 provides additional description)

Containment Spray (CS)

With the CS 125 A&B valves open two containment barriers exist

- One containment isolation check valve in each line
- A closed water filled system outside containment

With the valves open the containment continues to be protected from a single active failure

Containment Spray (CS)

The FSAR states that these lines "have the ability to be closed by remote manual operation from the main control room, thereby isolating any engineered safety feature system which malfunctions"

The valves can only be remote manually operated when

- Actuating power (non safety instrument air) is available
- No system actuation signal is present

Containment Spray (CS)

Valves 125 A&B perform the following functions:

- Open on a containment spray actuation signal
- Open at the onset of a loss of offsite power to its safety position
- Prevent spraying of containment due to an inadvertent CS pump start
- Allow the system to be isolated during non accident conditions

Based on this design, the only SAFETY FUNCTION of the valves is to open

CCW to the Containment Fan Coolers (CFCs)

The FSAR identifies that each penetration flow path has the following:

- Air operated valve outside containment (auto open and remote manual to close)
- Closed system inside containment formed by containment fan coolers

This is a GDC 57 penetration

CCW to the Containment Fan Coolers (CFCs)

- FSAR Table 6.2-32 describes the isolation features associated with the the valves being discussed
  - Penetrations are essential
  - Valve actuation is pneumatic
  - Loss of air OPENS the valves
  - Post accident position is OPEN
  - Actuation signals open the valves
  - Appendix J Type C testing is not required because the system(s) are connected to closed system(s) inside containment (FSAR Table 6.2-43 provides additional description)

CCW to the Containment Fan Coolers (CFCs)

As discussed in In FSAR Question 022.9, with these valves open a passive containment barrier exists

- A closed system inside containment formed by the containment fan coolers

With the valves open, a passive barrier exists and single active failure will not affect containment isolation

CCW to the Containment Fan Coolers (CFCs)

The FSAR states that these lines "have the ability to be closed by remote manual operation from the main control room, thereby isolating any engineered safety feature system which malfunctions"

The valves can only be remote manually operated when

- Actuating power (non safety instrument air) is available
- No system actuation signal is present

CCW to the Containment Fan Coolers (CFCs)

These valves perform the following functions:

- Open on an safety injection actuation signal to protect the containment from overpressurization
- Open at the onset of a loss of offsite power to its safety position
- This system is operating during normal plant operation and these valves allow individual coolers to be isolated during non accident conditions

Based on this design, the only SAFETY FUNCTION of the valves is to open

Safety Injection (HPSI and LPSI)

The FSAR identifies that each penetration flow path has the following:

- Check valve inside containment
- MOV outside containment (auto open and remote manual to close)
- Closed system outside containment
- This is a GDC 55 penetration

Safety Injection (HPSI and LPSI)

- FSAR Table 6.2-32 describes the isolation features associated with the valves being discussed
  - Penetrations are essential
  - Valve actuation is electric
  - Valves fail as is on loss of power
  - Post accident position is OPEN
  - Actuation signals open the valves
  - Appendix J Type C testing is not required because the system(s) are connected to closed water filled system(s) outside containment (FSAR Table 6.2-43 provides additional description)

Safety Injection (HPSI and LPSI)

With these MOVs open two containment barriers exist

- One containment isolation check valve in each line
- A closed water filled system outside containment

With the valves open the containment continues to be protected from a single active failure

An additional system check valve (PIV) provides added assurance of isolation

Safety Injection (HPSI and LPSI)

These MOVs perform the following functions:

- Open on an actuation signal
- Prevent an injection due to a inadvertent SI pump start
- Allow the system to be manually isolated whenever power is present
- Allow throttling of the valve to manipulate flow

The only SAFETY FUNCTION of the valves is to open

CVCS Charging System

The FSAR identifies that the RCS branch line penetration flow path has the following:

- Solenoid operated valve inside containment which fails closed and is normally maintained in the open position; the post-accident position is open
- Air operated valve (CVC-209) outside containment
- Closed water filled system outside containment
- This is a GDC 55 penetration

CVCS Charging System

- FSAR Table 6.2-32 describes the isolation features associated with valve CVC-209 the following way
  - Penetration is essential
  - Valve actuation is pneumatic
  - Valve fails open on loss on loss of air
  - Post accident position is OPEN (normally locked open)
  - Remote manual only
  - Appendix J Type C testing is not required because the system are connected to closed water filled system outside containment (FSAR Table 6.2-43 provides additional description)

CVCS Charging System

With the CVC-209 open two containment barriers exist

- One containment isolation check valve in each line inside containment
- A closed water filled system outside containment (FSAR Question 480.043)

With the valve open, the containment continues to be protected from a single active failure

CVCS Charging System

CVC-209 performs the following function:

- Allows the system to be isolated if desired (normally locked open)

Based on this design, the only SAFETY FUNCTION of the valve is to open

Issue Resolution

Safety Function

- A function necessary to assure:
  - The integrity of the reactor coolant pressure boundary,
  - The capability to shut down the reactor and maintain it in a safe shutdown condition, or
  - The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100

Safety Function

- For all of the valves in question the containment will continue to be protected from the effects of a single active failure by a current licensing basis barrier with these valves open
- None of the valves in question are part of the RCS pressure boundary
- Therefore, these valves are not required to close to mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100 and not required for the integrity of the RCS pressure boundary
- These valves do not have a SAFETY FUNCTION to close

Safety Function

- **The IST Program was the subject of an NRC inspection ending 7/10/96 which specifically evaluated the safety function classification of these valves. This inspection concluded:**

  "the licensee's practice of not testing the subject valves for the purpose of containment isolation was determined to be in accordance with the designed licensing bases of the plant"

- **Additionally, in Amendment 86 the NRC concluded:**

  "that should an event occur requiring containment isolation but not requiring containment spray, then check valves CS-128A(B) would provide one isolation barrier and the CS system piping water seal would provide a second barrier"

- **W-3's Inservice Testing (IST) Program reflects that these valves do not have a SAFETY FUNCTION close even though they are called containment isolation valves**

Safety Function

- W3 has requested via letter dated 11/15/96 that the Staff clearly accept the use of the closed system and the check valve inside containment as the isolation of the Containment Spray (CS) as meeting the "other defined basis" of GDC 56

- Pending Staff approval, a similar action may be taken for the following:
  - Safety Injection (HPSI and LPSI)
  - Chemical and Volume Control System (CVCS) Charging System

- W3 feels that that this will only be a clarification of the actual licensing basis of these systems since the valves in question are open post accident

Remote Manual Operation

- The W3 SER (section 6.2.4 page 6-15) states that "Lines which must remain in service following an accident for safety reasons are provided with at least one remote manual valve. All air-operated isolation valves assume the position of greater safety upon a loss of air or control power"

- The FSAR (subsections 3.1.47 and 6.2.4) identifies that valves isolating penetrating lines serving ESFS are not closed automatically, but have the ability to be closed by remote manual operation from the main control room, thereby isolating any engineered safety feature system which malfunctions

Remote Manual Operation

As previously discussed the Containment Spray system and the CCW to the Containment Fan Coolers have remote manual valves consistent with the discussion in the FSAR; the remote manual actuator can only be used when the actuation signal is not present

- These valves are identified in the FSAR as the following:
  - air operated
  - fail to the safety position (open) on loss of non-safety instrument air

- Neither the FSAR or any correspondence to the NRC discusses these valves having any motive power supply other than the instrument air

Remote Manual Operation

The valves can only be remote manually operated when

- Actuating power (non safety instrument air) is available
- No system actuation signal is present

Remote Manual Operation

- These valves fail open with the loss of instrument air; they will be open post accident and cannot be closed whether or not the valves have a remote manual operator

- Therefore, the remote manual operator can not be credited to close the valves to perform a containment isolation function during the DBA

Remote Manual Operation

- "have the ability to be closed by remote manual operation from the main control room, thereby isolating any engineered safety feature system which malfunctions"

- The remote manual operation of the CS and CCW valves post accident is not credited and the FSAR identified that the valves would fail open during a DBA; therefore, the intent of the FSAR was to identify that the remote manual valves will allow the system to be isolated during non accident conditions and ensure that they will remain open during accident conditions

Water Barrier Calculation

- During the original licensing of the plant there was several meeting and letters concerning the Appendix J testing requirements reflected in the FSAR
- The result of these meetings and correspondence was that the Containment Spray System was considered a closed water filled system outside of containment
- Also, the Containment Spray System was included in the TMI leak reduction program

Water Barrier Calculation

- In the W3 submittal dated 3/16/84, W3 supplied some additional calculations demonstrating the ability of various systems including the Containment Spray system to remain water filled even considering various postulated leaks

- The CSB felt that some type of monitoring program was required to ensure the assumptions of the "water barrier" calculation were not invalidated; letter dated April 19, 1984 indicates that the CSB decided that a through system leak test was not required

Water Barrier Calculation

- The calculation for the Containment Spray system calculated the potential effect of leakage on the 125 A&B stems on the water filled nature of the subsystems
- To provide an estimate of stem leakage from the valves the design seat leakage past the closed valve was used as the potential stem leakage
- The calculations provide additional assurance of a water filled system

Water Barrier Calculation

- Since the leakage used in the calculation was stem leakage and not through line leakage the fact that the valve is open or closed does not directly affect the calculation

- The method that was approved to ensure that the systems remain "water filled" was a commitment to add these systems to the TMI leak reduction program

- The fact that the 125 A&B valves will be open post accident is clear in the FSAR. Also, the valves being open post accident does not change the basis for determining that the subsystems are water filled

Future Actions

Containment Isolation

- Remote manual - currently two standing instructions in the Control Room to jumper the valves
- Refuel 8 - Waterford 3 will provide override capability for the CS and CCW valves
- Issues to resolve:
  - Waterford licensing basis justifies current design
  - Waterford will re-design if required
  - Combination of the above as appropriate