Proposed Removal of Catawba's Containment Valve Injection Water System (NW) from Specified Containment Isolation Valves (CIVs)

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Duke Energy Attendees

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Introductions / Opening Remarks

- Containment Valve Injection Water System (NW or CVIWS) System - Purpose and Sketch
- Planned License Amendment Request (LAR) to Change Catawba's Updated Final Safety Analysis Report (UFSAR) Section 6.2.4.2.2, "Containment Valve Injection Water System" and Table 6-77, "Containment Isolation Valve Data"
- UFSAR Change – Purpose, Precedent, Overview, and Subsequent Actions
- Other System Sketches
- Revised UFSAR Section 6.2.4.2.2
- Revised TSB 3.6.17, "Containment Valve Injection Water System (CVIWS)"

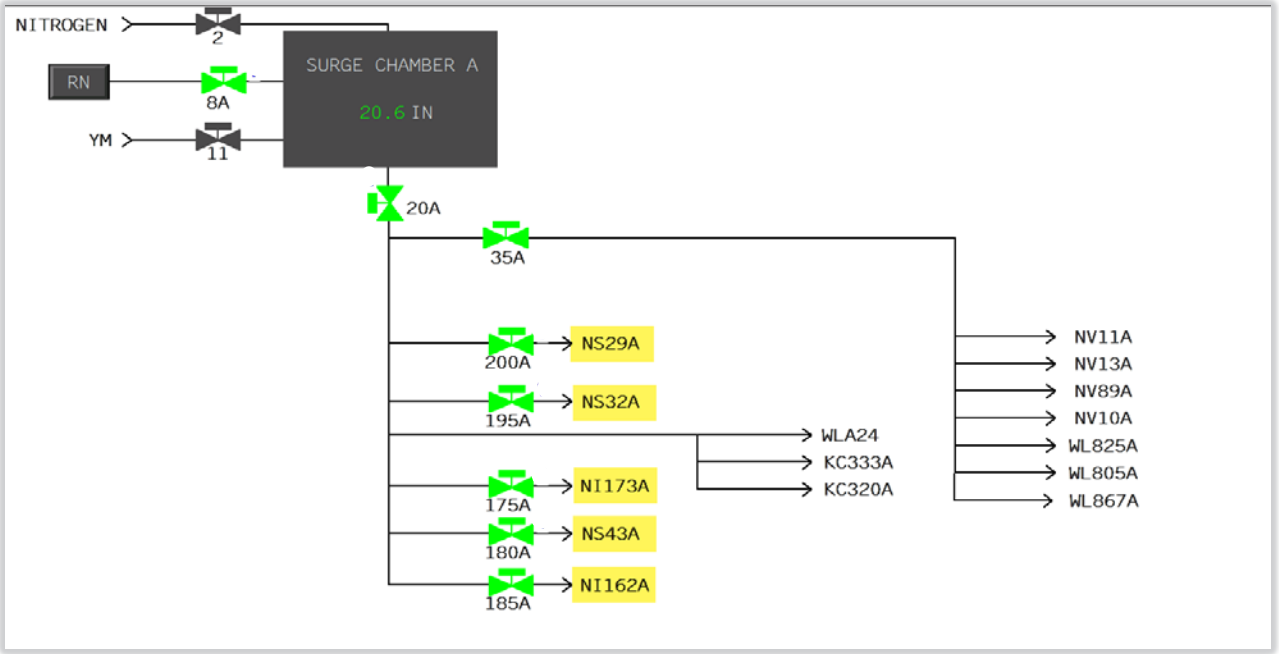
Containment Valve Injection Water System (NW or CVIWS) Purpose

- Containment Valve Injection Water System:
  - The Containment Valve Injection Water System (NW or CVIWS) is designed to provide a water seal to a specific class of containment isolation valves (gate valves) during a LOCA to prevent leakage of containment atmosphere through the gate valves.
  - The NW penetration valves are not required to be Type C tested.
  - The NW system is designed to meet all Regulatory and Testing requirements set forth in 10 CFR 50, Appendix J and ASME Code Section IX.

Containment Valve Injection Water System (NW or CVIWS) Sketch – 1(2) A Train

Legend:

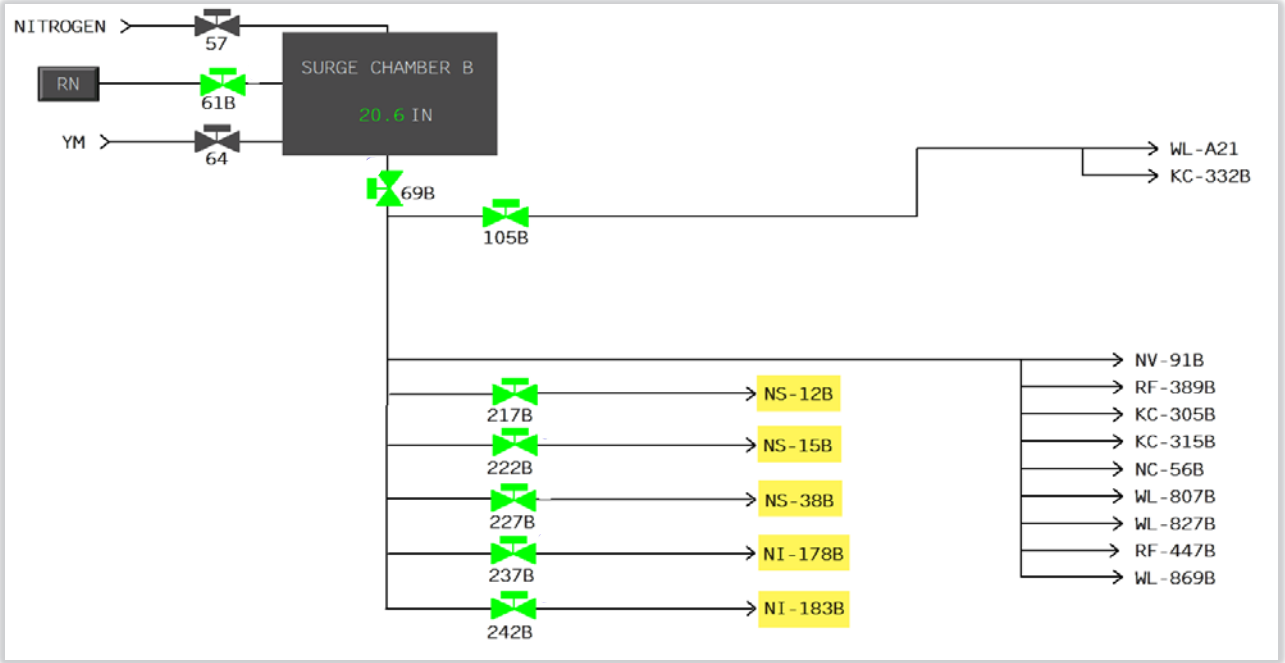
- For Information Only
- Highlighted – Proposed CIVs for NW isolation
- RN – Nuclear Service Water System
- YM – Demineralized Water System



Containment Valve Injection Water System (NW or CVIWS) Sketch – 1(2) B Train

Legend:

- For Information Only
- Highlighted – Proposed CIVs for NW isolation
- RN – Nuclear Service Water System
- YM – Demineralized Water System



Planned LAR to Change Catawba's

UFSAR Section 6.2.4.2.2, "Containment Valve Injection Water System" and Table 6-77, "Containment Isolation Valve Data"

Containment Valve Injection Water System (NW or CVIWS) UFSAR Change

- Purpose of Requested UFSAR Change:
  - Isolation of Containment Valve Injection Water System (NW) Supply from Safety Injection (NI) and Containment Spray (NS) Containment Isolation Valves (CIVs) and exclude the CIVs from Type-C Local Leak Rate Testing (LLRT).
  - Improve NW System reliability

Containment Valve Injection Water System (NW or CVIWS) UFSAR Change

- Precedent of Requested UFSAR Change:
  - Request to exempt from LLRT using a closed system outside containment submitted by VC Summer on October 12, 2011 for HHSI CIVs (ML11286A318) and Comanche Peak on March 18, 2003 for RHR and Containment Spray CIVs. (ML030860407)
  - Based on information submitted, the NRC granted the exception based on closed loop outside of containment and issued a SER on March 5, 2004 for Comanche Peak (ML040690358) and a SER on July 9, 2012 for VC Summer. (ML12184A135)

Containment Valve Injection Water System (NW or CVIWS) UFSAR Change

- Overview of Requested UFSAR Change:
  - This will be a Permanent Change to Catawba's UFSAR
  - Proposal is to revise UFSAR Section 6.2.4.2.2, "Containment Valve Injection Water System" to remove the reference to specific solenoid valves that supply seal water to valves closing on an SP signal. These solenoid valves are for the NI and NS containment isolation valves receiving seal water injection. UFSAR Table 6-77, "Containment Isolation Valve Data" will also be modified to remove the NW System designator for LRT type for the associated CIVs.
  - The subject CIVs are currently NW Leak Rate Tested consistent with the original licensing basis which was under 10 CFR 50, Appendix J, prior to availability of Option B.
  - The proposed LAR submittal will be deterministic.
  - Submittal is based on the affected valves not constituting a potential primary containment atmospheric pathway during and following a Loss of Coolant Accident (LOCA) and an acceptable program in place to monitor and reduce leakage from those portions of systems outside containment to ensure these systems will maintain containment isolation functions.

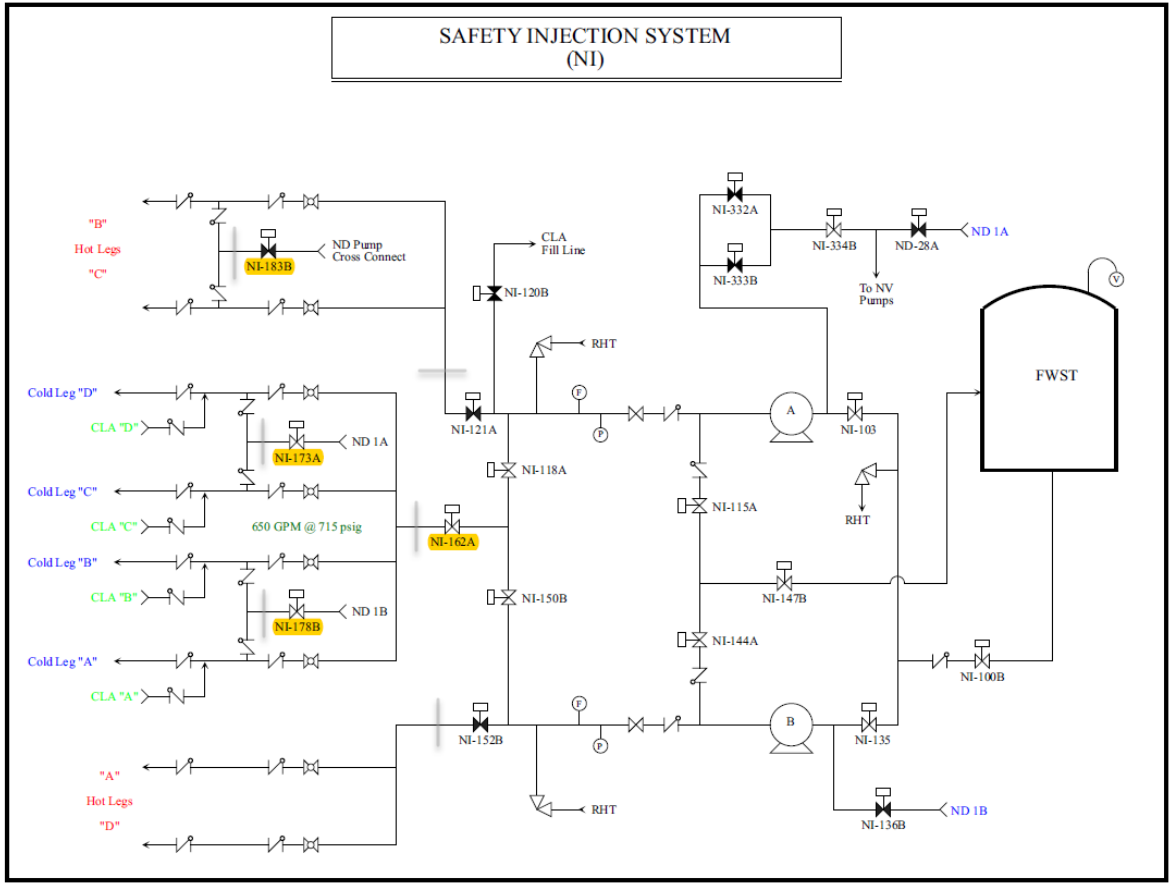
Containment Valve Injection Water System (NW or CVIWS) UFSAR Change

- Subsequent Actions of Requested UFSAR Change:
  - Planned Modifications
  - Future Inspections
  - Future Maintenance Activities

Safety Injection System (NI) Sketch

Legend:

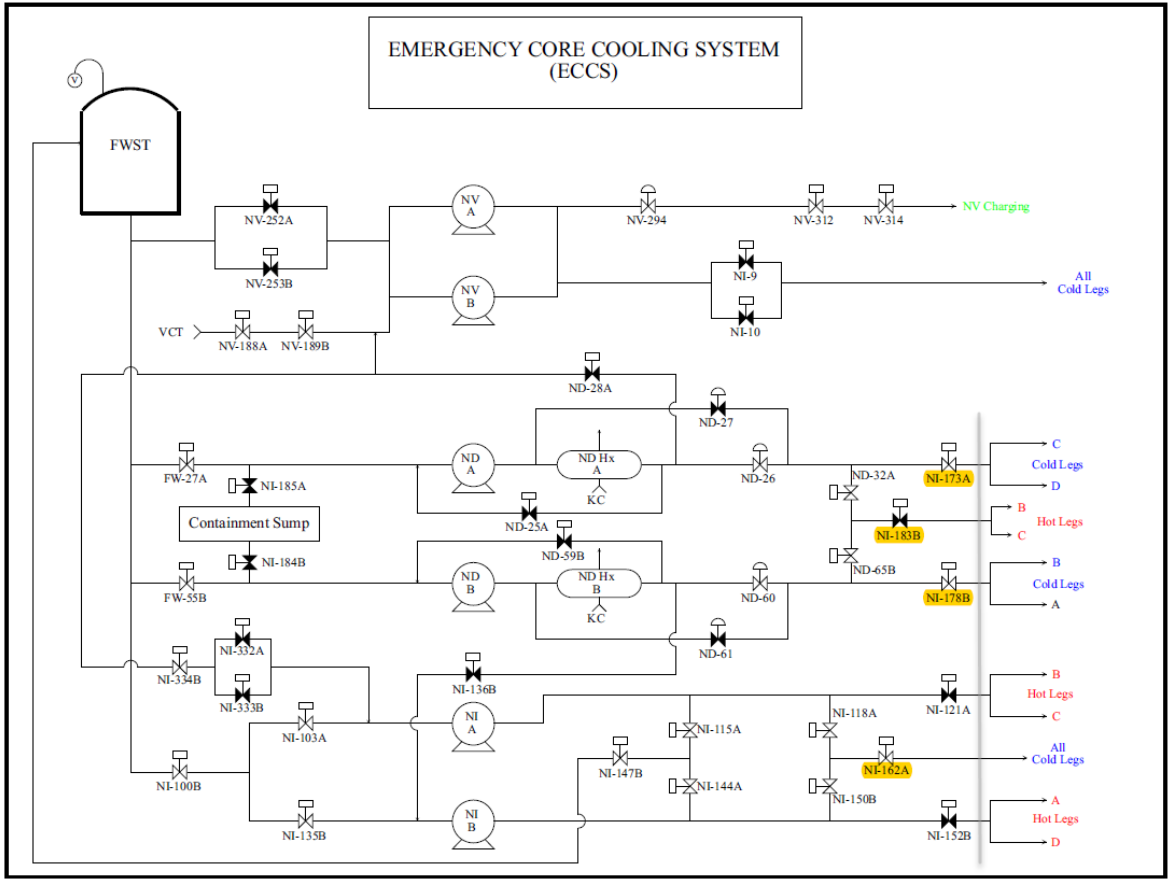
- For Information Only
- FWST – Refueling Water (FW) Storage Tank
- Highlighted – Proposed CIVs for NW isolation
- Gray Lines – Containment penetration reference



Emergency Core Cooling System (ECCS) Sketch

Legend:

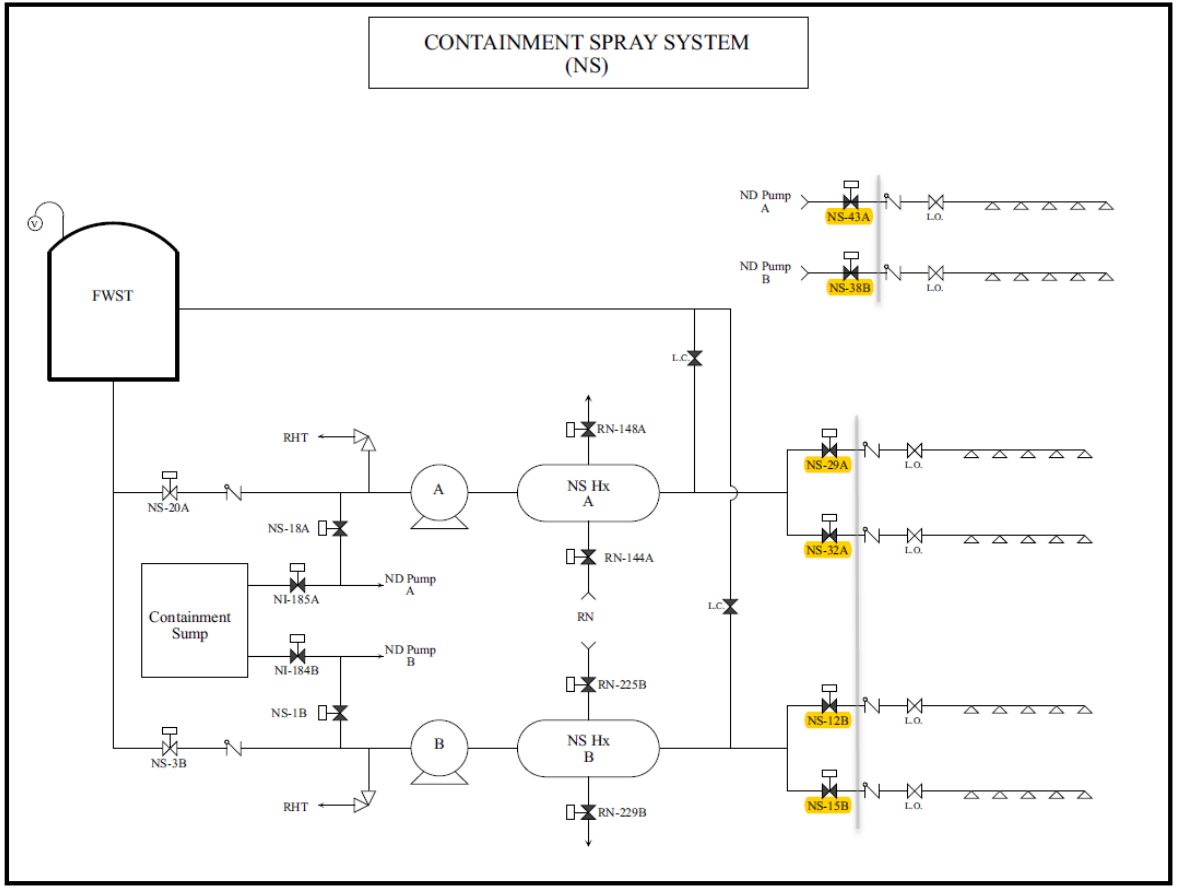
- For Information Only
- FWST – Refueling Water (FW) Storage Tank
- Highlighted – Proposed CIVs for NW isolation
- Gray Lines – Containment penetration reference



Containment Spray System (NS) Sketch

Legend:

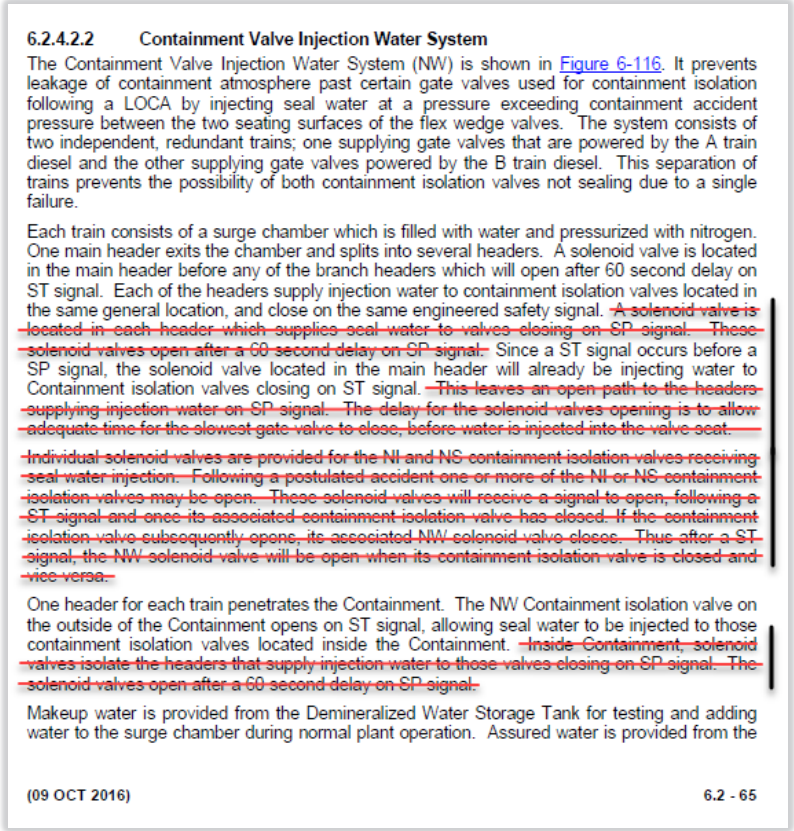
- For Information Only
- FWST – Refueling Water (FW) Storage Tank
- Highlighted – Proposed CIVs for NW isolation
- Gray Lines – Containment penetration reference



Revised UFSAR Section 6.2.4.2.2

Proposal:

- Revise UFSAR Section 6.2.4.2.2, “Containment Valve Injection Water System” to remove the reference to specific solenoid valves that supply seal water to valves closing on an SP signal. These solenoid valves are for the NI and NS containment isolation valves receiving seal water injection.
- Revise associated pages of UFSAR Table 6-77, “Containment Isolation Valve Data.”



6.2.4.2.2 Containment Valve Injection Water System

The Containment Valve Injection Water System (NW) is shown in Figure 6-116. It prevents leakage of containment atmosphere past certain gate valves used for containment isolation following a LOCA by injecting seal water at a pressure exceeding containment accident pressure between the two seating surfaces of the flex wedge valves. The system consists of two independent, redundant trains; one supplying gate valves that are powered by the A train diesel and the other supplying gate valves powered by the B train diesel. This separation of trains prevents the possibility of both containment isolation valves not sealing due to a single failure.

Each train consists of a surge chamber which is filled with water and pressurized with nitrogen. One main header exits the chamber and splits into several headers. A solenoid valve is located in the main header before any of the branch headers which will open after 60 second delay on ST signal. Each of the headers supply injection water to containment isolation valves located in the same general location, and close on the same engineered safety signal. ~~A solenoid valve is located in each header which supplies seal water to valves closing on SP signal. These solenoid valves open after a 60 second delay on SP signal.~~ Since a ST signal occurs before a SP signal, the solenoid valve located in the main header will already be injecting water to Containment isolation valves closing on ST signal. ~~This leaves an open path to the headers supplying injection water on SP signal. The delay for the solenoid valves opening is to allow adequate time for the slowest gate valve to close, before water is injected into the valve seat.~~

~~Individual solenoid valves are provided for the NI and NS containment isolation valves receiving seal water injection. Following a postulated accident one or more of the NI or NS containment isolation valves may be open. These solenoid valves will receive a signal to open, following a ST signal and once its associated containment isolation valve has closed. If the containment isolation valve subsequently opens, its associated NW solenoid valve closes. Thus after a ST signal, the NW solenoid valve will be open when its containment isolation valve is closed and vice versa.~~

One header for each train penetrates the Containment. The NW Containment isolation valve on the outside of the Containment opens on ST signal, allowing seal water to be injected to those containment isolation valves located inside the Containment. ~~Inside Containment, solenoid valves isolate the headers that supply injection water to those valves closing on SP signal. The solenoid valves open after a 60 second delay on SP signal.~~

Makeup water is provided from the Demineralized Water Storage Tank for testing and adding water to the surge chamber during normal plant operation. Assured water is provided from the

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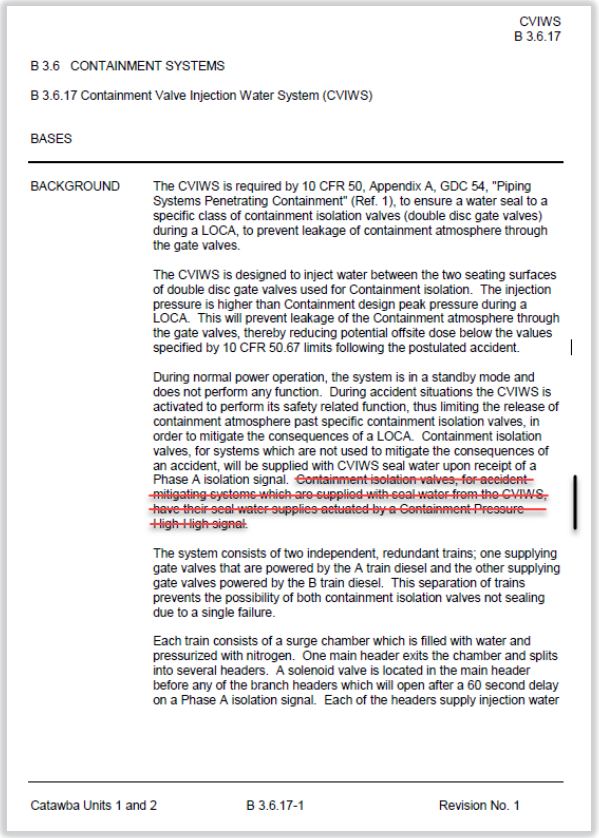
TSB 3.6.17 Change – Alignment

Proposal:

- Revise TSB 3.6.17, “Containment Valve Injection Water System (CVIWS)” for alignment with proposed UFSAR changes.



CVIWS
B 3.6.17

B 3.6 CONTAINMENT SYSTEMS

B 3.6.17 Containment Valve Injection Water System (CVIWS)

BASES

BACKGROUND

The CVIWS is required by 10 CFR 50, Appendix A, GDC 54, "Piping Systems Penetrating Containment" (Ref. 1), to ensure a water seal to a specific class of containment isolation valves (double disc gate valves) during a LOCA, to prevent leakage of containment atmosphere through the gate valves.

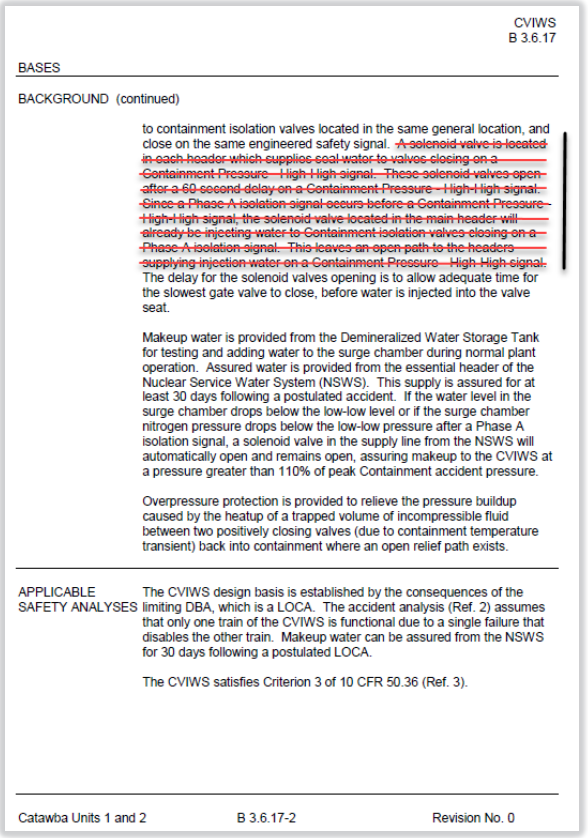
The CVIWS is designed to inject water between the two seating surfaces of double disc gate valves used for Containment isolation. The injection pressure is higher than Containment design peak pressure during a LOCA. This will prevent leakage of the Containment atmosphere through the gate valves, thereby reducing potential offsite dose below the values specified by 10 CFR 50.67 limits following the postulated accident.

During normal power operation, the system is in a standby mode and does not perform any function. During accident situations the CVIWS is activated to perform its safety related function, thus limiting the release of containment atmosphere past specific containment isolation valves, in order to mitigate the consequences of a LOCA. Containment isolation valves, for systems which are not used to mitigate the consequences of an accident, will be supplied with CVIWS seal water upon receipt of a Phase A isolation signal. ~~Containment isolation valves, for accident mitigating systems which are supplied with seal water from the CVIWS, have their seal water supplies actuated by a Containment Pressure High-High signal.~~

The system consists of two independent, redundant trains; one supplying gate valves that are powered by the A train diesel and the other supplying gate valves powered by the B train diesel. This separation of trains prevents the possibility of both containment isolation valves not sealing due to a single failure.

Each train consists of a surge chamber which is filled with water and pressurized with nitrogen. One main header exits the chamber and splits into several headers. A solenoid valve is located in the main header before any of the branch headers which will open after a 60 second delay on a Phase A isolation signal. Each of the headers supply injection water

Catawba Units 1 and 2 B 3.6.17-1 Revision No. 1



CVIWS
B 3.6.17

BASES

BACKGROUND (continued)

to containment isolation valves located in the same general location, and close on the same engineered safety signal. ~~A solenoid valve is located in each header which supplies seal water to valves closing on a Containment Pressure - High-High signal. These solenoid valves open after a 60 second delay on a Containment Pressure - High-High signal. Since a Phase A isolation signal occurs before a Containment Pressure - High-High signal, the solenoid valve located in the main header will already be injecting water to Containment isolation valves closing on a Phase A isolation signal. This leaves an open path to the headers supplying injection water on a Containment Pressure - High-High signal.~~ The delay for the solenoid valves opening is to allow adequate time for the slowest gate valve to close, before water is injected into the valve seat.

Makeup water is provided from the Demineralized Water Storage Tank for testing and adding water to the surge chamber during normal plant operation. Assured water is provided from the essential header of the Nuclear Service Water System (NSWS). This supply is assured for at least 30 days following a postulated accident. If the water level in the surge chamber drops below the low-low level or if the surge chamber nitrogen pressure drops below the low-low pressure after a Phase A isolation signal, a solenoid valve in the supply line from the NSWS will automatically open and remains open, assuring makeup to the CVIWS at a pressure greater than 110% of peak Containment accident pressure.

Overpressure protection is provided to relieve the pressure buildup caused by the heatup of a trapped volume of incompressible fluid between two positively closing valves (due to containment temperature transient) back into containment where an open relief path exists.

APPLICABLE SAFETY ANALYSES

The CVIWS design basis is established by the consequences of the limiting DBA, which is a LOCA. The accident analysis (Ref. 2) assumes that only one train of the CVIWS is functional due to a single failure that disables the other train. Makeup water can be assured from the NSWS for 30 days following a postulated LOCA.

The CVIWS satisfies Criterion 3 of 10 CFR 50.36 (Ref. 3).

Catawba Units 1 and 2 B 3.6.17-2 Revision No. 0

Questions?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