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Your ref: Docket No. 52-006
Our ref: DCP_NRC_003119

February 2, 2011

Subject: CI-23-22, Section 9.2.2.2 and 9.2.2.4.5.2 wording on CCS Isolation Valve Closure

Westinghouse is submitting a response to an NRC confirmatory item (CI) on Chapter 23. Proposed confirmatory item responses are submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Discussions were held to support closure of CI-23-22. An NRC concern was noted on the wording of the component cooling water system description in Chapter 9 of the DCD. It was concluded that WEC would revise wording in the DCD to reflect the automatic closure of the safety-related component cooling water isolation valves. Enclosure 1 provides a markup of DCD Revision 18, Sections 9.2.2.2 and 9.2.2.4.5.2 with the agreed wording.

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

R. F. Ziesing
Director, U.S. Licensing

/Enclosure

1. Markup of DCD Revision 18, Sections 9.2.2.2 and 9.2.2.4.5.2

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NRO

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ENCLOSURE 1

Markup of DCD Revision 18, Sections 9.2.2.2 and 9.2.2.4.5.2

The component cooling water system is a closed loop cooling system that transfers heat from various plant components to the service water system cooling tower. It operates during normal phases of plant operation including power operation, normal cooldown, and refueling. The system includes two component cooling water pumps, two component cooling water heat exchangers, one component cooling water surge tank and associated valves, piping, and instrumentation.

The system components are arranged into two mechanical trains. Each train includes one component cooling water pump and one component cooling water heat exchanger. The two trains of equipment take suction from a single return header. The surge tank is connected to the return header. Each pump discharges directly to its respective heat exchanger. A bypass line around each heat exchanger containing a throttle valve prevents overcooling the component cooling water. The discharge of each heat exchanger is to the common supply header.

Component cooling water is distributed to the components by this single supply/return header. Components are grouped in branch lines according to plant arrangement, with one branch line cooling the components inside containment. Loads inside containment are automatically isolated in response to a safety injection signal, which also trips the reactor coolant pumps, and in response to a high bearing water temperature trip signal from one of the reactor coolant pumps. Individual components, except the reactor coolant pumps, can be isolated locally to permit maintenance while supplying the remaining components with cooling water.

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The component cooling water surge tank accommodates thermal expansion and contraction. It also accommodates leakage into or out of the component cooling water system until the leak is isolated. Water makeup to the surge tank is provided automatically on a low surge tank level signal by the demineralized water transfer and storage system. A line routed from the pump discharge header to the surge tank includes a mixing tank to add chemicals into the system to inhibit corrosion.

9.2.2.3 Component Description

General descriptions of the component cooling water system components are provided below. The nominal equipment parameters for the component cooling water system components are contained in Table 9.2.2-1.

9.2.2.3.1 Component Cooling Water Pumps

The two component cooling water pumps are horizontal, centrifugal pumps. They have a coupled pump shaft driven by an ac powered induction motor. Each pump provides the flow required by its respective heat exchanger for removal of its heat load. The pumps are redundant for normal operation heat loads. Both pumps are required for the cooldown; however, an extended cooldown can be achieved with only one pump in operation. One pump can be out of service during normal plant operation.

These pumps are risk-significant and are included within the scope of D-RAP. See Table 17.4-1 for further information.

9.2.2.4.5 Abnormal Conditions

9.2.2.4.5.1 Failure of a Component Cooling Water Pump

If a component cooling water pump fails when one pump is in service, an alarm is actuated and the low header flow signal automatically initiates operation of the standby component cooling water pump. If a component cooling water pump fails during plant cooldown, the time to reach the cold shutdown condition is increased.

9.2.2.4.5.2 Leakage into the Component Cooling Water System from a High Pressure Source

Small leakage of reactor coolant into the component cooling water system is detected by a radiation monitor on the common pump suction header, by routine sampling, or by high level in the surge tank.

Flow sensors located in the cooling water inlet and outlet lines from each reactor coolant pump external heat exchanger also detect leakage from a heat exchanger tube into the component cooling water system. Simultaneous flow deviations in both the inlet and outlet lines will generate a flow deviation alarm; this alarm is indicative of leak conditions and would alert the operator to close the valve on the cooling water outlet line on each reactor coolant pump to prevent reactor coolant flow throughout the component cooling water system. Both the flow signals and the isolation valves are nonsafety-related. If the valve on the reactor coolant pump cooling water outlet line is not closed, reactor coolant leakage from the pump can be retained inside containment by closing the safety-related component cooling water containment isolation valves. These containment isolation valves close automatically if the leak rate is sufficiently large to cause a high bearing water temperature reactor and pump trip signal to be generated by the protection and safety monitoring system (PMS). The containment isolation valves can also be closed manually by the operator after being alerted to a reactor coolant pump leak by alarms from component cooling water system instrumentation (surge tank level and/or radiation level in the CCS pump suction header) or from the flow instruments located on the inlet and outlet lines from the leaking reactor coolant pump external heat exchanger. Manual closure of one CCS outlet isolation valve will result in a high bearing water temperature trip of the plant if the affected reactor coolant pump continues to operate.

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A safety injection signal results if sufficient reactor coolant system inventory is lost through the leak. This signal will trip the reactor coolant pumps and automatically close the component cooling water containment isolation valves to prevent reactor coolant leakage outside containment. Overpressure protection of the reactor coolant pump motor cooling jacket and the component cooling water piping subjected to the reactor coolant system pressure is provided by means of a relief valve on the cooling water outlet piping downstream of the reactor coolant pump external heat exchanger. Two additional relief valves, one on each CCS cooling water line penetrating the containment inside the innermost containment isolation valve, are provided to protect the containment isolation valves from overpressure while being closed to isolate a high-pressure leak in the CCS inside containment.

The operator is alerted to a large leak from the letdown heat exchanger by a high surge tank level or a high radiation alarm in the absence of a signal from one or both of the reactor coolant pump