

OCAN120504

December 15, 2005

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

Subject: Additional Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors"
Arkansas Nuclear One – Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

Dear Sir or Madam:

By letter dated August 31, 2005 (OCAN080501), Entergy provided a response to Generic Letter (GL) 2004-02, *Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors*. Entergy committed to provide the results of the downstream effects evaluation for long-term wear and the selected sump strainer vendor by December 15, 2005. Entergy has selected CCI as the sump strainer vendor for both of the Arkansas Nuclear One (ANO) units. Methodologies described in WCAP-16406 and letters LTR-SEE-05-160, LTR-SEE-05-172, and LTR-SEE-05-174 were utilized in the downstream effects evaluations.

The critical ANO-1 components in the flow paths downstream of the sump have been evaluated for the effects of internal wear and blockage. The impact of debris is determined for the entire duration of a loss-of-coolant accident (LOCA) for 30 days. The following provides a summary of the downstream effects evaluation.

- The calculated wear on the decay heat removal pumps' and the reactor building spray pumps' wear ring would result in minimal head loss.
- The calculated wear on the primary make-up pumps' wear ring could result in unacceptable vibration levels.
- The decay heat removal coolers' tubing has sufficient thickness to withstand the erosion due to sump debris.

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- The acceptance criterion for flow orifices is that the increase in system flow must be less than or equal to 3% for negligible flow effects due to wear. The effect on system flow due to wear is acceptable.
- The acceptance criterion for spray nozzles is that the change in the flow rate through the nozzles must be less than or equal to 10% for negligible flow effects due to wear. The calculated change in the flow rate meets the acceptance criterion.
- The wear in the throttle valves meets the acceptance criterion of 3%; however, these valves have the potential for blockage.
- Based on the evaluation, there is no impact on control instrumentation and associated root isolation valves due to debris ingested into the main flow paths.
- The relief valves would not prevent the emergency core cooling systems from performing their design functions because these valves cannot reach their lift setpoints during this mode of operation.
- The fuel evaluation is in progress pending the availability of the results of plant specific strainer debris bypass testing.

In conclusion, wear on components in the flow path downstream of the sump are not a concern except for potential unacceptable vibration of the makeup pumps. The throttle valves have the potential for blockage. Entergy is further evaluating the components which do not meet the acceptance criteria to reduce the wear and/or blockage in order to arrive at an acceptable resolution.

The critical ANO-2 components in the flow paths downstream of the sump have been evaluated for the effects of internal wear and blockage. The components' acceptability was based on a 30-day mission time except for the containment spray pumps which was based on a 278-hour mission time. The following provides a summary of the downstream effects evaluation.

- The calculated impeller and casing ring wear on the high pressure safety injection (HPSI) pumps could result in unacceptable vibration levels.
- The calculated change in the flow areas due to wear for the two-inch hotleg injection throttle valves and two-inch manual globe throttle valves do not meet the acceptance criterion of 3%. These valves have the potential for blockage.
- Debris in the piston check valves installed in the recirculation flow paths may prevent the piston check valves from closing.
- Cyclone separators are used on the seal cooling piping for the containment spray pump. It has been postulated that cyclone separators are prone to failure due to fibrous debris in the fluid stream.
- The calculated bushing wear and ring wear on the containment spray pumps would result in minimal head loss at the end of its service period.

- The acceptance criterion for flow orifices is that the increase in system flow must be less than or equal to 3% for negligible flow effects due to wear. The effect on system flow due to wear is acceptable.
- The acceptance criterion for spray nozzles is that the change in the flow rate through the nozzles must be less than or equal to 10% for negligible flow effects due to wear. The calculated change in the flow rate meets the acceptance criterion.
- Based on the evaluation, there is no impact on control instrumentation and associated root isolation valves due to debris ingested into the main flow paths.
- The relief valves would not prevent the emergency core cooling systems from performing their design functions because these valves cannot reach their lift setpoints during this mode of operation.
- The fuel evaluation is in progress pending the availability of results of plant specific strainer debris bypass testing.

In conclusion, the HPSI pumps, two-inch hotleg injection throttle valves, two-inch manual globe throttle valves, piston check valves, and cyclone separators have the potential for unacceptable wear and/or blockage. Entergy is further evaluating the components which do not meet the acceptance criteria to reduce the wear and/or blockage in order to arrive at an acceptable resolution.

There are no new commitments contained in this submittal. Should you have any questions concerning this submittal, please contact Ms. Natalie Mosher at (479) 858-4635.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 15, 2005.

Sincerely,



Thomas A. Marlow
Director, Nuclear Safety Assurance

TAM/nbm

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