

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

May 22, 1996

NRC INFORMATION NOTICE 96-31: CROSS-TIED SAFETY INJECTION ACCUMULATORS

Addressees

All holders of operating licenses or construction permits for pressurized water reactors (PWRs).

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the potential for operation in an unanalyzed condition with safety injection (SI) accumulators cross-tied. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On March 8, 1996, the licensee for Indian Point Nuclear Generating Unit No. 3 (IP3) reported that the plant may have operated outside its design basis because the safety injection accumulators had periodically been cross-tied for short periods of time. The IP3 technical specifications require the cross-connection of the safety injection accumulators once every shift to perform a channel check when an accumulator second pressure or level instrument channel is inoperable. The licensee had also cross-tied safety injection accumulators together to sluice water or nitrogen from one accumulator to another to ensure adequate water or nitrogen. An evaluation by the licensee engineering staff (confirmed by Westinghouse) shows that the plant may not be protected if accumulators are cross-tied during some loss-of-coolant accidents because nitrogen pressure is postulated to bleed off through the faulted loop to the containment.

Since the IP3 licensee report, several other licensees have reported that their plant procedures also allow cross-connection of safety injection accumulators, in some cases, all of the accumulators in order to equalize pressure. No other licensee has reported a requirement to perform this operation. The IP3 licensee has submitted an application to amend its technical specification to remove the cross-connection requirement. Other licensees have taken administrative action to prohibit cross-connection of the accumulators.

Discussion

The safety injections accumulators are pressure vessels filled with borated water and pressurized with nitrogen gas. The accumulators are isolated from

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updated on 5/24/96

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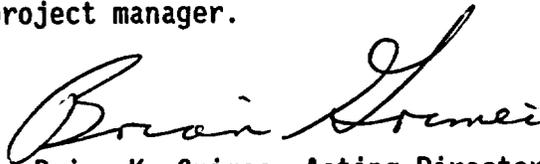
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the reactor coolant system cold legs by two check valves in series. Should reactor coolant system pressure fall below the accumulator pressure, the check valves would open and borated water would be injected into the reactor coolant system. The accumulators function as passive engineered safety features and perform a critical function in mitigating a loss-of-coolant accident. As stated in the IP3 final safety analysis report, the design capacity of the accumulators is based on the assumption that flow from one of the accumulators will spill onto the containment floor through the ruptured loop. The flow from the three remaining accumulators will provide water to reflood the core.

If two or more safety injection accumulators are cross-connected during a postulated large-break loss-of-coolant accident, the nitrogen gas pressure of the cross-connected accumulators on non-faulted loops will decrease because of gas escaping through cross-connected lines to the accumulator in the broken loop, through the ruptured pipe, and into the containment. Licensee calculations showed that the pressure of cross-connected accumulators on non-faulted loops would decrease below the value assumed in the safety analysis report. The IP3 licensee, with confirmation from Westinghouse, infers that the peak cladding temperature would exceed 1204 °C [2200 °F] using the design-basis model, but calculations were not performed because fewer than three accumulators injecting were not considered in their licensing-basis analyses.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.



Brian K. Grimes, Acting Director
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| 96-29 | Requirements in 10 CFR Part 21 for Reporting and Evaluating Software Errors | 05/20/96 | All holders of OLs or CPs for nuclear power reactors |
| 96-28 | Suggested Guidance Relating to Development and Implementation of Corrective Action | 05/01/96 | All material and fuel cycle licensees |
| 96-27 | Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation | 05/01/96 | All holders of OLs or CPs for pressurized water reactors |
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| 96-25 | Transversing In-Core Probe Overwithdrawn at LaSalle County Station, Unit 1 | 04/30/96 | All holders of OLs or CPs for nuclear power reactors |
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| 96-22 | Improper Equipment Settings Due to the Use of Nontemperature-Compensated Test Equipment | 04/11/96 | All holders of OLs or CPs for nuclear power reactors |

OL = Operating License
 CP = Construction Permit

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Original signed by Brian K. Grimes

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| DATE | 5 /9/96 5/9/96 | 5/10/96 | 5/16/96 | 5// 7/96 |

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Discussion

The SI accumulators are pressure vessels filled with borated water and pressurized with nitrogen gas. The accumulators are isolated from the reactor coolant system cold legs by two check valves in series. Should reactor coolant system pressure fall below the accumulator pressure, the check valves would open and borated water would be injected into the reactor coolant system. The accumulators function as passive engineered safety features and perform a critical function in mitigating a LOCA. As stated in the IP3 final safety analysis report (FSAR), the design capacity of the accumulators is based on the assumption that flow from one of the accumulators will spill onto the containment floor through the ruptured loop. The flow from the three remaining accumulators will provide water to reflood the core.

If two or more SI accumulators are cross-connected during a postulated large-break LOCA, the nitrogen gas pressure of the cross-connected accumulators on non-faulted loops will decrease because of gas escaping through cross-connected lines to the accumulator in the broken loop, through the ruptured pipe, and into the containment. Licensee calculations showed that the pressure of cross-connected accumulators on non-faulted loops would decrease below the value assumed in the FSAR. The IP3 licensee, with confirmation from Westinghouse, suspects that the peak cladding temperature (PCT) would exceed 1204 °C [2200 °F] using the design-basis model, but calculations were not done because fewer than three accumulators injecting were not considered in their licensing-basis analyses.

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| DATE | 5/19/96 5/19/96 | 5/ /96 | 5 / /96 | 5 / /96 |