



### Description of Circumstances

To comply with the ATWS rule, the Susquehanna licensee implemented a modification which revised the SLC pump start logic to a simultaneous initiation of both pumps. This resulted in a flow rate of at least 82.4 gpm and a corresponding required concentration of boron solution of 13.6 weight percent. This boron concentration became the licensing basis and was subsequently included in the Susquehanna improved technical specifications.

The change to the pump start logic caused a significant increase in system pressure losses in the pump discharge lines. These losses were the result of the increased fluid velocity in the common injection line as the flow rate doubled from 41.2 gpm to 82.4 gpm. As a result of the ATWS modification, the licensee determined that the maximum discharge pressure at the SLC pumps was 1276 psig. This value was based on the lowest setpoint (1076 psig) of the main steam safety relief valves (SRVs) in the pressure relief mode, the system friction losses for two-pump operation, and the elevation losses. Subsequently, in 1993, the licensee determined a new maximum SLC pump discharge pressure of 1319 psig, based on a power uprate modification. The change was due to a 30 psig increase to the SRV setpoint, and an increase in calculated core flow. The licensee determined that the calculated value of 1319 psig was acceptable because it maintained a 75 psig design margin requirement between the maximum SLC pump discharge pressure and the minimum setting of the SLC pump discharge relief valves (1400 psig).

During a recent design inspection at Susquehanna, the NRC found that the licensee's assumption for reactor vessel pressure used in the maximum pump discharge pressure calculation was non-conservative and disagreed with a vendor ATWS analysis for two of the transients analyzed. Specifically, the inspection team found that for the main steam isolation valve (MSIV) closure transient, the analysis indicated that, at the time of SLC system manual initiation, the reactor vessel pressure would be as high as 1133 psig. Similarly, for the loss of offsite power (LOOP) transient, the reactor pressure at various times in the event was a nominal 1200 psig. The much higher pressure calculated for the LOOP transient event was due to the loss of power to the containment instrument gas compressors and the resulting loss of gas required to open the SRVs. Although each SRV was equipped with a gas accumulator, the amount of gas available in each accumulator was sufficient for only a few SRV actuations. Therefore, the SRV would eventually lift on its higher spring setting (safety mode) and not in its normal pressure relief mode.

Based on the above, the inspection team concluded that the maximum reactor vessel pressure of 1106 psig assumed by the licensee in the design calculations of record was non-conservative. The increases in main steam SRV lift pressure setpoints through the years due to valve simmering concerns and power uprate considerations contributed to the loss of adequate margin between maximum expected pump discharge pressures and the system relief valve settings. This resulted in the likelihood that the SLC pump discharge relief valves would lift during at least one of the ATWS transient scenarios, the loss of offsite power. The lifting of the SLC pump discharge relief valves would cause the sodium pentaborate solution to be recycled to the pump suction and, therefore, prevent the system from meeting the equivalent flow capacity required by the ATWS rule.

Discussion

The licensee modified the Susquehanna Unit 2 SLC system, during a recent refueling outage. The modification increased the flange pressure rating of both pumps (from 1400 psig to 1500 psig) and raised the lift pressure of the pump discharge relief valves to 1500 psig. The licensee intends to perform the same modification on the Unit 1 system. Additional details regarding the issue identified during the inspection can be found in Inspection Report 05000387/01-004;05000388/01-004, Accession # ML011420068.

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.

**/RA/** Patrick M. Madden FOR

Ledyard B. Marsh, Chief  
Operational Experience  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Program  
Office of Nuclear Reactor Regulation

Technical contacts: Frank Arner, DRS  
(610) 337-5194  
E-mail: [fja@drs.gov](mailto:fja@drs.gov)

John Richmond, DRP  
(570) 542-2134  
E-mail: [jer4@drp.gov](mailto:jer4@drp.gov)

Neil Della Greca, DRS  
(610) 337-5046  
E-mail: [ald1@drs.gov](mailto:ald1@drs.gov)

Attachment: List of Recently Issued NRC Information Notices

Discussion

The licensee modified the Susquehanna Unit 2 SLC system, during a recent refueling outage. The modification increased the flange pressure rating of both pumps (from 1400 psig to 1500 psig) and raised the lift pressure of the pump discharge relief valves to 1500 psig. The licensee intends to perform the same modification on the Unit 1 system. Additional details regarding the issue identified during the inspection can be found in Inspection Report 05000387/01-004;05000388/01-004, Accession # ML011420068.

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.

**/RA/** Patrick M. Madden FOR

Ledyard B. Marsh, Chief  
Operational Experience  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Program  
Office of Nuclear Reactor Regulation

Technical contacts: Frank Arner, DRS (610) 337-5194 E-mail: [fja@drs.gov](mailto:fja@drs.gov)  
John Richmond, DRP (570) 542-2134 E-mail: [jer4@drp.gov](mailto:jer4@drp.gov)  
Neil Della Greca, DRS (610) 337-5046 E-mail: [ald1@drs.gov](mailto:ald1@drs.gov)

Attachment: List of Recently Issued NRC Information Notices

Distribution: IN Reading File PUBLIC

ADAMS ACCESSION NUMBER: ML012210146

Publicly Available  Non-Publicly Available  Sensitive  Non-Sensitive

OFFICE	RGN I	Tech Editor	RGN I	RGN I	RGN I	REXB
NAME	FArner	PKleene/NF for	JRichmond*	NDellaGreca	LDoerflein*	NFields*
DATE	08/01/2001	05/14/2001	07/31/2001	7/31/2001	08/01/2001	08/01/2001
C:SRXB	REXB	C:REXB				
JWermiel*	JTappert	LMarsh				
08/03/2001	8/10/2001	8/10/2001				

**OFFICIAL RECORD COPY**

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2001-12 (ERRATA)	Hydrogen Fire at Nuclear Power Stations	8/08/01	All holders of operating licenses or construction permits for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2001-12	Hydrogen Fire at Nuclear Power Stations	7/13/01	All holders of operating licenses or construction permits for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2001-11	Thefts of Portable Gauges	07/13/01	All portable gauge licensees
2001-10	Failure of Central Sprinkler Company Model GB Series Fire Sprinkler Heads	06/28/01	All holders of licenses for nuclear power, research, and test reactors and fuel cycle facilities
2001-09	Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor	06/12/01	All holders of operating licenses for pressurized water nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
2001-08 Supplement 1	Update on the Investigation of Patient Deaths in Panama, Following Radiation Therapy Overexposures	06/06/01	All Medical Licensees
2001-08	Treatment Planning System Errors Result in Deaths of Overseas Radiation Therapy Patients	06/01/01	All medical licensees