NAC Form 366 (9-83)				LIC	ENSE	E EVE	NT RE	PORT	(LER)	U.S. NL A E	CLEAR REQUI	LATORY COMMISSIO 8 NO. 3150-0104 95
FACILITY NAME (1	1								P	OCKET NUMBER	(2)	PAGE (3)
TITLE (4)	McG	uire	Nuclear	Station	1 - 0	nit l			10	0 10 10 10	0 3 6	1911000
	Rea	ctor	Trips o	n Both I	Units	Due	to Lo	ss of	Instrume	nt Air		
EVENT DATE	EVENT DATE (5) LEP NUMBER (6) REPORT DATE (7) OTHER (OTHER P	ACILITIES INVO	LVED (8)	ARER(S)			
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NAME				6	ICENSEE	CONTACT	FOR THIS	LER (12)		1	TELEPHONE	NUMBER
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1 1			COMPLETE	ONE LINE FOR	EACH C	OMPONENT	FAILURE	DESCRIBE	D IN THIS REPORT	(13)	L	1
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NRC Form 368 (9-83)

NRC Form 368A (9-83)	LICENSEE EVENT REPOR	T (LER) TEXT CO	NTINUAT	ON APPROVED OMB NO. 3150-0104 EXPIRES: 8/31/88					ION			
FACILITY NAME (1)		DOCKET NUMBER (2)	DOCKET NUMBER (2)			LER NUMBER (6)				PAGE (3)		
			YEA	R	SEQUENTIAL		REVISION					
McGuire Nu	clear Station - Units 1&2	0 5 0 0 0 3	69	5 -	- 0 3 4	_	010	012	OF	0	5	

On November 2, 1985, at approximately 0640, a section of braided, flexible pipe on the discharge of Instrument Air (VI) compressor B ruptured at a welded seam. As a result, all VI loads (VI is a shared system) not protected by check valves experienced decreased VI pressure. The low VI pressure caused the main feedwater (CF) control valves on each unit to begin to close. This caused steam generator (S/G) levels to decrease. At 0641, Unit 1 experienced a reactor/turbine trip due to S/G IA low-low level. Pressurizer pressure began to drop and at 0645 Safety Injection (SI) was actuated on Unit 1 when the pressure dropped below 1845 pounds per square inch gauge (PSIG). Unit 2 experienced a reactor/turbine trip due to S/G 2A low-low level. Pressurizer pressure did not decrease to the SI setpoint.

Both units were in Mode 1 at 100% power at the time of the incident.

Background

TEXT III more space is required, use additional NRC Form 3664's) (17)

The VI system is a shared system which supplies oil free, dried air to all air operated instrumentation, valves, and componenets on Units 1 and 2. The air supply comes from four air compressors, three of which are reciprocating type and one of which is a centrifugal type. If VI system pressure should fall below the automatic VI compressor start setpoints, valve 1VS-1 (Station Air to Instrument Air) will open to supply compressed air to the VI system from the Station Air (VS) compressors.

On the discharge of each of the reciprocating compressors is a section of braided, flexible pipe made of stainless steel. Inside the pipe is a stainles steel bellows which allows for expansion. There is no check valve protection at the discharge of these compressors in case of line breaks at the compressor.

Description of Event

On November 2, 1985, at approximately 0640, a section of braided, flexible pipe on the discharge of VI compressor B ruptured at a welded seam. The braided outer section of the pipe failed due to fatigue and the inner bellows failed due to overload.

The pipe failure resulted in depressurization of the VI system. The first indication of trouble appeared as alarms in the control room. Shortly thereafter, the air operated CF control valves began to close on both units. The operators then began to get S/G level deviation alarms. They tried to open the CF control bypass valves to increase S/G feedwater level. However, because these valves are also air operated, they did not respond. Consequently, at 06:40:56, CF pump 1A tripped due to high discharge pressure. This caused feedwater level in the S/Gs to decrease to the low-low level S/G reactor trip setpoint. At 06:41:57, Unit 1 experienced a reactor/turbine trip on S/G 1A low-low level. Likewise, feedwater level began to decrease in the Unit 2 S/Gs which resulted in a reactor/turbine trip at 06:42:02. VI compressor B was isolated at approximately 0648 and VI pressure returned to normal.

NRC Form 366A (9-83)	LICENSEE EVENT REPORT (LER) TEXT CONTINUATION						MB NO. 31500104			
FACILITY NAME (1)		DOCKET NUMBE	A (2)		LER NUMBER (6)		PAGE (3)			
				YEAR	SEQUENTIAL	REVISION NUMBER				
McGuire Nuclear	Station - Units 18	2 0 5 0 0	369	8 5 .	- 0 3 4	- 0 0	013	OF	0	5

TEXT (If more space is required, use additional NRC Form M6A's) (17)

Unit 1 experienced a Safety Injection initiation as a result of the reactor trip. Pressurizer pressure decreased more rapidly than usual and the pressure fell further than usual. The pressure fell below the Safety Injection setpoint of 1845 psig. Pressurizer pressure fell to a minimum of 1827 psig before recovering. A number of factors contributed to the lower than usual pressure drop: 1) three main steam power operated relief valves (PORVs) were open for approximately 3.5 minutes during the transient; 2) three S/G code safety valves lifted because of higher than normal steam pressure (one remained open for approximately 3.5 minutes); 3) one group of heaters in pressurizer heater bank A was out of service for approximately 1.5 minutes during the transient; 4) pressurizer heater group B failed to energize; 5) up to 20 two inch steam drain valves failed open due to low air pressure, causing higher than normal post-trip steam loads; 6) CA flow was at a maximum rate immediately after the trip because the flow control valves had failed open on loss of air, and the S/G levels were off scale low; and 7) Unit 1 was carrying most of the auxiliary steam loads until the auxiliary boiler was started.

Pressurizer pressure on Unit 2 dropped to approximately 1904 psig before recovering. This was lower than normal after a reactor trip. There are several reasons for the larger pressure decrease: 1) the pressurizer spray valve (2NC-27) was leaking prior to the reactor trip; 2) one bank of pressurizer backup heaters had been energized before the trip to maintain NC pressure; and 3) steam pressure was decreasing faster than usual because of abnormally high steam loads (up to twenty 2-inch steam drain lines may have failed open). However, Unit 2 did not experience a Safety Injection initiation. The operator secured Reactor Coolant (NC) pumps 2A and 2B to minimize pressurizer pressure decrease due to valve 2NC-27 leaking (These pumps supply flow for pressurizer spray). He also opened valves 2NI-9 and 2NI-10 (cold leg injection from chemical and volume control system) to increase charging flow and increase pressurizer level. NC pressure then began to increase. The unit became stable at approximately 0800.

McGuire Nuclear Station has not previously experienced an incident resulting in loss of VI and a reactor/turbine trip on either unit. Therefore, this is considered an isolated incident.

CORRECTIVE ACTION:

Immediate:	A Nuclear Equipment Operator	was sent	to	investigate	the	cause	of
	the VI low pressure alarm.						

Subsequent: The control operators attempted to open feedwater control bypass valves to increase S/G feedwater levels on both units.

The Unit 2 Main Turbine Control was put in manual and generator load was reduced.

NC pumps 2A and _B were stopped to minimize pressurizer cooldown.

VI compressor B was isolated.

INC Form 386A LICENSEE EVENT REPORT (LER) TEXT CONTINUATION LICENSEE EVENT REPORT (LER) TEXT CONTINUATION APPROVED OMB NO. 3150-0104 EXPIRES 8/31/88									
FACILITY NAME (1)		DOCKET NUMBER (2)	LER NUMBER (6)	PAGE (3)					
			YEAR SEQUENT'AL NUMBER	REVISION NUMBER					
McGuire Nuclear	AcGuire Nuclear Station - Units 1&2		815 - 01314	-0100140F015					
TEXT III more space is required, use	additional NRC Form 366A's/ (17)			ttttt_					
	The main steam PORV	s on Unit 1 were set	·						
	Pressurizer heater	group B on Unit 1 wa	s repaired.						
	Valve travel for valve 2NC-27 was re-adjusted to properly seat the valve.								
	The ruptured pipe on VI compressor B was replaced.								
Planned:	The use of the braided, flexible pipe on the VI system will be reviewed to determine if other replacements or modifications are necessary to increase reliability.								
	Check valves will be installed on the discharge of the three reciprocating VI compressors to prevent VI system depressurization in the event of another flexible pipe rupture.								
	Flexible pipe appli Power nuclear stati	cations in other pla ons will be reviewed	int systems and L.	at all Duke					
SAFETY EVAL	UATION:								
VI system p	ressure returned to no	rmal after VI compre	essor B was iso	lated.					
<u>Unit l</u>									

The reactor tripped when S/G 1A level fell below the reactor trip setpoint. Adequate core cooling was maintained at all times. The reactor pressure boundary was not challenged. Safety Injection was properly initiated when pressurizer pressure fell below the Safety Injection setpoint. Phase A containment isolation was initiated on the Safety Injection signal. All systems performed properly to the reactor trip and SI. All other safety systems were available at the time of this incident.

Transient Analysis Prior to the trip, a reactor power reduction of 10% occurred due to the temperature effect on reactivity caused by the primary to secondary power mismatch (the mismatch caused Tave to increase). No rod insertion occurred prior to the trip. Pressurizer pressure peaked at 2294 psig pre-trip. Pressurizer pressure decreased more rapidly than usual after the trip due to higher than normal steam loads and pressurizer heater response. The safety injection contributed to the cooldown and was secured ten minutes after initiation. Minimum pressure was 1827 psig (SI setpoint 1845 psig) and had recovered to about 2220 psig within thirty minutes after the trip. Cold leg temperature dropped to a minimum of 510.7 degrees-F about 21.5 minutes after the trip. The cooldown limit was not exceeded.

Steam pressure increased to 1110 psig prior to the trip peaking post-trip at 1194 in S/G 'D'. Three S/G PORV's opened as did three main steam code safety valves. The PORV that did not open was isolated at the time. S/G levels went off the narrow LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION APPROVED OMB NO 3150-0104

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	369		
McGuire Nuclear Station - Units 1&	0 5 0 0 0 3 7 0	85-034-00	0 50 0 5
TEXT /// more space is required, use additional NRC Form 388.4's/ 1171			

range scale low after the trip; levels were recovered by auxiliary feedwater and were on scale about eight minutes after the trip.

Both diesel generators started and the LOCA sequences were initiated on the SI signal as designed and within time limits. A phase 'A' containment isolation was also initiated on the SI signal. Pressurizer pressure and level started to increase within one minute after SI initiation.

Unit 2

Form 366A

The reactor tripped when S/G 2A level fell below the reactor trip setpoint. Emergency core cooling was not required during this trip; however, valves 2NI-9 and 2NI-10 were opened to increase charging flow. Emergency power was not required during this incident and was not initiated. The safety systems properly responded to the reactor trip. All other safety systems were available at the time of this incident.

Transient Analysis Prior to the trip, the operator attempted to reduce power. Pressurizer pressure peaked at 2270 psig. Pressure dropped more rapidly than usual to a minimum of 1904 psig before recovering. The operator tripped Reactor coolant pumps A and B to minimize pressurizer spray flow (pumps A and B supply the head for the pressurizer spray; the pressurizer spray valve was leaking by).

Steam pressure peaked at approximately 1178 psig; three main steam PORV's and four code safety values opened to relieve pressure. The value setpoints were adjusted as necessary. S/G levels went off the narrow range scale low after the trip. S/G's 'A' and 'B' returned on narrow range scale approximately eight minutes after the trip as they were not transferring much heat. Levels in S/G 'C' and 'D' took much longer to recover as they were carrying most of the decay heat load. Emergency power was not demanded and did not actuate. ECCS was not demanded or initiated. Although the post trip cooldown was greater than normal, the cooldown limits were not exceeded.

The health and safety of the public were not affected by this inciden :.

DUKE POWER COMPANY p.o. box 33189 charlotte, n.c. 28242

HAL B. TUCKER VICE PREMIDENT NUCLEAR PRODUCTION TELEPHONE (704) 373-4831

December 9, 1985

Document Control Desk U. S. Nuclear Regulatory Commission Washington, D. C. 20555

Subject: McGuire Nuclear Station Docket No. 50-369 and 50-370 LER 369/85-34

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/85-34 concerning both units tripping due to the loss of instrument air. This event was considered to be of no significance with respect to the health and safety of the public.

This report is not being submitted within thirty days of the event in accordance with my letter of December 2, 1985.

Very truly yours,

Tuckerfronc

Hal B. Tucker

JBD/hrp

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator U. S. Nuclear Regulatory Commission Region II 101 Marietta Street, NW, Suite 2900 Atlanta, Georgia 30323

Mr. Darl Hood, Project Manager U. S. Nuclear Regualtory Commission Office of Nuclear Reactor Regulation Washington, D. C. 20555

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Mr. W. T. Orders NRC Resident Inspector McGuire Nuclear Station

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