

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)
MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NUMBER (2)
05000 - 263

PAGE (3)
1 OF 7

TITLE (4)
Manual Scram Inserted Following Pressure Transient Closes Air Ejector Suction Isolation Valves and Trips Offgas Recombiners

EVENT DATE (5)			LER NUMBER (6)		REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	DOCKET NUMBER
09	09	98	98	004	00	10	09	98	05000
FACILITY NAME								DOCKET NUMBER	
								05000	

OPERATING MODE (9)	LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
N		20.402(b)		20.405(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)		73.71(b)	
POWER	100	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)	
LEVEL (10)	%	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER	
		20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		[Specify in Abstract below and in Text, NRC Form 366A]	
		20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)			
		20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

NAME: Tom Parker
TELEPHONE NUMBER (Include Area Code): 612-295-1014

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	SH	84, ISV	F052	NA					
X	WF	PCV	W255	NA					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (IF YES, COMPLETE EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT LIMIT TO 1400 SPACES, I.E., APPROXIMATELY 15 SINGLE-SPACED TYPEWRITTEN LINES) (16)
NRC FORM 366 (4-95)

A rapid recombination of hydrogen and oxygen in the Offgas System caused a pressure transient that closed the isolation valves between the main condenser and the air ejectors. The offgas recombiners tripped at the same time. With no apparent offgas removal means, operations personnel reduced power and subsequently manually scrambled the reactor.

The rapid recombination of hydrogen and oxygen was caused by a high temperature in an Offgas System valve. The high temperature was caused by valve seat leakage which self-ignited the hydrogen and oxygen. The burning of hydrogen and oxygen on the low pressure side of the valve caused a rise in the temperature of the valve body, which initiated the rapid recombination of hydrogen and oxygen on the high pressure side of the valve seat.

The valve seat was replaced, as was the valve seat of the similar valve on the other train. Several operating procedures were changed; temporary instrumentation was added; and extensive testing was performed. Training will be provided on the importance of performing thorough investigations should symptoms of a potential problem be identified. During subsequent piping inspections, no damage was found from the pressure transient.

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Conditions Prior to the Event

On August 30, 1998, the plant returned to service following a brief outage to repair equipment not related to this event.

On September 2, 1998, an unusual odor, possibly from something over-heating, was noticed in the offgas recombiner pump room. Engineering and operations personnel attempted unsuccessfully to determine the source of the odors throughout the rest of the week.

On September 9, 1998, the plant was operating at 100% power.

Description

On September 9, 1998, at approximately 0510, several annunciators alerted operators to the following events:

The air ejector suction isolation valves (AO-1083A, 1083B, 1084A and 1084B)¹ closed.

The operating offgas recombiner² (Train B) tripped.

The standby offgas recombiner (Train A) tripped.

The air ejector suction isolation valves are located between the main condenser and the air ejectors (See attached figure). The offgas recombiners are located downstream of the air ejectors and function to recombine hydrogen and oxygen gases.

Control room operators initiated a rapid power reduction within 20 seconds following the above events.

Three signals can cause a closure of the air ejector suction isolation valves: low main steam pressure, high offgas pressure and high offgas temperature. Since neither the high pressure nor the high temperature annunciators were in alarm and main steam

¹ EIS Component Code: ISV, EIS System Code: SH

² EIS Component Code: RCB

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pressure had not decreased, the lead control room operator believed that the air ejector isolation was caused by a spurious signal. After obtaining concurrence from the shift supervisor, the lead control room operator reset the air ejector isolation logic. This re-opened the air ejector suction isolation valves.

At 0512, the air ejector suction isolation valves automatically closed again. This time, the high offgas pressure annunciator was in alarm. With a confirmatory signal present, operating procedures do not allow resetting the air ejector isolation logic at power. With no apparent means of removing offgas from the main condenser, the shift supervisor ordered a manual reactor scram to be inserted at 0531. Following the scram, leakage through the air ejector suction isolation valves was observed.

The recombiner room is a locked high radiation area at power. Operations personnel enter this area once a month. No entry was made into this area between September 2, 1998 and September 9, 1998. On September 10, 1998, plant personnel entered the recombiner room and discovered: 1) the same odor that had been present in the recombiner pump room and 2) paint on the valve body of PCV-7496B³ was discolored.

The offgas piping was inspected for pressure boundary damage. No pressure boundary damage was found.

Cause

Seat leakage on PCV-7496B was determined to be the cause of the event. The pressure on the high pressure side of the seat was between 12 to 13.5 psia with 1 to 2 psia on the low pressure side. It is believed that around September 2, 1998, the seat leakage on PCV-7496B self-ignited causing a stable burn of hydrogen and oxygen on the low pressure side of the valve seat. Hydrogen and oxygen gases are known to self-ignite when rapidly expanded. This hydrogen/oxygen burn caused the valve body to heat and the paint on the exterior of the valve body to release odors which were noted by operations personnel. Ventilation pressure differences caused the odors to travel through floor drains to the recombiner pump room which is regularly inspected by operations personnel.

³ EIIIS Component Code: PCV, EIIIS System Code: WF

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The temperature of a section of the valve in contact with gases on the upstream side of the valve seat eventually reached the spontaneous ignition temperature for hydrogen and oxygen gases. At 0509, a rapid recombination of hydrogen and oxygen gases occurred, causing an extremely short duration pressure transient. The pressure transient caused instrumentation: 1) to trip both offgas recombiners and 2) to initiate an air ejector isolation.

After the air ejector suction isolation valves were reopened, additional hydrogen and oxygen gases were sent toward the offgas recombiners. At 0512, when these gases came in contact with PCV-7496B, a second rapid recombination of hydrogen and oxygen gases occurred. The resultant pressure transient caused instrumentation to initiate a second air ejector isolation.

As the air ejector suction isolation valves were closing, additional hydrogen and oxygen reached PCV-7496B, causing a third pressure transient at 0513. No additional pressure transients occurred as the valve body cooled below the spontaneous ignition temperature.

An instrument air leak was found on one of the air ejector suction isolation valve air actuators. This leakage caused a reduction in the closing thrust which resulted in the indicated valve leakage.

Analysis of Reportability

This report is being submitted per 10 CFR 50.73(a)(2)(iv), since a manual actuation of the reactor protection system occurred that was not part of a pre-planned sequence.

Safety Significance

The manual scram occurred without further complication.

The function of the air ejector suction isolation valves is to isolate the hydrogen and oxygen in the main condenser from the Offgas System. However, the leakage

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observed through the air ejector isolation valves was not a safety concern, since the Offgas System is designed to withstand a rapid recombination event.

This event caused damage to the external coating and the valve internals of PCV-7496B. This valve does not perform a safety function.

This event had no effect on the offsite releases of radioactivity and, therefore, had no effect on the health and safety of the public.

Actions

The leaking valve seat on PCV-7496B was reworked as well as the similar valve in the redundant train.

Temporary instrumentation was added to measure the temperature of the valve body of PCV-7496A and B during power operations and record system pressure. An alarm was added in the control room to alert operators of temperature increases.

The following procedural changes have been made:

Alarm Response Procedure 7-B-13 has been changed to: 1) alert operators that valid air ejector isolations may occur without either the high offgas temperature or the high offgas pressure annunciator alarming, and 2) identify alternate confirmatory indications of hydrogen and oxygen recombination outside the recombiners.

Operations Manual Section B.7.2.1-05.03, Stopping Off-gas Recombination at the Recombiner Inlet or Bypass Return, was written to provide guidance to operations on the new temporary instrumentation that was installed.

Operation Manual Section B.6.3-05, Steam Jet Air Ejector Suction Auto Isolation, was revised to provide 1) prompt closure of the manual air ejector isolation valves and 2) continued supply of steam to the air

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ejectors to reduce the likelihood of hydrogen and oxygen gas recombination during the isolation.

Training will be provided on the importance of performing thorough investigations should symptoms of a potential problem be identified. For example, all potential flow paths should be investigated if unusual odors are detected.

The air leak was repaired on the air ejector suction isolation valve actuator.

Internal offgas piping samples were analyzed to determine if the recombiner catalyst had migrated outside the offgas recombiner. No migrated catalyst was found.

Failed Component Identification

Air Ejector Suction Isolation Valves: Continental Butterfly Valves, Model 7710

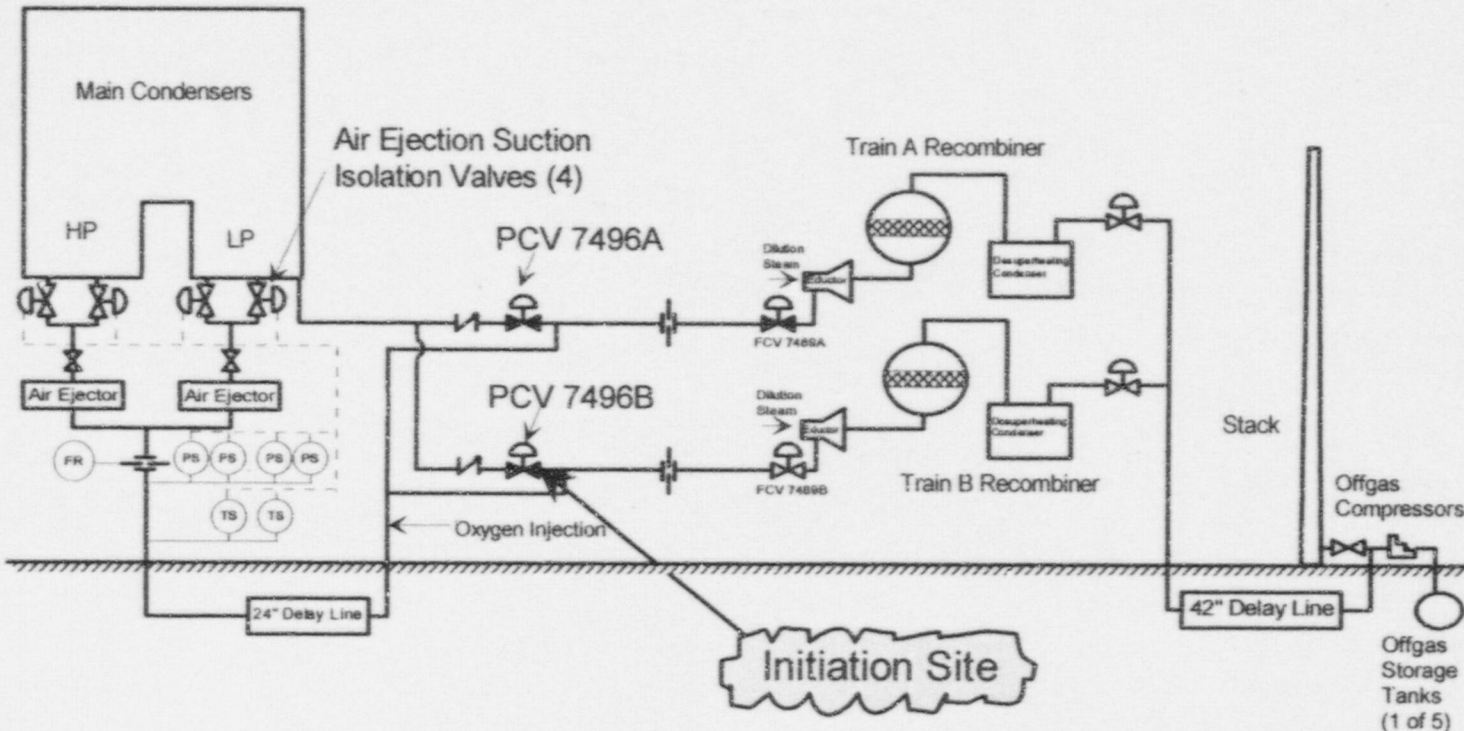
Air Ejector Suction Isolation Valve Operators: Fisher Diaphragm Operators, Model 656-60

PCV-7496B: WKM, Pressure Control Valve Model, 70-28-1DRT.

Similar Events

In 1974, similar events were caused by the migration of offgas recombiner catalyst into the offgas piping.

Simplified Drawing of the Offgas System



Notes:
 PS = Pressure Switch TS = Temperature Switch
 FR = Flow Recorder

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