NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

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Duane Arnold Energy Center	0 5 0 0 0 3 3 1	1 OF 0 16

TITLE (4)
Standby Liquid Control System Misalignment

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 7	1 8	8 4	8 4	0 2 9	0 0	0 8	1 7	8 4	None	0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.406(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		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	TELEPHONE NUMBER
Michael S. Harris, Technical Support Engineer	AREA CODE 3 1 9 8 5 1 - 1 7 3 0

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
A	B R			Yes					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

While in normal full power operation, improper manipulation of the common suction valve from the Standby Liquid Control System (SBLC) tank to two SBLC pumps resulted in SBLC being isolated for nearly 5 hours. The manual valve, which had been erroneously unlocked and cycled by a chemistry technician while performing a portion of a surveillance test, was observed to be in the incorrect position by licensed operators while walking by the SBLC. The valve was immediately restored to full open and the SBLC lineup verified. Because of the short duration of the valve mispositioning, all technicial specification action statements were complied with. Additional corrective actions are detailed in the text.

Calculations and a review of Operations procedures performed after the event indicate reasonable operator action would have restored system operation following manual initiation and fulfilled SBLC design basis reactor coolant system boron concentration in the specified time. As the Reactor Protection System (RPS) was fully operable throughout and following the event, manual initiation of SBLC would not have been required. The safe operation of the plant was not compromised and there was no affect on the health and safety of the public.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

On July 18, 1984 during normal full power operation at 1530 hours, two licensed operators discovered sodium pentaborate supply valve (BR-V-26-1) improperly in the substantially closed position. The valve was promptly restored to the open position. This valve is the common suction valve for two standby liquid control system (BR) pumps from the SBLC tank. As detailed below, an investigation promptly determined this chain-locked manual valve was improperly manipulated at approximately 1045 hours that day by a chemistry technician initiating a surveillance test procedure (STP) on the SBLC tank concentration. This event caused inoperability of the entire SBLC for nearly 5 hours. No other LCO's were in effect at the time of this event as all other safety systems, including the Reactor Protection System (JC), were fully operable.

Upon discovery of the valve in the improper position, operations personnel immediately and properly restored the valve to the full open position. A full valve lineup check for the SBLC was also initiated. The operators did not measure the extent of valve closure prior to restoring the valve to full open. Interviews with the technician and operators established that the valve was most probably in an intermediate position, between several turns from full open to two turns from full closed.

This valve, V-26-1, is a manual 3" gate valve with a rising stem. The licensed operators noticed the improper position while enroute to another location which required walking by the SBLC. The valve does not have position indication or an alarm in the Control Room. It is surmised that the valve was predominently in the closed position, as it is in this direction that the valve stem would appear improper.

The design basis of the SBLC is to insert sufficient negative reactivity to achieve subcritically from full power to a subcritical condition in 96 minutes. The sizing of the system is such as to establish 600 ppm boron concentration in the reactor coolant 96 minutes following manual initiation of either of two pumps. The system provides a diverse means of inserting negative reactivity in the event of a failure of the reactor protection system and control rod drives. This system is not designed to accomplish a fast scram of the reactor or provide operational control of fast reactivity transients.

Upon discovery of the valve in the improper position, Operations personnel initiated and completed NRC, County and State agency notification in accordance with NRC regulations and Licensee procedures. (NRC notification was made at 1558 hours of the simultaneous declaration and cancellation of an unusual event and the as-found condition of the valve.) Notification of management personnel was initiated and an immediate investigation by the Plant Superintendent and support personnel commenced. This investigation resulted in disclosure of the above circumstances by approximately 1830 hours (3 hours after the discovery of the mispositioned valve). These circumstances were also provided to the NRC in a follow-up telephone call by the Technical Support Supervisor.

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Cause of the Event

The cause of the valve being mispositioned was personnel error by a chemistry technician during the performance of a portion of a surveillance test procedure (STP). The ensuing investigation into the steps leading up to the personnel error have revealed the following:

A contract chemistry technician, who had prior experience as a chemistry technician at another nuclear facility and had been performing duties at DAEC since June 17, 1984, went to the Control Room to be authorized to conduct a sensor check STP which he was assigned by his supervisor. In addition to the sensor check STP and as was common practice, the technician also carried with him for authorization all the chemistry surveillances to be performed that shift by chemistry personnel. The Control Room shift supervisor reviewed the chemistry surveillances and authorized them to be performed. Included in the surveillance tests was a test of the SBLC tank concentration. As the SBLC test required opening of a locked air sparger valve (which ensures full mixing of the SBLC tank contents prior to drawing a sample), the shift supervisor issued a controlled key to the chemistry technician for the test. In accordance with adminstrative control requirements, the technician signed the controlled key log acknowledging receipt of the key.

Upon returning to the chemistry lab, the technician discussed the activity he was charged to do (sensor checks) with a second technician. The second technician indicated that during sensor checks, if a monthly test of the SBLC concentration was also to be performed, the technician performing sensor checks normally initiated the first part of the SBLC test, specifically, open the air sparger valve to the SBLC tank. Although the first technician was fully qualified to perform the sensor checks, he was not qualified to perform any other surveillance test. If he had gone to his supervisor, or if the second technician had known that he wasn't qualified, he would have been instructed to perform no more than the sensor checks and then await a qualified technician to initiate and perform the monthly SBLC STP. As a result of the second technician's advice and in his zeal to be productive and have the STP performed efficiently, the first technician proceeded to commence his assigned sensor check activities and his presumed responsibility to initiate the SBLC STP.

During performance of his sensor checks and after reviewing the SBLC STP, the chemistry technician proceeded to the SBLC to open the air sparger valve, V-26-11. The technician, who was not familiar with the system components, improperly located valve V-26-1 rather than V-26-11. He then removed the chain to the lock with the common key to the SBLC locks that had been provided by the Control Room and cycled the valve. The technician, either because of uncertainty or because expected bubbling was not heard in the tank, attempted to reposition V-26-1 to its prior status. In the process, however, he cycled V-26-1 further closed rather than reopening the valve. He then locked V-26-1 and went to the chemistry lab to seek help. The second chemistry technician identified the location of V-26-11 as being on top of the SBLC tank, as opposed to V-26-1 which was at the bottom. The first technician then returned to the SBLC tank, opened the correct valve (V-26-11), and resecured the lock.

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A third technician performed the remainder of the STP later that afternoon (prior to the valve status being discovered). It is noteworthy that a chemistry supervisor witnessed the entire performance of the test by the third technician pursuant to our policy of increased supervisory personnel time in the field. Sparger valve (V-26-11) position was independently verified by an operator following test completion. Valve V-26-1 is not referenced in the STP, consequently, the erroneous valve position was not discovered during the performance of the STP.

Corrective Action

The mispositioned valve, V-26-1, was restored immediately to the proper position upon discovery by licensed personnel, and to ensure that SBLC was fully operational, a full valve line-up verification of the system was conducted by Operations personnel without further incident.

An investigation was immediately initiated by the Plant Superintendent. This investigation, although conducted in evening hours, resulted in prompt identification of the circumstances surrounding the valve mispositioning. As a result of this investigation, the following corrective actions were initiated:

(1) Permanent Iowa Electric chemistry technicians are being hired to fill positions currently occupied by contracted personnel. We expect to complete the conversion to Iowa Electric personnel in the chemistry lab by October 31, 1984.

(2) The practice of issuing controlled keys to non-Operations personnel to allow manipulation of locks to safety-related valves has been discontinued. Effective July 20, only Operations personnel will be permitted to unlock safety-related chain locked valves.

(3) A study has been initiated to review plant drawings for locked valves and determine the rating (safety or non-safety) of their associated locks and keys. This review will ascertain that those valves which are shown locked meet the current criteria for locked valves.

(4) Chemistry technician certification for specific activities has been reviewed and strengthened. This program will ensure: (a) technicians are trained and certified to perform specific activities, (b) technicians do not perform activities prior to being trained and certified capable of performing such activities, and (c) technicians perform only those portions which have been authorized by proper authority.

(5) The practice of issuing STP's to a single technician for an entire department has been discontinued. The same technician performing the STP will be required to obtain authorization for the STP as well.

(6) A personnel development program following general employee training is being generated. This program will specifically address the importance of activities and what to do if an error is committed or suspected.

(7) Supervisory involvement and in-plant supervising responsibilities have been re-emphasized for the chemistry laboratory and for all plant disciplines and activities. Direct supervisory involvement in plant activities shall be strengthened and a coordinated, agressive approach shall be taken to eliminate personnel errors at DAEC.

DAEC Technical Specifications (Section 3.4) were reviewed by Operations personnel and by support personnel after discovery of the closed valve. These technical specifications require: (a) SBLC operability when in power operation, (b) allow a 7 day repair time and continued operation in the event a redundant SBLC component is inoperable, and (c) require the reactor be brought to a cold condition within 24 hours if the prior condition cannot be met. Although the event was discovered and rectified within less than 5 hours of its occurrence, and hence a violation of Technical Specification, Section 3.4 did not occur, Iowa Electric initiated the extensive corrective action identified above because of the seriousness with which we view personnel errors.

Conclusions

At no time was the safe operation of the plant compromised. The basis of this statement is provided below:

(1) Our review of plant records and LER's confirm that this is the first occurrence of the SBLC being disabled at times when system operability has been required. We conclude that SBLC reliability has been excellent through 10 years of operational experience.

(2) In the event of a failure of the RPS, the design basis of the SBLC is to achieve 600 ppm boron concentration in 96 minutes from the time the system is manually initiated (reference T.S. basis, page 3.4-4). The tank concentration of sodium pentaborate on July 18 was 16.7% (higher than the Tech Spec minimum of 13.4%). The actual minimum pump flow rate, as found during the previous STP performed on July 9, 1984, was in excess of 29 gpm. (This exceeds the 26.2 gpm minimum required per T.S. 4.4.A.1.)

The DAEC Updated Final Safety Analyses Report, Chapter 9, Section 3-11, states in part, "...the physical characteristics of the DAEC's pump and solution tank capacities set the boron injection rate such that the rate of increase in the concentration of natural boron in the primary coolant water is 11.1 to 13.4 ppm/min. The lower rate ensures that the boron gets into the reactor in about 68 minutes, considerably quicker than the cooldown rate. The upper limit injection rate achieves a concentration of 750 ppm in about 56 minutes."

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Based on the conservative injection rate of 68 minutes and the higher pump flow and sodium pentaborate concentration, the Operators would have to diagnose the reduced flow rate (effectively 0 gpm from the partially closed valve) and restore full flow within approximately 28 minutes of initiation to ensure a total injection of 600 ppm in 96 minutes per Technical Specifications. We believe it is a reasonable expectation of our personnel to complete this action well with the 28 minutes, given pump discharge pressure, the reactor flux, and SBLC operating parameters displayed in the Control Room. The SBLC operability instruction requires verification of adequate discharge pressure via Control Room indication, which would be low in this condition. Operating procedures then require operators to switch to the alternate pump. (By design, only one pump can be selected at a given time.) As they would observe no pressure, operators would be dispatched to diagnose the problem, and subsequently open the appropriate valve (V-26-1).

As a result of conversations with the SBLC pump vendor, our engineering judgment is that the internal check valve of the SBLC pumps would be the first failure to occur and that this failure would be expected after approximately 5 minutes of no flow conditions (severe pump damage would not occur until after 15 minutes). Operator actions would be such that the first pump selected, and possibly the second, would be run less than 5 minutes each prior to repositioning valve V-26-1. (SBLC system integrity would likewise be maintained during these conditions ensuring adequate liquid inventory to achieve subcriticality.) Therefore, it is our judgment that the SBLC would have performed within Licensing basis requirements under the as-found conditions.

(3) The Reactor Protection system (JC) was and remains fully capable of fully terminating reactor criticality. Therefore, had there been a need to reduce or terminate criticality, the SBLC would not have been required to operate. The safe operation of the plant was not compromised and there was no affect on the health and safety of the public.

Iowa Electric Light and Power Company
August 15, 1984
DAEC-84-505

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

Subject: Duane Arnold Energy Center
Docket No. 50-331
Op. License DPR-49
Licensee Event Report No. 84-029

Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

Very truly yours,

Daniel L. Mineck
Plant Superintendent - Nuclear
Duane Arnold Energy Center

DLM/WJM/kp

attachment

cc: Mr. James G. Keppler
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

NRC Resident Inspector - DAEC

File A-118a

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