U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket/Report Nos.	50-334/95-80 50-412/95-80
License Nos.	DPR-66 NPF-73
Licensee:	Duquesne Light Company One Oxford Center 301 Grant Street Pittsburgh, PA 15279
Facility:	Beaver Valley Power Station, Units 1 and 2
Location:	Shippingport, Pennsylvania
Inspection Period:	July 22-27, 1995
Inspectors:	John G. Caruso, Operations Engineer, DRS Samuel L. Hansell, Resident Inspector, DRP Jefferey F. Harold, Project Engineer, NRR Edward B. King, Physical Security Inspector, DRSS Gregory C. Smith, Physical Security Inspector, DRSS

Approved by: Clifford J. Anderson 8/30/95

C. J. Anderson, Team Leader, DRP — Date

Inspection Summary: See the Executive Summary

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EXECUTIVE SUMMARY
Beaver Valley Station
Inspection Report 95-80

On Friday July 14, 1995, at 1:45 p.m. Unit 2 operators discovered that valve 2SWS-82 was out of its normal system alignment. This valve is a service water cross connect valve (between the containment recirculation spray heat exchangers). The valve was found shut with the padlock hooked through a cut link in the chain securing the valve. The normal system alignment position is locked open. Late that night a special, confidential night order was implemented which verified the position of selected valves at Unit 2. No other deficiencies were identified by the licensee. On Monday, July 17, 1995, the licensee assigned a task force to identify the cause of this event. The determination that potential tampering may have occurred was not made until Thursday, July 20, 1995. At that time an ENS call was made to the NRC because the licensee was unable to conclusively establish the cause of the event and they could not definitively rule out the possibility of tampering (Section 2.1).

A Special Team was dispatched by the NRC to fully understand the event, review the event for potential generic issues, and to assess Duquesne Light Company's operational and managerial performance associated with the event and reporting of the event (Section 1.0).

Duquesne Light Company (DLC) was unable to conclusively establish the cause of the 2SWS-82 valve mispositioning or the reason that the valve was improperly locked with a cut chain. DLC continues to believe that the July 14 event was a result of operator error or poor work practices that occurred on May 1, 1995, during the last refueling outage and not potential tampering (Section 2.2). The Team agrees that the event was likely a result of operator error or poor work practices. In addition to the 2SWS-82 valve being mispositioned, two instrument valves were found to be mispositioned (section 4.2). This issue remains unresolved pending further review by the resident inspectors (URI 95-80-04). Weaknesses were identified in the independent verification process that may have contributed to problems with the establishment of the as left position of several mis-aligned valves (Sections 2.2.4 and 4.2).

The Team expressed concern that DLC did not utilize the Safeguards Equipment Operability Checklist at Unit 2 until 12 hours after identification of the event. Furthermore, the event was not treated as potential tampering at Unit 1 or 2 until six days after identification of the event (Section 3.3). DLC communication deficiencies prevented senior DLC management from being informed about the improper locking of the valve with a cut chain link until 4 to 6 days after the event was discovered (Section 3.3).

A procedural weakness was identified in that DLC does not have an initiator to implement a Special Order that deals with potential tampering events. Also, some operators were not familiar with the order (Section 3.1.1).

The control of work activities that occurred on May 1, 1995, was weak. Inadequate coordination of work activities and clearances led to the flooding of the recirculation spray system (RSS) heat exchanger cubicles (Section 2.2.4). Problems were identified with the documentation of work practices for work performed on May 1, 1995, which contributed to DLC's inability to positively establish the as left position of 2SWS-82 (Section 2.2.4). Several independent verifications were not performed as required by procedure. This issue remains unresolved pending further review by the resident inspectors (URI 95-80-01). A problem report was not written to document the inadequate clearance and subsequent flooding of the RSS heat exchanger cubicles. This issue remains unresolved pending further review by the resident inspectors (URI 95-80-02).

The procedure for locking devices provided limited guidance to plant personnel regarding the proper technique for applying chains and padlocks for safety related valves (Section 3.1.1).

The safety significance of the mis-aligned 2SWS-82 valve was low. Analysis by DLC concluded that the service water system (SWS) would have performed its design function (Section 3.5). However, DLC analysis indicated that flow in the 'B' train of the SWS to the RSS heat exchange was below the technical specification minimum. This issue remains unresolved pending further review by the resident inspectors (URI 95-80-03).

A potential generic implication of the July 14 potential tampering event is that many plants do not have procedures that deal with potential tampering events (Section 3.2).

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APPENDICES

DETAILS

1.0 INTRODUCTION

Upon being informed of a potential valve tampering event at Beaver Valley Unit 2 on July, 20, 1995, the NRC Region I Director of the Division of Reactor Projects and management from the Office of Nuclear Reactor Regulation (NRR) determined that a special team inspection should be formed to fully understand the event, review the event for potential generic issues; and to assess Duquesne Light Company's (DLCs) operational and managerial performance associated with the event and reporting of the event. Accordingly, a team was selected, briefed, and dispatched to the site on July 22, 1995.

1.1 Scope and Objectives

The charter for the special team inspection (Appendix A) was finalized on July 21, 1995. The charter directed the team to conduct an inspection and accomplish the following objectives:

1. Confirm that the licensee has taken sufficient action to assure that the potential for future tampering is minimized and that if it should occur appropriate actions are taken.

2. Determine the specific circumstances associated with the potential valve tampering events on July 14 and June 6, 1995. Develop a sequence of events and analysis of activities that occurred before and after the July 14 event. Assess the safety significance of the events.

3. Evaluate the licensee's actions following the event including implementation of procedures (security plan and implementing procedures, security contingency procedures, surveillance procedures, etc.) and root cause analysis. Evaluate the response of operations, security, and management personnel to these events. Evaluate the licensee's decision making relative to reportability.

4. Determine the adequacy of the licensee's response given previous security events at Beaver Valley.

5. Review and evaluate personnel performance (including operations, security, instrument and control technicians) relative to adherence to procedures and technical specifications, and quality and effectiveness of communications. Eva'uate the manner that the events were communicated to licensee management and the NRC.

1.2 Inspection Process

During the period of July 22-27, 1995, the team conducted an independent inspection, review, and evaluation of the circumstances associated with the July 14 potential valve tampering event at Beaver Valley Unit 2. The team inspected the area containing the valve and other equipment anomalies; held discussions and formal interviews with personnel involved with this event; reviewed relevant records; and evaluated the adequacy of procedures, management oversight, communications, and personnel training.

The inspection was conducted in accordance with Inspection Procedure 93702, "Prompt Onsite Response to Events at Operating Power Reactors."

2.0 POTENTIAL VALVE TAMPERING EVENT CIRCUMSTANCES

2.1 July 14, 1995 Potential Valve Tampering Event Description

2.1.1 Narrative

On Friday, July 14, 1995, at 1:45 p.m., Unit 2 operators discovered that 2SWS-82 was out of its normal position. The valve was found mispositioned (shut) and improperly locked with the padlock hooked through a cut link in the chain securing the valve. The normal position of 2SWS-82 is locked open. This problem was discovered during the performance of the operations surveillance test 2OST-48.7, "Padlock Quarterly Review". This surveillance test verifies the position of the locked valves at Unit 2, as well as the integrity of the locking devices. The valve was returned to its normally locked open position. No other deficient conditions were identified via the completion of 2OST-48.7.

The licensee's action on July 14 included the following at Unit 2. The general manager of nuclear operations (GMNO) was informed of the problem. The GMNO called the nuclear security manager (NSM) and told him that it was an operations issue and based on direct knowledge of the results of recent testing of the service water system with 2SWS-82 in the closed position that the misaligned valve had no safety significance on plant operations and was not considered a tampering issue. The GMNO formed an adhoc group to review previously performed Operating Surveillance Tests (OSTs), control room logs, safety tagging clearances, maintenance work requests, system procedures, and to conduct preliminary personnel interviews July 14 and 15, 1995. A problem report (2-95-219) was written and the reportability of the event was reviewed. The Division Vice-President, Nuclear Operations (VPNO) was notified that the valve was misaligned, and nothing about the cut chain.

Saturday, July 15, 1995, the (VPNO) and the on shift Nuclear Shift Supervisor (NSS) determined that the Unit 2, "Safeguards Equipment Operability Checklist" should be performed to assure that critical systems were properly aligned. This "safeguards" procedure verifies that emergency safety feature (ESF) systems are properly aligned to perform their intended safety functions. However, this procedure does not check every valve in each ESF system, instead, it verifies those valves in the principle flow path. No deficiencies were found by the licensee. In addition, a complete lineup verification was performed for all valves (including instrument valves) in the Unit 2 safeguards building. This is the same building in which 2SWS-82 is located. No other deficiencies were identified by the licensee. The NSM checked with the NSS and was informed that management felt that the misaligned valve was an operations concern and that nothing had been identified that would indicate the need for security involvement.

On Monday, July 17, 1995, security management again checked and was reassured that the results of the investigation to date, leaned towards the concern being operator error or poor work practices. Security management reminded operations management, that if it appeared to be anything but an operations issue security must be notified immediately. The licensee assigned a task force (root cause committee) to examine this event. The nuclear engineering department was requested to model flow through the service water system.

On Tuesday, July 18, 1995, the licensee's task force reviewed problem report 2-95-200 which described flow transmitter 2SIS-FT946 isolation and bypass valves being mispositioned. Based on this finding, I&C was directed to perform a verification of all safety related instruments valves in the Unit 2 safeguards areas. In addition, the task force conducted a thorough review of the security access logs, and developed a questionnaire to interview maintenance personnel. The task force made a presentation to the VPNO on the information gathered to date and the plans for continuing the investigation.

On Wednesday, July 19, 1995, security management discussed the concerns of the event being a potential security issue with operations management. Security management was reassured that the event was an operations issue and was not security related. During the discussions, security management informed oprrations management of the reporting requirements.

On Thursday, July 20, 1995, the nuclear engineering department notified the licensee's task force that all SWS flows were acceptable, except the 'B' train RSS heat exchangers. However, engineering analysis demonstrated the system still would have performed its safety function under design basis conditions given the current river water temperature and level. I&C completed the verification of instrument valves in the Unit 2 safeguards areas and found no additional valves were mispositioned.

The determination that the potential tampering could not be eliminated was not made until Thursday, July 20, 1995, six days after the licensee had first identified the problem. The emergency notification system phone call to the NRC was placed because the licensee could not definitively rule out the possibility of tampering. The GMNO directed Unit 1 to begin performing the safeguards equipment operability checklist in accordance with security department's recommendation.

On Friday, July 21, 1995, the NRC questioned the licensee's decision not to treat this problem as valve tampering from the time of discovery on July 14, 1995. This should have led the licensee to make NRC notifications and to verify ESF system alignments in both units not just Unit 2.

On Saturday, July 22, 1995, the NRC special inspection team arrived on site and conducted an entrance meeting. Plant management reviewed the event with the NRC.

On Sunday, July 23, 1995, the licensee provided the team a sequence of events of the activities involving 2SWS-82 between May 1, and the time of discovery on July 14, 1995. The licensee's records indicated the last time that the valve was verified in its correct position was on May 1, 1995.

2.1.2 Chronology of Events

Time	Description of Event
Friday, July 14	
1:45 p.m.	Unit 2 operator discovered 2SWS-82, mispositioned (shut) and improperly locked (i.e., pad lock hooked through a cut link in the chain securing the valve), while performing operations surveillance test 2OST-48.7, "Padlock Quarterly Review."
	Operator returned to the control room and notified the Assistant Nuclear Shift Supervisor (ANSS).
	Another operator verified 2SWS-82 was shut and improperly locked with a short length of chain through the valve hand wheel and around the platform hand railing.
	Once the position was verified, the Nuclear Shift Supervisor (NSS) dispatched an operator to open and lock the valve.
	A second operator independently verified the valve open and locked.
2:00 p.m.	NSS (not assigned to the Control Room) was dispatched to investigate. The as-found condition of the chain was reenacted and pictures of the configuration were taken.
3:30 p.m.	General Manager, Nuclear Operations (GMNO) and the Manager, Operations Experience (MOE) notified of the situation.
3:40 p.m.	Nuclear Security Manager (NSM) notified of the event and requested to supply security access logs for the safeguards area for selected individuals. NSM placed shift security on heightened alert and the GMNO directed the operations crew to continue with 2OST-48.7.
	NSM was told that it was an operations issue and that the misaligned valve had no safety significance on plant operations. Security, was informed that the event was not considered a tampering issue although the valve was found mispositioned (shut) and improperly locked (i.e., pad lock hooked through a cut link in the chain securing the valve). The GMNO was advised that if the investigation identified any issues which could be considered as being security significant, to inform the security department as soon as possible. Additionally, security shift resources were offered to assist in the investigation and on shift security supervision was instructed to review procedures and to identify the actions required to be taken in the event the investigation identified a security concern.

4:00 p.m.	GMNO, MOE, daylight NSS and shift NSS began a review of previously performed Operating Surveillance Tests (OSTs), NSS/ANSS logs and clearances. Also at this time, preliminary interviews were conducted with plant operators, ANSS, NSS, the service water system engineer, the service water procedure engineer and the Unit 2 outage planning supervisor. The efforts of this group continued throughout the next several days until Monday, July 17, when a licensee task force (root cause committee) was formed. Event chronology was begun to aid in the event investigation to determine possible scenarios that would cause 2SWS-82 to be mispositioned. Scenarios involved hasty 2SWS-82 manipulation following a RSS cubicle flood during the recent outage, clamicide manipulations, and temporary testing activities.
9:00 p.m.	GMNO attempted to notify the Division Vice-President, Nuclear Operations (VPNO) and left a phone message.
10:15 p.m.	NSS wrote problem report 2-95-219. Problem report reviewed by the 00-08 shift technical advisor and the reportability of the event was reviewed.
10:30 p.m.	The VPNO contacted the Unit 2 NSS.
11:30 p.m.	Operator who had performed the quarterly OST (2OST-48.7) on May 1, 1995, was interviewed by the shift NSS.

<u>Saturday, July 15</u>

3:00 a.m.	Vice President, Nuclear Operations and the on shift NSS determined that the Unit 2, "Safeguards Equipment Operability Checklist" should be performed.
5:40 a.m.	Checklist satisfactorily completed with no further deficiencies found.
9:00 a.m.	Investigation by the GMNO, MOE, daylight NSS and shift STA continued by reviewing Critical and Safety-related key logs as well as auxiliary building operator tours (included Safeguards Building), outage master clearances, non-outage clearances, maintenance work requests, service water system procedures and other documents. Interviews conducted with the NSS assigned as the 5R refueling outage clearance desk coordinator and a maintenance department engineer involved with 5R performance of 2OST-30.13A, and B "Train A, (B) Service Water System Full Flow Test."

Interviewed operators involved in last verifying 2SWS-82 open as part of restoration from 2OST-30.13A, and B.

GMNO directed MOE to form an event review team and root cause committee as outlined in Nuclear Power Division Administration Procedures (NPDAP) 5.2.

Nuclear Security Manager (NSM) discussed the progress of the investigation with the NSS and was updated on the findings. NSM was informed that licensee management felt that the misaligned valve was an operations concern and that nothing had been identified that would indicate the need for security involvement.

3:00 p.m. GMNO directed all valves in Unit 2 safeguards be verified in the proper normal system arrangement.

4:00 p.m. GMNO attempted to contact the senior resident inspector by phone and left messages at 4:00 p.m. and 8:00 p.m.

9:30 p.m. Unit 2 NRC inspector contacted and notified of the event.

Sunday, July 16

Safeguards building valve verifications ongoing.

Interviewed system engineer involved with the 5R performance of 2OST-30.13A,B "Train A,B Service Water System Full Flow Test".

Records investigation continued by reviewing security access logs for the safeguards building and other related information.

No interface between security management and operations. On shift security supervision was made aware of the need to notify security management in the event the investigation findings warranted security involvement.

Monday, July 17

12:55 a.m. Initial Unit 2 safeguards building valve verifications were completed.

8:00 a.m. Plan of the day meeting, a summary of the event was discussed. Director of security given a detailed update of the investigation by the manager of operating experience (MOE). Security was reassured that the results of the investigation to date, leaned towards the concern being operator error or poor work practices. Security reminded the MOE that if it appears to be anything but an operations issue security must be notified immediately.

9:00 a.m. Task Force (Root Cause Committee) assembled to perform a TapRoot analysis for the event. The Task Force included the manager operations experience, a Unit 2 NSS, an STA, the service water system engineer and the service water system procedure engineer. Committee reviewed the chronology developed by the GMNO, MOE and NSS on July 14 and 15, 1995.

Interviewed rad waste supervisor who was involved in the last performance of the clamicide procedure.

While touring safeguards, the security department manager found a half-link of chain similar to the chain found on 2SWS-82.

Nuclear engineering department requested to model flow through the service water system.

Tuesday, July 18

Interviews continued.

The Task Force reviewed problem report 2-95-200 which described flow transmitter 2SIS-FT946 isolation and bypass valves being mispositioned. Based on this finding, I&C was directed to perform a verification of all safety related instrument valves in Unit 2 safeguards areas. A thorough review of the Security Access Logs was performed, and a questionnaire was developed to interview maintenance personnel. In addition, the task force made a presentation to the VPNO on the information gathered to date and the plans for continuing the investigation.

Wednesday, July 19

NSM discussed the concerns of the event being a potential security issue with operations management. Security was reassured that the event was an operations issue and was not security related. Security during the discussions informed operations of reporting requirements as defined in the Duquesne Light Company's Nuclear Power Division Administrative Manual, NPDAP 5.1, No. 172.

Chain placed on 2SWS-82 on July 14, 1995, was replaced with heavier gauge welded link chain through the valve hand wheel and yoke.

Nuclear engineering department notified the Task Force of the results of their flow modeling calculations of the service water system. Engineering results determined that all SWS flows were acceptable, except the 'B' train RSS heat exchangers. The 'B' train RSS heat exchangers flow rate with 2SWS-82 closed was calculated to be 10,890 gpm.

However, further engineering analysis demonstrated that this flow condition ensures that the design basis function would be met.

4:00 p.m. I&C completed the verification of instrument valves in the Unit 2 safeguards area with no additional valves mispositioned.

Interviewed the plant operator who had verified valve position on May 1, 1995, by performing the quarterly surveillance of padlocked valves.

Interviewed five plant operators, a construction director, and construction personnel were not able to provide any pertinent information.

Thursday, July 20

8:30 a.m. Interviewed several Unit 2 mechanical maintenance personnel who were assigned to the Unit 2 RSS heat exchanger tube cleaning job during 5R.

12:30 p.m. Interviewed a large group of Unit 1 mechanical maintenance personnel assigned to the same job, which had been worked continually for several days.

3:30 p.m. Interviewed house and yards personnel who were working in the area during the RSS heat exchanger tube cleaning. No unusual activities involving 2SWS-82 were noticed by any of the interviewees.

Interviewed two operators, they described how they had trimmed excess chain from 2SWS-82 while replacing the valve tag on June 15, 1995.

4:55 p.m. GMNO directed Unit 1 to begin performing the safeguards equipment operability checklist in accordance with security department's recommendation.

6:00 p.m. MOE notified the Director of Security Operations that the Task Force had completed their review of the event and determined that tampering could not be ruled out.

6:52 p.m. Security notified the NRC in accordance with 10 CFR 73.71(b)(1) reporting requirements using the red phone in the control room.

Friday, July 21

	Unit 1 I&C directed to perform maintenance surveillance procedures 1MSP 4.03-I at Unit 1 and 2MSP 4.03-I at Unit 2, "ESF and Miscellaneous Safety Related Instrument Valve Alignment and Calibration Verification", to check instruments for safety related equipment in proper alignment.
4:00 p.m.	Operations began checking all components secured with medium gauge chain.
8:00 p.m.	Began performance of 2OST-48.7, "Padlock Quarterly Review," and concurrent replacement of chain with heavier gauge welded chain. Operation experience personnel reviewed all critical or safety related locked valves and generated valve verification checklists based on systems and locations. These checklists were performed once per shift on a random basis as directed by the GMNO.
10:35 p.m.	Unit 1 discovered 1FW-639, "Dedicated AFW Pump Suction Isolation Valve," missing lock and chain, but the valve in the proper position. Discussions with GMNO determined that implementation of "Two-man Rule" was not necessary. Security initiated compensatory measures to preserve the scene and isolate the area from plant personnel.

Saturday, July 22

	Unit 2 continued valve verification checklists and other compensatory actions.
2:02 a.m.	Unit 1 discovered an instrument isolation valve for PS-1FW-157B closed. Security was immediately notified and security initiated compensatory measures to preserve the scene and isolate the area from plant personnel.
2:27 a.m.	Senior management informed of isolation valve misalignment.
3:45 a.m.	Security restricted vital area access to all groups except operations, chemistry, radcon and security. NSSs began random tours of vital areas.
4:10 a.m.	Unit 1 verified isolation valves for the AFW Pump pressure switches open.
1:30 p.m.	NRC special inspection team arrived on site and conducted an entrance meeting. Plant management reviewed event with NRC.

Sunday, July 23

Tours, valve lineups and other compensatory measures continued.

2.2 2SWS-82 Valve Work Activities on May 1, 1995

2.2.1 Background

On May 1, 1995, DLC records indicated 2SWS-82 was last verified open prior to discovery of the closed valve on July 14, 1995. The Team reviewed records and conducted interviews to establish a sequence of events that occurred on May 1, 1995.

2.2.2 Chronology of Events on Monday, May 1, 1995

Time	Description of Event
1:52 p.m.	2SWS-105 'A' valve repositioned shut in accordance with control room computer logs.
2:15 p.m.	Mechanical maintenance worked on cleaning the tubes on the 'B' & 'D' recirculation spray system (RSS) heat exchangers until they took their afternoon break about 2:15 p.m.
2:30 p.m.	The day shift ANSS gave two plant operators five or six documents that required some actions to complete and directed them to complete those actions. At approximately 2:30 p.m. (while mechanics were on break), the plant operators went to independently verify 2SWS-82 locked open to complete step 18 of 2OST-30.13B, attachment 2. The document indicated that the valve had been repositioned open and locked previously on April 29, 1995, so the operators expected to find the valve in the locked open position. The operators discovered the valve in the shut position (2SWS-82 had been subsequently shut on April 30, 1995 during performance of 2OST-30.13A) and reported this to the ANSS as required by station procedure. The ANSS then directed them to open the valve. Operator #1 attempted to open 2SWS-82, he and operator #2 heard an unexpected flow of water and immediately closed the valve. Note: The licensee determined that the flooding of the 'B' and 'D' RSS heat exchanger cubicles had occurred due to an inadequate clearance that resulted in water being forced from the 'A' train SWS return piping (that had been pressurized with air earlier to facilitate draining of the 'A' and 'C' heat exchangers in preparation for tube

cleaning) and maybe to some extent from the downstream header through the open 'B' and 'D' RSS heat exchanger outlet valves (SWS-105B, and D) when 2SWS-82 was cracked open by operator #1.

Operator #2 discovered 'B' and 'D' RSS heat exchanger cubicles partially flooded and reported to the ANSS.

2:30 p.m.	Mechanics return from break and reported the 'B' and 'D' RSS heat exchanger cubicles partially flooded with about a foot of water (during interviews the mechanics said there was actually about three to four inches of water).
2:42 p.m.	2SWS-105 'A' valve repositioned shut in accordance with control room computer logs.
2:50 p.m.(approx)	Operator #2 repositioned open 2SWS-82 and initialed and dated 2OST-30.13B. Time unknown some time between 2:40 and 2:50 p.m.
2:52 p.m.	Operator #2 exited the vital area for the last time according to security logs.
2:54 p.m.	Operator #1 exited the vital area for the last time according to security logs and left for home about 3:00 p.m.
10:00 p.m.	Operator #3 independently verified 2SWS-82 locked open (between 9:30 and 10:30 p.m.) in accordance with 2OST-48.7, "Padlock Quarterly Review."
10:23 p.m.	2SWS-105 "B" and "D" valves repositioned shut in accordance with control room computer logs.

2.2.3 Observations

After reviewing the events of May 1, 1995, the team had the following observations that were shared with the general manager of operations at the conclusion of the inspection.

In interviews with operator #2, he stated, he told operator #1 to re-shut the valve when they heard the flow of water which was unexpected. Operator #1 in interviews stated, that when he re-shut valve 82, water was still flowing. He also indicated, that he could not recall locking 2SWS-82 before he left the area, but he did recall dropping the chain. He added, that he wouldn't have hesitated to lock the chain to the handrail especially since it was the end of his shift and it would have been difficult to place the chain around the pipe.

Operator #2 (a licensed RO) was holding over past 3:00 p.m. because of simulator training (scheduled to start at 3:30 p.m.). He stated he was not in a hurry because of that. Operator #2 could not remember actually repositioning the valve open, however, he remembered in vivid detail all the events prior to opening the valve which included cracking open and shutting 2SWS-82 approximately a half an hour earlier when the heat exchanger cubicles were partially flooded due to an inadequate clearance (leaving the heat exchanger outlet valves SWS-105A,B,C,D open). Operator #2 stated in interviews, that "if I signed for it I must have done it and the ANSS must have directed me to open it".

During interviews with Assistant Nuclear Shift Supervisors (ANSSs) for the day and evening shift - it was stated that no direction was given to operator #2 to reopen the valve prior to 2:52 p.m., when operator #2 exited the vital area for the last time on May 1, 1995 according to security logs. The day shift ANSS indicated that he would not have directed 2SWS-82 to be opened without first having resolved the inadequate clearance issue which had resulted in the partial flooding of the heat exchanger cubicles. The day shift ANSS was relieved about 3:00 p.m. and at that time the operations department clearance supervisor was working on resolving the inadequate clearance.

A review of control room computer records indicated that two of the four 2SWS-105 valves ('B' and 'D') were not repositioned closed until 10:23 p.m. on May 1, 1995 ('A' and 'C' were closed prior to the operators last entry into the area). These valves were closed to ensure an adequate isolation prior to reopening 2SWS-82. Without these four valves closed it would have been uncertain whether opening 2SWS-82 would have caused further flooding of the heat exchanger cubicles. The revised clearance that shut the SWS-105 valves, opened the breakers supplying power to associated motor operators, and hung danger tags was completed at 10:45 p.m.

2OST-30.13A, Step 18 required double verification of 2SWS-82 locked open. This double verification step was signed on May 4, 1995, based on the single verification made on the May 1, 1995 performance of 2OST-48.7 made by operator #3. Operator #3 was on vacation and was unavailable for NRC interviews.

The general manager of operations agreed with the team observations and planned to conduct additional interviews to further investigate these observations.

2.2.4 Findings and Conclusions

The control of work activities that occurred on May 1, 1995 was weak. Specifically, the coordination of work activities and the clearance issued to perform the draining of the SWS side of the RSS heat exchangers as part of restoration from the service water system full flow tests (2OST-30.13A & B) were inadequate which resulted in the flooding of the 'B' and 'D' RSS heat exchanger cubicles.

The Team also identified problems with the documentation of work performed on May 1, 1995, which contributed to DLCs inability to positively establish the position of 2SWS-82.

- The Team reviewed the records that last verified 2SWS-82 was repositioned to the open position and concluded that independent verifications were not performed as required by procedure. The inspector reviewed the service water system full flow tests (2OST-30.13A & B) that were completed between May 1-4, 1995.

  In 2OST-30.13B, attachment 2, step 18 an operator repositioned open 2SWS-82 on April 29, 1995 a second operator signed as an independent verifier that the valve was open on May 1, 1995. During interviews conducted by DLC and later independently conducted by NRC inspectors, it was confirmed that the operator had actually reopened the valve after it had been shut by another operator on April 30, 1995, performing the actions of 2OST-30.13A. There was no independent verification of the valve reposition of 2SWS-82 prior to completion of 2OST-30.13B on May 1, 1995, in violation of station procedure 1/2OM-48.3.D(ISS3). This issue remains unresolved pending further review by the resident inspectors (URI 95-80-01).

  In 2OST-30.13A, attachment 2, an operator inadvertently extended an arrow from a date (May 1, 1995) on step 17 at the top of the page through the step 18 verification date block towards the middle of the page indications that these steps were performed on that date. This error may have caused the operator to overlook performing step 18 that required repositioning open and locking open 2SWS-82 and the independent verification of the 2SWS-82 locked open. Step 18 was signed off on May 4, 1995, for both the initial verification and independent verification based on a single verification performed on May 1, 1995, by an operator conducting the padlock quarterly surveillance test 2OST-48.7. The valve was not verified open and locked by initial check by procedure 2OST-30.13A prior to using the padlock quarterly surveillance test to satisfy the independent verification requirements in violation of station procedure 1/2OM-48.3.D(ISS3).

  The Team concluded that the sloppy use of date block continuation arrows throughout 2OST-30.13A & B from the top of procedure pages through steps verified by different operators contributed to these problems. In interviews with several operators, ANSSs and operations management it was confirmed that this was a commonly accepted practice in completing this type of activity.

- Neither the control room (NSS, ANSS, RO) or plant operators logs documented the partial flooding of the 'B' and 'D' heat exchanger cubicles and the inadequate valve isolation that led to this problem. The clearance trailer had noted in their log that a report had been received that an operator manipulating 2SWS-82 had flooded 'B' and 'D' RSS heat exchanger cubicles with one foot of water and that a problem report was required.

- A problem report was never written documenting the inadequate clearance and subsequent flooding of the RSS heat exchanger cubicles as required by nuclear power division administrative procedure, NPDAP 5.2, "Preparation of Problem Reports, Conduct of Critiques and Follow up

Actions". The Team concluded that if a problem report had been written at the time documenting the problems involved in the partial flooding and inadequate valve isolation that it would have expedited reconstructing the sequence of events and may have led to a clearer understanding of the event as well as possibly identifying the problem significantly earlier based on a problem report investigation. The issue that problem reports were not written to document the above deficiencies remains unresolved pending further review by the resident inspectors (URI 95-80-02).

3.0 DUQUESNE LIGHT COMPANY (DLC) RESPONSE TO THE JULY 14 EVENT

3.1 Operations Response to the Potential Tampering

3.1.1 Initial Operations Response

The Duquesne Light (DL) response to the potential valve tampering event on July 14, 1995, included the following actions at Unit 2. The General Manager of Nuclear Operations (GMNO) was informed of the problem. The GMNO called the nuclear security manager (NSM) and told him that it was an apparent operations issue and that the misaligned valve had little or no safety significance on plant operations and was not considered a tampering issue. The GMNO formed an adhoc group that reviewed previously performed Operating Surveillance Tests (OSTs), control room logs, clearances, maintenance work requests, system procedures, and conducted preliminary personnel interviews July 14 and 15, 1995. A problem report, No. 2-95-219, was written to document the as found problem and evaluate the potential reportability of the event. The Division Vice-President, Nuclear Operations (VPNO) was notified about the mispositioned valve late in the day.

The operations shift personnel implemented the applicable written procedures related to the mispositioned service water valve. An example was the immediate report of the valve condition from the nuclear operator (NO) to the assistant nuclear shift supervisor (ANSS) and subsequent restoration of service water valve 2-SWS-82 to the locked open position. The shift technical advisors (STAs) initiated a plant problem report to document the event. The "confirmed sabotage" threshold was not reached for the procedure implementation of the two man rule, immediate NRC reportability, or emergency plan classification.

The operations management decision process was initially based on the assumption that the improperly controlled service water valve was more of an operator error concern than a valve tampering issue. Based on this assumption, the initial operations actions were focused on determination of the root cause for the valve out of position and reason for the cut chain link. Because of this approach, the Unit 2 operations personnel did not implement Special Operating Order (SOO) No. 2-93-6, until 12 hours after the valve was found mis-aligned. The SOO, "Suspicious Degradation of a Safeguards Train ...," included the performance of the Unit 2, "Safeguards Equipment Operability Checklist." The safeguards checklist was in addition to the routine safety system lineup checks performed by the STA, reactor operators (ROs) and plant nuclear operators (NOs). The NOs tour all safety related areas and verify a select number of locked safety valves at least every 8 hours.

Saturday, July 15, 1995, the VPNO and the on shift NSS determined that the Unit 2, "Safeguards Equipment Operability Checklist" should be performed. The SOO was an informal method that was used to communicate important information from operations management to the shift personnel. The SOO implementation criteria were contained in the conduct of operations procedure 1/2.48.1, "Operations Shift Rules of Practice." The order was a hand written document approved by the Nuclear Operations Supervisor. The operating order was not a permanent approved procedure and was not referenced or initiated by an approved operations or security procedure. Also, some operators did not appear to be familiar with the SOO or aware that a copy was available in the control room for reference during potential security events. However, it was the only written guidance available to the operators for the potential tampering condition. Of the five items listed in the SOO, the posting of a security guard at the scene was the only item not initiated within 12 hours of the event report. The safeguards information was kept in a sealed envelope in the NSS's desk. The checklist was satisfactorily completed on July 15, 1995, at 5:40 a.m.

The Unit 2 SOO did not recommend a verification of similar components on Unit 1. The GMNO decided to concentrate the investigation on Unit 2 based on satisfactory Unit 1 valve lineups, surveillance test data and shiftly safety system alignment checks in the control room and plant. When the initial event review could not rule out the possibility of tampering the GMNO decided to verify Unit 1 safety system alignments in more detail.

The Team's review of the checklist concluded that the list contained the required information necessary to verify that the standby safety system flow paths were aligned to combat any potential accident condition. The order was a "safeguards" procedure which verifies that emergency safety feature (ESF) systems are properly aligned to perform their intended safety functions. The procedure does not check every valve in each ESF system, instead, it verifies those valves in the principle flow path. No other deficiencies were found by the licensee. The Team independently verified the position of a majority of the safety related valves located in the safeguards building. All valves were locked and positioned as required by procedure.

The Team reviewed operations procedure 1/2OM-48.3.C, "Padlocks/Locking Devices Administrative Requirements." The procedure provided limited guidance to plant personnel in reference to the proper technique for applying chains and padlocks for safety related locked valves. For example, the procedure did not provide a preferred method about where and how to apply the chain. Also, there was no information to ensure that plant personnel do not apply chains around sensitive equipment such as instrument tubing and pipe support snubbers. The team also noted that procedures did not provide written guidance for the expected operator actions for performing initial and second verification of locked throttle valves.

3.1.2 Follow-up Actions for Units 1 and 2

The determination that the potential tampering could not be eliminated was not made until Thursday, July 20, 1995, six days after the licensee had first identified the problem. The emergency notification system phone call to the NRC was placed because the licensee could not definitively rule out the possibility of tampering. The GMNO directed Unit 1 to begin performing the safeguards equipment operability checklist in accordance with the security department's recommendation.

On Friday, July 21, 1995, the following directions were provided to the Unit 1 and 2 operations personnel. The information was written as an addendum to the Night Orders for the shift crews.

- SROs shall randomly tour (no routine order) a safety related area each shift and log in their narrative log what safety related items were looked at. A sample log entry would read - Toured safeguards area, 735' level. Aux feed pump suction, discharge, and recirculation isolation valves verified NSA open. These tours shall continue on a shiftly basis until further notice.

- Both Unit 1 and Unit 2 are to perform the quarterly Padlock log OST 1/2-48.7. Verify that each chain link and lock is intact and the chain is not cut. Replace any "dog chain" with 1/4" welded chain. The chain will be delivered to the PAF this evening.

- Ask operators if there are any bolt cutters that are on site and accessible. Confiscate the cutters and use under NSS control/issue only! Keep the cutters in the control room only.

- Remember and enforce proper key control. Tour operators should turnover key rings or hand rings to NSS or ANSS for proper control at turnover. Key rings should never be unattended.

- If any mispositioning events are identified, assume that a tampering event has occurred and notify security IMMEDIATELY. Quarantine the area and do not disturb any potential evidence. Refer to the Special Operating Order regarding the use of the safeguards checklist.

The Team reviewed the Duquesne Light follow-up actions. Based on the inability to identify when the service water valve was mispositioned, the DLC decision to wait six days to report the event as potential tampering was not timely. Ultimately, the safety system line-up verifications on Units 1 and 2 were comprehensive and did not find any additional valve tampering problems.

In addition, the Team interviewed personnel to determine their familiarity with the security information related to operations. Some control room senior reactor operators (SROs) were not aware that the security plan was available in the control room for reference during potential security events. With the exception of a recent one time initiative, security related training for licensed SROs was limited to the annual site access refresher training. The site refresher training did provide a comprehensive overview of the basic site security knowledge requirements for plant operators.

3.2 Security Response to the Potential Tampering

On July 14 at 3:40 p.m. the Nuclear Security Manager was informed of the anomalies associated with the 2SWS-82 valve. He was advised by the operations organization that they firmly believed the event was associated with either operator error or poor work practices. The operations organization did not consider it to be a potential tampering event. As a result the DLC security organization limited their response to monitoring the progress of the investigation and reviewing applicable regulations to be implemented if tampering were identified while the operations organization investigated the cause of the event. Review of the NRC approved Contingency Plan by security management disclosed that the Plan specified the actions to be taken for suspected or obvious attempts to sabotage the plant but not for potential tampering of equipment. As required by 10 CFR 73 Appendix C, the contingency plan was written to give guidance to licensee personnel in order to accomplish specific defined objectives in the event of threats, thefts or radiological sabotage. The potential tampering did not meet the threshold of the specific events defined in the Plan. Because the potential tampering did not meet the threshold of the events in the Contingency Plan, the Plan was not implemented. On July 20 Operations management determined that they could not firmly establish the cause of the July 14 event. Since tampering could not be ruled out, the event was reported to the NRC as potential tampering and the licensee instituted a number of security measures at both units.

On July 20 at 1862 Hours, the Director of Security Operations notified the NRC of the event in accordance with the provisions of 10CFR73 Appendix G reporting requirements using the red phone in the control room. Security was placed in a heightened state of awareness which required the security force members (SFMs), while performing their tours, to be observant for items such as broken locks, cut chains, or anything that would appear suspicious. Additionally, in the event any of these problems were identified, the SFMs were instructed to secure the area, notify security shift supervision, and monitor access into the area.

Security implemented compensatory measures in the areas in Unit #2 in which misaligned valves were identified in an attempt to preserve the scene. The compensatory measures included posting a SFM in the immediate area of the valves to monitor access to the area. The areas were monitored by security until July 22, 1995. On July 21 I&C was directed to perform a valve verification in Unit #1, to ensure safety related equipment was in proper alignment. The verification identified a valve that was in the proper position with the lock and chain missing and another valve that was misaligned. Security implemented compensatory measures in an attempt to preserve the scene. On July 22, 1995, the FBI was requested by security to investigate the identified areas and attempt to obtain fingerprints from the valve surfaces. Due to the composition of the valve hand wheels, the surfaces were non uniform, course and pitted. The FBI agent stated that it was impossible to obtain a useable set of fingerprints. Therefore, no fingerprints were taken.

Vital area (V/A) access control measures were instituted on July 21, 1995. In order to monitor V/A access, security was directed by the Chief Nuclear Officer to implement the following actions:

- Deactivate all blue access badges (non-Duquesne Light personnel) with the exception of the NRC and DER.
- Deactivate all house and yard labors (gold badge) access badges.
- Deactivate the badges of (8) Health Physicist technicians who were in the process of being placed into a lower job classification.
- Coordinate with the Department of Human Resources and obtain a list of individuals suspended from duty for disciplinary reasons between the periods of April 1-July 14, 1995.

To implement V/A access restrictions, security performed a unit/area roll call of personnel on site and began deleting the individuals noted above from the V/A access logs and notified site managers of the actions. Personnel accessing the site were informed of their V/A status.

On July 22 additional access restrictions were imposed. All plant employees except Operations, I&C, Radcon, Chemistry and Security were required to obtain Operations Shift Supervisions approval and an authorized access change notice (AACN) to verify authorization was given for V/A access. With the AACN, if someone had to enter a V/A, a security officer was dispatched to the area in which access was granted, opened the door, manually logged the individual into the area and out of the area when work was completed.

On July 23 modifications were made to relax some of the vital area restrictions that had been imposed earlier. All blue and gold badged employees that initially had their V/A access suspended were reevaluated based on whether they had accessed the safeguards building between the period of May 1 - June 15, 1995. Those individuals that had not accessed the area during that period had their V/A access restored.

Security implemented a temporary post order requiring security personnel to do a visual inspection of chained and padlocked valves in their patrol area, each hour. The inspection consisted of looking for signs of tampering, cutting, or any condition that could indicate tampering. If any problems were discovered, the SFM was to post the area to preserve the scene and notify the central alarm station (CAS) immediately. The SFM was to keep the area isolated, but not inhibit operations from making any emergency corrections to the valve and notify CAS if this occurs.

On July 24 the following vital area access restrictions were lifted:

- Lifted restriction requiring security to open V/A doors and maintain access logs.

- Lifted restrictions for Operations Shift Supervision's approval for V/A access.

Based on the manner in which security monitored the progress of the investigation conducted by the Operations Experience Group (OEG), and responded when potential tampering could not be ruled out, the actions taken by security in response to the event were considered to be appropriate. From the time the misaligned valve and cut chain were discovered and security was notified of the situation, security monitored the progress of the investigation on a daily basis and once potential tampering could not be ruled out, security notified the NRC in accordance with the provisions of 10CFR73 Appendix G reporting requirements. Security was sensitive to the situation evident by their actions implemented upon initial notification of the event to include initial procedural reviews by on shift security supervision, establishing internal communications with security management and on shift supervision, attendance of daily plant status meeting and ongoing interface with the Operations Experience Group. Additionally, once the event was reported, security went into a heightened state of awareness which required the security force members (SFMs), while performing their tours, to be observant for items such as broken locks, cut chains, or anything that would appear suspicious. In the event something was identified the SFMs were instructed to secure the area, notify security shift supervision, and monitor access into the area.

Security implemented compensatory measures in the areas in Units 1 and 2 in which discrepancies were identified during follow-up equipment verifications by Operations Personnel, in an attempt to preserve the scene, interfaced with the FBI in an attempt to gather evidence through fingerprinting, restricted vital area access, and implemented a post order stating that response personnel shall do a visual inspection of valves that are chained and padlocked, within their patrol area, each hour.

Because there were no security procedures which provided guidance for a potential tampering situation, security involvement was initially limited until a determination was made by operations that tampering could not be ruled out. This resulted in the event being reported six days after the initial discovery of the misaligned valve and cut chain.

3.3 DLC Management Response to the Potential Tampering

The General Manager, Nuclear Operations (GMNO) was notified that the 2SWS-82 valve was mispositioned and improperly locked approximately two hours after the initial identification of the valve anomalies on July 14. The Nuclear Security Manager (NSM) was provided this information shortly thereafter. The GNMO concluded that the valve anomalies were due to either operator error or poor work practices and that the anomalies were not a result of potential tampering. His basis for not treating it as a potential tampering event included the following:

- The safety significance of the mispositioned valve was low.

- This valve was a poor candidate for tampering considering that there were more safety significant valves in the immediate area.

- A number of outage activities were conducted in the area of the valve on May 1, 1995, when the valve was last determined to be in the open position. These could have led to the valve mispositioning.

- A number of new people were working in the area of the valve.

- Documentation of the valve position verification was suspect considering sloppiness in the documentation.

- Sloppy chain practices involving end cut links were previously observed.

- Significant differences were noted between the current July 14, 1995 valve anomalies and the tampering event of 1981.

Based on the above, from July 14 to July 20, DLC mounted an extensive effort to investigate a number of scenarios that could have led to the July 14 valve anomalies.

The GNMO attempted to notify the Division Vice-President Nuclear Operations (VNPO) and left a phone message at 9:00 p.m. on July 14. Ultimately the VNPO was informed by the Nuclear Shift Supervisor (NSS) at 10:30 p.m. that the valve was mispositioned. However, due to a mis-communication the VNPO was not informed that the valve was improperly locked until Tuesday July 18. The VNPO and the shift NSS determined that "Safeguards Equipment Operability Checklist" should be performed at Unit 2 at 3:00 a.m. on July 15. The Senior Vice President was informed that the valve was mispositioned on Monday July 17. However, he was not informed that the valve was improperly locked with a cut chain until Thursday July 20.

By July 20 DLC was unable to definitively establish that operator error or poor work practices led to the valve anomalies. While they still believed that these problems resulted in the valve anomalies, they could not rule out potential tampering as the cause. On July 20 the event was treated as a potential tampering event and reported as such to the NRC. At this time safeguards precautions were taken at both Beaver Valley units.

The Team expressed concern to DLC management that it took six days before the event was treated as a potential tampering event with appropriate safeguards precautions taken at both units. While it was recognized that actions were taken at Unit 2 to perform the safeguards checklist early in the morning on July 15, the special operating order that is to be implemented at Beaver Valley in the event of the identification of suspicious degradation of a safeguards train should have been implemented at both units shortly after the identification of the problem on July 14. The team also noted that problems in communicating the valve anomalies to senior DLC management may have contributed to the delay in implementing appropriate safeguards measures at both units.

3.4 Reporting of the Event

The Team reviewed the initial reportability requirements, potential emergency plan declaration and the subsequent notification of the NRC on July 20, 1995, for the potential tampering of service water valve SWS-82. The review was focused on the implementation of the existing Duquesne Light (DL) written procedure requirements and the NRC regulations.

The Team reviewed the Problem Report, No. 2-95-219, that was initiated at 10:15 p.m. on July 14, 1995, for the SWS-82 valve condition. After an initial screening, the problem report was reviewed by the midnight shift STA to determine the potential reportability of the event. The Problem Report provided an accurate description of the event including the "damaged link which would enable the chain to be removed without unlocking the padlock." Based on the closed position of SWS-82, the initial reportability determination addressed the potentially degraded 'B' loop service water flow conditions. The description of the event reportability was listed as: "To be determined, possible Technical Specification violation." The initial evaluation was appropriate because the valve event did not meet the threshold for the 10 CFR Part 50, Part 73, or the licensee's procedure Nuclear Power Division Administrative Manual (NADAP) 5.1, "Report Requirements."

The Duquesne Light Emergency Plan was also reviewed by the Team to determine if the event conditions met the Unusual Event (UE) declaration criteria. Emergency Action Level (EAL) section 4.6, "Security," provided a description of "confirmed security events which indicate a potential degradation in the level of plant safety." An Unusual Event would be declared if the Security Shift Administrator reported one or more of the events listed in Table 4-4. The events were: 1) Sabotage/Intrusion has OR is occurring within the protected area; 2) Hostage/Extortion situation that threatens to interrupt plant operations; 3) Hostile strike action within the protected area that threatens to interrupt plant operations; or 4) Civil disturbance ongoing between the site perimeter and protected area. The EALs define sabotage as "deliberate damage, mis-alignment, or mis-operation of plant equipment with the intent to render the equipment unavailable." Based on the definition of sabotage, the DLC decision not to make a UE declaration was appropriate.

On July 20, 1995, at approximately 6:00 p.m., the Manager of Operations Experience and the General Manager Nuclear Operations contacted the Director of Security Operations and told him that the review of work orders and interviews with operations personnel did not conclusively identify when the valve had been mispositioned and that tampering could not conclusively be ruled out. At that time the Director of Security Operations reviewed the reporting in 10 CFR 73.71, Regulatory guide 5.62 REPORTING OF SAFEGUARDS EVENTS, and the Beaver Valley Nuclear Power Division Administrative Manual 5.1 REPORTING REQUIREMENTS. At 6:52 P.M. the Director of Security Operations made an event notification to the NRC Headquarters Duty Officer under the provisions of 10CFR73.71 that there had been potential tampering with safety related equipment. The tampering had not been confirmed, however the NADAP 5.1, "Report Requirements," section B., NRC notifications and follow-up reports. Item g. states: "It is preferable to report a questionable event rather than not to."

In conclusion, the DLC personnel followed the written procedures related to event reportability and emergency declaration. The initial event information did not meet the written procedure criteria. The DLC decision to report the event to the NRC on July 20, 1995, was appropriate and based on the procedure guidance: "It is preferable to report a questionable event rather than not to."

3.5 Safety Significance of the Event

2SWS-82 is the service water header cross connect valve, outlet of the recirculation spray heat exchangers. During the first and second fuel cycles the licensee operated with this valve in the closed position. Over that time period the flow through the service water headers began to decline resulting in a reduced margin between the Technical Specification (TS) required minimum flow and the actual flow. After the second cycle the licensee conducted a chemical cleanup of the system. In addition, the engineering department determined that with the cross connect valve in the open condition, flow through both headers would be stabilized. During the next cycle the normal system alignment of the valve was change from closed to open. Due to the change in the operating condition of the valve the licensee determined that the valve should be locked in that position as an addition administrative precaution to alert operators of the new valve position.

Upon discovery of the 2SWS-82 valve in the closed position, the licensee performed an engineering evaluation of the service water system to determine what the Technical Specification required flow rate would be if the valve was shut (i.e., in the as found condition on July 14, 1995). The evaluation included a flow analysis of the service water system (SWS), whereby the latest surveillance test results were used as an input basis for the computer model. All SWS subsystems indicated flows were above the required minimums except for the 'B' train of the SWS to the recirculation spray system heat exchanger. The total flow was equal to 10,890 gpm. The minimum require by TS is 11,000 gpm. However, the computer program used to model the SWS incorporated several conservatisms. Further evaluations by the licensee concluded that the SWS would have met its design basis. Therefore, operating with the 2SWS-82 in the closed position is of minimal safety significance. The issue that the 'B' train of the SWS to the recirculation spray system heat exchanger was in a condition where it was below the technical specification minimum (T.S. 3.6.2.2., 11,000 gpm) will remain an unresolved item pending further review of this issue by the resident inspectors (URI 95-80-03).

4.0 PRECURSORS AND RELATED EVENTS

4.1 History of Security Events

Prior to the current July 14 potential valve tampering event, several other tampering or suspected tampering events occurred at Beaver Valley. These events and the corrective actions associated with these events are discussed below.

October 27, 1980, Tampering damage to door (50-334/80-27):

On October 27, 1980, a contractor security officer on a routine plant tour found the door from the Primary Auxiliary Building (PAB) to the Fuel Building (FB) damaged. The door had apparently been forcibly opened. The door was normally locked and subject to security key control. The door lock had apparently been pried open with a crowbar or similar device, damaging the door frame and locking mechanism such that the door could not be re-locked with installed equipment. A preliminary search of the building identified no unauthorized personnel, material, or signs of damage. A guard was posted at the damaged door while the search continued and repairs were being performed on the door. In addition a two-man security compensatory tour was initiated on a continuous basis for discouragement or discovery of further attempted vandalism. No abnormalities were identified.

The security plan identifies the entire PAB and FB as a single contiguous Vital Area. Therefore, the damaged door constitutes a secondary boundary established by the licensee to control traffic and access as a convenience. The security plan does not require this boundary to be locked or otherwise controlled. Based upon the review the inspector concluded that the damaged door could not be considered a Vital Area boundary. Although no actual degradation of plant security boundaries appears to have occurred, the inspector advised the licensee of NRC:RI concerns regarding the apparent disregard for and vandalism of security related hardware.

June 5-6, 1981, Mispositioning of Valve on the High Head Safety Injection (50-334/81-16):

Duquesne Light Company (DLC), Beaver Valley Power Station, Unit 1, reported to the NRC on June 6, 1981, that a manually-operated valve (SI-26) in the common suction line to the high head safety injection (HHSI) pumps was found shut during a routine nuclear operator tour on June 6, 1981. Valve SI-26 was immediately opened. The operator also discovered that the chain and padlock, attached to the valve handwheel to prevent accidental on inadvertent closure of the valve, were missing.

The closure of SI-26 resulted in the loss of high head (pressure) safety injection capability. With valve SI-26 shut, cooling water from the refueling water storage tank (RWST) would not have been automatically available under emergency conditions to the three HHSI pumps for high pressure injection of water into the reactor core. Manual action by an operator, responding to a system malfunction indication in the control room, would have been required to initiate operation of the HHSI system. The incident did not result in any adverse effects on the health and safety of employees and the general public, but the potential for creating a adverse safety condition did exist.

Concurrent with the report to the NRC of the mispositioning of SI-26, the licensee reported another occurrence of similar circumstances that was discovered on June 5, 1981. That incident involved discovery of chains and padlocks missing from the manually-operated suction valves (WT-225, 226, 227) for three auxiliary feedwater pumps. However, in that case the valves were found to be in their normal (open) position. The licensee was unable to identify the cause for two incidents.

The inspection resulted in 4 violations. The corrective actions was as follows:

- The use of high strength locking devices on valves whose mispositioning would reduce the margin of safety below analyzed levels as set forth in the facility licensing documents.

- Increased compartmentalization in the Primary Auxiliary Building, using key locked access doors, was established to limit access to certain plant areas.

- A specific procedure for supervision and plant management was developed and implemented which provided guidance for the initial response, investigation, evaluation, and long term action to be taken in response to a security incident of this type.

- A method of documenting on-the-job training was implemented so that an individual's training record would more adequately reflect their qualification for duties.

- Each valve which was administratively secured by a lock and chain was reevaluated. A list was identified of additional valves whose mispositioning would reduce the margin of safety below analyzed levels as set forth in the facility licensing documents.

- A new key control procedure was developed to control the distribution of keys to secured safety equipment.

<u>July 17, 1985, Mispositioned Load Limiter resulted in Inoperable Diesel Generator (50-334/85-17):</u>

On July 17, 1985, during performance of the monthly surveillance test (OST 1.36.1), the No. 1 diesel generator only accepted a 390 kw load. Licensee investigation determined that the load limiter was mispositioned at about one-third its normal setting. After consultation with plant management, the load limiter was adjusted to full load (2850 kw) and the surveillance test successfully completed.

The immediate implications were that the No. 1 diesel generator would not have been able to accomplish its design function until and operator could be dispatched to identify and correct the problem. The licensee initially believed that the mispositioned setting could be attributed to either motor vibration, inadvertent movement during housekeeping efforts several days before, or deliberate tampering. The second diesel generator was immediately checked. A walkdown of other plant equipment identified no other abnormalities.

Based on the lack of evidence that deliberate tampering with plant safety equipment occurred, the licensee reported the event to the NRC via the ENS two hours after discovery as an inoperable safety system. The rules and regulations do not require the licensee to identify suspected tampering events as such. Due to the NRC's sensitivity to these events, the inspector requested the licensee to notify the NRC in the future of any such events so that appropriate actions could be immediately implemented by the Region. The comment was acknowledged by the plant manager. In follow up discussions, the inspector noted that should a similar event occur, it would be prudent for the licensee, to develop a list of critical equipment in standby systems that are not normally operated such that the shift supervisor could conduct a very quick check to assure that important plant systems have not been tampered with. This list should not be widely distributed. Those comments were also acknowledged by the plant manager. Although a tampering act cannot be positively ruled out, it is believed that the load limiter was probably mispositioned during cleaning.

December 8, 1986, Equipment Tampering (50-334/86-29)

At approximately 11:10 p.m., December 18, 1986, during a shift changeover control room panel walkdown, an operator observed the "power available" indicator for one of six safety related auxiliary feedwater valves was dark. Investigation disclosed that the breaker for the valve motor operator was tripped but the valve was open, as required. The breaker was reset and the motor operator was re-energized at 11:20 p.m. The tampering review procedure was initiated by the shift crew. No other indications of equipment tampering were detected.

A subsequent investigation including review of security access control records and the plant process computer printout identified five personnel who had been in the area at that time. Interviews of those personnel were conducted late on December 19. A security guard stated that he may have bumped the breaker panel with his body just before leaving the area. The licensee did not consider that plausible since physical protective devices had been installed on safety-related breakers to preclude such occurrences. The guard was subsequently interviewed by a consultant hired by the security contractor. He admitted to handling the protective device, out of curiosity. During his efforts to return the protective device to its normal position, he tripped the breaker. He then left the area without notifying anyone. The guard was suspended by the security contractor pending completion of the investigation.

4.2 July 14,1995 Related Equipment Anomalies

Around the time that the July 14 potential valve tampering event was discovered several other valve anomalies were discovered whose cause could not be conclusively established. One of these was identified at Beaver Valley on

June 26. This valve was located in the same safeguards area as the 2SWS-82 valve. The other two anomalies were discovered at Unit 1 as a part of walkdowns that were conducted in response to the July 14 event. Each of these anomalies are discussed below along with a discussion of the safety significance associated with the anomaly. The mispositioning of the 2SWS-82 valve and the valves discussed below will remain an unresolved item pending further review of this issue by the resident inspectors (URI 95-80-04).

June 26, 1995, Misaligned valves found on flow transmitter

At approximately 4:35 a.m., June 26, 1995, an operator found the low side isolation and bypass valves associated with the five valve manifold for 2SIS-FT946, out of their normal system alignment position while performing an ESF clearance walkdown. The low side isolation valve was found closed, and the bypass valve partially open. In response, the licensee performed a search of site records to identify the cause of the incident. On April 3, 1995, a surveillance test was performed that required manipulation of the drain valve for 2SIS-FT946. As part of the restoration following the testing the drain valve was double verified shut on April 3, 1995. The instrument low side isolation valve and bypass valve were not operated for the test. As part of the performance of 2MSP-4.03-I, "ESF and Miscellaneous Safety Related Instrument Valve Alignment and Calibration Verification", the I&C department double verified proper system alignment on May 2, 1995. The licensee concluded that this incident could not have been caused by bumping instrument valves, because the low side isolation valve requires multiple turns of the valve stem in order to fully open/close the valve. 2SIS-FT946 provide a signal for indication only, therefore is of minimal safety significance.

Two weaknesses were identified in the independent verification process that may have contributed to difficulties in the establishment of the as left position of the instrument isolation valves. First, DLC I&C procedures require a concurrent vice independent verification process to ensure safety related instrument valves are aligned in the correct position. Secondly, DLC I&C procedures for verification of normal system transmitter lineups prior to start up, rely on "skill of the craft" for the correct valve position verification. The procedures only list the transmitters by name and do not include a more detailed list of the transmitter manifold high side isolation, low side isolation or equalizing valves with the required position of each valve. Concern of the I&C departments verification procedures has previously been identified by the resident inspectors in inspection reports 50-334/95-07 and 50-412/95-07.

July 21, 1995 Missing chain/padlock for Suction Valve on Appendix R AFW Pump

Following a conference call with the NRC on July 21, the licensee began to conduct more extensive measures to evaluate if tampering with plant equipment had occurred. The Unit 1 chain/padlock verification surveillance test, 1OST-48.7, "Padlock Quarterly Review," was performed. This surveillance test, in addition to the quarterly verifications, contains annual verification requirements for non-critical, no safety-related components. Operations personnel were also directed to evaluate all chain links for cuts, and to upgrade most manual valve chains to the 1/4-inch link type. While performing the surveillance test, operators identified a missing chain/padlock on FW-639, the dedicated AFW pump (FW-P-4) suction isolation valve. The valve was in the normal system alignment position. The licensee could not determine a reason for the discrepancy. However, after further investigations it was discovered that the most recent surveillance tests performed, that manipulated the valve, did not require the installation of a chain and padlock. Interviews with operators revealed that the valve was locked without a chain by use of a padlock placed through a hole drilled in the handle sub-assembly arm. The valve had been verified by three independent operators who recall that the valve was locked with the padlock through the handle. This was the as-found condition of the valve on July 21. The valve is of minimal safety significance. The Appendix R AFW pump is a backup system that requires operators to manually start the system. A system line-up is performed before operation. There is no automatic actuation of the system.

July 22, 1995, Pressure Switch Instrument isolation valve shut

To further investigate possible tampering the licensee performed Maintenance Surveillance Procedure (MSP) 1MSP-4.03-I, "ESF and Miscellaneous Safety Related Instrumentation Valve Alignment and Calibration Verification." This procedure was augmented with checks of several additional main steam pressure and feedwater flow transmitters. While performing the procedure operators discovered that the 3B AFW pump discharge pressure switch (PS-FW-157B) instrument isolation valve was shut. The valve had previously been verified to be in its normal system lineup position. The licensee also concluded that this incident could not have been caused by bumping instrument valves, because the isolation valve requires multiple turns of the valve stem in order to fully open/close the valve. The pressure switch initiates isolation of steam generator blowdown following a start of the 3B AFW pump (motor driven). The equivalent pressure switches for the other two AFW pumps were not isolated. Therefore it is of minimal safety significance if the pressure switch for AFW pump 3B is isolated.

5.0 GENERIC IMPLICATIONS OF THE JULY 14, 1995 EVENT

The Team reviewed the July 14 potential valve tampering event for generic implications. One item was identified that has potential generic implications. Nuclear power plants are required to have operational and security procedures to cope with sabotage in accordance with 10 CFR 73.55(h)(1) and Appendix C of Part 73. However, these procedures have a high threshold. It is a generic issue that many plants do not have procedures that deal with potential tampering events.

6.0 FINDINGS AND CONCLUSIONS

DLC was unable to conclusively establish the cause of the 2SWS-82 valve mispositioning or the reason the valve was improperly locked with a cut chain on July 14, 1995. Since they could not rule out potential tampering, they reported the anomaly as potential tampering to the NRC on July 20, 1995. While several other valve anomalies were subsequently discovered, DLC continues to believe that the July 14 event and the subsequent valve anomalies were a result of operator error or poor work practices during the recent outage and not valve tampering. The NRC Special Team agrees that the July 14 event and the other valve anomalies were likely a result of operator error or poor work practices.

The Team expressed concern that Unit 2 operations personnel did not implement Special Operating Order (SOO) No. 2-93-6 "Suspicious Degradation of a Safeguards Train" until 12 hours after discovery of the valve misalignment. The SOO was not implemented on Unit 1 until six days later. Instead, DLC spent six days investigating various scenarios before treating the event as potential tampering. The team concluded that DLC should have implemented the SOO on a more timely basis at both units, particularly considering previous potential tampering events at Beaver Valley in '80, '81, '85, and '86.

DLC personal communications deficiencies prevented the DLC Division Vice-President Nuclear Operations and the Senior Vice President from knowing about the improper locking of the valve until four and six days after the event, respectively.

Early in the morning of July 15 the "Safeguards Equipment Operability Checklist" was used to assure correct alignment of critical safeguards equipment at Unit 2. The safeguards list is a part of SOO No. 2-93-6. However, a weakness was noted in their procedures in that DLC does not have an initiator that directs operators to implement the SOO. Also, some operators did not appear to be familiar with the SOO or aware that a copy of the site security plan was available in the control room for reference during potential security events. Furthermore, with the exception of a recent one time initiative, security training for licensed SRO's was limited to the annual site access refresher training.

Weaknesses were identified in the independent verification process that may have contributed to problems with the establishment of the as left position of several misaligned valves. These included:

- Weaknesses were identified in the I&C verification process. DLC I&C uses a concurrent vice an independent verification process.

- DLC I&C procedures dealing with verification of normal system lineups prior to start up relies on skill of the craft for verification. The procedures provide little guidance as to how to verify a system is aligned correctly.

- No procedural guidance is provided on how to verify the position of throttled valves.

The control of work activities that occurred on May 1, 1995, was weak. Specifically, the coordination of work activities and the clearances issued to perform the draining of the SWS side of the RSS heat exchangers were inadequate. This resulted in the flooding of RSS heat exchanger cubicles on May 1, 1995.

Problems were identified with the documentation of work practices for the work performed on May 1, 1995, which contributed to DLC's inability to positively establish the as left position of 2SWS-82. These problems included the following:

- Several independent verifications were not performed as required by procedure.

- A sloppy use of date blocks continuation arrows from the top of procedure pages through steps verified by different operators contributed to problems with independent verifications.

- Neither the control room or plant operator logs documented the partial flooding of heat exchanger cubicles and the inadequate valve isolation that led to this problem.

- A problem report was never written documenting the inadequate clearance and subsequent flooding of the RSS heat exchanger cubicles.

The procedure for locking devices provided limited guidance to plant personnel regarding the proper technique for applying chains and padlocks for safety related locked valves.

The safety significance of the misaligned valves was low.

The DLC Beaver Valley security plan addresses sabotage events in accordance with 10 CFR 73.55(h)(1) and Appendix C of Part 73. The threshold for entering this plan is high. It does not address potential tampering events. Beaver Valley does have a Special Operating Order No. 2-93-6 that addresses suspicious degradation of a safeguards train. The order was a hand written document. It was not a permanent approved procedure. It is a generic issue that many plants do not have procedures that deal with potential tampering events.

7.0 MANAGEMENT MEETINGS

The licensee management was informed of the scope of this special inspection during an entrance meeting on Saturday, July 22, 1995. The licensee management was briefed of the inspection observations routinely and at the exit meeting on Tuesday July 27, 1995 at 2:00 p.m. The licensee acknowledged the inspection findings.

APPENDIX A

NRC SPECIAL INSPECTION TEAM CHARTER

APPENDIX A

(1)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

July 21, 1995

MEMORANDUM TO: Clifford J. Anderson, Chief, Reactor Projects Section, DRP, PB2, RPS2B

FROM: Richard W. Cooper, Director, Division of Reactor Projects

SUBJECT: SPECIAL TEAM INSPECTION CHARTER FOR REVIEW OF THE JULY 18, 1995 AND JUNE 26, 1995, POTENTIAL VALVE TAMPERING AT BEAVER VALLEY UNIT 2

As a result of potential valve tampering at Beaver Valley Unit 2, NRR and I have determined that a Special Team Inspection (STI) should be conducted to verify the circumstances and evaluate the significance of these events.

You will be the Team Leader for the STI. Further, you are responsible for the timely issuance of the inspection report, the identification and processing of potentially generic issues, and the identification and referral to Projects Branch 3 of any enforcement action warranted as a result of the Team's review. The Division of Reactor Safety and the Division of Radiation Safety and Safeguards will provide support to the STI as needed.

Enclosed is the charter for the STI delineating the scope of this inspection. The bases for this inspection are: the staff's need to fully understand these events and the staff's need to determine if there are potential generic issues worthy of staff action associated with these events. Additional questions also exist with regard to operational and managerial performance associated with reporting this event.

Docket Nos. 50-334
50-412

Enclosures:
1. Special Team Inspection Charter
2. Team Membership

ENCLOSURE 1

Special Team Inspection Charter

Potential Valve Tampering at Beaver Valley Unit 2

The general objectives of this special team inspection are to:

1. Confirm that the licensee has taken sufficient action to assure that the potential for future tampering is minimized and that if it should occur appropriate actions are taken.

2. Determine the specific circumstances associated with the potential valve tampering events on July 14 and June 26, 1995. Develop a Sequence of Events and analysis of activities that occurred before and after the July 14 event.

3. Evaluate the licensee's actions following the event including implementation of procedures (security plan and implementing procedures, security contingency procedures, surveillance procedures, etc.). Evaluate the response of operations, security, and management personnel to these events. Evaluate the licensee's decision making relative to reportability.

4. Determine the adequacy of the licensee's response given previous security events at Beaver Valley.

5. Review and evaluate personnel performance (including operations, security, instrument and control technicians) relative to adherence to procedures and technical specifications, and quality and effectiveness of communications. Evaluate the manner that the events were communicated to licensee management and the NRC.

6. Prepare a report documenting the results of this review for signature by the DRP Director within 30 days of the completion of this inspection.

ENCLOSURE 2

BEAVER VALLEY SPECIAL TEAM INSPECTION (STI) MEMBERSHIP

Clifford J. Anderson, STI Leader, Chief, Projects Section 2B
Division of Reactor Projects (DRP)

Gregory C. Smith, Physical Security Inspector
Division of Radiation Safety and Safeguards (DRSS)

Edward B. King, Physical Security Inspector
Division of Radiation Safety and Safeguards (DRSS)

John G. Caruso, Operations Engineer, Division of Reactor Safety (DRS)

Samuel L. Hansell, Resident Inspector, Division of Reactor Projects (DRP)

Jeffrey F. Harold, Project Engineer, Office of Nuclear Reactor Regulation (NRR)