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 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 89-023-00: on 890908, plant shutdown completed when
 vacuum relief valves declared inoperable. W/8 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: LPDR 1 cy Transcripts. 05000387

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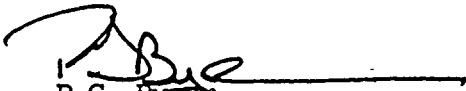
October 10, 1989

U.S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 89-023-00
FILE R41-2
PLAS - 385

Docket No. 50-387
License No. NPF-14

Attached is Licensee Event Report 89-023-00. This event was determined reportable per 10CFR50.73(a)(2)(i)(A) and (B) in that the suppression chamber - drywell vacuum relief valves were declared inoperable, thereby requiring entry into Technical Specification 3.0.3 (Limiting Condition for Operation not met) and the completion of a plant shutdown.


R.G. Bryan
Superintendent of Plant - Susquehanna

RRW/mjm

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

| | | | | | | | | | | | |
|--|--|--|--|--|--|--|--------------------------------------|--|--|----------------------|--|
| FACILITY NAME (1) Susquehanna Steam Electric Station - Unit 1 | | | | | | | DOCKET NUMBER (2) 0 5 0 0 0 3 8 7 | | | PAGE (3) 1 OF 0 4 | |
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TITLE (4)
Plant Shutdown Completed When Vacuum Relief Valves Declared Inoperable

| 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 9 | 0 8 | 8 9 | 8 9 | 0 2 3 | 0 0 | 1 0 | 1 0 | 8 9 | | | 0 5 0 0 0 | | |
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|---------------------------|-------------------|--|------------------|-------------------|--|-----------------|----------------------|--|--|--|--|
| OPERATING MODE (9) 1 | | 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) | | | 20.405(c) | | | 60.73(a)(2)(iv) | | | 73.71(b) | |
| | 20.405(a)(1)(i) | | | 60.38(c)(1) | | | 60.73(a)(2)(v) | | | 73.71(c) | |
| | 20.405(a)(1)(ii) | | | 60.38(c)(2) | | | 60.73(a)(2)(vii) | | | OTHER (Specify in Abstract below and in Text, NRC Form 366A) | |
| | 20.405(a)(1)(iii) | | | 60.73(a)(2)(ii) X | | | 60.73(a)(2)(viii)(A) | | | | |
| | 20.405(a)(1)(iv) | | | 60.73(a)(2)(ii) | | | 60.73(a)(2)(viii)(B) | | | | |
| 20.405(a)(1)(v) | | | 60.73(a)(2)(iii) | | | 60.73(a)(2)(ix) | | | | | |

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|--|--|--|--|--|--|--|---|--|--|
| LICENSEE CONTACT FOR THIS LER (12) | | | | | | | | | |
| NAME Richard R. Wehry - Compliance Engineer | | | | | | | TELEPHONE NUMBER 7 1 7 5 4 2 - 3 6 6 4 | | |

| 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 | |
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| SUPPLEMENTAL REPORT EXPECTED (14) | | | | | | | EXPECTED SUBMISSION DATE (15) | | MONTH | DAY | YEAR |
| <input type="checkbox"/> YES (if yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO | | | | | | | | | | | |

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

At 1620 hours on September 8, 1989, with Unit 1 at 100% power, it was determined that a potentially inoperable condition existed on the suppression chamber - drywell vacuum relief valves due to a component change (male elbow fitting on the valve actuating cylinder) which had taken place during the Unit 1 4th refueling outage. The original fitting contained an orifice to limit the closing velocity of the vacuum relief valves during cycling in the event of a LOCA; the new fitting did not. Preliminary analysis of the effect of the new fitting on relief valve cycling velocity was inconclusive at the time, so the conservative measure of declaring the valves inoperable was taken in the absence of a complete analysis. Declaring the vacuum relief valves inoperable requires entry into Technical Specification 3.0.3 and initiation of a plant shutdown. This incident was attributed to the following:

- Contrary to administrative procedures, a field drawing change mechanism was used to expand the scope of a modification package.
- Human error resulted in a component change request that was not equivalent to the original component.
- Engineering reviews failed to identify the above errors.
- Documentation available did not clearly describe the involved component nor its function.

The orifices were reinstalled and the valves were satisfactorily retested. This incident is being reviewed by the involved groups to emphasize using correct change mechanisms and performing proper reviews. Associated documentation will be revised to reflect actual design.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

DESCRIPTION OF EVENT

At 1620 hours on September 8, 1989, with Unit 1 operating at 100% power, it was determined that a potentially inoperable condition existed on the suppression chamber - drywell vacuum relief valves (EIIIS Code: BF) due to an equipment change (male elbow fitting) which had taken place during the Unit 1 4th refueling outage: As part of a modification, of Engineering Change Order (ECO) 89-6020 (Replace and Rewire Containment Vacuum Breaker Terminal Boxes), Plant Change Notices (PCNs) 89-1134, 1135 and 1136 were initiated and approved to replace existing Aeroquip fittings and hoses for air supply to the actuating cylinder on all ten vacuum relief valves and with fittings and hoses stocked as standard material which would result in an increase in system reliability. The original elbow fittings that were replaced contained an orifice to restrict the velocity at which the relief valves opened and closed. The new replacement fitting did not contain this orifice. The condition was discovered during development of a similar ECO for Unit 2, Non-Conformance Report NCR 89-0481 was issued on August 23, 1989 and an analysis of this condition on the operability of the valves was commenced. It was determined that these orifices were part of a relief valve upgrade which was designed to ensure the valves' ability to withstand the multiple operations required during a LOCA event. On September 8, 1989 preliminary analysis of this condition was inconclusive so the conservative measure of declaring the valves inoperable was taken. Declaring the vacuum relief valves inoperable requires entry into Technical Specification 3.0.3 and initiation of a plant shutdown. ENS notification to the NRC was made at 1707 hours on September 8, 1989.

CAUSE OF EVENT

This incident was attributed to the following causal factors:

- A field drawing change mechanism (PCN) was used to expand the scope of a modification package (ECO) in lieu of a revision to the ECO. This is contrary to department and station administrative procedures.
- Due to human error on the part of the I&C Assistant Foreman, the change from a non-orificed elbow fitting to an orificed elbow fitting, that had been incorporated as part of an earlier vacuum relief valve upgrade, was missed during his review of the vendor drawings when preparing the PCN.
- Review of the PCN by I&C Engineering and Resident Engineering failed to identify that the PCN was being used to expand the scope of the ECO. This review also failed to identify that an orificed elbow fitting was being changed to a non-orificed elbow fitting.
- The documentation available did not clearly describe vacuum breaker upgrade features of which the orificed elbow fitting was a part.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

This event was determined reportable per 10CFR50.73(a) (2) (i) (A) and (B) in that due to the analysis of the effect of the new elbow on vacuum relief valve cycling velocity being inconclusive, the conservative measure of declaring the suppression chamber - drywell vacuum relief valves inoperable was taken, thereby requiring entry into Technical Specification 3.0.3 (Limiting Condition for Operation not met) and the completion of a plant shutdown.

During a design basis LOCA, the condensation of steam in the drywell and the flow of steam from the drywell to the suppression chamber will create a negative pressure in the drywell with respect to the suppression chamber. To equalize the differential pressure, five pairs of vacuum relief valves are installed in the suppression chamber and attached to the downcomer pipes above the suppression chamber water level. The valves automatically open and close in response to pressure differentials across the valve discs to equalize pressure between the suppression chamber and the drywell.

The elbow fittings that were replaced by PCNs 89-1134, 1135 and 1136 contained an orifice which restricted the velocity at which the actuating cylinder allowed the vacuum relief valves to open and close. The new replacement fitting did not contain an orifice. Preliminary analysis of the effect of the new elbow on vacuum relief valve cycling velocity was inconclusive on September 8, 1989, so the conservative measure of declaring the valves inoperable was taken. Declaring the vacuum relief valves inoperable requires entry into Technical Specification 3.0.3 and initiation of a plant shutdown. ENS notification to the NRC was made at 1707 hours on 9/8/89. There were no safety consequences or compromise to public health or safety as a result of this event.

CORRECTIVE ACTIONS

Upon discovery of the problem, Non-Conformance Report NCR 89-0481 was issued on August 23, 1989 to document the inadvertent orifice removal. Following initial engineering evaluation, it was believed that the safety function of the valves was not significantly affected and could be bounded by engineering analysis and Unit 2 licensing conditions which provided justification for operation during the Unit 1 first operating cycle (prior to the vacuum relief valve upgrade which was completed during the Unit 1 first refueling outage). However, upon undertaking a more detailed design review, it was determined that the valves' ability to operate at acceptable velocities during a LOCA event could not be bounded by the Unit 1 first cycle justification due to other design changes which had been made to the valves during the upgrade. As such, it was determined that the valves could exceed their allowable stresses if operated without the dampening effect of the orifice. Because the analysis of the effect of the new orifice on vacuum relief valve cycling velocity was inconclusive, the conservative measure of declaring the valves inoperable was taken and the unit was shutdown on September 8, 1989.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

The orifices were reinstalled under Design Change Package DCP 89-9082 and the vacuum relief valves were successfully retested.

This incident was reviewed by the involved groups (I&C and Resident Engineering Sections) to emphasize the importance of using the correct mechanisms when revising modification packages and performing reviews consistent with department standards and instructions.

The associated documentation will be revised to reflect the actual vacuum relief valve design.

A detailed, independent review of this incident was completed by Nuclear Plant Engineering. Recommended enhancements for improving the quality of the design function areas are being evaluated by Nuclear Plant Engineering Management.

ADDITIONAL INFORMATION

Failed Component Identification : Not applicable.

Similar Events Previously Reported : None identified.

