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ACCESSION NBR: 9210200464 DOC. DATE: 92/10/16 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
 AUTH. NAME AUTHOR AFFILIATION
 METER, J.J. Pennsylvania Power & Light Co.
 STANLEY, H.G. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-014-00: on 920909, Engineers became aware that station circle seal SV could be susceptible to deterioration of O-rings. Caused by manufacturers' recommendation. SV training will be revised to reflect proper lubricant. W/921016 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: Maxwell, G 05000387 /

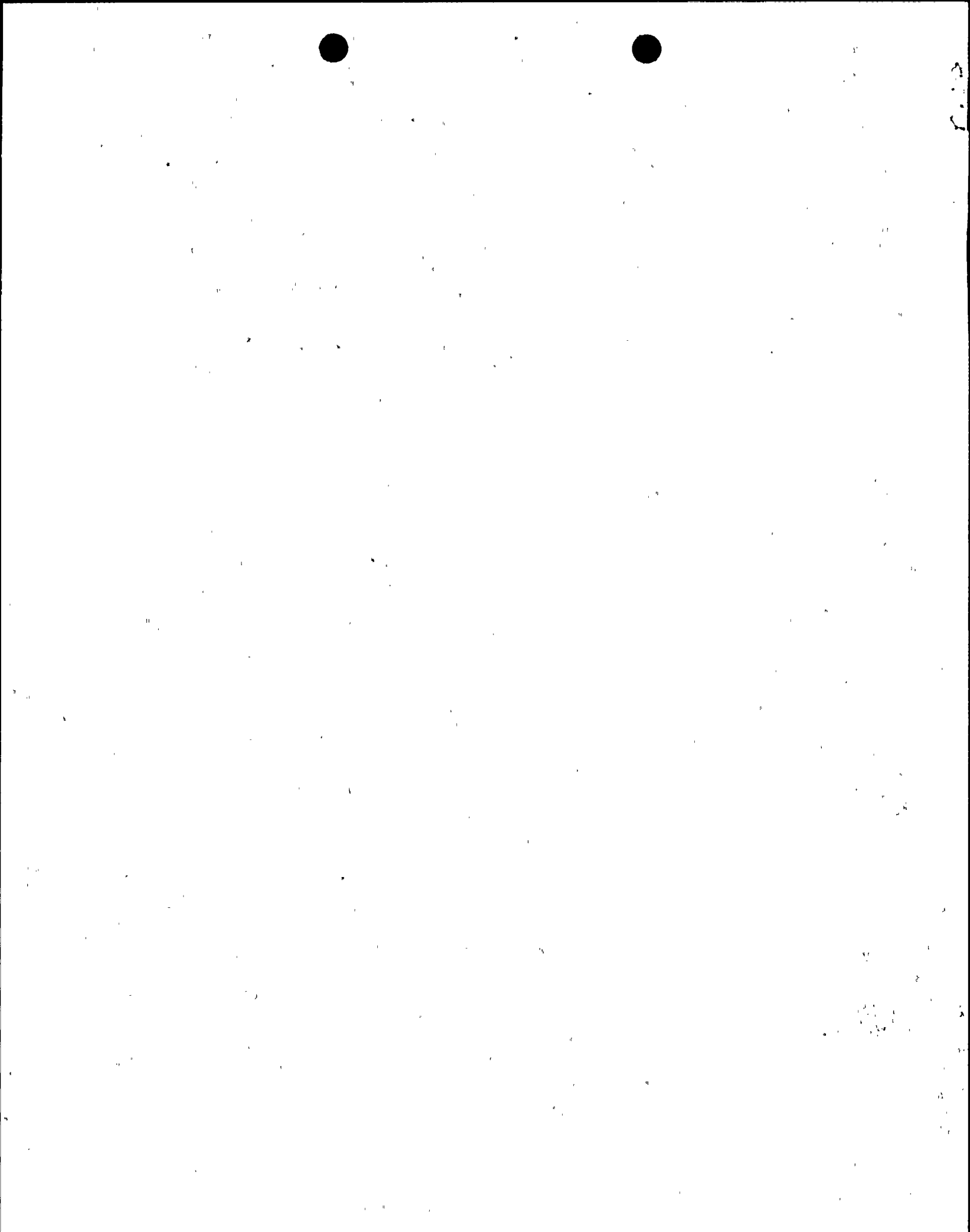
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	AEOD/ROAB/DSP	2 2	NRR/DET/EMEB 7E	1 1
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	NRR/DST/SELB 8D	1 1	NRR/DST/SICB8H3	1 1
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	<u>REG FILE</u> 02	1 1	RES/DSIR/EIB	1 1
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EXTERNAL:	EG&G BRYCE, J.H	2 2	L ST LOBBY WARD	1 1
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Pennsylvania Power & Light Company

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October 16, 1992

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 92-014-00
FILE R41-2
PLAS -538

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

Attached is Licensee Event Report 92-014-00. Although it was determined that this condition is not reportable, this voluntary report is being submitted in accordance with an agreement with the Commission.

H.G. Stanley
Superintendent of Plant - Susquehanna

JJM/mjm

cc: Mr. T. T. Martin
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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 1	PAGE (3) 1 OF 0 5
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TITLE (4) **Manufacturer's Installation and Operations Manual Required Incorrect O-ring Lubricant for Solenoid Valves**

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 9	9 2	9 2	0 1 4	0 0	1 0	1 6	9 2	Susquehanna SES - U2	0 5 0 0 0 3 8 8
										0 5 0 0 0

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) 0 6 0	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	60.36(c)(1)	60.36(c)(2)	60.73(a)(2)(i)	60.73(a)(2)(ii)	60.73(a)(2)(iii)	60.73(a)(2)(iv)	60.73(a)(2)(v)	60.73(a)(2)(vii)	60.73(a)(2)(viii)(A)	60.73(a)(2)(viii)(B)	60.73(a)(2)(ix)	73.71(b)	73.71(c)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A) Voluntary

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER
NAME J. J. Meter - Power Production Engineer	AREA CODE 7 1 7	5 4 2 1 - 1 8 7 3

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

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)

On September 9, 1992 during an evaluation of NRC Generic Letter 91-15, Engineers became aware that station Circle Seal Solenoid Valves (SOV's) could be susceptible to deterioration of their O-rings. Additionally, non-Environmentally Qualified (EQ) ASCO SOV's were noted as having the same potential problem. The concern was due to the fact that Ethylene Propylene elastomers (such as O-rings) are incompatible with hydrocarbons and that Circle Seal's Installation and Operations Manual (IOM) recommended using Vaseline Petroleum Jelly to rebuild their model SV31S-9101-3 and 4 SOV'S. It was also common practice for Maintenance personnel to use Vaseline Petroleum Jelly to rebuild non-EQ ASCO SOV's while in training classes. A review of current plant conditions, known plant equipment and system problems and an analysis of equipment failure modes lead to the conclusion that safe operations of both Units was not being jeopardized. Corrective actions included correcting the IOM, a station maintenance procedure and will include revising the SOV rebuild training, and removing and inspecting the twenty one station SOV's that might have possibly been exposed to Vaseline. There were no compromises to the health and safety of the public.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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FACILITY NAME (1) Unit 1 Susquehanna Steam Electric Station	DOCKET NUMBER (2) 0 5 0 0 0 3 8 7 9 2 - 0 1 4 - 0 0	LER NUMBER (6)			PAGE (3)										
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER											
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

EVENT

On September 9, 1992 Engineers (utility, non-licensed) were evaluating NRC Generic Letter 91-15, "Operating Experience Feedback Report, Solenoid-Operated Valve Problems at U.S. Reactors". During the evaluation the engineers became aware that station Circle Seal Solenoid Operated Valves (SOV's) containing Ethylene Propylene elastomers could be susceptible to deterioration of the elastomers. The concern was due to the fact that Ethylene Propylene elastomers are incompatible with hydrocarbons and that the manufacturer's Installation and Operations Manual (IOM) 239 recommended using the hydrocarbon Vaseline Petroleum Jelly to rebuild model SV31S-9101-3 and 4 solenoid valves.

The O-rings in these valves are ethylene propylene elastomers (EPDM and EPR) which, per EPRI NP-7414, will swell, become soft and deteriorate when exposed to hydrocarbons. In addition, NUREG-1275 Vol 6 stated that the combination of hydrocarbons and high temperatures has been known to cause embrittlement, and loss of mechanical properties. SOV failures involving degradation of EPR/EPDM elastomers are also described in NRC Information Notices 80-11, 86-57, and 88-43.

Models SV31S-9101-3 (AC) and SV31S-9101-4 (DC) are direct acting 3-way SOV's. At Susquehanna SES they are typically used as air pilots on Air Operated Valves (AOV's), or to actuate pneumatic dampers or pneumatic cylinders on testable check valves or vacuum breakers. An additional concern was raised for Environmentally Qualified (EQ) Circle Seal valves. If any of them had been rebuilt using Petroleum Jelly, that may have invalidated Environmental Qualification and/or may have introduced functionality problems associated with the use of Petroleum Jelly following a design basis accident.

Additionally, the Engineers discovered that it was common practice for Maintenance personnel (utility, non-licensed) to use Vaseline Petroleum Jelly to rebuild non-EQ ASCO solenoid valves while in training classes. Guidelines were not specifically given to Maintenance personnel that Vaseline was to be used for training purposes only. Therefore, the possibility existed that safety-related ASCO SOV's which are not used for EQ applications could have been overhauled at SSES without an ASCO rebuild kit (which contains appropriate lubricants) and could have functionality problems associated with the use of Vaseline.



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		YEAR 9 2	SEQUENTIAL NUMBER 0 1 4	REVISION NUMBER 0 0	0 3	OF 0 5

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

On September 9, 1992, a Nonconformance Report (NCR) was generated to document the potential problem with Circle Seal SOV's that were rebuilt using IOM 239 and also with non-EQ but safety related ASCO SOV's that were rebuilt. A maintenance history search was conducted for any of the above mentioned valves which could have been possibly rebuilt using a Petroleum based lubricant. It was subsequently determined that a total of 38 Unit 1 and common SOV's and 34 Unit 2 SOV's were found that could have been affected.

On September 11, 1992, a preliminary operability assessment was performed and concluded that the Circle Seal SOV's were not immediately or imminently inoperable. This conclusion was based on the fact that there was no identifiable, consistent trend, nor any noticeable increase in the frequency of failures to indicate that the use of Vaseline on SOV's was causing an increased challenge to safety systems at Susquehanna SES. The assessment for the cited non-EQ safety related ASCO SOV's was that they were operable. The issue of rebuilding non-EQ ASCO SOV's with Vaseline was determined to be not a concern. Rebuild kits are not normally available to Maintenance personnel for the non-EQ SOV's and the standard practice is to replace a failed valve with a new one. Discussions with maintenance personnel also revealed that silicone based lubricants are used in all cases when rebuilding SOV's unless otherwise directed by vendor instructions (as was the case with Circle Seal IOM 239).

CAUSE OF EVENT

The cause for having potentially degraded SOV's are; 1) the manufacturer of Circle Seal SOV's incorrectly recommended that Vaseline Petroleum Jelly be used as a lubricant while rebuilding SOV models SV31S-9101-3 and 4. 2) Training practices for non-EQ ASCO SOV's incorrectly used Vaseline Petroleum jelly while rebuilding. Instructors used Vaseline because they believed it was an acceptable practice.

REPORTABILITY/ANALYSIS

The event was determined not to be reportable under the requirements of the Code of Federal Regulations, Chapter 10. Maintenance and discrepancy histories for all station Circle Seal SOV's and all non-EQ safety related ASCO SOV's were reviewed. Also an engineering failures modes analysis was performed for the Circle Seal valves. Evaluation of these items showed that Vaseline was not used to rebuild any SOV's other than Circle Seal

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 2	- 0 1 4	- 0 0	0 4	OF 0 5

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(as directed by the IOM). Twenty-one safety related Circle Seal SOV's rebuilt using Vaseline were found to be in service at the time of the assessment. None of the SOV's that were rebuilt experienced a failure. All of the SOV's in question deenergize to perform their safety function. The analyzed failure mechanism would not prevent deenergized SOV's from moving to their proper position.

Although the event was determined not to be reportable, this Voluntary report is being submitted in accordance with an agreement made with the Commission on September 16, 1992. Lessons learned in association with this event could be useful to the rest of the industry.

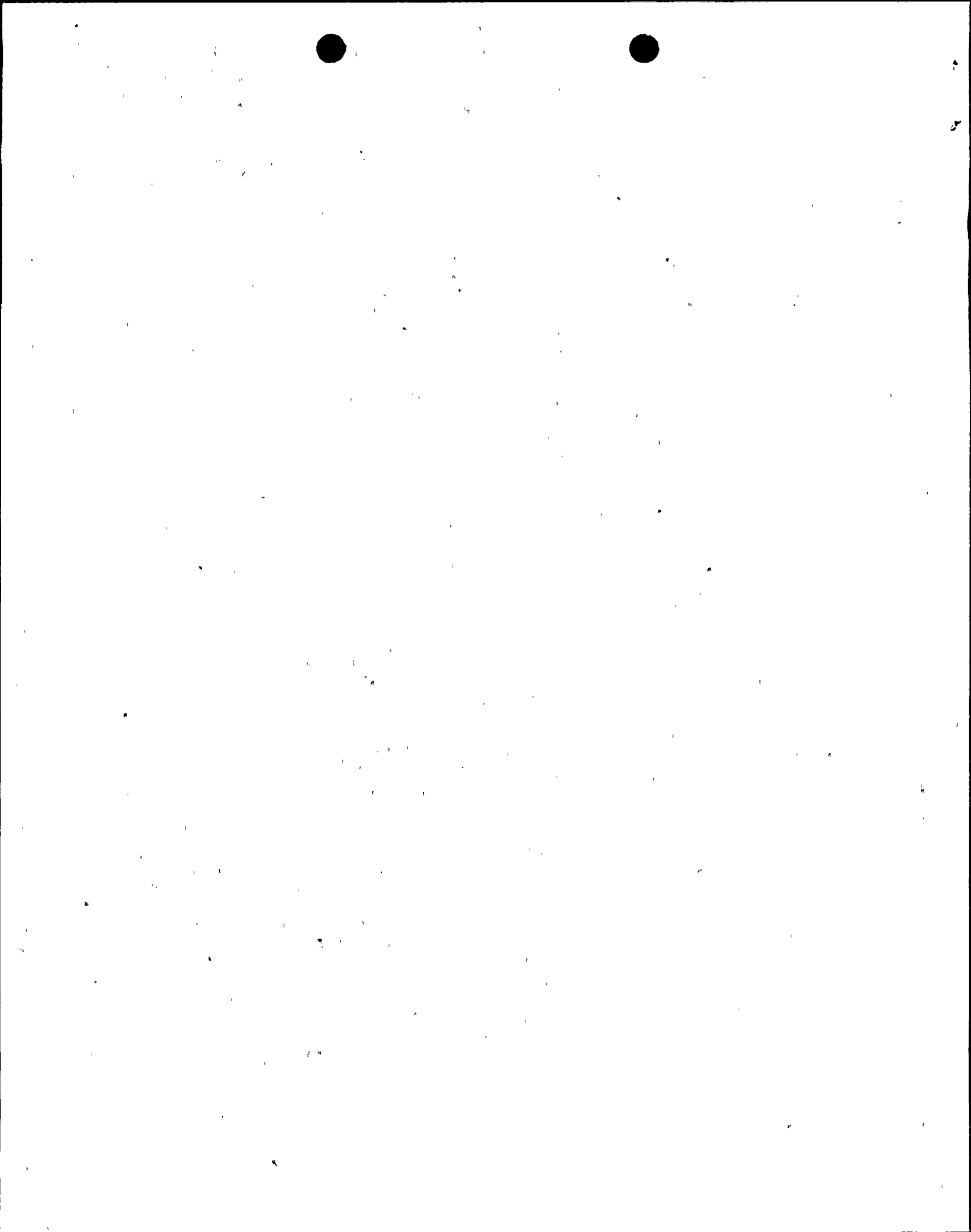
There were no actual or postulated equipment failures and subsequently no actual or postulated offsite releases associated with the review of the use of an improper lubricant on solenoid valves at the station. Therefore, there were no compromises to the health and safety of the public.

CORRECTIVE ACTIONS

A re-evaluation of Operability considerations was completed on September 16, 1992. The total number of SOV's that had any possibility of being rebuilt with Vaseline was reduced to 17 EQ and 3 non-EQ but safety related valves for Unit 1 and common and 1 EQ valve for Unit 2. A review of current plant conditions, investigation of know plant equipment and system problems, engineering analyses of equipment failure modes, and a functional review of each SOV identified as having been rebuilt at SSES was performed.

The re-evaluation of September 16 reached the same conclusion as the initial evaluation on September 11 that safe operations of both Units was not being jeopardized. A review of the EQ function of the nonconforming SOV's indicated that the function is only needed during the early stages of an accident (i.e. deenergize to perform its safety function). Therefore, these devices are not impacted by additional degradation due to a potentially harsh environment.

The evaluation also showed that all SOV's that could have contacted Vaseline have been stroke tested at least once since being rebuilt. Numerous routine operations to date have shown no evidence of degradation of any of the subject valves.



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		YEAR 9 2	SEQUENTIAL NUMBER - 0 1 4	REVISION NUMBER - 0 0	0 5	OF 0 5

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Actions to prevent recurrence include the following:

- 1) IOM 239 was changed to reflect the correct assembly lubricant, DC-55, for Circle Seal SOV's models SV31S-9101-3 and 4.
- 2) A station maintenance procedure for Circle Seal valves was issued and stated the proper lubricant.
- 3) Solenoid valve task certification training and the unit of instruction will be revised to reflect the proper lubricant.
- 4) ASCO and Circle Seal SOV's in stores were reviewed to determine if any have been rebuilt. None were found to be rebuilt.
- 5) The 21 SOV's noted above will be removed and inspected for degradation of elastomeric parts and then rebuilt. SOV's which are certified to have the proper lubricant will be installed in their place.

ADDITIONAL INFORMATION

Failed Components: None

Previous events involving SOV failure include:

Unit 1 (NPF-14, Docket Number 387)

- LER 84-010
- LER 84-044
- LER 87-023
- LER 89-006
- LER 90-011

Unit 2 (NPF-22, Docket Number 388)

- LER 87-001
- LER 89-003
- LER 89-008

