**Commonwealth Edison**
LaSalle County Nuclear Station
2601 N. 21st. Rd.
Marseilles, Illinois 61341
Telephone 815/357-6761

July 2, 1993

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Dear Sir:

Licensee Event Report #93-004-00, Docket #050-374 is being submitted to your office in accordance with 10CFR50.75(a)(2)(iv).

G. F. Spedl for
Station Manager
LaSalle County Station

GFS/KT/tsh

Enclosure

cc: Nuclear Licensing Administrator
NRC Resident Inspector
NRC Region III Administrator
INPO - Records Center
IDNS Resident Inspector



IE22 1/1

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

| Facility Name (1) | Docket Number (2) | Page (3) |
|---|---|---|
| LaSalle County Station Unit 2 | 0 5 0 0 0 3 7 4 | 1 of 0 5 |

Title (4)

Reactor Scram Due to Low Charging Header Pressure

| 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 5 0 0 0 |
| 0 6 | 0 4 | 9 3 | 9 3 | 0 0 4 | 0 0 | 0 7 | 0 2 | 9 3 | | 0 5 0 0 0 |

OPERATING MODE (9): 4

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

| | | | |
|---|---|---|---|
| ___ 20.402(b) | ___ 20.405(c) | X 50.73(a)(2)(iv) | ___ 73.71(b) |
| ___ 20.405(a)(1)(i) | ___ 50.36(c)(1) | ___ 50.73(a)(2)(v) | ___ 73.71(c) |
| ___ 20.405(a)(1)(ii) | ___ 50.36(c)(2) | ___ 50.73(a)(2)(vii) | ___ Other (Specify in Abstract below and in Text) |
| ___ 20.405(a)(1)(iii) | ___ 50.73(a)(2)(i) | ___ 50.73(a)(2)(viii)(A) | |
| ___ 20.405(a)(1)(iv) | ___ 50.73(a)(2)(ii) | ___ 50.73(a)(2)(viii)(B) | |
| ___ 20.405(a)(1)(v) | ___ 50.73(a)(2)(iii) | ___ 50.73(a)(2)(x) | |

LICENSEE CONTACT FOR THIS LER (12)

| Name | TELEPHONE NUMBER (AREA CODE) |
|---|---|
| Keith Taber, System Engineering Group Ext. 2705 | 8 1 5 3 5 7 - 6 7 6 1 |

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|
| X | R D | F L T | | | | | | | |
| | | | | | | | | | |

SUPPLEMENTAL REPORT EXPECTED (14)

___ Yes (If yes, complete EXPECTED SUBMISSION DATE) ___ X NO

Expected Submission Date (15): Month | Day | Year

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


On June 4, 1993 Unit 2 was in Operation Condition 4 (Cold Shutdown) at 0% power. At 2037 hours the Operations Department was performing control rod cycling in preparation for startup when an unexpected Control Rod Drive (CRD) Low Charging Water Header Scram was received.

The Operations Department was in the process of replacing the CRD Pump Suction Filter. This process requires that the Standby Suction Filter be placed on-line prior to valving out the on-line Pump Suction Filter. Approximately five minutes after placing the Standby Suction Filter on-line the CRD Drive Filter DP HI Alarm was received. One minute later the LO Charging Water Header A1/B1 Scram Alarm was received followed by the LO Charging Water Header A2/B2 Alarm. Since the mode switch was in REFUEL, ten seconds after receiving the A2/B2 LO Charging Water Header Alarm a SCRAM signal was generated.

The cause of this event is the mechanical process which allowed crud or foreign material to pass through the suction filter, and to be deposited on the drive filter. The crud deposit caused the filter to plug thus creating a large pressure drop. This pressure drop allowed pressure in the charging header to be reduced below the scram setpoint causing a reactor scram signal to be generated.

The main concern of this event is an operational concern that would arise if the filter element became detached as a result of this event. This investigation revealed that the drive filter while experiencing some degradation maintained it's integrity. The filter element was removed from it's casing and no evidence of disintegration of the filter element was observed. The process of cleaning and reusing the suction and drive filters will be examined for possible elimination. Also, station procedures will be revised to include steps for flushing the suction filter piping prior to bringing the standby filter on-line to eliminate crud build-up.

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

A. CONDITION PRIOR TO EVENT

Unit(s): 2 Event Date: 06/04/93 Event Time: 2037 Hours

Reactor Mode(s): 4 Mode(s) Name: Cold Shutdown Power Level(s): 0

B. DESCRIPTION OF EVENT

On June 4, 1993 Unit 2 was in Operational Condition 4 (Cold Shutdown) at 0% power. At 2037 hours the Operations Department was performing control rod cycling in preparation for startup when an unexpected Control Rod Drive (CRD, RD) (AA) Low Charging Water Header Scram was received.

Prior to receiving the scram signal the Operations Department was in the process of replacing the CRD 2C11-D010 Pump Suction Filter. This process requires that the Standby Suction Filter 2C11-D300 be placed on-line prior to valving out the on-line 2C11-D010 Pump Suction Filter. Approximately 5 minutes after placing the Standby Filter 2C11-D300 on-line the CRD Drive Filter DP HI Alarm was received. One minute later the LO Charging Water Header A1/B1 Scram Alarm was received followed by the LO Charging Water Header A2/B2 Alarm. Since the mode switch was in REFUEL (to support rod cycling) ten seconds after receiving the A2/B2 LO Charging Water Header Alarm a SCRAM signal was generated.

The cause of this event is the mechanical process which allowed crud or foreign material to pass through the suction filter, causing the crud to be deposited on the drive filter. This crud when deposited upon the drive filter caused the filter to plug thus creating a large pressure drop (approximately 500 psid). This pressure drop allowed pressure in the charging header to be reduced below the scram setpoint causing a reactor scram signal to be generated.

This event is reportable to the Nuclear Regulatory Commission pursuant to 10CFR50.73(a)(2)(iv) due to an Engineered Safety Feature (ESF) actuation.

C. APPARENT CAUSE OF EVENT

The CRD System Supply Pump provides cool high pressure water to: (1) the drive water header for normal control rod movement, (2) the cooling water header for control rod drive mechanism cooling, and (3) the charging header to keep the scram accumulators charged against nitrogen pressure. The CRD System hydraulic flow path consists of Suction Filters, Pumps, and Drive Filters. High pressure charging water remains stored in the accumulator until a full reactor scram signal is received. To assure the ability of the accumulators to provide sufficient energy to scram the control rods, an automatic reactor scram signal is generated when low charging header pressure is sensed. The automatic scram on low charging header is active only when the reactor mode switch is in the REFUEL or STARTUP position.

The root cause of this event is the mechanical process which allowed crud or foreign material to pass through the suction filter, causing the crud to be deposited on the drive filter. This crud when deposited upon the drive filter caused the filter to plug thus creating a large pressure drop (approximately 500 psid). This pressure drop allowed pressure in the charging header to be reduced below the scram setpoint causing a reactor scram signal to be generated.

This investigation found that the mechanical process which allowed the crud or foreign material to pass through the suction filter can be attributed to two related processes, 1) The method LaSalle uses in cleaning and reusing the CRD suction and drive filters, combined with the inability to determine the number of times a filter has been cleaned, and 2) The amount of time the filter was left in the standby position. The following is a description of the two processes and how they contributed to the outcome of this event.

The first process which contributed to this event is the method by which the suction and drive filters are cleaned and reused. The CRD System utilizes two filters (suction and drive) to clean the water from the cycled condensate tank or hotwell reject. These filters are designed to be cleaned in an ultrasonic cleaner and ther reused. The current practice at LaSalle is to use a filter (both suction and drive) until the differential pressure across the filter is close to its alarm setpoint at which time the filter is replaced. The filter is then placed in an ultrasonic cleaner for cleaning.

Currently, due to high radiation concerns and chemical control concerns, the ultrasonic cleaner is not used for peak effectiveness.

An additional problem associated with the filtering process is the age and number of cleanings of the CRD filters. Currently, there is no method for determining the age or number of cleanings of each filter. The filters have no identifiable markings which allow the operator to log the number of cleanings the filter has been subjected to. The manufacturer stated that as the filters are subjected to the ultrasonic cleaning process the filter walls will begin to thin. The amount of wall thinning is dependent upon the number of times the filter has been cleaned. The wall thinning will degrade the effectiveness of the filtering process. The manufacturer further stated that the filters should be used and cleaned no more than four times prior to being disposed of.

At the time of this event LaSalle had become aware of possible concerns regarding the filtering process. Plans had been instituted for determining the effectiveness of the cleaning process. New drive filters had been installed on Unit 2 with plans made to install new suction filters during the course of this maintenance outage.

APPARENT CAUSE OF EVENT (CONTINUED)

The second process which contributed to this event is the effectiveness of the filtering process. LaSalle's System Engineering Group had instituted a plan to determine the service life of a suction filter with the intention of instituting a one time use for the CRD Suction, and Drive Filters. A new suction filter was placed on-line in Unit 2 on September 25, 1992 and had remained on-line up to the time of this event. This configuration allowed the other filter to be placed in standby for nine months.

The configuration of the inlet piping for the suction filters is such that when a filter is in the standby mode a dead leg approximately ten feet in length exists between the filter and the hydraulic supply leg. This dead leg allows particles of crud to migrate and settle in the pipe. During current practices (where filters are cleaned and reused) this would not be a concern since a filter is never placed in the standby mode longer than four months. However, as stated above LaSalle was in the process of determining the service life of a new suction filter thus due to the extraordinary length of time the filter was left in standby mode (nine months versus four months) a larger than normal amount of crud was allowed to migrate and settle in the piping. This is the source of the material which was deposited on the drive filters causing the drive filters to plug.

In conclusion, the root cause of this event is: 1) The use of the new filter had allowed the other filter to remain in standby for extraordinary length of time, and 2) The configuration of the suction piping is such that crud is allowed to migrate and settle behind the standby filter causing a crud burst when the standby filter is placed on-line, and 3) The method of ultrasonically cleaning the filters reduces their effectiveness thus when a crud burst occurs large amounts of crud can pass through the suction filter. The standby filter was an older filter and had been subjected to at least one ultrasonic cleaning which means its effectiveness to clean was degraded. As the standby filter was placed on-line, a crud burst, larger than normal, was experienced. Due to the ineffectiveness of the suction filter, a large portion of this crud burst was allowed through the filter. The crud passed through the CRD Pump and into the drive filter. Since the drive filter was a new filter its effectiveness was almost 100%. The drive filter became overwhelmed with crud and immediately gave the high dp alarm. As more crud entered the drive filter the ability of the filter to pass flow was reduced. The differential pressure began to drop pressure in the charging header and a reactor scram signal was initiated.

D. SAFETY ANALYSIS OF EVENT

The safety consequences of this event are minimal. The Reactor mode switch was in REFUEL with all rods verified fully inserted prior to the scram. The mode switch was taken to SHUTDOWN immediately after the scram and after two minutes the scram was reset and the surveillance continued.

Accumulator pressure is established by the discharge pressure of the CRD System Supply Pump. During a scram the Scram Inlet and Outlet Valves open and permit the stored energy in the accumulators to be discharged into the drives.

Pressure in the accumulator charging header is monitored in the Control Room with a pressure indicator and a low/high pressure alarm. An automatic scram is initiated when the charging header pressure drops below 1157 psig for more than 10 seconds.

SAFETY ANALYSIS OF EVENT (CONTINUED)

The automatic scram on low charging header pressure is only active when the mode switch is in the STARTUP or REFUEL position. This is because when the mode switch is in these positions, the reactor may be in a condition that the accumulators provide the primary driving force for scramming the control rods. In all other reactor conditions either reactor pressure is sufficient to scram rods or rod blocks are initiated to prevent withdrawal of any rods.

Another possible consequence is that the large differential pressure experienced by the filter could cause the filter material to come apart. This material could then be deposited within the various headers and within the HCU control manifold. This investigation revealed that the drive filter while experiencing some degradation remained intact. The filter element was removed from its casing and no evidence of the filter element coming apart was found.

E. CORRECTIVE ACTIONS

The process of cleaning and reusing the filters is being investigated by LaSalle System Engineering. Current station plans are to go to a one time use on the CRD Suction and Drive Filters for Unit 2 for the next fuel cycle to determine the cost and benefits of this process. Should it be determined that the one time filter use is beneficial this process will be adopted on Unit 1, otherwise the concerns of reuse of filters will be specifically addressed. Action Item Record (AIR) 374-180-93-0044201 will track completion of the investigation.

Steps will be added to LaSalle Operating Procedure LOP-RD-14 "CRD Suction Filter Replacement" to provide a means of flushing the dead leg of piping prior to bringing the Standby Filter on-line. This will eliminate the crud build-up which could pass through the Suction Filter. These steps will be added for both Unit 1 and 2. AIR 374-180-93-0044202 will be generated to track the completion of the procedure revision.

F. PREVIOUS EVENTS

None.

G. COMPONENT FAILURE DATA

| MANUFACTURER | NOMENCLATURE | MODEL NUMBER | MFG PART NUMBER |
|---|---|---|---|
| CUNO | Filter | IC-ICN3 | 52440-01-41-0204 |

SHEET 7

# EVENT SUMMARY AND CAUSE CODES

DVR Number
OL-2-93-014

- [ ] Lost generation
- [ ] Cost > $25,000
- [ ] Hazard or Spill
- [ ] Personnel injury
- [ ] Reactor trip
- [ ] ESF actuation
- [ ] NRC reportable
- [x] LER
- [ ] PSE
- [ ] NRC violation, level___
- [ ] GSEP event, class_____
- [ ] Tech Spec LCO
- [ ] Potential or future loss
- SALP functional area__

| | Component type | Failure mode | Department |
|---|---|---|---|
| X | PIR | M M 018 | 01P |
| X | | | |
| X | | | |
| X | | | |

| | Licensed? L or blank | Level | Department | Type | Detail code |
|---|---|---|---|---|---|
| A | | | | | |
| A | | | | | |
| A | | | | | |

| | Type | Detail Code | Department |
|---|---|---|---|
| B | | | |
| B | | | |
| B | | | |

| | Type | Detail code |
|---|---|---|
| C | | |

| | Type of deficiency | Detail code | Procedure type |
|---|---|---|---|
| D | | | |
| D | | | |
| D | | | |

| | Type | Detail code | Department |
|---|---|---|---|
| E | | | |
| E | | | |
| E | | | |