LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
LaSalle County Station Unit 1	0 5 0 0 0 3 7 3	1 of 0 6

Title (4) Reactor Scram Due to Loss of Main Generator Caused by Failure of Unit 2 System Auxiliary Transformer Lightning Arrestor

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)
									LaSalle Unit 2	0 5 0 0 0 3 7 4
0 3	0 2	8 9	8 9	0 0 9	0 0	0 3	3 0	8 9		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
1		20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0 8 6	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
Steven J. Samolinski, Technical Staff Engineer, extension 2576	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	E I A	L A R	G 0 8 0	N					

SUPPLEMENTAL REPORT EXPECTED (14)		Expected Submission Date (15)	Month	Day	Year
Yes (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On March 2, 1989, Unit 1 was operating in Run Mode at 36% power and Unit 2 was operating in Run Mode at 89% power. At 2302 hours the C phase lightning arrestor on the primary (345 KV) side of the Unit 2 Station Auxiliary Transformer (SAT) failed, resulting in a phase to ground fault. The fault was automatically isolated by the tripping of switchyard Oil Circuit Breakers (OCB) 4-6 and 6-1 and the Unit 2 feeder breakers. All loads being fed from the SAT transferred to the Unit 2 Unit Auxiliary Transformer (UAT) except for bus 243 which was supplied by the 2B Diesel Generator which satisfactorily auto-started on undervoltage. Unit 2 remained on-line after the incident.

As a result of the transient on the 345 KV system, the Unit 1 Generator Protective Relaying sensed a high generator differential current on phase A and isolated the Unit 1 generator. The Unit 1 turbine tripped on load rejection resulting in a reactor scram from Turbine Control Valve (TCV) fast closure. Unit 1 proceeded into normal post-scram conditions with the exception of the temporary loss of the Service Air Compressor and the plant process computer. Problems were also encountered with the resetting of the scram logic.

The apparent cause of this event was the failure of the Unit 2 SAT lightning arrestor. The exact cause of the lightning arrestor failure has yet to be determined. The lightning arrestor was replaced and the Unit 2 SAT was tested for operability and returned to service at 0330 on March 5, 1989. The Unit 1 generator differential relays were recalibrated and the unit was returned to service on March 5, 1989.

This report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the automatic actuation of an Engineered Safety Feature.

IE22

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): 1/2 Event Date: March 2, 1989 Event Time: 2302 Hours

Reactor Mode(s): 1/1 Mode(s) Name: Run/Run Power Level(s): 86.0%/89.0%

B. DESCRIPTION OF EVENT

On March 2, 1989, Unit 1 and Unit 2 were operating in the Run Mode at 86% and 89% reactor power respectively. Both units were operating at steady state conditions. Calibration of the in-core neutron monitoring system (NR) [IG] was in progress on Unit 2. The station electrical distribution system (AP) [EA, EB] was in its normal breaker line-up which is shown in Figure 1. The Unit 2 plant process computer (CX) [ID], which performs the primary data acquisition and Safety Parameter Display System (SPDS) for both units, was operating with its Uninterruptable Power Supply (UPS) in bypass due to inverter problems. The Unit 1 process computer was in standby. This configures the computer to operate with power being fed from the Unit 1 System Auxiliary Transformer, but not through the power conditioning circuitry in the UPS. The Prime Computer, which performs core monitoring and off-site dose calculation functions, was operating with its UPS in bypass for elective maintenance. This placed the Prime Computer on "raw" AC power being fed from the Unit 2 System Auxiliary Transformer (through bus 232Y-2).

At 2302 hours on March 2, 1989, the "C" phase lightning arrestor on the Unit 2 Station Auxiliary Transformer (SAT) failed resulting in a phase to ground fault on the feed to the Unit 2 distribution system. The fault was detected by the station switchyard relaying (SY) [FK] which acted to isolate the fault by opening Oil Circuit Breakers (OCB) 4-6 and 1-6 as well as the Unit 2 feeder breakers from the SAT. The B phase breaker on OCB 4-6 failed while interrupting the fault current. The bus 4 bushing on the B phase breaker cracked during the cycling of the breaker and had leaked oil from the crack locations. The OCB was taken out of service when the failure was discovered. The loss of power from the SAT resulted in an automatic bus transfer to the Unit 2 Unit Auxiliary Transformer (UAT). The Unit 2B Diesel Generator (DG) [EK] auto started to supply power to bus 243.

As a result of the transient on the 345 KV system, the Unit 1 Main Generator protective relaying (TG) [TB] sensed a high differential current on phase A resulting in the generation of a Main Generator Trip System 1 lock-out signal. This resulted in a load reject turbine trip and reactor scram on Turbine Control Valve (TCV) [TA] fast closure. During the scram and recovery, vessel level reached a minimum of +18 inches and there was no cycling of Safety Relief Valves (SRV, MS) [SB]. After the scram of the Unit 1 reactor, the unit proceeded into a normal post-scram condition with the exception of several occurrences. The most significant of these occurrences were the loss of the Unit 1 Service Air Compressor (SA) [LF], the loss of the plant process computer, and the difficulties encountered with resetting the scram logic (RP) [JC].

B. DESCRIPTION OF EVENT (Continued)

The Unit 1 service air compressor was restarted without difficulty, approximately 4 minutes after the trip. All control rods were verified fully inserted by selecting rods individually and observing the Reactor Sequence Control (RSCS, RS) [AA] panel "full-in" lights. However, the loss of the process computer prevented the Control Room Operator from verifying that all control rods had fully inserted by use of the computer. After the automatic scram, the 1/2 scram in the "B" RPS channel could not be cleared due to the D and F Intermediate Range Monitors (IRM, NR) [IG] being out of service. Resetting the "A" side 1/2 scram would not close the scram valves due to air leakage out of the A channel scram pilot valves which is a consequence of normal aging of the scram pilot valves. The scram discharge volume vent and drain valves had closed as required on the scram. By properly executing the procedure for resetting the scram, the Control Room Operator ensured that the scram discharge volume vent and drain valves stayed closed. The channel A trip was re-instated to maintain the vent and drain valves closed, until the B channel could be reset.

The momentary loss of AC power to the busses being fed from the Unit 2 SAT during the transfer to the Unit 2 UAT caused the Unit 2 Service Air Compressor to trip. This resulted in the reduction of service air header pressure to a minimum of 60 psig. The Unit 0 (common) and the Unit 1 Service Air Compressors were started and provided sufficient air pressure to both units before any adverse effects occurred. As a result of the transfer, the Prime Computer system was temporarily lost. Both Unit 2 drywell chillers (VP) [KM] tripped resulting in an increase in drywell pressure and temperatures in some areas. The drywell reached a maximum of about 0.6 psig before the chillers were restarted about 15 minutes after the event occurred. The maximum temperature reached at any location in the drywell was 213 degrees Fahrenheit. The loss of power also caused the 2A Turbine Driven Reactor Feed Pump (TDRFP) controller (FW) [JK] to lock up resulting in a reactor vessel level transient which required immediate operator action to regain control. During the vessel level transient, reactor vessel level reached a minimum of +25.0 inches and a maximum of +53.0 inches. The power loss also resulted in the isolation of the Reactor Water Cleanup (RT) [CE] and Reactor Building ventilation systems (VR) [VA].

Units 1 and 2 entered the Action Statement of Technical Specification 3.8.1, due to lack of a second off-site power source due to the loss of the Unit 2 SAT.

At 0230 hours, on March 3, 1989, a General Station Emergency Plan (GSEP) Unusual Event was declared. This was a conservative declaration of Emergency Action Level (EAL) 3.D which was done at the discretion of the Station Director. This EAL applies to loss of off-site power from the Unit Auxiliary Transformer and System Auxiliary Transformer without credit for unit cross tie breakers. Since a Unit 2 trip would have resulted in the condition being directly applicable, the choice was made to take the conservative classification until more stable conditions existed. The GSEP was terminated at 1743 hours on March 3, 1989 after discussion with Corporate Emergency Planning and NRC personnel.

This report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the automatic actuation of an Engineered Safety Feature.

C. APPARENT CAUSE OF EVENT

The root cause of this event was the failure of the C phase lightning arrestor on the primary (345 KV) side of the SAT. The failure of the lightning arrestor resulted in a transient on the 345 KV system that caused the actuation of the A phase differential protective relay on the Unit 1 generator. This relay resulted in the generator lock-out trip signal. The root cause of the lightning arrestor failure is not known at this time.

The relay that actuated in the Unit 1 generator protective relaying was a generator differential relay which is designed to measure differential current across the generator. The protection zone of this relay is from the generator neutral to the primary side of the Unit 1 Main Power Transformers (MPT) and the Unit 1 Auxiliary Transformer. A fault such as this should not have caused the generator differential relay to actuate. However, the A phase differential relay, which has a setpoint of 0.2 amps +/- 10% at 85 milliseconds, was found to be out of tolerance low. The as found value was 0.178 amps at 63 milliseconds.

The cause of the bushing failure on OCB 4-6 was determined to be caused by mechanical forces acting on the bushing during the breaker operation to interrupt the fault current. During the inspection of the B phase breaker, the hold down bolts were found to be loose. This may have resulted in physical movement of the breaker as it opened and closed while the bus lead connections to the bushings created enough force to damage the bushings.

D. SAFETY ANALYSIS OF EVENT

There were minimal safety consequences associated with the loss of the Unit 1 generator and the subsequent scram. The scram occurred as expected in response to the load reject (except as noted above). The scram did not result in any degradation of primary containment boundaries or abnormal release of radioactive materials. The difficulty experienced in resetting the scram was properly handled by the operator. Incorrect reset attempts could have resulted in a release into the Reactor Building, however, existing procedures were adequate to prevent this. The temporary loss of Service Air compressors was an inconvenience but not a safety concern since Service or Instrument Air is not required for a safe shutdown of the plant. Service Air was restored within five minutes of the trip. The station switchyard relaying isolated the faulted components as designed to prevent damage to other equipment.

The failure of the Unit 2 lightning arrestor did result in the loss of the primary source of off-site power for Unit 2 and the secondary source for Unit 1. Safe operation of the unit continued after the event. Station switchyard relaying properly isolated the faulted lightning arrestor and all loads being supplied were transferred to their alternate power source as designed. The 2B Emergency Diesel Generator correctly auto-started. To prevent the continued operation of the Diesel Generator unloaded, the High Pressure Core Spray Pump (HPCS) [BG] was placed in full flow test condition, which is a normal mode for the HPCS pump. The loss of drywell cooling for the short period of time involved in this event did not result in significant heatup or pressurization of the Unit 2 drywell. An extended loss of Service Air on the operating unit could result in a mandatory reactor scram due to multiple rods drifting. However, air pressure was restored soon enough to prevent any rods from drifting. The Unit 2 event did not cause any scram setpoints to be exceeded. Safe shutdown of the unit was within the scope of the operators' procedures at that time.

E. CORRECTIVE ACTIONS

The failed lightning arrestor was replaced. The root cause of the lightning arrestor failure is being tracked by Action Item Record (AIR) 373-240-89-01200. The Unit 2 SAT was verified to be operational by performing megger testing on all windings, transformer turns ratio testing, high potential testing on the 4.16 and 6.9 KV feeder busses to Unit 2 and analysis of the transformer oil and gas samples. The Unit 2 SAT was returned to service at 0330 hours on March 5, 1989, exiting the Action Statement of Technical Specification 3.8.1.

The Uninterruptable Power Supply (UPS) to both the Prime and Process Computers was restored and the computers were placed on their normal power supply. AIR 373-240-89-01201 has been written to the Operating Department to review practices associated with placing these power supplies in "Bypass".

The three Unit 1 generator differential relays were recalibrated. Only the A phase relay was found to be out of tolerance and was satisfactorily recalibrated to within the specified tolerance. AIR 373-240-89-01203 has been initiated to track the future calibration of this relay.

Both bushings on B phase of OCB 4-6 were replaced and the hold down bolts were tightened. All three breakers were inspected during the outage. There was no other indication of damage. Hold down bolts on the other breakers in the yard were inspected and tightened as necessary. OCB 4-6 was returned to service on March 14, 1989.

A Work Request has been generated to rebuild the remaining 50% of the Unit 1 scram pilot valves which were not rebuilt in either refuel outage 1 or 2. AIR 373-200-88-08901 will track completion of this Work Request.

F. PREVIOUS EVENTS

LER Number	Title
374/84-020-00	Generator Lock-out and Reactor Scram
373/87-003-00	Reactor Scram, Main Generator Lock-out and Turbine Trip
373/87-014-00	Reactor Scram Caused by Fault on 6.9 KV Feed to Transformer 141

G. COMPONENT FAILURE DATA

Manufacturer	Nomenclature	Model Number	MFG Part Number
General Electric	Alugard II Station Arrestor	9L11MHA264	

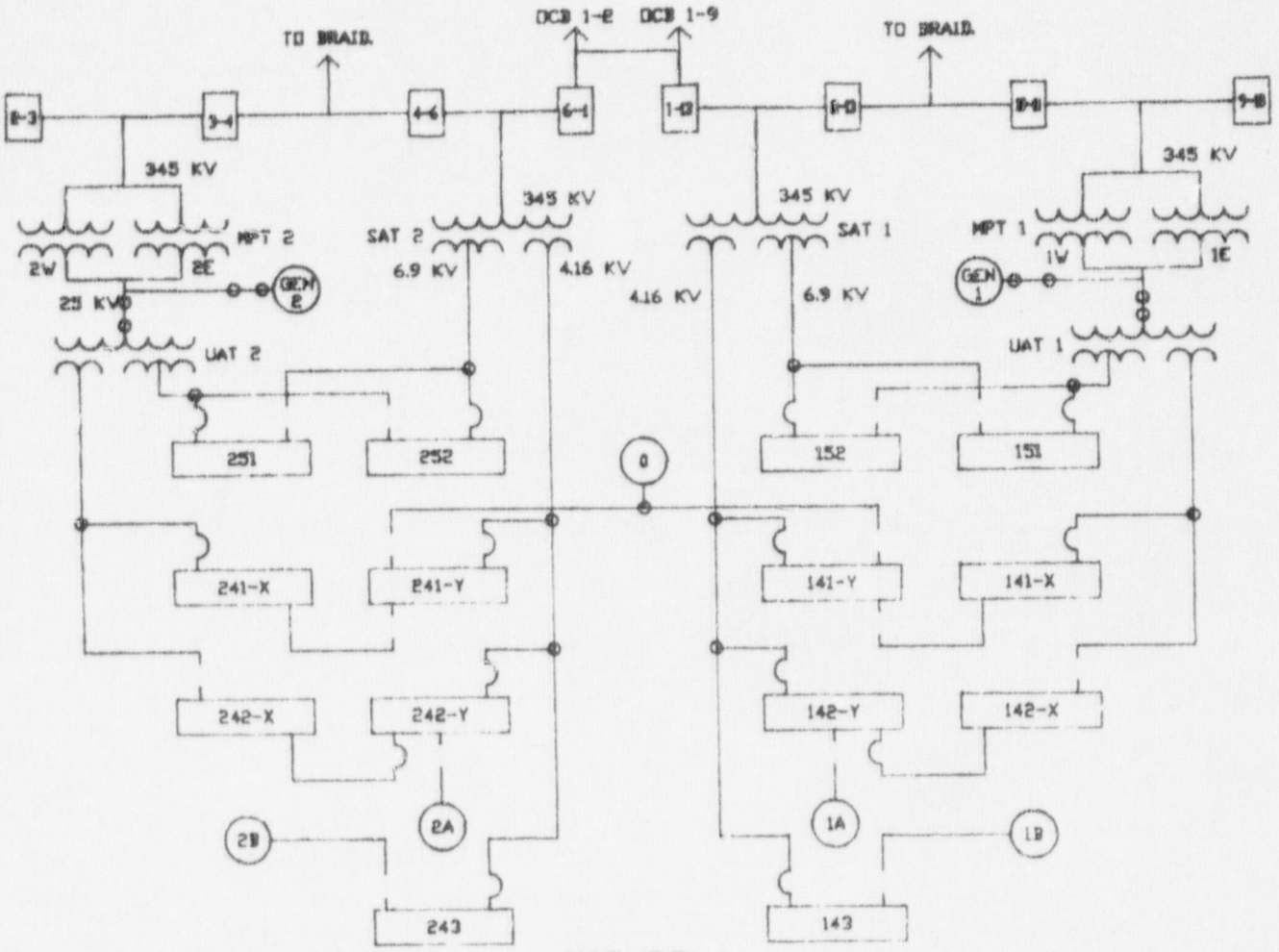

FIGURE 1
NORMAL AC DISTRIBUTION LINE UP

Commonwealth Edison
LaSalle County Nuclear Station
Rural Route #1, Box 220
Marseilles, Illinois 61341
Telephone 815/357-6761

March 30, 1989

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

Dear Sir:

Licensee Event Report #89-009-00, Docket #050-373 is being submitted to your office in accordance with 10CFR50.73(a)(2)(iv).

J. C. Diederich

G. J. Diederich
Station Manager
LaSalle County Station

GJD/SJS/kg

Enclosure

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

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