

<b>NRC FORM 366</b> (4-95)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		<b>APPROVED BY OMB NO. 3150-0104</b> <b>EXPIRES 04/30/98</b>	
<b>LICENSEE EVENT REPORT (LER)</b> (See reverse for required number of digits/characters for each block)				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION.	
FACILITY NAME (1) Sequoyah Nuclear Plant (SQN) Unit 1			DOCKET NUMBER (2) 05000327		PAGE (3) 1 OF 8
TITLE (4) Diesel generator starts that resulted from cutting a cable while drilling a panel and during repairs to the damaged cable.					
<b>EVENT DATE (5)</b> MONTH DAY YEAR 04 04 97		<b>LER NUMBER (6)</b> YEAR SEQUENTIAL NUMBER REVISION NUMBER 97 -- 007 -- 00		<b>REPORT DATE (7)</b> MONTH DAY YEAR 5 01 97	
				<b>OTHER FACILITIES INVOLVED (8)</b> FACILITY NAME DOCKET NUMBER SQN, Unit 2 05000328 FACILITY NAME DOCKET NUMBER NA 05000	
<b>OPERATING MODE (9)</b> N		<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)</b>			
		20.2201(b)		20.2203(a)(2)(v)	
<b>POWER LEVEL (10)</b> 000		20.2203(a)(1)		20.2203(a)(3)(i)	
		20.2203(a)(2)(i)		20.2203(a)(3)(ii)	
		20.2203(a)(2)(ii)		20.2203(a)(4) X	
		20.2203(a)(2)(iii)		50.36(c)(1)	
		20.2203(a)(2)(iv)		50.36(c)(2)	
				50.73(a)(2)(i) 50.73(a)(2)(viii)	
				50.73(a)(2)(ii) 50.73(a)(2)(x)	
				50.73(a)(2)(iii) 73.71	
				X 50.73(a)(2)(iv) OTHER	
				50.73(a)(2)(v) Specify in Abstract below or in NRC Form 366A	
				50.73(a)(2)(vii)	
<b>LICENSEE CONTACT FOR THIS LER (12)</b>					
NAME Steve Gilley, Licensing Engineer				TELEPHONE NUMBER (Include Area Code) (423) 843-7427	
<b>COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)</b>					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>					<b>EXPECTED SUBMISSION DATE (15)</b>
YES (If yes, complete EXPECTED SUBMISSION DATE).				X NO	MONTH DAY YEAR /    /    /
<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)</b>					
<p>On April 4, 1997, at approximately 0130 hours, Eastern Standard Time (EST), with Unit 1 in a refueling outage with the core offloaded and Unit 2 in power operation at approximately 100 percent, an Engineered Safety Feature (ESF) actuation occurred. Diesel generators (DGs) (1A-A, 2A-A, and 2B-B) started when a drill bit being used to drill into an electrical panel in the main control room, cut into the cable bundle connecting the 1A-A 6900-V Shutdown Board (SDBD) normal feeder handswitch to its associated electrical circuits. The 1B-B DG was tagged with an equipment clearance and did not start. A second ESF actuation occurred at approximately 1036 hours, EST, during repair of the damaged cable bundle, when personnel cut multiple wires simultaneously. The alternate feeder breaker for the 1A-A 6900-V SDBD tripped, which deenergized the board. The load shedding circuitry stripped all loads and three DGs (1A-A, 2A-A, and 2B-B) started and the 1A-A DG energized the board (DG 1B-B was already running as the result of a test in progress). The root cause of the first event was inadequate work practice brought on by overconfidence and lack of adherence to job performance standards. The root cause of the second event was improper control over sensitive plant activity due to lack of adherence to job performance standards. Following the first event, work was stopped for all electrical modifications for one shift, and stand down meetings were held site-wide to discuss the event. The work order was revised to ensure the engineer would perform an evaluation of the conditions prior to drilling. Following the second event, work activities on the cable repair were suspended and an assessment of electrical maintenance employee performance was performed. Disciplinary actions have been taken with the appropriate individuals.</p>					

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
SQN Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		97 --	007 --	00	2 of 8

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

## I. PLANT CONDITIONS

Unit 1 was in a refueling outage with the core offloaded. Unit 2 was in power operation at approximately 100 percent.

## II. DESCRIPTION OF EVENT

### A. Event:

On April 4, 1997, at approximately 0130 hours, Eastern Standard Time (EST), with Unit 1 in a refueling outage with the core offloaded an inadvertent Engineered Safety Feature (ESF) actuation occurred. A hole was being drilled in a control room panel to install a cover over a hole where a switch had been removed. When the drill penetrated the panel, the forward progress of the drill caused the drill bit to come into contact with a control power cable bundle inside the panel. The bundle consisted of eleven wires, four of these were damaged. The control power cable bundle served to connect the 1A-A 6900-V Shutdown Board (SDBD) normal feeder breaker handswitch to its associated electrical circuits. The penetration by the drill bit resulted in the instantaneous opening of the normal feeder breaker [EIS Code BKR] for the 1A-A 6900V SDBD. Automatic load shedding circuitry stripped the loads from the 1A-A 6900-V SDBD, the three available diesel generators (DGs) (1A-A, 2A-A, and 2B-B) started and the 1A-A DG energized the board. The 1B-B DG was tagged with an equipment clearance and did not start.

The second ESF actuation occurred at approximately 1036 hours EST during activities associated with the repair of the damaged cable bundle. Personnel had cut the wires in the bundle individually without incident and then proceeded to cut the wires simultaneously to facilitate installation of a new connector on the end of the bundle. This would allow the damaged area which was near the end of the cable bundle to be eliminated. When the wires were cut, the alternate feeder breaker [EIS Code BKR] for the 1A-A 6900-V SDBD tripped, which deenergized the board again. Automatic load shedding circuitry stripped the loads from the 1A-A 6900-V SDBD, three DGs (1A-A, 2A-A, and 2B-B) started and the 1A-A DG energized the board (DG 1B-B was already running as the result of a test in progress).

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
SQN Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 8
		97 --	007 --	00	

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

**B. Inoperable Structures, Components, or Systems that Contributed to the Event:**

None.

**C. Dates and Approximate Times of Major Occurrences:**

April 3, 1997

Two switches were removed from the 1-M-1 panel in the main control room and work to install covers over the holes was initiated. Operations personnel informed the craftsmen that the adjacent switches were SDBD handswitches. After unsuccessfully attempting to obtain a shortened drill bit or drill stop collar, the individuals determined on their own without consulting supervision to proceed with the activity because they felt they could accomplish the work without the special tools.

April 4, 1997  
~0129 EST

During the drilling operation, the drill bit protruded into the cable bundle and damaged the cable and the drill bit acted as a short circuit to energize the trip coil causing the normal feeder breaker for the 1A-A 6900-V SDBD to trip. DGs 1A-A, 2A-A, and 2B-B started and 1A-A DG energized the 1A-A 6900-V SDBD (DG 1B-B was tagged with an equipment clearance and did not start).

Two courses of action were initiated to restore the 1A-A 6900-V SDBD to either of its offsite power sources by restoring either the normal or alternate feeder breaker. One course of action was to verify operability of the alternate feeder breaker, parallel the SDBD to its alternate power source, then unload and shut down the 1A-A DG. The second course of action was to repair the damaged control power cable bundle and return 1A-A SDBD to its normal power source.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
SQN Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
		97 --	007 --	00	4 of 8

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

April 4, 1997  
~0655 EST

After it was determined that the 1A-A 6900-V SDBD could be placed on the alternate feeder, the necessary procedure changes were complete, and the alternate feeder breaker to the 1A-A 6900-V SDBD was closed.

April 4, 1997  
~0715 EST

The 1A-A DG was shut down.

April 4, 1997  
~0715 EST

The work order for the repair of the damaged cable was planned believing that the alternate feeder breaker to the 1A-A 6900-V SDBD would remain open throughout the repair and post maintenance test and included a signoff to verify the breaker was open prior to performing the work. The work order required the 1A-A 6900-V SDBD alternate feeder breaker to be verified in the open position. The verification was performed, but was performed on the incorrect breaker.

April 4, 1997  
~0725 EST

Operations requested a step-by-step brief on the work which was about to take place to repair the damaged cable. Operations asked if voltage checks have been performed on the cable bundle and were told that they have been checked and are deenergized. (Later it was discovered that only one of two terminal blocks were checked.) The terminal block which was not checked had two wires in the cable bundle that were energized from a control power circuit.

April 4, 1997  
1036 EST

All the wires in the bundle are trimmed simultaneously, resulting in the tripping of the 1A-A 6900-V SDBD alternate feeder breaker. The 1A-A 6900-V SDBD deenergizes and 1A-A, 2A-A, and 2B-B DGs start and 1A-A DG energizes the 1A-A 6900-V SDBD. The 1B-B DG was already running as part of an unrelated maintenance activity.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SQN Unit 1	05000327	97 --	007 --	00	5 of 8

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

April 4, 1997      Unit 2 entered LCO 3.8.1.1.c due to loss of offsite power  
 1036 EST      source to 1A-A 6900-V SDBD and one DG inoperable.

April 4, 1997      DG 1B-B stopped.  
 1126 EST

April 4, 1997      DG 2A-A and 2B-B stopped.  
 1135 EST

April 4, 1997      Unit 2 exited LCO 3.8.1.1.c The normal feeder breaker  
 2131 EST      to the 1A-A 6900-V SDBD has been closed. The 1A-A  
                  DG is connected in parallel with the offsite power to the  
                  1A-A 6900-V SDBD.

April 4, 1997      The Diesel 1A feeder breaker to the 1A-A 6900-V SDBD  
 2202 EST      was opened and the 1A DG was being shut down.

**D. Other Systems or Secondary Functions Affected:**

None.

**E. Method of Discovery:**

The DG starts were annunciated in the MCR.

**F. Operator Actions:**

MCR operators responded as prescribed by emergency procedures. In both instances, operators diagnosed the condition as an inadvertent ESF and secured the work activity. In the both events the 2A-A and 2B-B DGs started as a result of the ESF and were subsequently shut down by the operators. In the first event operators stopped the 1A-A DG after closing the alternate feeder breaker (the 1B-B was tagged and did not start). In the second event, the 1B-B DG which was already running as part of an unrelated test was stopped. Following repairs to the cable the normal feeder breaker to the 1A-A 6900-V SDBD was closed and the 1A-A DG was shut down.



**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
SQN Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 of 8
		97 --	007 --	00	

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

**G. Safety System Responses:**

The plant responded as expected to both loss-of-power conditions. In the first event, the three available DGs started (the 1B-B DG was tagged out for maintenance) and the 1A-A DG energized the 1A-A 6900-V SDBD as designed. In the second event, three DGs started (the 1B-B DG was already running as part of a maintenance activity) and the 1A-A DG energized the 1A-A 6900-V SDBD as designed.

**III. CAUSE OF THE EVENT**

**A. Immediate Cause:**

The immediate cause of the first condition was that the drill bit penetrated the energized wire bundle causing a short that energized the trip coil for the normal feeder breaker to the 1A-A 6900-V SDBD.

The immediate cause of the second condition was that when the wires in the bundle were cut simultaneously causing the alternate feeder breaker to the 1A-A 6900V SDBD to trip.

**B. Root Cause:**

The root cause of the first event was inadequate workpractice in that the hole was drilled without positive protection controls in place for the cable.

The root cause of the second event was inadequate workpractices and adherence to site policies and procedures by multiple individuals during performance of sensitive activities.

**C. Contributing Factors**

In the second event, the alternate breaker and its control circuits should have been tagged out of service under a hold order when the circuits for the normal feeder breaker were tagged.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SQN Unit 1	05000327	97 --	007 --	00	7 of 8

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

#### IV. ANALYSIS OF THE EVENT

The operability of the 6900-V SDBDs and their associated distribution system ensures that the necessary power is supplied to the equipment requiring AC power during a loss of offsite power and/or accident condition. In the events described by this LER, a loss of power condition occurred on the 1A-A 6900-V SDBD, generating a signal that started the available DGs as designed. The plant response to the events were consistent with responses described in the final safety analysis report and accordingly, the events did not adversely affect the health and safety of plant personnel or the general public.

#### V. CORRECTIVE ACTIONS

##### A. Immediate Corrective Actions:

Following the first event, work was stopped for all electrical modifications for one shift, stand down meetings were held site-wide discussing the situation and the measures that needed to be taken. The work order was revised to add a holdpoint to ensure the engineer performed an evaluation of the conditions prior to drilling. The workplans in progress were reviewed and pre-job briefings were given to modifications personnel again.

Following the second event, work activities on the cable repair were suspended. An assessment of electrical maintenance shop employee performance was performed and resulted in the removal of individuals from plant duties. A plan was also developed to provide for additional evaluation and training.

This event has been communicated through onshift briefings and a follow-up training letter to licensed operators.

MCR operators responded to both events by promptly diagnosing the condition and taking steps to restore one of the offsite power sources to the SDBD.

Disciplinary actions have been taken with the appropriate individuals.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
SQN Unit 1	05000327	97 --	007 --	00	8 of 8

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

**B. Corrective Actions to Prevent Recurrence:**

Management has instituted a site-wide initiative emphasizing the requirements for pre-job briefings and procedural adherence. No additional corrective actions are necessary to prevent recurrence. These events occurred as a result of human performance problems and the appropriate disciplinary actions have been taken.

**VI. ADDITIONAL INFORMATION**

**A. Failed Components:**

None.

**B. Previous LERs on Similar Events:**

A review of previous reportable events identified one LER (50-327/87-060) where an engineered safety system actuation occurred when, during the performance of a special maintenance instruction, an electrician's knife blade came into contact with two bare energized studs while cutting the plastic tie wraps from some cables. As a result, the normal feeder breaker for the 1B-B shutdown board tripped and all operable DGs started. The corrective actions included covering the bare studs to prevent inadvertent shorting during the remaining performances of the special maintenance instruction. The corrective actions would not have prevented the events described in this LER.

**C. Additional Information:**

An enhancement is planned to the emergent work process to require a risk assessment by a senior reactor operator prior to conduct of work.

**VII. COMMITMENTS**

None.