

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION

P. O. BOX A

SANATOGA, PENNSYLVANIA 19464

(215) 327-1200 EXT. 2700

J. DOERING, JR.
PLANT MANAGER
LIMERICK GENERATING STATION

April 22, 1991
Docket No. 50-353
License No. NPF-85

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

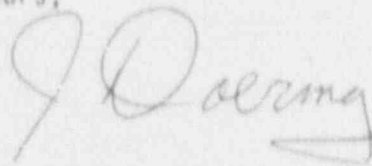
SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 2

This LER reports a Unit 2 Reactor Protection System actuation due to a personnel error which resulted in less than adequate communication during the application of a Temporary Circuit Alteration to the Division I and III instrumentation channels. There was no control rod movement since Unit 2 was shutdown for refueling and all control rods were fully inserted into the core.

| | |
|------------------|---|
| Reference: | Docket No. 50-353 |
| Report Number: | 2-91-003 |
| Revision Number: | 00 |
| Event Date: | March 24, 1991 |
| Report Date: | April 22, 1991 |
| Facility: | Limerick Generating Station P.O. Box A, Sanatoga, PA 19464 |

This LER is being submitted pursuant to the requirements of 10 CFR 50.73 (a)(2)(iv).

Very truly yours,



DMS:cah

cc: T. T. Martin, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

40-336

9104250285 910422
PDR ADOCK 05000333
S PDR

IE22
1/1

LICENSEE EVENT REPORT (LER)

| | | | | | | | | | | | | | | | | |
|---|--------|--|----------------|-------------------|-----------------|------------------|-----------------|------|----------------|---|--------------|--|------------------|--|-----|------|
| FACILITY NAME (1) Limerick Generating Station, Unit 2 | | | | | | | | | | DOCKET NUMBER (2) 0 5 0 0 0 3 5 3 | | | | PAGE (3) 1 OF 0 5 | | |
| TITLE (4) Inadvertent actuation of the Unit 2 Reactor Protection System due to a personnel error during the application of a Temporary Circuit Alteration. | | | | | | | | | | | | | | | | |
| 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 3 | 2 4 | 9 1 | 9 1 | 0 0 3 | 0 0 0 | 0 4 | 2 2 | 9 1 | | | | | 0 5 0 0 0 | | | |
| OPERATING MODE (9) 4 | | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11) | | | | | | | | | | | | | | |
| POWER LEVEL (10) 0 0 0 | | 20.402(b) | | | | 20.405(e) | | | | <input checked="" type="checkbox"/> 50.73(a)(2)(iv) | | | | 73.71(b) | | |
| | | 20.406(a)(1)(ii) | | | | 50.38(a)(1) | | | | 50.73(a)(2)(v) | | | | 73.71(c) | | |
| | | 20.409(a)(1)(ii) | | | | 50.38(a)(2) | | | | 50.73(a)(2)(vi) | | | | OTHER (Specify in Abstract below and in Text, NRC Form 368A) | | |
| | | 20.406(a)(1)(iii) | | | | 50.73(a)(2)(i) | | | | 50.73(a)(2)(viii)(A) | | | | | | |
| | | 20.409(a)(1)(iv) | | | | 50.73(a)(2)(ii) | | | | 50.73(a)(2)(viii)(B) | | | | | | |
| | | 20.406(a)(1)(iv) | | | | 50.73(a)(2)(iii) | | | | 50.73(a)(2)(ix) | | | | | | |
| LICENSEE CONTACT FOR THIS LER (12) | | | | | | | | | | | | | | | | |
| NAME Gil J. Madsen, Regulatory Engineer, Limerick Generating Station | | | | | | | | | | TELEPHONE NUMBER AREA CODE 2 1 5 3 2 7 * 1 2 0 0 | | | | | | |
| COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13) | | | | | | | | | | | | | | | | |
| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NRC | CAUSE | | | | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NRC | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| SUPPLEMENTAL REPORT EXPECTED (14) | | | | | | | | | | | | EXPECTED SUBMISSION DATE (15) | | MONTH | DAY | YEAR |
| 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 March 24, 1991, an inadvertent Redundant Reactivity Control System (RRCS) Alternate Rod Insertion (ARI) actuation was initiated from Division I Logic during the application of a Temporary Circuit Alteration (TCA) to support Unit 2 outage work on Division I and III instrumentation. The ARI initiation caused the SCRAM inlet and outlet valves to open, and caused the SCRAM Discharge Volume (SDV) vent and drain valves to close. Repositioning of these valves caused level in the SDV to increase to its high level trip setpoint, causing a Reactor Protection System (RPS) full SCRAM actuation. There was no control rod motion during this event since all control rods were fully inserted prior to the event. The ARI and the RPS actuated as designed during this event. The cause of this event was personnel error resulting in less than adequate communication during installation of the TCA; an RRCS reset was requested when both RRCS and ARI resets were required. Procedural guidance will be developed to ensure both RRCS and ARI resets are performed for these routine Divisional TCAs that are applied during outages. The Licensed Operator Regualification training module for RRCS will be revised to include more detailed information on RRCS and ARI logic resets.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| | | | | | | | |
|-------------------|-------------------|-----------------|-------------------|-----------------|----------|-----|--------|
| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) | | |
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| | | 0 5 0 0 0 3 5 3 | 9 1 | 0 0 3 | 0 0 | 0 2 | OF 0 5 |

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

Unit Conditions Prior to the Event:

Unit 2 Operational Condition was 4 (Cold Shutdown) and at 0% power level.

Unit 2 was in a refueling outage.

Electrical power to the Unit 2 'C' Standby Liquid Control (SLC) (EIS:BR) pump was off due to D23 AC Safeguard power electrical bus outage work. The Main Control Room (MCR) Redundant Reactivity Control System (RRCS) (EIS:JD) annunciators, "DIV I OUT OF SERVICE" and "DIV I/DIV II RRCS CHANNEL ACTIVATED", were illuminated as a result of the 'C' SLC pump being de-energized. Additionally, the "RRCS TROUBLE" status light on the Auxiliary Equipment Room (AER) RRCS panel 10C634 was illuminated due to the RRCS Self Test System (STS) being off-line and also as a result of the deenergized 'C' SLC pump.

An Instrumentation and Controls (I&C) System Engineer (SE) had obtained the MCR Shift Supervision's review and approval for the application of two (2) Temporary Circuit Alterations (TCAs) to the Division I and III instrumentation channels to prevent spurious Reactor Protection System (RPS) (EIS:JC), Nuclear Steam Supply Shutdown System (NSSSS) (EIS:JM), Emergency Core Cooling System (ECCS), and RRCS actuations and isolations during scheduled outage work on Division I and III instrumentation.

Description of the Event:

On March 24, 1991, at 2115 hours, a Unit 2 reactor SCRAM occurred as a result of a RPS actuation, due to the application of a TCA by the I&C SE. The activities which lead to this RPS actuation are as follows.

On March 24, 1991, at approximately 2045 hours, the I&C SE was preparing to apply the Division I TCA in accordance with Administrative (A) Procedure, A-42, "Procedure for Control of Temporary Circuit Alterations (TCA)," in the AER. This TCA was being applied to defeat Engineered Safety Feature (ESF) actuations and isolations for Division I instruments located on instrument rack 20C004. This TCA involved disconnecting the input from the Wide Range Reactor Water Level Transmitter (LT), LT-42-2N402A, to the RRCS Reactor Level Switch (LS), LS-X-M1-20128. After the input from the LT was disconnected, the LS tripped as expected due to a false reactor low level signal. A Division I RRCS Channel 'A' reactor low level trip signal was generated, and a Channel 'A' RRCS reactor low level trip status light located on the AER RRCS panel 10C634 illuminated as expected. The MCR received no indication or annunciation that the LS had tripped. Had the 'C' SLC pump been energized, the MCR would have received "DIV I RRCS OUT OF SERVICE" and the "DIV I/DIV II RRCS CHANNEL ACTIVATED" annunciators as a result of the LS trip. To complete the application of the TCA, a 1000 ohm resistor was installed on the LS to remove the LS from its tripped state, and to allow the LS to sense a simulated normal reactor water level condition. After the resistor was installed, the I&C SE requested a licensed MCR operator to perform an "RRCS Reset" for the Channel 'A' RRCS reactor low level trip signal. The MCR operator then depressed the RRCS Reset pushbuttons. Subsequently, the Channel 'A' RRCS reactor low level trip status

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) | |
|-------------------------------------|-------------------|----------------|-------------------|-----------------|----------|--------|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | |
| Limerick Generating Station, Unit 2 | 0 5 0 0 0 3 5 3 | 9 1 | — 0 0 3 | — 0 0 | 0 3 | OF 0 5 |

TEXT (If more space is required, use additional NRC Form 266A's) (17)

light on the AER RRCS panel 10C634 cleared, however, the "RRCS TROUBLE" status light on the AER RRCS panel 10C634 remained illuminated due to RRCS STS being off-line.

The I&C SE then attempted to start the RRCS STS in accordance with System Operation Procedure S36.O.B, "RRCS Self Test Monitor Start-up and Initialization," to ensure that the "RRCS TROUBLE" status light would clear, and so that application of the second TCA could commence. The STS is utilized to perform an internal diagnostic of the RRCS power and logic circuitry to identify any problems. When the STS failed to operate, the I&C SE recalled that the interrelationship between the de-energized 'C' SLC pump and the RRCS prevents the STS from functioning; however, the RRCS is able to perform its design function with the STS off-line. Since the Channel 'A' RRCS reactor low level status light cleared as a result of the "RRCS Reset", the I&C SE concluded that the de-energized 'C' SLC pump was the only condition attributing to the illuminated "RRCS TROUBLE" status light, and that application of the second TCA could commence.

The I&C SE then commenced with the application of the Division III TCA. This TCA was being applied to defeat ESF actuations and isolations for Division III instruments located on rack 20C005. This TCA involved disconnecting the input from the Wide Range Reactor Level Transmitter, LT-42-2N402E, to RRCS Reactor Level Switch, LS-X-M1-20131, and installing a 1000 ohm resistor. Disconnection of the input from the LT would result in an expected Division I Channel 'B' RRCS reactor low level trip signal being generated.

On March 24, 1991, at 2115 hours, when the input from the LT was disconnected for the application of the second TCA, an inadvertent RRCS Alternate Rod Insertion (ARI) initiated, since both Division I Channels 'A' and 'B' were tripped. The ARI initiation caused the SCRAM pilot air header to depressurize which subsequently actuated the SCRAM pilot valves and the SCRAM Discharge Volume (SDV) vent and drain valves to their fail-safe positions. Repositioning of these valves caused reactor water to flow into the SDV increasing its level to the high level trip setpoint causing an RPS full SCRAM actuation. There was no control rod movement since Unit 2 was shutdown for refueling and all control rods were fully inserted into the core. Various annunciators and status lights were received in the MCR and the AER as a result of the ARI initiation and the RPS actuation. The I&C SE immediately installed the 1000 ohm resistor to clear the trip actuation. The ARI initiation was subsequently reset at 2117 hours by MCR operators. The RPS full SCRAM actuation was reset at 2126 hours, in accordance with General Plant (GP) procedure GP-11, "RPS-SCRAM Reset." All associated annunciators were subsequently reset, except those already illuminated due to the 'C' SLC pump de-energization.

A four (4) hour notification was made to the NRC at 0037 hours, on March 25, 1991, in accordance with 10CFR 50.72(b)(2)(ii) since this event resulted in an automatic actuation of the RPS. This LER is being submitted in accordance with the requirements of 10CFR 50.73(a)(2)(iv).

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

| | | | | | | | |
|--|---|----------------|-------------------|-----------------|----------|--|--|
| FACILITY NAME (1) Limerick Generating Station, Unit 2 | DOCKET NUMBER (2) 0 5 0 0 0 3 5 3 9 1 — 0 0 3 — 0 0 0 4 OF 0 5 | LER NUMBER (6) | | | PAGE (3) | | |
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| | | | | | | | |

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

Analysis of the Event:

There was no control rod motion during the reactor SCRAM since all control rods were fully inserted prior to the event. The ARI and the RPS actuated as designed during this event, and the impact on these systems and the associated systems was minimal since the Unit 2 reactor was shutdown and depressurized. These types of TCAs are applied only during a reactor outage with the reactor shutdown and on equipment not required to be operable. These types of TCAs are not applied during a reactor startup or during normal reactor power operations. There was no release of radioactive material to the environment as a result of this event. Therefore, the actual and potential consequences of this event were minimal.

Cause of the Event

The primary cause of this event was personnel error resulting in less than adequate communication between the I&C SE and the MCR operator during the reset of the RRCS reactor low level trip signal following application of the first TCA. This inadequate communication was due to the I&C SE's lack of detailed knowledge resulting in the failure to properly assess a unique situation that was created by the existing deenergized 'C' SLC pump. This unique situation is described below as a contributing factor of this event.

During the application of the first TCA, the I&C SE requested the MCR operator to "Reset RRCS" for the Division I Channel 'A' RRCS low level trip signal. The operator performed the RRCS reset, however, the operator should have been requested to reset both the RRCS and the ARI logics to reset the Channel 'A' ARI logic trip signal. When the second TCA was applied (in which case the Division I Channel 'B' RRCS low level trip signal was expected), an ARI initiation occurred since the Division I Channel 'A' ARI logic was still tripped from the application of the first TCA. The ARI initiation eventually led to the RPS actuation.

Contributing factors of this event are as follows.

- o A unique situation was created in that the existing illuminated annunciators in the MCR for the de-energized 'C' SLC pump masked the Channel 'A' ARI logic trip during the application of the first TCA. The MCR received no additional annunciation or indication that the first TCA had been applied. Also, there is no indication on the AER RRCS panel to warn test personnel of a Channel 'A' ARI logic trip. Had the 'C' SLC pump not been de-energized during this event, the MCR "DIV I RRCS OUT OF SERVICE" and the "DIV I/DIV II RRCS CHANNEL ACTIVATED" annunciators would have been available and would have annunciated when the first TCA was applied. To clear the annunciators, the MCR operator would have had to reset both the RRCS and the ARI logic for the Division I Channel 'A' RRCS low level trip signal. During previous outages when the Division I and II TCAs were applied, the MCR annunciators described above were not in an alarm state prior to installation of the TCAs.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) | | |
|-------------------------------------|-------------------|----------------|-------------------|-----------------|----------|----|-----|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | | | |
| Limerick Generating Station, Unit 2 | 0 8 0 0 0 3 5 3 | 9 1 | 0 0 3 | 0 0 | 0 5 | OF | 0 5 |

TEXT (If more space is required, use additional NRC Form 365A-1 (17))

- o The TCAs did not include a precaution to reset the RRCS and ARI logics prior to proceeding with the application of the second TCA.
- o The I&C SE had not coordinated or assisted with the application of these specific Divisional TCAs during previous outages, although he had experience in the preparation and application of TCAs.
- o Resetting of RRCS and ARI logic is an infrequent task performed by MCR operators. Additionally, the MCR operator was not aware that both an RRCS and an ARI reset were required when he was requested to perform an RRCS reset.

Corrective Actions:

1. Procedural guidance will be developed to ensure both the RRCS and the ARI logics are reset during the application of these specific Divisional TCAs, which are routinely performed during outages. This guidance is expected to be completed by June 15, 1991, and will help to provide adequate communication between the individual applying these TCAs and the MCR personnel. This action is the only logic reset action required to be performed during installation of these TCAs. This procedural guidance will eliminate the need to correct the "UNIQUE" situation which masked the tripped ARI channel.
2. A Shift Training Bulletin (STB) will be issued to Licensed Operators (LO) by April 24, 1991, discussing this event. This STB will ensure that LOs are aware of the fact that an "RRCS" reset does not reset the ARI logic.
3. The Licensed Operator Regualification (LOR) training module for RRCS will be revised to include more detailed information discussing RRCS and ARI logic resets. This training module is expected to be revised by July 8, 1991.
4. A letter from the Limerick Generating Station Vice President to all site personnel dated on March 27, 1991, addressed this event and other incidents involving personnel error that have occurred during the Unit 2 outage. The letter emphasized the importance for all site personnel to fully understand the consequences of their actions being taken before proceeding with their work, and to stop and think if they have any doubts about their actions.

Previous Similar Occurrences:

LGS LERs 1-84-002, 1-85-046, 1-86-011, 1-86-020, and 1-90-026 reported RPS SCRAM actuations due to personnel errors. None of these events were due to similar causes or activities; therefore, the corrective actions that were implemented for these LERs would not have prevented this event from occurring.

Tracking Codes: A7 Failure to properly communicate