Power Reactor Event # 46997

| | | | | | |
|---|---|---|---|---|---|
| **Site:** SUMMER | | | **Notification Date / Time:** | 06/29/2011 | 09:49 (EDT) |
| **Unit:** 1 | **Region:** 2 | **State :** SC | **Event Date / Time:** | 06/27/2011 | 16:11 (EDT) |
| **Reactor Type:** [1] W-3-LP | | | **Last Modification:** | 06/29/2011 | |
| **Containment Type:** DRY AMB | | | | | |
| **NRC Notified by:** BRUCE THOMPSON | | | **Notifications:** | MARK FRANKE | R2DO |
| **HQ Ops Officer:** STEVE SANDIN | | | | PART 21 GP (email) | NRR |
| **Emergency Class:** NON EMERGENCY | | | | | |
| **10 CFR Section:** | | | | | |
| 21.21 | UNSPECIFIED PARAGRAPH | | | | |

| Unit | Scram Code | RX Crit | Init Power | Initial RX Mode | Curr Power | Current RX Mode |
|---|---|---|---|---|---|---|
| 1 | N | Yes | 100 | Power Operation | 100 | Power Operation |

APPENDIX R ANALYSES FAILS TO RECOGNIZE HOT-SHORT FAILURE RESULTING IN THE LOSS OF AN ESSENTIAL ELECTRICAL BUS

The following Part 21 report was received via fax:

"10 CFR 21: Appendix R analyses conducted for Virgil C. Summer Nuclear Station (VCSNS) failed to identify that a fire-induced hot-short failure in an ammeter circuit would result in a loss of the B-train 7.2KV essential electrical bus (XSW1DB).

"Appendix R analyses performed by Gilbert/Commonwealth (now WorleyParsons) in the early 1980s failed to recognize the possibility of a fire-induced hot-short condition in a circuit that was identified as being required for safe shutdown. This circuit connects a set of sensing current transformers (CTs) to an ammeter on the Main Control Board, and provides over-current sensing for an over-current relay. Gilbert/Commonwealth recognized that a fire-induced open circuit in this ammeter circuit would result in damage to, or a fire in, the B-train 7.2kV essential switchgear. Thyrite protectors were added to the circuit to protect the CTs from this open circuit condition as part of the Appendix R analysis.

"However, this analysis and resolution failed to consider the hot-short-to-ground failure mode. Current from a hot-short could flow through the ammeters, or neutral conductor, and then through the bus neutral over-current relay to ground. This could actuate the over-current relay, which in turn would actuate a lock-out relay and trip all incoming breakers to bus XSW1DB. This bus provides credited B-train power to safe-shutdown components credited for this scenario. The Appendix R analyses conducted for VCSNS by Gilbert/Commonwealth did not address the hot-short scenario and is considered to be a defect, or omission. reportable under 10 CFR 21.

"This condition was identified during the circuit analysis review for transitioning the Appendix R Fire Protection

IE19
NRR

Power Reactor Event # 46997

Program to NFPA 805 and was reported to the NRC as an unanalyzed condition on 05/03/2011 (see Event Notification No. 46811). Corrective actions have been taken to address this issue."

The licensee informed the NRC Resident Inspector.

**********

NRC FORM 361
(12-2000)

U.S. NUCLEAR REGULATORY COMMISSION
OPERATIONS CENTER

# REACTOR PLANT
# EVENT NOTIFICATION WORKSHEET

EN # 46997

NRC OPERATION TELEPHONE NUMBER: PRIMARY – 301-816-5100 or 800-532-3469*, BACKUPS – [1st] 301-951-0550 or 800-449-3694*, [2nd] 301-415-0550 and [3rd] 301-415-0553 *Licensees who maintain their own ETS are provided these telephone numbers.

| NOTIFICATION TIME | FACILITY OR ORGANIZATION | UNIT | NAME OF CALLER | CALL BACK # |
|---|---|---|---|---|
| 0949 | V C Summer Nuclear Station | 1 | Bruce Thompson | (803) 931-5042 |

| EVENT TIME & ZONE | EVENT DATE | POWER/MODE BEFORE | POWER/MODE AFTER |
|---|---|---|---|
| 1611 | 6/27/11 | 100% Mode 1 | 100% Mode 1 |

| EVENT CLASSIFICATIONS | | 1-Hr. Non-Emergency 10 CFR 50.72(b)(1) | | 4-Hr. Non-Emergency 10 CFR 50.72(b)(2) | | 8-Hr. Non-Emergency 10 CFR 50.72(b)(3) | | Other Unspecified Requirement (Identify) | |
|---|---|---|---|---|---|---|---|---|---|
| | GENERAL EMERGENCY GEN/AAEC | | TS Deviation ADEV | | TS Required S/D ASHU | | Degraded Condition ADEG | | Safe S/D Capability AINA |
| | SITE AREA EMERGENCY SIT/AAEC | | | (i) | | (ii)(A) | | | RHR Capability AINB |
| | ALERT ALE/AAEC | | | (iv)(A) | ECCS Discharge to RCS ACCS | (ii)(B) | Unanalyzed Condition AUNA | | Control of Rad Release AINC |
| | UNUSUAL EVENT UNU/AAEC | | | (iv)(B) | RPS Actuation (scram) ARPS | (iv)(A) | Specified System Actuation AESF | | Accident Mitigation AIND |
| | 50.72 NON-EMERGENCY (see next columns) | | | (xi) | Offsite Notification APRE | | | | Offsite Medical AMED |
| | PHYSICAL SECURITY (73.71) DDDD | | | | | | | | Loss Comm/Asmt/Resp ACOM |
| | MATERIAL/EXPOSURE B??? | | | | | | | 60-Day Optional 10 CFR 50.73(a)(1) | |
| | FITNESS FOR DUTY HRT | | | | | | | | Invalid Specified System Actuation AINV |
| | OTHER UNSPECIFIED REQMT. (see last column) | | | | | | | Other Unspecified Requirement (Identify) | |
| | INFORMATION ONLY NNF | | | | | | | ✓ | NONR |
| | | | | | | | | | NONR |

## DESCRIPTION

Include: Systems affected, actuations and their initiating signals, causes, effect of event on plant, actions taken or planned, etc. *(Continue on back)*

10 CFR 21: Appendix R analyses conducted for Virgil C. Summer Nuclear Station (VCSNS) failed to identify that a fire-induced hot-short failure in an ammeter circuit would result in a loss of the B-train 7.2KV essential electrical bus (XSW1DB).

Appendix R analyses performed by Gilbert/Commonwealth (now WorleyParsons) in the early 1980s failed to recognize the possibility of a fire-induced hot-short condition in a circuit that was identified as being required for safe shutdown. This circuit connects a set of sensing current transformers (CTs) to an ammeter on the Main Control Board, and provides over-current sensing for an over-current relay. Gilbert/Commonwealth recognized that a fire-induced open circuit in this ammeter circuit would result in damage to, or a fire in, the B-train 7.2kV essential switchgear. Thyrite protectors were added to the circuit to protect the CTs from this open circuit condition as part of the Appendix R analysis.

However, this analysis and resolution failed to consider the hot-short-to-ground failure mode. Current from a hot-short could flow through the ammeters, or neutral conductor, and then through the bus neutral over-current relay to ground. This could actuate the over-current relay, which in turn would actuate a lock-out relay and trip all incoming breakers to bus XSW1DB. This bus provides credited B-train power to safe-shutdown components credited for this scenario. The Appendix R analyses conducted for VCSNS by Gilbert/Commonwealth did not address the hot-short scenario and is considered to be a defect, or omission, reportable under 10 CFR 21.

This condition was identified during the circuit analysis review for trainsitioning the Appendix R Fire Protection Program to NFPA 805 and was reported to the NRC as an unanalyzed condition on 05/03/2011 (see Event Notification No. 46811). Corrective actions have been taken to address this issue.

| NOTIFICATIONS | YES | NO | WILL BE |
|---|---|---|---|
| NRC RESIDENT | ✓ | | |
| STATE(s) | | ✓ | |
| LOCAL | | ✓ | |
| OTHER GOV AGENCIES | | ✓ | |
| MEDIA/PRESS RELEASE | | ✓ | |

ANYTHING UNUSUAL OR NOT UNDERSTOOD? ☐ YES (Explain above) ☑ NO

DID ALL SYSTEMS FUNCTION AS REQUIRED? ☐ YES ☐ NO (Explain above)

MODE OF OPERATION UNTIL CORRECTED:

ESTIMATED RESTART DATE:

ADDITIONAL INFO ON BACK ☐ YES ☐ NO