A-171E

GPC EXHIBIT II-171-E
WEBB EX. C.5

LER 1-90-6

LOSS OF OFFSITE POWER LEADS TO SITE AREA EMERGENCY

EVENT DATE: 3-20-90

ABSTRACT

On 3-20-90, Unit 1 was in a re-fueling outage and Unit 2 was operating at 100% power. At 0820 CST, the driver of a fuel truck in the switchyard backed into the support holding "C" phase insulator for the Unit 1 Reserve Auxiliary Transformer (RAT) 1A. The insulator and line fell to the ground, causing a phase to ground fault. Both Unit 1 RAT 1A and Unit 2 RAT 1B H1 Side and Low Side breakers tripped, causing a loss of offsite power condition (LOSP). Both units' emergency Diesel Generators (DG's) started, but the Unit 1 DG tripped, causing a loss of residual heat removal (RHR) to the reactor core since the Unit 1 Train B RAT and DG were out of service for maintenance. A Site Area Emergency (SAE) was declared and the site Emergency Plan was implemented. The core heated up to 136 degrees F before the DG was emergency started at 0856 CST and RHR restored. At 0915 CST, the SAE was downgraded to an Alert after onsite power was restored.

The direct cause of these series of events is a cognitive personnel error. The truck driver failed to use proper backing procedures in the switchyard and hit a support, causing the phase to ground fault and LOSP. The most probable cause of the DG1A trip is the intermittent actuation of the DG Jacket water temperature switches.

Corrective actions include strengthening policies for control of vehicles, extensive testing of the DG and replacement of suspect switches.

LOSP loads on bus 1AA02.

3.2 Root Causes

a) The truck driver met all current site training and qualification requirements, including holding a Class 2 Georgia driver's license. However, to drive the same truck on state highways would have required a Class 4 license. The site requirement was therefore, inadequate. Furthermore, site safety rules requiring a flagman for backing vehicles when viewing is impaired were violated.

b) The root cause for the failure of DG1A has not been conclusively determined. There is no record of the trips that were annunciated after the first trip. The cause of the first trip can therefore only be postulated, but most likely has the same root cause as the second trip. The second trip occurred at the end of the timed sequence of the group 2 block logic. This logic provides for the DG to come up to operating conditions before the trips become active. The block logic timed out and the trip occurred at about 70 seconds. The annunciators observed at the second trip included Jacket water high temperature along with other active trips. It is believed that the jacket water trip is the most likely cause of the second trip. In conducting a investigation, the trip conditions that were observed on the second DG trip on 3/20/90 were essentially recreated by venting 2 out of 3 temperature sensors, simulating a tripped condition. The recreation duplicated both the annunciators and the 70 sec. trip time. This most likely cause assumes an intermittent actuation of jacket water temperature switches.

Following the 3-20-90 event, all three switches were bench tested. Switch TS-19110 was found to have a setpoint of 197 degrees F, which was approximately 6 degrees below its previous setting. Switch TS-19111 was found to have a setpoint of 199 degrees F, which was approximately the same as the original setting. Switch TS-19112 was found to have a setpoint of 186 degrees F, which was approximately 17 degrees F below the previous setting and was re-adjusted. Switch TS-19112 also had a small leak which was judged to be acceptable to support diagnostic engine tests and was reinstalled. The switches were recalibrated with the manufacturer's assistance to ensure a consistent calibration technique.

During the subsequent test run of the DG on 3-30-90, one of the switches (TS-19111) tripped and would not reset. This appeared to be an intermittent failure because it subsequently reset. This switch and the leaking switch (TS-19112) were replaced with new switches. All subsequent testing was conducted with no additional problems.

A test of the jacket water system temperature transient during engine starts was conducted. The purpose of this test was to determine the actual jacket water temperature at the

switch locations with the engine in a normal standby lineup, and then followed by a series of starts without air rolling the engine to replicate the starts of 3-20-90. The test showed that jacket water temperature at the switch location decreased from a standby temperature of 163 degrees F to approximately 156 degrees F and remained steady.

Numerous sensor calibrations (including jacket water temperatures), special pneumatic leak testing, and multiple engine starts and runs were performed under various conditions. Since 3-20-90, DG1A and DG1B have been started several times and no failures or problems have occurred during any of these starts. In addition, an undervoltage start test without air roll was conducted on 4-6-90 and DG1A started and loaded properly.

Based on the above facts, it is concluded that the jacket water high temperature switches were the most probable cause of both trips on 3-20-90.

4. ANALYSIS OF EVENT

The loss of offsite power to the Class 1E buss 1BA03 and failure of DG1A to start and operate successfully, coupled with DG1B and RAT 1B being out of service for maintenance, resulted in Unit 1 being without AC power to both Class 1E busses. With both Class 1E busses de-energized, the Residual Heat Removal (RHR) System could not perform its required safety function. Based on a noted rate of rise in the RCS temperature of 16 degrees F, measured at the core exit thermocouples over a fifteen minute period, the RCS water would not have been expected to begin boiling until approximately 1 hour and 50 minutes after the beginning of the event.

The steam generator primary side manway installation and closure of the containment equipment hatch were completed after re-establishing RHR, both well within the estimated 1 hour 50 minutes prior to the projected onset of boiling in the RCS. A review of information obtained from the Process and Effluent Radiation Monitoring System (PERMS) and grab sample analysis indicated all normal values. As a result of this event, no significant increase in radioactive releases to either the containment or the environment occurred.

Additional systems were either available or could have been made available to ensure the continued safe operation of the plant:

a) The maintenance on RAT 1B was completed and the RAT returned to service approximately 2 hours into the event.

b) Offsite power was available to Non-1E equipment through the generator step-up transformers which were being used to "back-feed" the Unit Auxiliary Transformers (UAT) and supply the Non-1E busses. Class 1E busses 1AA02 and 1BA03 could have been powered by feeding through Non-1E bus 1NA01.

c) The Refueling Water Storage Tank could have been used to manually establish gravity feed through the RHR and/or Chemical and Volume Control System (CVCS), and Safety Injection (SI) to the RCS to maintain a supply of cooling water to the reactor.

Consequently, neither plant safety nor the health and safety of the public was adversely affected by this event. A more detailed assessment of this event and an assessment of potentially more severe circumstances will be performed and included in a supplemental LER.

F. CORRECTIVE ACTIONS

a)

1)Onsite truck driver license requirements will be changed to match state requirements by 6-1-90.

2)Sensitive and vulnerable areas inside the the protected area will be evaluated by 7-1-90 and appropriate barriers erected or controls established.

b)

1)The Loss of Off Site Power (LOSP) diesel start and trip logic has been modified so that an automatic "emergency" start will occur upon LOSP.

2)DG operating procedures will be revised to include specific instructions for restarts following a DG trip during LOSP by 7-1-90.

3)Operator guidance on recording pertinent alarms and indications is being developed in order to assist in investigations of future plant events and will be in place by 5-1-90.

4)The DG1A test frequency will be increased to once every 7 days in accordance with Technical Specification Table 4.8-1. This frequency will be continued until 7 consecutive valid tests are completed and and one or less valid failures have occurred in the last 20 valid tests. Including these two valid failures, there have been a total of four valid failures in 66 valid tests of DG1A.

G. ADDITIONAL INFORMATION

1. Failed Components:
   Jacket Water High Temperature Switches manufactured by California Controls Company.
   Model # A-3500-W3

2. Previous Similar Events:
   None

3. Energy Industry Identification System Code:

   Reactor Coolant System - AB
   Administration Building - MA
   Residual Heat Removal System - BP
   Diesel Generator Lube Oil System - LA
   Diesel Generator Starting Air System - LC
   Diesel Generator Cooling Water System - LB
   Diesel Generator Power Supply System - EK
   Safety Injection System - BQ
   13.8 kV Power System - EA
   4160 volt non-1E power system - EA
   4160 volt Class 1E power system - EB
   Chemical and Volume Control System - CB
   Containment Building - NH
   480 volt Class 1E Power System - ED
   Engineered Safety Features Actuation System - JE
   Plant Page System - FI
   Security System - IA
   Component Cooling Water System - CC
   Nuclear Service Cooling Water System - BS
   Radiation Monitoring System - IL