EVENT 1: REACTOR TRIP AND
PARTIAL LOSS OF VITAL POWER
AUGUST 31, 1999

EVENT 2: STEAM GENERATOR TUBE FAILURE
FEBRUARY 15, 2000

C/49

PRESENTERS

- Chief, Events Assessment, Generic Communications and Non-Power Reactors Branch, NRR

INTRODUCTION

-
  - August 31, 1999
-
  - February 15, 2000
-
  - Sequence of events
  - Licensee response
  - Safety Significance

Reactor Trip and Partial Loss of Vital Power

- Initiator
  - Reactor Trip
    - Channel 3, OTDT in "Trip" for Maintenance
    - Spurious Actuation of Channel 4, OTDT
- Complications
  - (1) Offsite power lost to all vital 480 volts buses
  - (2) Essential power (EDG) lost to 480 volt bus 6A

SEQUENCE OF EVENTS

- Reactor Trip - Aug 31, 1999, 2:31 P.M.
  - Four 6.9 kV Buses Transfer From Unit to Station Auxiliary Transformer - as designed
- Offsite Power Lost to Vital 480 Volt Buses
  - (2A, 3A, 5A and 6A)
  - EDGs Started
- EDG 23 Output Breaker to Bus 6A Opens

Sequence of Events (continued)

- Battery 24 Depleted (~ 7.5 hours)
  - Loss of 125 VAC Instrument Bus 24
  - Loss of > 75% CR Annunciators
- Unusual Event Declared (8/31, 9:55 P.M.)
- Emergency Power Restored To Bus 6A
- Unusual Event Terminated (9/1, 3:30 A.M.)

SAFETY SIGNIFICANCE

- Loss of Bus 6A
- Loss of Battery 24
- Increased Burden to Operators

ROOT CAUSE AREAS

- Configuration Control
- Management Oversight
- Technical Support
- Corrective Actions

CONFIGURATIONAL CONTROL

- Station Aux. Transformer Load Tap Changer
  - Control Room Switch Not Maintained in "AUTO"
- Vital Bus Degraded Voltage Relay Setting
  - Reset Set Point Not Verified
- EDG 23 Breaker Over-Current Trip Settings

MANAGEMENT OVERSIGHT, TECHNICAL SUPPORT AND CORRECTIVE ACTIONS

- Weak Response During The Event
  - Focus on Shutdown Work Plans
  - Coordination/Use of Resources
- Weak Technical Support Before The Event
  - Degraded Voltage Relay Setting
  - Procedures - EP, 480 Volt Bus Recovery
- Inadequate Corrective Actions

RISK SIGNIFICANCE

- CCDP ~ 2E-4
- Dominant Sequence
  - Loss of one MDAFW Pump + Loss of TDAFW Pump + Failure to Recover Feedwater
- Key Assumptions
  - No Credit for 480 Volt Bus Recovery
  - Bleed and Feed Success needs 2 of 2