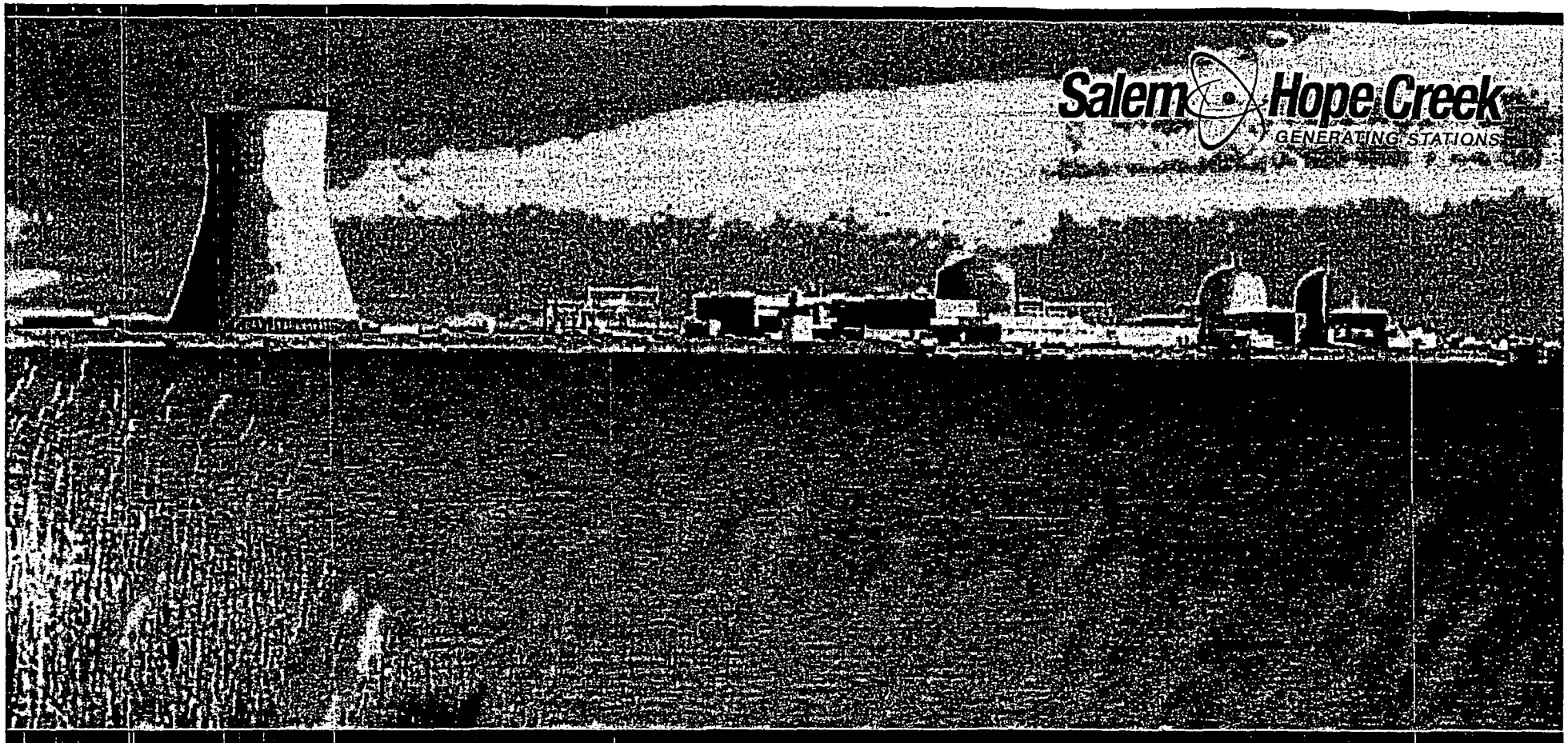


Salem Generating Station – CO2 System Review

December 13, 2005

Agenda

- Scope of CO2 Systems
- System Operation
- Design and Licensing Basis
- CO2 Concentration Issue
- CO2 Migration Issue
- Summary

Salem Station Units 1 & 2

- Owned by PSEG
- Located in Southern New Jersey on Delaware River
- Westinghouse 4-Loop PWRs
- 1120 MWe
- Unit 1 Operating License in 1976
- Unit 2 Operating License in 1980

Areas Using CO2

CO2 Areas within Scope of Discussion

- 64' 4kV Switchgear Room
- 84' 460V Switchgear Room
- 78' Electrical Penetration Room

Other Areas with CO2

- 100' Diesel Generator Rooms (3/unit)
- 100' Diesel Generator Control Rooms (3/unit)
- 84' Diesel Fuel Oil Storage Tank Rooms (2/unit)
- 84' Diesel Fuel Oil Transfer Pump Rooms (2/unit)
- Main Turbine Exciter (1/unit)

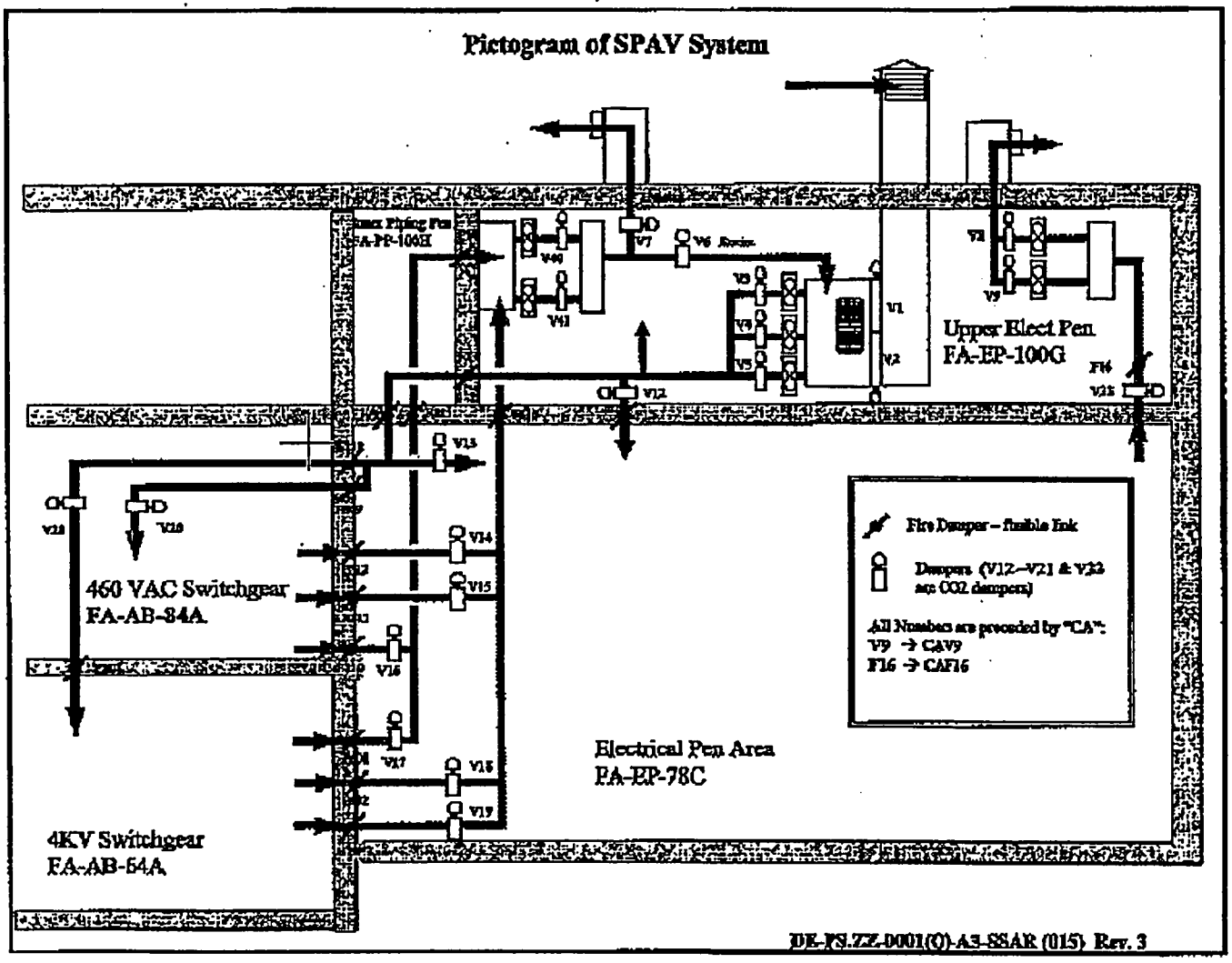
Figure of Salem Auxiliary Building 64 Foot Elevation

Withheld under 10 CFR 2.390

Figure of Salem Auxiliary Building 84 Foot Elevation

Withheld under 10 CFR 2.390

Ventilation System



Design Basis

Design Basis of Systems

- Low pressure total area flooding CO2 systems
- 64' 4kV Switchgear Rooms manually actuated
- 84' 460V Switchgear and 78' Electrical Penetration Rooms automatically actuated
- 50% concentration IAW NFPA 12
- 30 minute concentration hold time
  - Current NFPA 12 requirement 20 minutes
- Tank sized for two full discharges to largest area

Licensing Basis

SER for Amendment 11 - February 14, 1978

- Implemented Technical Specifications for CO2 Tank level and pressure

PSEG Letter - September 26, 1978

- PSEG committed to hold concentration for 30 minutes

SER for Amendment 21 - November 20, 1979

- CO2 designed to flood protected areas to 50%
- Manually actuated systems
- Designed IAW NFPA 12

Supplement 6 of SER was adapted into original Unit 2 Operating License – May 20, 1981

Status of Exemptions

NRC approved exemptions from Appendix R, III.g.2, for trains not separated by full one hour barriers – Letter dated July 20, 1989

- 64' 4kV Switchgear Rooms
  - Included manual CO2 actuation
- 84' 460V Switchgear Rooms
- 78' Electrical Penetration Rooms

Salem has no other CO2 related exemptions

Status of Exemptions

64' 4kV Switchgear Rooms

- Alternate Safe Shutdown
- Reflected plant modifications into analysis to bring area to III.g 3
- Exemption no longer required
- Retaining manual CO2

84' 460V Switchgear Rooms

- Alternate Safe Shutdown
- Reflected plant modifications into analysis to bring area to III.g.3
- Exemption no longer required

78' Electrical Penetration Rooms

- Normal Safe Shutdown
- Area remains III.g.2
- PSEG has completed fire wrap on cable trays
  - Eliminates one of two exemption issues
- Maronite walls separate MCCs
  - Approved exemption still required

Prior Design and Licensing Actions

1999 Self identified CO2 concentration discrepancies

- Calculated room volumes not representative of actual
- Pre-operational tests in 64' 4kV Switchgear and 78' Electrical Penetration Rooms did not meet acceptance requirements
- NRC Violation issued February 14, 2000

2001 PSEG evaluated replacement of CO2 suppression system with water in the 64' 4kV Switchgear Room

- Design implementation issues precluded option selection

2002 Testing of CO2 system performed

- Use of a tracer gas selected to support proposed design change to resolve CO2 concentration

Concentration after 2002

Immediate Actions Taken for System Operability

- Firewatches in place

Cause Identified Design Deficiencies

- Isolation dampers not leak tight design
- Ventilation fans continue to operate

Resulting Actions from Root Cause

- Performed assessment applying NFPA 2001 methodology
- Determined concentrations are sufficient to suppress fire and allow for Fire Department response
- Commitment change then License Amendment Request
- Focused efforts on damper maintenance
- Revisited response to Information Notice 99-05

Concentration 2005 Status

64' 4 kV Switchgear Rooms and 78' Electrical Penetration Rooms Meet the NFPA 2001 Methodology with Margin

Completed Damper Maintenance and Testing

84' 460V Switchgear Room leakage remains higher than desired

Firewatches in Place

Safe Shutdown Capability Independent of CO2

- Areas have defense in depth
  - Early warning detection
  - On Site Fire Department Promptly Responds
- Safe Shutdown Analysis assumes loss of all equipment in 64' 4kV and 84' 460V Switchgear Rooms
- 78' Electrical Penetration Rooms
  - Barrier to Barrier cable wrap
  - Partial Height Maronite walls between MCCs

Migration

Background

- Revisiting response to Information Notice 99-05 identified migration issue
- Engineering study conservatively assessed migration paths
- Study identified potential for CO2 migration to areas requiring access for manual actions
- Validated inputs and assumptions
- Action taken based on results

Cause Identified Design Deficiencies

- Pressure relief path not provided
- Ventilation fans continue to operate causing differential pressures
- Pressure is relieved by migration to surrounding areas

Migration Current System Status

CO2 Systems Isolated

Compensatory Actions Established

- Fire watches in place
- Control of transient combustibles
- Control of Hot Work

Safe Shutdown Capability Independent of CO2

- Areas have defense in depth
  - Early warning detection
  - On Site Fire Department Promptly Responds
- Safe Shutdown Analysis assumes loss of all equipment in 64' 4kV and 84' 460V Switchgear Rooms
- 78' Electrical Penetration Rooms
  - Barrier to Barrier cable wrap
  - Partial Height Maronite walls between MCCs

Resolution Status

Multiple Solution Paths being Evaluated

- Modifications to the current system / components
- Replacement with an alternate system
- Application of risk informed methodologies
- Enhanced Modeling of CO2 migration paths

Evaluation of Solution Method - February 2006

Management Selection - March 2006

Conclusion

- Some exemptions can be eliminated
- Concentration and Migration issues stem from design deficiencies
- Analytical and field actions were taken to resolve
- Compensatory measures provide conformance with licensing basis
- Multiple paths for resolution of issue being pursued
- One of Salem's key equipment issues to resolve
- PSEG will continue to communicate status