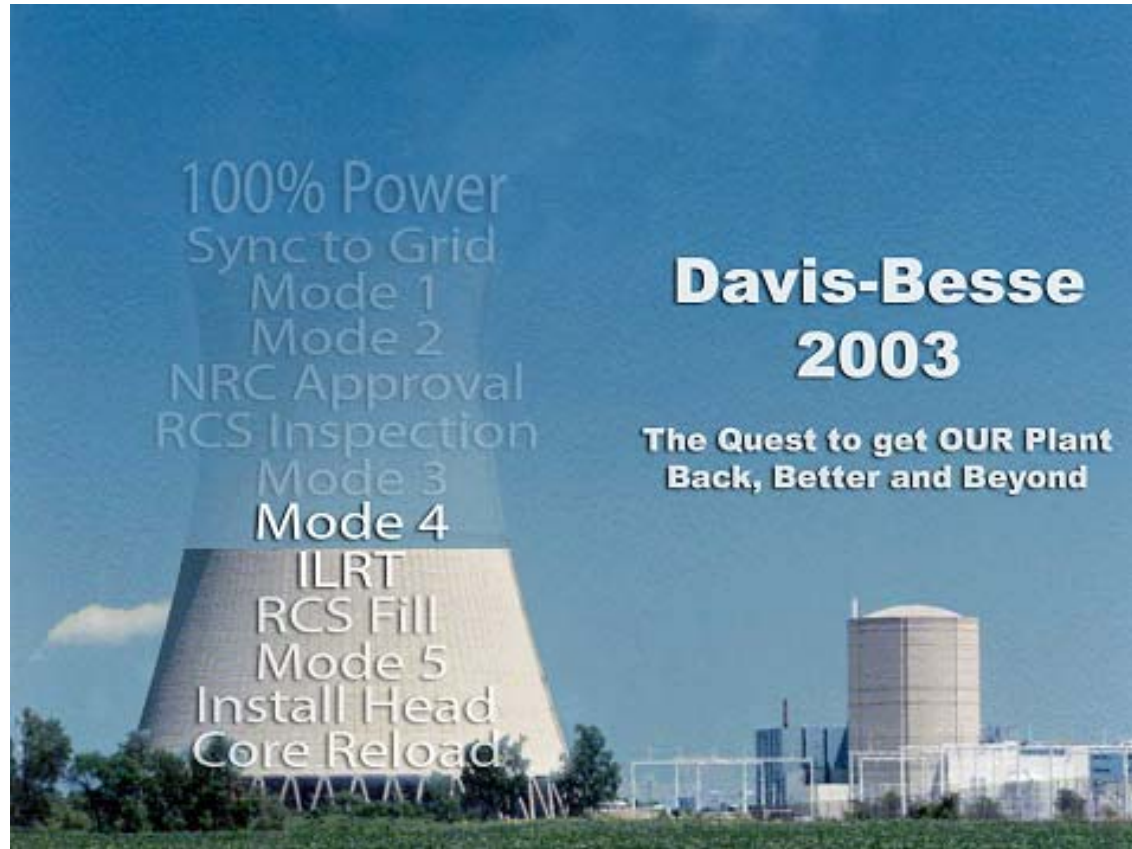


# *Davis-Besse Nuclear Power Station*



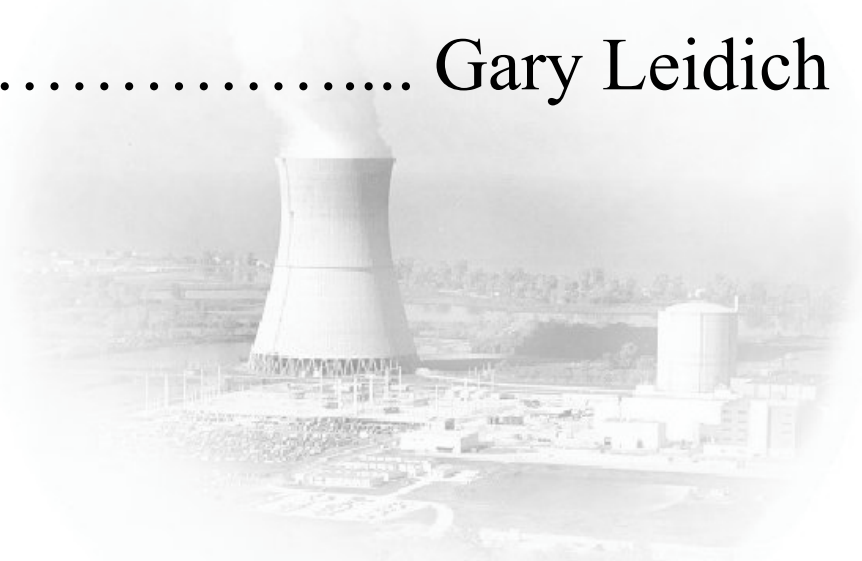
## **Resolution of Design Issues**

# Agenda

Opening Remarks . . . . . Gary Leidich

- Design Reviews..... Bob Schrauder
- Remaining Design Issues..... Jim Powers

Closing Comments..... Gary Leidich



# Opening Remarks



**Gary Leidich**  
**Executive Vice President - FENOC**

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# Overview

- Background

- Developed Building Block approach summer 2002
- System Health Assurance, Program Compliance and Containment Health all produced questions relevant to the design of the plant
- December decision to perform additional reviews, including Safety Function Validation Project (SFVP)
- Extensive effort included calculation reviews, detailed design reviews, revalidation of design inputs, and SFVP

- Today

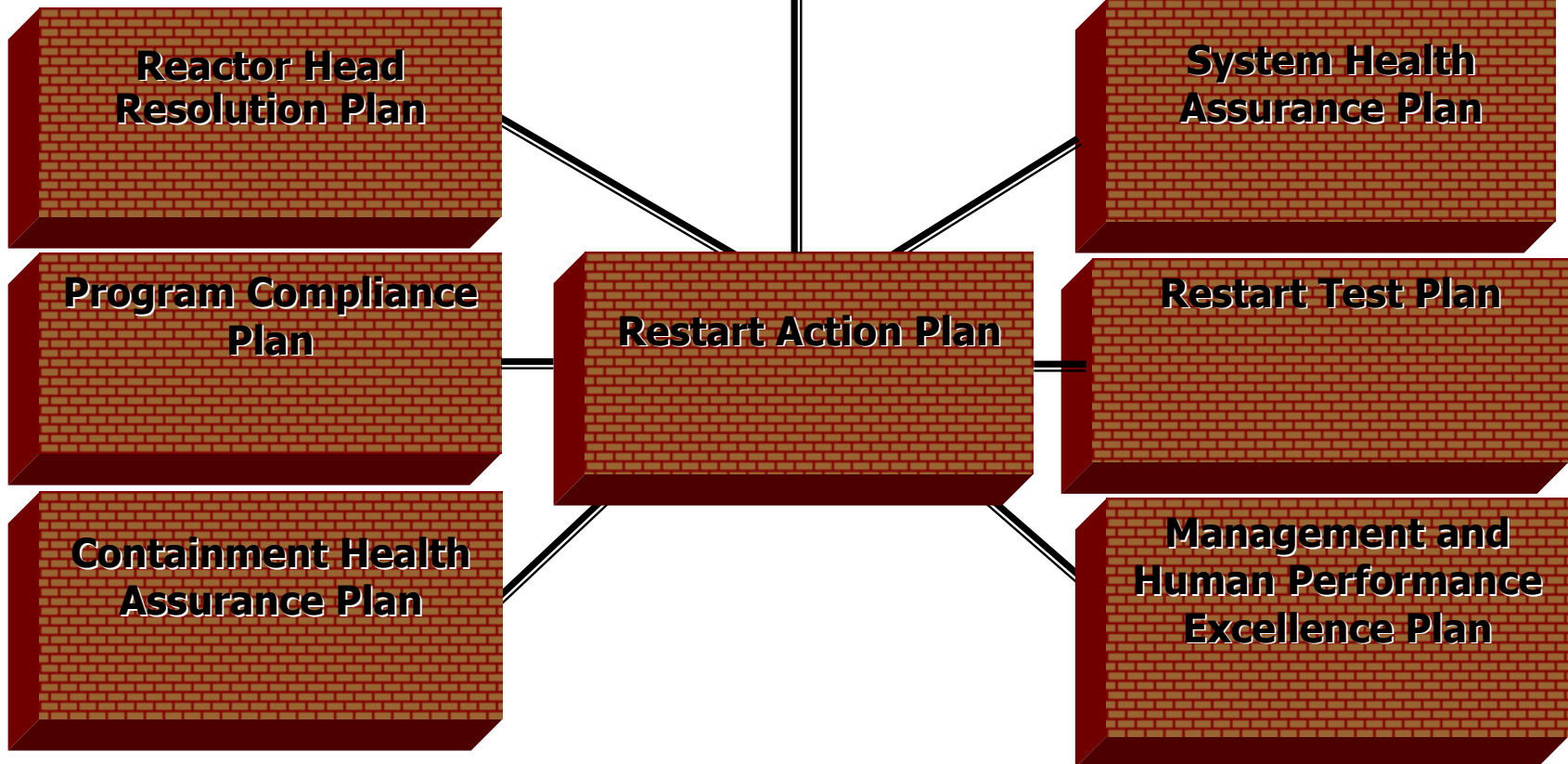
- Present overall results and conclusions
- Discuss few remaining issues and resolution plans

# Desired Outcome

- Demonstrate to the regulators and the public that FirstEnergy has provided reasonable assurance that systems at Davis-Besse can perform their safety and accident mitigation functions

# Return to Service Plan

## Restart Overview Panel



# Design Reviews



**Bob Schrauder**  
**Director - Support Services**

# Design Reviews

- Purpose

- Provide assurance that the safety function of those systems which have a significant contribution to Core Damage Frequency and Large Early Release Frequency (>99%) would perform their safety and accident mitigation functions

- Reviews performed

- Latent Issue Reviews (5 systems)
  - Safety Function Validation Project (10 systems)



# Design Reviews Performed

- Latent Issue Reviews
  - Reactor Coolant System
  - Auxiliary Feedwater System
  - Component Cooling Water (CCW) System
  - Emergency Diesel Generators
  - Service Water System

# Design Reviews Performed

- Safety Function Validation
  - Main Steam System
  - Steam Generators
  - Safety Features Actuation System
  - Steam and Feedwater Rupture Control System
  - High Pressure Injection System
  - Decay Heat Removal/Low Pressure Injection (LPI) System
  - Heating, Ventilation and Air Conditioning (HVAC) of Emergency Core Cooling System
  - 4160 Volt AC
  - 480 Volt AC
  - 125/250 Volt DC

# Current Status

- Safety functions confirmed
  - Main Steam System
  - Service Water System
  - Safety Features Actuation System
  - Steam Generators
  - Reactor Coolant System

# Steam and Feedwater Rupture Control System

- Technical Specification trip setpoint value for reverse differential pressure is non-conservative relative to the Design Basis Calculation
- Actual field setpoint was conservative relative to the Design Basis Calculation, but did not account for instrument uncertainty
  - In accordance with NRC Administrative Letter 98-10, “Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety,” administrative controls will be in place to assure compliance with Design Basis pending revision to the Technical Specification
- Isolated occurrence bounded by Safety Function Validation Project

# Auxiliary Feedwater System

- Pumps and piping may be subjected to a lower temperature than analyzed (8° F difference)
  - Reanalysis to be performed post restart
  - Acceptability highly likely
- Instrument uncertainty for pump flow acceptance criteria not formally documented
  - Calculation verifying no impact is in final review

# Component Cooling Water System

- Flow test verifying adequate flow to minor flow paths has not been performed
  - System flow test scheduled prior to Mode 4
  - Demonstration of adequate flow is expected
- Air Operated Valve deficiencies may impact system operability

# Decay Heat Removal /Low Pressure Injection System

- NPSH and potential vortexing issues related to boron precipitation control
  - Additional testing and analysis nearing completion
  - Function capability expected to be demonstrated
  - Modification to add additional method of boron precipitation to be implemented prior to restart
- Impact of sump debris on pump seal being evaluated
- Flow test demonstrating system margin scheduled prior to restart
- Air Operated Valve deficiencies may impact system operability

# Emergency Diesel Generators

- Voltage and frequency drop during first load step
  - Transient analysis demonstrating acceptability in review
- Room temperature may exceed maximum analyzed value
  - New analysis demonstrating past operability in review
  - Additional ventilation to be installed

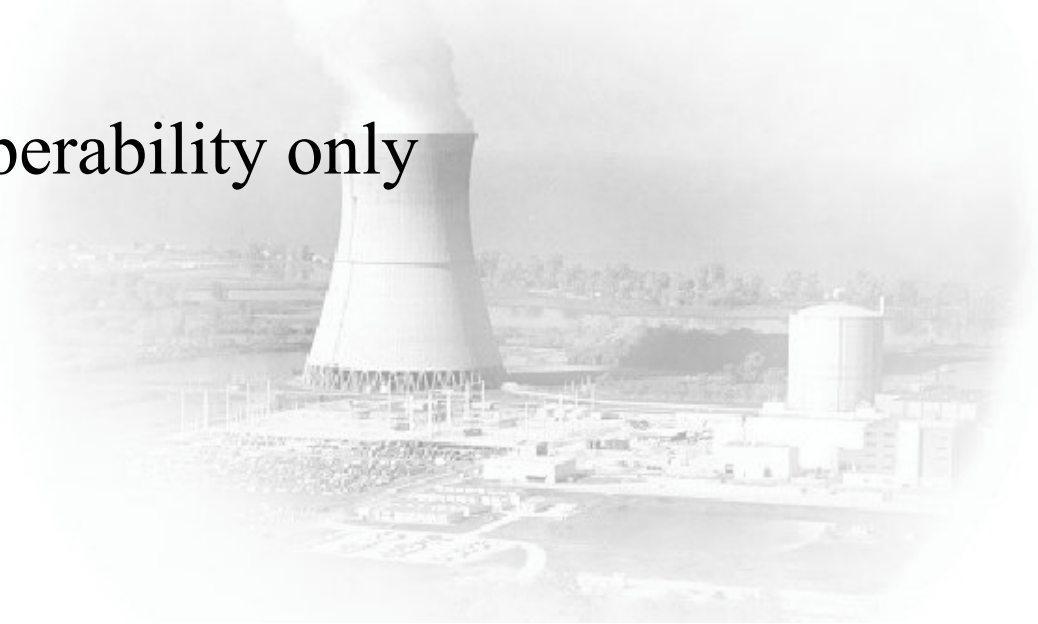


# High Pressure Injection System

- Sump debris could potentially result in pump damage during recirculation phase
- Motor exceeds its nameplate rating during accident conditions
  - Preliminary evaluations indicate the motor will remain within its service factor range and will be acceptable
- Inconsistencies between Surveillance Test criteria and Technical Specification requirements
  - Acceptance criteria clearly satisfies accident analysis
  - Acceptable flow demonstrated; instrument uncertainties are being incorporated and are expected to be acceptable

# ECCS-HVAC

- Historical operability justification with one cooler in service flawed
- Potential impact on past operability only



# Electrical Distribution Systems

4160 Volt AC; 480 Volt AC; 125/250 Volt DC

- Reanalysis is incomplete



# Topical Area Reviews

- Purpose

- Evaluate cross-cutting generic issues that could affect multiple systems

- Scope

- Seismic Qualification
- Station Flooding
- High Energy Line Breaks (HELB)
- Environmental Qualification (EQ)
- Appendix R - Safe Shutdown Analysis



# Topical Area Reviews

## Appendix R - Safe Shutdown Analysis

- Actions to Support Restart
  - Complete Framatome analysis to rebaseline Appendix R transient analysis
  - Complete necessary procedural revisions resulting from new analysis
  - Complete analysis for Emergency Diesel Generator, Component Cooling Water System, and Service Water System for Appendix R scenarios
  - Evaluate technical adequacy of calculations performed in response to Requests for Assistance
  - Complete procedure upgrade project for Safe Shutdown procedures
  - Train operators on new procedures
- Future Improvements
  - Revise Fire Hazards Analysis Report, as necessary

# Topical Area Reviews

## Summary of Results

- Collective Significance reviews confirmed that the programs were adequate to support safe plant operation
- Each review identified discrepancies which needed to be resolved
- Extent of Condition reviews were performed where warranted
- Issues appropriately dispositioned as restart or post-restart

# Summary of Results of Design Reviews

- Safety functions confirmed for a number of systems
- Ongoing activities expected to confirm operability of other systems
- Some systems were inoperable
  - Corrective actions are being taken
  - Conditions are isolated or bounded

# Remaining Design Issues



**Jim Powers**

**Director - Davis-Besse Engineering**



# Remaining Design Issues

## Restart Readiness

- Provide assurance that
  - Safety issues are resolved
  - Technical Specification operability is met
  - Systems, structures, and components will perform their safety functions
- Significant design issues requiring completion of corrective actions for restart
  - High Pressure Injection Pumps Recirculation Mode
  - Electrical Distribution System
  - Air Operated Valves
  - Emergency Diesel Generator Loading

# Remaining Design Issues

## High Pressure Injection Pumps Recirculation Mode



**High Pressure Injection Pump**

- Issue
  - Fine debris from containment emergency sump could potentially result in damage to pumps during the loss-of-coolant accident recirculation mode
- Resolution Options
  - Modify and test existing pumps to ensure operability
  - Install new pumps and motors
- Extent of Condition
  - Low Pressure Injection Pumps
  - Cyclone Separator
  - Containment Spray Pumps

# Remaining Design Issues

## Electrical Distribution System



**Electrical Breaker Cabinet**

- Issue
  - Condition reports questioned the analysis of the electrical distribution system
- Resolution
  - Revalidate input to the analysis
  - Reanalyze calculations using updated computer software to meet industry standard
  - Validate results to ensure electrical distribution system meets its safety functions
- Extent of Condition
  - 4160V AC, 480V AC, and 125/250V DC systems

# **FirstEnergy** Remaining Design Issues

## **Air Operated Valves**



**Air Operated Valve**

- Issue
  - Air Operated Valves (AOVs) have design basis issues related to calculations and hardware
- Resolution
  - 19 valves potentially had negative margin
    - Adjust 7 valves (prior to restart)
    - Modify 12 valves (prior to restart)
  - 10 valves to have margin increased (post-restart)
  - 54 valves demonstrated sufficient margin
- Extent of Condition
  - Safety significant AOVs included in program
  - Motor Operated Valves addressed by GL 89-10 Program

# Remaining Design Issues

## Emergency Diesel Generator (EDG) Loading



**Emergency Diesel Generator**

- **Issue**

- EDG loading analysis not updated
- EDG starting voltage and frequency response not in accordance with design and licensing basis

- **Resolution**

- Revise EDG loading calculation
- Prepare transient analysis for EDG voltage and frequency response and evaluate impact on safety functions
- Evaluate results to ensure the EDGs will meet design basis load requirements

- **Extent of Condition**

- Adequacy of design calculations being addressed

# Remaining Design Issues Conclusion

- Resolution of the remaining design issues is being addressed in the Corrective Action Program and will ensure safe and reliable operation

# 50.54(f) Design Basis Information Letter Responses Background

- Response credited calculation improvement programs and system design description projects of mid-1980's
- Excluded Topical Areas due to previous assessments and inspections
  - Environmental Qualification
  - High Energy Line Breaks
  - Seismic Analysis
  - Flooding
- Initiated a Design Basis Validation Program

# 50.54(f) Design Basis Information Letter Responses Background

- Design Basis Validation (DBV) Program reviews were performed
- Program's completion was defined as capturing open items for disposition in:
  - Corrective Action Program
  - Corrective Action Tracking System
  - DBV Program Tracking Database



## 50.54(f) Design Basis Information Letter Responses Issues

- Completion of open items (e.g., calculations) had less than adequate priority
- Collectively the System Health Readiness Reviews (SHRR), Latent Issue Reviews (LIR), and Safety Function Validation Project (SFVP) provided a different and more incisive assessment of the design basis
  - Found similar weaknesses in design basis calculations
  - Design basis was largely found to be adequate to support operability

# 50.54(f) Design Basis Information Letter Responses Summary

- DBV Program was completed to the extent defined in the responses (i.e., placed into a tracking system)
- Follow-up items have been dispositioned or placed in the Corrective Action Program
- DBV Program provided significant value relative to the documented review of the design bases
- SHRR, LIR, and SFVP have substantiated the design basis was adequate to support operability
- Capture the results of current reviews and submit 50.54(f) Design Basis Information supplemental letter to NRC

# Closing Comments



**Gary Leidich**  
**Executive Vice President - FENOC**

# Conclusion

- Based on the extensive Latent Issues Reviews, focused self-assessments, Safety Function Validation, Topical Area Reviews, containment inspections, and program reviews, there is reasonable assurance Davis-Besse's systems will be able to perform their intended safety functions upon completion of the remaining defined activities