

# WCNOC-NRC Pre-submittal Meeting



## Modification to Essential Service Water System

August 7, 2013



# Meeting Agenda

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- Introduction of the team
- State the objectives of the meeting
- Describe the waterhammer phenomena
- Explain how this modification will address the issue
- Describe the approach to the modification



# Presentation Objective

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Discuss the Wolf Creek Waterhammer  
Mitigation Modification



# Project Team

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- Rich Clemens Vice President – Strategic Projects
- Russell Bowie ESW Project Director
- Tom Sydnor Water Hammer Mitigation PM
- Kamran Derakhshandegan ESW Project Engineer
- Larry Stevens Licensing Engineer
- Rich Kokesh Sargent & Lundy - Project Manager
- Tony Ryan Sargent & Lundy - Lead Engineer
- Donald Graf MPR Associates - Consultant



## Description of the Total ESW Initiative

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- Buried Piping Replacement Project (BPRP)
- Above Ground Replacement Project (AGRP)
- Waterhammer Mitigation Project
- ESW System Inspection and Repair Program



# Description of the Waterhammer Mitigation Modification

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- The use of a bypass line around the ESW Pump discharge valve
- The closure of the ESW Pump discharge valve for a fixed time period to force flow through the bypass
- The locking shut of ESW cross-tie valves
- A time-delay relay in-line to ESW Pump discharge valve open signal



# Waterhammer Phenomena

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- Present design results in a pressure transient (waterhammer) when ESW flow is initiated upon shutdown of the normal Service Water (SW) system



# System Operation

1. Initiating event
2. Service water shutdown, system begins to drain down
3. EDG start
4. Sequencer operation
5. Cross-tie valve operation
6. Start ESW pumps
7. ESW flow in bypass mode
8. Main ESW Valves open, full flow of ESW





## Effects of this Modification

1. Reduces system column closure effects
2. Reduction in pressure pulse
3. Reduction in piping loads
4. Remains within design specifications



## Analytical Methods Used

Computer modeling (vice hand calculation)  
using the same calculation methods as  
existing plant license

- Hydraulic network evaluation
- Void closure pressure - Joukowsky Equation



## Conclusion

- The 50.59 process has concluded that prior NRC approval not required
- WCNOOC intends to implement the proposed modifications to the ESW by completion of mid-cycle outage during spring of 2014.



## Schedule for Implementation

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- Complete design Oct. 29, 2013
- Receive valves & materials Jan. 6, 2014
- Fabrication of sub-assemblies Jan. 17, 2014
- Start outage Feb. 1, 2014
- Start-up April 2, 2014



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Any questions or comments?