

An Overview of the

# Palisades Reactor Head Replacement Project

Presented by NMC to NRC Staff  
December 21, 2005  
NRC Region III Headquarters  
Lisle, Illinois

# Agenda

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- Purpose
- Mission Statement
- Project Organization
- Project Status
- Engineering
- Quality Oversight
- Summary
- Conclusion



# Purpose

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- Communicate the scope and status of the Palisades Reactor Head Replacement Project (RHRP) to NRC Region III
- Provide NRC with information necessary for planning inspection activities of the Palisades RHRP project



# Mission Statement

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*Replace the NMC Reactor Head Closure Systems in a world-class manner and with a team that fulfills the customers' expectations for safety, reliability and cost effectiveness*



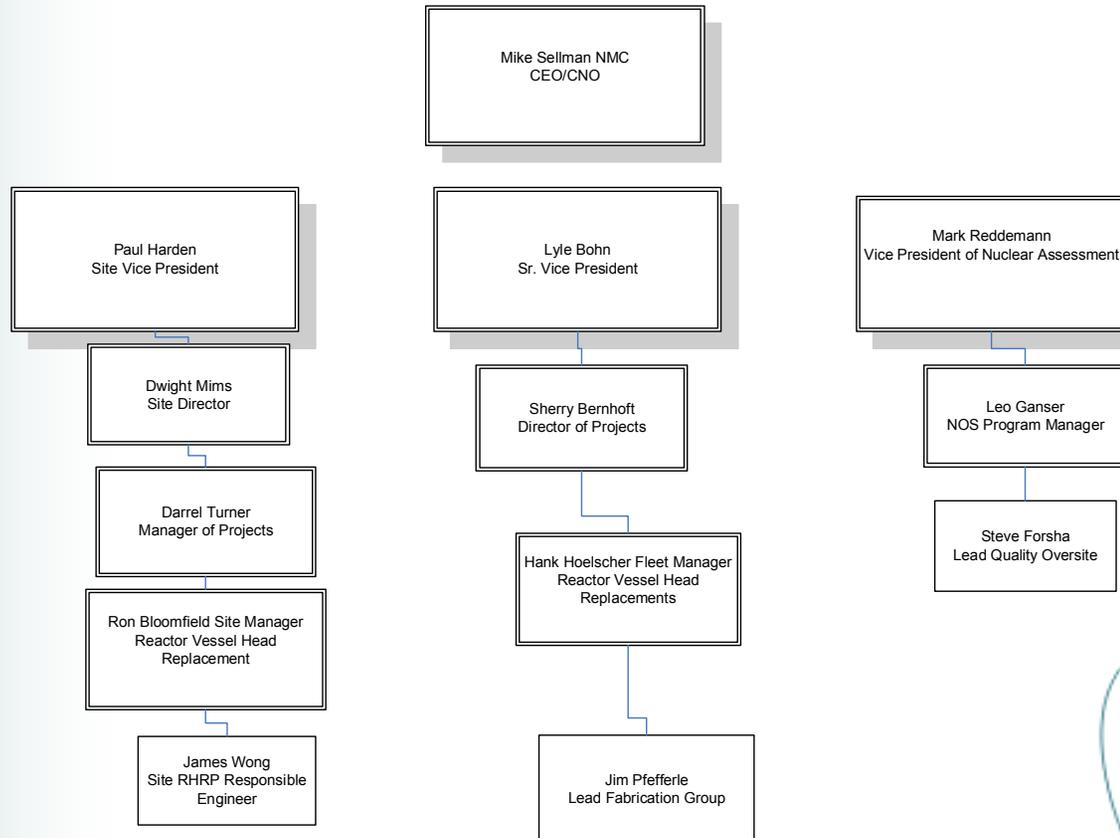
# Background on NMC Head Replacements

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- Multi-site capital project for NMC
- Common fabrication organization
  - NMC's Fleet approach allows for the transfer of operating experience to our current head replacement projects
- Site specific installation organizations
  - Key personnel, experiences and resources are being utilized on Palisades head replacement



# Project Organization



# Head Replacement Lessons Learned

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- NMC Fleet
  - J-groove weld quality
  - Head drop analysis issues
- Industry
  - Vendor oversight
  - Containment restoration



# Project Status



# Project Status

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- Scope
  - New reactor pressure vessel head (nearly like-for-like)
  - New control rod drive mechanism (CRDM) pressure housings, supports and in-core instrument (ICI) closures
  - “Through-the-wall” replacement
- Schedule
  - Installation in Fall 2007 (est. 50 days)
  - N-1 walkdowns in Spring 2006

# Design

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- Babcock & Wilcox Canada (BWC) is the designer of the replacement head
- Westinghouse (WEC) supplied Certified Design Specification
- WEC providing design and advisory services to BWC (fabricator) and NMC



# New Reactor Head Fabrication

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- Contracted with BWC to supply replacement reactor vessel head (RVH)
- Head forged at Japan Steel Works
- Head forging recently arrived at BWC shop
- CRDM nozzle tubing by Valinox
- July 2007 head delivery to Palisades site
- QA data package available 30 days after RVH arrival on site
- Fabrication schedule available





# Head Components

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- WEC fabricating / supplying:
  - 45 CRDM pressure housings
  - Seismic supports for pressure housings
  - 8 ICI Grayloc closures
  - New designed incore instrumentation assemblies (compatible with Graylocs)
- Components will be installed at Palisades site
- Fabrication schedule available



# Design Change Assessment

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- Other WEC Services
  - Licensing support, Design Change Package (DCP) support, etc.
  - Reactor head-related DCP and 10 CFR 50.59 reviews to be completed by September 2006
- NMC leading these activities
- These activities conducted on site



# Construction & Installation Activities

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Currently negotiating with prime contractor to perform/support:

- Pre-outage assembly of new RVH
- Containment construction opening/close/test
- Rigging and heavy loads handling
- In-containment disassembly/reassembly of RVH
- Old RVH disposal



# Pre-Outage Assembly

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- Off Load from BWC truck
- Place new RVH in dry fuel storage (DFS) building
- Weld 45 CRDM pressure housings to new RVH
- Install seismic supports
- Install Grayloc closures



# Containment Construction Opening

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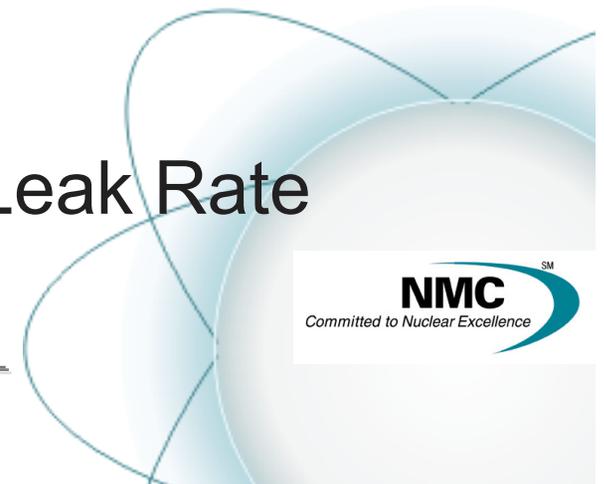
- Plant reaches Mode 5
  - Remove affected tendons
  - Relax adjacent/surrounding tendons
  - Remove concrete, rebar & tendon sheaves
- Reactor defueled
  - Remove liner plate



# Containment Construction Close/Test

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- Concrete test pour
- Liner plate prepared/reinstalled
- Install new rebar and solid tendon sheaves
- Install new tendons
- Install forms and pour concrete
- Tension tendons
- Perform Containment Integrated Leak Rate Test (ILRT)



# Rigging & Heavy Loads

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## Pre-Outage:

- Head drop analysis recently completed
- Evaluate and prepare haul routes
- Evaluate containment lay-down area floor loading
- Analyze & establish required heavy load safe paths in containment

# Rigging & Heavy Loads (cont'd)

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- Major lifts
  - Place old RVH in shipping container
  - Lift Old Head in shipping canister off runway
  - Transport new RVH from DFS; lift to runway; up-end inside containment
- Other
  - Transfer RVH lift rig & service platform from old to new RVH

# In-containment RVH Activities

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- Project will receive old RVH when still on vessel flange
  - Remove CRDM support tubes (clean and store)
  - Remove CCW lines to CRDM pressure housings
  - Remove RVH lift rig and service platform
- New RVH will be rigged into containment and set on vessel flange (defueled)
- Above components will be installed on new RVH



# Old RVH Disposal

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- Currently evaluating:
  1. Leaving CRDM pressure housings on old RVH, or
  2. Removing the CRDM pressure housings prior to shipping off site
- Expect this decision by January 31, 2006
- Expect old RVH to be shipped off site very soon after removal from containment
- Duratek already contracted to dispose of old RVH



# Construction & Installation Activities

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- Currently negotiating construction/installation contract
- Anticipate installation contract awarded by January 31, 2006
- Anticipate Integrated Project Plan completed by April 30, 2006
- Installation-related DCPs and licensing packages will be completed by March 31, 2007

# Licensing Requirements

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- RHRP planned to be completed in accordance with 10 CFR 50.59
- Additional NRC reviews or prior approvals not anticipated



# Key Dates Summary

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- **January 31, 2006:** Installation contract awarded
- **April 2, 2006:** Refueling Outage begins; N-1 walkdowns performed
- **April 30, 2006:** Integrated Project Plan Rev. 0 completed
- **September 2006:** RVH Design Change Packages (DCPs) and 10 CFR 50.59 reviews completed
- **March 2007:** Installation DCPs and 10 CFR 50.59 reviews completed
- **July 2007:** New reactor head arrives at Palisades site
- **September 8, 2007:** Refueling/RVH Replacement Outage begins (50 day duration)

# Engineering



# Replacement Head Scope Details

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- Single-piece forging
- Strip cladding
- Alloy 690 tubing and weld material required
  - Alloy 600 Prohibited
- Automated gas tungsten arc welding process used for J-groove welds

# Applicable ASME Codes

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## Replacement Reactor Vessel Head

- Sections II, III, V – 1998 Edition thru 2000 Addenda
- Section IX – Latest Edition
- Section XI – 2001 Edition thru 2003 Addenda

## Containment Liner and Concrete

- Section XI - 1998 Edition thru 1998 Addenda



# Applicable Regulatory Requirements

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- U.S. NRC Regulatory Guide 1.28, Rev. 3 – Quality Assurance Program Requirements
- U.S. NRC Regulatory Guide 1.37 – Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants
- U.S. NRC Regulatory Guide 1.38, Rev. 2 – Quality Assurance Requirements for Packing, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants

# Nondestructive Testing

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- Section III, ASME 1998 Edition thru 2000 Addendum
- Section XI, ASME 2001 Edition thru 2003 Addendum
- Additional NDE requirements imposed by NMC for Alloy 690 tubing and J-groove welds
  - Implemented NRC flaw evaluation criteria
  - Utilized NRC acceptance criteria for preservice examination
  - Verified examination capabilities with NDE and repair mockups

# Quality Oversight

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# Quality Oversight

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- NMC Project Oversight Plan
  - Establishes the program oversight and responsibilities for the project
    - Supplier qualification
    - Fabrication oversight
    - Installation oversight
    - Release and receipt inspections
    - Status reporting



# Resident Oversight

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- Resident oversight personnel for NMC
  - Monitoring work activities at:
    - Japan Steel Works – Head forging
    - Valinox – Inconel 690 head adapters
    - Patriot Forge – Head adapter flanges
    - Babcock & Wilcox Canada – Head manufacture
    - Ionics – CRDM housings
  - Verify critical attributes at witness and hold points
  - Follow-up on nonconformances and corrective actions
  - Review of quality documentation as work is completed



# Quality Assurance Audits

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- NMC project follow-up audit of Westinghouse in December 2005
- Nuclear Procurement Issues Committee (NUPIC) audit of Babcock & Wilcox Canada in first quarter 2006
- Project audit planned for Babcock & Wilcox Canada during 2006
- Project self-assessment



# Summary & Conclusion

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# Summary

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- Palisades Sale – no anticipated effects on this project
- NMC has monitored fabrication of five replacement heads and completed head replacement at four sites
- Fabrication of the Palisades replacement head is ongoing
- Planning and engineering for installation of replacement head at Palisades is underway

# Conclusion

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- We appreciate this opportunity for NMC to update the NRC on our head replacement activities
- We will continue to work with the site resident inspectors to keep them apprised of our schedules

