



# Cook Nuclear Plant

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## Reactor Vessel Closure Head Replacement Project

May 10, 2005



# Agenda

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- Project Description
  - Background
  - Objectives
  - Overview
  - Organization
- Project Elements
  - Design and Fabrication
  - Installation
  - Disposal
- Quality Assurance and Project Oversight
- Licensing Approach
- Summary



# Background

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- Alloy 600 susceptible to PWSCC
- Affects CRDM and other RVCH nozzles
- NRC Order EA-03-009
- Susceptibility ranking:
  - Unit 1 - Moderate
  - Unit 2 - High
- RVCH inspections at CNP
- Proactive decision to replace RVCHs



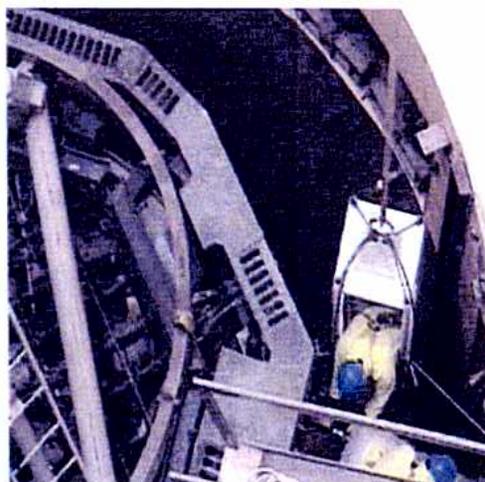
# Project Objectives

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- Cook's RVCH Replacement Project will:
  - Eliminate materials susceptible to PWSCC
  - Address component aging
  - Improve outage safety, dose, and duration

# Service Structure Issues

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- Ventilation vertical riser and “doughnut” ring are difficult to access and remove
- Access to the vent piping and electrical connections requires man-basket use
- Extensive polar crane use impacts outage critical path



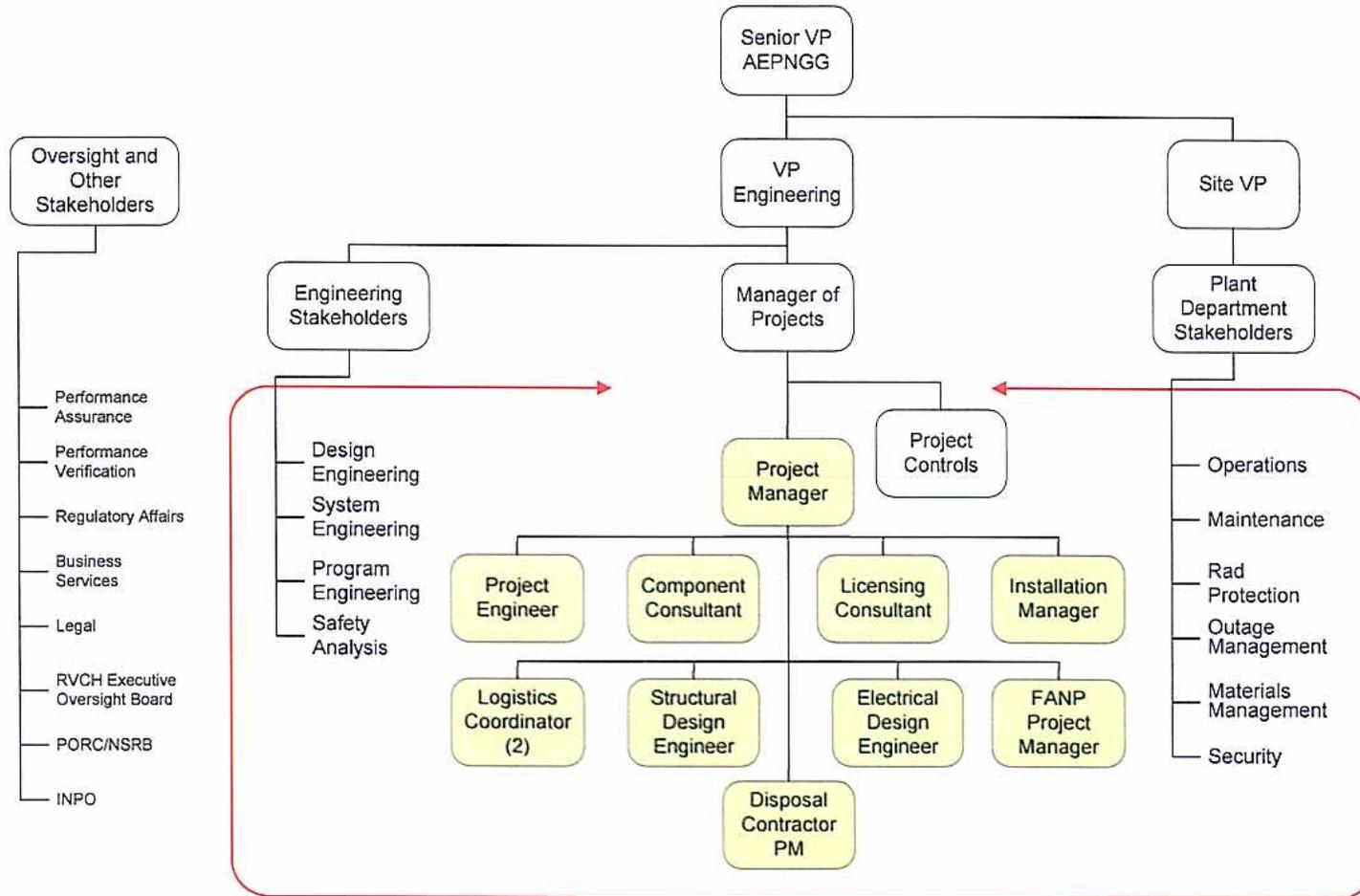
# Project Overview

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- Scope
  - Replace RVCHs and CRDMs
  - Upgrade RVCH service structures
  - Eliminate unnecessary head penetrations
  - Standardize design features between units
  - Reroute head vent and RVLIS piping
  - Dispose of old components
- Implement changes during:
  - U1C21 (fall 2006)
  - U2C17 (fall 2007)
- Fabrication and installation by Framatome-ANP
- Replacements can be performed under 10 CFR 50.59

# Project Organization

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RVCH Replacement Project Team

# Design and Fabrication

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- Design features
- Codes and standards
- Design responsibilities
- Non-destructive examination
- Status

# Design Features

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- RVCH and CRDMs
  - Alloy 690 in lieu of Alloy 600 for penetrations
  - Mono-block forgings to reduce RVCH welds
  - Elimination of 12 spare penetrations
  - Elimination of 8 part-length rod penetrations
  - Integrated CRDM latch housing
  - Specific penetrations for RVLIS and head vent
  - Upgraded CETNA design
  - Standardized flange surface, ventilation skirt, vent pipe, O-ring grooves and retention clips



# Design Features (cont'd)

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- Service Structure
  - New ventilation plenum and ducting
  - Integrated radiation shield and ventilation shroud
  - New CRDM, RPI, and CET cables
  - Retractable cable bridges
  - New CRDM cable connectors
  - Replacement of transducers and cables for LPMS
  - Improved seismic support connection
  - Re-routing of RVLIS and head vent piping/valves
  - Walkway and work platform upgrades

# Codes and Standards

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- ASME Boiler and Pressure Vessel Code
  - Sections II, III, and V: 1995 Edition, Addenda through 1996
  - Section IX: Latest Edition
  - Section XI: 1989 Edition, No Addenda
- ASME B&PV Code Cases
  - Code Case N-474-2, Design Stress Intensities and Yield Strength Values, UNS N06690
  - Code Case 2142-1, F-Number Grouping for Ni-Cr-Fe, UNS N06052, Filler Metal Section IX
  - Code Case 2143-1, F-Number Grouping for Ni-Cr-Fe, UNS W86152, Welding Electrode Section IX

# Codes and Standards (cont'd)

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- Others
  - ASME NQA-1-1989, Quality Assurance Requirements for Nuclear Facilities
  - ASME NQA-2-1986, Quality Assurance Requirements for Nuclear Power Plants
  - Regulatory Guide 1.31, Rev. 3, Control of Ferrite Content in Stainless Steel Weld Metal
  - Regulatory Guide 1.43, Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components



# Design Responsibilities

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- AEP
  - Design scoping
  - Certified Design Specifications
  - Project management
  - Technical and quality oversight

# Design Responsibilities (cont'd)

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- Framatome-ANP
  - Material procurement
  - Fabrication (St. Marcel and Jeumont, France)
  - Certified Design Reports for RVCH and CRDM
  - ASME NPT stamp (St. Marcel and Jeumont)
  - Code reconciliation
  - Pre-service inspection
  - Packaging and shipping
  - CRDM installation services

# Non-destructive Examination

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- Section III, ASME 1995 Edition with Addenda through 1996
- Section XI, ASME 1989 Edition, No Addenda
- MRP 2003-013, Pre-service Inspection Guidance for New Reactor Pressure Vessel Heads, June 26, 2003

# Status

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- RVCH Components
  - RVCH (JSW, St. Marcel)
    - Long-lead forgings completed at JSW (11/03)
    - Both units' forgings arrived at FANP (11/04 and 2/05)
    - RVCH cladding and J-groove machining complete on Unit 1
  - CRDMs (Jeumont)
    - Material on order (5/05 delivery)
    - Final design in progress
  - Core exit thermocouple nozzle assemblies (Jeumont)
    - Material on order (5/05 delivery)
    - Design proof-testing in progress
  - Delivery
    - Unit 1 to ship 6/06 (delivery at Cook Plant 8/06)
    - Unit 2 to ship 5/07 (delivery at Cook Plant 7/07)



# Status (cont'd)

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- Service Structure
  - Enhanced Service Structure (ESS) components
    - Contract awarded 12/04
    - Plant walkdown conducted 4/05
    - Design in progress
  - Insulation panels
    - Contract awarded 4/05
    - Design to begin 5/05
  - Delivery
    - Unit 1 ESS and insulation 8/06
    - Unit 2 ESS and insulation 7/07

# Installation

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# Installation (cont'd)

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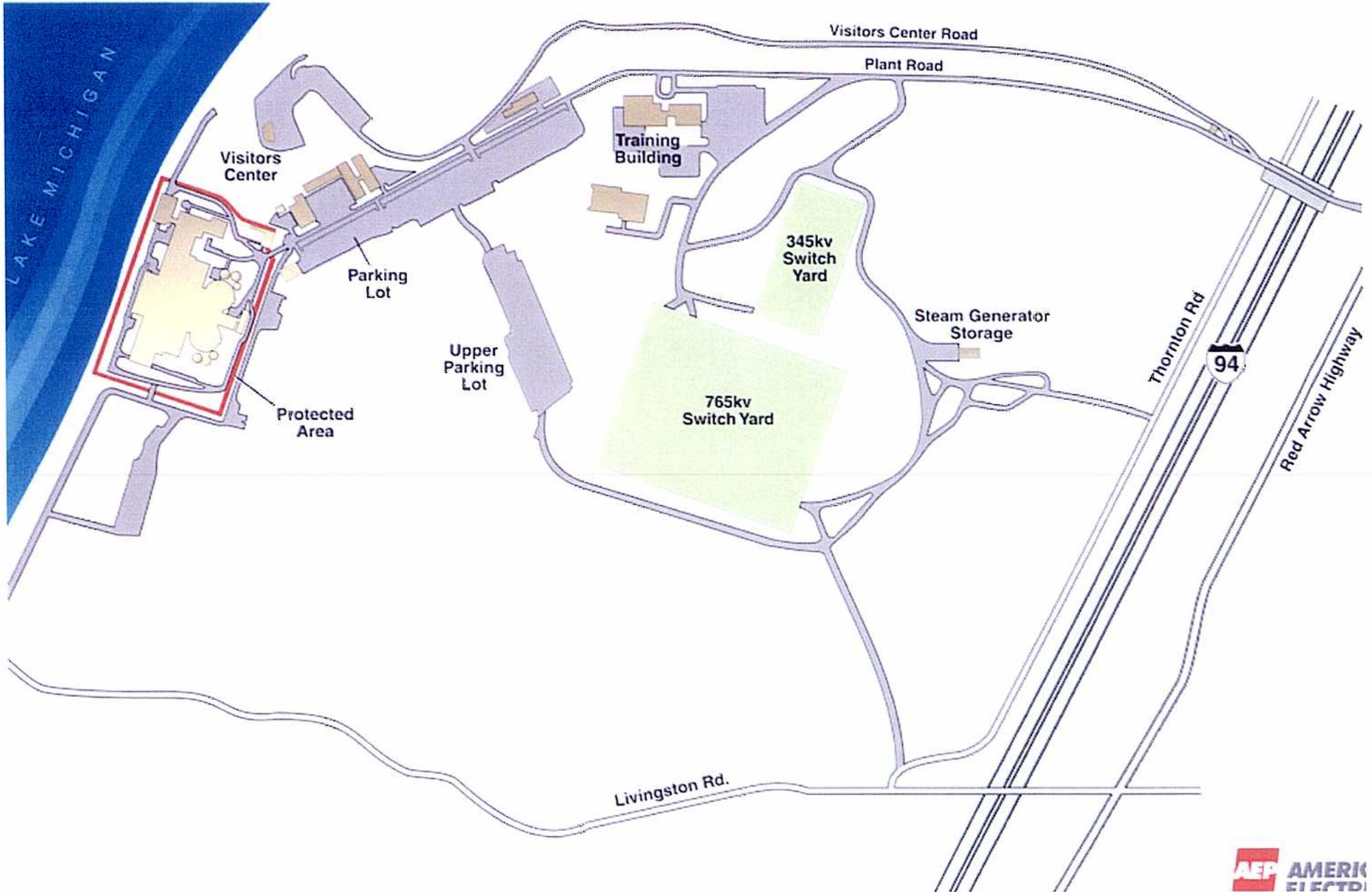
- Comparison to SG replacement in 1999
  - Similar plant condition
    - Defueled (for all but old head lift and new head set)
  - Similar load path inside protected area
  - Crane use and configuration bounded
    - 270 tons for SGRP vs. 125 tons for RVCH/CRDM
    - Fewer major component lifts
  - No major RCS breach

# Installation (cont'd)

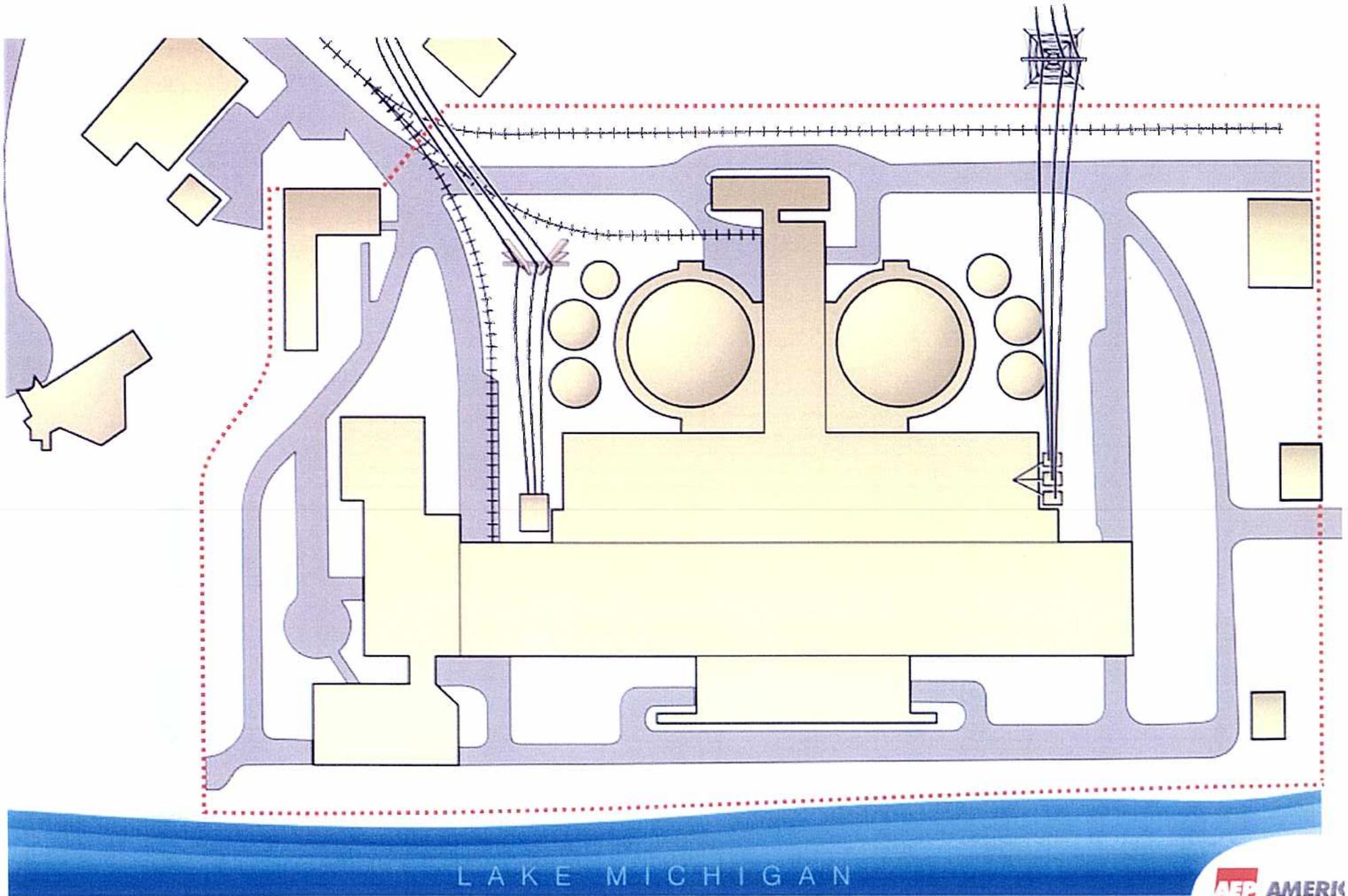
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- Shipment of components to Cook
- On site transportation
- Pre-installation activities
- Plant modifications required
- Crane use and configuration
- Removal of the old RVCH
- Installation of the new RVCH

# ook Nuclear Plant – Site Layout



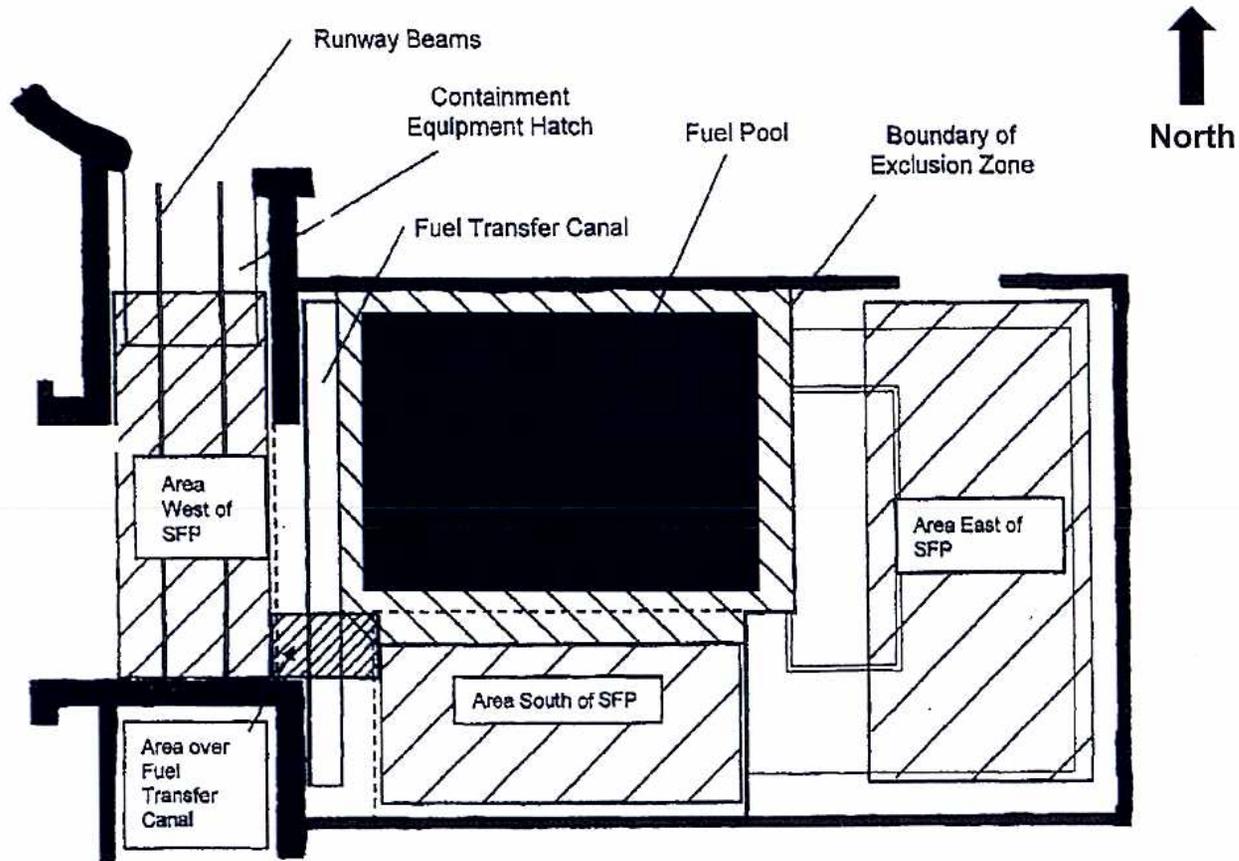
# Brook Nuclear Plant – Protected Area



LAKE MICHIGAN

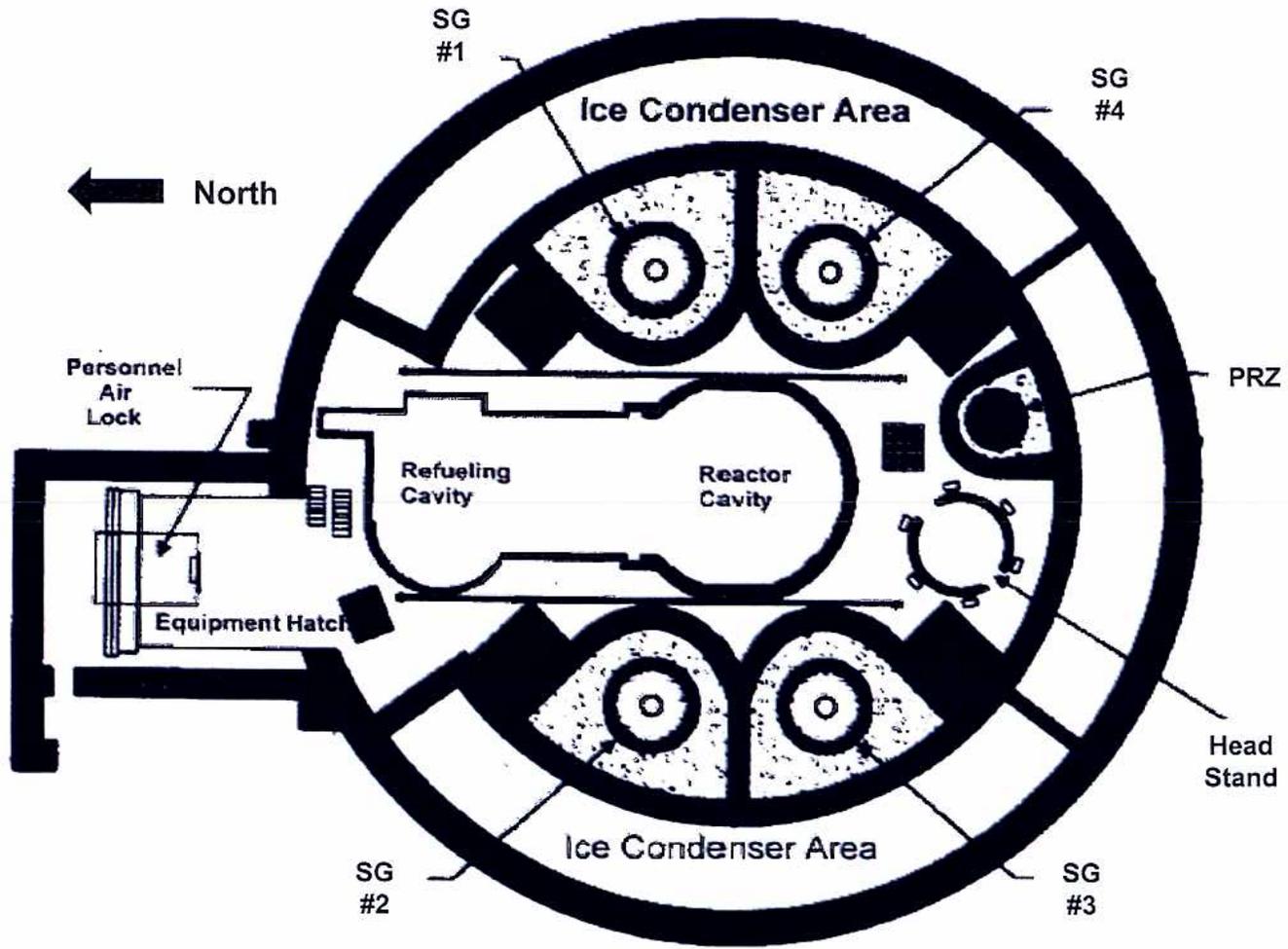
# Auxiliary Building

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# Containment Plan

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# Disposal

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- Two options under consideration
  - Remove CRDMs from RVCH on site
  - Leave CRDMs intact
- Removed equipment will be sent to long-term burial site
  - Some pre-burial processing may occur
- Transportation/disposal contract to be awarded in June/July 2005



# Quality Assurance

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- Cook Nuclear Plant QAPD
  - Cook personnel, including RVCH Project Team
  - FANP Design Change Packages and 10CFR50.59s
  - Disposal activities
- FANP Quality Management Manual
  - Lynchburg ASME Sections III and XI QA Program
  - St. Marcel QA Program
  - Jeumont QA Program



# Project Oversight

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- Project team
- Performance Assurance
- Performance Verification
- Executive Oversight Board
- PORC and NSRB



# Licensing Approach

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- RVCH replacement scope/execution assessment
  - Heavy loads considerations are critical, but similar to S/G replacement projects
  - Reviewed past AEP/NRC interactions and ongoing commitments
  - Benchmarked other licensees
  - Reviewed NRC Inspection Procedure 71007
- Preliminary 10 CFR 50.59 review
  - No licensing amendments identified to date
- Ongoing communication with NRC



# Summary

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- RVCH replacement planned for both units
  - Fall 2006 (Unit 1)
  - Fall 2007 (Unit 2)
- Dedicated project team
- FANP selected as primary vendor
- Disposal decisions pending
- No license amendments identified to date



# Cook Plant RVCH Replacement

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