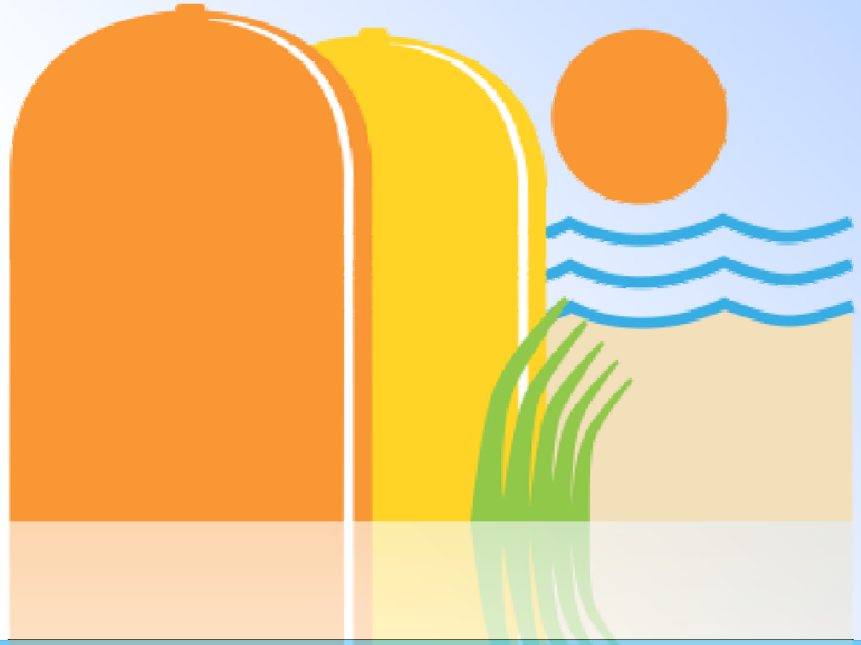


Continued Strong ALARA Performance at Cook Units 1 & 2

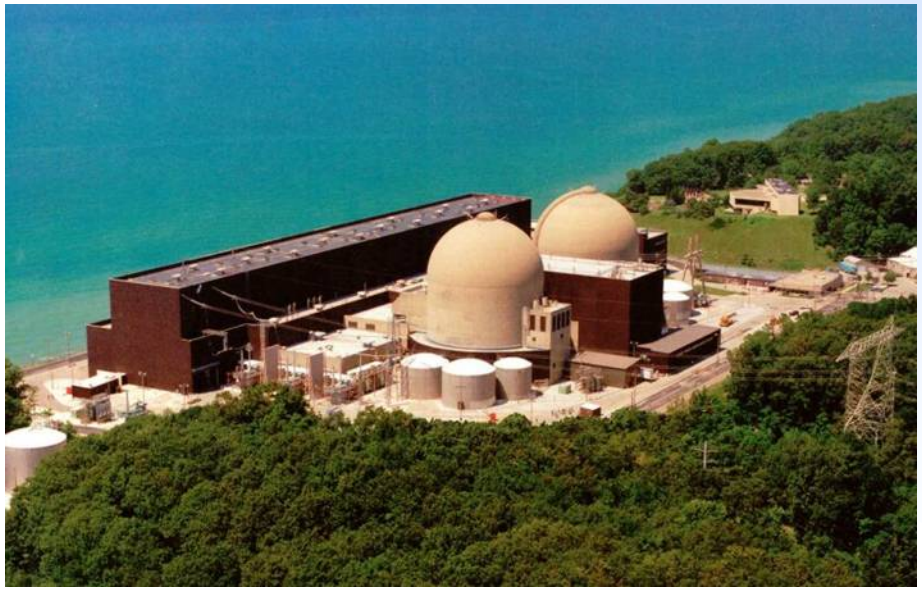
Carl Moeller

Cook Nuclear Plant

2011 North American ISOE ALARA Symposium & EPRI RP Conference

Hyatt Bonaventure Hotel

Goal of this presentation is to show how a site can have strong ALARA performance even with significant organizational changes and outage challenges.



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Objectives of Presentation

1. **To show the importance of developing an ALARA plan to meet the INPO 2015 dose goals & fully implementing the plan**
2. **Cook's RP Team Aggressive Goal Achievements in 2010.**
3. **To maintain focus on the fundamentals of good RP management in the midst of major plant component failures and repairs**

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Results= Good ALARA Focus?

What I hear quite often:

“you are so LUCKY to have a low source term plant”

How I respond:
“where was the luck before 2007?”

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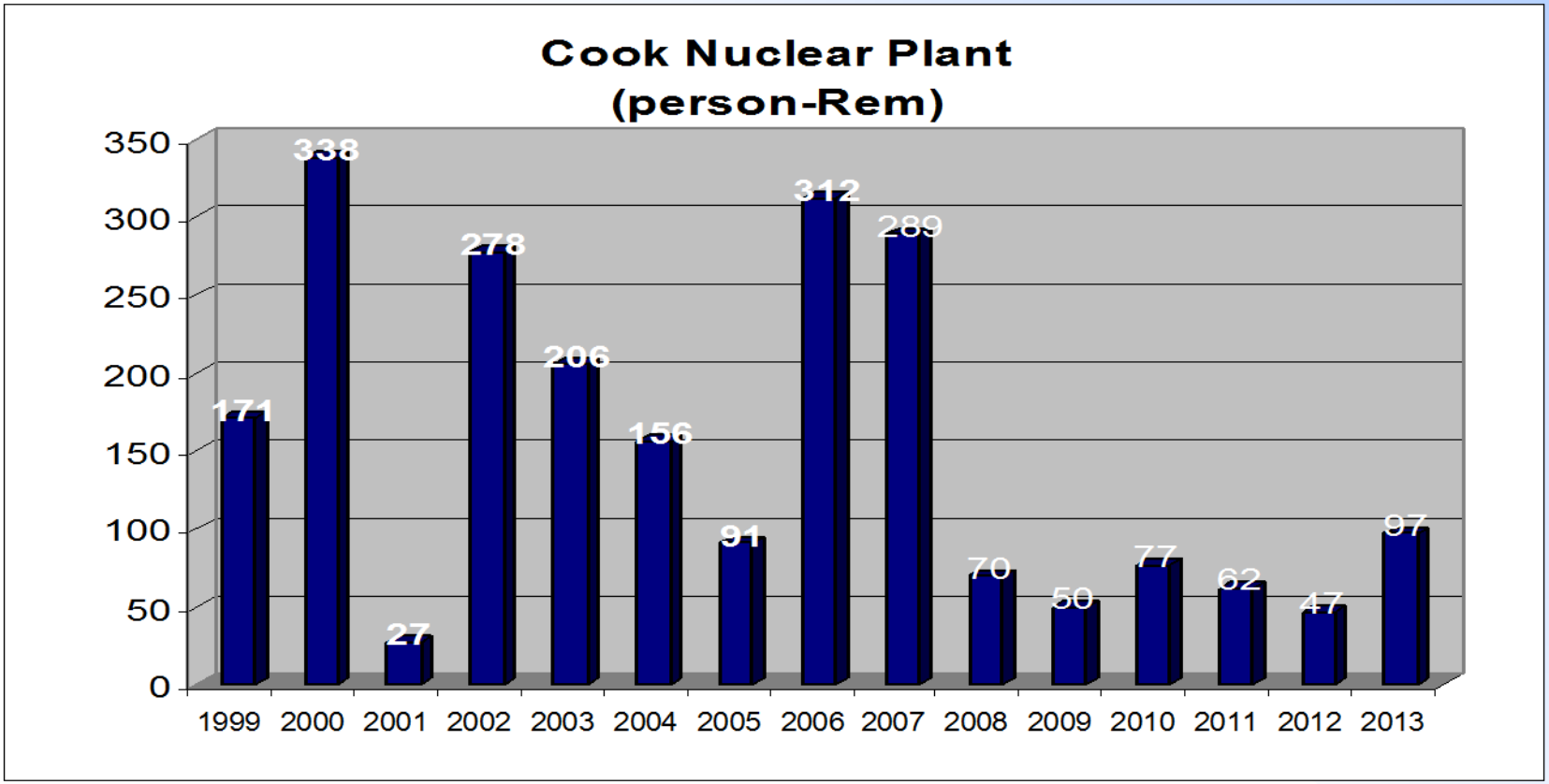
Cook Units 1 & 2 Dose Projection 2013



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Cook Five Year ALARA Plan

- **At Cook, the 5-Year Dose Reduction Plan is the road map to superior ALARA performance.**
- **The ALARA Committee reviews and approves the initiatives contained in the Plan annually in the formulation of ALARA initiatives.**
- **ALARA Initiative are included in Long Range Business Plans.**

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2010-Year of Challenges and Opportunities

- **Recovering from an ~15 Month Shutdown to rebuild Turbine.**
- **U1C24 Spring Refueling Outage**
  - **MSIP Decision ~6 months prior to outage**
- **New CNO, SVPs, PM in May**
- **Voluntary Severance**
  - **(1) RP General Sup, (1) Staff HP, (2) Techs**
- **Significant Industry Issues (SOER 10-02)**
- **U2C19 Fall Refueling Outage**
  - **Basic 31 day refueling outage**

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Spring 2010 Unit 1 Outage Dose Results

- **36.355 person rem outage (goal 42)**
- **38 days**
- **30 Personnel Contamination Events**
- **10.5 person rem for mechanical stress relief of pipes.**
- **4.0 person rem for scaffolding**
- **5.0 person rem for 10 year ISI on Core Barrel**

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Opportunities

Unit 1 Outage Results had very positive impact on station ALARA Focus

Lowest Dose Refueling Outage In US History?

Outage Management directly involved in establishing ALARA “radiological safety focus”

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Unit 2 Refueling Outage Scope

- **Basic Refueling Outage**
- **Replace Reactor Coolant Pump Motor**
- **Replace (4) Reactor Coolant Pump Seals**
  - **Result of Root Cause Evaluation involving failures of # 2 Seals**
  - **Vacuum Fill process introducing debris into seals**
- **Scheduled for <31 days**
- **Outage Stretch Goal of 29 Rem Approved**

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Initial Unit 2 Outage Dose Results

- **Reactor Disassembly completed and core off loaded**
- **Dose tracking about 2 rem under Outage to Date estimates**
- **Ready to begin core-reload!**

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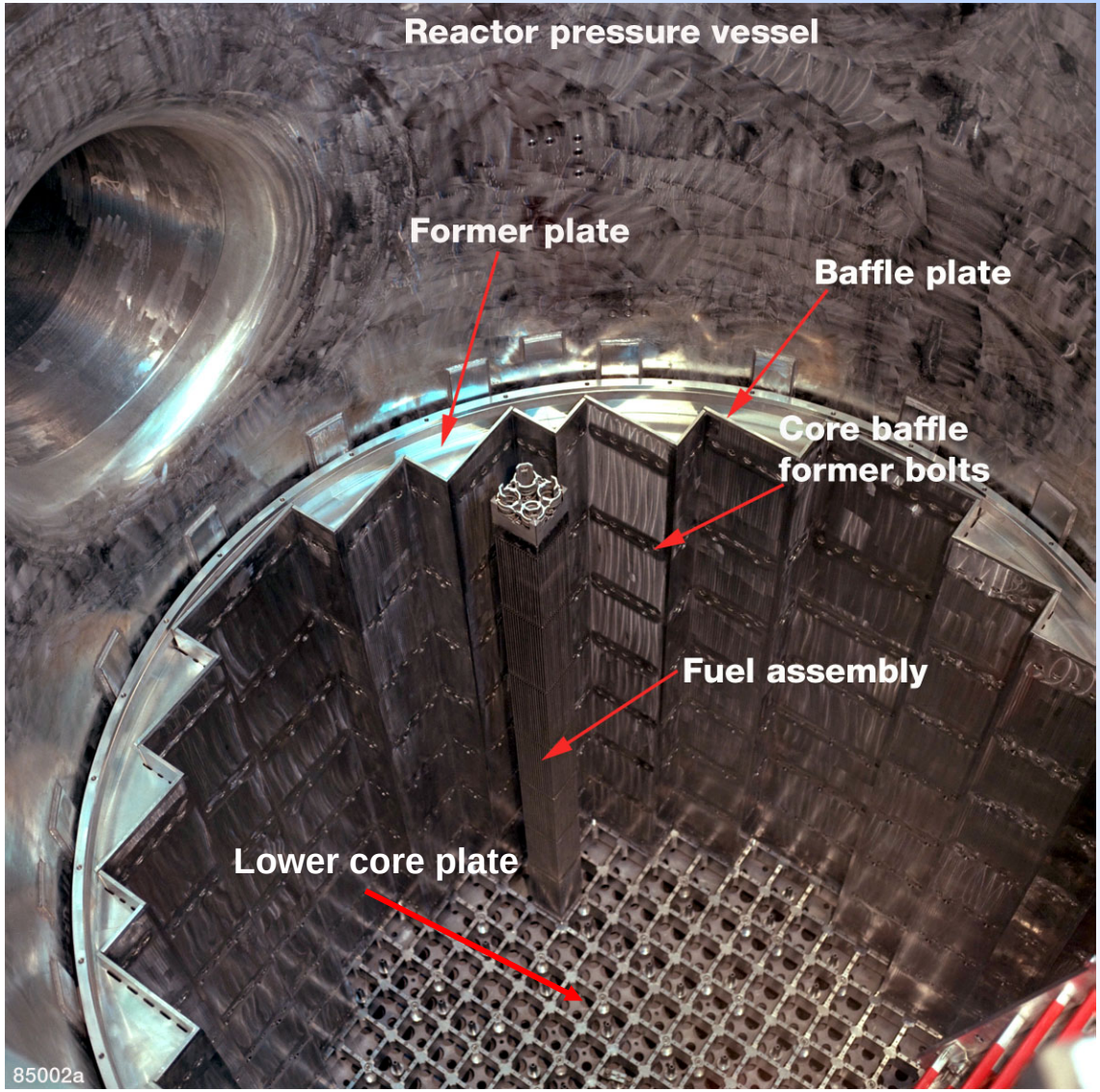
Inspecting and vacuuming lower core

It is normal practice during a refueling outage to totally unload the reactor fuel from the reactor core. After this is done we do an inspection of the lower core plate.

The former and baffle plates provide structure for the fuel assemblies and direct water flow through the reactor.



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Discovery of Baffle Bolt issue at Cook

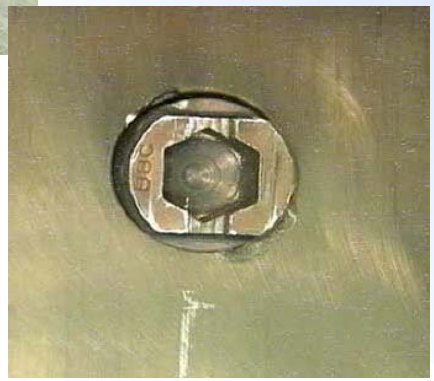
During the lower core plate inspection, we discovered six pieces of foreign materiel: four locking tabs and two cap screws identified as pieces of baffle bolts.

Every baffle bolt location was videotaped.

These pictures show the three types of problems discovered on 18 bolts.

Missing bolt head

Cracked lock bar weld



Missing lock bar

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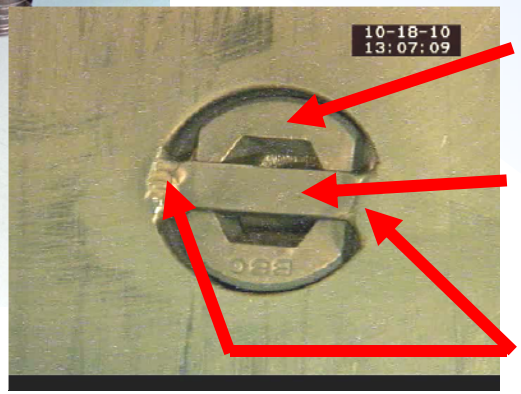
What is a baffle bolt?

Baffle bolts hold the vertical baffle plates to the horizontal former plates.

Cook's baffle bolts are 5/8 inch in diameter and about 2 inches long.

Once bolted in place, a lock bar is welded across the bolt head to secure the bolt.



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Baffle Bolt inspection and repairs

- **1st Phase of work was to remove identified debris and perform extent of condition inspection**
- **Inspection identified other degraded bolts all located on the “south wall”**
- **Vendor’s mobilized to remove degraded bolts**
- **Preparations made to ship materials for failure analysis**

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Baffle Bolt inspection and repairs

- **Vendor begins further inspections and removal of 9 damage bolts.**
- **Engineering evaluation identified extent of condition to be 52 Baffle Bolts to be replaced**
- **Mechanical tooling located in Germany**
- **Core-Barrel removed**
- **RP Reviewed Industry Experience (Switzerland,EDF, Farley and Point Beach)**

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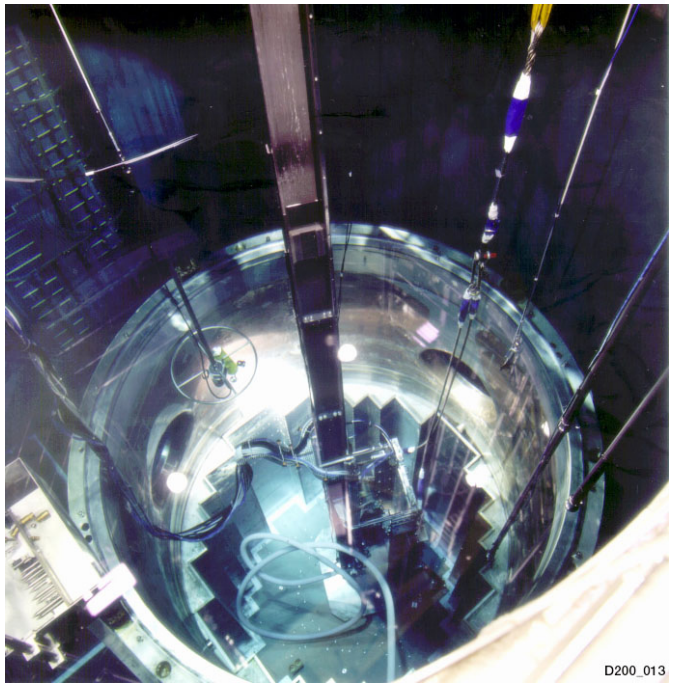
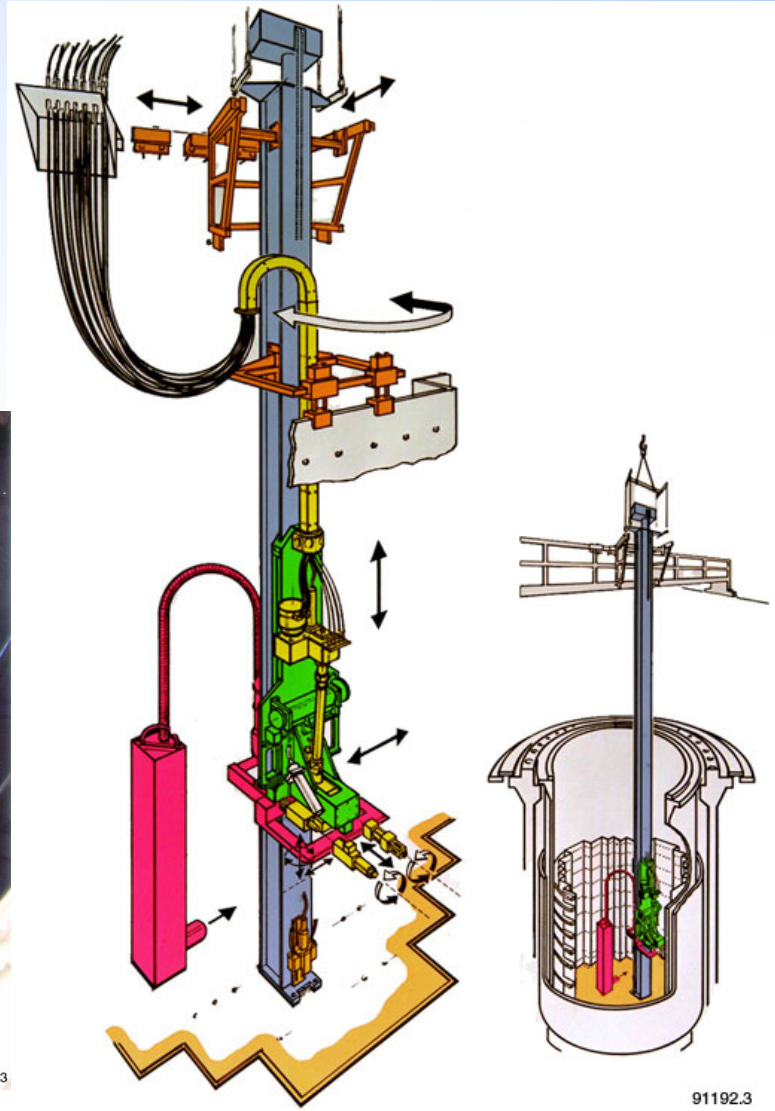
Highly specialized repair equipment

- Repair tooling was refurbished and shipped
- Radioactive shipment of 3 large sea vans required dedicated air transport from Germany
- *(right)* diagram of repair tool and picture of tool in place





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RP Challenges-baffle bolt repairs

- **Handling High Dose Rate Materials**
  - **Special containers for SFP storage**
- **Waste Minimization and Handling**
  - **Tri-nuke Filters**
  - **Vendor Procedural Controls**
- **Contamination Controls**
  - **EDM Process**
  - **Tooling maintenance**
  - **Post work clean-up**
- **High Risk Radiological Shipments**
  - **Limited shipping container availability**

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Fall 2010 Unit 2 Outage Dose Results

- **No significant safety issues**
- **~ 40 person-rem**
- **60 day outage duration**
- **28 Personnel Contamination Events**
- **~ 12 person rem (baffle bolt impact)**
- **~ 1.5 person rem for Fibrous Insulation mitigation.**
- **~ 0.9 person rem for Safety Injection Valve rebuild**

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Cook Unit 1 & 2 ALARA Outage Successes

- **Maintained focus on Prevention**
  - **Remained organizational focused on ALARA**
    - **Project ownership for dose results**
    - **Benchmarking and lessons learned for prior industry experiences**
    - **Detailed procedure development and review**
    - **Departmental accountability to complete outage work as scheduled**
- **Development and execution of 5 year plan (Plant, People and Process)**
  - **Resources provided for emergent work**
  - **Station ALARA Committee frequent reviews prior to and during work execution**
- **Manage distractions**

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Upcoming Cook ALARA Initiatives

- **Rx Cavity Lift Systems (Both Units)**
- **Ice Condenser Access (Both Units)**
- **Containment Penetrations (Both Units)**

“maintaining forward momentum with our long range ALARA plans is a station priority”

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Benchmarking site visits to Cook from other US PWRs after 2010 NATC ISOE ALARA Symposium in January 2010

- **First Energy Corp visited Cook & NATC in April 2010: Beaver Valley and Davis Besse continued to use PRC resin**
- **Duke Energy Benchmarking in May 2010 for McGuire, Oconee (sister plants to Cook) and Catawba –decision follow Braidwood**
- **Exelon Nuclear Benchmarking in May 2010 – decision to implement PRC at Braidwood 1,2 for next 4 cycles, then compare with Byron 1,2**

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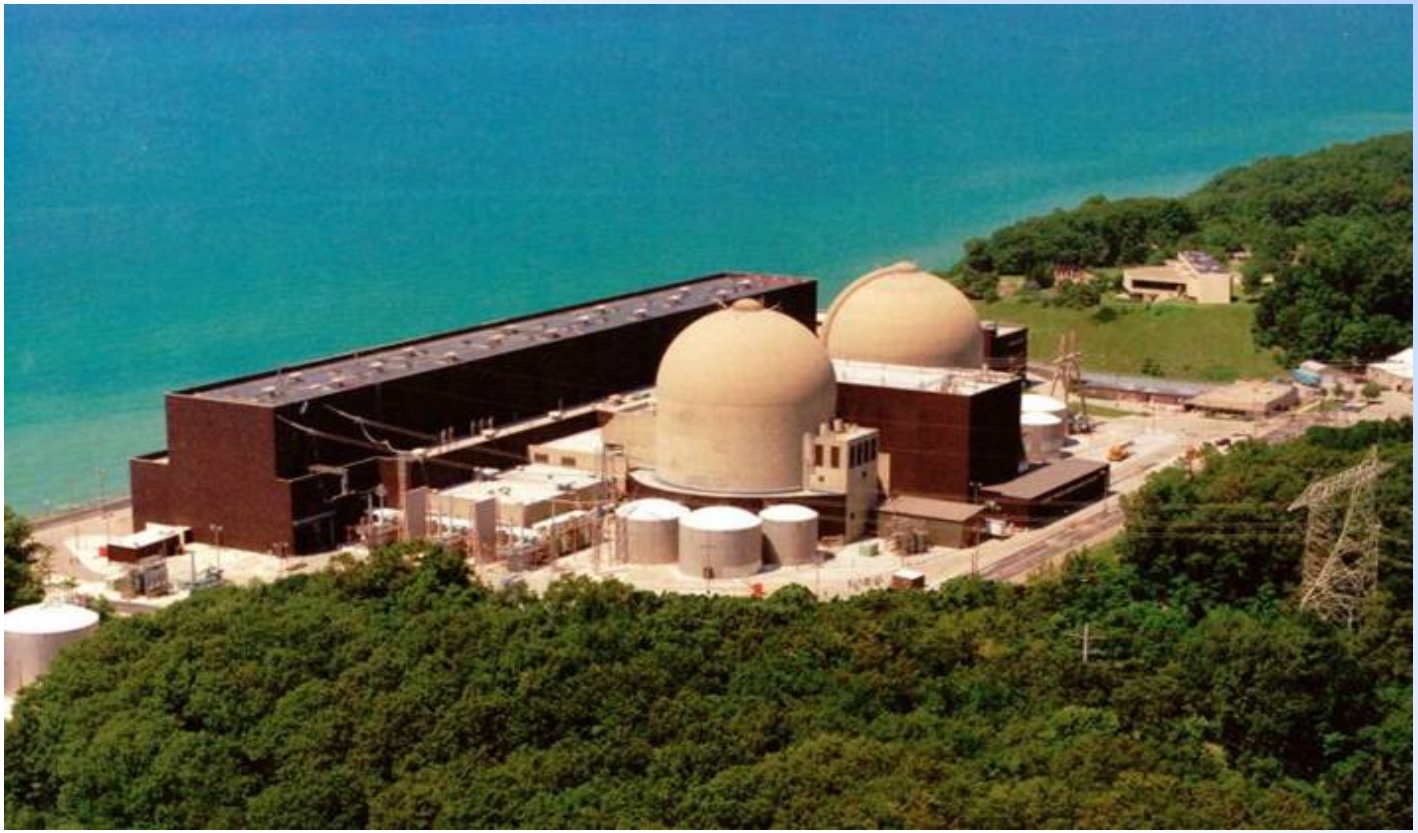
You are Welcome to Visit Cook NP



Thank You

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