

# Constellation Pilot Plant Project

Ronald Johansen  
Project Engineer



Workshop on Life Beyond 60

Washington DC  
February 22, 2011

Light Water Reactor Sustainability R&D Program



# Project Description

- The Department of Energy (DOE) in partnership with the Electric Power Research Institute (EPRI) and Constellation Energy Nuclear Group (CENG) will investigate the technical issues and demonstrate analysis methods to achieve nuclear plant life extension to 80 years.
- Issues and methods will be investigated and evaluated through the LWRS Program and EPRI Long Term Operation (LTO) Project.



## Project Description - continued

- The demonstration project will provide plant specific information, material samples, and associated environmental conditions for evaluation by the LWRS pathways. Ultimately, the work will lead to methods and processes to support life extension of nuclear plant.
- The demonstration project works with the EPRI Long Term Operation (LTO) for coordination of all on-site activities.



## Project Description - continued

- Minimize overlap and gaps between the stakeholders and activities planned by the LWRS pathway leads and EPRI.
- Provide collaborative research opportunities for all ongoing programs
  - DOE-LWRS
  - EPRI-LTO
  - NRC-LB60
- Maximize the opportunities for shadowing maintenance and inspections to be performed by Ginna and Nine Mile Point plants



# LWRS and the Constellation Pilot Project

## LWRS Research and Development Pathways

- Materials Aging and Degradation Pathway (MAaD)
- Advanced LWR Nuclear Fuel Development
- Advanced Instrumentation, Information, and Control System Technologies
- Risk-Informed Safety Margin Characterization
- Economics and Efficiency Improvement



# Development of Constellation Pilot Project Tasks

## FY 11 Major Activities

- Review of existing work and opportunities at Ginna and NMP1
  - Corrective Maintenance
  - Inspections
  - Areas of Interest by Ginna and NMP personnel
- Comparison of opportunities to the LWRS research areas.



# Constellation Pilot Project Focus Areas

## Ginna

- **Concrete**
  - Containment - development of a Containment Inspection Guideline.
  - Radiation Effects on Concrete – Not performed due to inability to get samples of interest.
  - Shadow of existing maintenance – Identification of potential future areas of interest.



# Constellation Pilot Project Focus Areas - continued

## Ginna

- **Reactor Metals**

- Baffle Bolt Replacement – specific irradiated materials of interest
- Surveillance Capsule Specimens – specific irradiated materials of interest
- Shadow of existing maintenance – Identification of potential future areas of interest.





# Constellation Pilot Project Focus Areas - continued

## NMP1

- **Concrete**

- Shadow of existing maintenance – Identification of potential future areas of interest.

- **Reactor Metals**

- Top Guide Sampling – under evaluation.
- Supplemental and Original Surveillance Capsules – under evaluation.
- Shadow of existing maintenance – Identification of potential future areas of interest



# Ginna Baffle Bolts

- Many baffle bolts will be replaced to meet the intent of MRP-227
- Selected baffle bolts will be evaluated under contract by CENG and others will be evaluated under the LWRS Program
- Purpose of the evaluations is to determine the extent of any of the key degradation mechanisms
  - IASCC and traditional SCC
  - Irradiation embrittlement
  - Void swelling
  - High fluence phase transformations



# Ginna RPV Surveillance Capsule Materials

- **Base and weld metal specimens tested under the RPV surveillance program will be selected to help understand the evolution of radiation embrittlement out to doses greater than 60 years**
  - Tentatively three capsules have been identified (three highest doses)
  - Remaining untested capsule will be assessed as to the optimum time to be pulled and tested
- **In addition to the traditional surveillance capsule mechanical property testing (Charpy V-notch and tensile), other investigations are being planned**
  - Fine scale microstructure using three-dimensional atom probe, small angle neutron scattering, annealing/hardness, and possibly others
  - Consideration of fracture toughness testing using reconstituted specimens to utilize the Master Curve methodology



# MAaD Pathway and Constellation Pilot Project

## MAaD Pathway

## Constellation Pilot Project

