



# **Lessons Learned from Past and Ongoing Construction Projects**

CNRA International Workshop on  
New Reactor Siting, Licensing and Construction Experience

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# Presentation Outline

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- NUREG-1055: History Lesson for the NRC
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- Long-term Goals
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# NRC ConE Program

- Focuses on new reactor designs and construction
- Screens both OpE/ConE events for applicability to new reactors design and construction
- Assigns a safety-significance level (SSL) to OpE/ConE events based on the risk of the event causing future operational impact
- Assesses NRC regulatory activities for adequacy or the need for enhancement
- Shares ConE insights internationally via Generic Communications such as Information Notices

*ConE: Construction Experience*

*OpE: Operating Experience*

# ConE Program Successes

- Updated NRC-INPO MOA to exchange ConE info with industry
- Issued several information notices (INs)
  - [IN 2008-17](#): Construction Experience With Concrete Placement
  - [IN 2009-06](#): Construction Experience with Flood Protection Features
  - [IN 2010-01](#): Pipe Support Anchors Installed Improperly
  - [IN 2010-02](#): Construction Experience with Cables, Connectors, and Junction Boxes
  - [IN 2010-08](#): Lessons Learned with Welding and NDE
  - IN 2010-xx: Construction Experience with HVAC (*in process*)
- Evaluated 350+ OpE/ConE events
- International Cooperation and Exchange of ConE Information
- Developed a ConE database in SharePoint and a Webpage
- Evaluated “old” LER and IRS reports

*INPO: Institute for Nuclear Power Operation*

*MOA: Memorandum of Agreement*

*LER: Licensee Event Report*

## **NUREG-1055: History Lesson for the Industry**

- Treat regulatory requirements as “minimums” not “maximums”
- Design before construct
- Hire project staff/contractors with previous experience
- Use experienced procurement organizations
- Encourage problem reporting and resolution
- Carefully evaluate bidders before awarding contracts
- Closely monitor contractor performance
- Use QA program as management tool – Upper management should be engaged in QA program

[NUREG-1055](#): *“Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants: A Report to Congress”*

## **NUREG-1055: History Lesson for the NRC**

- Enhance review of licensee experience/qualifications
- Perform detailed audits of licensee QA implementation
- Use contractor support for inspection activities
- Third party audits as a supplement to NRC inspections
- Revise construction inspection program
- Assign (construction) resident inspectors on site earlier
- Improve trending analysis of inspection findings

## **History Repeats Itself!**

Ongoing construction projects show similar deficiencies identified in NUREG-1055, for example;

- Poor communication between design and construction organizations
- Overconfidence in personnel
- Ineffective problem ID, reporting and corrective action
- Unrealistic and aggressive schedules
- Inadequate assignment of responsibilities and authority
- Vendor Issues
- Subcontractor issues

# NRC Initiatives

- Development of a new construction inspection and a construction assessment program
- Enhanced vendor inspection program
- Part 52 standardization to address early design issues
- Use of construction resident inspectors
- Use of ITAAC in verifying construction completed per design and license requirements
- Developed a Construction Experience (ConE) program
- Developed a Construction Experience Knowledge Management Center



# **NRC ConE Program Long-term Goals**

- Establish a ConE Organization
- Establish a Clearinghouse for Construction Events
- Launch a Public Version of the ConE Database
- Support NRC Inspectors During Construction Activities
- Improve Communication across the NRC and Globally
- Publish NUREG Documents to Communicate/Maintain Knowledge
- Conduct Periodic Self-assessment
- Expand International Cooperation and Information Exchange
- Support Advanced Reactor Program

# NRC ConE Database

- Initially Developed in MS ACCESS in May 2009
- Transitioned and deployed in SharePoint in September 2010
- Web-based functions/search
- Contains “evaluated” ConE/OpE Events
- Links each event to specific SRP Chapters and IPs
- Provides recommendations to enhance NRC licensing or inspection guidance documents
- A valuable tool for NRC inspectors and technical reviewers
- Currently contains over 350 ConE-related events
- A public version of the ConE database is being developed

*SRP: Standard Review Plan*

*IP: Inspection Procedure*

# Examples From Event Evaluations

## Grand Gulf Safety-related SW Pump House Airflow (8/2009)

- With the ventilation fans running, GG measured the airflow significantly lower than expected
- Inspections showed the intake screens had not been inspected or maintained for 20 years
- After cleaning, airflow improved by 50%
- Original operability evaluation did not address impact of external/seismic events on the system under this condition







# ConE Insights From the GG Event

- Can be interpreted a “design” deficiency because maintenance and inspection requirements were not specified in the plant design or tech specs
- This event is significant since inoperability of SR ventilation system impacts multiple systems, specifically, during accident conditions
- “Low” discovery potential in the absence of inspection/maintenance requirements
- Numerous past experiences exist
- An information notice is being developed
- Identified specific SRP Chapters, and IMCs and IPs to emphasize surveillance and preventative maintenance

## Examples From Event Evaluations

- Nogent-1: Leak in Underground Section of two Trains of ESW
  - Leak discovered on sections of two ESW Trains
  - Pipes are underground and set on bed of concrete at each bend
  - Causes attributed to (1) insufficient clearance between the pipes and the walls of the manholes, and (2) differential subsidence between civil engineering structures
  - Many similar past events, including U.S. plants
  - IN all instances, (common) causes attributed to poor design, poor compaction of backfill before laying the pipes, and poor construction quality

# ConE Insights From the Event

- All types of new reactor designs are susceptible
- Low discovery potential affecting multiple systems
- A safety-significant issue due to common-cause failure, programmatic deficiencies, and multiple previous occurrences
- Identified applicable NRC IPs and recommended enhancements regarding inspection of buried piping – e.g., sample inspection of all activities (procurement, installation, backfill, and QA of as-built configuration and associated manholes);
- Evaluating the adequacy of NRC requirements, and Industry initiatives, for design, inspection, and maintenance of buried piping a priority for the NRC, especially, the NRC Chairman