Project Plan for Restoring Dry Shielded Canister (DSC) 11 - 16 Compliance to 10 CFR Part 72

Pre-Submittal Meeting

Monticello Nuclear Generating Plant
Independent Spent Fuel Storage Installation (ISFSI)

Xcel Energy

November 9, 2016

Introduction

Xcel Energy

- Pat Burke – Vice President Engineering and Technical Services
- Jeff Place – Nuclear Vice President Fleet Operations
- Kent Scott - Director Site Operations, MNGP
- Marty Murphy – Director, Nuclear Licensing, Regulatory Affairs
- Scott Marty – Director, Dry Fuel Storage
- Mike Baumann – Director, Nuclear Fuels
- Glenn Adams – Project Licensing

Introduction

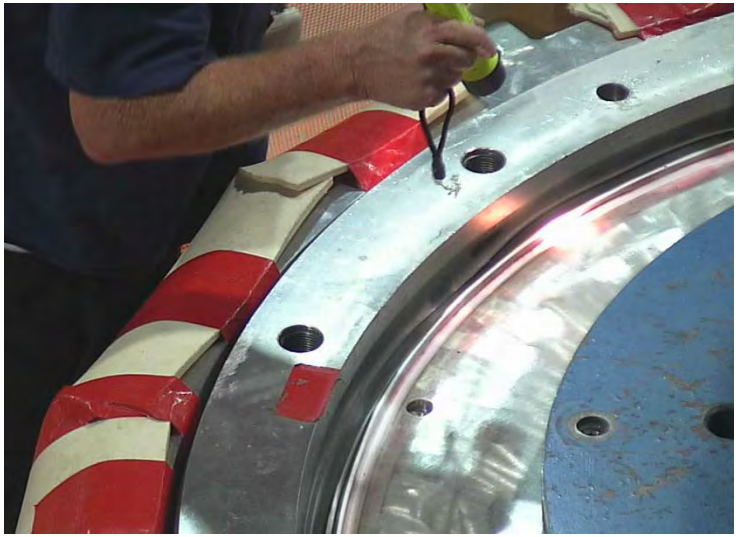
Meeting Objectives

- Understand Project Plan for restoring DSC 11 – 16 compliance
  - DSC 16 is currently restored
- Understand Project Schedule
- Understand NRC engagement and approvals

Background

2013 DSC 11 – 16 Loading Campaign

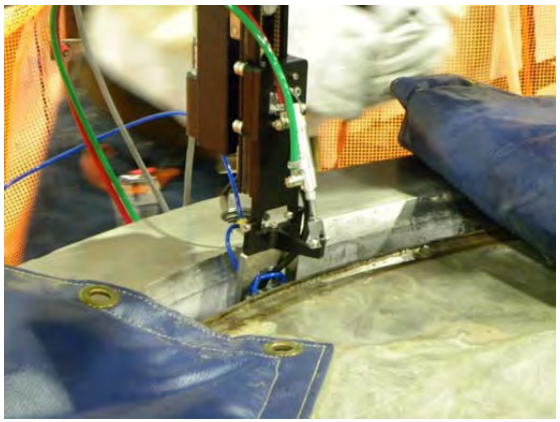
- Dye penetrant (PT) exams non-compliant with Technical Specification (TS) 1.2.5
- Integrity of welds assured through weld process, advantages of multi-layer weld, visual inspection, and helium leak testing



Background

DSC 16 Exemption (6/15/2016) – Reasonable Assurance

- Integrity of fuel cladding
- Quality of the welding process
- Advantages of multi-layer weld technique
- Visual inspections of welds
- Helium leak testing
- Lack of failure mechanisms
- Margin of safety available in welds demonstrated by:
  - Analysis of theoretical full circumferential flaws
  - Analysis of flaw distribution derived from DSC 16 PAUT exams



Background

Confirmatory Order EA-14-193 (12/21/2015)

1. **Restore DSC 11 – 16 compliance to 10 CFR 72 within 5 years of exemption (i.e., by 6/15/2021)**
   - DSC 16 restored by Exemption 6/15/2016; placed in HSM 10/5/2016
2. **Submit Project Plan for restoring compliance by 12/12/2016**
   - Scope of Project Plan is DSC 11 - 15

Project Principles

- Maximize Nuclear Safety
- Minimize Industrial Safety Risks
- Minimize Radiological Dose
- Using proven technology
- Timely restoration to compliance
- Optimize submittal scope

Alternatives

PAUT Scope Considered

- DSC 16
- DSC 11 and DSC 16
- DSC 11 - 16

PAUT Methods Considered

- In Horizontal Storage Module (HSM)
- In Transfer Cask with Inspection Ring
- In Transfer Cask – Horizontal on Trailer
- In Transfer Cask – Vertical on Refuel Floor

PAUT Timing Considered

- Perform in 2017
- Perform in 2018

Alternatives - Scope

PAUT of DSC 16 - Results Applied to DSCs 11 – 15

Demonstrate DSC 16 is a representative sample. Margins of safety account for potential differences between DSC 16 and DSCs 11 - 15

- **Benefit**
  - Eliminate nuclear risk associated with handling
  - Eliminate industrial risk and radiological impact of handling and PAUT
- **Challenges**
  - Uncertainty of potential flaws in DSCs 11 – 15

Alternatives - Scope

PAUT of DSC 11 and 16 - Results Applied to DSCs 12 – 15

Perform PAUT on DSC 11. Demonstrate DSCs 11 and 16 are representative samples. Margins of safety account for potential differences between DSC 11 and 16, and DSCs 12 – 15

- **Benefits**
  - Specific analysis of DSC 11 PAUT results
  - Improved confidence in weld quality of DSCs 12 – 15
  - Minimize nuclear risk associated with handling
  - Minimize industrial risk and radiological impact of handling and PAUT
- **Challenges**
  - Uncertainty of potential flaws in DSC 12 – 15
  - Increased nuclear risk associated with handling

Alternatives - Scope

PAUT of DSC 11 – 16

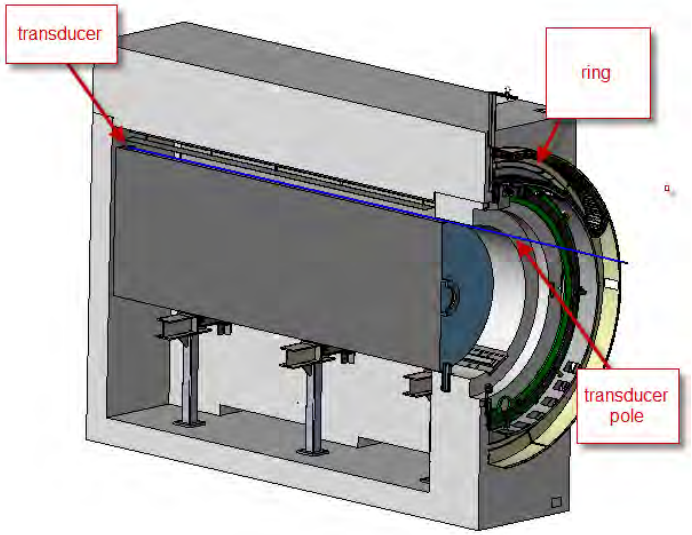
Perform PAUT on DSC 11 - 16

- **Benefit**
  - Specific analysis of DSC 11 – 16 PAUT results
- **Challenges**
  - Increased nuclear risk associated with handling
  - Increased industrial risk and radiological impact of handling and PAUT

Alternatives – Methods

PAUT in HSM

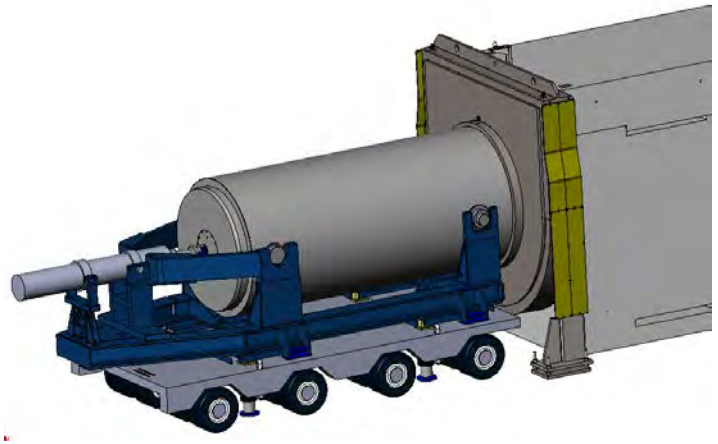
- **Benefits**
  - DSC is not moved
  - Potential lower occupational dose
  - Incorporates same PAUT transducers
- **Challenges**
  - < 360^{o} coverage due to rails
  - 72.48 screening implications
  - Unproven transducer delivery tooling
  - Unproven shielding design
  - Weather risks



Alternatives – Methods

PAUT in TC with Inspection Ring

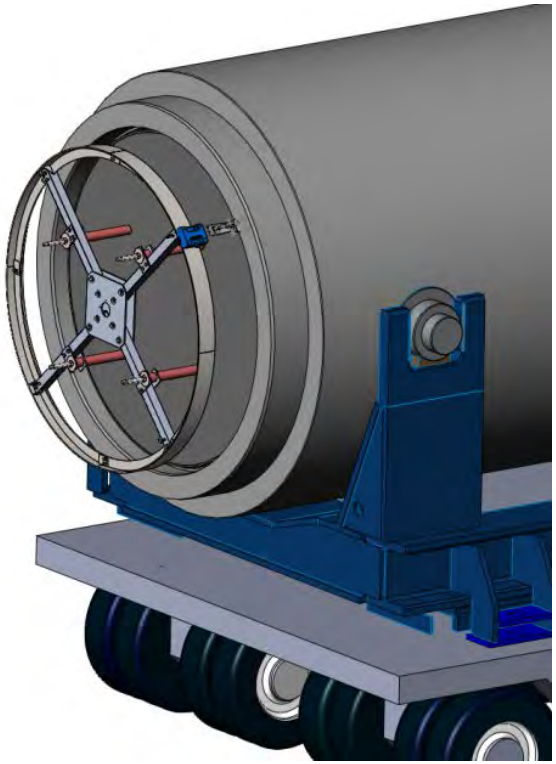
- **Benefits**
  - Minimize DSC movement and transfer
  - Same weld coverage as DSC 16
  - Potential lower occupational dose
  - Incorporates same PAUT transducers
- **Challenges**
  - Requires move of DSC into TC
  - 72.48 screening implications
  - Unproven transducer delivery tooling
  - Unproven shielding design
  - Unproven transfer system modifications
  - Weather risks



Alternatives – Methods

PAUT in TC – Horizontal on Trailer

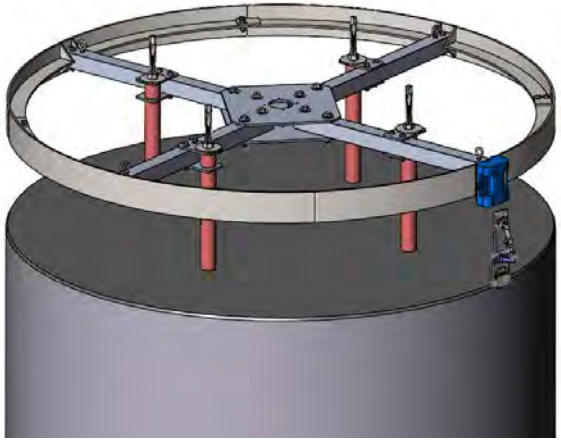
- **Benefits**
  - Minimize DSC movement and transfer
  - Same weld coverage as DSC 16
  - Incorporates same PAUT transducers
- **Challenges**
  - Requires move of DSC into TC
  - 72.48 screening implications
  - Higher occupational dose
  - Unproven transducer delivery tooling
  - Weather risks



Alternatives – Methods

PAUT in TC – Vertical on Refuel Floor

- **Benefits**
  - Same weld coverage as DSC 16
  - Proven 72.48 determination on refueling floor
  - Proven transducer delivery tooling
  - Proven PAUT transducers
  - Controlled environment
- **Challenges**
  - Requires move of DSC into TC
  - Requires move to Refuel Floor
  - Known occupational radiological dose (~ 1 Rem / DSC)



Alternatives – PAUT Timing Considerations

Perform in 2017

- **Challenges**
  - Less time to resolve open question on moving non-compliant DSC(s)
  - Requires a dedicated crew mobilization

Perform in 2018

- **Benefits**
  - Allows time to resolve the open questions
  - Allows execution with a crew mobilized for 2018 campaign

Selected Approach

PAUT of DSC 11 and 16

- Optimized balance of nuclear, radiological and industrial safety
- Improved confidence in weld quality of DSCs 11 – 15

PAUT in Transfer Cask on Refueling Floor

- Same weld coverage as DSC 16
- Proven 72.48 determination on refueling floor
- Proven transducer delivery tooling
- Proven PAUT transducers
- Controlled environment mitigates weather and environmental risks

PAUT in 2018 (following planned 2018 DSC loading campaign)

- Allows time for resolution of open questions
- Allows execution with crew mobilized for 2018 campaign
- Provides margin to Confirmatory Order deadline

Project Plan

The project plan consists of two major areas:

1. **Open questions on movement of non-compliant DSCs**
   - Move non-compliant DSC from HSM
   - Move non-compliant DSC to HSM
2. **Exemption to Restore Compliance**
   - Exempt DSCs 11 - 15 from TS 1.2.5 using DSC 11 and DSC 16 PAUT directly applied to DSC 11, and as representative of DSCs 12 - 15

Project Plan

Open Question on Movement of Non-Compliant DSC

Certificate of Compliance 1004 and TS have no action statements for discovery of noncompliant PT discovered during Storage

- TS 1.2.5 Action for unacceptable weld requires weld repair and re-performance of PT
- TS 1.2.10 Limit and Applicability requires that any TC/DSC dropped on route to, or at, the storage pad, the fuel shall be returned to the spent fuel pool and the DSC removed from service and evaluated

Project Plan

Bases for Movement of non-compliant DSC from HSM

Reasonable Assurance of Safety, Presumption of Operability

- Integrity of fuel cladding
- Quality of the welding process
- Advantages of multi-layer weld technique
- Visual inspections of welds
- Helium leak testing
- Lack of failure mechanisms
- Margin of safety available in welds demonstrated by:
  - Analysis of theoretical full circumferential flaws
  - Analysis of flaw distribution derived from PAUT exams

Project Plan

Bases for movement of non-compliant DSC to HSM

Additional assurances supporting return to HSM

- Compliant PT exam of OTCP final pass
- Comparative review of PAUT data informed by analysis of theoretical flaw and flaw distribution derived from DSC 16 PAUT

Project Plan

Exemption Request of DSCs 11 - 15 Bases:

- Integrity of fuel cladding
- Quality of the welding process
- Advantages of multi-layer weld technique
- Visual inspections of welds
- Helium leak testing
- Lack of failure mechanisms
- DSC 11 and DSC 16 are representative (first and last)
- Margin of safety available in welds demonstrated by:
  - Analysis of theoretical full circumferential flaws
  - Analysis of flaw distribution derived from DSC 11 and 16 PAUT exams

Project Plan

Milestones:

12/2016	Submit Project Plan
01/2017	NRC input on open questions on movement of DSCs
03/2017	Clarify open questions on movement of DSCs
08/2017	Resolve open question on movement of DSCs
08/2018	Transfer DSC 11 from HSM to Refuel Floor

- Perform PT and PAUT
- Perform OTCP PT and comparative review of PAUT data
- Return DSC 11 to HSM
- Perform analysis and prepare exemption request

12/2018	Submit exemption request
12/2019	NRC grant exemption request

Project Plan

Plan Content

- Cover letter
- High level summary and milestone schedule

Progress Reporting

- Required 180 days after project plan submittal, and every 360 days thereafter
- Will provide additional updates as appropriate as development and planning progress

Summary

- Work with NRC to resolve open question on movement of non-compliant DSCs from HSM
- Work with NRC to resolve open question on movement of non-compliant DSCs to HSM
- Plan is to submit an exemption request for DSCs 11 - 15 from TS 1.2.5 based on PAUT and analysis of DSC 11 and DSC 16 and demonstrating these are representative of DSCs 12 - 15