Exemption Request for Restoring Dry Shielded Canister (DSC) 11 - 15 Compliance to 10 CFR Part 72

Pre-Submittal Meeting

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

Xcel Energy

March 2, 2017

Introduction

Xcel Energy

- Pat Burke – Vice President Engineering and Technical Services
- Kent Scott - Director Site Operations, MNGP
- Mike Baumann – Director, Nuclear Fuels
- Marty Murphy – Director, Nuclear Licensing, Regulatory Affairs
- Scott Marty – Director, Dry Fuel Storage
- Mark McKeown – Manager, Spent Nuclear Fuel
- Glenn Adams – Project Licensing
- Jay Silberg – Pillsbury Law

TN Americas, LLC

- Raheel Haroon – Engineering Manager

Introduction

Meeting Purpose

- Pre-Application presentation and feedback
- Review Basis for Proposed Exemption Request
  - Safety assured through design, material quality, welding and examination processes
  - Processes confirmed through inspection of DSC-16
  - Requested exemption balances consequences and risks
    - DSC 11 - 15 are in storage; transfer risks are eliminated
    - Additional examination would increase risk w/o significant increase in confidence
- Review Schedule

Background

Timeline

10/2013	**Discovered PT examinations were non-compliant**
7/2014	**Submitted Exemption Request (ER) for DSC 11 - 16**
12/2014	**Withdrew ER for DSC 11 - 16**
2/2015	**Performed Phased Array Ultrasonic Exam (PAUT) DSC 16**
9/2015	**Submitted ER for DSC 16 (based on PAUT)**
12/2015	**Confirmatory Order to restore compliance within 5 years**
6/2016	**Exemption granted for DSC 16**
10/2016	**DSC 16 placed in Horizontal Storage Module (HSM)**
12/2016	**Submitted Project Plan**

Background

- **CoC 1004 Dye Penetrant Exam (PT)**
  - **PT in accordance with TS 1.2.5**
  - **Based on ISG-4 Rev. 1 and ISG-15**
  - **TS 1.1.12.4, Alternatives to Codes and Standards**
    - **PT at each layer is alternative to volumetric examination**

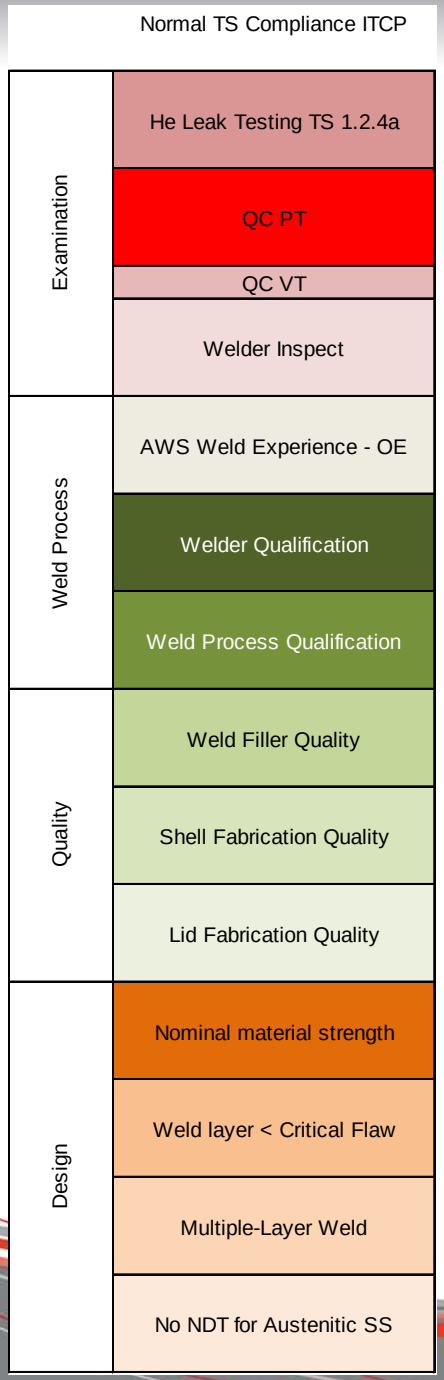
Principles

- Balance Risks
  - Nuclear Safety
  - Industrial Safety
  - Radiological safety
- Timely restoration to compliance
- Optimize NMSS staff review effort
  - Leverage previously docketed information

Safety Basis

Determination of Safety

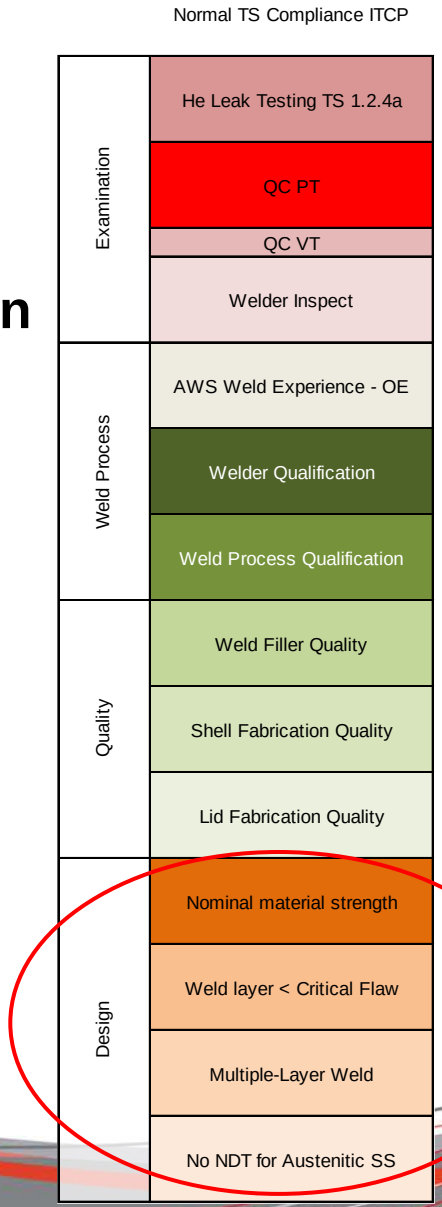
- Design
- Material Quality
- Weld Process
- Examination



Safety Basis - Design

Design

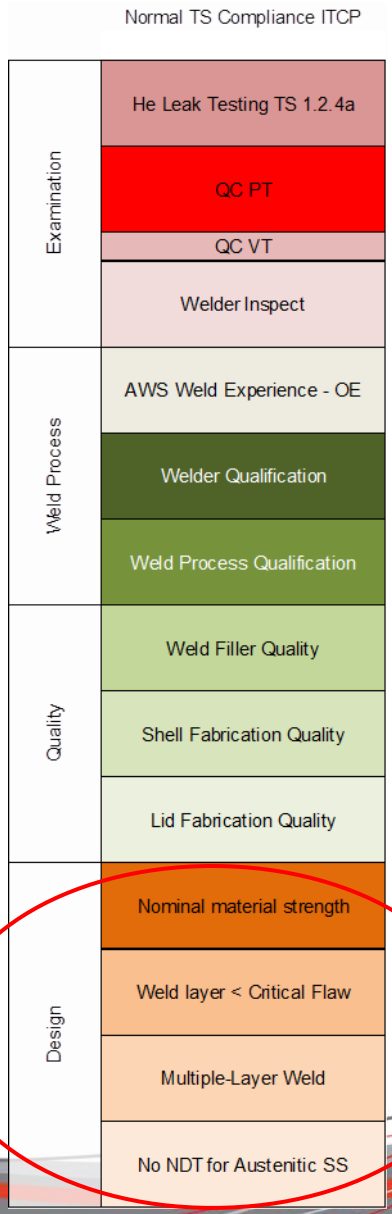
- Critical weld flaws are considered in the design
- Stress reduction factors are imposed to account for imperfections or flaws
- Creep is not plausible
- Cyclic loading has been considered and is below the threshold of ASME Code



Safety Basis - Design

Design

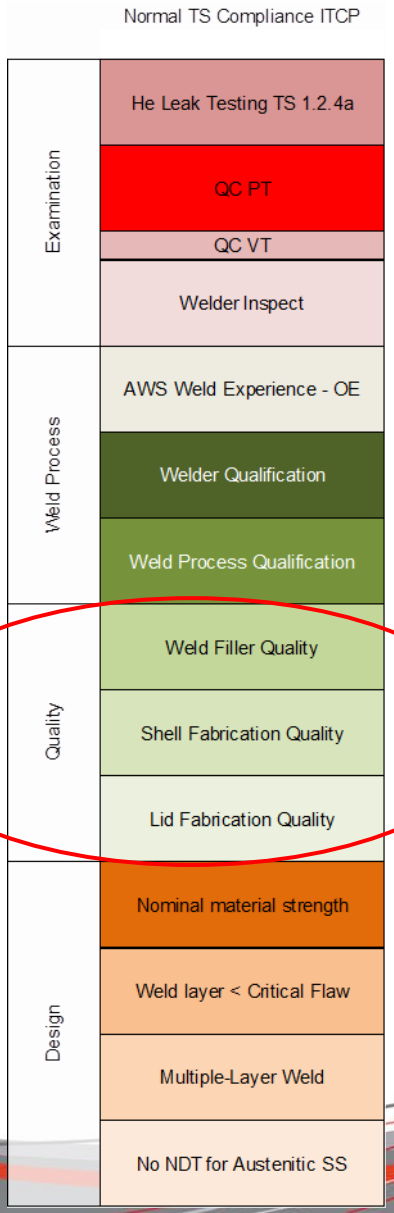
- Multiple layer welds effectively eliminate pinhole leaks
- Flaws in austenitic stainless steels are not expected to exceed one weld bead
- Austenitic stainless steels are ductile and can withstand large flaws
- Use of nominal material strength in design (<actual)



Safety Basis – Material QA

Material Quality

- Lid fabrication quality
- Shell fabrication quality
- Weld filler quality
- Quality validated by Nuclear Oversight



Safety Basis – Weld Process

Welding Process

- Welding program elements met requirements
- Experienced and qualified welders employed
- OEM Automated Welding System utilized
- Welding demonstrations performed
- Flat welding orientation is forgiving
- Ductile and easily weld-able base materials
- Evidence of good welding practices
- Process provided excellent results in 2008

Safety Basis – Examinations

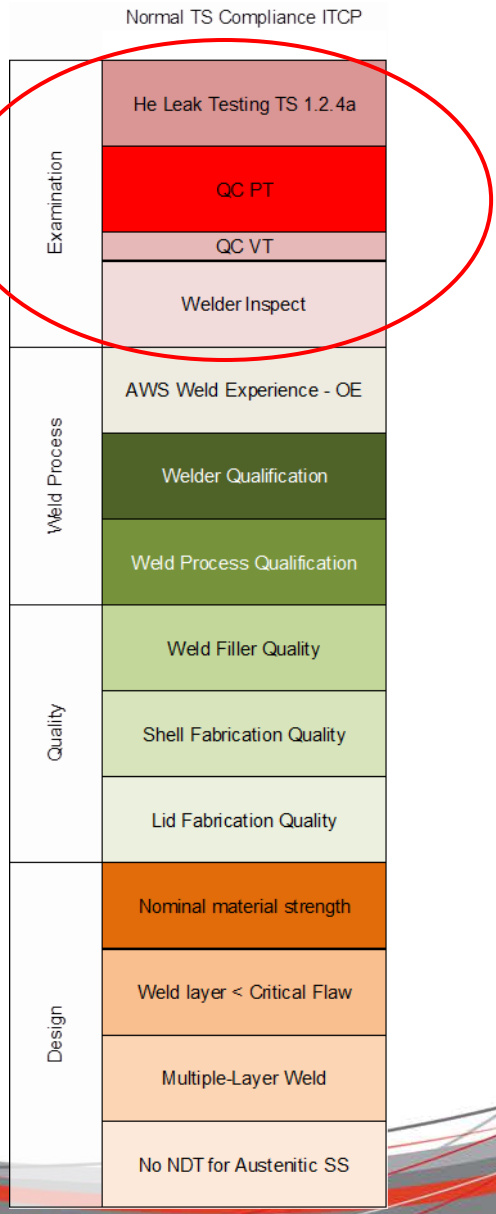
Examinations

- **Welders performed visual inspection**
- **QC performed VT NDE**
- **Regarding the non-compliant PT exams:**
  - Progressive PT exam does not preclude flaws

Safety Basis – Examinations

Examinations

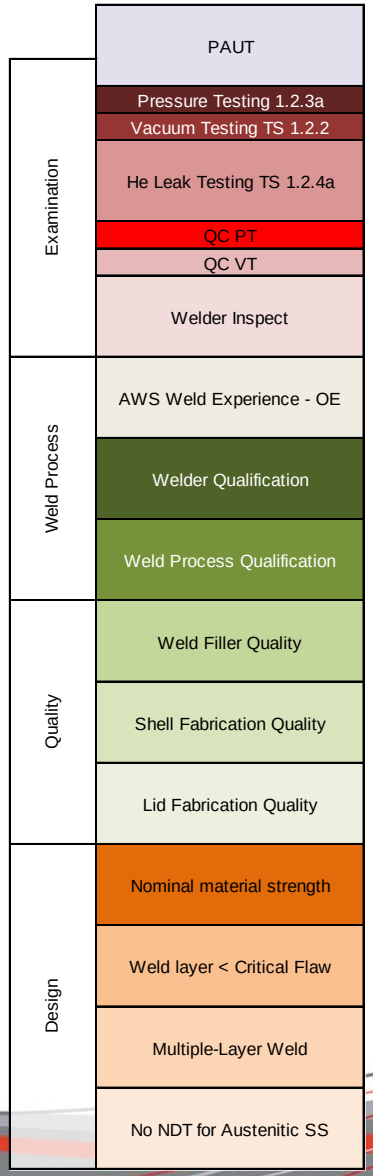
- **ITCP, siphon port and vent port passed the helium leak test; this demonstrates the confinement function**
- **ITCP passed the vacuum test and pressure test, which support a determination of structural integrity**
- **OTCP root pass served as the barrier to in-leakage during the ITCP helium test and therefore provides some measure OTCP weld integrity**



Safety Basis - Confirmation

Processes Confirmed Through PAUT

- **PAUT examination and analysis of DSC-16 confirmed processes produce acceptable welds**
  - **Conservative flaw sets and application of design loads create margin to safety**
- **DSC 16 representative of the campaign**



Exemption Request

10 CFR 72.7

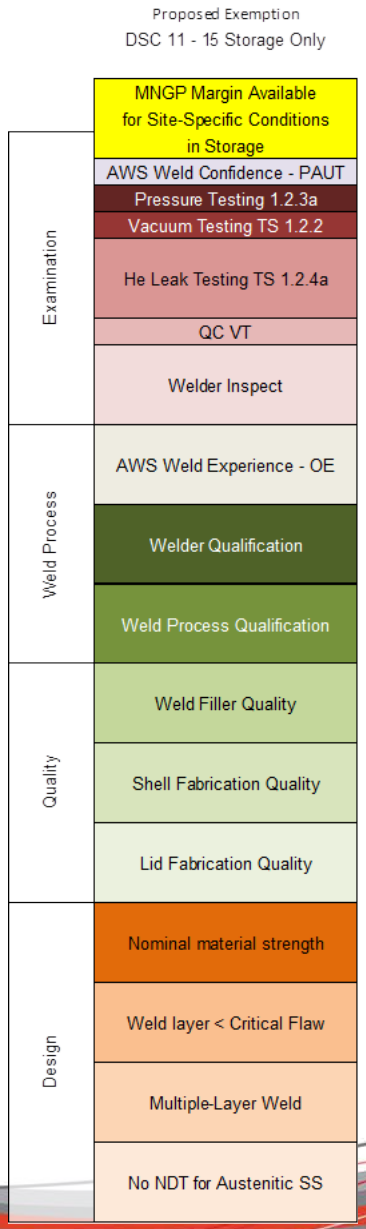
1. **Authorized by law**
2. **Not endanger life, property or the common defense and security**
3. **Otherwise in the public interest**

Exemption Request

10 CFR 72.7 – Not endanger life or property

- Assurance of weld integrity as previously discussed
  - Design, material quality, weld process, exams
  - Confirmed by PAUT and analysis of DSC-16
- Recognize DSCs 11 – 15 in Storage Mode at MNGP
  - Site specific load cases allow additional margin
- Even in the case of loss of confinement, consequences are minimal

Conclusion: Therefore the selected approach, to not do any more examinations, does not endanger life or property



Exemption Request

10 CFR 72.7 - Otherwise in the public interest

- Alternatives offer higher dose, greater risk, little increase in confidence

	Incremental Change Compared to Proposed Exemption Request				
Alternative ▼	Dose / DSC	Safety Risk	Safety Confidence	Licensing Challenges	Technological Challenges
Proposed ER	Null	Null	Null	Null	Null
Unload - Reload	1.5 R	High	Nominal Increase	Zero	Zero
Repair ITCP Weld	1.4 R	High	Nominal Increase	Med	High
Lid Augmentation	1 R	Med	Nominal Increase	High	High
PAUT DSC 11 in Rx Bldg	1 R	Med	Nominal Increase	Med	Zero
PAUT DSC 11 - 16 in Rx Bldg	1R	High	Nominal Increase	Null	Zero
In Situ PAUT - HSM	Med	Low	Nominal Increase	Null	High
In Situ PAUT - Drill HSM	Low	Med	Nominal Increase	Med	High
In Situ PAUT - TC	Med	Med	Nominal Increase	Med	High

Exemption Request

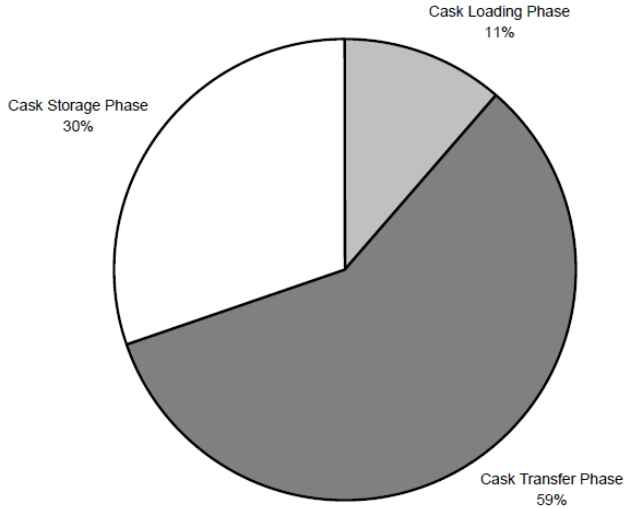
10 CFR 72.7 - Otherwise in the public interest

- **Significant Effort for transfer**
  - Obtain transfer cask, equipment and crew
  - Mobilize, train and qualify crews
  - Execute work
- **Risks of Canister Transfer from HSM**
  - Stress of extraction (bottom welds)
  - Risk of binding and gouging during extraction
  - Exposure of TC/DSC to more significant external events
  - Risk of TC drop from Transfer Trailer (TT)
  - Risk of cask handling accident with Reactor Building Crane
  - Radiological dose to workers

Exemption Request

10 CFR 72.7 - Otherwise in the public interest

- **NUREG 1864 and EPRI 1009691 provide risk insights for dry fuel storage**
  - **The transfer phase carries the highest risk**
- **Transfer also increases industrial risk**



EPRI 1009691 Figure 3-1, Summary of Total Cask Lifecycle Risk by Phase

Exemption Request

10 CFR 72.7 - Otherwise in the public interest

- Certain radiological dose with any of the alternative
  - Radiological risk of handling >> Radiological risk in Storage
- Theoretical risk in Storage described in UFSAR 8.2.8.3
  - No mechanism for such a release

Conclusion: Therefore the selected approach, to not do any more examinations, is the least dose and least risk alternative, and therefore in the public interest

Examples

Examples

- VSC-24 Confirmatory Action Letter (ca 1997): Inner shield (confinement) welds, subject to known cracking, were not subject to additional examination
- HI-STORM Enforcement Discretion (ca 2009): Canisters were loaded without fabrication welds being adequately leak tested
- Oconee DSC Exemption (ca 2014): Canisters were loaded without field welds being subject to a compliant helium leak test
- ANO HI-STORM Exemption (ca 2014): Applied safety risk of a retrieval operation to accept a canister loaded with a failed fission product barrier

Exemption Request – DSCs 11 - 15

Tentative Schedule

- **June 2017 Xcel Energy Submit ER**
- **June 2018 NRC approve exemption**
- **July 2018 Xcel Energy report Order satisfied**

Proposed plan meets deadline 3 years early

- **June 2021 Confirmatory Order deadline**

Questions