

# MSIP<sup>®</sup> Mechanical Stress Improvement Process



- **MSIP<sup>®</sup> Background**

- Invented, developed and first used in 1986
- Permanently mitigates stress related cracking in nuclear reactor plant piping weldments
- Over 30 years of successful operating experience treating more than 10,000 welds worldwide
- MSIP<sup>®</sup> has been performed successfully at 13 other PWRs.



# MSIP<sup>®</sup> Scope at South Texas Project

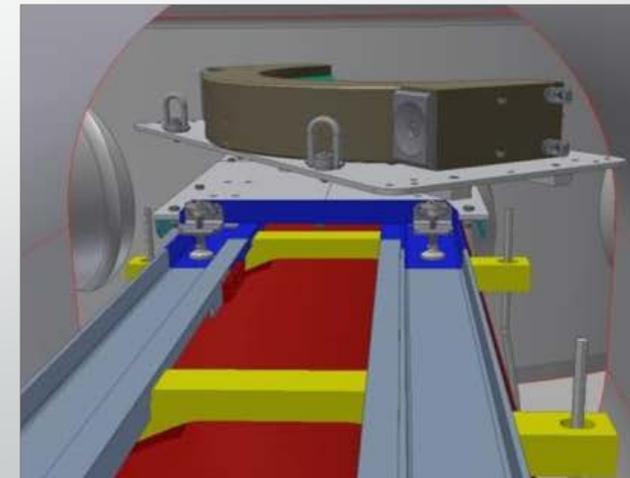
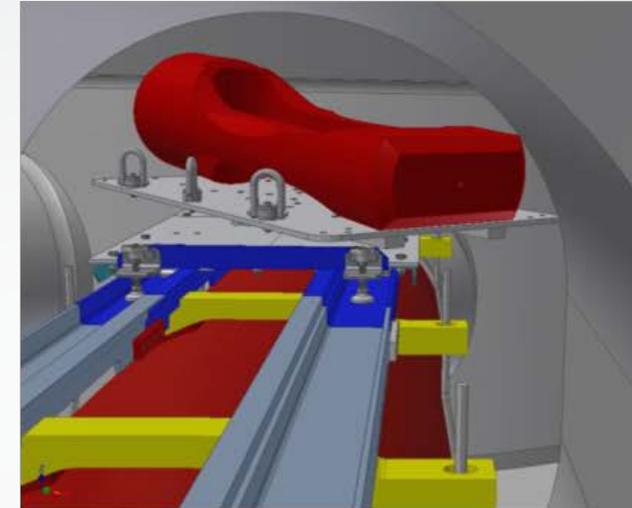
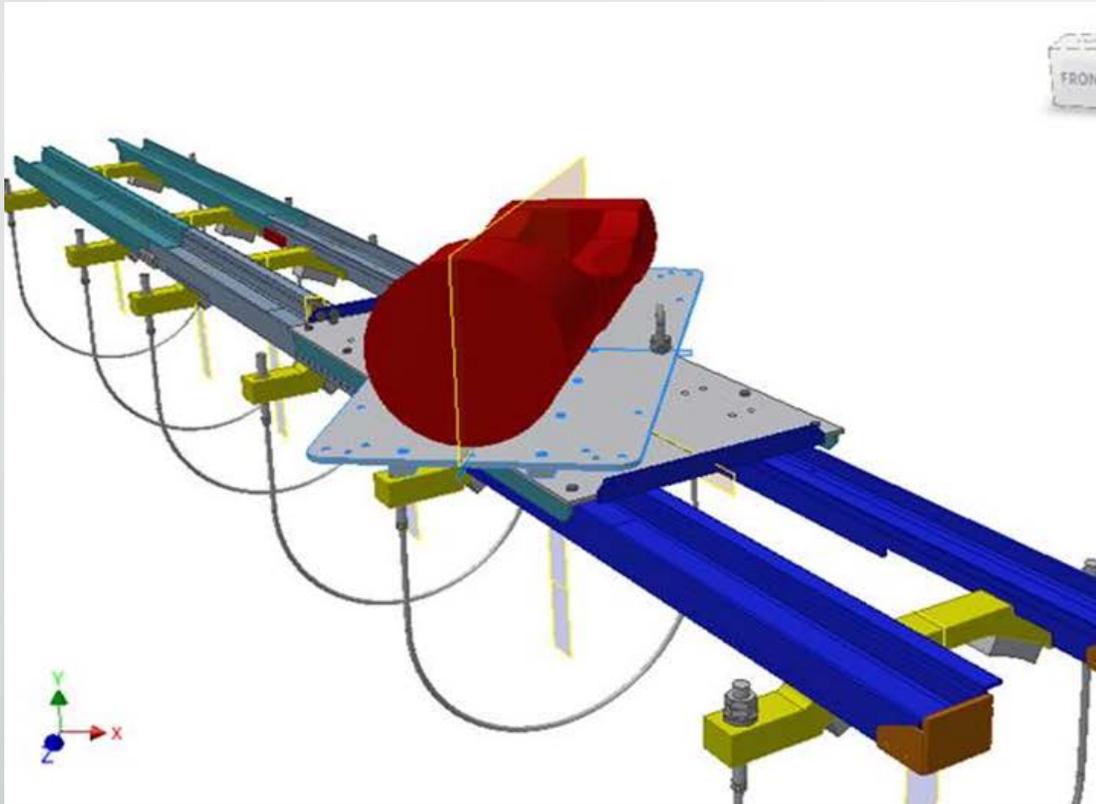
- Perform MSIP<sup>®</sup> on four (4) RV inlet nozzles and four (4) RV outlet nozzles during the 1RE20 outage
  - Dissimilar metal weld centerline marking
  - Pre and Post- MSIP<sup>®</sup> NDE inspections
  - Shim gap advisement
- Work Groups involved with MSIP:
  - NuVision – Performs squeeze
  - Westinghouse – Design Change Package and equipment setup
  - Day and Zimmerman – Interference removal and delivery of equipment to gallery
  - STP Radiation Protection – Shielding and ALARA Support
  - STP Engineering – Ensures engineering and technical quality

# Challenges

- No access through seal ring area
  - Mitigated with Bioshield Delivery System (BDS)
- Large work force
  - Mitigate with supervisory oversight ensuring proper crew sizes.
- Limit space for shielding with nozzle gallery
  - Mitigated with increased efficiency
- Project Risk leading to project delays adding man hours
  - Risk Log identifies mitigation and contingency strategies.
  - Nozzle Gallery – Very good WEC OE performance
- Complex Project
  - Large amount of OE incorporated into STP plan

# Equipment Overview





Bioshield Delivery System (BDS)

# MSIP<sup>®</sup> Project Preparation for STP

- N-1 Detailed walkdown – Fall 2015
  - Westinghouse, NuVision, and STP.
  - Use of a detailed walkdown plan
  - Identified interferences for removal / reinstallation

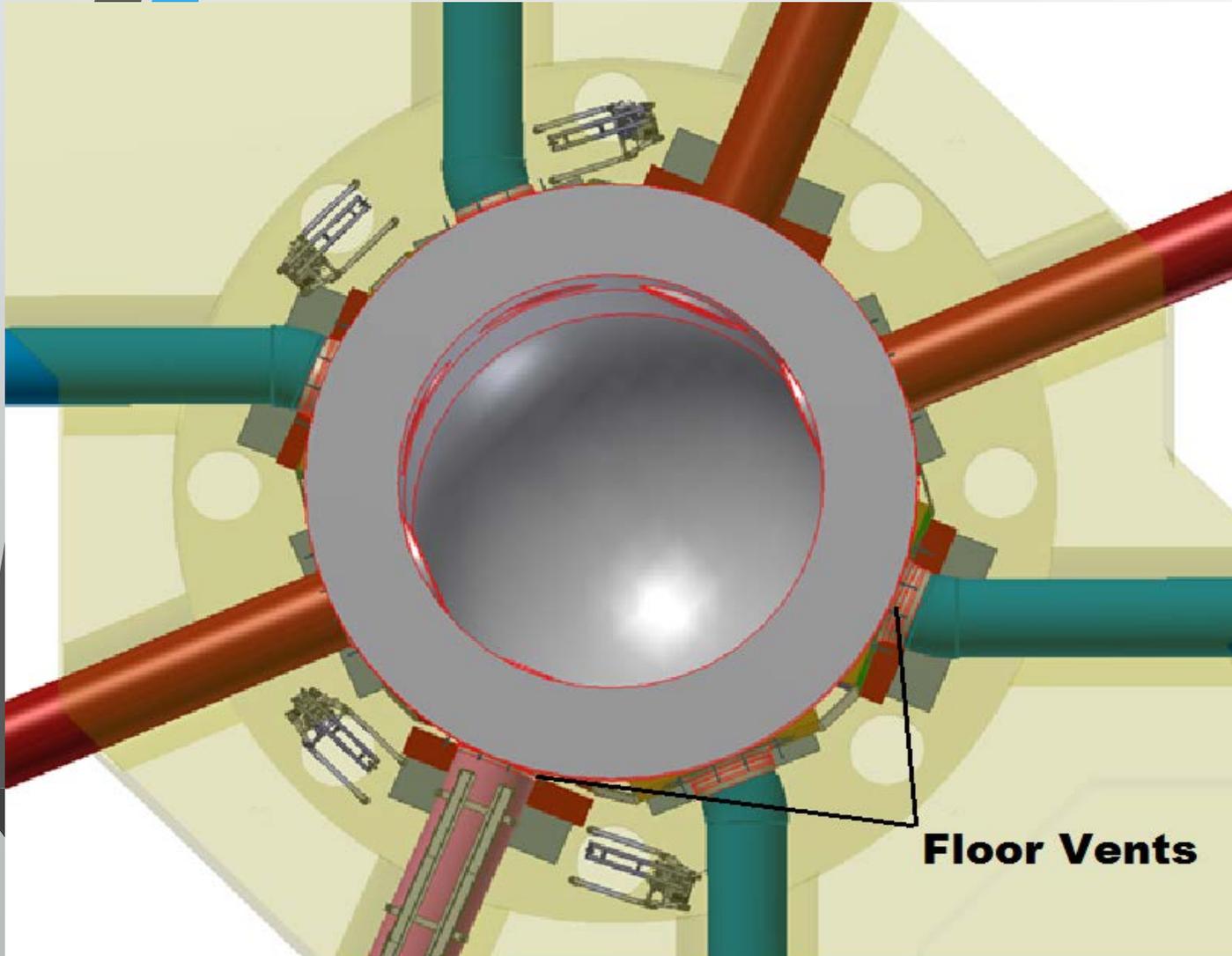


# MSIP<sup>®</sup> Project Preparation for STP

- Rigid foam mock up tooling validation
- Equipment haul paths identified



# Location: Nozzle Gallery



- 50 mRem/hr (0.5 mSv/hr) on Contact with piping.
- 40 mRem/hr (0.4 mSv/hr) General Area.
- 400 mRem/hr (4 mSv/hr) on Contact with floor vents.
- 5 – 15 mRem/hr (0.05 – 0.15 mSv/hr) General Area outside of Nozzle Gallery.

# MSIP Dose Reduction Strategies

## Time

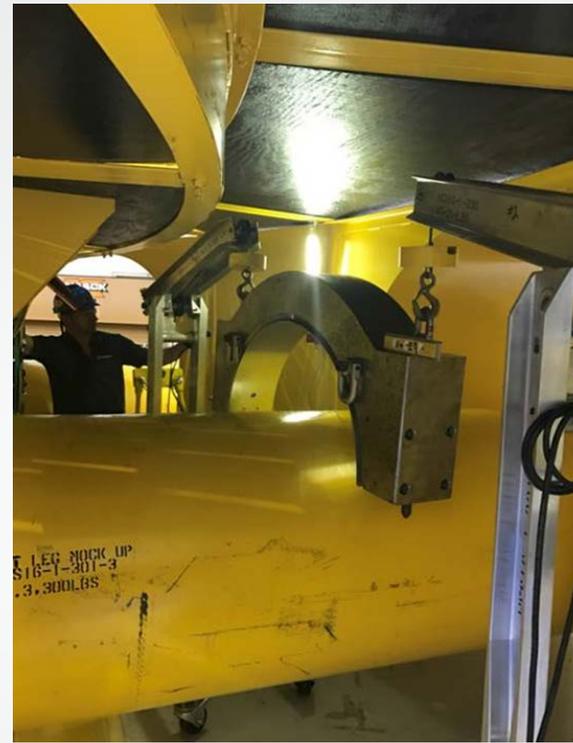
- Use of mock up training
- Use of experienced workers
- Crew size optimization
- In field oversight

## Distance

- Use of low dose waiting area outside bioshield.
- Use of cameras in the field for remote observation
- MSIP RP technicians
  - Continuity and monitoring and facilitating ALARA practices
  - Familiarity with the crew and scope of work
  - Assisting with necessary shielding

## Shielding

- Comprehensive shielding plan
  - Incorporated the bio-wall



# MSIP Dose Estimate & Time Projection

Craft	Dose Estimate (Rem)	Time Projection (Hours)
WEC	9.637 (96.37 mSv)	1232
NuVision	2.030 (20.30 mSv)	344
D&Z	11.882 (118.82 mSv)	2723
SQUID NDE	0.306 (3.06 mSv)	306
<b>Total</b>	<b>23.855 (238.55 mSv)</b>	<b>4605</b>

- The total estimate was revised to **18.452 Rem (184.52 mSv)** after effective dose rates were determined to be lower than initially expected.

# MSIP Actual Dose & Time

Craft	Dose Actual (Rem)	Time Actual (Hours)
WEC	7.202 (72.02 mSv)	1179
NuVision	1.805 (18.05 mSv)	326
D&Z	8.382 (83.82 mSv)	2230
SQUID NDE	0.218 (2.18 mSv)	259
<b>Total</b>	<b>17.607 (176.07 mSv)</b>	<b>4075</b>

- Actual dose was 95.4% of revised estimate
- Actual time was 88.5% of projection.

# Lessons Learned

- Up-front Planning with vendor and site project
- Strategic use and non-use of shielding
- Use of dedicated Technician support
- Use of remote monitoring and infield coaching
- Pre-outage walk-downs



Questions?