

# HATCH NUCLEAR PLANT – UNIT 2

## PLANT SERVICE WATER PIPING REPLACEMENT USING HIGH DENSITY POLYETHYLENE (HDPE) PIPING

### NRC/SNC MEETING JULY 13, 2015



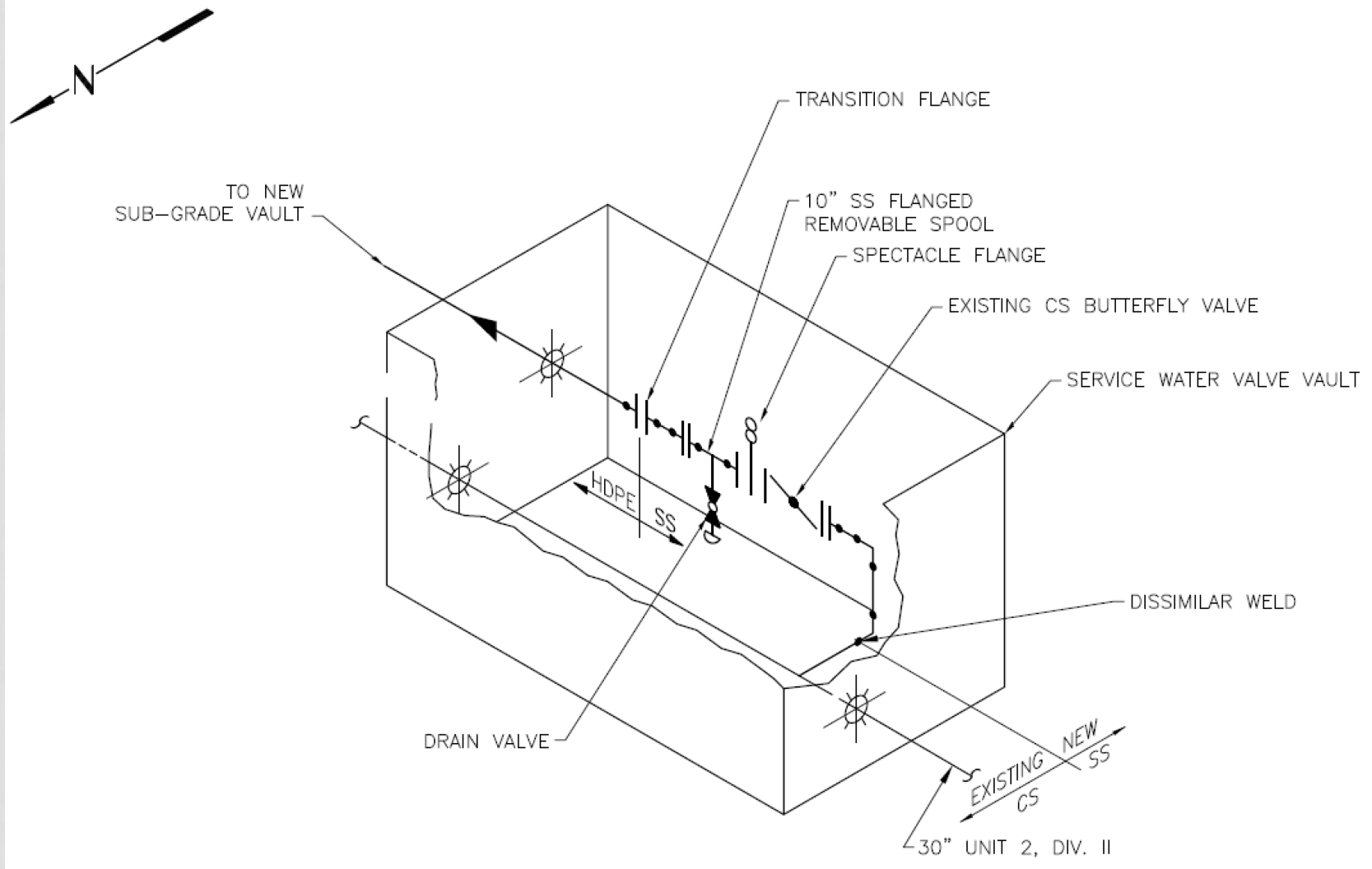
# MEETING OBJECTIVES

- Discuss updates from conceptual design review
- Discuss Mechanical and Civil Branch RAI Responses
- Discuss content of updated HDPE stress analysis to be submitted in August 2015.
- Discuss schedule for SNC submittals and for NRC approval

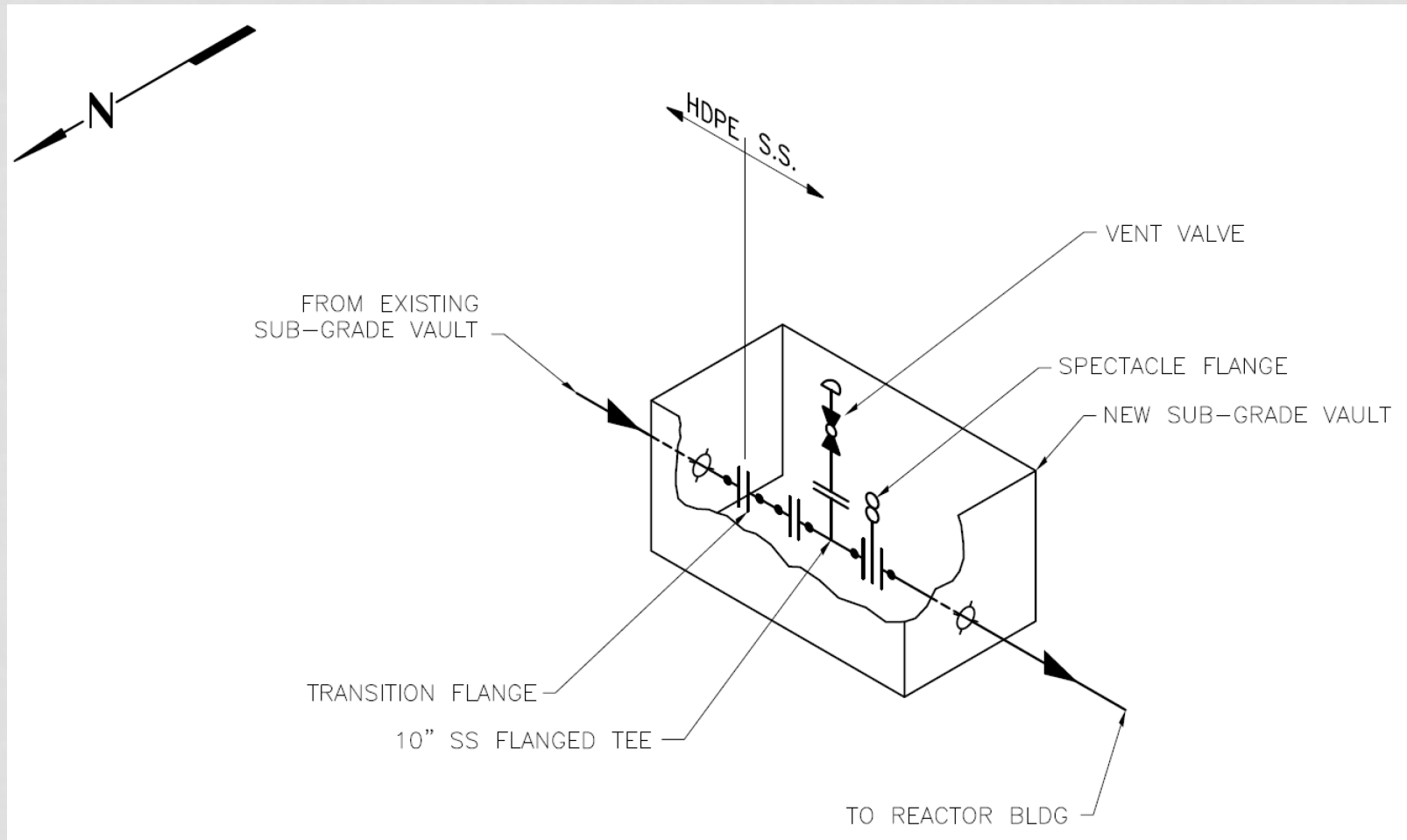
# OVERVIEW OF HDPE PIPE ROUTING



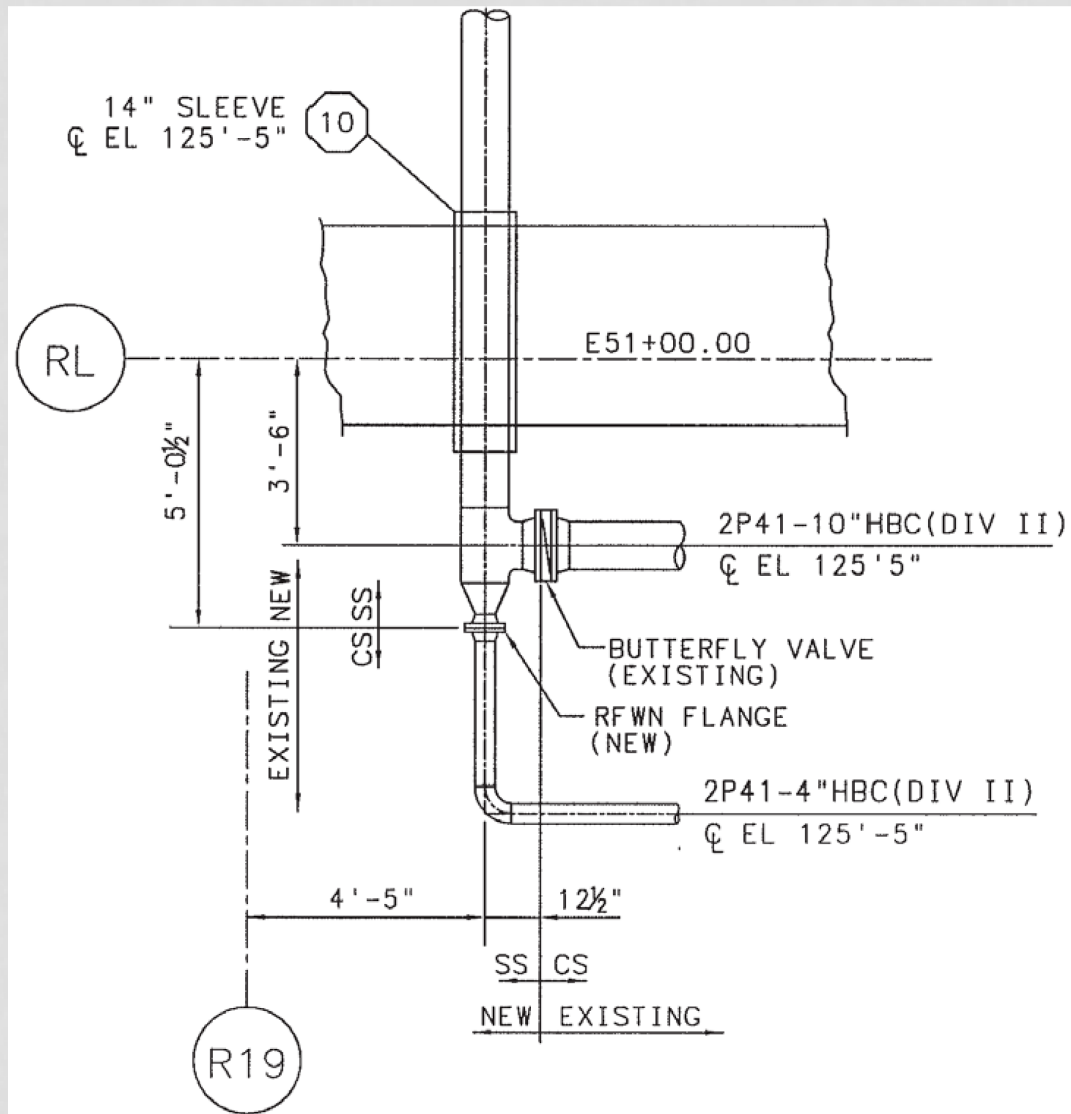
# UPDATED SUB-GRADE VAULT CONFIGURATION



# UPDATED NEW SUB-GRADE VAULT CONFIGURATION



# CONNECTIONS WITHIN THE REACTOR BUILDING



# MECHANICAL AND CIVIL BRANCH RAI RESPONSES

- **RAI-1:** addresses minimum required wall thickness for fitting and components.
- **RAI-2:** addresses normal and maximum operating pressures and temperatures for Plant Service Water supply and return piping.
- **RAI-3(a):** addresses the HDPE stresses with respect to the hydrostatic pressure test
- **RAI-3(b):** addresses the periodic pressure test maximum operating pressure

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-4(a):** addresses excerpts from the stress analysis computer program (i) input, and (ii) output corresponding to the maximum reported stress locations. The updated HPDE stress analysis summary will include this information
- **RAI-4(b):** addresses the model termination boundary of the stress analysis. The updated HPDE stress analysis will be extended to the transition flange and the above ground piping model will include a portion of the buried piping to provide overlapping analysis. The piping will then be evaluated using bounding loads from the overlapping models.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-4(c):** addresses forces and moments at the transition flange from the stress analysis. The stresses and loadings at the transition flange will be in the detailed design. A summary of the flanged joint bolt torque calculation that determines the acceptability of the joint to maintain a leak tight joint will be submitted.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-5(a):** addresses loads on the metallic piping supports included in the buried HDPE piping subsystem. Updated loads on the supports of the metallic piping in the vicinity of the HDPE piping will be included in the above ground stress analysis.
- **RAI-5(b):** addresses acceptance limits for valve accelerations. The acceptability of valve acceleration changes due to this change will be included in the above ground stress analysis.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-5(c):** addresses the impact of this change to the above ground piping stress analysis including the qualification of valves and pipe supports in the vicinity of the transition flange. Justification of the changes to the valves and piping supports in the vicinity of the transition flange will be included in the above ground stress analysis.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-6(a):** addresses anchor movement based on 1/4" assumed building settlement. The updated HDPE stress analysis will include the technical justification for the building settlement.
- **RAI-6(b):** addresses allowable stress limits for non-repeated anchor motions. This was an inadvertent entry. This has been corrected in the revised summary report.
- **RAI-7:** addresses load cases and load combinations for service levels A, B, and D. The updated load cases and load combinations for these service levels will be included in the updated HDPE stress analysis.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-8:** addresses seismic input values used for seismically induced stresses such as soil strains caused by seismic wave passage, seismic soil movement, and seismic anchor motion. These values will be included in the updated HDPE stress analysis.
- **RAI-9:** addresses stresses from thermal expansion, thermal contraction and combined stress. These values will be included in the updated HDPE stress analysis.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-10:** addresses stresses and methodology from alternative thermal expansion and contraction. These values and a description of methodology will be included in the updated HDPE stress analysis.
- **RAI-11:** addresses the use of gaskets and achieving a leak tight joint. The updated gasket details as well as the ability to achieve a leak tight joint will be addressed by a transition flange bolt torque calculation summary that will be submitted with the updated HDPE stress analysis.

# MECHANICAL AND CIVIL BRANCH RAI RESPONSES (CONTINUED)

- **RAI-12:** addresses moderate energy crack postulation.
- **RAI-13:** addresses fire hazards of the non-buried sections of the HDPE piping.

# UPDATED ROUTING DESIGN CHANGE PACKAGE ITEMS TO BE SUBMITTED

- Updated Description of Scope
- Updated P&ID, Isometric and Select Piping Drawings to Support the Updated HDPE Stress Analysis
- Updated HDPE Minimum Wall Calculation
- Updated HDPE Hydraulic Performance Calculation Summary
- Updated Transition Flange Bolt Torque Calculation Summary (RAI-4(c), (RAI-4(a), RAI-11)
- Updated HDPE Stress Analysis Summary

# UPDATED HDPE STRESS ANALYSIS SUMMARY

- Purpose of Summary Report
- Results and Conclusions
  - Allowable Service Level Spikes due to Transient Pressures
  - Pressure Design of Joints and Fittings
  - Pressure Design of Miter Elbows
  - Ring Deflection due to Soil and Surcharge Loads
  - Compression of Sidewalls due to Soil and Surcharge Loads
  - Buckling Due to External Pressure
  - Effects of Negative Internal pressure
  - Flotation
  - Longitudinal Stresses (RAI-4(a), RAI-7, RAI-8)

# UPDATED HDPE STRESS ANALYSIS SUMMARY (CONTINUED)

- Seismic-Induced Stresses (RAI-4(a) , RAI-8)
- Short Duration Longitudinal Applied Mechanical Loads
- Design for Combined Thermal Expansion and Contraction (RAI-9)
- Alternative Thermal Expansion and Contraction Evaluation (RAI-4(a), RAI-10)
- Non-Repeating Anchor Movements (RAI-4(a), RAI-6(b))
- Forces and Moments at Transition Flanges (RAI-4(b), RAI-4(c))
- Design Inputs
- Acceptance Criteria
- Methodology

# UPDATED HDPE STRESS ANALYSIS SUMMARY (CONTINUED)

- Assumptions (with associated justifications)
- References
- Attachment- Development of Spring and Breakaway Forces
- Attachment- Summary of Above Ground Stainless Steel Piping Analysis Impacting HDPE Piping (RAI-4(b), RAI-5(a) , RAI-5(b) , RAI-5(c))

# SNC HDPE SCHEDULE

# CURRENT HDPE PROPOSED SCHEDULE

Milestone	Date
SNC Submittal of Version 2	09/19/2014(Actual)
SNC Submitted Summary of Conceptual Design	11/26/2014 (Actual)
NRC Submits Initial Round of RAls to the Alternative	02/05/2015(Actual)
SNC Executive Management Go/No-Go Decision Regarding Using HDPE Versus Stainless Steel	03/31/2015 (Actual)
SNC Begin Internal Procurement Process for HDPE Piping Material	06/01/2015 (Ongoing)
SNC Submits Summary of Updated Stress Analysis & Supporting Items	08/31/2015
Expected NRC Approval	11/16/2015
Begin Fabrication of HDPE Piping Fittings (elbow & flange adaptors)	12/01/2015
Begin to Install Piping	04/01/2016