



# Varo Engineers, Inc.

## Nuclear Plant Engineering Services

### Our Experience

Experienced in a variety of Nuclear plant configurations, including Generation III+, our seasoned Civil, Structural, Mechanical, Piping, Pipe Support, and Electrical Engineers and Designers provide nuclear energy clients with the solutions and support they need. We possess a broad-ranging background that provides a solid understanding of operating plant issues. We have logged thousands of man-hours providing services to NSSS vendors as well as generating stations across North America. Our Quality Program is based on NQA-1, contains additional ISO elements, and is implemented with the level of rigor commensurate with the project at hand.

#### The Professionals at Varo Engineers Specialize in:

- Design Coordination
- Design Finalization/Reconciliation
- Systems Evaluation
- 3rd Party Review of Design Documents

### Civil/Structural Group

Structural Engineering and Design on Nuclear Island, Auxiliary/Ancillary Buildings, and remainder of site including:

- Reinforced Concrete & Steel Design
- Composite Concrete Structures
- Wall/Floor Design
- Steel Containment Vessel Design
- Base Mat Connections
- Wall/Floor Penetrations - Through Penetrations, Embedded Pipe, Six-Way & Four-Way Penetration Restraints
- Annulus Seal Support Structures Design - Including Equipment Hatch & Personnel Airlock Enclosures
- Equipment Supports
- Wall Attachment Designs - Embedded Plates, Overlay Plates, & Direct Welding to Liner Plates
- Watertight Doors
- Platforms/Crane Supports
- Module Design & Evaluation
- 3rd Party Peer Reviews
- Design Finalization
- Construction Support Including - Review of Shop Drawings, Resolution of Field Engineering Problems, & Civil Design Support

### Piping Supports Group

Pipe Supports Engineering and Design on Nuclear Island and Auxiliary/Ancillary Buildings, and Remainder of Site Including:

- Seismic & Non-Seismic Support Analysis
- Support Stiffness/Deflection Evaluation
- Overlay & Embedment Plate Evaluation
- Piping Support Conceptual Drawings
- 3rd Party Peer Reviews
- Design Finalization
- Construction Support Including - Review of Shop Drawings, Resolution of Field Engineering Problems



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### Piping Group

Piping design and Pipe Stress Analysis for Nuclear Code & B31.1 Piping on the Nuclear Island, Auxiliary/ Ancillary Buildings, and remainder of site including:

- Seismic Analysis - Dynamic Analysis of Safe-Shutdown Earthquakes, Functional Seismic Piping, Non-Seismic Piping
- Seismic/Thermal Anchor Motions
- Relief/Safety Valve Analysis of Static & Transient Reactions
- High Energy Line Break Analysis
- Piping Penetration Loadings - Wall, Floor, & Steel Containment Vessel
- Equipment Nozzle Loadings & Interactions
- Piping Support Loads
- Code Valve/Flange Analysis
- 3rd Party Peer Reviews
- Design Finalization
- Construction Support Including - Review of Shop Drawings, Resolution of Field Engineering Problems

### Mechanical Group

Mechanical Engineering and Design for the whole site, including:

- HVAC Design & Evaluation
- Vessel/Tank Design & Evaluation
- Nozzle Evaluations- WRC107/297 & Finite Element
- FEA Analysis of Custom Tank/Vessel Geometry, Equipment Attachments, Valve Attachments, and Other Custom Configurations
- Equipment Selection & Sizing:
  - Pumps, Heat Exchangers, Tanks, Vessels
- Piping & Valve Sizing and Selection
- Network Flow Analysis - Steam, Cooling Water, Condensate, & Compressed Gases
- Surge/Water Hammer Analysis
- System Design and Evaluation

### Electrical Group

Electrical Engineering and Design for the whole site, including:

- Instrumentation and Controls
- Load & Breaker Coordination
- Generator Controls Consultation
- Substation Design
- Power Distribution
- Equipment Qualification
- MCC Calculations
- Arc Flash/Fault Studies
- Noise and Harmonic Mitigation
- Outage Planning



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