ENGINEERING ASSOCIATE SERVICES

www.engineeringassociateservices.com

58Briarwood Drive
Wakefield, RI 02879
Cell (401) 935-6557
Fax (801) 729-0611
mikeb.plunkett@gmail.com

Michael B. Plunkett P.E.

Education: BSME, 1969 University of New Haven
MSME, 1972 University of Rhode Island
P.E. Licenses: Rhode Island, Massachusetts, Connecticut, New Mexico, New Hampshire, New York, Michigan, Maryland, North Carolina and Florida
National Council of Examiners Certification, PE Certificated in all US states

Summary of Experience: NRC "L" Clearance, Nov 2009

Thirty five years' experience performing design and analysis, inspections and auditing of piping, pipe supports, pressure vessels and other structural and mechanical components. Extensive experience performing design reviews, safety and hazards & engineering risk analyses, USQ evaluations to the requirement of 10CFR 50 including Appendix B, emergency planning and preparedness to the requirements of DOE G 151.1 in the areas of hazards surveys and Risk Assessments, fire protection systems, field inspections for the Nuclear Regulatory Commission (NRC), Department Of Energy (DOE) and Environmental Protection Agency (EPA), rate case reviews and expert witness testimony. In particular, specific hands-on working experience in design analysis, maintenance and field engineering for performance enhancement of piping systems including high energy steam, vacuum air systems for sludge removal, HVAC, air and vacuum handling systems, buried piping and seismic qualification in accordance with ASME, ANSI, AWS, API and NRC requirements. I have extensive piping & structural experience on over 40 waste treatment facilities, 40 fossil plants and over 30 nuclear plants.

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- Experience in quality assurance and related disciplines. Performed numerous technical audits to assure compliance with ANSI N45.2.11, ASME Section III NQA-1, ASME VIII, API-510, DOE G 151.1, 10CFR50 and NRC and public utility license requirements.

- Experience in design, analysis and field engineering of piping systems and pressure vessels including high energy steam, fire protection, vacuum air systems for sludge removal, buried piping and seismic qualification in accordance with ASME, ANSI, AWS, API, NFPA 13 and NRC requirements. Extensive system experience on waste treatment plants including air and vacuum handling systems.

- Manager of Design Engineering, (2005-2010) Nuclear Enrichment Facility, Responsible design and field engineering activates at the facility. Had 70 structural, civil, electrical, I&C, and mechanical engineers, 30 field engineers and 10 project managers reporting to me. Responsible for a $28M budget. Interfaced responsibility for engineering, design, construction, and transition to operations.

- Certified ANSI/ASME N45.2.6 Level III Inspector for procurement surveillance for mechanical equipment including welded components. Have Passport experience.

- 25 years' experience in design, analysis and field engineering including mechanical equipment, structural, air/vacuum systems, fire protection, and Environmental and Seismic Qualification of Equipment (EQE) in accordance with ASME, ANSI, AWS, and NRC requirements. Experience using ADLPIPE, AUTOPIPE, ME101, ANSYS, SAP, RAM, STADD, STRUD, and numerous FEA Codes. Providing electric utilities with expert witness testimony for prudence and rate case hearings. Duties included providing a clear and concise report written in everyday language to support utility's rate case efforts.

- Performed review and oversight for the DOE Office of River Protection for the Waste Treatment Plant at Hanford, Washington. Responsibilities included review of the Contractor's Preliminary Safety Analysis Report (PSAR) & Risk Assignment Analysis, including evaluation to the requirements of 10CFR50. Also review of design documentation such as reports, design calculations, studies, design drawings, and construction authorization requests particularly in the area of HVAC design and mechanical components & fluid systems design. Prepared various portions of the project SER.

- Establish and maintained Quality Assurance Program for both Engineering and Manufacturing facilities to the requirements of ASME NQA-1

EXPERIENCE:

2015 to 2016 **Empyrean Technical Services**

SUMMARY OF WORK PERFORMED AT PRAIRIE ISLAND NUCLEAR PLANT

- **Responsibility for the heavy lift structural design reviews for the generator replacement project including all plant structural modification performed.**

2012 to 2015 **Empyrean Technical Services**

SUMMARY OF WORK PERFORMED AT BRUNSWICK NUCLEAR PLANT

- **Responsibility for Fukushima technical requirements. Reviewed field activates and designs to insure that NRC flood and seismic requirements were met. Senior Structural Engineer performing detailed structural analysis on structural components**

- **Performed structural(GTSTRUDL),piping analysis(AUTOPIPE) and pipe support(MathCad) calculations for modification designs and reduce calculation backlog.**

- **Currently trained on all the new Duke systems, CAS & Fussion.**

2011 to 2012 **Empyrean Technical Services**

SUMMARY OF WORK PERFORMED AT CRYSTAL RIVER NUCLEAR PLANT

Senior Structural/Mechanical Engineer – Performed detailed calculations to reduce calculation backlog to comply to the NRC commitment. Both piping and structural analysis was performed. Detailed plant walk-downs were performed to confirm design details.

2010 to 2011 **Hukara Technical Services**

SUMMARY OF WORK PERFORMED AT LOS ALAMO NATIONAL LAB

Project Manager – Managed several project to upgrade in infrastructure to comply with the DOE energy requirements. Work performed: Upgraded HVAC, structural, power requirements, replaced major power equipment. Performed upgrades on all seismic structures to current DOE requirements.

2005 to 2010 **Engineering Associate Services**

SUMMARY OF WORK PERFORMED FOR THE NATIONAL ENRICHMENT FACILITY

Manager of Design Engineering – Responsible design and field engineering activates at the facility. Had 70 structural, civil, electrical, I&C, and mechanical engineers, 30 field engineers and 10 project managers reporting to me. Responsible for a $28M engineering budget. Interfaced responsibility for engineering, design, construction, and transition to operations.

Detailed review of the following systems:

- UF_6 Feed System
- Cascade System
- Product Take-off System
- Tails Take-off System
- Product Blending System
- Product Liquid Sampling System
- Contingency Dump System
- Gaseous Effluent Vent System
- Centrifuge Test and Post Mortem Process
- Material Handling Process

EXPERIENCE:

2000 to 2005 Engineering Associate Services

SUMMARY OF WORK PERFORMED FOR THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PROJECT AT HANFORD

Participated in gathering the Safety and Hazard Data to support the EIS program. Scope of work required preparation of draft and final Safety Analysis Data Package. This package involved identification all accident and activities associated with the alternative technologies identified during internal scooping. Accident analysis included the evaluation of both probability and consequences of radiological and chemical accidents. Supplementary technology included: Pretreatment; Bulk Vitrification; Steam Reform; Sulfate Removal; Grout Containerization and TRU.

SUMMARY OF WORK PERFORMED FOR DOE AT HANFORD

Performed Reviews and Evaluations on the Safety Analysis Reports (PSAR) to the requirements of 10CFR50 for the Department of Energy (DOE), Office Of Safety Regulations (OSR) Vitrification Facility. Review included detailed assessment of Emergency Planning, Risk Assessment and Preparedness Program including application, response, organization, hazard evaluations, program elements and training.

Scope of work included performing reviews on the following buildings:

- Low-Activity Waste (LAW)
- High-Level Waste (HLW)
- Balance Of Facility (BOF)

Author of the Mechanical & Structural Sections of the Safety Evaluation Report (SER).

Detailed scope of Mechanical & Structural activities included:

- Ventilation Systems (HVAC).
- All Water, Steam and air Systems.
- Seismic Analysis on Mechanical Equipment & Structures.
- Piping, Tanks and Vessels.
- Melter Shell & Handling Cranes & Bogies.
- Offgas from Melter.

- Basemat
- Piping & Pipe Supports.
- Canister Drops & Glass Spills.
- Liquid Spills.
- Thermal evaluation of equipment Important To Safety.
- Fire Protection system
- Vessel Vent System
- Primary cooling water and chilled water system
- Natural Phenomena Hazards
- Spray Leaks
- Fire protection systems

Performed Technical Risk Assessments

- Hazards involving natural events, such as earthquakes, tornado, flooding, wind, snow/ash-fall, wind missile, lighting and fire.
- Risk analysis performed along with developing controls to mitigate events.
- Identification anticipated operational occurrences and accident.
- Ensure that equipment was designed to withstand the effects of natural phenomena Hazards (NPH) events such as earthquakes, wind, and floods without loss of ability to perform their specified safety function.
- Designs equipment to assure that the effects of natural phenomena (including lightning), and of normal operating, maintenance, testing, and postulated accident conditions on redundant channels do not result in loss of the protection function.
- Established Risk Guidelines for design and operational personnel.
- Establish controls to provide preventive and mitigative safety features for the facility relative to accidents and terrorist actions.
- Risk analysis performed in accordance with 10CFR68, " EPA Risk Management Program"

Detailed scope of work included, reviewing and accepting mechanical and structural Safety and Hazard calculations against the requirements of the Waste Treatment Plant Safety Requirements Document Volume II (SRD) and DOE Standard 1029-94. Also wrote dispositions on numerous mechanical and structural technical issues related to facility Safety and Hazards.

1978 to 2002 Engineering Associate Services

President / CEO:

Responsibility: For the design, analysis, inspection and auditing of piping, pipe supports, cable tray, pressure vessels, tanks and other mechanical components on nuclear, fossil and chemical plants. Also, extensive experience in ASME Codes Section III ,VIII and IX, ANSI B31.1, B31.3, AWS D1.1 and field engineering assignments. Performing detailed ASME piping and structural calculation. Experience using ADLPIPE, AUTOPIPE, STRULD and numerous FEA Codes.

- Project Manager for the San Onofre NRC Generic Letter 89-10 MOV Weak Link analysis project.
- Responsible for implementation the Quality Assurance (QA) Program to the requirement of 10CFR50 Appendix B and NQA-1.
- Performed equipment reviews, vendor audits, calculation and specification reviews to insure compliance to FSAR. Included extensive on-site documentation review of mechanical equipment installation purchase and design.

- Performed detailed piping analysis in accordance with ASME III, ANSI B31.1, B31.3 and other applicable codes.

- Performed detailed pipe support designs and analysis in accordance with ASME, NF, AISC and other local building codes.

- Performed detailed piping transient (water hammer, thermal. turbine trip, etc) analysis in accordance with detailed specifications.

- Performed independent structural and pressure vessel evaluations and reviews.

- Evaluation of seismic qualification of equipment.

- Performed structural analysis of motor operated valves (MOV) in accordance with GL-89-10.

- Field inspection of mechanical and structural components.

- Retained as NRC consultant for detailed inspections (see attached list).

1972 to1978 ITT Grinnell Corporation

Vice President Of Engineering

Major Responsibility: Responsible for formulation, recommendation and direction of product development programs to meet company needs. Responsibility for development of new products in accordance with the market's needs including: Sales, Engineering, Production and Field Engineering. Responsibility for engineering functions of U.S.A. and Europe subsidiary which included performing engineering risk evaluations during the due diligence stages of an ITT acquisition. During my tenure at ITT I was involved in three acquisitions.

General Responsibility:

- Total technical responsibility for existing product line in both U.S.A. and Europe.

- Supported the sales and marketing effort by developing technical criteria which both aided and trained the sales force in their endeavor to sell.

- Responsibility for developing both new and existing technical criteria for nuclear products including upgrading existing QA program to NQA-1 standards.

- Planned and directed approved development programs for improvement and cost reduction of existing products and for new products in accordance with approved product plans.

- Responsible for establishment of uniform specifications for materials, equipment and product, and for authorizing substitute materials and parts.

- Defined, developed, organized, supervised and coordinated the plans, problems and projects of the Product Development Department to ensure on- time completion within budgets.

- Responsible for interface with ITT Grinnell Legal for patent activity to protect new products.

- Responsible for definition of standard product requirements and specific technical specifications for each shock suppressor product application.

- Provided to Unit Management guidance on pricing, terms and conditions of sales.

- Ensured development of standard product designs to meet market requirements and ensured that each product for each application was properly designed to meet customer performance specifications.

1969 to 1971 Stone & Webster Engineering Corporation
Boston, Massachusetts
Nuclear Consultant on various Power Plant Projects.

1965 to 1969 General Dynamic Electric Boat

Jr. Mechanical Engineer Reactor fluid section, S5G Project