

BRUNSDON - -

EXHIBIT 1

BRUCE E. BRUNSDON

EDUCATION

Massachusetts Institute of Technology - BSME 1980
UCLA Extension Short Course in Pressure Vessel Engineering - November 1982
Stone & Webster Project Simulation Workshop - 1981
DOE Natural Phenomena Hazard Mitigation Workshop - November 1998

LICENSES AND REGISTRATION

Registered Professional Engineer - Colorado
Registered Professional Engineer - South Carolina

CLEARANCES

DOE "Q" Clearance - Active at Rocky Flats Environmental Technology Site

EXPERIENCE SUMMARY

Mr. Brunsdon has extensive experience in the dynamic response analysis of mechanical systems, structures, piping systems, and vessels in the commercial nuclear power industry and DOE weapons programs. He is experienced in calculating system response using linear elastic and non-linear finite element analysis methods under static, response spectra modal dynamic, time history modal dynamic, and direct integration transient loading. He is also familiar with techniques for evaluating barrier penetration and impact effects using energy balance and ductility ratio considerations. He has over twelve years of experience in the design and analytical evaluation of nuclear material processing systems and directing project activities for DOE facilities at Rocky Flats, Lawrence Livermore National Laboratory, Idaho National Engineering Laboratory, and the Savannah River Site.

Mr. Brunsdon is experienced in the application of DOE Orders and Standards to seismic qualification and nuclear safety analysis, including DOE Orders 6430.1A and 5481.1B, DOE-STD-1020-94, and DOE-STD-1021-93. He is familiar with a wide variety of computer codes used for static and dynamic structural analysis.

STONE & WEBSTER ENGINEERING CORPORATION, DENVER, COLORADO - 1980 TO PRESENT

Actinide Packaging and Storage Facility (Jan 1998 to Present) Department of Energy Savannah River Site

As Lead Dynamic Analyst, Mr. Brunsdon was responsible for all seismic design and response analysis activities associated with the Actinide Packaging and Storage Facility, a 10,000 square foot plutonium processing and storage complex to be installed at the DOE Savannah River Site. Design responsibilities included the development of detailed drawings and specifications for safety class storage systems for nuclear material; gloveboxes, handling systems, and tooling for use in disassembling nuclear material shipping packages; and first-of-a kind, massive security barriers and deployment systems using air bearing and linear motor technology. Analysis responsibilities included seismic qualification of all safety class structures, systems, and components, generation of the acceleration response spectra used in seismic qualifications,

oversight of the detailed soil-structure interaction analyses performed on major structures, and evaluation of security barriers under bulk explosive, missile, and penetration weapon attack. Principal structures analyzed included an underground Material Access Area building, Auxiliary Building, Diesel Storage Tank Vault, and a secure Truck Bay. Safety class utility systems and their associated supports, including building and glovebox ventilation systems, emergency power distribution systems, and buried diesel fuel oil supply piping, were designed and qualified in accordance with applicable nuclear codes and standards.

Salt Residue Stabilization and Repack (May 1995 to Dec 1997)

Department of Energy Rocky Flats Environmental Technology Site

As Project Engineer, Mr. Brunsdon was responsible for the technical direction of all project conceptual design, title design, and field engineering activities through startup for a \$6.0 million retrofit of a plutonium processing line to stabilize actinide residues at the DOE Rocky Flats Environmental Technology Site. The project involved reconfiguration of existing glovebox and process facilities for nuclear material receipt and unpackaging, stabilization, non-destructive assay, and repackaging activities. Significant technical issues addressed as part of the project included demolition and modification of existing contaminated gloveboxes; design and tie-in of new gloveboxes and safety class utilities to the existing glovebox line; design of pyrochemical furnaces, stirring mechanisms, and utility and control systems and associated glovebox pass-throughs; integration of through-wall non-destructive assay spectroscopy equipment into the glovebox design; and design and installation of contamination control cells and safety class storage facilities for out-of-line handling of special nuclear material. Extensive criticality, shielding, and seismic and related dynamic response evaluations were prepared to support the design and develop the nuclear safety basis for operating the facility. The facility is currently stabilizing actinide residues in support of the cleanup and decommissioning of Rocky Flats.

Cooper Nuclear Station (Oct 1993 to Apr 1995)

Nebraska Public Power District

As Systems Engineer, responsible for the review of site engineering activities impacting the service water system to ensure compliance with regulatory and site requirements, commitments made in response to Generic Letter 89-13, and safety analysis assumptions and single failure criteria. The review was conducted in preparation for a comprehensive audit of the service water system conducted by the Nuclear Regulatory Commission. The scope of the review included maintenance histories of major service heat exchangers and pumps, Microbiologically Induced Corrosion detection and mitigation activities, and preventative maintenance activities to evaluate the potential for biofouling, flooding, or other system hazards. Operating and surveillance activities used to verify operability in accordance with plant safety analyses, ASME XI test activities used to monitor and trend equipment performance capabilities, and corrective actions resulting from nonconformances or deficiencies were also reviewed. The review resulted in recommendations to upgrade maintenance procedures and preventative maintenance practices, develop calculations to demonstrate compliance with regulatory requirements, and establish programmatic controls for regulatory commitments.

Additional responsibilities included development of a system to trend safety related heat exchanger performance, preparing responses to Nuclear Regulatory Commission bulletins, dispositioning nonconformance reports, reviewing maintenance practices and component classifications, and evaluating the applicability of generic industry issues to plant systems.

Healy Clean Coal Project (Apr 1993 to Sept 1993)
Alaska Industrial Development Authority

As Engineer, responsible for preparation of stress analyses for main steam and extraction steam piping for a DOE clean coal power project. Also developed pipe support designs and loading requirements for a variety of high energy piping systems for the plant.

NO_x Abatement Facility (May 1992 to Mar 1993)
Department of Energy Idaho National Engineering Laboratories

As Lead Seismic Engineer, responsible for the implementation of all seismic analysis activities associated with the project in accordance with DOE and site regulations, as well as national codes and standards. Principal analyses included facility structural analysis incorporating the effects of soil-structure interaction, buried piping analysis, dynamic analysis of large above-ground ammonia storage vessels, dynamic analysis of nuclear piping and equipment, and qualification of components required to operate during and after seismic events. Related activities included development of a seismic analysis plan to document analysis scope and calculation techniques and coordination with site safety analysis staff to ensure consistent implementation of DOE regulations.

Resumption of Plutonium Operations - Bldg 559 (Aug 1991 to Apr 1992)
Department of Energy Rocky Flats Plant

As System Engineer, responsible for development and processing of Maintenance Work Requests to support resumption of operations in a DOE Plutonium Analytical Laboratory. MWR development included review and approval of planned work instructions, specification of system isolation and post-maintenance test requirements and resolution of non-conformances resulting from the modifications. Primary responsibility was the glovebox fire detection system.

Resumption of Plutonium Operations - Bldg 771 (May 1991 to July 1991)
Department of Energy Rocky Flats Plant

As Lead Mechanical Engineer, responsible for review/revision of the scope of work and estimation of resources required to define system operability in support of resumption of operations at a DOE Plutonium Recovery facility. Also responsible for directing the development of walkdown packages and processing of field verified data in order to create mechanical P&ID's for safety systems at the facility. Walkdown package development included procedure development and plant document research activities. Data was also gathered during walkdowns to support systems analyses to be performed after P&ID's were prepared in accordance with plant standards, national codes and industrial practice.

Resumption of Plutonium Operations - Bldg 559 (Feb 1991 to Apr 1991)
Department of Energy Rocky Flats Plant

As Engineer, responsible for preparation of engineering analysis of a vacuum sampling system in a DOE Plutonium Analytical Laboratory to resolve system operability issues. Analysis included both technical evaluation to establish overall system capacity and provide a basis for alarm setpoints, and operational testing to verify performance in accordance with established procedures. As a result of the analysis, design modification packages were prepared to reset critical setpoints and rewire control circuits to enhance the backup capability of the system.

Resumption of Plutonium Operations – Bldg 559 (July 1990 to Jan 1991)
Department of Energy Rocky Flats Plant

As Engineer, responsible for developing mechanical sections of a design basis reconstitution pilot program for vital safety systems at a Department of Energy weapons fabrication facility. The program was designed to recover system performance capabilities for use in justification of plant safety analysis and support of plant modification projects. Two phases were implemented, including a document search and compilation phase to generate the historical account of regulatory and site-specific requirements and system design which meets those requirements, and a design verification phase to ensure that the system as installed met the performance requirements. The pilot program was implemented on a confinement HVAC system for a laboratory used to analyze plutonium samples.

Tritium Research Facility Safety Analysis Report (Feb 1990 to July 1990)
Department of Energy Lawrence Livermore National Laboratories

As Lead Mechanical Engineer, responsible for researching and writing mechanical sections and integrating other disciplines' sections in a safety analysis report for a Department of Energy tritium research facility. The effort included researching design capabilities and responses of mechanical systems under various accident scenarios, and evaluating and identifying deficiencies in documents used to support the accident analyses.

Plutonium Research Facility Triton Separation Project (Oct 1989 to Feb 1990)
Department of Energy Lawrence Livermore National Laboratories

As Engineer, responsible for design and analysis of gas cooling system piping for Triton Isotope Separation process. Stress calculations were performed in accordance with ANSI B31.1 Piping Codes, under normal operating and design basis accident loading. Static and modal dynamic finite element analysis techniques were used in the calculations.

Fort St. Vrain Nuclear Power Station (Aug 1989 to Sept 1989)
Public Service Company of Colorado

As Engineer, responsible for database reconstitution and trending analysis of data from a system used to monitor control rod drive performance to ensure compliance with plant Technical Specifications. Also used data and other analyses to identify and document the failure mechanism for a control rod drive which failed to insert during surveillance testing.

Plutonium Research Facility Engineering Demonstration Project (Oct 1987 to July 1989)
Department of Energy Lawrence Livermore National Laboratories

As Engineer, responsible for design and analysis of process equipment and utility systems associated with the Engineering Demonstration System prototype version of the Laser Isotope Separation process. The process is being developed as a means of enriching plutonium using high energy laser light. The process environment must meet stringent vacuum and radioactive containment requirements, throughout normal operation and postulated accident scenarios. Systems analyzed include gas scattering cells, a rail-based transport and lift system, and vacuum roughing and utility piping.

Salton Sea #3 Geothermal Power Station (June 1987 to Sept 1987)
Union Oil of California

As Engineer, responsible for the design and analysis of brine and steam piping and supports in accordance with ANSI B31.1 codes.

Fort St. Vrain Nuclear Power Station (Jan 1985 to May 1987)
Public Service Company of Colorado

As Engineer, responsible for design review and coordination of qualification testing of dry-film lubricated bearings for the control rod drive mechanisms in a HTGR. Tasks included analytical investigations as well as design and implementation of test rigs, development of test specifications and evaluation of bearing failure mechanism at vendor test facilities. Other responsibilities included design and implementation of a system to monitor the performance of the control rod drive mechanisms on-line. This system utilizes the capacitance-generated back-EMF voltage signal in CRD shim motors to detect machine faults in gear trains and bearings via fourier analysis techniques. The system is implemented on HP 200 series computer systems, using codes developed in Basic and Pascal.

River Bend Nuclear Power Station-Unit No. 1 (May 1984 to Dec 1984)
Louisiana Power and Light

As Engineer, responsible for qualification of pipe whip restraints on high energy piping inside containment. Tasks included development of thrust loads based on limit analyses, resolution of applied loads through nonlinear energy absorbing components, and time-history dynamic analyses of support structure response using STARDYNE computer program.

Nine Mile Point Nuclear Power Station-Unit No. 2 (Mar 1984 to May 1984)
Niagara Mohawk Power

As Engineer, responsible for seismic qualification of polar crane in containment and auxiliary cranes in diesel-generator building. Dynamic models were developed and modal analysis performed using STARDYNE computer program.

Enrico Fermi II Nuclear Generating Station (Oct 1983 to Feb 1984)
Detroit Edison

As Engineer, responsible for on-site inspection and evaluation of pipe supports. Also processed QC Category I design change requests and piping deflection interference problems.

WPPSS-Unit No. 2 (July 1983 to Sept 1983)
Washington Public Power Supply System

As Engineer, responsible for inspection and analysis of nuclear safety-related pipe supports as part of an independent third party review of as-built program for quality Class I piping and supports. Also, implemented computerized tracking system to identify trends in support deviations.

Rancho Seco Nuclear Generating Station (Mar 1983 to July 1983)
Sacramento Municipal Utility

As Engineer, responsible for the design and analysis of pressurizer relief line supports inside primary containment. Analysis involved nonlinear finite element techniques using ANSYS computer program.

Fort St. Vrain Nuclear Power Station (May 1981 to Feb 1983)
Public Service Company of Colorado

As Engineer, responsible for onsite computer stress analysis of as-built, nuclear safety-related piping and supports for the seismic review program on a high temperature gas-cooled reactor. Analysis was in accordance with ANSI B31.1 and AISC Codes and NRC requirements. Computer programs used include NUPIPE, STRUDL, and ANSYS.

Prairie Island Nuclear Generating Station (Mar 1981 to Apr 1981)
Northern States Power Company

As Engineer, responsible for seismic stress analysis of nuclear safety-related piping for modifications to the containment cooling system.

SMUDGEON No. 1 Geothermal Power Station District (Dec 1980 to Feb 1981)
Sacramento Municipal Utilities

As Engineer, responsible for dynamic finite element analysis of turbine building and turbine pedestal to support the licensing effort.

Fort St. Vrain Nuclear Power Station (May 1980 to Nov 1980)
Public Service Company of Colorado

As Engineer, responsible for breakdown of as-built, nuclear safety-related piping systems into packages for computer analysis, as part of the seismic review program.