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Summary of Qualifications

- 30 years of experience in the areas of engineering management; energy management; economic analysis; energy use analysis; finite difference and finite element fluid and thermal analysis; design of heating, ventilating, and air conditioning (HVAC) systems; and design of central chilled water systems
- Extensive thermal/fluid analysis and energy conservation experience in the areas of Energy Savings Performance Contracting (ESPC), energy conservation, CHP, design assistance, and spacecraft environmental control systems.
- Thermal analysis experience includes manual calculations, finite difference and finite element thermal math model simulations, and use of energy simulation tools. Energy simulation tools included DOE-2, MarketManager, Power DOE, TRNSYS, eQuest, and Energy10. When analysis requirements were not compatible with existing simulation tools, unique algorithms were developed in spreadsheet or other programming languages.
- Finite difference and finite element experience involved development of thermal and fluid mathematical models of Skylab, Spacelab, and Space Station environmental control systems.
- Design experience includes project development, system design, and system performance and commissioning.

Work History and Accomplishments

- 1991 to present Oak Ridge National Laboratory, Oak Ridge, TN**
- 2001 to present **Engineering Science and Technology Division, Commercial Buildings Group**
Senior R&D Staff Member
- Supporting FEMP Southeast Regional Super ESPC, Geothermal Technology Specific ESPC, and served as a member of the CHP core team.
- 1998 – 2001 **Engineering Division**
Manager, Energy Management Engineering Section
- Providing engineering support to FEMP Southeast Regional Super ESPC, Geothermal Technology Specific ESPC, and other programs managed by the Energy Division.
 - Providing project facilitation for the ESPC projects and performing energy analysis using existing software such as DOE-2.1E, DesiCalc, eQuest, Energy10, etc.
 - Generating software as needed to perform specialized analysis.
- 1993-1998 **Engineering Division**
Manager, In-house Energy Management Dept.
- Performing energy conservation studies/surveys, retrofit project design, and construction support.
- 1993-1998 **Engineering Division**
Technical Specialist, Environmental Control Dept.
- Designing HVAC systems, central chilled water systems, and energy conservation retrofit projects.
- 1988-1991 NASA Marshall Space Flight Center, Huntsville AL**
- Managing group responsible for fluid and thermal analysis of Environmental Control System for Space Station Program.
- 1982-1988 McDonnell Douglas**
- Managing of Fluid/Thermal Analysis Branch. Branch responsible for thermal and fluid analysis of Spacelab Environmental Control System.

- 1977- 1982** **Union Carbide, Oak Ridge, TN (DOE Y-12 Plant and Oak Ridge National Laboratory)**
- Designing of HVAC systems, central chilled water systems, and energy conservation retrofit projects as a HVAC design engineer.

- 1972-1977** **Teledyne Brown Engineering**
- Performing fluid and thermal analysis of Skylab Environmental Control System as a thermal analyst

Education and Training

M.S., Mechanical Engineering, 1971, Tennessee Tech
B.S., Mechanical Engineering, 1969, Tennessee Tech
Professional Engineer, State of Tennessee
Certified Energy Manager

Certification of Accuracy

This resumé has been certified for accuracy by Frank E. Pierce, Jr., on February 21, 2002, and by Jeffrey E. Christian, Center Director, ORNL Buildings Technology Center, on February 21, 2002.