

CURRICULUM VITAE  
**CHRISTOPHER K LANE, P.E.**  
3219-263rd CT SE, Sammamish, WA 98075

**Education and Certification:**

M. S. Nuclear Physics - Naval Postgraduate School, Monterey, CA, 1972.  
B. S. Physics - Oregon State University, Corvallis, OR, 1971.  
Graduate Studies in Systems Management, Univ. of So. Calif.  
Registered Professional Engineer - Mech., CA(22192)/AZ(27683)/WA(41575)  
Licensed Engineering Contractor (A-Haz); California (413866/503465).  
Graduate Naval Nuclear Power Program for Officers 1972  
GE Programmable Controls – Applications & Programming Course, 1998  
Completed Turbine Fuel Delivery Systems short course, ATUA, October 2002  
Factory Training -Turbec (Volvo-ABB) Microturbine Application, Installation & Service – 2003  
NFPA-85 Boiler-Burner Management Code Compliance Course, Inst. Society of Am. (ISA) – 2003  
OSHA Certified Training – Lockout/Tagout & Control of Hazardous Energy (29CFR 1910.147) – 2008  
OSHA Certified Training – OSHA 10-Hour Construction Safety (29CFR 1926) (Cert.001901774)-2008  
NSPE Engineering Ethics and the Law: The PE as an Expert Witness online course 2009  
US Transportation Worker Identification Credential effective to 01SEP2013  
Private Pilot – Single Engine Land 1985 (Licensed but inactive)

**Publications & Presentations:**

“Measure by Measure”; Parametric Fuel Metering for Liquid Fueled Combustion Turbines and Diesel Engines article; “On-Peak Performance”, a supplement to Consulting-Specifying Engineer Magazine, publisher Reed Business Information, November 2002 special issue for Electrical Generating Systems Association Annual Meeting.

Parametric Fuel Metering for Industrial Gas Turbines; presentation to general session at 2003 Rolls-Royce Turbine Users Group Conference, Houston, TX.

“Finite-Amplitude Standing Waves in a Rigid-Walled Cavity”, Thesis (M.S. Physics) -- Naval Postgraduate School (NPS), Monterey, California, 1972. NPS Library locator L2568; Reference code AD747522.

“Engine Firing Temperature Optimization for LM-500 Industrial Gas Turbines”; private research study report for Roche Pharmaceutical Company (New Jersey & Switzerland); October 1999.

USS Thomas A. Edison SSBN-610 Ship’s Information Book (SIB) and Training Aid Booklet (TAB) set, Rev. 2, 1974; Comprehensive revision of 14 volume set of information and training manuals covering all ship’s systems with focus on new upgrades including new reactor plant, new sonar/radar/visual sensor systems, new torpedo and missile launch and fire control systems, SubSafe flooding prevention & recovery upgrades, and other navigation, communications, engineering and ship’s control changes performed during major overhaul. Published by U.S. Navy as Classified document.

## **Patents & Inventions:**

“High performance coolant system with manifold for large diesel engines”, U.S. Patent # 5,337,705 (August 16, 1994). Patented device used on large marine and stationary ElectroMotive Diesel (EMD) engines in United States and Australia. Patent allowed to expire after sale of products to all known potential users.

“Keyed Split Ring Gear” for large diesel engines, patent disclosure filing submitted but no patent processed due to lack of commercial interest. Numerous units sold using company “secret” methodology.

“Parametric Fuel Metering for Liquid Fueled Industrial Gas Turbines and Diesel Engines”; patent disclosure filed 2002, formal patent application dropped due to lack of economic incentive, but several systems sold unprotected by patent rights.

Inventor for unique application using waste heat from combustion turbine effluent oil for heating influent raw field gas (methane) to add superheat to water saturated gas supply. (Sold in So. America, no patent filed)

Designer/Inventor of a custom, portable, semi-robotic computer room environmental data collection unit for 3-D data collection of ambient temperatures, humidity and under-floor forced air pressures for major data center computer rooms. Systems designed and build for Johnson Controls who applied them to major data centers for precision balancing of computer room environmental conditioning systems.

## **Current Position & Most Recent Activities:**

Project Manager, Engineering Liaison and Engineer of Record for the propulsion systems for the 144-Auto Ferries Project and similar technical support role for the 64-Car Ferries Project for Washington State Ferries. The 144-Car Project involves \$50 million multi-year contract for design, equipment supply and systems integration for the 6,000 HP diesel reduction propulsion systems for each of four vessels to be constructed in the Seattle area. This work involves management of both technical and commercial aspects of the propulsion system contract and extensive personal involvement in system design and design reviews. Additional part-time work for the Washington State Ferries 64-Car Ferry Project for main engine reconfiguration and engine systems integration.

## **Expert Witness and Related Expert Consulting Activities:**

The highly technical nature of these cases is such that they typically involve the preparation of reports, only sometimes involve depositions, and seldom involve in - court testimony. This is particularly true for the international cases which have, to date, all involved arbitrations and mediated settlements. As a result in the last 5-years I have testified by deposition and/or formal hearings as follows:

- 2/26/10 & 3/9/10 as witness for the plaintiff in *Fontes et al vs. Aetna Metals et al* Superior Court of California, County of Los Angeles, Case BC418084. Testimony by formal declaration and deposition. Case involving claims of asbestos exposure from pump, valve and other gaskets and seals at a metal plating facility.
- 9/3/09 as witness for the defendant in *Avista Turbine Power, Inc. vs. Rathdrum Power, LLC*. Arbitration Case No. 75-198-Y-00042-JMLE. (Deposition, followed by direct written testimony and appearance for cross examination) Case involved power plant performance, metering and economic proforma related issues.

- 8/6/09 as witness for the plaintiff in Richard Simpson vs. AWC 1997 Corp et al. Supreme Court of New York, County of Schenectady, Fourth Judicial District, Case 2008-511 (deposition). Case involving asbestos issues in ship construction.
- 7/1/09 as witness for the plaintiff in Curtis vs. Chesterton et al. California Superior Court Case ID RG09429497 (Deposition). Case involving engineering aspects of thermal insulation and use of asbestos.
- 1/15/09 as witness for plaintiff in Klickitat County Public Utility v. Waukesha Engine Dresser, Inc. et al. Arbitration in Milwaukee, WI. In a case involving issues with landfill gas fueled engine generator life cycle costs, air emissions, warranties and maintenance intervals. (Hearing testimony)
- 8/1/08 as witness for plaintiff Romero in Al Romero and Advanced Service Solutions, Inc. v. L.A. Power Joint Venture, Peter Kiewit & Sons, Inc., Kiewit Industrial Co., Bibb & Associates, Inc. and Cliff Heck; Superior Court of California, County of Los Angeles Case No. BC-309731. This case involves claims of wrongful termination & discrimination for an individual working in the area of distributed controls configuration and testing for a large steam power plant in southern California. (by Deposition)
- 8/1/07 as witness for the defendant in Basin Electric Power Cooperative vs. Lacy M. Henry, Judy B. Henry, MPS Generation et al and as witness for 3<sup>rd</sup> party plaintiffs in MPS Generation, Lacy B. Henry and Judy B. Henry vs. Ormat, Inc. and Clifford Waddell in United States Bankruptcy Court, Eastern District of North Carolina, Wilson Division. Adversary Proceeding No.L-05-00262-8-AP. This case involved technical and economic issues for a series of organic Rankine Cycle power generation plants in the north-central plains of the United States. (Deposition and hearing testimony)
- 8/1/05 as witness for the plaintiff in Homero Alvarado and Valania Alvarado vs. Bechtel Corporation, Bechtel Power Corporation, Alstom Energy USA, Inc., et al for the District Court of Harris County Texas, 152<sup>nd</sup> Judicial District Case Num. 2003-23229 (Deposition)
- 5/3/05 as witness for the defendant, the US Department of Justice, in the case of Mann vs. United States, Federal Court of Las Cruces, NM. CASE NO.: 98-312C (Fed.C1). This case involved engineering and economic issues for use of low to medium temperature geothermal fluids for greenhousing in southern New Mexico. Expert testimony in this case included extensive economic analysis and development of economic life-cycle proforma projections and a formal acceptance of Mr. Lane as a qualified expert in this area of work. (Deposition and hearing testimony)

Additionally in November 2002 in the case referred to as Resource Technology Corporation vs. Connecticut Resources Recovery Authority (Case 99-35434) United States District Court Northern District of Illinois – Eastern Division. This case involved issues concerning operation, maintenance and economic damages at a landfill gas power generation plant in Connecticut.

Expert consultant to law firm of Fisher, Kanaris (Chicago) for group of insurance companies for assessment of manufacturer's claims of increased warranty exposure associated with new heavy-duty diesel engines designed to latest EPA-10 emissions regulations for on-highway applications. (3/10-Present)

Expert consultant to major international pharmaceutical company for investigation of a major incident involving large natural gas fueled reciprocating engines operating at a cogeneration plant in Southern California. Failure involves extensive engine damage caused by water intrusion from a failed Heat Recovery Stream Generator. (2/10 to Present)

Consultant to a private development company for design and equipment selection for small, grid-connected cogeneration systems to be fueled by gasified wood waste. 10/09 to Present)

Consulting expert for technical and safety issues including requirements and adequacy of warning labels for two cases involving multiple deaths due to carbon monoxide poisoning from operation of a small 3500 to 5500 Watt portable engine driven generators in the eastern United States. (2008-Present)

Expert for the Plaintiff in a wrongful death case at a major utility coal-fired power plant located in the Southwestern United States. Issues involve OSHA requirements, lockout/tag Out requirements, safe operation of power plant equipment and related issues. (2009)

Expert for law firm of Dow, Golub, Berg & Beverly, LLP and their client, Shaw Group, Inc. in Occidental Petroleum Corporation vs. Shaw Global Energy Services, Inc. for a case involving an explosion and fire at a cogeneration power plant in Texas. (Cause No. 2007-01482, 215<sup>th</sup> Judicial District Court of Harris County, Texas). Work involves failure analysis, cost of repairs and operational matters. (2008 to present)

Completed a major case assignment and remain under retainer to provide expert witness services for major international engineering, design & construction firm for litigation and risk assessments related to plant operations and asbestos exposure issues at land-based power generation stations, refineries and similar heavy industrial projects. This client has requested general anonymity though I am able to disclose their identity to any party with a legitimate need for that information. (2007 to 2008)

Provided technical and engineering economic analysis in support of an \$80 million municipal bond default resulting from the failure of a large municipal waste-to-energy, municipal solid waste incineration and energy recovery project. Services provided to one of the world's largest investment banking and bond underwriting firms. Services included analysis of project technical and economic performance relative to original investor prospectus, determination of the causes of the shortfalls in performance and offering of opinions regarding organizations responsible for those errors. (2008)

Provided expert witness services on various personal injury/illness cases involving individuals suffering from mesothelioma and other asbestos related illnesses from exposure associated with work in, on or around US Navy and/or US Coast Guard vessels and/or in shipyards. This work included determination of probable exposure scenarios on submarines and other vessels both underway and in new construction, repair or overhaul. This work was performed for the Law Firm of Early, Ludwick, Sweeney & Strauss (New Haven, CT.) Named cases by plaintiff surname to date include Drucker, Paolino, Hanlon, DesPres, Kotecki and Smart. (2006 to present) Additional cases for law firm of Levy, Phillips & Konigsberg (New York, NY) for cases with plaintiff surnames of Simpson and Smith (2008 to Present). Consulted to a major international engineering contracting firm on a mesothelioma case involving both power plant and shipyard exposures to asbestos (2008).

Expert for Plaintiff in Al Romero and Advanced Service Solutions, Inc. v. L.A. Power Joint Venture, Peter Kiewit & Sons, Inc., Kiewit Industrial Co., Bibb & Associates, Inc. and Cliff Heck; Superior Court of California, County of Los Angeles Case No. BC-309731. Case involves technical issues associated with plant controls automation and boiler, burner and turbine generator safety, NFPA code compliance and other related issues for a large utility combined cycle power plant. (2004-2005 and 2008 continuing )

Expert to Klickitat Public Utility District (KPUD) against Dresser Industries, Waukesha Engine Division for landfill gas fueled power generation project in south, central Washington. Case involves range of technical and contractual issues for warranties, useful life, emissions conformance, maintenance life cycle, equipment availability & reliability for a 10.5MW landfill generation project. (2008 to 2009)

Completed case, Basin Electric Power Cooperative vs. Lacy M. Henry et al vs. Ormat, Inc. and Clifford Waddell; United States Bankruptcy Court, Eastern District of North Carolina, Adversary Proceeding No.L-05-00262-8-AP as expert for Lacy M. Henry et al. Expert witness for the Plaintiff providing primary and supplemental reports and with deposition taken on 8/1/07. Case noticed as settled on 9/25/07 soon after submittal of supplemental report confirming underlying basis for economic analysis and opinions on valuations for the Plaintiff.

Expert witness to Watson Law Group and the Los Angeles Department of Water & Power associated with a pending action against parties as yet identified associated with the catastrophic failure of a utility-sized steam turbine due to introduction of debris into the rotating machinery. Based on expert recommendations this case was dropped in November 2005.

Expert witness for the Plaintiff in Alvarado v. Becon Construction Company, Inc., Bechtel Corporation and Alstom Energy USA, Inc. in 152<sup>nd</sup> District Court of Harris County, TX in matter involving personal injuries in an industrial accident at a large power plant. Work involved forensic analysis of engineering and operational matters including OSHA Lockout/Tagout requirements. Deposition taken; case settled prior to trial.

Expert witness for defendant attorney Carrington, Coleman, Sloman & Blumenthal, LLP in Houston Casualty Company, Comision Federal de Electricidad and Seguros Comercial America, S.A. de C.V (plaintiff) vs. Siemens Power Corporation et al. in the District Court of Dallas County, Texas in matter involving turbine blade failures and other damage at a utility power plant in Mexico. Work to date has included preparation of an expert report and formulation of opinions on matters related to proper operation of a large combined cycle power plant. Depositions are understood to be set for November-December 2005 timeframe though notice has just been provided indicating preliminary settlement agreements have been reached as of 15 October 2005.

Expert witness for defendant Davis Electric in Florida Power & Light vs. Black & Veatch Corporation, a case involving damage to a large gas turbine due to uncontrolled spray of water into the intake of that engine. Prepared expert report and physical demonstration of water injection tubing assembly. Case settled before deposition or trial. 2005.

Expert witness for defendant, the U.S. Department of Justice, in Stanley K. Mann vs. United States of America in U.S. Court of Federal Claims No. 98-312C involving assessment of the economic potential of the direct use of geothermal energy for heating a proposed commercial greenhouse project in New Mexico. Work involves technical and economic feasibility analysis for a conceptual project. Report filed April 2005, deposed 4 May 2005; trial completed in November 2005.

Expert witness for defendant in Desert Power LP vs. Sermatech et al for various technical & engineering economics associated with a gas turbine based peaking power plant project in Utah. Case settled on eve of date for submittal of expert report and planned depositions. (Settled January 2005)

Expert witness for engineering and project economics for Plaintiff's attorney Gauthier, Downing, LaBarre, Dean & Sulzer (later Stephen M. Huber, Gauthier, Houghtaling & Williams) (Metairie/New Orleans, LA) for ESI, Inc. (DELASA) v. Coastal Power Company, Tenneco, et. al. (CDC Docket No. 95-13172 "F") and related case Walk Haydel & Assoc. v. Coastal Power Production Company et. al. (Delassa) etc. (U.S. Court of Appeals, Fifth Circuit Docket 06-30886) involving an Independent Power Producer project in El Salvador. Merchant Power Plant economics, plant life-expectancy, rate analysis and other issues associated with large 2-cycle diesel engines fueled by Bunker-C (Heavy Oil). (2004-2005, settled before depositions or trial)

Expert witness for Defendant in Sithe Daesan Cogeneration Company v. Hyundai Petrochemical; International Chamber of Commerce (ICC-Singapore) Arbitration Case No. 12672/TE/MW; party appointed testifying expert by Hyundai Petrochemical and counsel Allen & Overy (London/Hong Kong) and Shin & Kim (Seoul) for technical construction & performance, engineering economics and energy sales agreement issues with “Third Party” owned and operated multi-unit cogeneration plant at the largest petrochemical complex in South Korea. Work included detailed quantum analysis of claims and rate structure in case involving over \$100 Million in claims. (2003-2004 Settled before depositions or trial)

Forensic investigation of technical design and operations issues associated with a major power outage at the Bellagio Resort in Las Vegas that experienced a major electrical distribution system failure caused by a cable fault in an underground vault. Work performed for a major international insurance carrier and other parties whose identity is yet to be made public.(July 2004 – Noticed as settled November 2007)

Expert witness for the defendant for The Estate of Vernon Cornelius Dunaway et al vs. Channel Terminal Corporation d/b/a International Terminals Company, Mitsui & Co. (USA) et al In Probate Court No. One, Harris County, Texas in case involving major steam accident and alleged violations of OSHA rules including 29CFR1910 regulations for control of hazardous energy (lockout/tagout). Expert Witness services for the Defendant Counsel Hilburn, Shores & Sherer, Houston, TX (Case “suspended” March 2005 then announced as “settled” in July 2005).

Expert consultant to Defendant in Montenay International et al v. Asplundh Construction et al for a commercial litigation in Nassau County, New York. Consultant and expert for defendant in case involving major damage to electrical and mechanical power generation equipment at a 12 MW independent power producer municipal solid waste to energy facility. Issues include application of NFPA/NEC and utility interconnection codes and standards as well as other power plant design, operations and maintenance issues. Contracted by defendant law firm Chesney & Murphy, LLP, Baldwin, NY. (2003 – 2004 case suspended, reactivation noticed 3/05; case understood to have been abandoned by plaintiff or to have settled)

Forensic investigations and case review work for subrogation screening for a major insurance carrier for cases involving 4MW reciprocating engine driven cogeneration project and a 6MW lumber mill waste fueled steam turbine generation project, both located in Northern California. (2004)

San Francisco State University, consultant for preliminary proceedings and OSHA citation appeal associated with a personal injury from high temperature steam and/or condensate at an on-campus energy plant. (2003-2004)

Claude Brown European Patent Application No. 98903513.4; technical opinions leading to formal affidavit regarding merits of claims for inventive features involving steam separation for mobile agricultural superheated steam generation units. Work for law firm Sheppard, Mullin, Richter & Hampton LLP of San Francisco, CA. (June/July 2003)

Noseff vs. Peter Paul Electronics et al; Bernalillo County (New Mexico) No: CV-2001-01278; Expert review and forensic investigation of a natural gas fire/explosion causing personal injuries to maintenance technician at gas interconnection station in Hobbs, New Mexico. Work included OSHA Regulations and NFPA Code compliance review of duplex gas metering station and automated control system. September 2002 to September 2003 for Defendant’s attorney Hatch, Allen & Shepherd, P.A. Issues addressed include release of hazardous energy, OSHA lockout/tagout requirements, NFPA/NEC hazardous area classification & required equipment, safety procedures, and related matters.

Varnsdorf Pty. Ltd. versus Fletcher Construction Australia Ltd. Commercial arbitration proceedings

Involving issues with fitness for purpose, expressed and implied warranties, operations and maintenance methods, root cause analysis for several major failures and other subjects for a major project involving six power plants referred to as the Victorian Hospital Cogeneration Project in and around Melbourne, Australia. Worked for owner, AXA/National Mutual of Australasia and attorney Freehills. Assignment involved 18 months temporary residency in Melbourne Australia at Client request. This was an extremely extensive engagement involving over 6,000 man-hours of professional services work as a consultant and expert. (1996-2001)

Resource Technology Corporation vs. Connecticut Resources Recovery Authority (Case 99-35434) United States District Court Northern District of Illinois – Eastern Division; Expert report and testimony concerning energy conversion aspects of a two unit, 1,730 kW, landfill gas project in Shelton, Connecticut, 2001 to 2002 for Defendant's attorney Ross & Hardies. Final testimony completed November 2002. I provided sworn testimony in court for this case.

Strategic Resource Solutions, Inc. vs. San Francisco Unified School District, et al; Investigation and analysis of boiler failures and furnace explosion, including formal NFPA Code compliance review of boiler/burner systems. Work for San Francisco Unified School District via City Attorney's office, June 2002 to 2004. I provide informal responses during a court supervised mediation that included the judge asking if I would repeat that same testimony "under oath", I indicated I would but was never called to do so as the case settled the next day.

Electrical systems duty cycle review, analysis and expert report for a wood processing plant in Washington State for plaintiff's attorneys Ball & Janik (parties not named); 2001. Expert report contributed to early settlement of case without formal expert reports, depositions or trial.

Flagg Energy Development Corp. et. al. (Kenetech) versus General Motors Corporation (dba Allison Gas Turbine) Re: Hartford Hospital Cogeneration Project, Hartford, Connecticut; Superior Court for the Judicial District of New Haven at Meriden, CN (CV 92-0242198-S). Work for Plaintiff attorney Smith & Fleming, Atlanta, GA. 1996-1997. Provided sworn testimony in depositions for this case in 1996.

### **Professional Experience:**

#### **o 1984 - Present Generation Equipment Services Co. (POWERPLANT Consultants, Inc.)**

Project Manager, Engineering Liaison and Engineer of Record for the Propulsion Systems Integration Contractor, Valley Power Systems, Inc. on the "New 144-Auto Ferries Project" for the State of Washington Department of Transportation, Washington State Ferries. This \$50 million multi-year project involves comprehensive scope of engineering, procurement, supply of equipment, supervision of installation by others (shipyard), and training for a new class of four to five vessels for Washington State Ferries in Seattle.

Consultant and expert witness for technical and economic investigations, arbitration/litigation, due diligence reviews, contract and rate disputes involving with industrial power generation, cogeneration, standby emergency power units, emergency diesel generators, gas turbine generation systems, steam generation (nuclear, fossil fueled and waste heat recovery boilers), marine propulsion and power generation systems and other energy conversion processes. Special emphasis in industrial sized cogeneration, combined cycles and waste-to-energy and other special fuels including landfill gas, digester gas, raw field gas, refinery off-gas, and other fuels as applied to energy recovery projects.

Consultant to Bank of America and Jones Lang LaSalle (facilities management group) for wide range of engineering, economics and environmental permit matters from 1987 to present. Work has included design and

installation of complete diesel generator systems (Caterpillar, Detroit Diesel, Perkins, ElectroMotive Diesel, Deutz, John Deere, etc.) major diesel fuel system redesign and upgrades, diesel-hydraulic starter system design, installation and commissioning for new systems, and redesign and upgrade for previously existing systems, numerous control systems upgrades renegotiation of energy service contracts with major utilities and other prospective energy service companies, and for air permit issues for several major onsite generation plants.

International experience including extended assignment in Australia as principal expert for family of large multinational insurance and financial services companies (recruited for this position by and worked through R.W. Beck on this multi-year, \$100 million project dispute). Projects where served in this capacity include Hartford Hospital (Hartford, CT), Victorian Hospitals (Melbourne, Australia), Hyperion Waste to Energy Project (City of Los Angeles), Vernon Municipal (Vernon, CA) and others. Power Purchase Agreement and general energy rate (gas and electric) analysis in newly deregulated system for 40 MW power project.

President and owner of GESCO/PCI providing specialized technical services to the both utility and industrial power generation industry with special emphasis in critical use facilities such as data centers, telephone switching centers and hospitals and other small utility power projects, but considerable experience on Utility sized projects to over 1,000 MW. Also provide highly specialized analytical services relating to plant performance, operating efficiencies, reliability improvements and resolution of performance shortfalls. Particular expertise for projects involving Allison, Solar, Garrett and GE gas turbines in standby power and cogeneration applications, and for stationary and marine power generation applications with Caterpillar and ElectroMotive Diesels.

Consulting engineering, field maintenance and modifications, and contract project management for a wide range of conventional and alternative fuel projects including large emergency standby, base load and peaking cogeneration projects and a variety of specialty fueled projects including digester gas, landfill gas, methanol, municipal solid waste, geothermal and others. Special emphasis on power plant startup, O&M, construction supervision, plant performance testing & evaluation, and special system commissioning. Particular focus on process controls and fuel processing/safety systems and related controls for industrial engines and boilers.

Project Manager and Startup Engineer for the City of Los Angeles digester gas fueled 20,000 kilowatt Hyperion Energy Recovery Project Cogeneration Plant. Responsible for all aspects of equipment installation and startup/performance testing for this \$12 million project. Equipment includes four Allison 570-KA gas turbine generators with dual pressure HP/LP heat recovery steam generators (HRSG), selective catalysts and numerous auxiliaries including digester gas treatment and digester gas/natural gas fuel controls. This project involved extensive technology development work on various fuel processing, energy conversion, heat recovery and other aspects of this, the world's largest waste to energy plant involving use of municipal digester gas.

Startup Engineer for International Power Technology, Inc. Conducted startup for three 6MW gas turbine cogeneration units at two sites, each with Allison 501-KH steam injected gas turbines and supplementary fired heat recovery steam generators (HRSG) operating in a "Cheng Cycle". Responsible for integrated plant testing, performance verification and demonstration, development of operating and casualty procedures and conduct of operator training program. Programmed Bailey Network 90 control system operator interface graphic displays. Startup Test Engineer for development of Factory and Field Acceptance Test Program and other documentation for an Allison 501 based 6 MW Cogeneration Project in Bakersfield, California. Various follow-on contracts for graphic display programming for "Standard" plant design, and customizing standard graphics for new projects, plant design/performance improvement reviews, technical document reviews and general technical consulting. Programmed and validated computer based economic model for real-time calculation of project performance using mathematical algorithms of Power Purchase Agreement rate structure and actual plant performance data.

Project Manager and Principal Engineer for geothermal drilling/testing and power plant development project for Imperial Energy Corporation. Supervised design, drilling, completion and testing of an 8500' high



temperature geothermal production well in the Imperial Valley, California. Developed design for modular 3MW steam power plant. Processed all permits for project drilling, construction, operation and testing. Formulated development plan for project expansion to 16MW including utility interconnection, power sales agreements and draft pro-formas for venture capitalists and institutional investors.

Inventor for a high performance cooling manifold design for use on Electro-Motive Diesel engines in the 3,600 to 4,800 HP range. This invention covered by Patent (U.S. 5,337,705), improved oil cooling by 30% to 70% and is now in use by the U.S. Navy and at other “arduous” applications in Australia and Alaska. Inventor of a portable precision computer room environmental monitoring station for 3-D modeling of critical environment in large computer center main processing rooms.

Project Manager for replacement of 18kV high current main power bushings on main output transformer at NRG El Segundo Unit #3. Direct supervision of transformer bushing replacement, comprehensive transformer testing, oil removal/replacement, cooling pump overhaul & replacements, case refinishing and unit recommissioning. (2004)

**o 1979 - 1984 WESTEC Services, Inc.**

Deputy Manager for Energy Division responsible for supervision of both Engineering and Contract Operations & Maintenance groups which included fifteen engineers and eighty power plant operations and maintenance technicians. Project Manager for numerous cogeneration and geothermal consulting contracts as well as for field operations and testing projects involving geothermal wells and both geothermal and cogeneration power plants. Directly involved in the development of operating procedures and station orders for both utility and non-utility power generating stations. Project work with Navy Facilities Engineering Command, Public Works Branch for investigation of cogeneration and geothermal power generation projects at various Navy facilities in California.

Three digester gas projects of note included (1) feasibility analysis and conceptual design for a feed lot digester system in Brawley, CA; (2) Plant operation of a large 2.5MW digester fueled reciprocating engine plant for the City of San Diego at their Pt. Loma Waste Water Treatment Plant, and (3) system design, design optimization, air permit screening and various other technical support activities for the City of Simi Valley digester gas fueled power plant development program.

Additional engineering feasibility work on a variety of geothermal, solar, cogeneration and new-technology and hybrid projects for various clients.

**o 1977 - 1979 Bechtel Power Corporation**

Nuclear Licensing Engineer and Safety Design Review Coordinator for \$3.5 billion nuclear power plant project in Georgia. Responsible for conduct of formal design review program for plant process systems (Mechanical, electrical and controls) to assure compliance with applicable codes and other regulations, including Nuclear Regulatory Commission regulations and NFPA safety codes, and to verify that each system would meet its design criteria. Principal liaison between client utility licensing and operations management and Bechtel Power Corporation. Chaired all Licensing Review Meetings whose participants included A/E and utility Vice Presidents, Chief Engineers and Program Managers.

**o 1971 - 1977 United States Navy**

Submarine Officer serving on the USS Thomas A. Edison SSBN-610, a nuclear powered Fleet Ballistic Missile submarine. Principal duties as Engineering Division Officer in billets as Main Propulsion Asst. and Damage Control Asst., with temporary assignment for one patrol as Communications Officer and Ships Control

Training Officer. Qualified in all possible supervisory watch stations including Engineering Officer of the Watch, Engineering Duty Officer, Ship's Diving Officer, Torpedo Fire Control Supervisor, Officer of the Deck, and Ship's Duty Officer. Provisional qualification as Command Duty Officer lacking only advancement in rank to Lt. Commander for final qualification.

Special expertise in ship systems and ship control resulted in assignment of Junior Officer Training duties normally reserved for more experienced, senior officers. Authored major revision to Ship's Information Book (14 Vol.) and Training Aid Book and implemented SUBSAFE Program for first ship in class. Directed several special maintenance programs including nuclear plant primary resin replacement, high-power reactor testing, and turbine generator replacement.

Extensive shipyard overhaul experience including responsibility for the ship's lockout/tagout safety program, confined space and hot work permitting and for in-port fire, flooding and atmospheric hazards control programs.

As Midshipman in ROTC program at Oregon State University completed normal 4-year program in 2-years and was selected as "Distinguished Naval Graduate", a top honor for a graduating ROTC midshipman and offered (and accepted) a "Regular" versus normal "Reserve" commission as Navy Ensign. Finished near top of class in ROTC and later at the Naval Post-Graduate School (Monterey) and at both Nuclear Power School and Naval Reactor Prototype Training Programs as a junior officer. Completed graduate studies at Naval Post-Graduate School and earned MS degree in Nuclear Physics in 12-month fast-track program.

### **Memberships:**

American Society of Mechanical Engineers (ASME), Instrument Society of America (ISA), UL Code Committee Member for Standby Power Equipment (UL-2200) (1997 to 1999) and Member, UL Standards Technical Panel STP 2200 for development of Stationary Engine Generator Assemblies Standard Number 2200 (2003-2005), National Society of Professional Engineers (NSPE), Member, Society of Naval Architects & Marine Engineers (SNAME); Sigma Pi Sigma (National Physics Honor Society 1971); SNAME Committee Member for Naval Architect & Marine Engineer Professional Registration Examination Review & Validation (2008)