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 (with honors)
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 1973
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
Completed NSPE Engineering Ethics Course 2009
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. Materials published for restricted use onboard Navy warships by U.S. Navy as Classified documents.

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 was 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 and liquid hydrocarbon 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 and Specialized Capabilities:

Project Manager, Engineering Liaison and Engineer of Record as Propulsion Systems Integrator for all propulsion, propulsion controls and vessel Alarm & Monitoring System for the 144-Auto Ferries Project of three vessels, one of which, the M/V Tokitae having been completed and placed into commercial service in June 2014, and the other two currently under construction for deliveries in early 2015 and 2017 respectively. Provided similar but less comprehensive technical support services for the 64-Car Ferries Project, a recently completed three vessel project, all for the Washington State Department of Transportation, 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 Electro-Motive Diesel gear 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, design reviews and the preparation and processing of USCG Marine Safety Center and other submittals including Qualitative Failure Analyses (QFA), Periodic Safety Test Procedures (PSTP)and Failure Modes and Effects Analyses (FMEA). Additional part-time work for the Washington State Ferries 64-Car Ferry Project for EMD main engine reconfiguration and engine systems integration.

Expert witness work on cases focused on power plant technical and financial performance, investigation of major accidents & major machinery failures, assessment of designs and duty of care for design, application of lockout/tag-out and related safety regulations and work characterization for shipyard and other industrial workers who have contracted mesothelioma or other asbestos related ailments. Special experience in power plant systems integration including mechanical, electrical and controls systems and human aspects of operations, maintenance, training and safety.

Expert Witness and Related Expert Consulting Activities:

The highly technical nature of these cases is such that they typically involve the preparation of one or more reports per case, often involve depositions, and occasionally involve testimony at court or arbitration hearings. Experience included participation as technical expert in several international cases involving tens

to hundreds of millions of as measured in US dollars. As a result in the last several years I have testified at deposition and/or formal hearings as follows:

Recent testimony at trial, arbitration hearing or deposition:

- 5/12/2015 as witness for Plaintiff Donald J. Robertson vs. Cleaver-Brooks, et al; State of Wisconsin, Milwaukee County, Circuit Court Branch – 42; Case No. 14-CV-732
- 12/3/2014 as witness for the Plaintiff Ellingworth, Collins et al vs. AC and S, Inc. et al; Superior Court of California, County of Alameda – Unlimited Jurisdiction, Case RG11599656
- 10/23/14 as witness for the Defendant Trustee in Angelina County et al vs. Aspen Power et al. District Court of Angelina County, TX, 217th Judicial District. No. TX-186.
- 12/18/13 as witness for the plaintiff is asbestos litigation Arenius vs. Cleaver-Brooks in U.S. District Court, Western District at Seattle Case 2:12-cv-02131-RSL.
- 10/2/13 as witness for plaintiff's in asbestos litigation Roy J. LeFevre et al vs. CBS Corp. et al in U.S. District Court – Western District of Washington at Tacoma Case NO. 3:13-cv-05058.
- 9/19/2013 as witness for the defendant in a matter involving property damage and business interruption claims associated with a fire at a large utility power plant in southern Nevada in El Dorado Energy, LLC v. Laron, Inc.; U.S. District Court – District of Nevada; Case No. 2:12-cv-01316-GMN-PAL.
- 7/24/13 as witness for plaintiff in asbestos related in large utility power plants, primarily the Four Corners Power Plant, in the case Fountain vs. AES Alamitos et al, Superior Court of California, County of Los Angeles, JCCP Case No. 4674; No. BC 462828. .
- 2/24/2013 as witness for the plaintiff in personal injury case involving explosion of a low pressure valve actuator due to alleged improper system design and operation resulting in over-pressurization of said actuator. Christopher Latham et al v. Natural Gas Systems et al and related cross-complaints; Superior Court of California, County of Ventura, Case 56-2010-00379881-CU-PP-SIM.
- 9/11/2012 as witness at deposition for plaintiff in asbestos litigation Roland L. Stevens and Shirley J. Stevens v. CBS Corporation, et al. U.S. District Court Western District of Washington at Tacoma No. 3:11-CV-06073.
- 12/2/2011 as witness for plaintiff in asbestos litigation Mara Lynn Abbay vs. Armstrong International, Inc. et al, CIVIL ACTION NO. MDL 875, EDPA Case No.: 2:10-cv-83248-ER
- 9/20/2011 as witness for the third party defendant, Source North America/Ace Tank, in ATT Mobility v. Holaday Parks Fabricators v. Evergreen Power Systems and other third party defendants. Case is associated with diesel fuel day tank fill controls and related technical and procedural issues with lockout-tagout related to a spill of some 15,000 gallons of #2 diesel fuel in Bothell, WA.
- 9/8/2011 completed three days of testimony as principal technical expert for the Plaintiff, AES Merida III, in an arbitration against the Comision Federal de Electricidad associated with various technical aspects of causes and effects of plant outages, assessment of equivalent hours and equivalent starts, fuel quality issues and declarations of force majeure at the Merida III 484MW combined cycle power plant in Merida, Mexico.
- 2/7/2011 as witness for the plaintiff in Los Angeles County Sanitation District #2 vs. Siemens Power Generation Inc.; Case No. 30-2009-00330264 in Superior Court of State of California, County of Orange. Case involves mechanical overspeed and destruction of a 5.5MW electrical generator. Focus on duty of care in original and remedial design.

- 10/5/10 as witness for defendant Carter Burgess/Jacobs Engineering in Carter Burgess Inc. vs. City of Victorville, CA and DOES 1 thru 100, Superior Court of California County of Riverside Case ID RIC503565. Case involves various design, duty of care, reliability and economic issues for a 17.5 MW gas turbine-steam turbine combined cycle power plant in islanded municipal utility district in Victorville, CA.
- 9/3/10 as witness for the plaintiff in asbestos litigation George Schab vs. AC and S Incorporated et al, Superior Court of California, County of San Francisco, Case ID CGC-10-275530. Deposition testimony defended by law firm of Harowitz & Tigerman for questioning by counsel for York International and A.W. Chesterton in asbestos litigation involving alleged exposures from commercial boilers, air compressors and related campus machinery at the University of Washington.
- 5/13/10 as witness for the plaintiffs providing generic technical report and related opinions for use of asbestos in insulation of industrial boilers, turbines and related equipment at power plants, refineries and similar facilities for the law firm of Cohen, Placitella & Roth in Red Bank, NJ. Deposition covering three New Jersey cases; Mary O. Barile et al vs. 3M Company et al (Docket L-7862-07AS), William Grau et al vs. Alfa Laval (Docket L-7959-07-AS) and Savarese vs. ABB Lummus Crest Inc. et al (Docket L-4527-09 AS).
- 3/30/10 as witness for the plaintiff in Hall vs. Arizona Public Service Company et al; Superior Court of Arizona County of Maricopa Case No. CV2008-021259; Testimony by written expert report and at deposition on date cited in case involving lockout-tagout safety issues at a large coal fueled power plant.
- 2/26/10 & 3/9/10 as witness for the plaintiff in asbestos litigation 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, fuel metering and economic proforma related issues for a 275MW combined cycle power plant in Idaho.
- 8/27/09 as witness for the plaintiff in asbestos litigation Barbara Gaia, et al vs. Allis-Chalmers, etc. et al (deposition); Superior Court of State of California, County of Los Angeles Case BC373142. Case involving asbestos use in power plants and refineries.
- 8/6/09 as witness for the plaintiff in asbestos litigation 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 asbestos litigation 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 3rd 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, 152nd 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)

Other Expert Witness and Consulting Experience:

Expert consultant for a wide range of power plant projects and marine propulsion projects including projects of various sizes from a few megawatts to hundreds of megawatts of various types and fuel sources including fuel oils, gaseous and liquefied natural gas, and various waste solids and gases including digester gas, landfill gas, municipal and agricultural solid waste and finally nuclear project experience and expertise, though no longer active in that area due to its bureaucratic nature of that industry.

Expert witness for the City of Lamar, Colorado for a dispute involving alleged default by the local regional municipal utility to successfully convert a previously City owned natural gas fueled cogeneration power plant to coal fired. Work involves both technical and economic factors, rate analysis and application of best practices in design, permitting and construction. (2015 to present)

Extensive hands-on experience in diesel engine based marine propulsion system design, construction and commissioning, particularly for projects using Electro-Motive brand diesel engines. (ongoing since 2004)

Expert for engineering and economic factors for a pair of large landfill gas fueled cogeneration facilities (25Mw & 30MW), one in Southern California and the other in Rhode Island. Issued included fitness for purpose, best practices in design and operations, and financial performance of the project. (2014-2015)

Expert for defendant Woodward Governor Company in WESCO Distribution, Inc. v. On-Power, Inc., et al concerning propulsion control issues and test cell damages to a Pratt & Whitney ST18 in a marine propulsion system involving ST18 and ST40 gas turbines for the Royal Norwegian Navy. (2013 – present)

Expert for Defendant in DCO Energy, LLC and DCO California, Inc. v. Rhode Island LFG GENCO, LLC and Brea Power II, LLC; United States District Court District of New Jersey; Case No. 1:14-cv-05568-RBK-KMW in case involving warranties and construction defect issues for large 50MW landfill gas fueled projects. (2014 – 2015)

Expert for plaintiff in Sea Planes Inc. vs. Caterpillar, Inc, et al; Central Court of California Case Number: 2:2012cv07039. Case involves failures of marine diesel engines in a fast ferry application. (2013 ongoing)

Expert for the defendant in Mineral Park & Bluefish Energy v. Saulsbury, Inc. in Superior Court of Arizona, Mohave County CV2013-07111 concerning damages to a GE LM6000 onsite power plant at a major mining site in northern Arizona. (2013 – present)

Expert to the plaintiff in PPL SavageALERT v. ASML US, Inc. concerning performance and failure issues for a 1900 kW onsite cogeneration plant in Connecticut. (2103 – 2015)

Expert for the Plaintiff in asbestos litigation Henry Collins et al v. AC and S et al, Superior Court of California, Alameda County Case No. RG11599656 involving alleged asbestos exposure to a plant engineer at the Nine Mile Island Nuclear Power Station in upstate New York working with the firm of Harowitz & Tigerman of San Francisco.

Expert for the defense for case involving a fire at the El Dorado Energy (now Desert Star) 500 MW combined cycle power plant in Boulder City, NV. Issues involving the assessment and quantification of property damage and business interruption claims associated with a major fire and plant outage (2013)

Expert consultant and expert witness for the Trustee, in Angelina County et al v. Aspen Power et al, 217th Judicial District of Angelina County, TX; Cause No. TX-0186 involving a $120M, 50MW municipal biomass waste to energy power plant in Lufkin, TX working with the firm of Faegre Baker Daniels of Indianapolis. (2012 to present intermittent)

Investigating engineer for the insurance carrier for a $3 million boiler and machinery claim associated with multiple failure of one of the world's largest thrust bearings at a major hydro power unit in central Washington. (2011 initial investigation; November 2012 follow-up; recently noticed 8/14 for possible further legal actions)

Expert witness for the Plaintiff, AES Merida III, in an international arbitration against the Comision Federal de Electricidad (CFE) associated with various technical aspects of causes and effects of plant outages, assessment of equivalent hours and equivalent starts, fuel quality issues and declarations of force majeure at the Merida III 484MW combined cycle power plant in Merida, Yucatan, Mexico. (2011 to 2013 and pending appeal)

Engineering expert for the defendant in a $2.2 million subrogation case involving damage to a GE LM2500 gas turbine caused by contamination of injection water for a project in the Bakersfield, California oil fields. (2012-2013 settled without trial)

Expert for defendant Gas Transmission Northwest, affiliate of Trans-Canada Gas, involving fuel quality issues and effects alleged to have resulted in premature failures of GE Frame 7 gas turbines operating in a combined cycle power plant in Hermiston, OR. (2011 to 2013 settled without trial)

Expert for plaintiff Lake Cogeneration vs. Florida Power Company dba Progress Energy in a case involving operations and maintenance issues and operating economics for a LM-6000 based combined cycle power plant in central Florida. (2011 to 2012 Settled without trial)

Expert witness for defendant INMAR and their insurance carrier, Lloyd's of London, in a case involving the catastrophic failure of a 12-645 EMD engine on an ocean going tug boat that was operating in the Gulf of Mexico. (6/11 to 3/12)

Expert witness for defendant Power Management Engineering vs. Energy and Power Solutions et al, Superior Court of California, San Bernardino, Rancho Cucamonga District, Case ID CRVIS 808649 involving a small 290 kW packaged cogeneration plant working through the Law firm of Gordon & Rees, Los Angeles.2009 to 2012)

Expert consultant for FM Global Insurance, affiliate of Factory Mutual Insurance, for a boiler and machinery claim associated with the explosion of a large natural gas/digester gas fueled reciprocating engine operating

in a cogeneration configuration at a large municipal waste water treatment plant in Albuquerque, MN. (10/10 to 1/11) and forensic assessment of a boiler explosion in Los Angeles area (5/11 to 8/11)

Troubleshooting of vibration problems and redesign of special vibration mounts for a 16-cylinder 710 EMD generator set at the Copper Valley Power Plant in Alaska (2011); similar work on the Factory Ship Northern Victor 645 EMD generator sets, as well as similar work on the M/V Tustumena and M/V Auora, long range ferries operating in southern Alaska.

Expert for plaintiff in a personal injury case involving a small explosion at a high-pressure natural gas compressor station for fueling of municipal transit vehicles in Simi Valley, CA. Issues involve duty of care for design, maintenance and operation and conformance to applicable codes and standards. (2010-2013 Settled)

Expert for the defendant, the State of Connecticut, in the case 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 powered reciprocating engine generation plant in Connecticut. (2002)

Expert for the defendant in a criminal case involving death of a plant worker at a gravel plant in San Francisco area. Expert analysis of Lockout-Tagout (LOTO) procedures and related training and practices. (2010 to 2011)

Expert for plaintiff in case involving claims of fraud, misrepresentation and faulty workmanship and materials associated with the repeated failure of a remanufactured Detroit Diesel Corporation Series 60 diesel engine in a long-haul truck. Testimony in form of affidavit prepared August 2010 and October 2012. (5/10 to 12/10; reactivated 6/12 and pending trial as of 1/13) Case being handled Pro-bono except for reimbursement for incidental expenses.

Expert for the plaintiff in Robert Walker and Alberta Walker vs. Burnham Company et al, an asbestos related litigation in Superior Court of New Jersey, Middlesex County, Docket No. L-9945-09. (5/10 to 7/10)

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. (3/10-6/11)

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 San Diego, CA. Failure involves extensive engine damage caused by water intrusion from a failed Heat Recovery Stream Generator. (2/10 to 6/10)

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 1/12)

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)

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, 215th Judicial District Court of Harris County, Texas). Work involved failure analysis, cost of repairs, and duty of care issues for plant operator and maintenance subcontractors for a large industrial power plant. (2008 to 2010) (Case settled 8/2010)

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) Additional cases for law firm of Levy, Phillips & Konigsberg (New York. NY) for cases with plaintiff surnames of Simpson and Smith (2008 to 2014). Consulted to a major international engineering contracting firm on a mesothelioma case involving both power plant and shipyard exposures to asbestos (2008). Stevens vs. CBS et al for Bergman Draper Ladenburg (Seattle) (2012)

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 to 2010; settled)

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. Case settled through arbitration. (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 as potential Plaintiff associated with anticipated litigation 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 152nd 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 working through 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 focused on the methods of calculation and meaning of Equivalent hours and Equivalent Starts 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 combined cycle power 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 working for Claimant 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 the death of a maintenance technician at a gas interconnection station in Hobbs, New Mexico. Work included various duty of care issues and conformance to applicable OSHA Regulations and NFPA Code requirements. 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 involving $120 million in claims with key issues of duty of care of designer, manufacturer and operator, fitness for purpose, expressed and implied warranties, operations and maintenance methods, root cause analysis and assessment of technical and economic effects of elevated firing temperatures and abnormally high number of shutdowns-restarts for a major project involving six power combined cycle 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 duty of care issues and NFPA Code compliance review of the 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 – 2015 POWERPLANT Consultants, Inc. (2015 Reorganizing in WA as POWERPLANT Specialists, LLC)

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. Two ships are currently under contract for construction with a third vessel pending approvals. This $50 million multi-year project involves comprehensive scope of engineering, procurement, supply of equipment, supervision of installation by the State selected shipyard on each of the vessels, two 3,000 HP Electro-Motive Diesel (EMD) engines and all the related propulsion equipment from the engines to the propellers. This scope included responsibility for the vessel controls and the Alarm & Monitoring Systems and involves integration of the four DDC Series 60 diesel generators and training for a new class of four to five vessels for Washington State Ferries in Seattle.

Engineering Liaison and Commissioning Engineer for engine systems for the M/V Chetzemoka, M/V Salish and M/V Kennewick, a series of 64-car ferries for the State of Washington Department of Transportation, Washington State Ferries. Duties include extensive involvement in extended sea trials for new class of ship and for crew training including training in controller programming and data logging using latest electronic engine controls used with the 3,000 HP Electro-Motive Diesel Corporation 12-710-G7C Tier-2 main engines and integration with the DDC Series 60 diesel generators, 3-normal and 1-emergency units.

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, continuous duty and emergency diesel generators particularly involving DDC and EMD diesels, 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. One of the more challenging of these special fuels projects was the conversion of a fleet DDC Series 60 diesel engines to operate on methanol for the City of Los Angeles bus system.

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 2014. 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, Siemens and GE gas turbines in standby power and combined cycle/cogeneration applications, and for stationary and marine power generation applications with 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 plant performance optimization including technical and economic aspects of different operating modes and levels of power. The latter includes assessment of what are referred to as the Equivalent Hours and Equivalent Starts for gas and steam turbines in various modes such as comparison of base load and standby operations weighted by economic returns and varying O&M costs. Another focus on process controls, fuel quality and fuel control, processing/safety systems and related controls for industrial engines and boilers.

Under contract to Bechtel Power Corporation, Consulting and field commissioning support for plant support auxiliaries including steam auxiliaries, fuel and air compressors, ammonia injection systems and other auxiliaries at the Gilroy Foods 120 MW Combined Cycle Power Plant in Gilroy, CA. (1987-1988)

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, well 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 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. All three of these projects included detailed economic analysis and modeling of project finances to assess financial feasibility.

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 (2003-2014), 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 and 2014)