

Dr. Harold (Hal) L. Ornstein | Managing Principal Mechanical Engineer,
Ph.D., PE, CFEI

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Professional Summary:

Dr. Ornstein has over fifty-five years of mechanical engineering experience in root cause failure analysis, accident reconstruction and loss prevention. Dr. Ornstein has had formal training and extensive experience on warnings, labels, instructions, and product liability litigation. Dr. Ornstein possesses in-depth knowledge to reach the root cause of a wide range of accidents and failures in the following areas: piping systems, fire protection sprinkler systems, heat transfer and thermodynamics, water intrusion – building envelope degradation, commercial and residential HVAC systems, structures, material science, metallurgy, plastics, furnaces, boilers, freezers, refrigeration systems, heat pumps, elevators, cranes, hoists, escalators, aerial platforms, forklifts.

Dr. Ornstein is a member of NFPA's 211 Committee (committee on chimneys, and flues, the International Code Council (ICC) [formerly BOCA], the International Association of Plumbing and Mechanical Officials (IAPMO), the American Society of Mechanical Engineers (ASME), and the American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE). Dr. Ornstein has an EPA Universal License for Freon handling (40 CFR part 82, Subpart F).

Mechanical Engineering

Consults on the mechanical engineering aspects of accidents, design errors, design problems, operational problems, operator errors, materials problems, materials defects and other causes of loss. Provides investigation and analysis for insurance companies, attorneys, public utilities, industrial manufacturers, property managers, property owners, construction companies, manufacturers, and individuals. Performed root cause failure analyses on a wide variety of equipment failures and industrial accidents, including: consumer and household products, medical equipment, engines, generators, turbo-machinery, gas transmission and distribution systems, fire protection sprinkler systems, HVAC systems, AHUs, heat exchangers, piping systems, reactors, scrubbers, incinerators, and water heaters. Analyzed accidents involving elevators, escalators, man lifts, ladders, hoists, scaffolds, cranes, booms, forklifts, conveyors, punch presses, and concrete grinders. Also investigated damages to structures that were attributed to blasting, hail, wind, water intrusion, etc.

Safety – Human Factors – Warnings – Walkways – Buildings – Vehicles

ADA requirements, OSHA requirements, building and construction code requirements, human factors, man-machine interface, consumer products, warnings, labels, operating instructions, slips and falls, trips and falls, adequacy of walking pathways, walking surfaces, obstructions to perambulation, adequacy of lighting and illumination for safety and for security. Adequacy of packing and shipping containers. Fabric flammability. Vehicular accident reconstruction – automobiles, trucks, motorcycles, bicycles and all-terrain-vehicles (ATVs)

Fire Origin and Cause

Conducted fire origin and cause evaluations involving mechanical equipment, HVAC systems and structures; including fires in boilers, industrial plants, manufacturing facilities, commercial buildings, restaurants, and residences, fires in cars, trucks, excavators and forklifts. Investigated and evaluated fires and smoke damage from commercial and residential cooking equipment, including: salamanders; gas, electric, and mesquite grills; hoods, filters, and ducts. Investigations also include sooting and smoke damage involving fireplaces (vented and vent-less), furnaces (oil and gas), emergency generators (diesel, propane and natural gas), farm equipment, including: tractors, silos, and conveyors.

Licenses and Certifications:

Professional Engineer, CA #M40301
Professional Engineer, DE, #12651
Professional Engineer, FL, #79541
Professional Engineer, IL, #062.067372
Professional Engineer, KS, #27851
Professional Engineer, MD, #26845
Professional Engineer, NJ, #43506
Professional Engineer, NY, #046772-1
Professional Engineer, NC, #027704
Professional Engineer, PA, #61492
Professional Engineer, TX, #121020
Professional Engineer, VA, #34939
Professional Engineer, Washington DC, #900417
Professional Engineer, WV, #15095
Professional Engineer, Puerto Rico, #27324 PE
Certified Fire and Explosions Investigator, NAFI, #11692-5585
EPA 608 Universal Certificate for Freon Handling # TEEP 105 -1005326
OSHA #510 Certified – Standards for the Construction Industry

Project Experience:

Three Mile Island -2 Accident

Served on the United States Nuclear Regulatory Commission's Special Inquiry of the TMI-2 accident

Browns Ferry Nuclear Plant Fire

Investigated a multi-plant fire and provided testimony on the accident for the United States Congress

**DHA Cogen Plant- Karachi, Pakistan
Turbine**

Completed root cause failure analyses (metallurgical laboratory analysis of stator blades, compressor harmonic and dynamic analyses) of surge events which damaged compressor stators of a 63-megawatt gas turbine

**Salem Nuclear Power Plant- New Jersey
Turbine**

Investigation a Westinghouse turbine over-speed event. Contrary to Westinghouse's licensing analysis the turbine experienced a 60% over-speed. Several rotor blades were damaged and penetrated the turbine's casing. An oil fire resulted, and one blade was airborne for almost 200 feet.

**Slips and Falls – Investigated and testified on accidents in NY, DC, VA, MD, NJ, NC, FL,
PA, WV, DE**

Voting member of American Society for Testing Materials (ASTM) F-13 Committee on Pedestrian and Walkway Safety

Human Factors, Product Liability, Warnings, Labels, Instructions – MD, VA, WV, MI, IA

Investigated and testified on accidents involving consumer products and recreational equipment (trampolines, rock-wall climbing, baseballs, bicycles)

Crane Accidents – National Cathedral - Washington DC

Root cause analysis of multiple lifting accidents in MD, VA, NY, TX, WI

Materials Handling – Warehousing Accidents – MD, TX, PA, DE

Root cause analysis of accidents involving forklifts, stock-pickers, pallet jacks, and skid-steers

Gas Transmission and Distribution Pipelines – Massachusetts, Maryland, Virginia

Investigations of Pipeline Safety, Fires, and Explosions

**Building Envelope – HVAC System Design – Air Quality - Mold Growth
New Jersey – Virginia - Maryland**

Root cause analyses of air quality and mold growth issues in college laboratories, large apartment buildings, and commercial buildings

Water Intrusion in Banks**New Jersey – Multiple cities**

Determined sources of water intrusion in multiple bank branch offices – and provided recommendations for remediation and prevention of additional water intrusion

Houston, Texas - Hurricane Ike**Damage to HVAC Systems**

Inspected and evaluated hurricane damage to multiple HVAC systems in commercial properties

New Orleans - Hurricane Katrina**Damage to Elevators**

Inspected and evaluated multiple hydraulic and traction elevators subsequent to Hurricane Katrina

Spotsylvania, Virginia**Tornado damage (2013)**

Inspected and evaluated damage to multiple homes subsequent to a tornado.

**Savannah, GA and Charleston, WV
Sprinkler System Failures in
Warehouses**

Root cause failure analysis of sprinkler system failures during fires in large warehouses storing raw rubber and tires (2013 and 2015)

**Nationwide
Flooring Damage**

Damage to vinyl composition floor tiles and carpeting at department stores from use of improper cleaning techniques (2014 and 2015)

**West Virginia
Boiler failure**

Investigation of a "dry fire" in a process heat boiler (2013)

San Juan, Puerto Rico (2016)

Evaluations of roof membrane degradation, hydraulic elevator failures, fire pump and diesel generator fires

**Fairfax County and Loudon County, Virginia
Sprinkler system failures (2005)**

Investigated and evaluated multiple sprinkler system failures which resulted from subfreezing ambient temperatures.

Food Contamination – Multiple types (2008 to 2012)

Investigated losses involving foreign bodies in ground beef and microbial contamination of beverages.

Dinosaur Skeleton – Packing and shipping errors (2001)

Investigated shipping damage to a replica of Dinosaur "Sue's" skeleton.

Kentucky and New York (2013 and 2015)

Investigated natural gas well fires.

West Virginia – strip and deep shaft mines (2013 and 2016)

Investigated mining equipment fires and accidents.

Professional Experience:

EFI Global, Inc., Sr. Principal Mechanical Engineer, 2000-Present

U.S. Nuclear Regulatory Commission, Sr. Engineer/Technical Advisor, 1975-2000

U.S. Atomic Energy Commission, Engineer, 1971-1975

University of Connecticut, Instructor of Mechanical Engineering and Assistant Director of Information Services at the New England Research Application Center, 1966-1971

Pratt & Whitney Aircraft division of United Aircraft Corporation – Senior Analytical Engineer – Advanced

Power Systems Heat Transfer Group -1961 to 1966

Specialized Education:

Formal accident investigation training from the U.S. government and was qualified to be on the U.S. NRC's rapid response roster (similar to NTSB's "Go Teams").

Formal training on accident investigation (Management Oversight Risk Tree – MORT) at U.S. NRC

Formal training on human factors – at U.S. NRC

Formal training on probabilistic risk assessment – PRA at US. NRC

Formal Training on gas pipeline safety – from ASME

Formal training on labels, warnings, and instructions, and failure to warn – at the University of Wisconsin
Formal training on crane and rigging safety and operations – from the Crane Institute of America
Formal training on construction safety and fall protection from OSHA

Formal training on elevator and escalator safety, maintenance and inspections. - from ASME

Formal training on gas turbines – International Gas Turbine Institute – at Southwest Research Institute
Formal training on design and operation of fire protection sprinkler systems and water supply systems for

fire protection sprinklers – from NFPA

Formal training on automotive accident reconstruction, tires, wheels, and brakes. - from SAE

Formal training on Crash Data Recorder (CDR) downloads – from Rusty Haight

Formal training on variable incidence tribometer (VIT) – from Wm. English

Formal Training on Life Safety – (egress safety) from NFPA

Formal Training on Confined Spaces - from Alliance Safety Council – Gonzalez, Louisiana

Formal Training on Fastening Technology – Bolted/Screwed Joint Design – from EduPro U.S.

Education:

Ph. D., University of Connecticut, 1970

Masters of Science, Mechanical Engineering, Rensselaer Polytechnic Institute, 1964

Bachelors of Science, Mechanical Engineering, City College of New York, 1961

Affiliations:

National Fire Protection Association (NFPA) – member of NFPA 211 Committee on chimneys and flues
American Society for Testing Materials (ASTM) Member of F-13, F-15, and D-13

Committees:

F-13 Committee - Pedestrian and Walkway Safety and Footwear

F-15 Committee – Consumer Products

D-13 Committee - Clothing Flammability

American Society of Mechanical Engineers (ASME) – Chairman OM-17 working group on instrument air
International Society for Measurement and Control (ISA) – Member of S7.3 working group on instrument air

American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) - member
International Association of Arson Investigators (IAAI) - member

National Association of Fire Investigators (NAFI) - member

International Code Committee (ICC) – formerly BOCA – member

International Association of Plumbing and Maintenance Officials (IAPMO) - member

Illumination Engineering Society of North America (IESNA) - member

American Society of Safety Engineers (ASSE) – member

National Society of Professional Engineers – (NSPE) – member

Engineering Society for Advancing Mobility Land Sea Air and Space - (SAE) –member

American Society for Metals (ASM) - member

Institute of Electrical and Electronics Engineers (IEEE) – member of committee authoring recommendations for good practices for solenoid operated valves

Courses Instructed/ Guest Lecturer:

Author/Presenter of over forty technical papers at national and international meetings and conferences

“Failure of a Boom Truck”- presented at 2010 American Society for Metals meeting – Houston, Texas

Organizer, session leader of Operating Experience sessions of numerous annual meetings of ICONE (International Conference of Nuclear Engineering) – [Kyoto, Tokyo, New Orleans, San Francisco, Nice] (1990 to 1999)

Chairman of International Conference on Fire and Safety – session on Turbine Building Hazards – Barcelona, Spain, 1994

Lecturer on safety, accident analysis, and root cause failure analysis in the U.S., Japan, Germany, France, Russia, Spain, Ukraine, Czech Republic, India, Bulgaria, Pakistan. (1990 to 1999)

Publications and Presentations:

Over 50 EFI Global expert reports submitted since the year 2000 in support of litigation.

Over 3000 EFI Global proprietary expert reports which require client permission to release.

“Failure of a Boom Truck” –Presented at Materials Science and Technology (M S & T) Conference- Houston Texas – October, 2010.

“How Are Your AOVs Performing” – 20th Air-Operated Valve Users Group. January 2001.

NRC Regulatory Issue Summary (RIS) 2000-03 “Resolution of Generic Safety Issue 158: Performance of Safety-Related Power-Operated Valves Under Design Basis Conditions” U.S. Nuclear Regulatory Commission - March 2000 – co-author.

NUREG 1275 Volume 13 "Evaluation of Air-Operated Valves at U.S. Light Water Reactors" U.S. Nuclear Regulatory Commission – February 2000.

Fifth NRC/ASME Symposium on Valve and Pump Testing "AEOD's Recent Study of Air-Operate Valves" July 1998 NUREG/CP-0152 Volume 2.

"Turbine Building Hazards Discovered by IPEEE" – 6th International Conference on Nuclear Engineering (ICONE 6) – May 1998.

"Assessment of Spent Fuel Cooling" – 5th International Conference on Nuclear Engineering (ICONE 5) - May 1997 (co-author).

S97-01 Special Study "Oconee Electrical System Design and Operation" U.S. Nuclear Regulatory Commission – March 1997 co-author.

NUREG 1275 Volume 12 "Assessment of Spent Fuel Pool Cooling" U.S. Nuclear Regulatory Commission – February 1997 (co-author).

NUREG 1275 Volume 11 "Operating Experience Feedback Report –Turbine-Generator Overspeed Protection Systems" U.S. Nuclear Regulatory Commission – April 1995.

Third International Conference on Nuclear Engineering – ASME/JSME "Solenoid-Operated Valve Problems in the United States - Boiling Water Reactor Scram System Pilot Valves" April 1995.

International Conference on Fire and Safety "Turbine Building Hazards" December 1994.

1993 American Nuclear Society Winter Annual Meeting "Turbine Building Hazards" November 1993 (co-author).

1992 American Nuclear Society Winter Annual Meeting "Turbine Overspeed Control Systems at U.S. Reactors" November 1992.

Nuclear Engineering International Journal "Raising Awareness of SOV Problems at U.S. Light Water Reactors" July 1992.

Second NRC/ASME Symposium on Pump and Valve Testing "Recent Solenoid-Operated Valve Experiences Involving Maintenance and Testing Deficiencies" NUREG/CP-0123 July 1992.

Second NRC/ASME Symposium on Pump and Valve Testing "Recent Solenoid-Operated Valve Experiences Involving Maintenance and Testing Deficiencies" NUREG/CP-0123 July 1992.

1991 American Nuclear Society Winter Annual Meeting "Solenoid-Operated valve Problems at U. S. Light Water Reactors" November 1991.

91 IEEE Winter Annual Meeting "Solenoid-Operated Valve Problems at U.S. Light Water Reactors" February 1991

NUREG 1275 Volume 6 "Operating Experience Feedback Report –Solenoid-Operated Valve Problems" U.S. Nuclear Regulatory Commission – February 1991.

1989 American Nuclear Society Winter Annual Meeting "Recently Discovered Safety System Problems Resulting from Air System Deficiencies" November 1989.

50th Annual American Power Conference "Air Systems and Their Impact Upon Nuclear Safety" June 1988.

NUREG 1275 Volume 2 "Operating Experience Feedback Report –Air Systems Problems" U.S. Nuclear Regulatory Commission – December 1987.

1987 American Nuclear Society Winter Annual Meeting "Air Systems Problems at U. S. Light Water Reactors" November 1987.

1987 American Nuclear Society Winter Annual Meeting "DHR Losses in PWRs with Partially Drained Reactor Coolant Systems" November 1987.

USNRC/AEOD Special Report S702 "Loss of Decay Heat Removal Function at Pressurized Water Reactors With Partially Drained Reactor Coolant Systems" May 1987.

USNRC/AEOD Case Study Report C503 "Decay Heat Removal Problems at Pressurized Water Reactors" December 1985.

USNRC/AEOD Case Study Report C501 "Safety Implications Associated with In-Plant Pressurized Gas Storage and Distribution Systems in Nuclear Power Plants." June 1985.

USNRC/AEOD Engineering Evaluation Report E326 "Steam Voiding in Oconee Unit 3 on June 13, 1975: A Precursor Event to the TMI-2 Accident" November 1983.

USNRC/AEOD Case Study Report C204 "San Onofre Unit 1 Loss of Salt Water Cooling Event on March 10, 1980" July 1982.

1982 American Nuclear Society Power Division topical Meeting Transactions. "A Recently Evaluated Preoperational Test Precursor of the TMI-2 Accident" March 1982.

USNRC/AEOD Case Study Report C004 "AEOD Actions Concerning the Crystal River Unit 3 Loss of Non-Nuclear Instrumentation and Integrated Control System Power on February 26, 1980" November 1980.

"Three Mile Island – A Report to the Commissioners and to the Public" U.S. Nuclear Regulatory Commission Special Inquiry Group (contributing author).

USNRC NUREG 0460 Volume 1 "Anticipated Transients Without Scram" 1978 (co-author)

Probabilistic Analysis of Nuclear Reactor Safety American Nuclear Society Topical Meeting "An Approximate ATWS Study to include Parameter Variations and Equipment Reliability In Probabilistic Accident Analysis" May 1978 (co-author)

"Evaluation of Plant Safety During the Browns Ferry Fire" Presented to the Joint Committee on Atomic Energy – 94th Congress of the United States September 1975.

"An Investigation of Turbulent Open Channel Flow Simulating Water Desalination Flash Evaporators" University of Connecticut Report May 1970 (Doctoral Dissertation).

"Energy Requirements for Desalination" Pratt and Whitney Aircraft Division of United Aircraft Corporation – New Product Memo NPM July 1966.

"Study of Two-Phase Flow Through an Interstage Device" University of Connecticut Report (co-author) June 1966.

"Computer Program for Liquid Metal Condensing Heat Transfer Coefficients Inside Tubes" NASA Contractor Report 54350 PWA 2556 March 1965.

"Computer Program for Designing Shell and Tube Liquid Metal Condensers" NASA Contractor Report 54252 PWA 2370 August 1964.

"Experimental Evaluation of Hydrodynamic Losses in Manifolds" NASA Contractor Report PWA 2227 Volume 1 June 1963.

Honors and Awards:

U.S. Nuclear Regulatory Commission's Professional Engineer of the Year

U.S. Nuclear Regulatory Commission's Meritorious Service Award for Engineering Excellence (twice)

American Nuclear Society Power Division Best Paper Award

American Society of Mechanical Engineers Award for Exemplary Service on the Operations and Maintenance Committee

International Society for Measurement and Control Exceptional Service Award