

Randy Clarksean, Ph.D., P.E., CFEI, CFII

Mechanical Engineer

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Relevant Technical Experience

- *Fire and Explosion Investigator*
- *Expert in failure analysis of systems*
- *Heat transfer and fluid mechanics expert*

Failure Analysis / Forensics Type Projects

- **Inadvertent Discharge of Foam Fire Suppression System (~\$3M)**
 - Scene investigation and documentation
 - System testing and sensor evaluation
- **Fire in Semi-Tractor Garage (USD \$1M+ loss)**
 - Fire cause and origin investigation
 - Arc mapping, video review, facility examination
- **Fire in Laundry and Storage Facility (USD \$5M+ loss)**
 - Fire cause and origin investigation
 - Video review, fire scene investigation
 - Investigate potential issues with fire protection system
- **Fire and ammonia release for ammonia refrigeration system (USD \$5-8M+ loss)**
 - Investigated fire source at refrigeration facility
 - Ammonia release also occurred
- **Inadvertent sprinkler discharged (>USD \$100K)**
 - Investigated failure of sprinkler head
- **Investigation of Solar Thermal Plant (USD \$20M+)**
 - Examined floating pipe scenario in thermal storage tank
- **Investigated Gas Turbine Loss (USD Unknown)**
 - Reviewed metallurgical data
 - Examined Operational data
 - Participated in fault tree review
- **Consulting Expert - Large Fire Tube Boiler Facility**
 - Reviewed design, commissioning and failures
 - Provided technical guidance to legal team
- **Investigation of Solar Energy System Collapse (USD \$50M+)**
 - Ongoing, structural failure of support structure

- **Investigation of Mold and Moisture Damage** - Residential (USD > \$700K)
 - Improper maintenance and setup for HVAC system
- **Fires in Hospital Facilities** (several facilities)
 - Battery backup fires – ***lithium ion batteries***
- **Small Garage Fire** (~ \$40K)
 - Cause and origin within garage
 - Product exam to determine fire cause (electrical)
- **Investigation of HVAC system** (USD \$1M+ loss)
 - Performance and installation issues (***potato storage***).
 - Improper control system design
 - **Improper overall system design** (competing controllers, improper sizing)
 - Infant mortality of compressors
- **Operating Loss in Fire Tube Boiler System** (USD \$5M+ in loss claims)
 - Six 1000 HP fire tube boiler facility to provide process steam for large facility
 - Investigation relating to system design, water quality, operations.
 - \$70M+ dollar facility which failed 9 months into operations. Claims for \$5M+ in renovations and design changes.
- **Grain Bin Failures** (several investigations)
 - Assisted in review of opposing expert's report
 - Assessed failure mechanism of collapsed structure (bad weld)
 - Assessed reasons for structural failure of structure that failed and fell
- **Collapse of concrete silo for coal storage** (USD \$20-30M+ loss)
 - South Korean loss site
 - Investigated potential for **dust explosion**
- **Propane boiler explosion** (< USD \$500K)
 - Backup fuel supply (dual system for natural gas and propane) of propane led to boiler explosion
 - Evaluated safety aspects of design (single point failure led to failure).
- **Explosion in Residential Structure**
 - Multiphase investigation of natural gas system
- **Submarine pipeline failure** (\$30M+ loss)
 - Pipeline used for power plant cooling water inlet and outlet
 - Investigated reasons why pipeline floated and failed
 - Rough seas and **design calculation assumptions (flow related)**
- **Mining equipment collapse** (\$35M+ loss)
 - Collapse of a stacker reclaimer used at a steel mill for movement of iron ore pellets

- Structural collapse, modified PLC control systems, motor controllers
 - Failed due to **lack of electromechanical safety system**
- **Inadvertent ignition for natural gas boiler**
 - Failure of electronic valve/ignition units
- **Residential Fire Loss** (small USD ~\$40K)
 - Investigated potential product failure that caused the fire
- **Frozen sprinkler system** (>USD \$300K)
 - Investigated and documented loss associated with frozen sprinkler system
- **Turbine blade failure analysis** (USD \$5M+ loss)
 - Turbine blade **design and materials related issues**.
- **Natural gas skid failure** (personal injury)
 - System removes “oil” from natural gas prior to entering utility scale natural gas turbine
 - Safety system failure led to oil release and natural gas release
 - **Single point failure and system design issues**