In performing work involving standard of care matters, our consultants have advised legal teams on a wide range of technical and economic issues across the hydrocarbon processing industries. Typical assignments include: (a) prudent design, engineering, operations, and maintenance; (b) assessment of management processes; (c) training; (d) documentation of procedures and adherence to the procedures; and (e) adherence to generally accepted industry practice and industry regulations. Our clients have included oil and gas companies, law firms, underwriters, and brokerage houses. Our analyses and conclusions have been presented at court proceedings where our expert testimony has been relied upon by judges, juries, and arbitrators.
EXPERT WITNESS AND DISPUTE SUPPORT
Standard of Care

PRIMARY CONTACTS

Charles J. Hirst
Senior Vice President
Dallas

David P. Huffman
Consultant
Houston

J. David Morgan
Vice President
Houston

Melvin M. Sinquefield
Consultant
Houston
EXPERT WITNESS AND DISPUTE SUPPORT

Standard of Care

RELATED EXPERIENCE

- **Chemical Plant Evaluation**
  Provided an independent assessment at a chemical plant of recent maintenance and sustaining capital projects.

- **Due Diligence of Gas Gathering and Processing Assets**
  Conducted due diligence on gas gathering and processing assets within the Permian Basin in Southeast New Mexico and West Texas on behalf of lending group and prospective purchaser. Conducted physical inspection of the facilities, reviewed operation and maintenance records, assessed gas supply and competitive position, and reviewed financial assumptions and projections to ensure consistency with current gas supply contracts and asset performance.

- **Estimate for Fire Rebuild**
  Developed a cost estimate for replacing and/or purchasing new equipment and materials after damage from plant fire.

- **Evaluate Biodiesel Production Facility**
  Provided due diligence review of a biodiesel facility in support of project financing. Reviewed capital costs, operating costs, process technology, and maintenance requirements.

- **Electric Incident Investigation**
  Conducted a Root Cause Failure Analysis on a power generation facility following the failures of a surge arrester and a backup battery system. Identified required inspection assistance, evaluated failed component inspection results and examined practices and procedures in place at the facility.

- **Gasoline Blending Compliance**
  Provided analysis for a refiner that does not produce finished gasoline on the prospects for producing gasoline that meets all API and ASTM requirements. Analyzed the options available to the refinery for blending reformate fractions and whether aromatics or benzene would likely be the constraining specification as it relates to the “anti-dumping” rule. Evaluated potential early compliance with the EPA's mobile source air toxics (MSAT2) program.

- **Natural Gas Gathering Disputes**
  Provided expert report regarding claims involving natural gas measurement, prudent operations, natural gas pricing, surface estate issues, reasonable accommodations, and environmental considerations.

- **Condensate Gathering System Due Diligence**
  Assisted client with engineering due diligence on a Texas condensate gathering system focusing on pipeline mechanical integrity issues.

- **New Petroleum Products Terminal**
  On behalf of a major international construction company, prepared a preliminary feasibility study on a new petroleum products import terminal to serve the local market. Study included facility layout and size estimates for docks and storage tanks.

- **Natural Gas Production Facilities**
  Served as one of two project managers responsible for the engineering, procurement, and construction of a 200 million cubic feet per day natural gas recovery facility in central Algeria to provide the feedstock for a new liquefied natural gas (LNG) plant on the Algerian coast. At the time of installation, the $250-million project was the largest of its kind in the world. Conducted negotiations with local labor, equipment, and utility suppliers. Arranged meetings with local environmental agencies to ensure compliance with all national environmental rules and regulations.

- **Maintenance and Reliability Improvement Program**
  Managed the development of a client’s routine maintenance and reliability improvement program that identified areas of concern and implemented new work practices aimed at improving competitiveness. Efforts reduced maintenance costs and improved
operating performance.

- **Maintenance Contracting Strategies**
  Worked with international clients to analyze existing maintenance and turnaround contracting strategies, contractor availability, and local cultures to identify areas of concern and develop strategies for improvement.

- **Reliability and Maintenance Continuous Improvement Initiatives**
  Improved efforts to eliminate equipment defects and unscheduled outages by developing and incorporating the use of reliability indices to identify problem equipment. Reliability teams were then able to prioritize concerns to focus reliability improvement initiatives in areas of highest risk to safety, operational performance, and profits. This defect elimination program was utilized as the cornerstone for the plant’s continuous improvement initiatives.

- **Turnaround Optimization Studies**
  Performed numerous turnaround optimization studies and execution reviews for refineries and petrochemical companies worldwide. Areas of focus included analyzing the work selection process, reviewing work execution schedules, evaluating the facilities preparedness to perform the turnaround, and optimizing turnaround cycles or start dates.

- **Performance Improvement Initiatives in Worldwide Refineries**
  Helped design and direct a consulting project to identify the most successful profit improvement initiatives at top performing worldwide refineries. Audited and examined company culture, energy usage, refinery losses, personnel training, safety practices, environmental controls, process operations, technical services, administration, planning and economics, capital investments, maintenance, and reliability factors. Identified and documented those initiatives, which proved most successful, including their duration, need, and value added. Assignments were in the U.S., U.K., Romania, Korea, and West Africa.

- **Evaluation of Refinery Operating Procedures**
  Acted as independent advisor in a dispute between a refinery and the Environmental Protection Agency following a period of excess emissions.

- **MTBE Litigation**
  Provided expert report that evaluated and discussed the issues concerning why MTBE was chosen over ethanol to the federal oxygenate requirements in the early 1990s. Also included was a discussion of how gasoline was supplied to the local region in California over the 1990s and early 2000s.

- **Caustic Soda Contract Dispute**
  Reviewed caustic soda plant expansion and the ability of supplier to deliver the required volume of caustic soda under contract. Advised on the reasonableness of the expansion construction schedule based on review of environmental permits, public data, and internal documents on construction activities.

- **Heliport Pipeline Leak**
  Prepared expert rejoinder report on leakage from fuel storage, pipeline, and loading system located at a heliport and marine dock.

- **Fall Protection Evaluation**
  Investigated circumstances concerning the injury to a person who fell from a loading dock. Provided opinions regarding general safety requirements, industry practices, and fall protection requirements for this type of activity.

- **Pipeline Contamination Dispute**
  Assisted in a claim involving an alleged y-grade/NGL pipeline contamination from a gas processing facility. Examined the following key areas to evaluate the claim: pipeline hydraulics, laboratory records, chronology of pipeline sample data, reasonableness of claimed expenses, gas processing facility operation, and records.

- **Condensate Feedstock Contract Dispute**
Assisted in a claim between: (1) a European refiner and ultimate condensate supplier, and (2) an intermediary company, concerning allegations that the intermediary company was prevented from obtaining condensate supplies for sale to the refiner. Studied the potential availability and quality of condensates in the producing region and elsewhere. Identified potentially suitable condensates for the refinery. Based on forecasts of oil and petroleum product prices, prepared an estimate of potential economic damages. Described how term feedstock contracts for condensate are typically concluded. Testified at an arbitration in London.

**Gasoline Contamination Dispute**
Provided expert report on refinery practices concerning caustic carryover in FCC gasoline mercaptan treaters. Class action plaintiffs, consisting of retail station owners, alleged underground storage tank damage due to gasoline contamination.

**Refinery Restart Due Diligence**
Performed a site inspection and advised potential investor regarding the technical and commercial viability of restarting a refinery that had been shut down for several years.

**Defend Wastewater Treater Air Emissions**
Requested to provide expert witness opinion of industrial standard of care for wastewater treater operations. Issue concerned volatile organic compound (VOC) emissions from a wastewater treater feed tank.

**Midstream Acquisition Due Diligence**
Assisted energy distribution company with due diligence for potential transaction involving gas gathering and processing assets located in the Permian Basin. Assets evaluated included over 4,000 miles of gas and liquid pipelines, four gas processing plants, and multiple gas treating plants. Participated in data room reviews and management presentations with a focus on commercial, operational, and technical evaluations of midstream systems. Developed comprehensive economic model of the integrated gathering and processing assets that was used to determine valuations and evaluate key sensitivities.

**Contractual Dispute**
Performed a due diligence of owner allegations and contractor claims pertaining to a Lump Sum-Turn Key contract termination. Reviewed documents, schedules, witness statements, and expert reports to advise counsel on implications of contracting strategy and contract management following award.

**Construction Dispute - Petrochemicals Plant**
Prepared a confidential “Cold Eyes Review” assessment concerning a contemplated claim between an owner and a contractor of a grassroots petrochemical facility. Reviewed draft claims, researched evidence, and interviewed key personnel in order to produce an independent view of the claim.

**Construction Dispute - Gas Plant**
Provided expert reports and testimony regarding project management issues, alleged defects, and liquidated damages for international arbitration between owner and contractor. The project involved an offshore platform, an undersea pipeline, an onshore pipeline, an onshore cryogenic gas processing plant, and a sales gas pipeline.

**Economic Damages Litigation - Plant Explosion**
Retained concerning claims of design errors and failures in project management, following explosions and fires at a petrochemical plant. Conducted in-depth reviews of engineering, procurement, and construction agreements; process technology and design basis; construction records; owner's operating procedures; and actual operating history since start-up of the plant. Evaluated operating system provided against prevailing industry standards and examined potential for equipment failure.

**Performance Improvement - Petrochemicals**
Assisted in a global study focused on analyzing the operating performance of steam crackers. Participated as a member of a multi-disciplined team responsible for: reliability and operations data gathering, analysis, plant personnel interviews, and industry
benchmarking of performance. The study concluded with numerous recommendations to company senior management aimed at improving worldwide plant operational availability.

Supply Contract Dispute
Assisted in breach of contract claims regarding a helium supply agreement from a large natural gas processing/treating complex. Analyzed historical operation and performance of processing and extraction facilities, including sources and composition of gas supplies, plant shutdowns, and plant turndown capabilities. Reviewed plant performance, including operating costs, efficiencies, and operating modes to support defendant's plant operations.

Litigation - Wastewater Treating
Provided expert consulting support for a refinery wastewater treating environmental criminal matter. The work required previous experience with and a solid understanding of the plant processes and equipment which are used in treating industrial wastewater.

Class Action Environmental Litigation
Provided assistance in evaluating environmental issues which led to a neighborhood lawsuit. Reviewed plant operating and emissions history and provided preliminary opinions regarding the potential for future impact on local community.

Polyurethane Foam Litigation
Assisted in claims concerning polyurethane foam system products that were alleged to be defective or unfit for their intended use. Assisted in discovery, observed and reviewed work environment and work methods, evaluated manufacturing records, reviewed warranty claims, and prepared trial exhibits.

Jet Fuel Contamination Dispute
Following product quality issues in major interstate product pipeline movements, reviewed product injection practices and analyses at pipeline injection point. Evaluated analyses at various points along the pipeline to assess possibility of quality degradation.

Natural Gas Royalty Litigation
Evaluated the design and historical capital costs of a natural gas pipeline system in western Oklahoma. Reviewed system material balances and operator's natural gas measurement practices.

Crude Oil Sludge Accumulation
Following a claim concerning sludge accumulation in crude oil storage tanks over a twenty-year period, advised as to the creation of sludge in crude oil tanks, its accumulation, the ways to prevent or control it, and the conventional ways of dealing with it.

Gas Pipeline Rupture Dispute
Performed an independent assessment of the costs incurred, including the lost natural gas inventory, on a ruptured interstate gas transmission line for which the owner requested a multi-million dollar damage reimbursement. A report was prepared for mediation which resulted in a negotiated settlement.

Historical Refinery Waste Generation
Provided expert report on the probable types and amounts of wastes produced by a refinery during its 50-plus year operating life. Study was part of litigation involving assignment of responsibility for an EPA superfund site.

Nitroparaffins Litigation
Assisted in a dispute between an operator and an EPC firm concerning allegations that the process design contributed to an explosion at a nitroparaffins manufacturing plant. Assisted in discovery, evaluated design issues, and provided expert testimony.

Offshore Platform Design
Assessed design of elevated platform and ladders on a jack-up oil derrick which was under construction. Compared design to industry standards.

Paraxylene (PX) Contract Dispute
On behalf of a major international buyer of paraxylene, prepared an expert analysis concerning damages claimed by a large US based supplier. Analysis included a detailed evaluation of supplier’s paraxylene manufacturing economics.

- **Propane Product Quality Dispute**
  Investigated the design and operation of a natural gas liquid fractionation, storage, and loading facility located on the Red Sea to determine potential causes of alleged hydrogen sulfide contamination of propane cargoes.

- **Petroleum Refinery Dispute**
  Provided overview of turnaround practices and industry standards utilized in the United States and Europe. Evaluated decisions and practices utilized at the subject refinery to determine if those decisions were in compliance with standard practices and whether a decision to optimize the turnaround execution date was a factor in a plant incident.

- **Refinery Force Majeure Claims**
  Prepared expert reports and testified in an international arbitration involving multiple product supply disputes between a refinery and an adjacent chemical plant. Reviewed force majeure claims related to catalytic cracking technology, product supply contracts, and utility supply interruptions.

- **Polybutylene Pipe Litigation**
  Assisted municipal water districts in asserting claims for tens of millions of dollars in damages resulting from defective polybutylene pipe. Assisted in discovery, evaluated research and development records, reviewed state-of-the-art issues, and provided expert testimony.

- **Terminal Operations**
  Provided litigation support assistance and expert opinion for case involving historic Standard of Care issues with petroleum product terminals.

- **Dispute Support - Groundwater Contamination**
  Provided expert witness support regarding a groundwater contamination claim at a closed refinery. Provided opinions regarding the standards of care and operation of the former refinery. Prepared a written expert report.

- **Project Development Dispute**
  Prepared an expert report and delivered a deposition and testimony at jury trial in a dispute involving a project development claim. The dispute focused on the value and likelihood of successful completion for two projects in the early stages of development: a natural gas salt dome storage facility and a petroleum products terminal.

- **Wellhead Value - Natural Gas**
  Provided opinion with respect to effect of capital recovery of production facility costs on wellhead value of natural gas.

- **Pipeline Operating Dispute**
  Assisted in a dispute between an owner and an operator of a recently-constructed crude oil pipeline. Prepared an expert report concerning: (1) the facilities that should have been provided as part of the capital project to construct the pipeline; (2) the equipment necessary to operate and maintain the pipeline; and (3) whether defects found during the early operating period were the result of improper equipment design specifications and construction, or improper operation and maintenance. Testified at arbitration in London.

- **Gas Processing Metallurgy Replacement**
  Evaluated the reasonableness of a large project’s cost to replace the piping with a different metallurgy for a high-pressure, high-temperature sour gas reinjection facility in Central Asia. Also opined on the industry knowledge of the proper metallurgy at the time of construction of the original facility.

- **Review Infrastructure Assets**
Assisted client in evaluating infrastructure spending to support ongoing operations and maintenance activities. Our review evaluated whether the infrastructure assets were integral to the overall technological complex.

- **Gas Compressor Incident Dispute**
  Provided expert opinions concerning a gas compressor failure insurance claim related to: (1) evaluating the gas processing facilities' maintenance and standard of care practices compared to industry standards; and (2) reviewing the operating practices and programs utilized at the facility to determine if these practices caused or contributed to the incident and subsequent damage.

- **Biodiesel Plant Construction Dispute**
  Evaluated engineering and construction practices in a dispute between an owner and EPC contractor due to cost overruns. Issues included engineering and project management practices which required rework, and construction practices which created safety and operability issues. Cost estimates were prepared for correcting the deficiencies.

- **Tube Sheet, Flare Tip Matter**
  Investigated the cause of tubesheet and flare tip damage related to an unplanned sudden shutdown of the facility. Evaluated whether damage was caused by the shutdown, long-term wear, or contractor error during installation. Provided expert support through mediation and settlement efforts.

- **Interstate Pipeline Inspection Practices**
  Provided expert testimony on inspection and maintenance practices for interstate petroleum products pipelines. Issues included reasonable depth of additional overfill and width of maintenance right-of-way.

- **Offshore Pipeline Project**
  Served as Independent Engineer on behalf of a major financial institution for a $200 million project to build a deepwater gas and oil-gathering system. Prepared a valuation of offshore pipelines and an onshore gas processing plant for gathering and processing of deepwater Gulf of Mexico oil and gas production in support of structured finance. Certified completion of the project for financial purposes.

- **Construction Dispute Litigation - Gas Plant**
  Assisted in a litigated dispute between Owner-Operator and Engineering & Construction Contractor over whether a cryogenic gas plant, as engineered, procured, and constructed, met the stipulated contractual performance guarantees; prepared expert witness rebuttal report with respect to relevant issues.

- **Oil Field Pipe Dispute-Insurance Claim**
  Reviewed a claim involving an insurance dispute relating to proper preservation of drilling pipe in a storage yard following a hurricane.

- **Refinery Contractor Indemnification Dispute**
  Provided expert opinion concerning an indemnification dispute between a refiner and contractor, as well as the standard of care and practice in the industry concerning the design and construction of a piping relief system. Also opined on the refinery owner's responsibilities concerning the acceptance and maintenance of completed piping systems.

- **Gas Producer Contractual Dispute**
  Provided expert report and testified in federal bankruptcy court concerning disposal costs of produced salt water, reasonableness of a farm-out joint venture agreement, costs of capital, and salvage value of production equipment.

- **M&A Dispute**
  Evaluated the foreseeability of project cost overruns that negatively impacted the economics of the acquisition of an EPC Firm.

- **Root Cause Analysis**
  Conducted a Root Cause Failure Analysis on a high pressure steam turbine that failed following a planned outage at a
cogeneration power plant. Evaluated outage work procedures, actual outage work undertaken, start-up monitoring results, and post-failure turbine inspection results on turbine disassembly.

**Gas Plant Acquisition Dispute**
After concluding a transaction, the acquiring party claimed that the facilities were not sufficient to conduct business due to deficiencies related to design, construction, safety, and failure to meet environmental regulations. Visited the plant to interview key personnel, viewed the physical facilities, and reviewed relevant operational, safety, and engineering design information. Our findings and opinions were presented in an expert report which was submitted into evidence.

**FCC NOx Allocation**
Prepared a report of FCC regenerator nitrogen oxides (NOx) production that allowed allocation of FCC NOx from a combined refinery stack. The report was used to negotiate the allowable corporate average NOx limits with the EPA.

**Pressure Vessel Failure**
Investigated the cause of a hydrocarbon release resulting from the brittle fracture of a pressure vessel during start-up at a petrochemical plant. Incident involved multiple injuries and deaths and extensive property damage. Issues studied include ethylene plant design, operating practices and procedures, start-up operations, instrumentation, and safety training.

**Polyolefins Plant Explosion**
Assisted attorneys and company in preparation for litigation and negotiation with government agencies while investigating the cause of an explosion which caused the death of over 20 people. Assisted risk management in preparing and negotiating property damage and business interruption claims in excess of $1.3 billion.

**HF Alkylation Incident**
Investigated facts related to pump casing rupture where hydrofluoric acid was released. Reviewed refinery operations, training, and safety practices. Advised attorneys on generally accepted industry engineering practices and standards regarding design, operation, and maintenance of hydrofluoric acid alkylation unit.

**Delayed Coker Fire Investigation**
Assisted client in investigating the cause of a coker hydrocarbon release and fire, which resulted in multiple fatalities. Visited refinery and reviewed procedures and events preceding the incident to identify potential areas of causation and liability. Operating experience and knowledge of technical and safety issues and of industry and management practices helped the client in addressing specific claims issues.

**Industrial Incident**
Investigated cause of dust cloud deflagration at a Vitamin E production facility. Assessed that bulk solids handling procedures were modified without considering the original safety design basis for the equipment. Developed expert opinions on causation.

**Investigate Refinery Heater Explosion**
Performed root cause analysis of an explosion at a refinery heater and identified contributing factors. Performed a review of safe operating procedures, including shutdown and start-up of heaters. Provided expert testimony.

**Pulp and Paper Mill Incident**
Analyzed processing operations and engineering design in a pulp and paper mill to determine sequence of events and possible causes of incident.

**Sulfuric Acid Storage Incident**
Retained to assist in the investigation of a fatality incident at a sulfuric acid processing and storage facility. Reviewed equipment design, inspection and repair history, operating procedures, training of personnel, and industry practices. Assisted legal team with on-site investigation and interaction with local, state, and federal agencies. Reviewed conclusions by root cause analysis for
consistency and factual support.

- **Thermal Radiation Exposure**
  Investigated an incident involving a claim of thermal radiation exposure during a refining unit fire. Engineering reports, videos, weather conditions, unit design drawings, and published literature on levels of heat exposure from large hydrocarbon fires were evaluated.

- **Chemical Plant Accident Investigation**
  Investigated an accident at a polyethylene production and storage facility. Reviewed equipment design, inspection and repair history, training of personnel, industry practices, and standards of care.

- **Asbestos Exposure Litigation**
  Assisted a manufacturer of industrial equipment in defending personal injury claims related to asbestos exposure. Assisted in discovery, assessed the likelihood and degree of employee exposure to asbestos during maintenance activities, and reviewed equipment specifications, project histories, and maintenance records for various power generation units. Provided opinions regarding the potential for personal injury due to asbestos exposure in the course of normal work activities.

- **Salt Water Disposal Tank Explosion**
  Investigated the cause and origin of a storage tank explosion at an oil and gas salt water disposal facility in Colorado. Conducted site investigation and facility/equipment inspections, evaluated system design and operation, and conducted witness interviews. Determined cause of explosion and worked with company management to evaluate existing policies and procedures for potential areas of improvement.

- **Incident Analysis - Petrochemicals**
  Performed an investigation analysis following fire and explosion incidents at a major Gulf Coast manufacturing facility. The engagement entailed development of the sequence of events, root cause analysis, assessment of the decision to rebuild, and reconstruction monitoring. An independent project schedule and cost estimate for the plant reconstruction was developed.

- **Marine Accident Investigation**
  Investigated causes for contamination of a cargo of residual fuel aboard a barge that exploded and sank.

- **Litigation - Fuels Terminal Operations Assessment**
  Performed expert advice on fuels terminal operations that focused on the practices and procedures with an emphasis on the filling of product tanks.

- **Review of Facilities Safety Issues**
  Assisted in technical review of safety related issues at crude oil production and gathering facilities.

- **Dust Collection System Risk Assessment**
  Performed a quantitative risk assessment on a dust collection system associated with the multifold process at a large paper products manufacturing facility. Purpose was to determine if OSHA stipulations were appropriate.

- **Reciprocating Compressor Accident**
  Reviewed details of non-fatal accident involving a restart of skid-mounted gas compression machinery at a producing well. Upon investigation of the facts, prepared report detailing the proximate cause of the incident.

- **Coal Gasification Plant Accident**
  Provided assistance to a mechanical contractor for a root-cause investigation of a fatal accident at a coal gasification plant.

- **Gas Well Incident**
  Prepared expert report on behalf of client versus OSHA. Matter involved failure of a pipe carrying natural gas that injured one contractor. OSHA cited client for failure to provided a safe means of pressure relief for vessel (in-line heater) and piping.
Expert Consulting Services
Provided expert consulting services concerning a personal injury incident that involved a weld failure and a release of hydrocarbons.

Tank Truck Explosion Investigation
Investigated the potential causes and sources of ignition for an explosion that destroyed a road tanker, used to haul raw natural gas liquids from a gas treating plant, that was in a repair shop for the replacement of a pressure relief valve.

Petrochemical Terminal Fire
Reviewed testimony, expert reports, and forensic evidence and attended depositions to determine cause and origin of terminal fire. Prepared report addressing electrostatic discharge theory, petrochemical handling procedures, employee training, and management issues.

Pipeline Pigging Accident
Reviewed injury accident that occurred while pigging a gathering pipeline to remove formation water produced with natural gas. Provided an expert report regarding applicable industry standards regarding operation of vacuum truck for disposal of formation, as well as observations regarding the contractual responsibilities of the tank truck operator and the production operator.

Post-incident Equipment Preservation Review
Assisted client by assessing preservation techniques and "mothballing" efforts following the catastrophic failure of a vessel at a specialty products company. Incident resulted in an insurance claim for damaged equipment and idled equipment in the vicinity of the vessel failure. Efforts included assessing preservation techniques utilized at the plant compared to industry practices, developing an expert report, and providing expert testimony.

Paper Mill Safety Incident
Assisted attorneys by investigating the circumstances concerning an incident that occurred at a paper plant during a scheduled turnaround that resulted in a fatality. Issues studied included assessing work practices and safety procedures utilized to prepare equipment for turnaround activities, including vessel entry and paper mill plant design.

Flash Fire Investigation
Investigated circumstances concerning a flash fire that occurred during vessel entry and cleaning operations. The investigation included the: (1) assessment of refinery safe work practices compared to industry standards and government regulations; (2) utilization of vessel entry and confined space safety practices to mitigate ignition hazards; and (3) responsibilities of both the operating company and contractor organization to recognize, develop, and follow safe work plans to prevent potential flash fires from occurring during vessel entry. Developed and submitted expert report.

Litigation Support for Asbestos Claim
Asbestos Litigation—provided expert input and litigation support for trial preparation on refinery/chemical personnel's exposure to asbestos gaskets and equipment insulation materials.

Refractory Failure Investigation
Provided expertise and technical assistance related to the evaluation of a failed refractory in a methanol reformer.

Production Facility EPC Dispute
Reviewed and opined on different aspects of a dispute between the developer of an oil production facilities project and the EPC contractor. Assessed variation/change orders for entitlement and reviewed claims of preferential engineering (versus functional design).

Power Outage Cause and Origin
A refinery suffered an unplanned shutdown due to a power outage. At the time of the incident, the power source was from the grid.
via a third-party cogeneration station. Analyzed facilities and procedures to determine which parties: the grid, the cogeneration station, and/or the refinery, contributed to the outage.

**Feedstock Supply Dispute**
Reviewed the incidents of feedstock disruption and its effects on production of a basic chemical by a chemical producer in its dispute concerning a long-term feedstock supply contract. Dispute was settled at an early stage, prior to the preparation of an expert report.

**EPC Construction Dispute**
Provided expert support in a construction dispute relating to a natural gas processing plant in North America. The dispute primarily concerned engineering design issues and whether the installed facilities met contract, specification, and industrial standard requirements.

**Cost Allocation Report**
Following a refinery fire incident and rebuild, performed an analysis of all elements of the repair costs, and produced a report that assessed and allocated repairs into three categories: identical replacement, functional replacement, and upgrade.

**Defective Product Lawsuit**
Provided an expert report concerning a dispute between a pressure safety relief device manufacturer and an operator of a claim that a device did not operate as designed in a reactor overpressure incident.

**Damages from Steam Turbine Failure**
Assisted in determining economic damages resulting from failures associated with a new steam turbine that was provided and installed by a turbine manufacturer at a power generation facility. Conducted independent assessment of economic losses suffered by electric cooperative as a result of both short-term and long-term performance shortfalls and outages.

**Economic Damages Litigation - Plant Fire**
Following furnace damage and rebuild, provided expert regarding property damage costs and normal maintenance/scheduled turnaround/betterment costs. Similarly, business interruption costs were compiled with reference to market situation and product volumes that were available from inventory.

**Ethylene Plant Construction Litigation**
Assisted in a dispute concerning allegations that poor engineering work product contributed to a >$100 million cost overrun. Assisted with discovery, inspected plant, evaluated construction documents, analyzed the project critical path, and analyzed lost income due to delays in the project schedule.

**Gasoline Spill Litigation**
Assisted in a dispute between a retail marketer and contractor concerning allegations that contractor’s work contributed to a gasoline spill from a retail gas station that contaminated the well water of 130 homes. Assisted in discovery, evaluated the mechanical integrity of equipment, examined unique theories of causation, inspected site, and attended destructive testing procedures.

**LPG Pipeline Contamination**
Evaluated pipeline contamination and potential sources of contaminants from various sources.

**Underground Storage Tanks Claim**
Assisted in a dispute concerning an allegation that Underground Storage Tanks (USTs) at a retail outlet had released gasoline vapors, resulting in contamination of groundwater with MTBE. Assignment included review of procedures for delivery of gasoline from tankers to UST, review of equipment and fittings used in UST, review of hydrogeological data regarding groundwater and contamination plumes, review of the design of vapor recovery systems, and calculations of vapor composition and amounts...
released. Prepared report to document findings and testified in deposition.

- **Floating Production Platform Dispute**
  Reviewed, opined, and prepared expert report regarding the project cost differences experienced during construction of the hull and integration of topsides for a semi-submersible platform, which was placed into service offshore of Brazil. Our review included a change in the construction site, changes in construction strategy, and changes in the sequence of construction.

- **Formaldehyde Plant Construction Litigation**
  Assisted in a dispute concerning allegations that completion delays and poor plant performance at a European formaldehyde plant resulted in a multi-million dollar damage claim. Assisted with discovery, inspected plant, evaluated plant operating records, reviewed construction contracts, valued the plant, and calculated damages. Presented and defended conclusions at hearing.

- **Marine Terminal Development**
  Reviewed design requirements and monitored construction, start-up, and operation of a project to develop a bulk liquids terminal. Work included review of dredging requirement, schedule, and interfaces between this project and a project to export ammonia from the terminal.

- **Lender's Independent Engineer**
  Served as independent engineer for a "grassroots" olefins project. Prepared the technical due diligence for a US$4 billion facility on behalf of international export credit agencies and onshore and offshore lenders.

- **Manufactured Gas Plant**
  Provided technical assistance and review of historical documents in support of litigation regarding the environmental cleanup of a manufactured gas plant site. The site, which had various gasification units in operation between approximately 1870 to 1950, had been used for a number of other purposes. Analysis investigated the contamination present at the site to all previous and current gas plant operations.

- **Independent Engineer**
  Retained as the Independent Engineer for the "grassroots" Tangguh LNG Liquefaction Project in Indonesia. Prepared the technical due diligence for the US$3 billion facility on behalf of a financial consortium.

- **Insulation Works Dispute**
  Provided expert witness assistance with technical issues regarding the installation of insulation on an LNG facility. Baker & O'Brien reviewed the technical issues, prepared an expert report, and testified regarding our opinions in an ICC Arbitration hearing.

- **Polypropylene Manufacturing**
  Assisted in a dispute concerning insurance claims for property damage and business interruption in connection with a reactor incident during construction of a production facility.

- **PVC Plant Litigation**
  Assisted in a dispute concerning allegations that an explosion at a major manufacturer of PVC resins was due to a poor process design that failed to meet government regulations and engineering standards. Assisted in discovery, inspected the plant, evaluated procedures and work methods, reviewed applicable standards, and reviewed operating records.

- **Gas Turbine Damage**
  Assisted in a root-cause analysis and damages dispute concerning a major turbine failure in the start-up of a power plant.

- **Insurance Arbitration**
  Investigated the circumstances surrounding an oil spill at a Gulf Coast refinery following a hurricane. Work focused on whether the refiner acted as a "prudent operator" before and after the hurricane and whether the owner was entitled to a claim for damages based on an insurance policy's pollution exclusion clause. Prepared a written report for submission into evidence in an
international arbitration.

**Hurricane Rita Claim**
A petrochemicals facility experienced a loss of steam supply from an outside steam supplier and a subsequent unscheduled shutdown which, in turn, resulted in production losses and major damage to the facility. The steam supplier attributed the steam outage to boiler damage caused by a hurricane, which had made landfall several months earlier. Assisted by investigating the link between the hurricane and the steam supplier boiler outages.

**Offshore Pipeline Failure**
Following a business interruption claim concerning number of failures on a large subsea crude oil pipeline, examined original construction specifications, maintenance, inspection, and operation records of the pipeline. Also reviewed the repair plans and repair execution of the failed components and made recommendations to include: a) comprehensive metallurgical analyses; b) preparation of an efficient repair and execution schedule; and c) complete subsea modeling of the pipeline for the purpose of failure mode and time to failure predictions.

**Gas Plant Construction Dispute**
Prepared expert report and testified regarding alleged performance deficiencies of a general mechanical contractor performing a reimbursable construction project. The project allegedly experienced poor productivity, resulting in cost overruns and schedule delays. Assessed the different potential causes of alleged poor productivity, including project management, scope changes and weather impacts.

**Gas Plant Mediation Support**
Provided mediation support in relation to a helium supply agreement dispute between a new natural gas processing plant and a downstream customer. Reviewed force majeure declaration and prepared mediation presentation summarizing aspects of the dispute.

**Tank Collapse Dispute**
Investigated the cause of a tank collapse that occurred during cleaning activities in preparation for a planned internal inspection. Assessment included evaluating: (1) condition of the tank prior to the incident; (2) work processes utilized by contractor performing tank cleaning; (3) maintenance and inspection practices of tank operator; (4) industry accepted practices for tank inspection; and (5) contributing causes that led to the incident. Baker & O’Brien also assessed the cost to clean the tank and perform repairs following the incident. Developed expert report and provided support through mediation and settlement efforts.

**Commercial Contract Litigation**
Assisted in a force majeure claim related to the recommissioning of a facility after a hurricane. Examined conformance with standard industry protocols and applicable laws, standards, and regulations. Assessed whether the facility operator acted in a reasonably prudent manner with respect to the commercial and technical issues necessary to safely restart the facility as soon as possible.

**Gas Pipeline - Alleged Valve Defects**
Addressed the alleged failure of valves to meet specification and the appropriateness of a party’s action to remove the valves from service.

**Hazardous Remediation Costs Allocations**
Assisted client with a claim related to remediation of property associated with a pipeline corridor and the surrounding petrochemical and terminal industrial complex. Assignment included evaluating pipeline and tank fabrication requirements, inspection, and maintenance practices during the history of the pipeline and surrounding industrial complex; and, specifically, the
practices of the client during its ownership of pipelines and facilities involved in the dispute. This information was used to assess the client's responsibilities and the cost allocations between all parties during the history of this industrial site.

**Plant Reliability Dispute**
Assessed plant operating shutdowns and production losses related to force majeure claims. Evaluated if these outages were reasonably the result of a force majeure event, or were related to poor maintenance practices and/or reductions in cost associated with process reliability programs.

**Ammonia Plant Relocation**
Evaluated technical issues related to project management in the relocation of an ammonia plant. Reviewed records related to schedule, progress measurement, and construction budgets throughout the relocation project. Reviewed project execution plan and compared actual execution to plan.

Also advised on responsibilities of the owner, contractor, and subcontractors on the project.

**Refinery Power Failure**
A power supply failure at a refinery resulted in a complete and extended outage of the refinery, as well as long-term impacts to refinery operation. Opined on the duration of the outage, the refiner's actions, and refinery procedures during the restart effort with respect to typical refinery restart efforts. Also calculated the economic damages suffered by the refinery as a result of the power outage.

**Power Market Analysis**
Provided advice and expert opinion on the commercial and technical assumptions used in the calculation of steam and power rates that an oil and gas producer charged its clients.

**Hurricane Product Shortage Claim Assessment**
Assessed a product shortfall by a chemical producer following Hurricane Harvey. Provided volume and revenue estimates, taking into consideration port closures and the timing of force majeure declarations.

**Insurance Support: Liability and Business Interruption**
Assessed the merits of a liability claim and business interruption claim associated with an equipment failure in a sulfuric acid regeneration facility. Advised on the value and key determinants of a business interruption claim.

**Well Services Contractor Injury**
Assessed witness reports, investigation reports, depositions and other documents pertaining to the circumstances of a workplace injury during a well service activity. Provided opinions on responsibilities for the incident and submitted an expert report.

**Condensate Splitter Operating Plan**
Assisted a large midstream company with preparation of a condensate splitter operating plan, including staffing, maintenance, quality assurance, planning, and related items.

**Refinery Air Pollution Dispute**
Analyzed refinery and chemical plant air emissions data, categorized events, and explained how and why refinery and chemical plant operations air emission events occur.

- **Ammonia Plant Business Interruption Dispute**
  Provided expert witness testimony in a multi-million dollar business interruption claim. Evaluated operating records, estimated business interruption losses due to a power outage.

- **Ammonia Plant Construction Insurance Dispute**
  Evaluated the technical basis for a ammonia plant insurance claim involving construction defects and warranty work. Inspected the plant, evaluated project records, and reviewed maintenance records.

- **Ammonia Plant Lender's Engineer**
  Lender's engineer services for a major European bank on a 750 TPD ammonia plant relocation. Assessed existing and new technology that was to be incorporated in the project. Analyzed feedstock supply, reviewed contracts, and inspected progress prior to close of financing. Monitored construction progress, certified mechanical completion, and witnessed the plant performance test.

- **Ammonia Plant Lender's Engineer**
  Lender's engineer for a major European bank on a world-scale ammonia plant construction project. Assessed the technology, analyzed feedstock supply agreements, reviewed contracts, and assisted with contracts negotiation. Monitored construction progress and witnessed the plant performance test.

- **Ammonia/Urea Reactor Failure Analysis**
  Investigated the cause of an ammonia/urea plant reactor failure and responded to OSHA claims. Analyzed process equipment and operating practices used in ammonia and urea manufacture.

- **FCC Construction Litigation**
  Provided expert testimony regarding allegations that construction errors in the installation of an FCC catalyst cooler resulted in a significant business interruption claim. Assisted in discovery, analyzed operating data, evaluated design issues, calculated property damages and business interruption losses.

- **Crude Oil Custody Transfer Dispute**
  Investigated alleged crude oil Automatic Custody Transfer volume and quality measuring devices irregularities. Reviewed common carrier pipeline tariffs, inspected site, and analyzed measurement data.

- **MTBE Litigation**
  Prepared declaration of gasoline distribution issues in northern California, including rebuttal of other experts' analyses of gasoline distribution.

- **Benzene Exposure**
  Reviewed plant operating history and emissions records and provided expert opinions regarding potential benzene exposure to refinery employees.

- **Clean Fuels Studies**
  Modeled petroleum refinery operations to determine the impact of proposed ultra-low sulfur gasoline (ULSG) and diesel (ULSD) specifications on manufacturing costs. Provided reports to industry trade associations and government agencies.

- **Business Interruption Claim and Root Cause Analysis**
  Monitored rebuild engineering and construction of facilities damaged by fire and offered expert opinion on the appropriate construction period for the business interruption claim. Participated in the incident root cause analysis.

- **Chemical Plant Business Interruption Claim**
Analyzed the impact of a major equipment fabrication error on a chemical plant business interruption (BI) claim including schedule delay and financial impacts.

- **Pump Failure Root Cause Analysis**
  Root cause analysis of a boiler feed water pump failure including analysis of rotating equipment maintenance shop's pump maintenance and rebuild procedures. Provided recommendations to improve maintenance shop quality control.

- **Process Plant Fire Protection Review**
  Advised client regarding API and NFPA process industry fire protection standards.

- **Fuel Oil Contamination Dispute**
  Expert witness services regarding a residual fuel oil contamination in a storage facility.

- **Oil/Gas Separator Accident**
  Investigated the cause of an oil/gas separator failure. Reviewed and analyzed the design and manufacturer's specifications for the pressure relief system versus the installed equipment.

- **Force Majeure Dispute**
  Provided expert report relating to a claimed force majeure event that extended a petrochemical plant's turnaround schedule. The plant operator claimed force majeure due to defects in critical equipment that was required to be installed during the turnaround. The correction to the defects then resulted in the late delivery of equipment.

- **Petroleum Products Terminal and Pipeline Environmental Matter**
  Provided expert witness testimony in a groundwater contamination dispute regarding a petroleum products terminal.

- **Petrochemical Plant Explosion**
  Provided expert witness testimony and a expert report regarding a petrochemical plant reactor explosion, the design and sizing of the pressure relief valve (PRV), and standard operating procedures.

- **Refinery Due Diligence**
  In support of a potential acquisition and start-up of a topping refinery that had been shut down for an extended period, addressed any "fatal flaws" and provided support for evaluating order-of-magnitude costs required to inspect, repair, staff, and start-up the facility.

- **Industrial Accident Investigation**
  Investigated circumstances concerning personal injury of a contract employee who fell off a process vessel during a turnaround. Investigation included evaluating: (1) the operating company's and contractor's safe work practices; (2) relevant OSHA regulations; (3) appropriate fall protection requirements to mitigate risk associated with work activities; (4) responsibilities of affected parties and employees to utilize appropriate fall protection; and (5) identifying contributing factors to the incident.

- **Refinery Environmental Consent Decree**
  Investigated the causes of exceedances of permitted emissions levels at a petroleum refinery in relation to a proposed consent decree to resolve excessive notices of violation. Evaluated the causes, frequency, and levels of sulfur dioxide exceedance incidents. Correlated exceedances with refinery operations and capabilities of emissions control equipment. Prepared a strategy to eliminate exceedances under most operating scenarios, which was much lower in cost than the remediation proposed by the consent decree. Presented findings to regulatory agencies for approval.

- **Refrigerants Manufacturing Arbitration**
  Assisted in investigating claims that a plant, which manufactured refrigerants, was not designed to make products that complied with applicable laws. Work included assistance in discovery, inspection of the plant, evaluation of operating records, review of the plant technology and design, review of capital cost estimates, valuation of the plant, and determination of economic
damages. Prepared expert report and testified at hearing.

- **Refinery Incident Claim**
  Assisted in the investigation of a refinery leak and fire. Coordinated the collection of information related to the incident and disseminated it to the relevant parties. Helped audit incident related retained materials and developed inventory documentation.

- **Tank Incident Report**
  Assisted during an incident investigation related to construction of a storage tank. Interfaced with OSHA personnel during the identification and removal of tank components. Worked with attorneys and other experts to develop protocols for the identification and storage of retained materials.

- **Ethylene Plant Construction Dispute**
  Opined on the reasonable period of time for the completion phase of a rebuild project after a fire during an expansion project. Commented on the implementation of relief system changes during the rebuild to be in compliance with standards and codes.

- **Assessment of Naturally Occurring Radioactive Material**
  Followed claims by personnel who claimed to have been damaged by technically enhanced radioactive material (TERM), which occurred due to industrial activity. Investigated this phenomenon and compared it to normally occurring radioactive material (NORM).

- **Nitrogen Related Incident**
  Investigated events surrounding the rupture of a nitrogen vessel utilized to purge process equipment during a planned TA. The rupture led to several employee injuries and a fatality. Assisted counsel by evaluating existing plant safe work practices, procedures utilized by different parties associated with the event, and OSHA/PSM requirements relative to the job that was being performed. Efforts included reviewing employee depositions, employee and contractor safe work practices, documentation related to the planned TA and incident, and OSHA regulations. Developed expert report and provided deposition testimony.

- **Pipeline Operation Dispute**
  Following an unreported incident during right-of-way mowing, in which the machine downed a high voltage power line, the pipeline ruptured causing crude to seep into wetlands for several hours. We were asked to opine on the following pipeline operational parameters: supervision of mowing crews, whether mowing is - or should be - a ‘covered task,’ actions/inactions of control room operators when starting and monitoring pumping operations and leak detection software.

- **Chemical Plant Construction Dispute**
  Provided expert report on alleged engineering design and failed mechanical completion issues for a chemical plant in a lump sum and guaranteed completion date EPC contract. Prepared expert report and provided testimony detailing the basis of findings and opinions.

- **Natural Gas Distribution System Construction Dispute**
  Provided expert written reports and arbitration testimony in an EPC construction dispute concerning the construction of a new hydrocracker and associated refinery units. The dispute involved a range of issues, including engineering defects, construction quality control, and construction schedule delay impacts.

- **Natural Gas Measurement Dispute**
  Assisted with evaluating a claim for natural gas billings that may have exceeded actual usage. Investigated and evaluated purchased natural gas metering and material balancing at refinery site and natural gas supply metering stations.

- **Splitter Performance Review**
  Provided guidance on test run procedures regarding a new condensate splitter start-up. Reviewed operating and lab data to be
obtained during the test run and provided input into additional information to be collected.

- **Dispute Support - Groundwater Contamination**
  Provided expert report related to the standards of care for U.S. refineries operating prior to 1960, including typical maintenance practices employed at the time. Reviewed very limited historical records of the refinery and depositions taken of the workers at the refinery during its time of operation. Reviewed the hydrocarbon leak detection technology that existed during the operating life of the refinery and compared it to present technology available today.

- **Crude Oil Pipeline Dispute**
  Provided expert reports and interrogatory responses regarding the blending of butane into a crude oil stream that fed a commingled pipeline system. For an extended time period, evaluated the potential refining impacts of the individual crude oil qualities into the commingled crude oil.

- **Gas Wellhead Equipment Failure**
  Performed root cause analysis of a gas well casing hanger which led to a well blow out.

- **Business Interruption Damages Claim by Concrete Supplier**
  Provided an expert consultant business interruption loss estimate for damages to a concrete products producer as a result of an incident at an oil refinery.

- **Retail Marketing Contamination Dispute**
  A gasoline marketer that had withdrawn from a particular region was being sued for alleged contamination from leaking underground storage tanks at retail marketing locations in that region. We were retained to provide an overview of the gasoline supply chain with an emphasis on the various types of retail operations and to review the plaintiffs’ claims regarding the number of retail outlets that were owned and controlled by that company in the relevant time period.

- **Personal Injury Liability Investigation**
  Investigated a personal injury claim following a petroleum refinery process incident. Provided expert opinions on refinery conformity with the latest available industry technology, regulations, standards, and practices.