



IRC Risk and Safety, LLC



Capabilities Statement

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Protecting life and improving production by shaping the design and operation of hazardous facilities

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1 IRC RISK AND SAFETY, LLC

1.1 Overview

IRC Risk and Safety, LLC is an independent consultancy providing safety and risk management services. IRC is based in Houston, Texas, with an office in The Hague, Netherlands.

The company was founded on the principle of providing safety and risk assistance to the oil and gas industry and has completed projects for most major oil companies and operators worldwide. Although IRC's focus was, traditionally, in the oil and gas sector, demand for the company's skills and expertise has led to assignments outside the energy industry including mining, maritime and ports, water authorities, and local and state governments.

IRC is a young, dynamic team of experienced professionals with a proven track record of safety and risk management services in all corners of the globe. IRC recruits from a global pool of talent to ensure that the company always remains abreast of the latest industry trends and information.

The depth of experience to manage unpredicted fluctuations in client workloads and schedules is a hallmark of the company. IRC is ideally suited to perform any and all of these services for any discrete phase of a project or can complete comprehensive services and support the entire project scope.

1.2 History

The current IRC owners and partners were part of the original team that started International Risk Consultants (IRC) in Perth, Australia, in 1997. The Houston office was formally launched in 2002 and became an independent company at the beginning of 2006 as IRC North America LP. In January of 2008 the company name was changed to IRC Risk and Safety, LLC to add emphasis to IRC's mission and focus—protecting life and improving production by shaping design and operation of hazardous facilities.



2 SERVICES OFFERED

IRC offers a wide range of safety and risk management services varying from small, one-off studies to complete management of safety and risk for major field development projects. The company's approach to risk assessment is pragmatic—the work should be “fit for purpose,” easily read, and accurate. IRC delivers solutions that fit the application and are in each client's interest.

The company's portfolio attests to its extensive expertise in onshore and offshore oil and gas project support including concept selection, construction, operation, and decommissioning.

With a broad range of core competencies that span the gamut of risk and safety analyses—from broad scoped safety case preparation to specific, individual studies—IRC's services include:

- Accident and incident investigation (root cause analyses)
- ALARP—As low as reasonably practicable demonstration studies
- Building siting assessment
- CFD—Computational fluid dynamics studies
- Concept and design safety evaluations
- Concept safety case preparation and review
- Design validation and verification and risk management workshops
- Discrete risk studies
- Dropped-objects studies
- ETRERA—Escape, temporary refuge, evacuation, and rescue analysis as well as escape and evacuation studies
- FMEA & FMECA—Failure modes and effects analyses; failure modes, effects, criticality analyses
- HAZID—Hazard identification and risk management workshops and studies
- HAZOP—Hazard and operability studies
- Helicopter risk analyses
- HSE—Health, safety and environmental; development and implementation of integrated HSE management systems, including gap analyses
- LOPA—Layer of protection analyses
- Modeling and assessment
- Explosion
 - Fire
 - Source and discharge
 - Toxic gas or smoke dispersion
- MODU—Mobile offshore drilling unit safety case analyses
- Monte Carlo simulation
- Passive fire protection analysis
- Performance standard development
- PHA—Process hazards analyses
- QRA—Quantitative risk assessment
- RAM—Reliability, availability, and maintainability analyses
- Safety case (design, construction, operation, drilling) preparation including formal safety assessment (FSA) studies
- Safety-critical elements analyses
- Ship collision analyses
- SIL—Safety integrity level assessments
- SIMOPS—Simultaneous operations plans

3 PROVEN SAFETY SUPPORT PERFORMANCE

An enviable and proven track record in providing safety support to its clients ensures that up to 80% of IRC's work is generated from repeat business. IRC's recruitment philosophy and high caliber personnel ensure that the company remains current with the requirements and expectations of industry and regulators, which has enabled IRC to retain key clients since its inception. Some of the clients that IRC continues to provide support for include:

— Clients —

Aker Solutions	HESS Corporation	Repsol YPF
Alliance Engineering	LyondellBasell	SBM Atlantia
BG	Maersk	Seadrill
BHP Billiton	Modec	Shell
British Petroleum (BP Americas)	Mustang Engineering	Stena Drilling
Chevron	Noble Energy	Technip
Devon Energy	Occidental Petroleum Corp.	TORP
Enbridge	Oceaneering	Williams Energy
Environmental Sciences Limited (ESL); Mora Oil Ventures Limited	OPE Inc. Ophir	Woodside Natural Gas WorleyParsons
ExxonMobil	PegasusTSI	
Fluor	Petrobras	

4 EVIDENCE

4.1 Overview

IRC has significant experience in safety case preparation, front-end engineering design (FEED) support, concept safety evaluation (CSE) studies, SIMOPS studies, asset optimization (using dynamic simulation to best reflect reality), HSE training, HSE management system and in-house support.

IRC has provided this support across a range of industries including oil and gas, gas production, refining, petrochemicals, pipeline, public infrastructure, and marine and ports.

4.2 Flexible Team

IRC's offices maintain a permanent professional staff of approximately 25. With this size workforce, the company is an ideally situated resource for its clients to manage workload fluctuation. IRC often is asked to respond rapidly to a client's need to manage changing deadlines and project requirements around the world. The depth of experience of IRC personnel ensures that the company can, at short notice, supply resources to prepare project deliverables that are of the highest quality.

4.3 Regulatory Knowledge

Not only does IRC have a demonstrated track record of ensuring successful regulatory acceptance for its clients' activities, but many of the company's staff members also have worked in key offices at regulatory agencies around the world.

4.4 Whole Life Cycle Approach

In addition to IRC's capabilities in design, concept selection, and construction and operations support, the company has provided decommissioning support for a number of different projects. This complete range of experience ensures that IRC applies whole of life cycle considerations to its decisions. Concept selection studies will include relevant assessment of field abandonment and decommissioning requirements. This ensures that any development or operation activities are selected with the complete knowledge of short- and long-term project requirements.

4.5 Project Support Tools

IRC's staff is supported with expert tools and systems to ensure project deliverables are of the highest possible quality. The company's library of tools grows with client needs and technological advances. An ever-expanding electronic reference library currently holds more than 600 files—primarily global industry and regulatory guidelines, standards, and data. IRC's electronic toolbox holds software and IRC-created resources based on industry standard methodologies, such as:

Application	Tool
HAZID and HAZOP workshop facilitation	PHA-Pro®
Consequence Modeling	Tool
Explosion	DNV-Phast; CEBAM; FLACS
Fire analysis (jet, pool, and two-phase)	DNV-Phast; CIRRUS; FLACS; Phoenix (CHAM support) *HEPHAESTUS; *TARTARUS
Gas dispersion	DNV-Phast; DEGADIS; PHOENICS; CIRRUS
Smoke dispersion	Fire Dynamics Simulator (FDS); Smokeview (SMV)
Risk contouring	*CHECKERS
Reliability and availability	*RAM2
Frequency Analysis	Tool
Leak frequency and ignition probability modeling	*DELTA
Offshore blowout frequency	*DANTE
Risk Analysis	Tool
Dropped-object over water	*ICARUS
Ship collision modeling	*POSEIDON
Hydrocarbon offshore QRA	*HOMER
Offshore nonprocess fire risk	*BACKDRAFT
Helicopter risk calculation	*HERMES
Structural event risk	*CRUNCH
Occupational risk calculation	*DARWIN
Data Repository†	Tool
Inventory calculation	*DEMETER
Impairment criteria	*PROMETHEUS
Release group	*OMNI
Offshore evacuation and rescue	*TALARIS

* IRC tools (based on accepted standard methodologies) that facilitate analyses and reporting

† Repository for information to feed process risk analyses

5 QUALITY ASSURANCE

IRC's Business Management System (BMS) has full ISO9001:2000 Quality Management System certification.

IRC's BMS has been established and documented and is maintained with the specific objective of ensuring that all work provided by IRC meets the specified requirements of the customer at a consistent level.

To ensure that clients receive the highest quality document, IRC's business system requires that every report be quality checked by a competent person, including supporting calculations and then approved by a person authorized to do so.



6 CONTACT INFORMATION

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