

QRA

Quantitative Risk Assessment

An essential tool to manage your process risks and improve your process safety performance.



Why QRA?

To successfully manage process hazards, both identification of the hazards and assessment of the risks arising from them are required.

In some cases it is sufficient to carry out qualitative risk assessments using simple techniques such as calibrated risk matrices. However, in the following circumstances qualitative assessments may be too generic:

- If the risk is judged to be high.
- If the potential on and offsite consequences are severe.
- Where the system is very complex.
- Where there is a regulatory requirement e.g. Seveso II.
- Where there are potential domino effects, i.e. a fire or explosion that can escalate to involve other hazardous installations.
- Where risk based decision making is required.

In these cases, it is necessary to evaluate the risks numerically using QRA.

In Europe, following the Seveso II directive, QRA has been selected in countries such as the Netherlands or some regions of Spain as the best tool for risk management and land use planning, and the adoption in other countries is being seriously considered at this time.

Worldwide, several major Oil & Gas multinational companies already use QRA in the decision-making process of new projects and there are various countries which are including progressively in their national legislations the need of a QRA for process industries (USA, Australia, Switzerland, Hong Kong etc.).

What is the output of QRA?

QRA allows a site operator to quantify and therefore determine the acceptability of risks arising from major process hazards on an industrial site by quantifying:

- the severity of the final events derived from a failure (fire, explosion, toxic).
- the frequency of occurrence of the failure scenario and their related final events.

The results of a QRA can be presented at least in two different ways: individual risk (IR) or societal risk (SR). The most usual representations are the Location Specific Individual Risk (LSIR) contours for IR and the FN curves for SR. The risk obtained by a QRA can then be compared against established risk tolerability criteria or, when looking at options, by benchmarking risks against each other. Reassessment of the risk can then be considered if more accurate and realistic assumptions and data can be used.

The results from QRA can be used to:

- Identify cost-effective measures for risk reduction.
- Compare the relative risks of different options e.g. the transport of materials by pipeline vs. road transport.
- Establish risk-based inspection and maintenance programs.
- Define the safe lay-out of storage/production units, occupied buildings, etc.
- Define safe on-site manning number and locations.
- Optimise semi-quantitative HAZOP or SIL determination reviews (since lots of quantitative consequence and frequency data is obtained).



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- Draft the Predictive Aspects sections of Seveso II safety reports, and as a risk assessment record to meet other legislation (ATEX, CAD etc.).
- Ensure site risks meet international, national, local, industry and/or company standards for risk tolerability and acceptability.
- Land use planning and compatibility assessment between existing industrial sites and anthropised areas
- Improve the company's reputation.

How we deliver this service?

The way we deliver this service is proportioned to your needs and operations. We can adapt to the different approaches of QRA:

- Definition of scenarios
 - Corporate methodologies.
 - Purple Book / BEVI guideline or isolatable sections + parts count + OGP database for generic scenarios.
 - HAZOP, Process Hazard Review or other Hazard Identification techniques for specific scenarios.
- Risk target
 - Off-site population only.
 - On-site population only.
 - Both on-site and off-site population.

A generic QRA consists on the following steps:

- Process safety information gathering and analysis.
- Kick-off-meeting at the site.
- Scenario and assumptions workshops as needed.
- Calculations to obtain the raw IR/SR results are performed by our experts at our offices.
- ALARP workshop at the site where results are presented and risk reduction measures for further assessment are identified.
- Back in our offices the risk is reassessed if required and the final report issued.



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Our experience and strengths

Our global team of consultants has a vast amount of experience in QRA for corporate requirements, Seveso II Safety Reports and for Occupied Buildings Risk Assessment (OBRA). They also have experience in carrying out process safety reviews/audits, particularly in explosion prevention and protection. They are generally former process engineers with a strong chemical industry background complemented by a genuine expertise in process safety. Curricula Vitae (CVs) are available on request.

Our consultants are also used to work with different types of failure frequency databases, perform Fault Tree Analysis (FTA) and have extensive experience in the most common packages used for QRA:

- Consequence calculations: EFFECTS, Phast, ALOHA.
- Risk integration: RISKCURVES, Phast Risk.

Through our Process Safety Academy, our consultants also educate and build competency in QRA for a range of process industry companies and regulators worldwide, using their internal guidelines if required. They also deliver open courses at various locations worldwide in local language.

Contact your local representative

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About Us

We are consultants and business partners to many of the world's largest chemical, oil and gas, transportation, utility, pharmaceutical, and agriculture companies. Through a transformational approach, we guide clients in evolving both their organisational culture and their operational environment, enabling them to reduce exposures and injuries, save lives, protect assets—and in the process, achieve higher performance. DEKRA Insight represents the collective expertise of our legacy businesses, each an institution in safety.

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