

# Curriculum Vitae

## Richard Smyllie



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Director  
RS Process Safety Limited

### Education and Qualifications

1977, BSc, Environmental Chemical Engineering, Exeter University  
2008, Certificate, Reliability and Functional Safety, Technis Course Approved by IGEM (Distinction)

### Professional Memberships

Engineering Council UK - Chartered Engineer  
Institution of Chemical Engineers - Member  
Institution of Chemical Engineers - Chartered Scientist  
Society for the Environment - Chartered Environmentalist

### Career Summary

2012 Director RS Process Safety Limited  
2012, Technical Director - Risk and Safety Management AMEC E&I UK  
2011, Associate Director, AMEC Environment & Infrastructure UK  
2007, Associate Director, Entec UK Ltd  
1994, Principal Consultant, Entec  
1987, Principal Engineer, Cremer and Warner Limited  
1985, Project Engineering Manager, Procter and Gamble Limited  
1983, Production Shift Manager, Procter and Gamble Limited  
1978, Senior Development Engineer, British Gas Corporation Midlands Research Station  
1977, Research Engineer, Water Research Centre

## Overview

After graduating in Environmental Chemical Engineering Richard Smyllie has followed a rewarding and influential career in chemical engineering consultancy. His involvement in the Inquiry and Litigation following the explosion and fires on the Piper Alpha platform has given him a unique perspective on the issues that can lead to major disasters, loss of life and loss of critical assets. This experience has enabled him to follow a successful and internationally respected career in process safety where his expertise and knowledge has helped over fifty clients, in a range of industries, to manage the risks posed by their processes and operations. This has frequently been conducting Strategic Asset Risk Assessments (SARA) on multi million pound facilities across the world including 15 European countries, Brazil, India, Middle East (Qatar, Dubai, Kuwait), Libya, Singapore and Australia. These facilities have frequently represented strategically critical assets on which the individual Country and Operator's economic and financial wellbeing is founded.

## Key Expertise

Richard Smyllie is a Chartered Chemical Engineer with over 40 years experience in chemical engineering, process engineering, process safety, risk management and pollution prevention and control. He has used this expertise and experience across a wide range of industrial sectors including high hazard industries such as Oil and Gas, Chemicals and Petrochemicals as well as the Water, Wastewater and Pharmaceuticals Industries. His experience in process safety was gained following involvement in the high profile Piper Alpha Disaster Public Enquiry and subsequent litigation where he gave expert evidence. This was on the matter of unexplained extended flaring. He also prepared the evidence on hydrates that was subsequently found to be the initiating event of the disaster. In process safety he is an internationally recognised risk management practitioner that has included various types of risk assessment including, qualitative and quantitative risk assessment (QRA), hazard identification (HAZID), hazard and operability studies (HAZOP) facilitator, Layer of Protection Analysis (LOPA) Facilitator, Failure Modes Effects and Criticality Analysis (FMECA), Operational Risk Assessments and Availability, Reliability and Maintainability (ARM) studies (BP Approved HAZOP/LOPA Facilitator). His HAZOP facilitation has involved over 100 studies on some major multibillion dollar process facilities including offshore installations, Liquefied Natural Gas (LNG) terminals, oil and gas processing plant, oil, gas and LPG pipelines, oil and gas terminals, refineries, wastewater treatment plant, incinerators (hazardous waste, MBM and sewage sludge) and drying plant. His pollution prevention and control experience was gained in undertaking several contract research reports for the Environment Agency which culminated in drafting 5 of the Series 2 Integrated Pollution Prevention and Control Guidance Notes and several of the Local Authority Pollution Control Guidance Notes (Part B Processes). He has undertaken several environmental risk assessments. He is experienced in ATEX and DSEAR (Dangerous Substances and Explosive Atmospheres Regulations) and has given training courses in this subject.

## Oil and Gas Industry Experience

Richard has considerable experience in the oil and gas industry mainly related to process safety issues of high hazard installations. He worked on the Piper Alpha Public Enquiry including giving expert evidence. He has conducted several process safety related projects for International clients that have included BP, Maersk Oil and Gas, Maersk Oil UK, Shell, Danish Oil and Natural Gas (DONG), GNI (Gas Networks Ireland), Gas Authority of India Limited (GAIL), Qatar Petroleum (QP), AGOCO (Arabian Gulf Oil Company), SNCL- Poland LNG, PBG Poland, National Grid Gas, Technit Sener LNG, Transpetro (Brazil), TGE Gas Engineering (Tractebel), Sofregas, Fingleton White, FingeltonMcAdam, Oil and Gas Producers Association. These studies have covered a wide range of topics including feasibility study for live crude oil transfer from offshore platforms to onshore terminal. This covered integrity analysis of pipelines, flow

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assurance, safety / environmental risk assessments, gas processing technology and option review. He has also performed projects on pipeline integrity analysis for a crude oil pipeline; VOC Emissions reduction Feasibility Study for a crude oil terminal; degassing facility (Denmark and Libya), ARM studies for crude oil pipelines (Brazil), products pipelines and crude oil terminal and a gas storage facility; Operational Risk Assessment for key gas pipeline valve station; Quantified Risk Assessment for gas pipelines, LNG terminal and chemical storage facility; Hazardous Area Classification for LNG terminal. He is a BP approved HAZOP LOPA facilitator and has conducted studies for the Shah Deniz 2 project (offshore installation, onshore gas terminal and SCPX gas pipeline); recent experience facilitating the FEED and detailed design HAZOP studies for the Culzean Field Development Project (Maersk Oil UK – North Sea) and most recently a re-HAZOP of the Halfdan A platforms for Maersk Oil and Gas. Other HAZOP studies have included: wellheads and full oil stabilisation and gas processing plants, 1200km LPG pipeline in India, LNG storage and loading terminals (8), facilities upgrade project (Qatar). He also provided technical input to EU ETS emission abatement for projects for the Oil and Gas Producers Association.

### Process Safety and Risk Management

From the experience gained during the Piper Alpha Public Enquiry Richard has become internationally respected in the field of process safety and risk management. This experience includes process safety reviews, design reviews, layout reviews, Operational Risk Assessments, Quantified Risk Assessments (QRA), FMEA, FMECA (Failure Modes Effect and Criticality), ARM (Availability, Reliability and Maintainability) Studies, HAZID, HAZOP, DSEAR (Dangerous Substances and Explosive Atmospheres Regulations) and ATEX reviews, HAC (Hazardous Area Classification), LOPA / SIL (Layer of Protection Analysis / Safety Integrity Levels) assessment, regulatory compliance reviews and integrity analyses.

### Offshore Experience

Richard's offshore experience is considerable and started with his involvement with the Piper Alpha Disaster Public Inquiry and ensuing legislation. His wide range of experience in oil and gas has involved more recent offshore experience including ongoing HAZID, HAZOP/LOPA for various facilities including Maersk Oil and Gas (Halfdan A asset); Maersk Oil UK - Culzean field offshore bridge linked platforms (FEED and Detailed Design), BP Shah Deniz 2 packages for offshore platform including some subsea facilities; the Ichthys offshore gas field development off the NW coast of Australia (large semi-submersible Central Processing Facility (CPF) and Floating Production Storage and Offloading (FPSO) units) (both of these were the largest in the world at that time). He also conducted a Health Risk Assessment for the Ichthys project. For the Commission for Energy Regulation in Ireland he undertook a review of the safety regulatory regime for the upstream oil and gas industry in Ireland. This covered offshore exploration and extraction and included development of

the implementation programme for the move to a risk based (Safety Case) Safety Regulatory Framework. He has project managed a large project for Danish Oil and Natural Gas (DONG) investigating the issues associated with transferring live crude oil from offshore platforms through to onshore terminals. This included pipeline integrity assessment, flow assurance, operational implications, risk assessment, crude oil degasification and NGL gas processing plant design review and layout review. He has performed risk assessments and reliability reviews for Gas Networks Ireland covering interconnectors (between the UK and Ireland) and subsea isolation valves to the Isle of Man.

### Risk Assessment and HAZOP / LOPA Facilitator (See table at back of CV)

Richard is an internationally recognised HAZOP / LOPA and Risk Assessment Facilitator. He is a BP approved HAZOP and LOPA facilitator. These commissions have been performed in the oil and gas (onshore and offshore), water, wastewater, chemicals / petrochemicals, pharmaceuticals and semiconductor industries. They frequently relate to large scale multimillion/billion dollar projects. Some examples include: Halfdan A offshore platforms (MOG); Culzean offshore platforms for Maersk Oil UK, Oil and gas facilities Shah Deniz 2 onshore gas terminal and South Caucasus Pipeline for BP, other oil and gas facilities (wellheads, pipelines, oil stabilisation, gas processing), natural gas pipelines and AGIs, 1200km LPG pipeline, LNG storage and loading facilities (8 terminals), chemicals production, flammable liquid storage and handling, sewage sludge incinerators and dryers (10 off), sludge digestion and automation, offshore mud cleaning heater, blackstart facility for power station, waste handling pre-treatment plant, pharmaceutical GPP, Pharmaceutical CHAZOP study, Wastewater treatment CHAZOP studies (x 2), oil and fuel storage, waste fuel to cement kiln, pharmaceutical SHE Review, chemical storage facility.

### Pipeline Engineering and Networks

Through his oil and gas expertise Richard has considerable pipeline expertise. This covers crude oil pipelines, natural gas transmission pipelines (Gas Networks Ireland / South Caucasus Pipeline for BP), LPG pipelines, LNG piping, products pipelines (e.g. fuel oil, methanol), water and effluent pipelines. He has undertaken Quantified Risk Assessment (QRA) of natural gas transmission pipelines, Safety Case and MAPD (Major Accident Prevention Document) preparation for natural gas transmission pipelines (under the Pipeline Safety (NI) Regulations) and Availability, Reliability and Maintainability (ARM) studies for crude oil and products pipelines. For Danish Oil and Natural Gas (DONG) an integrity analysis of a crude oil pipeline was performed. He has conducted HAZOP studies and process safety reviews for the SCPX gas pipeline project (Azerbaijan / Georgia); a 1,200km LPG pipeline in India. In Ireland he has conducted many risk assessments, HAZOP, FMEA, LOPA of several of GNIs major transmission facilities.

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### Water and Wastewater Expertise

He has conducted process safety reviews, design reviews, risk assessments (including QRA), DSEAR assessments, and HAZOP studies for water treatment plant (membrane filters, chloramination disinfection) and waste water treatment (complete new effluent treatment works in UK, Czech Republic, Jordan, Qatar and Dubai) including sewage sludge dryers and sewage sludge incinerators. He facilitated the hazop studies for Beckton, Crossness and Belfast line 2 SS Incinerators. His sewage sludge dryer experience is considerable and covers 10 sites representing a significant number of dryers in the UK (Andritz and Nara dryers.). Bran Sands for Northumbrian Water, Cardiff and Afan for Welsh Water, 4 sites for Southern Water, Galashiels and Levenmouth for Scottish Water, Brno in the Czech Republic for Degremont. One of the main hazards associated with these plants is the issue of dust explosions. He has conducted compliance reviews with HSE guidance on sewage sludge dryers. He also has considerable Sewage Sludge Digestion experience having project managed preparation of P&IDs for all United Utilities and Northumbrian Water Limited sewage sludge digesters, followed by chairing HAZOP studies including preparation of best design / best practice advice and guidance notes. He has conducted HAZOP studies on many other wastewater treatment systems, including pumping stations, CSOs, pipeline networks and feeds to STWs.

### Biomethane and Hydrogen

As indicated under wastewater treatment, he has considerable experience of Anaerobic Digestion plant and biomethane production. More recently (2019) he facilitated a study for biomethane injection into the Irish gas distribution network. He has much experience on landfills with performance of risk assessments and DSEAR for landfill gas handling and CHP engines. When at British Gas he operated a methanol reformer for the production of hydrogen used in a large-scale pilot plant fluidised bed hydrogenator at high temperature and pressures. (750°C and 50barg). He performed a HAZOP of a pharmaceutical process for Fisons which included sodium reaction with water and hydrogen generation.

### Reliability and Functional Safety

He completed an extensive training course in Reliability and Functional Safety accredited by IGEM with Technis (David Smith). Following successful completion of the post course assignments he received a distinction in the course and has used the knowledge gained to perform Layer of Protection Analysis (LOPA). He is a BP Accredited LOPA Facilitator as well as performing LOPA for other clients including Nigeria LNG (to Shell standards), KBR and Gas Network Ireland. He undertook a LOPA assessment on gas odorant injection to gas entry facilities for GNI which was subject to critical review by the Regulator (Commission for Regulation of Utilities).

### Utilities

When conducting studies on all the previously mentioned projects many of them have involved utilities in support of the main process. Any offshore facility needs to be self-sufficient in all utilities and several studies have included covering all aspects of utility safety, reliability and operation: e.g. power generation, em gen, UPS, N2, Inst Air, steam production and distribution, potable water production, seawater cooling, chemical injection, effluent treatment, wastewater treatment, sewage treatment.

A Summary of HAZOP / HAZID / LOPA / Risk Assessment Facilitation in the last 10 years is included in the table on the next page.

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HAZOP / LOPA / HAZID / Risk Assessment Study	Approx Dates	Client
Southern Area Reinforcement (Rol) HAZOP and LOPA	2020 Q2 / Q3	Gas Networks Ireland
Compressor Station Export Facilities FMECA, RA.	2019 Q2-2020 Q2	Fingleton for GNI
Biomethane Injection to Gas Network HAZOP + LOPA	2019 Q3-4	FWL for GNI
HAZOP LOPA African Gas and LNG facilities (Algeria+ Nigeria)	2018 Q3+Q4 2019 Q1-2	KBR JV Gas Nigeria LNG
Valve Criticality Study	2018 Q2-3	GNI
Sintering Ovens HAZOPs	2018 Q3	CRP Ltd
Odorant LOPA & QRA for Gas Transmission and Biomethane	2017 Q4-2018 Q4	Arup for Gas Networks Ire'd
Control upgrades HAZID Northern Ireland AGIs	2017 Q3	NeoDyne
HAZID Glen Moar PRS	2017 Q3	Manx Utilities
Risk Assessment / LOPA aftercooler failure. HAZOP / HAZCON Brighthouse Bay CS	2017 Q2 - Q3	Arup for Gas Networks Ireland GNI
HAZID / HAZOP Loughshinny Gas Terminal Ireland - Control System Changeout	2017 Q1 - Q2	NeoDyne for Gas Networks Ireland GNI
Halfdan A Offshore Platforms re-HAZOP Study	2016 Q3 to 2017 Q1	Maersk Oil
Hamina (Finland) LNG Terminal HAZOP Study	2016 Q3	Tractebel Gas Eng'g
Culzean Field Development UK North Sea – Detailed Design HAZOP. Singapore	2016 Q1 to Q3	Maersk Oil (UK) Ltd
Culzean Field Development UK North Sea – Detailed Design HAZID. Singapore	2015 Q4	Maersk Oil (UK) Ltd
SCPX – HAZOP and LOPA Gas Pipelines, Compressor Stations and facilities. AFC HAZOP / LOPA and Packages	Q2 to Q4 2015	South Caucasus Pipeline Co for BP
Culzean Field development UK North Sea – FEED HAZOP	Q1 to Q2 2015	Maersk Oil (UK) Ltd

HAZOP / LOPA / HAZID / Risk Assessment Study	Approx Dates	Client
CPX – HAZOP and LOPA. Gas Pipelines, Compressor Stations and facilities. AFC HAZOP / LOPA	Q4 2014	South Caucasus Pipeline Co for BP
Shah Deniz 2 Package HAZOP Offshore Platforms + Gas / Condensate terminal	Q1-Q3 2014	BP Shah Deniz Ltd
HAZCON Brighthouse Bay Compressor Station Gas Turbine Exhaust Replacement	Q4 2013	Bord Gais (UK) Ltd
Isolation Valve Replacement (Gas Compressor Station). HAZID / Risk Assessment	Q3 2013	ARUP for Bord Gais Networks
PTFE + ETFE Plant HAZOP study facilitation	Q3 2013	AGC Chemicals Europe Ltd
Subsea Facilities – Wellheads, Manifolds, Flowlines and Risers. Shah Deniz Phase 2. Change HAZOP	Q3 2013	BP Shah Deniz Ltd
Shah Deniz Phase 2 – Onshore Gas terminal. RFD HAZOP and Prelim LOPA. Gas and Condensate Treatment	Q1 to Q2 2013	BP Shah Deniz Ltd
Pigging Temporary Filter – Natural gas AGI. – HAZID / HAZOP / LOPA	Q1 2013	Fingleton White for Bord Gais Networks
SCP Exp – HAZOP and LOPA Facilitation. Nat Gas Pipelines, Compressor Stations and facilities. AFD HAZOP / LOPA	Q4 2014	South Caucasus P/L for BP Shah Deniz Ltd.
Chirag Oil Project (COP) – DWG Water Injection HAZOP	Q3 2012	JP Kenny
Shah Deniz 2 – Onshore Gas terminal. HAZOP and LOPA. Gas and Cond treatment.	Q1 to Q3 2012	BP Shah Deniz Ltd
KOC Kuwait Oil Company – Oil Gathering Station Kuwait	Q4 2011 - Q2 2012	Amec for KOC
Semi sub-mersible Gas and condensate treatment. Ichthys Field / NW Australia.	2011	Amec for Inpex
FPSO Condensate treatment, storage + offload	2011	Amec for Inpex
Valhal Platform - Prod. Water xfer to S'-off tanker	2011	BP Norge AS
Loughshinny AGI (Republic of Ireland) HAZID	2011	Fingleton White for BGE