

CURRICULUM VITAE  
**ALAN BORROWMAN**  
TECHNICAL EXPERT



### QUALIFICATIONS

BSc (Hons), Chemical Engineering, University of Birmingham, UK, 1969  
MSc, Chemical Engineering, University of Birmingham, UK, 1970  
CEng, Chartered Engineer

### MEMBERSHIPS

Fellow, Institution of Chemical Engineers, UK

### PROFESSIONAL DEVELOPMENT

Witness Familiarisation Training by Bond Solon, 2021  
Advanced Professional Award in Expert Witness Evidence (APAEWE) by Legal Experience Training, accredited at Masters/BTEC Level 7 by Edexcel, 2020  
Witness Familiarisation by Legal Experience Training, 2019  
Witness Familiarisation Training by Bond Solon, 2015  
Energy Savings Opportunity Scheme (ESOS); assessor accredited by IChemE, 2014

### KEY STRENGTHS

Chemical / Process Engineer with multi-discipline design and operational experience  
Team management experience (in projects, design and process safety)  
Experienced in process risk assessment techniques (HAZOP, HAZID, SIL, LOPA, QRA) :  
(Please refer to sample listing of studies conducted over the last 20 years)  
Experienced in SHE management systems (including safety cases, setting & monitoring KPIs)  
Trainer for HAZOP team leader, process safety management and hydrogen safety courses  
Investigation and communication to non-technical professionals (as expert witness)

## PROFILE

**Alan Borrowman** is an expert in chemical and process safety engineering, with over 50 years' experience in his field. His roles have exposed him to site and plant operations, providing advanced knowledge and experience in project engineering, project management, process design, safety and environmental engineering, and risk management. His global work spans Africa, Asia, Europe, the Middle East, North America and Oceania.

Alan spent the first 20 years of his career as a design and project engineer for pharmaceutical and fine chemical companies. This involved designing chemical processes, specifying plant equipment and selecting materials for highly corrosive and toxic processes, often where textbook data was not available. He spent a further 10 years working on the design of hazardous plants for the onshore and offshore oil and gas industry, being responsible for reviewing and changing design safety practices in the aftermath of the high-profile Piper Alpha disaster. In recent years, Alan has been called upon to conduct various offshore incident investigations.

He has facilitated over 150 HAZOP, LOPA and HAZID (safety) reviews for UK and international clients in the last 20 years and now passes on that experience by delivering IChemE accredited training courses in HAZOP and Process Safety Engineering skills. He also provides strategic consultancy to companies to identify process safety shortcomings and hence improve their SHE management system.

Alan has concurrently spent several years developing unconventional energy projects. This includes underground coal gasification (UCG) in Scotland, Serbia and Nova Scotia, for which he patented a multi-lateral well design, and a bioenergy plant in Rwanda.

He is a Fellow of the UK Institution of Chemical Engineers, having served on the Scottish branch committee and he was elected to and successfully held the role of chairman of the Scottish branch for a two-year term in 1991. Alan has also served as chairman of the Safety and Reliability Society for the North of Scotland branch. He has lectured on Reliability Analysis to the MSc course in Process Safety and Loss Prevention at Sheffield University.

Since 2015, Alan has been appointed to expert advisory roles on 13 occasions for accident investigations and for clients in contractual disputes involving the design, construction and safe operation of chemical, oil & gas production and other processing facilities.

## EXPERIENCE

### EXPERT WITNESS & ADVISORY

#### **Gas Terminal, North Africa (2022)**

Expert Witness. Opined on the methodology adopted for a detailed design HAZOP study

#### **Waste to Energy Plant, United Kingdom (2020-2021)**

Expert Witness. Advised defendant's lawyers on ATEX compliance matters in relation to the storage and handling of activated carbon, and gave evidence to the High Court in London.

#### **Polymer Plant, Saudi Arabia (2020)**

Expert Witness. Provided an independent report on the cause of an explosion resulting from inadequate pressure relief and procedure violation.

#### **Modular LNG Plant, West Africa (2018-2019)**

Expert Witness. Appointed to a multi-discipline team as a process engineering and process safety expert to investigate and provide opinion on alleged design shortcomings relating to gas venting, compression equipment, and safety deficiencies during commissioning. Presented 5 expert witness reports and testified at the international arbitration hearing in New York in December 2019.

#### **Oil Production Vessels, Singapore (2017)**

Expert Witness. Assessing and providing opinion on the contribution of client comments on the contractor's design to causing delay to a FPSO (Floating Production and Storage and Offloading) project.

### **FPSO Integrity Assurance Performance Standards, Nigeria (2017)**

Updated and re-aligned 30 safety performance standards for a FPSO to Total's standard.

### **Gas Plant, Middle East (2016)**

Expert Witness. Investigated and advised on the safe separation distances between process units in a gas plant in order to assist the client to identify its position in a contractual dispute.

## **INDUSTRIAL & MANUFACTURING**

### **Steel Rolling Mill, UK (2019)**

Expert Witness. Investigated the cause of an explosion in the lubrication system, which resulted in fatalities.

### **Uranium Hexafluoride Tails Management, UK (2018)**

Expert Witness. Investigated engineering and design matters specific to safety systems which delayed completion of design and related materials supply, with further impact on the delayed construction and commissioning of a uranium fuel recycling facility.

### **Silicon Wafer Manufacture, UK (2017)**

Expert Witness. Investigated the cause of a chemical spillage which resulted in a fire leading to the total loss of a factory, to assist the factory owner to reach a view on its position in the related contractual dispute.

### **Plastics Manufacturing Plant, UK (2017)**

Expert Witness. Advised on the incorrect design of pressure relief systems and other process safety design defects resulting from an immature design and sub-standard HAZOP study.

### **Nuclear Fuel Reprocessing, UK (2016)**

Expert Witness. Investigating and opining on the design procedures and design execution of a new nuclear fuel processing facility to enable the client to decide if the design contractor had met the safety case standard for managing fire, radiological and toxicological hazards.

### **Nail Varnish Manufacture, Scotland (2016)**

Expert Witness. Investigated the cause of pump and pipework damage from a pressure surge, which occurred during batching solvent from a tank farm.

## **POWER & UTILITIES**

### **Energy from Waste Plant, UK (2021)**

Expert Witness. Advised the respondent to a claim for damages on the requirement for ATEX rating of an activated carbon storage and transfer facility.

### **SWIFT Single Well Design (2013)**

Developed and awarded the patent for SWIFT single well design, the most significant cost-reduction technology for underground coal gasification in the last 25 years.

### **Renewable Energy Project, Rwanda (2010-2013)**

Technical and economic development of a proposal for 65 MWe of generation from peat, papyrus and agro-waste in Rwanda.

### **Coal Gasification Project, UK and Serbia (2006-2012)**

Technical Director responsible for the development of in situ extraction proposals, including a) the first UK underground coal gasification (UCG) licence, b) an in-situ conversion of kerogen to oil in Serbian shales and c) kerogen recovery using steam assisted gravity drainage techniques.

## **TRAINING & TECHNICAL AUTHORITY**

### **HAZOP Team Leader and Process Safety Engineering Training, Malaysia (2019 - ongoing)**

Provision of remote training courses in SE Asia on HAZOP technique and Team Leader (approx. 4 to 6 courses per year), Process Safety Management and Hazardous Area Classification.

**Knightsbridge FPSO project, North Sea, UK (2014-2015)**

Safety 'Technical Authority' within the FPSO operator's project team.

**Rosebank FPSO Project, UK (2014)**

Carrying out a gap analysis of Major FPSO Accident Hazards compared to a reference design.

**Western Isles FPSO Project, UK (2013)**

Delivering a safety gap analysis of the Front-end Engineering Design (FEED) by a Norwegian contractor to assess compliance with UK health and safety legislation and engineering practices.

**Solan Project, North Sea, UK (2012)**

Carrying out an independent review of design safety documents

**Forties Alpha Satellite Platform Project, UK (2011)**

'Technical Authority' on Safety within the operator's project design team.

**Oil Escape, Greenland (2011)**

Investigated an oil escape from a subsea blow-out preventor (BOP) on a drill rig located in Arctic waters. The investigation identified procedural failures in the washing out of drill cuttings (client confidential).

**Gas Corrosion, North Sea Platform, UK (2010)**

Investigation of a sour gas corrosion of a high-pressure gas compressor pipework, which identified the amount of water in the gas as critical.

**West Franklin Project, North Sea, UK (2010)**

Delivering hazard identification, design safety philosophies and safety assessment studies.

**Babbage Platform Project, North Sea, UK (2009)**

Safety support studies, e.g. gas release & dispersion, fire and explosion.

**Shell International, HAZOP Team Leader Training, Netherlands, Malaysia and Russia (2006-2009)**

HAZOP Team Leader Trainer. Responsible for providing all of Shell International's HAZOP Team Leader training.

**Gas Leak, North Sea Platform, UK (2004)**

Investigating a gas leak which occurred during piping modifications due to the premature removal of safety interlocks and a lack of coordination between operating and engineering personnel.

**Mobile Drilling Units Integrity Assurance, UK (2004)**

Developing a generic Operational Integrity Assurance Scheme for mobile drilling units, identifying safety-critical elements from hazard studies, producing performance standards for designers, and developing assurance tasks to ensure that standards were maintained during live operations.

**BP North Sea Assets Integrity Assurance, UK (2003)**

Managing the application of in-house developed software to identify safety-critical equipment in the SAP database of maintainable items for over 40 North Sea installations.

**Project Safety Reviews, Worldwide (2001-2017)**

Independently facilitated over 200 design safety reviews including HAZOP, HAZID, SIL Assessment and Level of Protection Analysis for numerous international oil & gas operators and design contractors.

**Gas Plant, UK (1997)**

Prepared a Design Safety Case for a 'not normally manned' gas platform. Carried out Quantified Risk Analysis to select the optimum platform position, jacket, topsides layout and risk reduction measures.

**Shutdown Valve Failure, UK (1996)**

A platform riser emergency shutdown valve failed to close during a test due to a degraded seal in a solenoid control valve and inadequate testing procedures.

**Brent Spar, UK (1995)**

Assessing occupational and major accident hazards associated with the re-use of the Brent Spar oil storage and tanker loading buoy as a coastal protection reef.

### **Gas Explosion in Gas Compression Plant, UK (1994)**

Prepared a safety case for commissioning a barge-mounted gas compression plant in a construction yard on the River Tyne, following a multiple fatality explosion during high pressure leak testing of pipework.

## **DESIGN**

### **Director, QEDi Consultancy, UK (2001-2006)**

Co-founding and developing an oil and gas risk consultancy growing the business from start-up to a £2m pa turnover enterprise holding responsibility for setting the firm's strategic direction and managing long-term client assignments.

### **BNFL Sellafield, AMEC, UK (2000)**

HSE Manager with responsibility for establishing regulatory arrangements for the implementation of shutdown projects in the Fuel Reprocessing Plant, providing method statements and risk assessments, organising safety studies, conducting failure / reliability studies in the Flask Handling Plant to develop maintenance strategies and fault-finding guides.

### **Technical Authority (Safety and Environment), AMEC, UK (1992-1999)**

Responsible for 10 technical safety engineers in a core team and resourcing others into project teams for the assurance of safety and environmental protection in engineering projects. Established hazard management philosophies and procedures within alliance contracts. Developed and promoted risk identification and assessment techniques as an integral part of the design process. Developed project risk management awareness and practitioner courses to improve performance in setting project objectives.

### **Chief Engineer (Process Studies), Foster Wheeler Wood Group, UK (1991)**

Responsible to Engineering Manager for a group of process engineers engaged in offshore conceptual design studies, designing modifications for improving safety and operability.

### **Process Engineering Manager, Roche Products Ltd, Ayrshire, UK (1988-1990)**

Responsible to Chief Engineer for directing 10 process engineers and supporting draughtsmen in pre-sanction studies, front end design, commissioning and de-bottlenecking studies, preparation of technical and financial assessments of new projects.

### **Project Engineering Manager, Roche Products Ltd, Ayrshire, UK (1984-1988)**

Responsible to Chief Engineer for technical direction and administration of engineering design and construction, executing projects (value £10M pa.). Established procedures for estimating, planning, cost control, procurement, contract specification and construction management.

### **Vitamin C Plant Commissioning, Roche Products Ltd, Ayrshire, UK (1982-1984)**

Supervised start-up of multi-column distillation plant, trained operators, prepared operating documentation and supervised punch list modifications.

### **Glaxochem Ltd, Montrose, UK (1978-1982)**

Senior Project Engineer responsible to Chief Engineer for engineering design and construction of organic chemical plants. Managed engineering and process design of automated steroid plant.

### **Dista Products Ltd, Liverpool, UK (1970-1976)**

Project Engineer responsible to Project Engineering Manager for chemical engineering design and implementation of organic chemical synthesis and fermentation plants.

## **PRESENTATIONS & SPEAKER ENGAGEMENTS**

**“A Quantum Leap in UCG Technology”**, Annual Conference of Underground Coal Gasification Association, London, 2012

**“Explosion at Plastics Plant”**, First Jordanian International Chemical Process Safety Virtual Conference, March 2021

## **LANGUAGES**

English (native)

CLIENT	EXAMPLES OF HAZOP ASSIGNMENTS	LOCATION
Agip/KCO	HAZOP & HAZID reviews for Kashagan Tranche 3 Facilities	Milan
KBR/ExxonMobil	HAZID of Atlantic Cromarty pipeline installation	Aberdeen
SBM/BP	HAZOP/HAZID of Greater Plutonio CALM buoy offloading	Monaco
SBM/Chevron	HAZOP of Sanha LPG FPSO refrigeration plant modifications	Oslo
Total	HAZID of Moho Bilondo FPSO FEED design (Bluewater)	Amsterdam
IMCO/QP	Cause & Effects review of Fahahil Stripping Plant controls upgrade	Doha, Qatar
IMCO/QP	SIL Assessment for Fahahil Stripping Plant controls upgrade	Doha, Qatar
Total	Moho Bilondo FPSO FEED HAZOP	Paris
CSL	Gannet Hazard Identification & Risk Assessment	Aberdeen
PSN	Harding Platform Oil-based Mud HAZOP	Aberdeen
SLP	Wenlock Platform NUI HAZOP	Lowestoft
PSN	Captain Piggings Operations HAZOP	Aberdeen
SBM	Kikeh Gravity Actuated Pipe HAZID	Monaco
AkerKvaerner	HAZOP - Calcium Pantothenate Removal Trial on Bleo Holm FPSO	Aberdeen
Nexen	HAZOP of Buzzard Pre-Commissioning Procedures	Aberdeen
PSN	Alba Flare Tip Removal HAZID	Aberdeen
AkerKvaerner	Affleck SIL Review	Aberdeen
Shell	Caravel 'Normally Unmanned Installation' (NUI) HAZOP	Assen
WoodGroup	Schiehallion Riser Valve SIL Review	Aberdeen
Shell	Pearl GTL (Qatar) Project HAZOPs – Offshore Platforms & Pipelines; Onshore Pipelines; Tankfarms; Offshore-Onshore Interfaces in Dubai, Abu Dhabi, London	
Teekay Petrojarl	Foinavon FPSO Hydrocyclone Jetting System HAZOP	Aberdeen
Monitor Offshore	Power Buoy for Lyell Subsea Wells HAZOP	Aberdeen
Shell / partners	HAZOP Awareness and Leader Training Courses in Rijswijk, Sarawak, Sakhalin	
KOC	Process Hazard Analysis Training	Kuwait
BP	BP Fiddich SIL Review	Aberdeen
Wood Group	In Salah Closed Drains HAZOP	Glasgow
Statoil	Risk Assessment of Gullfaks BOP during Underbalanced Operation	Bergen
ENPPI	SIL Review of Rosetta and IKPU separator gas blowby protection	Cairo
MOL Pakistan	Manzalai Flash Gas Compression HAZOP	Dubai
ENPPI	West Delta Booster Gas Compression	Cairo
Shell	Pearl GTL (Qatar) Project – Offshore/Onshore Interface HAZOP	Qatar
BP	Schiehallion Marine Systems Re-HAZOP (through Altra)	Aberdeen
BP	Clair Gas Plant Re-HAZOP (through Woodhill Frontier)	Aberdeen
Conoco	Judy Platform Re-HAZOP (through Optimus)	Aberdeen
Pakistan Petroleum	HAZOP of Adam X-1 Early Gas Production Facility	Dubai
Presson Descon	Kandhkot Gas Dehydration / Glycol Regeneration HAZOP (Pakistan)	Dubai
Tullow Oil	Early Production Facility HAZOP, HAZID (through Weatherford)	Kampala
Client confidential	MV1A-1 Early Production HAZOP (through Weatherford)	Gloucester
Petrom	Oprisenesti Field Development HAZID/HAZOP/SIL	Romania
MOL/Ural O & G	Kazakhstan gas/condensate development	Budapest
AMEC/Enquest	Knightsbridge Process & Utilities HAZOP	Aberdeen
Maersk	Chaired Drilling HAZID for Senergy	Copenhagen
Aker/Talisman	Flyndre/Cawdor Detailed Design HAZID/ENVID	Aberdeen
Shell	Penguins FPSO Marine Systems FEED HAZOP	Aberdeen
BWO / Premier	Catcher FPSO Marine and Vendor HAZOPs	Singapore