

Reuben Sunderland

Senior Consultant

Experience Summary:

Reuben Sunderland is a Chartered Engineer with over nineteen years of experience in offshore oil and gas. During this time he has been involved in the development and execution of numerous pipeline / subsea projects in various parts of the world and with various operators, including:

- Atlantic Canada (ExxonMobil);
- Australia (Apache, BHP Billiton, Chevron, ConocoPhillips, ENI, INPEX, PTTEP, QGC, Santos, Shell and Woodside);
- Persian Gulf (Occidental, PEDCO);
- The Caspian Sea (BP);
- The Gulf of Mexico (PEMEX);
- The North and Irish Seas (Amerada-Hess, BHP Billiton and Norsk-Hydro); and
- West Africa (Shell).

He has skills/experience in the following:

- Concept, FEED, detailed design, installation / construction and operational support.
- Pipeline system design.
- Engineering management of multi-disciplined design teams (e.g. Process, Flow Assurance, Subsea Systems and Controls, Materials and Welding, Integrity Management, Construction, Procurement, Technical Safety, Reliability, Project Services, Cost Estimation, etc.).
- Project and construction management and client site representation.
- Package management, (procurement and execution contracts)

Pipeline intervention experience includes:

Client	Project	Input Stage
ConocoPhillips	Barossa-Bayu-Undan Tie-in	Concept
Chevron	Greater Gorgon Compression Study	Concept
Shell	Confidential NWS Deepwater Project	Concept
Apache	Julimar	FEED
Esso Australia	Dead leg replacement study	Concept
Woodside	Pluto Diverless Repair Plans	Detailed Design
Woodside	Angel hot-tap	FEED-Execute
ExxonMobil	South Venture hot-tap	Concept-Execute
BHPBilliton	Douglas Platform Replacement Riser	Execute
BHPBilliton	Lambda hot-tap tie-in	Concept

Personal Info:

Nationality: British / Australian.

Location: Perth, Australia.

Qualifications:

M.Sc. (Eng), Maritime Civil Engineering, The University of Liverpool, UK. (1995-1998).

B.Eng. (Hons.), Civil Engineering, The University of Liverpool, UK. (1992-1995).

Professional Memberships:

Chartered Engineer in the UK and Canada:

- Member, Institute of Marine Engineering, Science and Technology
- Association of Professional Engineers of Nova Scotia (retired in good standing)

Experience Summary:

BOMBORA-ESP PTY LTD (2011 to date)

Position: Director/ Senior Consultant

Bombora-ESP supplies specialist engineering services to owners/operators, consultancies and construction/installation contractors who operate in the offshore oil and gas or renewables sectors.

Role: Acting as the Operations Director, main duties are to:

- Identify, pursue and secure business development opportunities;
- Act as Project Manager / Engineering Specialist on selected projects; and
- Implement, maintain and improve the company's ISO 9001 Quality Management System.

Client: Granherne

Project: INPEX, Ichthys Phase 2a Pre-FEED

Project Description: INPEX, the Operator of the Ichthys Field, is developing Phase 2a; the introduction of an additional 15 subsea wells tied back to the CPF facility (via existing a new gathering system and tie-ins into existing gathering systems). Granherne were engaged to support INPEX with pre-FEED.

Role: Lead URF Engineer whose responsibilities included: materials and welding (investigation into improvements into CRA clad / lined linepipe), qualification planning (flexible risers and subsea cooling options), construction and installation (development of SURF Constructability Strategy and reeling feasibility studies which included preliminary ECA assessments), subsea architecture and routing, preliminary pipeline design (including lateral buckling assessments), preliminary design of subsea structures and input to geotechnical / geophysical studies (including assessments of sand-wave mobility, scour and pipeline self-burial).

Client: Granherne

Project: ConocoPhillips, Barossa Export Pipeline Concept Study

Project Description: The Barossa gas field is located approximately 300 km north-north-west of Darwin in approximately 250 m of water. COPA were investigating options to develop the field, with options considering the installation of a fixed / floating infield facility delivering dry gas condensate to Darwin via a ~26-inch, 250 km export pipeline tying into the existing Bayu-Darwin dry gas pipeline (in approximately 50 m of water). Granherne were awarded the concept design of the export pipeline.

Role: Study Manager for Granherne coordinating a multi-discipline team costing of: HSE (SSIV requirement study), Flow Assurance (steady state and transient modelling to select pipeline diameter and determine slug catcher volumes), Subsea Pipelines (mechanical design and tie-in design/methodology), Facilities (preliminary slug catcher design) and Project Controls (cost and schedule estimating).

Client: Granherne

Project: INPEX, Ichthys Phase 2 Development Studies

Project Description: INPEX investigated Ichthys Phase 2 development options (Phase 2a, 2b and 2c); an additional 30 subsea wells tied back to the CPF facility via existing and additional gathering systems. Granherne were engaged to undertake the select phase to assist INPEX in creating a reference case for the development and sub-phasing.

Role: Senior SURF Consultant, performing desktop reviews to support concept definition (Subsea System Operability Review, Subsea Cooling Methodology, Pipeline Construction Methodology, Flexible Riser Design Review and Pipeline Design Review).

Client: Atteris Pty Ltd

Project: Chevron, Greater Gorgon Compression Study

Project Description: The Chevron operated Gorgon project investigated deepwater (1350 m) and shallow water (150 m) compression options for Jansz. The 150 km 30 / 34-inch Jansz export flowline does not include any shallow water facilities to permit the tie-in of a compression platform. Atteris were engaged to undertake a feasibility study on possible isolation technologies and tie-in architecture for shallow water compression.

Role: Senior Consultant – providing expertise on hot-tapping (diver and diverless), hyperbaric welding and pipeline isolation technologies.

Client: S2V Consulting Pty Ltd

Project: Occidental, Phase 5 Idd El Shargi North Dome Field, Qatar

Project Description: As part of a production sharing agreement with Qatar Petroleum, Occidental Petroleum Qatar Limited operates the Idd El Shargi North Dome (ISND) field, located in the Persian Gulf approximately 80 km east of the Qatar peninsular. The ISND oil production field consists of a bridge linked production station together with numerous remote wellhead jackets in shallow water (~35 m). Phase 5 of the field development program for ISND included several water Injection, gas lift and production pipelines.

Role: Consultant - responsible for the fast-track detailed design of 14 retrofit rigid risers; coordinating the engineering team and managing the interfaces with AMEC Black Cat in both Doha and Jakarta.

Client: Apache Energy Ltd

Project: Decommissioning Study - East Spar Control Buoy

Project Description: The East Spar field, located approximately 40 km off the west coast of Barrow Island, was developed in 1996 as a subsea tie-back to Varanus Island. The development consisted of a subsea production system, a control buoy and a subsea export pipeline. The control buoy was a 56 m tall structure which contained storage tanks, pumps, generators and other equipment to control, monitor and inhibit the subsea production. The equipment was spread over five floors all located below the water line. The buoy was held in place by four pairs of vertical tethers anchored to a gravity base. The control buoy had been out of operation for approximately 10 years and was nearing the end of its licensed design life.

Role: Senior Consultant - identifying and screening decommissioning methodologies based on HSE, cost and key risks/opportunities.

Client: Burnvoir Corporate Finance

Project: Confidential

Project Description: Burnvoir Corporate Finance were engaged by a confidential Australian client to examine alternative power options for an existing aluminium refinery, with one option investigating the potential production expansion of a third party DOMGAS facility.

Role: Study Manager, independently evaluating the works and costs associated with the potential expansion of the facility. Study considered additional offshore wells, upgrading the wellhead platform and upgrading the onshore gas plant to meet the additional gas requirements.

Client: PTTEP

Project: Subsea and Pipeline Standards

Project Description: Development of a suite of subsea and pipeline engineering design standards, for PTTEP's use on future Australian and international developments.

Role: Coordinator; acting as a focal point for the development of the various engineering standards.

Client: Granherne

Project: Shell, Confidential Deepwater NWS Project

Project Description: Concept screening study for a confidential deepwater (+1500 m) North West Shelf development examining multiple development concepts, grouped within a number of themes.

Role: Senior Consultant, Pipelines

- Examining enabling technologies that may permit / preclude concept options
- Providing definition to the concepts to identify risks and permit cost estimating, by developing system architecture, producing a preliminary materials selection philosophy and performing preliminary pipeline and flowline engineering.

Client: KBR

Project: QGC, QCLNG Narrows Project

Project Description: Queensland Curtis LNG (QCLNG) Project exports LNG derived from Coal Seam Gas from the Surat Basin. The LNG plant is located on Curtis Island, near Gladstone, Queensland. CSG is extracted from several production areas and transported by a 42-inch pipeline to the LNG Plant. The pipeline route includes a 12 km narrows crossing (from the mainland to Curtis island), which was installed with, and alongside APLNG's 42-inch pipeline.

Role: Senior Consultant - Pipelines, supporting KBR Brisbane in the development of the detailed design deliverables for the QCLNG Narrows crossing.

HOT-TAP CONSULTING PTY LTD (2008 to date)

Position: Manager / Senior Consultant

HT-C supplies specialist tie-in expertise to oil and gas owners / operators, engineering consultancies and installation contractors.

Role: Acting as the General Manager, main duties are to:

- Identify, pursue and secure business development opportunities; and
- Act as Project Manager / Engineering Specialist on selected projects.

J P KENNY PTY LTD (2005 - 2011)

Position: Delivery Manager, FEED

Client: Apache Energy Ltd

Project: Julimar Development Project

Project Description: The Julimar development consists of up to 18 subsea wells, clustered around three drill centres, tied back to the to the Chevron Wheatstone Platform via two 18-inch CRA lined subsea pipelines. From Wheatstone the gas is exported via a 44-inch Trunkline to an onshore LNG facility, near Onslow, WA. The Julimar system design uses a passive (insulate and blow-down) hydrate management system, with two 4-inch MEG and Utility pipelines from each centre for hydrate mitigation/avoidance during start-up/shutdown.

Role: Management of integrated team, with team members from various Wood Group entities. Disciplines include: Process, Flow Assurance, Subsea Systems and Controls, Subsea Pipelines, Materials Selection, Integrity Management, Construction, Procurement, Technical Safety, Reliability, Project Services and Cost / Schedule Estimation.

Position: Small Projects Group Manager

J P Kenny's Small Projects Group (SPG) consisted of a team of up to 45 Engineers and Designers which undertook projects that were small in terms of engineering scope.

As well as executing standalone projects, the SPG also provided engineering support to J P Kenny's project teams (e.g. Browse, Gorgon, Ichthys and Pluto), J P Kenny's Asia Pacific offices (Melbourne, Jakarta and KL) and J P Kenny's sister companies (e.g. IONIK, MCS and Mustang).

In addition, the SPG was also responsible for developing in-house technology such as propriety software and global 'Gold Standard Spreadsheets'. The SPG also assisted in the development and implementation of standard companywide QMS procedures.

Role: Main duties were to:

- Identify, pursue and secure business development opportunities;
- Act as Project / Engineering Manager on selected projects;
- Take full technical and commercial responsibility for the execution of all SPG projects;
- Establish and implement all necessary project plans and procedures;
- Identify and agree resources required for the successful execution of the various SPG projects; and
- Organise the project team and motivate its members towards achievement of specified goals.

SPG projects included:

Client	Project
Apache	Devil Creek Development Project - Detailed design offshore pipeline (inc Pluto crossing).
	Halyard – Concept design.
	Operations – Various pipeline integrity assessments.
BHPB	Macedon – Supporting J P Kenny Houston design team.
Chevron	Gorgon - Ad-hoc support to the project team.
	Greater Gorgon Development – Concept design and cost estimating.
Clough	DCDP - Onshore pipeline detailed design.
ENI	Blacktip - Ad-hoc support during detailed design and construction.
Esso Australia	Dead leg replacement study for the Esso MLA 300.
ExxonMobil	Scarborough - Supporting J P Kenny Houston design team.
INPEX, Ichthys	Darwin trunkline feasibility studies and ad-hoc support during FEED.
PTTEP	Cash Maple FLNG concept development – Concept development and cost estimation.
Santos	Casino – Ad-hoc operational support.
Woodside	CWLH - Replacement flowlines design support and construction support.
	Enfield Expansion - Deepwater spoolpiece design.
	Operations - HISC review of CRA pipelines and flowlines.
	Northern Endeavour replacement flowlines – Construction support.
	Otway II - Concept design of a subsea tie-back.
	Pluto – Development of flowline (diverless) and trunkline (diver-assisted) repair plans.
	Operations – Various pipeline integrity assessments and increased flow rate studies.
Xena – Concept design subsea tie-back.	

Position: Pipeline Project Manager, Concept/FEED Phase

Client: Apache Energy Ltd

Project: Devil Creek Development Project

Project Description: Apache developed the Reindeer field as part of the Devil Creek Development Project (DCDP). The Reindeer field is located in the Northwest Shelf, Offshore Western Australia.

The DCDP pipeline components consist of a 90 km 16-inch subsea pipeline from the unmanned Reindeer platform to a HDD shore crossing at Forty Mile Beach and a 10 km 16-inch onshore pipeline which connects the offshore pipeline to a purpose built onshore process facility.

Role: Responsibilities included management of onshore and offshore pipeline design teams.

Position: Pipeline and Subsea Project Manager, Concept Design Phase**Client: Chevron Australia Pty Ltd****Project: Confidential NWS Projects**

Project Description: Chevron was considering developing one or more fields located in the Barrow sub-basin on the Northwest Shelf, Offshore Western Australia in order to meet its DOMGAS objectives.

Numerous fields, in water depths ranging between 150 m and 1200 m, were considered during the concept select phase. Studies led to two field options with similar facilities: a ~200km ~18-inch subsea pipeline tied back from a subsea facility to a shore crossing (either HDD or shore-pull) on the mainland. Once onshore, the raw gas would be processed at a purpose built facility, which would export the processed gas via a 50-200 km, 20-inch, onshore pipeline. The subsea facilities would initially consist of three Xmas trees (c/w IOPPS), controlled from the onshore gas plant via an offshore control facility. Hydrates and internal corrosion (associated with high CO₂ content) would be managed by injecting MEG and pH stabiliser into the product stream, which would be transported to the field via a 4-inch MEG pipeline. Top of line corrosion would be managed through the use of CRA clad flowlines.

Role: Integrated into Chevron's team, responsibilities included management of design team for the offshore and onshore pipelines, and subsea system.

Position: Lead Pipeline Engineer, FEED Phase.**Client: Santos Ltd****Project: Henry Gas Project**

Project Description: Santos has developed the Henry and Martha gas fields in the Otway Basin off the coast of Victoria, South-East Australia, The fields lie approximately 10 km west of the existing Casino subsea development. The infrastructure consists of two subsea wells tied-back to the Casino subsea facilities via a 12-inch carbon steel pipeline.

Role: Responsibilities included coordination of pipeline design team.

Position: Lead Pipeline Engineer, Develop and Execute Phases**Client: Woodside Energy Ltd****Project: Angel Project**

Project Description: The Angel field is a gas-condensate field, approximately 50km east of the existing North Rankin Alpha Platform. The infrastructure consists of three subsea wells tied-back to an unmanned platform via three 14-inch CRA lined carbon steel flowlines. At the Angel platform the product is processed before being exported, via a 30-inch pipeline, to the existing 1TL 40-inch trunkline. The 30-inch pipeline is tied into the 40-inch existing 1TL pipeline through an existing 30-inch Futuretap flange. The hot-tap operation was the first in Australian waters and the biggest diameter subsea hot-tap in the world.

The Angel Project was voted the winner of the Engineers Australia 'WA Engineering Excellence Award' and 'Best Resource Development Award' in 2009.

Role: Integrated in to Woodside's team, responsibilities included coordination of pipeline detailed design, third-party verification and government approvals, developing design and operating philosophies, and providing specialist input for subsea hot-tapping and subsea pig-trap design.

SNC-LAVALIN UK LTD, CROYDON, UK (2004 – 2005)

Position: Proposals Engineer

Business Development Group, reporting to the Vice President of Operations, with responsibilities including: proposal & bid preparation, development of capability statements, project fact sheets & corporate presentations.

KVAERNER SNC-LAVALIN OFFSHORE (KSLO), HALIFAX, CANADA (2001-2004)

Position: Lead Pipeline Engineer, Conceptual Design to Execution Phases

Client: ExxonMobil Canada Properties (EMCP)

Project: South Venture Development:

Project Description: ExxonMobil Canada Properties has developed the South Venture field, the second field in the Tier II development. As part of the development, a 12-inch pipeline was installed to transport gas-condensate from the South Venture platform to the existing 18-inch Venture-Thebaud pipeline where it tied into the existing pipeline via a hot-tap assembly (the first in Canadian waters). The South Venture 12-inch pipeline was piggybacked with a 3-inch MEG pipeline which also tied into the existing Thebaud-Venture pipeline system.

Role: Integrated into ExxonMobil's team, responsibilities included: tie-in concept selection; coordination of detailed design; Package Responsible Engineer (PRE) for various procurement packages; supporting EMCP's Construction Team; Company Representative for EMCP during offshore Installation; and supporting a knowledge transfer to local Engineers.

Position: Senior Pipeline Engineer, Detailed Design and Execute Phase

Client: ExxonMobil Canada Properties (EMCP)

Project: Alma Development

Project Description: ExxonMobil Canada Properties has developed the Alma Field, the most southerly of six fields that comprise the Sable Offshore Energy Project Development. As part of the development, a 52km, 12-inch gas-condensate pipeline piggybacked with a 3-inch MEG pipeline was installed between the Alma unmanned platform and the existing Thebaud platform.

Role: Integrated into ExxonMobil's team, responsibilities included: preparation of installation specifications, PRE on a number of procurement packages (inc. linepipe and flanges & fittings); PRE on a number of contract packages (inc. concrete coating, and pipeline installation) and Company Representative for EMCP during the pipe-lay.

KVAERNER, LONDON, UK (2001)

Position: Senior Pipeline Engineer, Concept Design Phase

Client: The Petrolran Development Company (PEDCO)

Project: Salman Field Integrated Development:

Project Description: The Petrolran Development Company proposed to further develop an existing Iranian field in the Persian Gulf by adding 27 oil, gas and gas-lift inter-field-pipelines of various diameters (4 to 24-inch) and one 200 km 30-inch gas trunkline. Three concepts were examined, each of which included over 200 crossings with potential requirements for additional stability.

Role: Stability analysis, crossing design and spanning analyses to support conceptual design.

KELLOGG BROWN & ROOT / GRANHERNE, LEATHERHEAD, UK (1998-2001)**Position: Senior Pipeline Engineer, FEED Phase****Client: The Azerbaijan International Operating Company (AIOC)****Project: ACG Full Field Development:**

Project Description: The Azerbaijan International Operating Company, a consortium of international oil companies, developed the Azeri, Chirag and Gunashli (ACG) oil fields in the Caspian Sea. As part of the development, a number of pipelines were required to transport oil and gas between the Central Azeri DQ, Central Azeri CP and Chirag-1 platforms and to the receiving terminal at Sangachal.

Role: Senior Pipeline Engineer for Phase 1 development which consisted of: three interfield oil and gas pipelines, one 200 km oil-trunkline, conversion of an existing 180 km trunkline from oil to gas, seven risers including one retrofit riser, two J-tubes and an onshore produced water pipeline. The design considered environmental aspects such as subsea mud-volcano's, seismic loadings, high currents, fault displacements, deep water, and slope instability. The scope of work included the preparation of various ITT's and the subsequent verification of the detailed design performed by the EPC contractor.

Position: Company Representative, Operational Support**Client: Amerada Hess A/S****Project: De-Watering Incident, South Arne**

Company Representative for an offshore subsea-survey of the 24-inch gas riser on the South Arne GBS platform in the North Sea where an inspection survey was required following excessive deformation in the riser due to abnormal transient shock loads, experienced during a dewatering incident.

Position: Pipeline Engineer, Execute Phase**Client: BHP Billiton****Project: Replacement Riser, Douglas Platform**

Project Description: BHP Billiton operates a number of fields in the Liverpool Bay area of the Irish Sea. BHPB had previously constructed a replacement 12-inch, sour (2% H₂S) gas injection pipeline between the Douglas and Lennox Platforms. After an internal inspection of the original spoolpiece and riser system at the Douglas Platform, BHPB decided to replace both the riser and spoolpiece.

Role: Pipeline Engineer, involved in the detailed design of the retrofit riser and replacement spoolpiece. Responsibilities also included Package Responsible Engineer for the procurement of mattresses, flanges and fittings.

Position: Pipeline Engineer, Concept Design Phase**Client: BHP Billiton****Project: Lambda Development, Liverpool Bay**

Project Description: East Hamilton (formally known as Lambda) is a small gas reservoir situated in Liverpool Bay approximately 4.5 km Northeast of the Hamilton Platform. As part of the development, BHP Billiton required a reappraisal of earlier study work, which had examined various options of tying back the production to existing infrastructure.

Role: Pipeline Engineer, involved in the concept development of several tie-back options.

Position: Pipeline Engineer, Execute Phase**Client: Norsk Hydro****Project: Troll Olje Province Development**

Project Description: As part of the Troll Olje Gas Province Development, the Rockwater/Wellstream alliance appointed KBR to perform upheaval-buckling analyses on 18 flexible flowlines.

Role: Pipeline Engineer, involved in the as-built analysis to predict sand/rock dump requirements along the 18 flexible flowlines, which were trenched whilst the pipelines were pressurised.

Position: Pipeline Engineer, FEED Phase**Client: Shell Petroleum Development Company of Nigeria (SPDC)****Project: Offshore Gas Gathering System (OGGS)**

Project Description: Shell Petroleum Development Company of Nigeria developed a structured programme to phase out gas flaring by the year 2008, and create a commercially viable gas business. The programme included the necessary gathering system to collect, treat, compress and transport the gas to the point of sales. This system included a 32-inch trunkline and 24-inch and 18-inch spurlines.

Role: Pipeline Engineer involved in the various aspects of the FEED design.

Position: Pipeline Engineer, Concept Design Phase**Client: The Azerbaijan International Operating Company (AIOC)****Project: Export Pipeline Stability Investigation**

Project Description: The Azerbaijan International Operating Company proposed to develop the Chirag, Azeri and Gunashli oil fields in the Caspian Sea. As part of the development, AIOC were considering installing a new 200 km 30-inch export oil pipeline and converting an existing 180 km 24-inch export pipeline from oil to gas.

Role: Pipeline Engineer involved in the conceptual phase, which included a detailed 3D on-bottom stability analysis of both lines.

Position: Pipeline Engineer, Detailed Design Phase**Client: Petróleos Mexicanos (PEMEX)****Project: EPC-28, Cantarell Field Development**

Project Description: PEMEX undertook a major upgrade and expansion of the Cantarell field in the Gulf of Mexico to curtail gas flaring and increase crude oil production. Under the EPC-28 contract, 12 pipeline systems were installed to transmit gas / oil / nitrogen between nine platforms in the Gulf of Mexico. The development included 62 pipeline crossings. KBR performed the detailed design for European Marine Contractors (EMC) who had been awarded the EPC contract.

Role: Pipeline Engineer involved in the various aspects of the detailed design.