

Project	Description
MPFM Uncertainty, Norway	Uncertainty study to assess suitability of a multiphase flow measurement system as an alternative to a dedicated allocation separator.
MPFM FAT, Norway	Witness calibration and signed off FAT documentation for 4 multiphase flow meters.
Condensate Gathering System Uncertainty, Wyoming, USA	Assess the uncertainty of a coriolis measurement for allocation of gas condensate to lease holders and the BLM for a gas gathering system for a major operator.
Multiphase Allocation Uncertainty, Alaska USA	Defined uncertainty matrix for allocation tariff adjustment for field life for a heavy oil multiphase measurement.
Satellite field MPFM Uncertainty, UKCS, North Sea	Assess the uncertainty of MPFM 2003 configuration 2008 operating conditions and uncertainty of the 2009 revised configuration.
Satellite field dedicated allocation separator uncertainty and allocation method, GOM, USA	Assess the uncertainty of two phase separator oil and gas measurement for a 3 <sup>rd</sup> party satellite field area on existing TLP.  Assessed the allocation uncertainty for the forecast field life.
Crude Oil, Condensate and LPG product allocation, Middle East.	Preparation of a Measurement and Allocation Philosophy, Methodology and Monte Carlo Simulation allocation uncertainty model for allocation of production from four fields. Mass Component Allocation was selected due to the large difference in the field fluids and the products. The work included sizing and specifying 50 meters to measure fluid from separation, process metering, gas injection and Custody Transfer.
Crude Oil Tanker Loading, South East Asia.	Investigation of discrepancy between export loading tanks and liquid ultrasonic Custody Transfer meter to identify the cause and assess the uncertainty of both measurements.

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Heavy Crude Oil Fiscal MPFM Uncertainty Analysis, Alaska.	Uncertainty analysis of a Dual Gamma Venturi MPFM (Multi Phase Flow Meter) for a heavy oil application with very low Reynolds Number which required a correction to the Venturi Cd (Coefficient of Discharge). Monte Carlo was used to simulate the Dual Gamma phase detector measurement based on a physical model from first principles.
Major Oil & Gas Operator, USA.	Custody Transfer uncertainty analysis and validation of measurement for the operators 80 percentile production in the USA covering offshore and onshore oil and gas production at five facilities.
Crude Oil Ultrasonic Meter, Venezuela.	An uncertainty analysis was required to specify a Custody Transfer liquid ultrasonic meter for pipeline monitoring.
Gas Fiscal Meter Audit and Uncertainty Analysis, South East Asia	Audit and uncertainty analysis of fiscal ultrasonic gas custody transfer meters at three onshore facilities in Sumatra and two offshore facilities in the South China sea.
Main Oil Line (MOL) flow meter health check. Middle East.	Site inspection to document each of 48 measurement nodes entering the MOL. Work included estimate of uncertainty and bias and assessment of the condition of each meter. Meters comprised full Custody Transfer meters with prover's, PD, Coriolis, Ultrasonic, Orifice and V cone meters.
LNG meter trials, North America.	Trials of Coriolis and multipath Ultrasonic Meters to assess suitability for flow measurement of LNG. Meters were compared to storage tanks which were calibrated by ship loading. Developed data acquisition spreadsheets with AGA8 gas density and COSTALD liquid density and statistical analysis of results.
Custody Transfer Metering. Middle East.	Statement of Requirements for a Crude Oil Coriolis Metering System with BS&W and Master Meter for RFQ.
Oil Export Terminal, Middle East, Material Balance & Uncertainty.	One million bpd terminal import metering, stock transfer and export metering. Measurement and analysis procedures. This work included a material balance and uncertainty model for ongoing use by the terminal.

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Process Plant, Iran.	Thermal and compressibility calculation with COSTALD for 14 products including Propane, Butane, MEG, DEG, Styrene, Methanol, Ethylene, Ammonia and Butadiene
Gas Platform, Gulf of Mexico Flow Measurement Review.	Subsea wet gas venturi meters, topside, separation, gas compression, fuel gas chemical injection, condensate spike and ultrasonic gas export metering.
Oil & Gas Platform, Gulf of Mexico, MPFM Allocation Procedure.	Review of measurement and allocation procedures for third party production over existing facilities.
API UATG MPFM RP.	Recommended practice for well rate determination uncertainty for multiphase flow meters
Oil & Gas Platform, Gulf of Mexico, Flow Measurement Review.	First stage separation, Test Separator, Fuel Gas, Gas Sales Meter and LACT Oil export.
Shell Shearwater Liquid Ultrasonic Master Meter modification and meter station uncertainty.	Liquid ultrasonic master meter prover replacement project comprising a feasibility study, specification of metering system and flow computer modifications, Reynolds Number correction of USM calibration and meter station uncertainty study using quadrature methods.
Power Station, Flow measurement review.	Review of gas turbine cooling air, fuel gas, steam and water flow measurement. Ongoing measurement support.
Shell, New Orleans, Auger Platform, Gulf of Mexico - MPFM and Well Test allocation uncertainty model.	Vx multi-phase flow meter and well test allocation uncertainty model for 6 fields on the Auger platform. Options to allocate by well test or MPFM for comparison and find financial exposure to partners and MMS. Uncertainty is found with combination of Monte Carlo Simulation and quadrature methods.
BPH Billiton, Ohanet Development, Algeria, - wet gas well test allocation uncertainty.	Well test wet gas allocation with a mobile rig and manifold wet gas venturi for 50 wells on 13 manifolds to 2 processing trains. Uncertainty found by quadrature methods for selection of venturi meters.

Project	Description
Antech, Gas densitometer velocity of sound correction software.	Software to correct velocity of sound from calibration gas to measurement gas. Utilises equation of state (EoS) and AGA8 software to find velocity of sound and apply correction.
Shell Penguins over Brent combination WGM and MPFM difference allocation uncertainty.	Slug Suppression Device (SSD) with wet gas meter (WGM) and MPFM simulation and difference allocation of Brent and Penguins oil and gas production. Uncertainty found by combination of Monte Carlo Simulation and quadrature methods.
Shell Otter over Eider Geochemical fingerprint allocation uncertainty.	Geochemical Fingerprint (GF) of Otter and Eider production with difference allocation with North Cormorant oil production.
BP America, Pompano allocation system and uncertainty model.	Pompano/Mica oil and gas allocation system to meet PHA and MMS requirements. Allocation uncertainty found Monte Carlo Simulation.
Phillips Judy Fiscal Data Management.	Database retrieve, validate, store and report fiscal data for 3 fiscal and allocation metering stations.
Shell, Brent, Central, Northern, Fiscal Data Management.	System to retrieve, validate, store and report fiscal data for 26 fiscal measurement stations. First installed in 1997, upgraded and extended to include all of Shell's Aberdeen operations.
Phillips, Maureen Production Reporting (MPR) System.	End of life replacement for mainframe PRS. Included platform reporting inc. plant, fiscal and allocation data. Monthly reports to 5 partners and PPRS.
Shell Gannet allocation system.	Hydrocarbon allocation well test, separator and export oil and gas allocation system.
Shell Anasuria/Cook FPSO allocation system.	Oil, gas and water separator and well test database allocation system.
Conoco Caister/Murdoch mass component allocation and uncertainty system.	Mass component gas and condensate measurement and allocation uncertainty system comprising uncertainty modules 8 meters, well test allocation module, and allocation module with fuel use.

Project	Description
Conoco WNTS gas allocation and uncertainty system.	Allocation of gas standard volume and energy with uncertainty for 3 offshore platforms and an onshore terminal. Energy found according to GPA2172.
BP ETAP Allocation uncertainty model.	Model to investigate operational scenarios for existing fields and six subsea satellite wells with MPFM. Uncertainty by Monte Carlo Simulation.
Talisman Blake/Ross allocation exposure model.	Allocation of oil and gas by difference and proportion with shrinkage to find field allocation uncertainty for operational scenarios.
Phillips Petroleum Judy/Jade allocation uncertainty model with process simulation.	Oil and gas difference allocation model including process simulation with flash calculations for 3-stage gas compression and a 2nd stage separator. Uncertainty found by Monte Carlo Simulation.