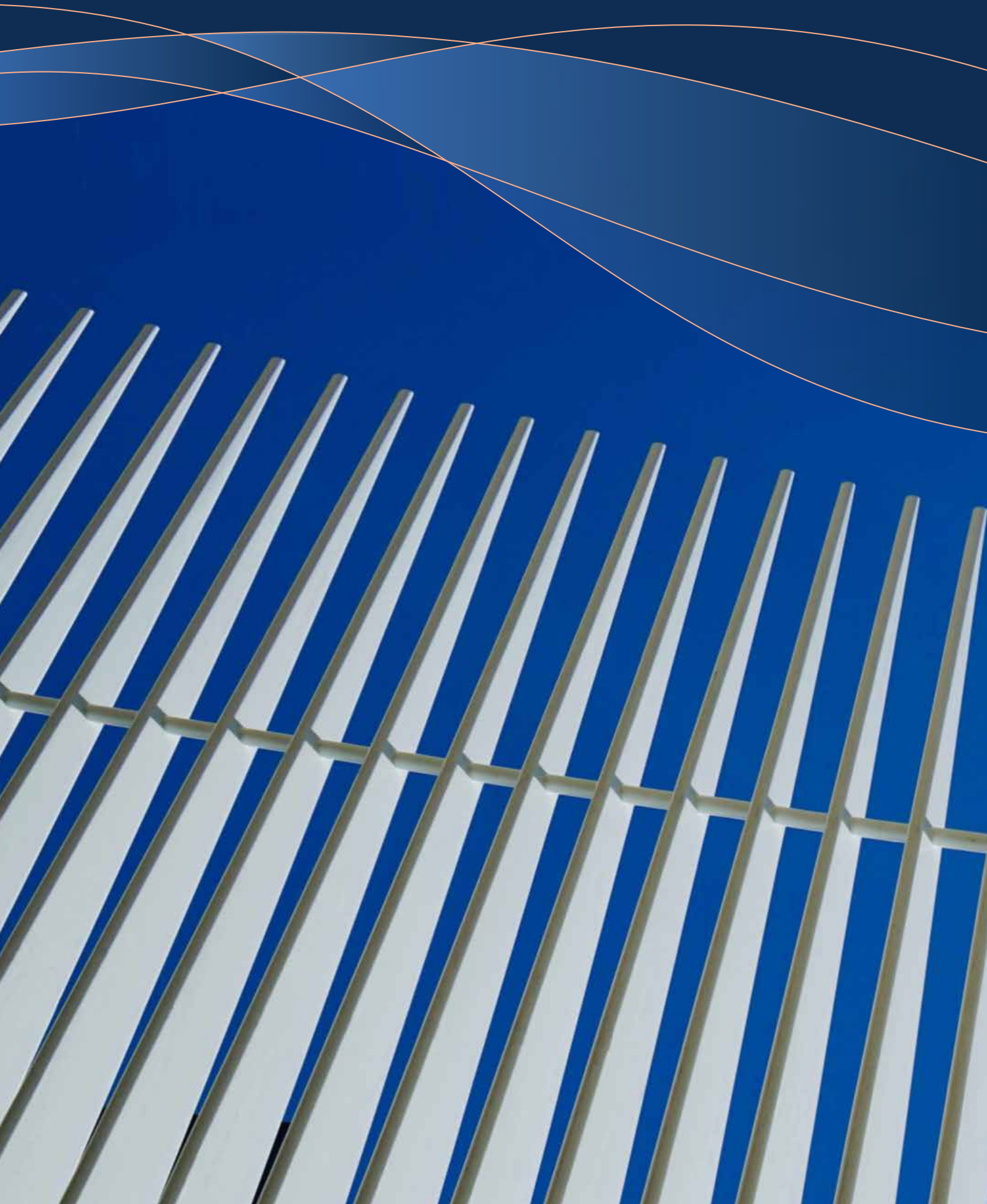


Gaffney  
Cline

Field Unitisation and Redetermination Expertise



## About GaffneyCline

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GaffneyCline is a global consultancy that has been offering technical, commercial, and strategic advice to the oil and gas sector for over 50 years. GaffneyCline's reputation demonstrates that advice, along with its insight, is high-quality, impartial, technically based, and commercially astute. GaffneyCline is often referred to as one of the leading Reserves consultants within the industry, but in reality, GaffneyCline offers a full range of upstream, midstream and downstream technical and commercial consultancy services. These range from seismic interpretation, static and dynamic reservoir modelling, field development planning, field engineering, gas monetisation, LNG/GTL, mergers and acquisition, economics and project finance. GaffneyCline operates worldwide from three main offices in London, Houston and Singapore, and from regional offices located in Buenos Aires, Sydney and Dubai.

## Unitisation and Redetermination

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Unitisation and Redetermination (U&R) can be a time consuming and costly activity for any company involved in the process. U&R requires specialist skills and experience that may not be readily available within the company. These issues can be managed by appropriate planning and training, and the use of teams skilled and experienced in Technical and Commercial U&R matters.

GaffneyCline has a wide experience in U&R projects gained over many years and in many geographical locations, and can work with your company to ensure that the U&R process achieves the best outcomes. GaffneyCline has worked with clients to advise on the process, undertake work as part of a client team (or act as the client's team) as well as being the Expert in matters of dispute. This experience allows GaffneyCline to provide an unrivalled understanding of the U&R process which it uses to help deliver bespoke solutions to address the client's needs. This can range from providing techno-commercial advice on the basis for Tract Participation, to providing a full technical team to undertake the project on behalf of the company.



## GaffneyCline U&R Experience

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GaffneyCline has, for more than thirty years, been actively involved in work relating to U&R. This includes the role of the Independent Expert in matters of dispute, advisor to individual companies (or groups) and as a substitute technical and commercial team for companies or groups.

Equity determinations have long history, and were relatively frequent in Europe, and especially the North Sea. GaffneyCline has built on this experience to develop a U&R practice that now encompasses many regions; from the Americas, through Africa and Asia to Europe. This has allowed GaffneyCline to develop a techno/commercial understanding of all aspects of the U&R process and allows GaffneyCline to provide a unique offering to clients.



# Our Experience

## Assistance related to Redetermination, SE Asia

For an independent Australian oil and gas producer, GaffneyCline provided on-going support and assistance throughout the run-up and during a major, complex Redetermination process in SE Asia. This support included strategic, technical, editorial and QC inputs as needed by the client as well as a one-day Unitisation workshop to familiarize the team with key issues and concepts.

## External Expert for Equity Redetermination, Asia

GaffneyCline was appointed as External Expert by two parties to assess a multi-reservoir gas condensate field across an international boundary in Asia. The project involved a fully integrated study including: seismic interpretation, geological studies, petrophysical interpretation, geological model build, pressure and production data analysis, simulation history match and forecast and development planning. The deliverables included Tract Participation for both static and recoverable volumes on each side of the boundary and how much volume has crossed the boundary. The work was carried out sequentially following a series of milestones which were discussed and reviewed as the project progressed.

## Advice during Unitisation Dispute, Canada

For a large Canadian operator, GaffneyCline assisted in a rights/Unitisation dispute on a new field development under the jurisdiction of the Canada Newfoundland Labrador Offshore Petroleum Board (CNLOPB). GaffneyCline's involvement was with regard to the subsurface interpretation plus support in a collaborative effort, culminating in GaffneyCline providing expert testimony during a hearing with the Oil & Gas Committee of the CNLOPB.

## Unitisation Support, Pakistan

For Pakistani clients, GaffneyCline functioned as an External third party Expert and provided an independent view on the reservoir communication, migration and Reserve issues associated with three distinct fields. GaffneyCline independently assessed whether the fields are deemed to be in communication, identified specific layers in communication, and constructed 3D static and dynamic models to estimate the hydrocarbons initially in place, expected ultimate recovery, and migration across the lease boundary.

## Unitisation Support, North America

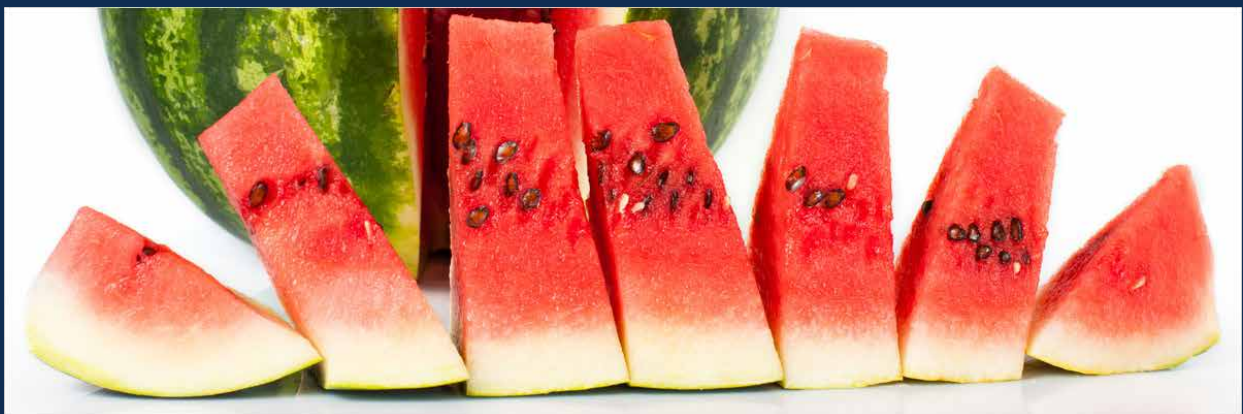
For a major oil and gas company, GaffneyCline provided strategic guidance and oversight along with support to the technical team for the company's preparation for the Governmental hearing process in a Unitisation case. The scope involved delivery of a two day course on Unitisation, audit the company's technical work, direct testimony at the hearing and provide additional technical/strategic support.

## Equity Redetermination, North Sea

GaffneyCline undertook a major two-year study on behalf of a major oil company, the field Operator, to assist them in preparation of their case for the equity Redetermination of a giant North Sea gas-condensate field. The GaffneyCline team was embedded within the client team and included the responsibility for building a depositional and reservoir model, which honoured all terms of the Unit Agreement, computing hydrocarbons-in-place, reviewing all sensitivities, preparing the technical submission to the chosen Expert and managing the rebuttal process. The very successful outcome was a testimony to the integrated approach taken to this project.

## Unitisation Advice, South America

A legal firm engaged GaffneyCline to provide technical, financial and independent contractual advice related to the Unitisation of two fields located in South America. As a part of the project, GaffneyCline reviewed and validated the existing static, dynamic and integrated models of the two fields. GaffneyCline also estimated the volumetrics, technical (production and reserves), and financial implications for different alternatives to assist with negotiating a Unit Agreement.



# Our Experience

## Unitisation and Technical Support, Africa

GaffneyCline provided support to a Major Oil Company through a unitisation process, including input to the preparation of Pre Unit Agreement, Unit Agreement and technical procedures, particularly with respect to the basis of determination of tract participation. GaffneyCline provided an analysis of the bases of determination most frequently used in gas Unitisations to provide an objective opinion for input to the negotiations.

In parallel with the above activities, GaffneyCline reviewed geophysical, geological and petrophysical sensitivities in preparation for negotiation of guidelines for Tract Participation.

## Assessment of STOIP and Tract Participation, Far East

For a US subsidiary operating in the Far East, GaffneyCline undertook an independent assessment of the STOIP for two discoveries in different blocks and estimated a range of Tract Participation based on the STOIP. The study involved sensitivity studies related to seismic interpretation and other factors impacting STOIP.

## Unitisation and Technical Support, Algeria

GaffneyCline provided support to a Major Oil Company on a unitisation process in Algeria. GaffneyCline reviewed alternative bases for Tract Participation appropriate for this Brown-Green Unitisation, recommending remaining recoverable hydrocarbons as the preferred option. GaffneyCline also built new static and dynamic models to estimate STOIP and Tract Participation for the initial determination. GaffneyCline also performed multiple sensitivity analyses to understand and optimise key parameters to be fed into the technical procedures.

## Preparation of Unit Operating Agreement

GaffneyCline assisted an African company in drafting an UOA to address the operations and equity determination of a field in North Africa. In drafting the agreement, GaffneyCline examined technical material pertaining to the field and has taken reservoir character and field size to establish a sound basis for the determination of Tract Participation and to decide the number of equity Redeterminations.

## Unitisation Study and Technical Support, Nigeria

For a Major European Operating Company, GaffneyCline performed a year-long study to support its determination of initial Tract Participation for its petroleum interests in two oil fields in Nigeria which straddled several licence block boundaries, in preparation for a pending Unitisation process. The client had previously been selected as unit operator.

## Assistance related to Redetermination, Australia

For an independent Australian oil and gas producer, GaffneyCline provided on-going support and assistance throughout the run-up and during the Redetermination process. This support included strategic, technical, editorial and QC inputs as needed by the client.

## Strategic and Technical Advice, Redetermination, Gulf of Mexico

GaffneyCline provided an analysis of a draft submission document prepared by a Major European Company for an interim Equity Redetermination of a field in the Gulf of Mexico. GaffneyCline provided constructive guidance in the layout, format and content of the submission in order to best represent the client's basis of opinion to the Redetermination Expert.

## Equity Redetermination Strategy, Norway

For an international Major with a non-Operating interest in a multi license development involving three large fields in Norway, GaffneyCline provided advice during the first equity redetermination. The fields include multiple pools with reservoir fluids varying from volatile oil to dry gas. GaffneyCline provided advice regarding the redetermination process, and proposed the strategy that the client should adopt for the various stages in the procedures. GaffneyCline also assisted the client to develop a 'list of disagreements' on the Operator's proposals, and represented the client at negotiations with the Operator. GaffneyCline then constructed the 3D reservoir models that were used to develop the Client's understanding of a reasonable revision to tract participation. GaffneyCline also designed the format of the documentation that was submitted to the Expert and provided editorial assistance in drafting the final submission.

## Assessment of Adopting STOIP as Basis, Norway

For an independent company with interest in fields in the Norwegian North Sea, GaffneyCline investigated the potential role of STOIP as a basis for the calculation of Tract Participation. As a part of the project, GaffneyCline reviewed the client's models and generated maps for each zone, and drew conclusion to support the selection of STOIP as the basis.

# Instructional Workshops

GaffneyCline delivers practical workshops on Unitisation and Redetermination (U&R) procedures based on wide experience in various roles, and can add custom modules to address client specific topics upon request. The workshop materials include national and international aspects, procedures and costs, and feature case study exercises enabling participants to appreciate both technical and commercial issues. GaffneyCline has also presented papers on the subject at international conferences. A workshop is an ideal introduction involving all disciplines who are likely to be involved in an upcoming U&R project.

Here are brief descriptions for some of the U&R workshops provided by GaffneyCline:

**For a European NOC** confronted with a number of petroleum field Unitisation projects, GaffneyCline organised and presented a three-day workshop and provided recommendations for manpower allocations and negotiating strategies to achieve corporate objectives.

**For a consortium of Australian companies** soon to become engaged in Unitisation negotiations, GaffneyCline prepared and presented a three-day training course on the subject and recommended manpower allocation and negotiating strategies designed to achieve corporate objective.

**For an eight-company group** involved in unitising an offshore gas condensate field in a Joint Development Area in the Timor Sea, GaffneyCline was commissioned to present a four-day orientation course on the principles of Unitisation and Redetermination.

**In Algeria, for a number of companies** involved in the potential Unitisation of a large, onshore oil field, GaffneyCline delivered four separate orientation courses in the principles of Unitisation and Redetermination, based on maximising individual negotiating positions in a production-sharing environment.

**For a client whose needs were two-fold** GaffneyCline provided an extended Unitisation and Redetermination workshop. In addition to GaffneyCline's standard U&R course, a custom-designed addendum was presented. This additional course addressed matters specific to the client's upcoming Redetermination issues, and encompassed recommendations to improve the basis for the Redetermination process itself, e.g. by clarifying ambiguities in the Unit agreement.

**For a super major oil company,** GaffneyCline moderated a framing workshop on recommended approaches to field Unitisation in West Africa. GaffneyCline's deliverables comprised a structure for a best practices approach.

**For a multinational oil company** facing an increase in Redetermination activity GaffneyCline ran a targeted U&R course. The objective of the course was to describe and review the optimum procedures for the Unitisation and subsequent Redetermination of hydrocarbon reservoirs. The course comprised several presentations complemented by a series of practical case studies.

**On behalf of a government petroleum ministry** GaffneyCline moderated a workshop on Unitisation issues. Particular attention was paid to the variations in the methodologies employed dependent on the status of the field development. For example, Unitisation methodologies and processes in the exploration phase and for green-brown field developments versus brown-brown field developments.

**For an independent Australian oil and gas producer,** GaffneyCline conducted a full day U&R course, which was followed by two days of workshop discussion sessions with the project team to frame and document the Redetermination project process, timelines, key uncertainties, forward work program, strategy and decision points.

Topics covered typically include:

- Unitisation agreements
- Basis for Determination
- Technical Procedures
- Expert Determination
- Strategies for submission and negotiation
- Case Histories and Exercises



For more information about GaffneyCline's integrated services, please contact your regional GaffneyCline office.

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