IMPLEMENTING UNITISATION IN DEVELOPING PETROLEUM RESERVOIRS: UNIQUE COMPLICATIONS

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Abstract

Unitisation is an industry practice within the petroleum industry. It is a process by which licensees of oil and gas reserves in a straddling field pool their individual interests in return for an interest in the overall unit. This article suggests that unitisation seeks to solve the challenges of competitive drilling, economic waste, and poor management of the hydrocarbon reservoir, which are peculiar to developing petroleum reservoirs. However, in implementation, unitisation has created novel and unique complications, such as refusal to unitise, determination of tract interest, equalisation of pre-unitisation cost, redetermination, dispute resolution and cross-border concerns. This article seeks to examine unitisation from this perspective, with the aim of proffering a way forward for International Oil Companies (IOCs) when operating in developing petroleum reservoirs.

Keywords: Unitisation; Straddling assets; Developing petroleum reservoirs; International Oil Companies (IOCs).

Introduction

Oil and gas deposits are typically fluid in nature and do not exist in fixed states like other natural minerals, such as coal, tin, tungsten, tantalum, gold, etc. The unique migratory attribute of oil and gas deposits poses some peculiar challenges in the petroleum industry.[1] In other words, there are certain situations where a reservoir does not lie within one block but extends into vacant lands, acreages that have been issued to different licensees by the state or by private title owners, or across a continental shelf controlled by another state.[2] In such a situation, it

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[1] Nicola MacLeod, 'Unitisation' in Greg Gordon, John Paterson and Emre Usenmez (eds), *UK Oil and Gas Law: Current Practice and Emerging Trends: Volume II: Commercial and Contract Law Issues* (3rd edn, Edinburgh University Press, 2018) 411.

[2] T Reynolds, 'Delimitation, Exploitation and Allocation of Transboundary Oil and Gas Deposits betweenNation-States' [1995] ILSA Journal of International and Comparative Law 136

becomes imperative to determine how such a field will be extracted.[3] Accordingly, the concept of unitisation was developed to cure the inadequacies in the property law 'rule of capture' which led to competitive drilling, economic waste, and other detrimental consequences to the reservoir. Unitisation therefore underscores 'how affected licensees agree to treat the reservoir as one unit, to develop it as such and to share the production equitably, irrespective of which part of the reservoir it has come from'.[4]

However, despite the enormous challenges that unitisation seeks to resolve in the development petroleum reservoirs, the application of this concept gives rise to further novel complications in the petroleum industry.[5] It is against this backdrop that this article aims to critically examine the benefits of unitisation *vis-a-vis* the unique challenges that it poses in the oil and gas industry, while advancing a way forward.

1 Historical Perspective of Unitisation

The historical evolution of unitisation is traceable to the United States (US) where natural resources are owned by private landowners, who lease their tracts to lessees, in exchange for royalty interests.[6] Fundamentally, this ownership structure has led to the systematic exploitation of hydrocarbons deposited in common fields by boundary owners. Hence, the US government initially adopted the 'finders-keepers' rule (the common law rule of capture) which was applied in the discovery of wildlife to resolve the exploitation, by licensing plots to prospectors to own what they found.[7] However, this approach led to competitive drilling,[8] proliferation of wells, premature and unnecessary depletion of subsurface pressures,

[3] Bernard Taverne, *Petroleum, Industry and Government: An Introduction to Petroleum Regulation, Economics and Government Policies* (Kluwer Law International, Zuidpoolsingel, Netherlands, 2000) 11.3.1.
[4] Greg Gordon, John Paterson and Emre Usenmez (eds), *UK Oil and Gas Law: Current Practice and Emerging Trends: Volume II: Commercial and Contract Law Issues* (3rd edn, Edinburgh University Press, 2018) 10.
[5] Hunton Andrews Kurth, 'Unitisation – the oil and gas industry's solution to one of geology's many conundrums' (*Lexology,* August 29, 2014) <Unitisation – the oil and gas industry's solution to one of geology's many conundrums - Lexology> accessed 21 September 2023.
[6] David Asmus and Jacqueline Weaver, 'Unitizing Oil and Gas Fields Around the World: A Comparative Analysis of National Laws and Private Contracts' [2006] 28 [3] Houston Journal of International Law 7
[7] *Westmoreland & Cambria Natural Gas Co v De Witt* [1889] 130 Pa. 235; *Barnard v Monongahela Natural Gas Co* [1907] 65 A. 801; Paul Collier and Anthony J Venables, 'Natural Resources and State Fragility' [2010]36 European University Institute Working Paper, 9-10.
[8] *Kelly v Ohio Oil Company* [1897] 49 NE 399; T Daintith, G Willoughby and A Hill, *United Kingdom Oil and Gas Law Looseleaf* (3rd edn, Sweet and Maxwell Ltd UK, 2022) para 1.

reduction of oil recovery,[9] economic wastage,[10] duplication of expenditure,[11] and in some circumstances, abandonment of wells that were not commercially viable.[12] Thus, the concept of unitisation was developed in the US as a solution to the above problems.[13]

Furthermore, the practice of unitisation began outside the US as a result of the OPEC embargo in 1973, relinquishment of acreages/reduction in contract areas, and the need for host states to maximise revenue through signing bonuses.[14] The concept of unitisation is currently adopted by International Oil Companies (IOCs) in several other jurisdictions,[15] including the UK.[16] Accordingly, this article shall consider the benefits derived from the unitisation of oilfields.

2 Benefits of Unitisation

Unitisation is an approach that the oil and gas industry has developed to maximise economic recovery from hydrocarbon reservoirs. There are several benefits that are accrued from the adoption of unitisation in the oil and gas industry. These include the fact that unitisation prevents economic and physical waste from arising through unnecessary well-drilling and construction of related facilities, as were prevalent under the common law rule of capture.[17] It has also become the norm for the development of straddling reservoirs, not only because the joint development of a straddling reservoir is more economical and efficient than separate developments by licensees, but also because the unitisation and unit operatingagreement (UUOA), which is usually entered between licensees of the areas containing the reservoir, stipulates the rights of the licensees.[18]

Moreover, unitisation helps to ensure the optimum recovery of petroleum from a reservoir basedon the best geological or engineering information, whether during primary production

[9] Reynolds (n 2) 139
[10] David and Weaver (n 6).
[11] P Deemer, 'Unitisation Agreements' (Conference Paper delivered at the University of Dundee September2004) 2.
[12] David and Weaver (n 6).
[13] Hunton (n 5).
[14] Sandoval Amui and Marienne L R Melo, 'Unitization of Oil and Gas Reservoirs' [2003] 231 AIPN Advisor,8-15.
[15] Nigerian Petroleum Industry Act 2021, s 80; Ghanaian Petroleum (Exploration and Production) Act 2016 (Act919), ss 34-35.
[16] Petroleum Act 1998, s 4; Model Clauses, cls 17, 18, 20, 27.
[17] David and Weaver (n 6), 14.
[18] Thomson Reuters, 'Unitisation (Oil & Gas) (UK)' (*Thomson Reuters Practical Law*, 2023) <https://uk.practicallaw.thomsonreuters.com/w-018 5594?transitionType=Default&contextData=(sc.Default)&firstPage=true> accessed 25 September 2023.

operations or enhanced recovery operations.[19] In other words, unitisation creates room for knowledge sharing, knowledge acquisition and the application of best practices in the oil and gas industry. Additionally, unitisation curtails surface damages on lands and environmental issues (such as air and water pollution), by avoiding unnecessary wells and infrastructure.[20]

Despite these benefits, the concept of unitisation poses novel and unique complications in the oil and gas industry. These complications shall be examined in the next section.

3 Consequences of Unitisation in the Petroleum Industry

The unique complications that arise in the petroleum industry because of unitisation include the following:

3.1 Refusal to unitise

As a general practice, unitisation of oil fields can be done voluntarily or compulsorily. However, it appears to be of universal necessity that where licensees who hold an interest in straddling reservoirs do not agree to voluntarily unitise, a unitisation plan will be imposed on them by the relevant government authority,[21] for the purposes of ensuring maximum recoveryof petroleum and to avoid unnecessary competitive drilling.[22] For instance, in the UK, the Secretary of State is empowered to design and impose a fair and equitable unitised programme on licensees, where they cannot agree on one within the timeframe set out by the Secretary of State or where the latter does not approve the scheme submitted by the licensees,[23] although this is subject to the licensees' right to arbitrate.[24] In a similar vein, s34(1) of the Ghanaian Petroleum (Exploration and Production) Act 2016 and s80(1) of the Nigerian Petroleum Industry Act 2021 authorise the Minister of Petroleum to direct the relevant contractors/licensees to unitise oil fields where an accumulation of petroleum extends beyond the boundaries of one contract area into one or more other contract areas, for the purpose of ensuring optimum recovery of petroleum.

However, despite these laudable provisions for compulsory unitisation, there are instances where contractors may refuse to unitise oilfields, thereby leading to legal disputes, delays in

[19] David and Weaver (n 6) 14.
[20] Bruce M Kramer, 'Unitization: A Partial Solution to the Issues Raised by Horizontal Well Development inShale Plays' [2015] 68 [295] Arkansas Law Review 297.
[21] David and Weaver (n 6), 36.
[22] DECC's Guidance on the Content of Offshore Oil and Gas Field Development Plans, para 2.5.1.
[23] Model cl 27 (4).
[24] Model cls 27 (5), 43; This is also provided in the Brazilian Petroleum Law No. 9778, art 27 and the 2003 ModelConcession Agreement (5th ANP Round), cl. 12.1.

exploration and production process and great cost to the parties. The current Ghanaian case of *Springfield Exploration and Production Ltd v Eni Ghana Exploration and Production Ltd and Vitol Upstream Ghana Ltd*[25] comes to mind. In *Springfield*, the Claimant filed a suit at the Accra High Court following Eni's refusal to comply with the directives of the Ministry of Energy to unitise the Afina oil block held by Springfield and the Sankofa Field operated by Eni and Vitol, because the two oil blocks were said to straddle.[26] The court held that 30% of revenues received by Eni and Vitol from the sale of crude oil from the Sankofa field, which was operated by Eni Exploration and Production Ghana Limited, should be paid into an escrow account, pending the resolution of the dispute.[27]

Dissatisfied with the High Court's decision, Eni has filed an action before the London Court of International Arbitration, challenging the directives of the Ministry of Energy to be a breach of contract under the Petroleum Agreement.[28] ENI is requesting a full appraisal that would ascertain how much recoverable oil Springfield's discovery contains, because Springfield's data, which is supported by Ghana National Petroleum Corporation's claims, will make Springfield the biggest shareholder of the unitised field.[29] In addition, Eni is unwilling to unitise the oilfields because unitisation will entitle Springfield to claim part of ENI's revenues, while Springfield is not generating any revenue on which ENI can make a claim.[30] It was against this backdrop that Lasheng argued, 'even though unitisation always increases fieldwide rent, it may cause net losses to its participants unless the scale of unitisation is sufficiently large'.[31]

The case of *Springfield v Eni* illustrates one of the novel complications that can arise because of unitisation, especially where licensees refuse to unitise. This also raises the issue of enforcement of unitisation laws, mainly where unitisation is not validly performed by the administrative body and not backed by data. Nonetheless, even where parties accept to unitise straddling oilfields, other novel issues may still arise.

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[25] [2021] DLCA10066 (hereinafter referred to as *Springfield v Eni*)
[26] Springfield Group, 'Breaking News: Ghana: High Court Orders ENI & Vitol to Set Aside 30% of Oil Cash from Sankofa Oil Field Pending Final Determination of Springfield E&P Case' (Springfield Group, June 29, 2021) <https://www.springfieldgroup.com/breaking-news-ghana-high-court-orders-eni-vitol-to-set-aside-30-of-oil-cash-from-sankofa-oil-field-pending-final-determination-of-springfield-ep-case/> accessed 27 September 2023.
[27] Springfield Group, 'Ghana Court Orders Oil Giant Eni to Pay 30% Revenue into Escrow Account' (Springfield Group, June 29, 2021) <https://www.springfieldgroup.com/ghana-court-orders-oil-giant-eni-to-pay-30-revenue-into-escrow-account/> accessed 27 September 2023.
[28] GhanaWeb, 'ENI challenges government's oilfield unitization order in London Court' (*Business News*, 6September 2021) <https://www.ghanaweb.com/GhanaHomePage/business/ENI-challenges-government-s-oilfield-unitization-order-in-London-court-1350007> accessed 27 September 2023.
[29] ibid.
[30] ibid.
[31] Lasheng Yuan, 'The Widespread Failure of Production Unitization in US Oil Fields: A Strategic Explanation'[2004] 13 [1] Energy Studies Review 13.

3.2 Determination of tract interest

Tract determination is one of the unique challenges that differentiates unitisation from a Joint Operating Agreement (JOA).[32] The determination of tract interest is used to decide the percentage interest to be held by each licensee in a UUOA. Once this is resolved, each licensee will be liable for the undivided percentage costs and liabilities, and will also be entitled to its percentage interest, irrespective of the part of the unit where hydrocarbon is produced.[33]

Nevertheless, the issue associated with tract determination is evinced in the fact that in the earlystages of development, there will be inadequate relevant technical data to decide each licensee's share in the reserve.[34] Hence, licensees will usually agree that tract interests should be basedprimarily upon the hydrocarbons believed to underlie each tract.[35] This leaves a substantial degree of uncertainty. Therefore, most UUOA will frequently provide for redetermination of the parties' ownership interests.[36]

Despite the provision for redetermination, the complications posed by unitisation can be seen through the three most common methods of tract determination and redetermination, namely: stock tank oil originally in place (STOOIP), recoverable reserves and moveable oil originally in place (MOOIP).[37] For instance, STOOIP accentuates on the total quality of oil that was originally in the reservoir and can be determined with finality once development drilling is completed.[38] However, STOOIP is not an absolutely equitable method of tract determination because some of the oil will never be produced. In addition, it fails to distinguish between the produced hydrocarbons and hydrocarbons that are left in the reservoir.[39] In the same vein, the adoption of recoverable reserve as a tract determination technique is limited, because recovered reserves cannot be determined until the reservoir is completely depleted. Also, MOOIP is an inequitable and uncertain method of determining tract interest because it focuses on the oil originally in place, minus the theoretical oil left in the reservoir once depleted.[40]

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[32] Deemer (n 11).
[33] David and Weaver (n 6), 58.
[34] Nicola (n 1), 422.
[35] David and Weaver (n 6), 80.
[36] Michael Polkinghorne, 'Unitisation and Redetermination: Right or Obligation?' [2007] 25 [3] Journal of Energy & Natural Resources Law, 303-304.
[37] W English, 'Unitisation Agreements' in M R David(ed), *Upstream Oil and Gas Agreements* (Sweet andMaxwell, London, 1997) 105.
[38] M Taylor and S Tyne, *Taylor, and Winsor on Joint Operating Agreements* (2nd edn, Sweet and Maxwell,1992) 115.
[39] Nicola (n 1), 423.
[40] English (n 37), 106.

Again, the complication associated with the determining tract interest in a unitised oil field is also seen through the complex unitisation formulae in the United States, which involves factors such as well productivity, well density, reservoir penetration, and acre-feet.[41] Thereby requiring extensive geological, geophysical, and reservoir engineering studies. Accordingly, the determination of tract participation remains one of the most lengthy and difficult areas to bargain during the pre-unitisation agreement.

3.3 Equalisation of pre-unitisation cost

Closely linked to the determination of tract interest is the issue of pre-unitisation cost. Owing to the enormous cost and liabilities associated with the oil and gas industry, licensees who may have incurred expenses to the unit area prior to unitisation will always demand equalization of those costs, either through a cash payment from the tracts that spent less than their tract-interest share or through an increased tract interest.[42] On the other hand, the licensees who spent less will not wish to be responsible for up-front costs for greater area than estimated, especially as they will have no revenue from such a field at the material time.[43] Costs such as dry hole costs or costs of drilling wells to targets other than the productive unit reservoir may be resisted.[44] Thus, this may give rise to contentions as to the efficiency of the prior operations on each tract. Disagreements over pre-unitisation costs can also lead to disputes and even legal action, which can slow down operations and reduce profitability.

For instance, in Brazil, when the straddling reservoir extends into an area not yet granted to a contractor, the National Petroleum Agency (ANP) takes the position of a contractor on the adjacent tract, without bearing any appraisal cost.[45] The adjacent area will be offered by the ANP for investors to bid. If the contractor proceeds solely with operations and finds a dry well, the contractor bears such an appraisal cost. However, if commerciality is declared, the contractormay recover the cost through reimbursement from the new holder of the adjacent area or by cost deduction for tax purposes.[46]

Similarly, upon equalisation of the pre-unitisation cost, the benefited tracts will be expected to furnish the unit with capacity rights to use the existing infrastructure through a

[41] Bruce M. Kramer and Patrick H. Martin, *The Law of Pooling and Unitization* (3rd edn, Matthew Bender EliteProducts, 2014) para 17-16.12.
[42] David and Weaver (n 6), 82.
[43] ibid.
[44] ibid.
[45] 2003 Model Concession Agreement (5th ANP Round), cl. 12.1.2; David and Weaver (n 6), 31.
[46] Sandoval and Marienne (n 14), 14.

transportation agreement, production-handling agreement, etc.[47] It is therefore not surprising that these provisions are often the subject of lengthy negotiations.[48]

3.4 Redetermination and dispute resolution

As stated above, the determination of tract interest is most of the time reached with uncertainties. Therefore, to ascertain the characteristics of the field and gain more technical understanding as to the nature of the reservoir, most UUOA will always provide for redetermination of tract interest,[49] while setting out the procedures and placing some restrictions on the circumstances in which it can be done, because redetermination is quite expensive and time-consuming.[50]

The unique complication that arises because of redetermination of tract interest is evidently seen in the financial consequences of redetermination. Whenever redetermination of tract interest is done, the participating interest of each licensee will either increase or decrease.[51]The UUOA will provide for a retroactive effect on the tract interest, re-allocation of pastexpenditures and adjustments of unit percentage interest.[52] Thus, the licensee whose participating interest is increased will have an increase in its annual production share, while incases where the redetermination is done late in the life of the field, the other licensees willmake a case payment to the deficient licensee. Accordingly, Deemer noted that these financial adjustments raise a lot of issues, 'such as how to value the oil and whether interest should bepayable. There may also be significant negative tax implications regarding cash pay back'.[53]

Similarly, the unique problem associated with redetermination becomes more complicated when it impacts on long-term production sales contracts of a unit party.[54] This may lead to changes in delivery quantities upon redetermination, transfer of additional tract interest subjectto the delivery obligations under the sales contract, or the settlement of adjustment quantity incash.[55] Redetermination can also lead to mass litigation between unit parties, as was seen in the second redetermination for the Prudhoe Bay Unit in Alaska, which

[47] David and Weaver (n 6), 82.
[48] Nicola (n 1), 422.
[49] ibid, 424.
[50] ibid.
[51] ibid, 425.
[52] Bernard Taverne, *Co-operative Agreements in the Extractive Petroleum Industry* (Kluwer Law International,1996) 89.
[53] Deemer (n 11), 2.
[54] David and Weaver (n 6), 92.
[55] ibid.

continued for at least five years and caused great financial loss to all unit parties.[56] Furthermore, in *Phillips Petroleum Co. v. Arco Alaska, Inc.,*[57] the execution of additional agreements relating to the redetermination process contributed to extensive litigation in Delaware over the arbitration proceedings and award.

Bearing in mind the complexity, cost, time, and the tendency for discord to arise out of redetermination, most recent UUOA provides for dispute resolution through independent experts, in all stages of the redetermination process, in order to settle disputes as they arise.This is regarded as the 'guided owner' approach.[58] Herein, the expert observes the negotiations and is abreast with the positions of the parties, which enables the expert to make an informed decision. However, it has been argued that 'this approach of dispute resolution increases costs. Although, in the overall, significant savings can be gained if dispute is avoided'.[59] The referralof disputes to independent expert becomes contentious, time-consuming and costly because the parties are unable to agree to the revised tract participations amongst themselves.[60]

Fundamentally, the role of experts in resolving disputes arising from redetermination was seen in *Amoco UK Exploration Co v Amerada Hess Ltd*,[61] where the plaintiffs challenged the use of data that was not expressly included in the guided owner provisions. The defendant argued that the plaintiff failed to adhere with the mechanism for objecting data as provided in the guided owner provisions before approaching the court. The court ruled in favour of the defendant because the guided owner provisions contained a complex dispute resolution mechanism which must be exhausted before seeking court intervention.[62]

Nevertheless, experts are required to stick to their instructions in the UUOA so as not to put a party in a disadvantaged position.[63] In the same vein, decisions of experts can be challenged on jurisdictional grounds, or because of a departure from the applicable rules for the dispute resolution. Thus, in *Nestle Production Ltd v Shell UK Ltd*[64] it was held that the independent expert provisions cannot be construed to oust the jurisdiction of the court.

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[56] ibid, 88.
[57] [1983] WL 20283; [1985] WL 11560; [1986] WL 7612; [1987] WL 10650; [1988] WL 60380.
[58] Nicola (n 1), 428.
[59] Daintith, Willoughby and Hill (n 8) cited in Nicola (n 1), 428.
[60] Philip Weems and Nina Howell, 'Oil and Gas Unitization: Specific Considerations for Cross-Border Unitization' (*Energy Law Exchange*, 3 June 2016) <Oil and Gas Unitization: Specific Considerations for Cross-Border Unitization - King & Spalding (kslaw.com)> accessed 27 September 2023.
[61] [1994] 1 Lloyd's Rep. 330.
[62] Nicola (n 1), 429.
[63] *Shell UK Ltd v Enterprise Oil Plc* [1999] 2 Lloyd's Rep 456.
[64] [1994] 1 Lloyd's Rep 447.

3.5 Cross-border unitisation concerns

Unitisation poses more complex issues when it involves straddling oilfields in an international boundary. This is because it involves the sharing of resources among countries with different laws, regulations and administrative procedures. Negotiations of this nature are quite protracted because the Governments are faced with several concerns before reaching an agreement.[65] This includes issues such as the need to ensure that the field is developed in a manner that maximises economic recovery, the retention of power to control the unitisation process, and the need to ensure financial return from the field through royalties and taxation.[66] Since each country may have its own laws, tax policies, and regulatory frameworks, it can sometimes be difficult to harmonise these factors to create a joint agreement. Therefore, unlikea situation where fields are within the remit of one government (such as the Jubilee field in Ghana), when a field straddles an international boundary, each government is faced with the need to protect its license groups' tract participation in order to maximise its tax revenue.[67]

Furthermore, since different countries may have different technological capabilities, environmental and safety standards, and political priorities, cross-border unitisation also poses on each government the concerns of reserving the right to determination and redetermination, applicable law and arbitration, health and safety, movement of personnel across borders, and transportation issues.[68]

Accordingly, the complexities associated with cross-border unitisation are addressed by Governments through bilateral agreements[68] and joint development agreements (JDAs).[69] Therefore careful planning, negotiation, and communication between the participating countries are essential to overcome the novel complications posed by cross-border unitisation.

Conclusion

Unitisation is the joint development of a reservoir which extends across two or more contract areas to ensure the efficient production of the reservoir, prevent competitive drilling and

[65] Peter D Cameron, 'The Rules of Engagement: Developing Cross-Border Petroleum Deposits in the North Sea andthe Caribbean' [2006] 55 [3] International and Comparative Law Quarterly 559; David Pike, 'Cross-border Hydrocarbon Reserves' in R Schofield, *Territorial Foundation of the Gulf States* (UCL Press London, 1994) 187.
[66] Deemer (n 11), 3.
[67] David and Weaver (n 6), 71; English (n 37) 100.
[68] English (n 37), 101.

maximise the economic recovery of petroleum from such contract areas. This process, when completed, prevents disputes between the parties, which could potentially hinder efficient exploitation. In addition, the practice of unitisation enables sharing economies of scale and making best use of technical information, means, and equipment. It also reduces costs and investments to optimally develop hydrocarbon reservoirs as a single unit.[70]

However, despite these benefits, unitisation poses unique problems such as the refusal to unitise, determination of tract interest, redetermination, dispute resolution, equalisation of pre-unitisation cost, and concerns associated with cross-border unitisation. Therefore, to address these novel complications when dealing with developing petroleum reservoirs, IOCs must be pragmatic in their negotiations and should adopt technological-driven processes that will assist them to gain more knowledge about straddling reservoirs from the outset of a unitisation process.