Marine Construction Vessel Impacts of Proposed Modifications and Revocations of Jones Act Letters Related to Offshore Oil and Natural Gas Activities

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IMCA – April 2017

Executive Summary

IMCA has considered the implications of the CBP notice published on January 18, 2017 and conclusively demonstrated the practical reality that the coastwise approved fleet is unable, on its own, to support the deepwater Gulf of Mexico construction market. This has always been the case and unlikely to change.

Vessels Supporting the Offshore Oil and Gas Exploration and Production Industry

IMCA has analysed the worldwide offshore support vessel (OSV) fleet of over 8,500 vessels and defined a specific set of characteristics of ships technically qualified to be competitive in the deepwater markets.

There are only 528 vessels worldwide in five key categories which are suitable for working in water depths of 3,280 ft/1,000 meters(m) or greater, of which there are only 33 coastwise approved vessels.

Vessel Type	Coastwise Qualified	% Coastwise Qualified	Non-Coastwise	% Non-Coastwise	Total
Light Construction vessels	9	5.5%	156	94.5%	165
Pipelayers	0	0%	55	100%	55
Heavy Lift vessels	0	0%	26	100%	26
Well Intervention vessels	1	8.3%	11	91.7%	12
Seismic survey/geophysical	23	8.5%	247	91.5%	270
Total	**33**	**6.3%**	**495**	**93.7%**	**528**

Breakdown of worldwide deepwater fleet capacity
Source: IMCA analysis of Clarkson Research Services 2016 Worldwide OSV Database dated November 2016

Of the total global deepwater fleet, in 2016 there were only 30 non-coastwise approved vessels active in the GoM and 5 coastwise approved. To put these numbers into perspective, the US has the largest OSV fleet in the world with 1,004 vessels, of which 772 fall into the high volume commodity markets of supply vessels (PSV) and anchor handlers (AHTS); 474 were believed to be active in the GoM in 2016. This is the domain of the US marine services industry, which has clearly prioritized investment in the lower risk commodity sectors where commercial reimbursement is typically based on the dayrate business model.

The deepwater construction market is a completely different business model, with reimbursement typically based upon a fixed price basis, where the contractor is responsible for the complete engineering, project management and offshore execution of the work. This is the domain of large marine contractors based in the US but with their own specialist non-coastwise fleet of vessels and equipment. These ships are of a completely different asset class than the commodity markets, and far most costly to build and operate. They are often purpose built incorporating contractors' own intellectual property for equipment layout and offshore operation. These are niche markets and clearly demonstrated in a comparison of GoM deepwater vessels in 2013 (prior to the industry downturn) and in 2016.

	2016		2013	
Vessel Type	**Coastwise Qualified**	**Non-Coastwise Qualified**	**Coastwise Qualified**	**Non-Coastwise Qualified**
Light Construction vessels	2	18	2	16
Pipelayers	0	7	0	8
Heavy Lift vessels	0	2	0	4
Well Intervention vessels	1	1	0	1
Seismic survey/geophysical	2	2	2	15
Total	**5**	**30**	**4**	**44**

Deepwater Coastwise Qualified and Non-Coastwise Qualified offshore support vessels operating in the US GoM in 2016 and 2013.
Source: IMCA analysis of Clarkson Research Services 2016 Worldwide OSV Database dated November 2016

The data is remarkably constant, with only one significant deviation in the survey and seismic category. The remaining categories are very stable, and emphasise the narrow niches of the market that support the handful of high value deepwater developments that take place each year.

The coastwise fleet cannot meet the needs of the GoM for deepwater construction activities beyond 1,000 meters (3,280 feet). There are no coastwise qualified pipelay vessels, no coastwise qualified heavy lift vessels, and only one coastwise qualified well servicing vessel. Despite plenty of opportunity, historically the coastwise sector has not invested in larger, higher value deepwater capable construction and IRM assets outside of the LCV segment:

- Deepwater construction is a high risk business where work is often conducted on a fixed price basis, unlike the market for PSV and AHT vessels which is a day-rate business.
- In addition to specialised ships, contractors need advanced engineering, project management, procurement, and construction skills to manage large sophisticated projects on a fixed price basis.
- The specialised ships represent very high levels of unit investment, which can range from a lower end of around $200 million to upwards of $1 billion at the higher end.
- This is a world-wide market for the large marine contractors, as no single domestic market can support the levels of investment needed.

Should the proposed CBP modifications and revocations take place, the impact on business in the Gulf of Mexico could be catastrophic, simply because there would be no capacity to install the production facilities offshore. The resulting impact on the whole oilfield supply chain in the USA could cause a collapse in industry confidence and countless job losses onshore and offshore.

A strategy intended to support a limited number of vessel owners could well have enormous unintended consequences for the whole US offshore oil and gas industry.

1 Introduction

On 18 January 2017, the US Customs and Border Protection (CBP) published a notice of proposed modification and revocation of ruling letters related to Customs application of the Jones Act to the transportation of certain merchandise and equipment between coastwise points. This proposal, which could have serious and widespread impact on a variety of industries and the entire US economy, comes nearly eight years after the same Obama administration attempted a similar proposal that was ultimately rejected in response to industry concerns. The purpose of this study is to demonstrate that the same concerns related to fleet capacity remain as of today; and the industry structure, absent of a very large increase in capital investment in specialist shipbuilding, is very unlikely to change going forward.

Something which will rapidly become apparent when reading the report is that despite the very small number of vessels working in the sector, they are essential to deepwater offshore oil and gas exploration and production (E&P). This means that the proposed CBP modifications and revocations only need to impact a tiny number of vessels to result in negative consequences for the entire deepwater E&P market with the potential to seriously impair output and potentially to stop some development activities altogether. This point must be understood, since otherwise it might be easy to conclude that the number of vessels involved is so small that preventing their deployment in areas subject to the Jones Act would not result in significant negative consequences.

This study was conducted to provide a concise but comprehensive overview of both US coastwise-qualified and non-US coastwise-qualified vessels engaged with: cable/umbilical and flexible pipelay, rigid steel pipelay, heavy lift operations, dive and ROV support, well intervention and survey activities. The analysis considers the US coastwise endorsement of the aforementioned vessels, and how the proposed CBP modifications and revocations could affect activities in the Outer Continental Shelf (OCS), the area generally referred to as the US Gulf of Mexico (GoM).

The present report provides:

- ♦ Background information on the types of vessels that routinely support the repair, installation and servicing activities on the OCS;
- ♦ An analysis of the types, numbers and flag states of offshore support vessels which provide the aforementioned support globally, with a particular emphasis on the US GoM fleet;
- ♦ A discussion of the negative impact on the US marine workforce and US industry based on comparative data analysis between the current US coastwise-qualified vessel capacity and non-US coastwise-qualified vessel capacity in the US GoM.

The information provided in this report contains details on the US coastwise qualified and non-US coastwise qualified vessels as described above and a list of conclusions supported by the data. All data is believed to be accurate at the time of collection and/or analysis.

Certain assumptions regarding regionalised vessel allocations have been made, including:

- ♦ The vessels included in the following tables and exhibits represent the assessed fleet distribution of both US coastwise-qualified and non-US coastwise-qualified vessels as of November 2016, which is the most recent worldwide database report;
- ♦ The report focuses on five market segments relevant to the proposed CBP action: light construction vessels (LCVs), pipelay vessels, heavy lift vessels and crane barges, survey and seismic vessels and well intervention vessels.

This report makes frequent reference to deepwater and the associated technical challenges. As the industry has developed, the definition of deepwater has progressively moved deeper. For instance, in the 1970s this may have been 400ft, and in the 1980s 1,000 ft. Today, the API defines the deepwater contour as 2,000 feet and ultra-deepwater beyond 6,000 feet. The US Energy Information Administration has published material referencing shallow water or continental shelf water depth as up to 125 meters (410 feet), deepwater 125-1,500 meters (410-4,921 feet) and ultra-deepwater as more than 1,500 meters (4,921 feet). In practice, there will be many factors that governing a vessel's water depth capability, not least statutory and class certification rules. This report defines key operational capabilities which are considered to differentiate deepwater capable vessels (generally 1,000 meters or 3,280 feet which is used by many industry commentators) from those which operate in shallower water.

The report opens with an overview of market conditions followed by an introduction to offshore market sectors and business models. These sections are intended to provide sufficient background information to allow those from outside the industry and who are not familiar with offshore operations to better understand the information and arguments presented in the main body of the report.

The body of the report is supported by two appendices:

Appendix 1 - A case study of an actual project to further assist readers to understand the operational implications of the analysis, by demonstrating the real-world impact of the proposed CBP revocations and modifications for an ultra-deepwater GoM project which started in 2016 and is still ongoing.

Appendix 2 – Silhouettes of offshore vessels, in scale, to illustrate the sizes and complexity of the different categories of offshore vessel.

2 Market Conditions

The collapse in oil price from $100/barrel in mid-2014 has had a significant negative affect on the offshore oil and gas industry world-wide, resulting in immeasurable job losses and distress to the whole supply chain. Oil companies reacted swiftly to the collapse by reducing investment and driving costs down. Offshore operating expenditure (OPEX) has been hard hit with all but essential expenditure curtailed, with the supply chain taking the brunt of the cuts. Offshore capital investment expenditure (CAPEX) has collapsed by an unprecedented 50% in the past two years (2015-2016), bringing the industry to an almost standstill in certain markets.

The impact on the offshore marine sector has been particularly hard, and exacerbated by a high level of new vessel building in the preceding 10 years, much of which was financed by debt. Consequently, today we have a gross over-supply situation in every market of the world, where we have seen:

- A collapse in equity values of vessel owners;
- Wide scale asset write-downs;
- Corporate failures;
- A significant proportion of the world's fleet of offshore support vessels laid-up and inactive due to a lack of work.

The GoM is not immune to these realities, despite enjoying record investment in deepwater production in the 10 years prior to the collapse in oil price.

In high level terms, the oil industry has always been cyclical, with an oil price shock every 10 years or so. That said, the current down-turn is analogous to the collapse in the mid-1980s which took 10-15 years to recover. Going forward, some recovery in the market can be expected if the oil price continues to rise, but all will depend upon the industry's cost-base and economic efficiency of competing global oil markets for capital. Should the GoM not remain competitive, market forces will encourage movement of capital to onshore production (shale oil for example) or overseas.

3 Market Sectors

The oil industry comprises many different market sectors. The offshore support vessel (OSV) market is no different, and comprises a range of different vessel types designed to meet the needs of each market segment. In order to put this into context and provide the framework for this report, it is worth considering the typical life cycle of an offshore oil field and the marine assets needed to support each phase. This is shown in Table 1.

Phase	Life Cycle Activity	Vessel Category Requirements
1	Drilling	Drilling rigs, supply vessels, anchor handlers/tugs
2	Construction and installation of offshore production facilities	Pipelay vessels, heavy lift vessels, light construction vessels, survey vessels, supply vessels, tugs, barges
3	Inspection, maintenance and repair of production facilities	Light construction vessels, survey vessels
4	Maintain production and production optimisation	Light construction vessels, drilling rigs, well intervention vessels, supply vessels
5	Plug wells and abandonment	Drilling rigs, well intervention vessels, supply vessels
6	Decommissioning and removal of facilities	Heavy lift vessels, light construction vessels, supply vessels, barges

Table 1 – Life cycle of an oil field and vessel requirements

By far the most common support vessel category requirement is that for supply vessels, often called platform supply vessels or PSVs, and tugs (and combinations thereof) often called anchor handling tug supply vessels (AHTS). They provide all the offshore transport and logistical supply-runs in support of all phases of an offshore production facility. The high-volume markets are in the support of drilling operations and the daily logistical support of offshore production facilities over a 20-30 year lifespan.

Light construction vessels encompass diving vessels and ROV support vessels. Diving support vessels (DSV) can vary from sophisticated purpose-built ships with all-weather deep diving capability (typically diving to 400-1,000 ft) to small anchored ships and barges for shallow diving activity (typically 100-200 ft). Likewise, remotely operated vehicle (ROV) support vessels can vary in configuration, but all deploy sophisticated robotic vehicles and tools in deep water well beyond diving range (and typically up to 10,000 ft). Light construction vessels typically have small to medium sized cranes on board (typically 100-250 tons) for supporting diver or ROV construction intervention activities.

There are many forms of drilling rigs today, from deepwater drill ships, to midwater semi-submersible rigs, to shallow water jack-up rigs. They are often generically referred to as mobile offshore drilling units (MODU) and all are equipped with a high level of equipment inventory to support drilling operations.

Well intervention vessels provide intervention into a live well for maintenance operations when the full capability of a drilling rig is not warranted. It is a specialised operation with a limited number of such vessels in operation world-wide.

Heavy lift vessels are used for installing the very heaviest of loads (between 1,000 to 10,000 tons) comprising offshore platforms, decks, etc. It is a highly specialised market with a limited number of deepwater capable vessels world-wide.

Pipelay vessels vary considerably in configuration depending upon the technology they deploy for laying pipelines on the seabed. The market has developed greatly over the past 30-40 years from the early generation of anchored barges to highly sophisticated units today for successfully laying rigid steel pipelines in deep and ultra-deep water. An adjacent market to rigid steel pipelaying is that of laying pipelines manufactured from flexible materials, the so called flexible flowlines, which are a competing product for rigid steel pipelines and risers. These vessels are configured with heavy duty storage facilities for thousands of tons of flexible products and sophisticated equipment for handling and laying the product on the seabed. These vessels are also used for laying umbilicals and cables which provide the power and telemetry systems for remotely controlling production wellheads on the seafloor. The vessels are normally configured with cranes (300-500 tons) for installing the associated production hardware on the seabed.

Survey vessels comprise a range of sub-categories from seismic surveying activities to hydrographic surveying. Seismic is in support of exploration and mapping of oil and gas reservoirs, whereas hydrographic surveying is largely associated with topographical surveys of the seafloor providing design data for subsea structures, pipelines, etc.

A common feature of modern tonnage today has been the shift away from traditional means of position keeping on location offshore. Traditionally this was with an anchor mooring system, but has now been almost completely replaced with dynamic positioning (DP). This system uses computer based technology to navigate and control the ship’s thrusters and propellers to maintain accurate position. The technology has been developed massively over the past 30 years and deploys a multitude of technology including satellite, sonar and microwave navigation systems. However, there are various classes of DP system, which use a numbering system DP1, 2 and 3 to differentiate between vessels with higher levels of equipment redundancy and resilience, DP3 being the most sophisticated, and DP1 being viewed as quite limited today.

4 Offshore Business Models

When considering fleet capacity in the offshore sector it is important to have some understanding of the different business models used by the industry, and that the model varies according to the market sector. The most prevalent model is a day rate reimbursement mechanism based on prevailing market conditions. Oil companies charter tonnage either on a term basis or spot market basis, or a combination the two to suit their business needs. It is therefore a relatively low risk business model, provided there is adequate vessel utilization, and has a low overhead burden.

There is plenty of scope for technical differentiation in the drilling and well servicing sectors, but little technical differentiation in the supply vessel and AHTS sectors beyond cargo capacity and bollard pull. Pricing in these commodity sectors is largely driven by the spot market. The supply vessel and AHTS markets are the domain of the marine service providers, which are often companies with large fleets of vessels operating in domestic and international markets.

By contrast, the business model in the construction and decommissioning sectors is completely different and based on a fixed price contracting mechanism. It is therefore a high risk business with potentially higher returns, but is not one for the faint hearted, as the risks are wide-ranging, including operational performance risks, weather risks, procurement risks, etc. It is the domain of international marine contractors who engineer, design, build and install offshore production facilities on a world-wide basis. They normally own or at least control their vessels and installation equipment; this is because the assets are highly specialised for deepwater activities and incorporate their own intellectual property. The market is truly international in nature because no single domestic market can support the level of investment – which is the case in the GoM. The business model is therefore much more sophisticated than the chartering model, as contractors not only have to lay pipelines and construct production facilities offshore in extreme water depths, but also need the engineering, project management and procurement capabilities in order to integrate the activities successfully on a fixed price basis.

5 Methodology

Clarkson Research Services Ltd is an internationally recognised provider of marine services with a global presence, including Clarksons Platou Shipping Services USA LLC. They maintain an updated list of offshore support vessels worldwide, this list is an industry recognised resource and includes data from the near real-time ship tracking system ShipAIS, which is an automatic identification system of commercial shipping. As part of this study, IMCA accessed and reviewed Clarkson's 2016 database edition of A-Z of *Offshore Support Vessels of the World*. The 2016 database contains 8,610 vessels operating internationally. As part of the analysis a number of vessel types that were not considered relevant to the scope of the CBP's proposed modification and revocation of rulings were eliminated, including dredgers, shuttle tankers, offshore production vessels, offshore supply vessels, and similar vessel categories. IMCA recognises and accepts that vessels transporting merchandise and/or passengers are within the scope of the Jones Act. Therefore, this report does not consider those vessel types.

The screening process identified a list of 1,818 vessels in seven key vessel classes. The seven vessel classes were then consolidated into five construction sector categories in order to simplify the presentation, this involved combining several vessel classes into a single category.

A final screening identified vessels in the five categories suitable for deepwater operations and resulted in a list of 528 deepwater capable vessels. The consolidation was conducted as follows:

- Light construction vessels (LCVs) include the sub-categories of dive and ROV support, and multi-purpose support vessels;
- Pipelayers include the sub-categories of cable, umbilical, and flexible pipelay, and rigid steel pipelay;
- Heavy lift vessels include the sub-categories of crane vessels and transportation/heavy lift – note that some of these vessels are also capable of laying pipe;
- Survey vessels include the sub-categories of hydrographic/oceanographic and seismic/geophysical vessels;
- Well intervention vessels include the sub-categories of multi-purpose support, multi-role, and other support where they are configured as well intervention vessels.

The report provides a gap analysis between the US and foreign fleet capacity to support the offshore oil and gas exploration and production industry in the US. For this reason, the scope of this report primarily focuses on the aforementioned vessel types, and narrowing them down to those which are able to operate in deepwater environments. Industry experience shows that the US coastwise qualified fleet is able to support shallow water offshore oil and gas operations in the OCS.[1] In contrast, this report shows the practical reality that the US coastwise qualified fleet is unable to support deepwater offshore oil and gas operations in the OCS.

Supplementary sources of information include the following reports by Clarkson Research Services Ltd:

- Offshore Review and Outlook North America (*October 2016*);
- Offshore Review and Outlook (*October 2016*); and,
- Regional Outlook North America (*November 2016*).

1 Coastwise is a specific endorsement issued by the US Coast Guard. To receive a coastwise endorsement, vessels must be built in the US with a majority of US products, owned by a US company and registered in the US. Only vessels with coastwise endorsement are allowed to engage in coastwise trade.

As part of this study, IMCA accessed and reviewed Clarkson's 2016 database and used it as a cross-reference to distinguish coastwise qualified vessels and non-coastwise qualified vessels.

There is a crucial difference between US flag and US-coastwise qualified; a vessel may be flagged to the US registry but not satisfy the requirements to be coastwise qualified (see section 6.2). This is usually because the vessel was not constructed in a US shipyard or fails to meet Jones Act ownership criteria. Section 7 of this report identifies coastwise qualified vessels, as opposed to simply being US registered.

Vessel requirements were developed based on discussions with marine contractors and vessel captains, literature reviews, and industry commentaries.

6 Vessels Supporting the Offshore Oil and Gas Exploration and Production Industry

6.1 International Overview

The offshore oil and gas exploration and production (E&P) industry is dependent on the support of numerous types of specialised support vessels. Worldwide, there is a fleet of over 8,500 vessels that support various aspects of offshore operations.[2] Table 2 depicts the fleet capacity of major flag states regarding offshore support vessels (OSVs). The US OSV fleet is the largest in the world with almost 50% more registered vessels than the next largest fleet (1,004 US flag vessels to Singapore's 678).

Rank	Country	Vessel #	Rank	Country	Vessel #
1	United States	1,004	15	India	187
2	Singapore	678	16	Russia	185
3	Panama	555	17	UAE	169
4	China	432	18	Bahamas	164
5	Malaysia	360	19	Netherlands	159
6	Vanuatu	308	20	Norwegian International	154
7	Norway	280	21	Cyprus	110
8	Mexico	263	22	Bahrain	98
9	Indonesia	251	23	Liberia	88
10	St Vincent & Grenadines	241	24	Azerbaijan	85
11	Brazil	211	25	Italy	82
12	Nigeria	198	26	Danish International	77
13	Marshall Islands	188		*Others*	1895
14	United Kingdom	188		**Total**	**8,610**

Data source: Clarksons Research

Table 2 – OSV fleet capacity of major flag states worldwide (November 2016)

Of those vessels, there is a subset of 1,817 vessels (21% of the total of 8,610) that are capable of providing construction, repair and inspection (such as heavy lifting, installing pipe) in support of the oil and gas E&P industry. Of this subset, approximately 10% are US flag, see Table 3.

2 Offshore Review and Outlook North America, Clarksons Research, October 2016.

Type	US	% US	Non-US	% Non-US	Total
Dive/ROV support vessels	18	12%	129	88%	147
Pipe/cable lay vessels	24	9%	230	91%	254
Crane and derrick lay barges	34	12%	240	88%	274
Heavy lift vessels	1	1%	93	99%	94
Multipurpose support	18	6%	300	94%	318
Well stimulation vessels	8	27%	22	73%	30
Survey vessels	81	12%	620	88%	701
Total	**184**	**10%**	**1,634**	**90%**	**1,818**

Table 3 – Breakdown of overall OSV fleet capacity worldwide (November 2016).
Within this subset, there is a further, much smaller subset of vessels suitable for deepwater operations

To simplify the presentation, these seven vessel types were consolidated into the five categories defined in section 5 of this report. Their technical capabilities to allow operation in deepwater are defined in Section 7. After this consolidation and screening process to identify the deepwater capable fleet, a list of 528 vessels remains. This is shown in Table 4. The report concentrates on this small fleet of deepwater capable offshore vessels and separates them into coastwise and non-coastwise qualified.

Type	Coastwise qualified	% Coastwise qualified	Non-coastwise qualified	% Non-coastwise qualified	Total
Light construction vessels	9	5.5%	156	94.5%	165
Pipelayers	0	0%	55	100%	55
Heavy lift vessels	0	0%	26	100%	26
Well intervention vessels	1	8.3%	11	91.7%	12
Seismic survey/geophysical	23	8.5%	247	91.5%	270
Total	**33**	**6.3%**	**495**	**93.7%**	**528**

Table 4 – Breakdown of worldwide deepwater fleet capacity

This small group of highly capable vessels represents approximately 6% of the global OSV fleet. If only looking at pipelayers, heavy lift and well intervention vessels then the global fleet of deepwater vessels is less than 100, just 1% of the global OSV fleet. This small number of vessels are essential for deepwater oil and gas operations and, put simply, developing deepwater fields would not be possible without them. To put these numbers into perspective, in the high volume commodity sector there are currently believed to be a combined total of 5,535 PSV and AHTS vessels in the global fleet, of which 772 are US flag and of which 474 were believed to be active in the US GoM in November 2016 (excluding vessels in long term lay up).[3]

3 Regional Outlook North America (November 2016).

6.2 US Overview

Out of a US flag OSV fleet of 1,004 vessels, 820 vessels, or 82% of the total, fall into the high-volume commodity types such as platform supply vessels, anchor handlers (AHTS) and crew boats. There are 184 US flag OSVs capable of providing construction, repair and inspection (such as heavy lifting, installing pipe) in support of the oil and gas E&P industry. But there are just 33 coastwise qualified deepwater capable vessels in the five deepwater categories analysed in section 7 of this report, or 3.6% of the US flag OSV fleet, most of which are survey vessels.

It is very clear that the US flag OSV fleet is focused on the commodity and shallow water markets, and largely absent in the high cost deepwater markets.

The OSV business in the US is dominated by US flagged, coastwise qualified vessels. This results from the fact that, with limited exceptions, US laws reserve the privilege of conducting 'coastwise trade' to vessels meeting the criteria for coastwise qualification, which include requirements that vessels are built and documented in the US, crewed with US citizens and owned by US nationals. Similarly, only US documented vessels with a coastwise trade endorsement may engage in towing or carrying passengers between ports or places in the US.

Section 4(a) of the Outer Continental Shelf Lands Act of 1953, as amended (OCSLA), extended the coastwise laws of the US to:

> "*the subsoil and seabed of the outer Continental Shelf and to all artificial islands, and all installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring for, developing, or producing resources therefrom … to the same extent as if the outer Continental Shelf were an area of exclusive Federal jurisdiction within a State.*"

The 1978 amendments to OCSLA added the language above concerning attachment to the seabed of installations and other devices. CBP has interpreted this language to mean that only US-coastwise qualified vessels (i.e. US build, owned, manned and documented) can:

- carry cargo between shore and an offshore MODU, platform, or other fixed or floating facility while temporarily or permanently attached to the seabed;
- carry cargo between two such offshore locations (or points);
- carry passengers from shore to an offshore MODU, platform, or other fixed or floating facility while temporarily or permanently attached to the seabed;
- carry passengers between two such locations;
- engage in towing between shore and an offshore MODU, platform, or other fixed or floating facility while temporarily or permanently attached to the seabed; or
- engage in towing between two such offshore locations.

For example, CBP applies the Jones Act applies to anchor handling tug supply vessels (AHTSs) and PSVs supplying offshore vessels, structures or installations captured by Section 4(a) of OCSLA as stated above.

The vast majority of the US flag OSV fleet will not be affected by the proposed ruling revocations as they fall into categories which are reserved for coastwise qualified vessels such as transporting supplies and offshore workers. The number of coastwise qualified deepwater vessels is very small in the context of overall fleet numbers.

6.3 Offshore Activities in Deepwater Environment

Offshore oil and gas exploration and production in deepwater is technically challenging, and is associated with highly demanding requirements for dynamic positioning, lifting capacity and other vessel industrial systems.

These and other factors will dictate the physical characteristics of a vessel, such as displacement and hull form. Similarly, the technical characteristics of cranes and other lifting appliances used in deepwater environments are strictly defined which necessitate 'purpose built' specificity to meet innovative performance criteria.

Dynamic positioning allows a ship to accurately and automatically control its position and heading, including remaining stationary using a system of computers, position references, propellers and thrusters. In shallower water it is possible to use anchors or spud cans to control the position of a vessel, however this is not practical in deepwater. There are three classes of dynamic positioning, many deepwater offshore vessels require DP systems meeting the more demanding requirements of DP equipment classes 2 or 3 to provide more dependable positioning. The requirements for these equipment classes are provided in International Maritime Organization (IMO) guidelines (MSC/Circ.645).

Many of the vessels under consideration need ship mounted cranes. These cranes are not the same as the small cranes installed on board PSVs for handling stores and spare parts, or even larger cranes installed on board conventional cargo carrying vessels such as bulk carriers or crane equipped container vessels. The cranes required for deepwater capable OSVs include the largest cranes in the world, and even the smaller examples used on LCVs and survey vessels have a high lifting capacity relative to most marine cranes, and have high wire capacity and sophisticated control systems to lower items to deep depths.

Using a crane for tasks outside its design intent significantly increases safety risks, equipment failures and downtime. The intended use of the crane includes shipboard lifts, subsea construction, the installation and retrieval of loads on the seabed, remotely operated vehicle (ROV) support, supply vessel operations, vessel to vessel lifts, vessel to platform lifts and personnel lifting.

In addition to requirements for the lifting equipment itself, the hull of the vessel must be suitable, and must have adequate stability for the intended operations, while satisfying international stability regulations as enforced by the USCG in the US.

The result of these factors is that the vessels considered in this report will tend to be much larger, be provided with greater installed power and have larger, more capable mission systems than vessels designed to perform similar activities in shallow water or which are restricted to near coastal and inshore operations. This means they are much more expensive to build and operate. They also need highly specialised technical expertise if they are to be safely operated; only a limited number of companies in the world currently possess the necessary technical expertise, hence the small number of such vessels.

6.4 Oil Production in the US Gulf of Mexico

According to the US Energy Information Administration, average daily consumption of oil in the United States in 2016 was 19.4 million barrels per day (MB/d). Domestic oil production was 8.9 MB/d. Production from the Gulf of Mexico was approximately 1.6 MB/d of oil (excluding gas equivalent to oil) representing around 17-18% of domestic production. Offshore oil production is much more expensive than onshore production and globally represents approximately 30% of the world's oil production.

Offshore oil production volumes in the US GoM are enjoying something of a renaissance, the weaker oil price environment notwithstanding. In 2014, offshore oil production in the area increased year on year for the first time since 2002. The revival of offshore production can be substantially attributed to the advent of deepwater and ultra-deepwater E&P activity in the last decade: the US GoM has been one of the foremost areas for deepwater E&P spending and innovation globally.[4] The health of the US GoM and fulfilment of these expectations depends on continued availability of deepwater capable OSVs. As highlighted in section 6.1, a very small number of deepwater capable vessels are essential for continued deepwater activity in the region. Section 7 of this report demonstrates that there will be insufficient vessel capacity to service these deepwater activities if non-coastwise qualified vessels are excluded from the GoM.

6.5 Employment of American Workers Employed Onboard Offshore Vessels in the US Gulf of Mexico

The GoM provides a wealth of marine and offshore employment opportunities for US citizens. From welders to caterers, from chief engineers to deck hands and commercial divers to ROV pilots, the GoM offers opportunities for people with a wide and diverse range of skills and talents. In the current downturn however, there is a surplus of American seafarers and resulting unemployment.

The present poor market conditions may superficially make measures intended to exclude non-coastwise vessels seem an attractive means of boosting employment for US seafarers. However, the surest way to provide long term job opportunities for seafarers is for the industry to return to good health and for the market to grow. The small fleet of non-coastwise qualified vessels offer opportunities for US workers offshore, a survey of twelve Contractor members of IMCA conducted in February 2017 found that these companies had more than 1,100 US workers offshore.

It must also be recognised that marine contractors have substantial investments in the US and a long heritage of pioneering commitment to the GoM. They have significant onshore operations with extensive engineering, management, production, and fabrication facilities throughout the Gulf Coast States, and employ many thousands of US workers onshore. Banning their construction vessels from the market through the proposed CBP modifications and revocations will cost jobs rather than create jobs. Onshore, the GoM market is supported by a vast range of industrial infrastructure and suppliers representing a huge supply chain of activities. These businesses employ many tens of thousands of American workers and are dependent on continued investment offshore – which is at risk through the proposed CBP modifications and revocations.

4 ibid.

7 US Fleet Capacity for Offshore Support Vessels Operating in Deepwater Environments

7.1 General Overview

Offshore oil and gas exploration and production in deepwater environments is technically challenging, and is associated with more demanding functionality such as dynamic positioning, increased lifting capacity and other complex vessel industrial systems (section 6.3). This section provides information about the five categories of vessel considered suitable for operating in water depths of 3,280 ft/1,000 meters(m) or greater, summarized in Figure 1.

To assist readers in appreciating the different sizes of the vessels considered in this section, a selection of vessel silhouettes is provided in Appendix 2.

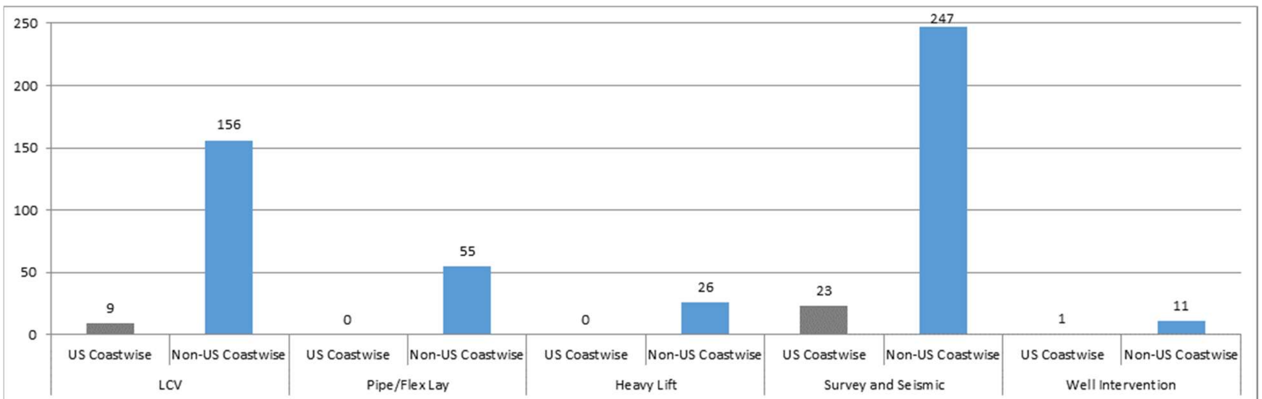

Figure 1 – Worldwide breakdown of deepwater OSV types (528 vessels)

7.2 Light Construction Vessels (LCVs)

This category includes a number of vessel types, including those that conduct the light and medium construction activities in the support of the installation of offshore oil and gas platforms, pipelines and related facilities.

LCVs are often configurable for a wide range of potential activities and can be mobilised with different mission equipment according to the needs of the contractor. Although in the last 20 years there has been an increasing move to specialization in this sector. This category includes vessels which are capable of supporting manned and/or remotely operated vehicle (ROV) diving.

The basic requirements[5] for a light construction vessel include:

- Station keeping of DP2 or greater;
- Minimum of 100T crane capacity in single fall mode[6];
- Minimum crane working depth of 1,000 meters.

Although many LCVs look like enlarged platform supply vessels, they are provided with accommodation and appropriate certification for carrying industrial workers, power supplies capable of feeding mobilised equipment and will be provided with a crane capable of supporting construction and deploying systems and equipment overboard. A typical LCV, the *Grand Canyon II*

5 Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews. Individual construction companies may apply different criteria based on their own preferences or specific circumstances.

6 For subsea work, it is highly advisable to avoid multi-fall arrangements due to the likelihood of spinning and fouling.

of Helix Energy Solutions Group Inc, is illustrated in Figure 2 alongside the same company's semi-submersible well intervention vessel *Q5000*.

Figure 2 – LCV Grand Canyon II *(left) and Helix well intervention vessel* Q5000

LCVs suitable for supporting their intended activities in water depths of 3,280ft/1,000m or greater will be equipped with minimum of 100T crane capacity and 3,280ft/1,000m wire[7].

The currently available number of US coastwise and non-US coastwise LCVs with a crane capacity of >100T and >1000m wire is highlighted graphically in Figure 3.

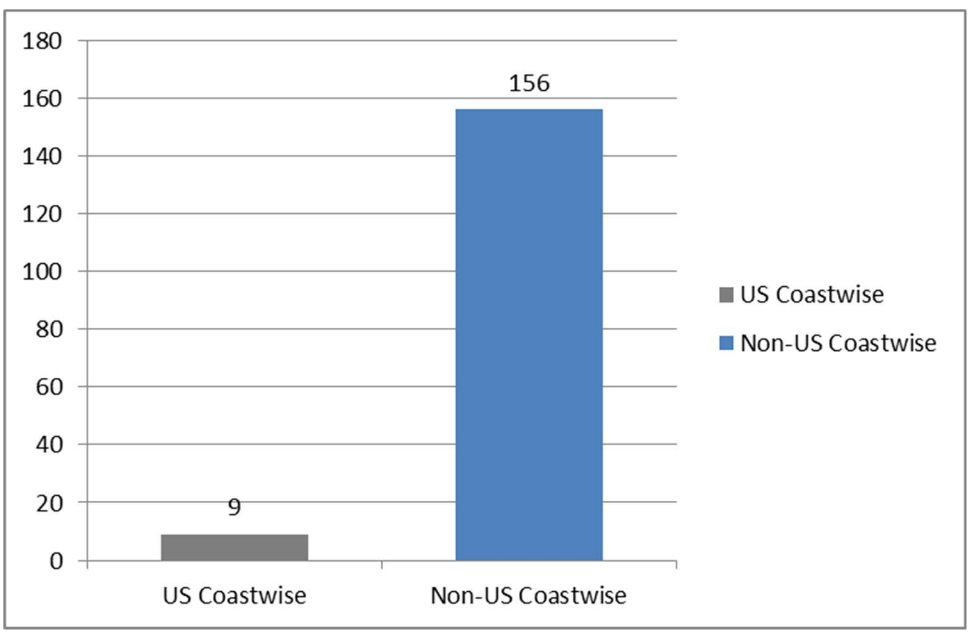

Figure 3 – Worldwide breakdown of deepwater capable light and medium construction vessels (>100T crane capacity; >1000m wire)

[7] Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews. Individual construction companies may apply different criteria based on their own preferences or specific circumstances.

Of the nine coastwise qualified LCVs meeting the criteria used to define deepwater capability, six are equipped with a crane of 150T or greater capacity which is considered the industry accepted minimum capacity for deepwater lifts.[8] These vessels are shown in Table 5.

Name	Owner	DP Class	LOA (m)	Beam (m)	Crane SF (mT)	Max Working Depth (m)
HOS Warland	Hornbeck Offshore	DP2	92	23	250	3700
HOS Woodland	Hornbeck Offshore	DP2	92	23	250	3700
Harvey Deep-Sea	Harvey Gulf	DP2	92	20	165	3000
Harvey Intervention	Harvey Gulf	DP2	92	20	165	3000
C-Installer	ECO	DP2	97	20	150	3000
Ocean Alliance	Oceaneering	DP2	94	20	150	3000

Table 5 – US-coastwise LCVs suitable for deepwater lifts

IMCA is aware that there are small number of additional coastwise new build projects underway. The inclusion of these vessels does not provide any meaningful new capacity, or do anything to close the capability gap.

A significant complicating factor is that offshore marine construction is undertaken by marine contractors – not marine service providers. It would challenge normal economic and industrial logic to expect contractors, with all the operational risks they shoulder, to bankroll marine service providers while somehow redeploying or stacking their own vessels. This would be a significant backward move to an earlier era which was not sustainable in the 1980's, let alone today. Our industry has a long history of integrating important parts of the supply chain in order to manage risk, and it is unrealistic to now start to disaggregate the industry's structure.

7.3 Pipelayers

This category includes a number of vessels that support the installation of rigid steel pipelines and flexible pipelines. There are several methods in use for laying pipe, principally:

- J-Lay – used to install rigid pipelines in deep water. Pipe is upended and welded to the seagoing pipe in a near vertical ramp or tower, the angle of which is adjusted so that it is in line with the pipe catenary to the seabed. This method minimises pipe bending.
- S-Lay – pipe joints are welded together onboard the vessel in a horizontal production line, a stinger supports the pipe as it leaves the vessel to control the radius as it bends towards the seabed. This method offers a high rate of laying pipes and is mainly found in shallow to intermediate water depths although the method can also be used in deepwater.
- Reel Lay – long pipe segments are welded, tested and coated onshore and then spooled onto a large, usually vertically oriented pipe reel, in one continuous length. Once the reel-lay vessel is offshore, the pipe is unspooled, straightened and then lowered to the seabed as the vessel moves forward. This offers a high production rate and high quality assurance as the welds and quality are checked onshore before loading. A fabrication spool base is required onshore.

8 Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews. Individual construction companies may apply different criteria based on their own preferences or specific circumstances.

♦ Flex Lay – uses a vertical tower, equipped with one or more tensioners, and a chute or wheel aligner on top to install flexible pipelines. The installed pipeline is less sensitive to fatigue and requires less complex installation, abandonment and recovery procedures.

Some pipelayers can operate in several of the above modes, offering a multi-lay capability which optimizes the lay system used according to specific requirements. Pipelayers may be very large vessels and are often provided with large cranes to undertake construction activities when not laying pipe. Figure 4 shows the pipelayer *Seven Oceans* laying pipe using a reel lay system; Figure 5 shows the same vessel at a fabrication spool base. To demonstrate how large some pipelay vessels are, Figure 6 shows the Allseas vessel *Solitaire*.

Figure 4 – Subsea 7's Seven Oceans *pipelay vessel*

Figure 5 – Seven Oceans *alongside at the Subsea 7 Port Isabel, Texas fabrication spool base*

Figure 6 – The large deepwater pipelay vessel *Solitaire* at sea

Pipelayers suitable for deepwater operation[9] will be provided with:

- ♦ Station keeping of DP2 or greater;
- ♦ Minimum of 100T top tension;
- ♦ Minimum of 1,000T pipe carrying capacity.

At present, there are no US-coastwise qualified pipelay vessels believed to be provided with either dynamic positioning and/or this minimum pipe tension, thereby severely limiting their ability to serve deepwater fields in US waters. Dynamic positioning is essential as in deepwater; as it is not practical to use anchors for positioning. If operating in deepwater and ultra-deepwater pipe tension capabilities of 100T and greater are typically required.

Non-US coastwise qualified assets dominate the deepwater pipelay sector. These assets have long been a staple in the development of offshore oil and gas field development projects and have an unparalleled track record of safe, environmentally friendly operations. This is the result of many years of highly skilled asset management, design expertise and leveraging experiences gained from global operations.

Figure 7 provides the numbers of coastwise and non-coastwise qualified pipelay vessels meeting the specified criteria for deepwater operation.

[9] Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews. Individual companies may apply different criteria based on their own preferences or specific circumstances.

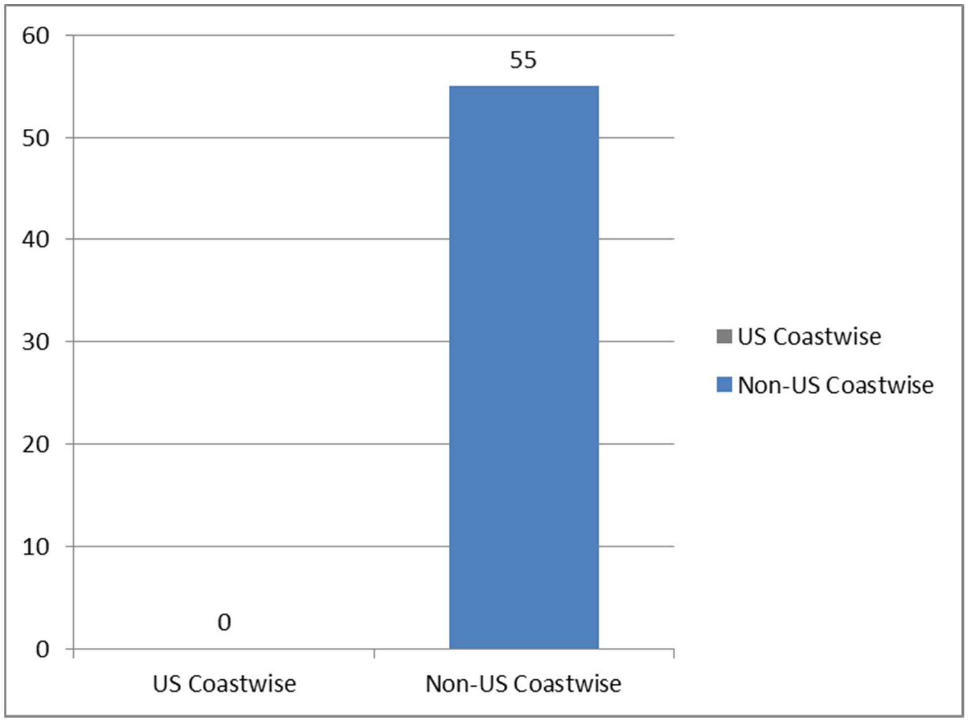

Figure 7 – Worldwide breakdown of pipelay vessels capable of deepwater operations; meeting the minimum requirements

Table 6 lists the known coastwise pipelaying fleet. All of these vessels are designed for shallow water operations, less than 984ft/300m, utilising anchors or spud cans to maintain vessel position.

Name	Operator	DP	LOA (m)	Beam (m)	Top Tension (>100mT)	Flag	Coastwise
Rider	Everest Hill	Anchor	79	22	UNK	US	Y
Brave	Cal Dive Intl	Anchor	84	21	UNK	US	Y
Pecos	Cal Dive Intl	UNK	78	22	UNK	US	Y
CLB Big Max	Mobro	Anchor	79	22	UNK	US	Y
CM9	Chet Morrison	Anchor	55	16	18	US	Y
Diamond 85	Diamond Services	Anchor	66	21	UNK	US	Y
Diamond Jim	Diamond Services	Anchor	53	23	UNK	US	Y
DLB Super Chief	Bisso Marine	Anchor	81	22	45	US	Y
Midnight Runner	Torch Inc	Spud	46	16	14	US	Y
Mighty Chief	Bisso Marine	Anchor	60	23	23	US	Y

Table 6 – US-coastwise qualified pipelay fleet

7.4 Heavy Lift Vessels

This category includes various self-propelled and non-self-propelled heavy lift vessels. These vessels are used for lifting large loads into position offshore. For the purposes of this report a heavy lift vessel is considered one provided with a crane of at least 1,000T lifting capacity. Smaller lifts may be performed by LCVs (see section 7.2) or smaller lift vessels.

Heavy lift vessels may take many forms, including both semi-submersible and conventional ship-shaped hull forms.

A large semi-submersible heavy lift vessel is shown in Figure 8 and a more conventional ship-shaped vessel shown in Figure 9.

Figure 8 – Large semi-submersible heavy lift vessel

Figure 9 – Large conventional ship shape heavy lift vessel

The basic requirements[10] for a deepwater heavy lift vessel include:

- Station keeping of DP2 or greater;
- Minimum of 1,000T crane capacity;
- Minimum of 200ft hook height;
- Minimum of 100ft working radius.

The discrepancy between the coastwise qualified and non-coastwise qualified fleet is readily apparent in this crucial heavy lift segment.

Figure 10 shows the coastwise and non-coastwise qualified heavy lift fleet satisfying the above criteria for deepwater heavy lifting.

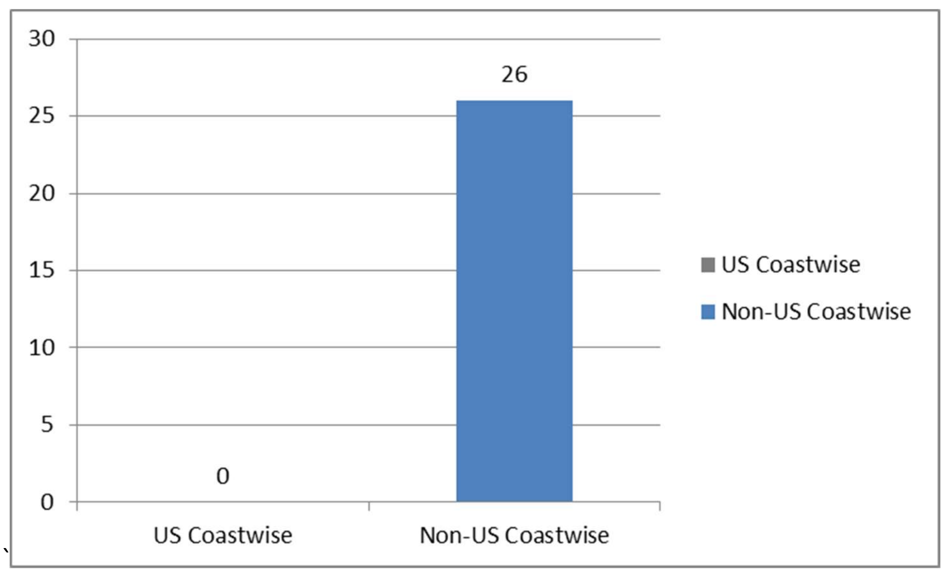

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Figure 10 – Worldwide breakdown of coastwise and non-coastwise qualified deepwater heavy lift vessels

10 Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews.

Table 7 lists some of the larger coastwise qualified heavy lift vessels and their capabilities (this is not a complete list).

Type	Name	Owner	LOA (m)	Beam (m)	DP	Crane Max Load (>1000mT)
Heavy lift crane	VB 10000	Versabar	85	96	DP3	6,800
Heavy lift crane	EP Paup	Manson Construction	116	32	Anchor	907
Heavy lift crane	Chesapeake 1000	Donjon Marine Co	58	31	Anchor	907
Heavy lift crane	Mr Two Hooks	Laredo Construction	64	21	Anchor/Spud	800
Heavy lift crane	Tetra Arapaho	TETRA Tech	107	31	Anchor	726
Heavy lift crane	DB General	General Construction	91	30	Anchor/Spud	700
Heavy lift crane	Cappy Bisso	Bisso Marine	61	21	Anchor/Spud	635
Heavy lift crane	Lili Bisso	Bisso Marine	59	22	Anchor/Spud	544
Heavy lift crane	Illuminator	Laredon Construction	55	21	Anchor/Spud	513
Heavy lift crane	Wotan	Manson Construction	91	27	Anchor/Spud	454
Heavy lift crane	Derrick No 24	Manson Construction	61	26	Anchor/Spud	400

Table 7 – Sample of US coastwise qualified heavy lift vessels and their capabilities

The only US-coastwise heavy lift vessel which meets the 1,000T lifting capacity and dynamic positioning requirements is the *VB 10000*. However, this vessel does not fulfil the minimum of 200ft hook height and as it is not a slewing crane, and is not used for platform jacket installations. The remaining 10 US heavy lift barges are positioned utilising anchors/spud cans and designed for shallow waters. As such, there are no coastwise heavy lift vessels which meet the defined criteria.

7.5 Well Intervention Vessels

These specialised vessels perform operations on an oil or gas well during its life to increase production efficiency, provide well diagnostics and support well abandonment activities. The intervention is accomplished through the use of riser and riserless technologies. A semi-submersible well-intervention vessel is shown in Figure 2 (Section 7.2).

The basic requirements for a deepwater well-intervention vessel include[11]:

- ♦ Station keeping of DP2 or better – the USCG recommends DP3;
- ♦ Minimum of 350T tower for riser based intervention;
- ♦ Minimum of 150T tower/crane for riserless intervention;
- ♦ MODU class notation.

Figure 11 shows the global and coastwise qualified well intervention vessel fleet meeting the above deepwater criteria.

At present, there is only one US-coastwise qualified well intervention vessel meeting the aforementioned requirements.

11 Vessel requirements were developed based on discussions with marine contractors, vessel captains, and literature reviews. Individual construction companies may apply different criteria based on their own preferences or specific circumstances.

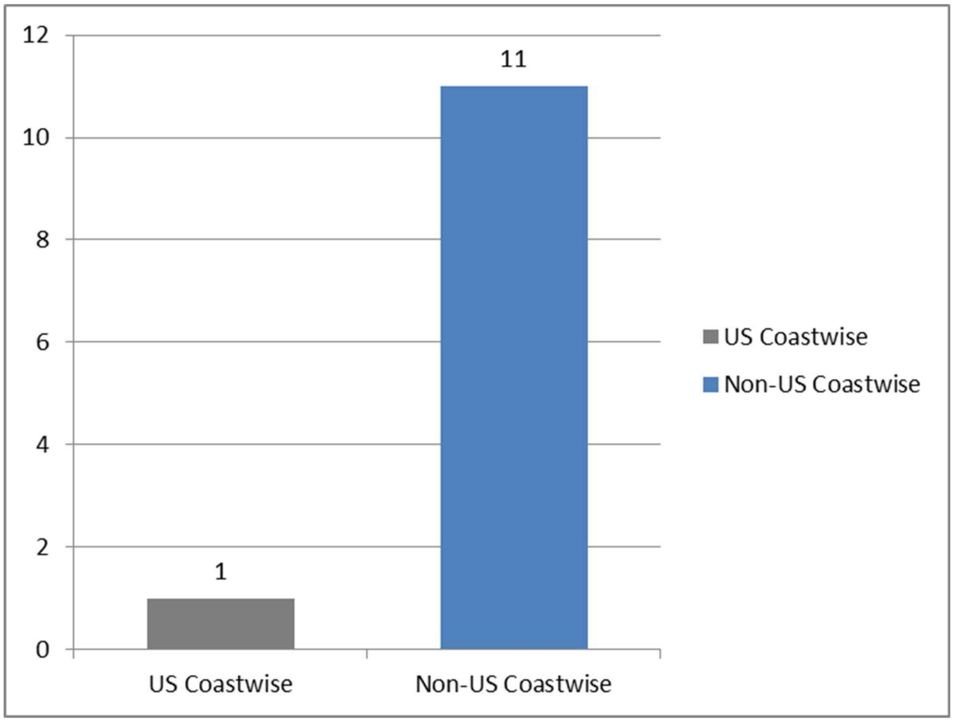


Figure 11 – Worldwide breakdown of coastwise and non-coastwise qualified deepwater well intervention vessel capacity

7.6 Seismic Survey/Geophysical

These vessels are equipped with specialised equipment to collect data needed to characterise the seafloor and underlying geologic formations. Some basic features for a deepwater survey vessel include:

- Echo sounder equipment – multi beam, single beam or side scan;
- Hull transducer;
- Acoustic positioning equipment;
- Hydrophone streamers;
- Seismic sound source arrays (air guns) with appropriate compressors;
- Sound velocity profiling equipment;
- Magnetometer equipment and gravity sensing equipment;
- Antennas and below-decks equipment for satellite positioning;
- Motion reference units – means to detect heave, pitch and roll;
- A-frame and/or back deck space for storage and deployment and recovery of subsea equipment;
- DP capability.

The majority of the survey vessels at home and abroad are engaged in research for universities, institutions and government entities. The coastwise fleet alone has over 65 survey vessels; however, less than 25 are available to support the oil and gas sector. Figure 12 shows the global and coastwise qualified deepwater capable survey and seismic vessel fleet.

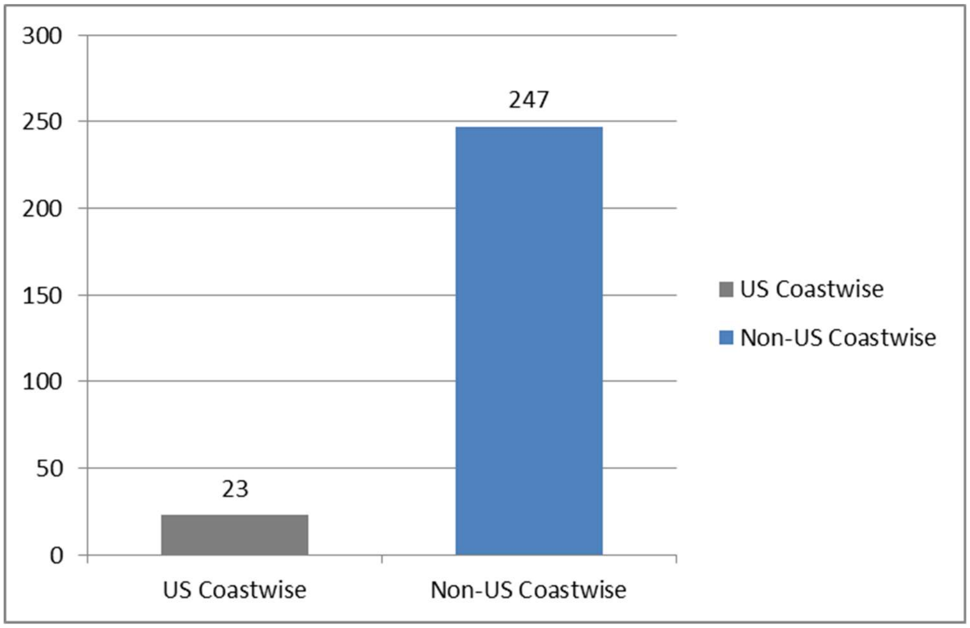


Figure 12 – Worldwide breakdown of coastwise and non-coastwise qualified deepwater survey and seismic vessel capacity

8 Vessels Deployed in the US Gulf of Mexico: 2013-2016 Comparison

This section of the report has quantified the coastwise and non-coastwise qualified offshore vessels in each category believed to have been deployed in the US GoM in 2016 (a poor year) and 2013 (a good year). Figure 13 shows the number of vessels which were operational in the US GoM meeting the following criteria:

- LCVs: DP2 or better; 100T + single fall crane capacity; 1000m + crane working depth;
- Pipelayers: DP2 or better; 100T + top tension;
- Heavy lift vessels: DP2 or better; 1000T + crane capacity;
- Seismic/survey vessels: working on commercial activities;
- Well intervention vessels: DP2 or better; MODU or well intervention notation.

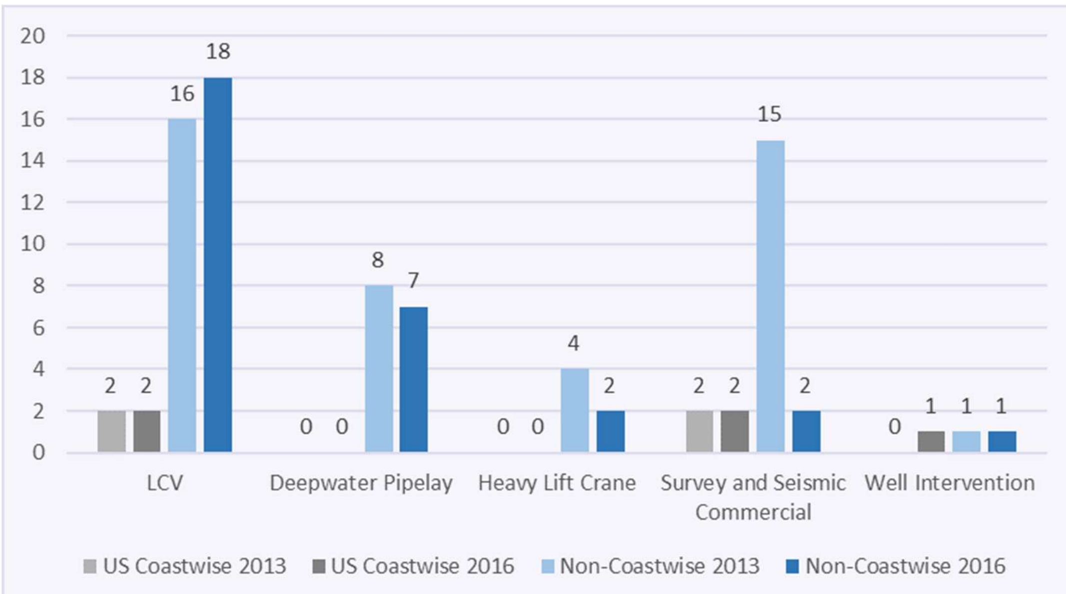


Figure 13 – Offshore support vessels operating in the US GoM 2013 and 2016

The data is remarkable, in that there is very little change in the overall vessel numbers active in four of the five vessel categories considered. The only category showing a major change is survey and seismic vessel segment, which is always the first market to be hit in a downturn. This indicates that these are niche market segments, and that vessel numbers have been stable in both good and poor market conditions. And in neither case has the coastwise fleet been sufficient to meet the needs of the market.

The reason for this phenomenon is readily explained by the fact there are only a handful of large deepwater projects per year, which although generate a lot of drilling and supply vessel activity during the upfront development phase, only require a small number of specialist construction vessels during the installation phase. Table 8 was published by the US Energy Information Administration in February last year and lists the limited number of deepwater and ultra-deepwater projects being worked on in the period 2015-17.

Deepwater Gulf of Mexico field starts (2015)

Field name	Majority operator	Associated project	Water depth (ft)	Discovery year
Silvertip	Shell	Perdido	9,280	2004
West Boreas	Shell	Mars B	3,094	2009
Hadrian South	ExxonMobil	Lucius	7,983	2009
Lucius	Anadarko	Lucius	7,168	2009
Deimos South	Shell	Mars B	3,122	2010
Big Bend	Noble Energy	Rio Grande	7,273	2012
Marmalard	LLOG Exploration	Delta House	6,148	2012
Dantzler	Noble Energy	Rio Grande	6,580	2013

Anticipated Deepwater Gulf of Mexico field starts (2016-17)

Field name	Majority operator	Water depth (ft)	Discovery year	Anticipated production start
Stones	Shell	9,556	2005	2016
Gunflint	Noble Energy	6,138	2008	2016
Heidelberg	Anadarko	5,271	2009	2016
Holstein Deep	Freeport McMoRan	4,326	2014	2016
Son of Bluto 2	LLOG Exploration	6,461	2012	2017
Horn Mountain Deep	Freeport McMoRan	5,400	2015	2017

Table 8 – source: US Energy Information Administration, February 18, 2016

Despite many years of previously healthy demand, the US coastwise industry has not invested in these niche sectors with the exception of the LCV segment. This is because:

1. The vessels and their systems are highly specialised and vastly more expensive than the commodity markets of supply vessels and AHTS vessels.
2. These are global segments; no single domestic market is large enough to support the required investments.
3. This is the domain of international marine contractors, and large investments are needed in engineering, project management and procurement capabilities to execute the work.

These barriers to entry have dissuaded the US coastwise industry from entering these higher risk segments, they have instead invested in high volume commodity segments of supply vessels and AHTS vessels.

9 Conclusions

In 1989, the US Congress Office of Technology Assessment expressed strong reservations about further expanding cabotage restrictions on the US OCS.[12] These reservations remain valid today. The existing cabotage laws are some of the most stringent in the world and have allowed the US OSV fleet to become the largest in the world with over 1,000 ships.

This report shows that the overwhelming majority of OSVs operating in the US GoM are coastwise qualified vessels. The industry readily acknowledges that the US-coastwise qualified fleet is capable of supporting offshore activities in the shallower waters of the Gulf of Mexico. However, for deepwater construction activities beyond 1,000 meters (3,280 feet) this report supports the practical reality that the US-coastwise qualified fleet is pretty much absent from these niche markets.

Current US cabotage laws permit a small market for non-coastwise qualified vessels engaged in specific niche activities other than transport. This report has focused on the five deepwater niche segments of (1) light construction activities, (2) pipelaying including cable/umbilical laying, (3) heavy lift construction, (4) seismic and hydrographic surveying, and (5) well-servicing.

Worldwide, there are approximately 528 vessels technically capable of addressing these niche deepwater markets, of which 33 are coastwise qualified. Importantly, there are no coastwise qualified pipelay vessels, no coastwise qualified heavy lift vessels, and only one coastwise qualified well servicing vessel. There are only nine light construction vessels and 23 survey vessels which are coastwise qualified. Even when some planned new vessels are delivered, the coastwise fleet will not meet the capability or capacity gaps.

Over the past decade, marine service companies have invested in building ships for the alternative high volume markets of logistical supply vessels and tugs, for both the domestic and international markets. This US fleet comprises some 772 ships, 474 of which were active in the US GoM in November 2016. These vessels represent relatively modest unit investment, and the market has a relatively low commercial risk profile. With the collapse in market demand following the oil price crash in mid-2014, the market is now grossly oversupplied and many ships are laid up. This is a world-wide phenomenon and the economic and human distress in terms of job losses is significant during this phase of the business cycle.

With the single exception of the LCV segment, US marine service providers have clearly not invested in the deepwater construction niche markets:

1. Deepwater construction is a high risk business where work is conducted on a fixed price basis, and totally unlike the commodity markets which are day-rate businesses.
2. In addition to specialised ships, contractors need advanced engineering, project management and procurement skills to manage large sophisticated projects on a fixed price basis. This is a market for marine contractors not marine service companies.
3. The specialised ships represent very high levels of unit investment, often incorporating the contractor's intellectual property of equipment design and layout. Unit investments can range from a lower end of around $200 million to upwards of $1 billion at the higher end.
4. This is a world-wide market for the large marine contractors, as no single domestic market can support the levels of investment needed; and many of the assets that work in the deepwater Gulf of Mexico move from one geographic market to another as projects dictate. That said, marine contractors in the US have substantial investments in their workforce, industrial assets and market positioning; and importantly a long history of pioneering development in the GoM.

12 US Congress, Office of Technology Assessment, Competition in Foreign Seas: An Evaluation of Foreign Maritime Activities in the 200-Mile EEZ – Background Paper, OTA-BP-0-55 (Washington, DC: US Government Printing Office, July 1989).

This report shows that the level of demand in the deepwater construction market for these specialist ships has remained pretty much constant in both good and poor market conditions. Whereas the high volume businesses can be expected to do well in a good market, they are left highly exposed in a poor market.

Despite plenty of opportunity, historically the coastwise sector has not invested in the larger, higher value assets in the deepwater construction markets. Nor have they shown the ambition to vertically integrate from vessel owners and marine service companies to marine contractors (which is the history of many contractors). Should the proposed CBP modifications and revocations take place, the impact on business in the Gulf of Mexico could be catastrophic, simply because there would be no capacity to install the production facilities offshore.

The big dollar investments in the Gulf are targeted at the deepwater plays, as these represent the largest and most prolific oil and gas reservoirs. Should these projects be blocked by the banning of non-coastwise approved deepwater construction vessels, or result in increased costs making these investments uneconomic, then it is very unlikely that the projects will happen. In which case, capital can be expected to flow to other projects, potentially abroad. The resulting impact on the whole oilfield supply chain in the USA could cause a collapse in industry confidence and countless job losses onshore and offshore. Such a collapse would have a particularly bad effect on the gulf coast states.

The collateral effects of such a market collapse could be dire. Onshore, the subsea production hardware plants, umbilical manufacturing plants, fabrication spoolbase yards, etc could be empty, with the corresponding impact on engineering and construction companies. While some capacity may be used for exports to international markets, the longer-term response from those markets could well turn negative and protectionist. Offshore, the routine operations of existing facilities and shallow water projects may be able to continue unaffected, but the CBP modifications and revocations could make the US activity uneconomical for marine contractors. It could take years for the coastwise sector to invest in deepwater assets to the necessary level, if ever, which could have dire consequences for any ambitions of growing Gulf of Mexico production. The potential impact and risks to industry look grossly out of all proportion to the intended consequences of the CBP's modification and revocation strategy. A strategy intended to support a limited number of vessel owners could well have enormous unintended consequences for the whole US offshore oil and gas industry.

A Study of an Ultra-deepwater Project in the Gulf of Mexico

A case study to demonstrate the need for international vessel capability to develop deep water fields in the Gulf of Mexico

Ultra-deepwater Project in the Gulf of Mexico

A study of an ultra-deepwater project demonstrating capability gaps if international vessels are not available to support the development of deep water fields in the Gulf of Mexico

1 Introduction

The International Marine Contractors Association (IMCA) established a technical workgroup to assess the capability of the US coastwise qualified fleet to support the offshore oil and gas industry in the US Outer Continental Shelf (OCS).[13]

This report contains the results of the technical workgroups analysis and assessment. The report studies different phases of the development of the field, details the foreign flagged and non-coastwise qualified[14] vessels used on the project and assesses:

- existing rulings that allow the use of a non-coastwise qualified vessel to perform the scope of work
- if the proposed modification and revocation of rulings would have had an effect on the eligibility of the non-coastwise vessels used to perform the work
- what changes to the methodology would be required to comply with the proposed modifications to the rulings
- if alternative coastwise qualified vessels capable of performing the work are available.

For simplicity, the term non-coastwise qualified is used in this report, as it encompasses both foreign flag vessels and any US flag vessels which are non-coastwise qualified. The requirement for coastwise qualified vessels to be constructed in US shipyards precludes the possibility of re-flagging a foreign vessel to the US register to undertake tasks which are restricted to the coastwise fleet. Not all readers may understand that the terms 'coastwise qualified' and 'US flag' are not synonymous and that a US flag vessel may not be eligible for coastwise qualification.

2 Case Study Project Summary

This study is based on an actual ultra-deepwater project, the operator and project name are not referenced specifically and will be referred to throughout as Case Project.

The Case Project operates in a water depth of over 9,000 feet. The reserves are 30,000 feet below the seabed. The project was chosen to demonstrate how the technology challenges of developing such deepwater fields in the OCS are being met.

The case study will discuss the vessels used throughout the development of the field and focus on:

- whether the proposed modifications and revocations of ruling letters would have affected that vessel's eligibility to perform the work
- whether there are Coastwise approved vessels that can perform that scope and, if not, the barriers to bringing such a vessel to the market.

13 This report has been produced in response to the publishing on 18 January 2017 by the US Customs and Border Protection (CBP) of a notice of proposed modification and revocation of ruling letters related to Customs application of the Jones Act to the transportation of certain merchandise and equipment between coastwise points.

14 Multiple coastwise approved vessels were also used in the field development for transport and other support.

3 Early Development

Exploration of the field required the use of deep water capable drilling rigs, the availability of deep water capable drillships was essential for the viability of the project.

3.1 Effect of Proposed Modifications

The bulletin removes the long standing acceptance that equipment used and supplies incidental to the vessel's service are not merchandise. Ultra-deepwater drillships during exploration often move from one well to another within the same field.

3.2 Coastwise Approved Alternatives

There are no coastwise qualified ultra-deepwater drillships. No coastwise approved rig or vessel could have performed the exploratory drilling for the project.

4 FPSO: Installation of Moorings and Buoy

The Case Study project's host facility is a floating production storage and offloading (FPSO) vessel with a disconnectable buoy that allows the FPSO to move off site in a hurricane event. The buoy is secured to the seabed by suction piles and nine mooring lines. Each line is a combination of polyester rope and chain arrayed in three groups of three.

4.1 Effect of Proposed Modifications

The installation of the buoy (weighing 3000Tons) and its moorings was done by a foreign flagged heavy lift vessel with the assistance of coastwise approved vessels.

Due to recent CBP rulings, there has been significant uncertainty with respect to the term "transportation" as it applies to necessary incidental movement associated with construction work, which for decades has been conducted for safety purposes.

It is clear that the proposed modifications could potentially affect the method used for work offshore and that to facilitate such activities the industry would need a pragmatic, workable means of allowing vessels to make minor movements when working. For example, agreeing to a safe zone within which vessel movements would not be considered to be transportation could provide a solution which allows construction vessels to work without compromising Jones Act requirements concerning transportation.

Before the above mentioned ruling, a lift was considered to begin when the cargo was secured for removal from the transport vessel or from the offshore facility and ended when the load was positioned in place or when the final rigging or cargo was detached from the lifting device and secured on the transport vessel.

From the above, it is clear that the proposed modifications could potentially affect the method used and that to facilitate such activities the industry needs a pragmatic, workable means of allowing vessels to make minor movements when working. For example, agreeing a safe zone within which vessel movements would not be considered to be transportation could provide a solution which allows construction vessels to work without compromising Jones Act requirements concerning transportation.

4.2 Coastwise Approved Alternatives

Not required. However, it is worth noting that there is no coastwise approved rig or vessel that could have performed the work of installing the moorings and buoy.

5 FPSO

The FPSO is a vessel registered to a country other than the USA. The FPSO is shown in figures 14 and 15.

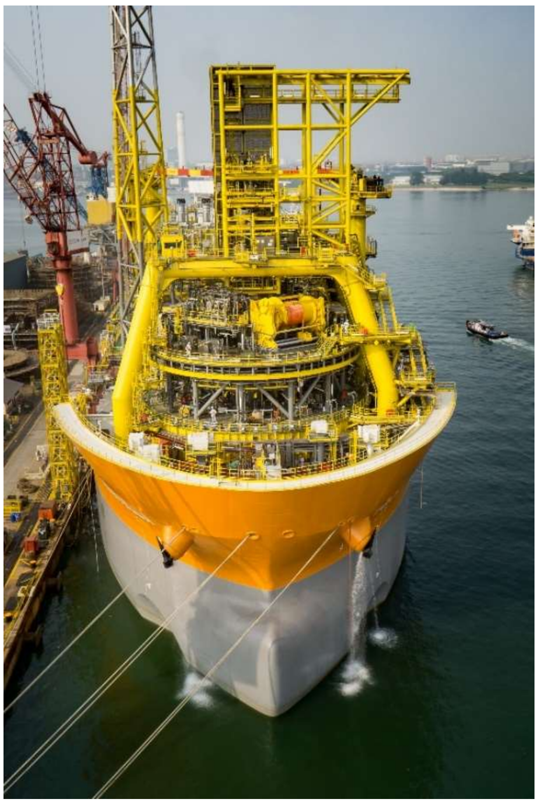


Figure 14 – The FPSO deployed for the case study project being prepared before arriving on location. The large yellow structure on the foredeck is the turret mooring system which connects the vessel to the 3000T disconnectable buoy.

5.1 Effect of Proposed Modifications

As noted in footnote 13, the revocation of HQ 108223 introduces some concern about whether it is permitted for the FPSO to move off of location with chemicals and other materials to support production onboard. There is additional concern that in the event of severe weather then moving off location for reasons of safety could be considered as transportation and as such a violation of the Jones Act.

5.2 Coastwise Approved Alternatives

Not applicable. FPSO was selected, in part, because it can be re-used on future developments. International deployment of a theoretical coastwise approved FPSO build would not be viable as a result of the costs associated with such a vessel relative to alternatives and would, certainly, change the decision making significantly.

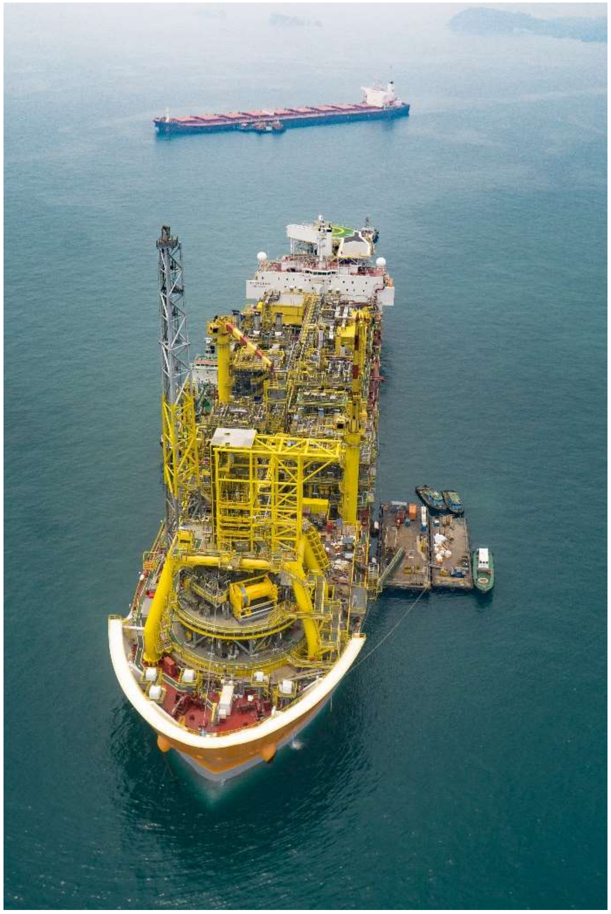


Figure 15 – FPSO at anchor being prepared for operation

6 Wellheads

The deepwater trees built in Houston, Texas, were transported to the drillships by coastwise qualified vessels and then installed from the drillships

6.1 Effect of Proposed Modifications

None. The wellheads were transported on coastwise approved vessels.

It should be noted that Subparagraph 10 of HQ 101925 was discussed in the bulletin but the statement in the original ruling that 'use of a vessel in the installation of a wellhead assembly at a location within United States waters, after transportation of such assembly by a vessel entitled to engage in coastwise trade, is not considered a use in coastwise trade' was not questioned and, for this study, is assumed to stand.

6.2 Coastwise Approved Alternatives

Not required.

7 Gas Pipeline

The Case Study project features a gas pipeline which can be used for importing fuel gas or for exporting sales gas. A 20-mile gas pipeline was installed from the FPSO to an existing pipeline system. The gas pipeline system includes a subsea maintenance valve in-line sled (ILS), a pipeline end termination (PLET) at the tie-in and an intermediate manifold.

7.1 Effect of Proposed Modifications

The pipeline was fabricated at a coastal spoolbase located in Alabama and loaded onto a non-coastwise qualified reeled pipelay vessel which then laid the pipeline in the Case Study field. The ILS and the PLET were installed incidental to the pipelay. The manifold was transported to the field by a coastwise qualified vessel and installed by the pipelay vessel.

The long standing ruling that 'the transportation of pipeline connectors to be installed by the crew of the work barge incidental to the pipelaying operations of the work barge is not an activity prohibited by the coastwise laws' is proposed to be revoked. The gas pipeline portion of the Case Study project could not have proceeded as it did if the proposed modifications had been in place.

The following long standing ruling has made pipelay operations permissible in the Gulf of Mexico:

> "*since the use of a vessel in pipelaying is not a use in the coastwise trade, a foreign-built vessel may carry the pipe which it is to lay between such points. It is the fact that the pipe is not landed but only paid out in the course of the pipelaying operation which makes such operation permissible*."

The subparagraph[15] above is not subject to change in the modification bulletin. However, in the explanation of modification of ruling of subparagraph 2) of the same ruling, it is stated;

> "*The statute does not provide exceptions for certain activities. It does not state that if the activity the vessel is engaged in does not constitute coastwise trade then the transportation of the merchandise in order for the vessel to engage in such activity does not violate 46 USC § 55102.*"

It is, therefore, assumed that the transportation of the pipeline from the spoolbase to the Case Study field on the reel of the non-coastwise qualified vessel would not be permitted.

7.2 Coastwise Approved Alternatives

The interpretations of the bulletin explained above remove the option of fabricating the pipeline onshore at a spoolbase and transporting the pipeline on a reel to the field. There are no coastwise qualified vessels that have the equipment to lay a pipeline from a reel. Further, there are no coastwise approved pipelay vessels that can work in the water depth in Case Project field.

15 Citation is from subparagraph 1) of HQ 101925 (7 October 1976)

The alternative to this would be to transport the pipe to the field on a coastwise qualified vessel, transfer the pipe to the DP lay vessel, weld the pipe on the vessel and lay it. This can be done in either J-lay or S-lay. There are several non-coastwise qualified vessels that are capable of performing the work in this manner.

8 Flowlines

The case study project has two Steel Lazy Wave Risers and flowlines that tie to the first drill centre and two flowlines to the second drill centre. The risers have buoyancy to provide a wave in the riser configuration. The risers also feature a combination of fairings and strakes to protect against surface current induced vortex-induced vibrations (VIV). PLETs are installed at the drill centre end of the FPSO flowlines and on each end of the in-field flowlines.

8.1 Effect of Proposed Modifications

HQ15311 (10 May 2001) clarified that the use of a non-coastwise qualified vessel for the installation of flexible flowlines, umbilical lines and risers on the OCS does not constitute a violation of 46 USC App. § 883. This ruling is proposed to be withdrawn.

As with the gas pipeline, the flowlines were fabricated at a coastal spoolbase and loaded onto a foreign flagged reeled pipelay vessel that then laid the flowlines in the Case Study field. The PLETs were installed incidental to the pipelay.

Again, it is assumed that the transportation of the flowlines from the spoolbase to the Case Study field on the reel of the non-coastwise flagged vessel would not be permitted.

Further, the transportation of the PLETs, buoyancy, strakes and fairings by the non-coastwise pipelay vessel would not be permitted. Prior to the bulletin, such items were considered to be permitted since they are 'installed by the crew of the work barge incidental to the pipelaying operations'.

8.2 Coastwise Approved Alternatives

As stated for the gas pipeline, there are no coastwise approved pipelay vessels that can work in the water depth in Case Project field.

9 Umbilicals

Two high voltage electro-hydraulic umbilicals are installed between the FPSO and the first drill centre. A single umbilical connects the first drill centre to the second.

The umbilicals were manufactured in a facility in Florida and, for the umbilicals between the FPSO and the first drill centre (referred to as the dynamic umbilicals), transpooled into carousels on a non-coastwise qualified dedicated umbilical and flexible pipe installation vessel at the facility in Florida then installed in the Case Study field. The riser configuration used for the umbilicals was a pliant wave configuration. This required a clamp/anchoring system as well as buoyancy modules. Fairings were installed to address concerns about VIV. The umbilical termination assemblies (UTA) consisted of mudmats with a hydraulic distribution manifold. All of these accessories (including the UTA mudmats) were transported on the installation vessel and installed incidental to the laying of the umbilicals.

The static umbilical between the two drill centres was loaded onto a reel and lifted into a reel drive system on a non-coastwise qualified specialty umbilical and flexible pipe installation vessel that then installed it in the Case Study field. The static umbilical had a UTA mudmat at each end, that were transported on the installation vessel and installed incidental to the lay.

9.1 Effect of Proposed Modifications

As noted above, it is assumed that the transportation of the umbilicals from the fabrication site to the Case Study field on the non-coastwise vessel would not be permitted and the umbilical installation for the Case Study project could not have proceeded as it did if the proposed modifications had been in place.[16]

9.2 Coastwise Approved Alternatives

There are no coastwise approved vessels capable of installing the dynamic umbilicals. The deep water and large (and heavy) umbilicals created a maximum umbilical top tension of around 170 tonnes. Only a small number of vessels are capable of gripping that tension without crushing the product and none of them are coastwise qualified.

The static umbilical was delivered on a reel and was smaller (and lighter) than the dynamic umbilicals. There are no coastwise vessels with a lay system capable of installing the static umbilical. However, since the umbilical is on a reel, the reel could, in theory, be transported to the field on a coastwise approved vessel then lifted onto the lay vessel. Note that for Case Study project, the chosen installation vessel's crane would not have been able to lift the loaded reel, though there are other non-coastwise qualified vessels with a suitable lay system and crane.

10 Subsea Distribution Hardware (SDH)

Steel tubed and electrical flying leads connect the wells and manifolds to the umbilicals. Electrical distribution modules (EDMs) are located at both drill centres. This equipment was transported on the installation vessel and installed incidental to the laying of the umbilicals.

10.1 Effect of Proposed Modifications

The SDH (connectors) has previously been installed from the lay vessel incidental to the laying of the umbilical. Previous ruling letters had stated[17] "the use of a foreign-flag vessel to transport … connectors … would not violate the coastwise laws if the work was done from the vessel, but would violate the coastwise laws if the vessel merely transported the connectors … and the connection operation was not performed on or from that vessel." For the reason explained above (when discussing the gas pipeline), the Case Study project could not have proceeded as it did if the proposed modifications had been in place.

16 HQ15311, as previously stated, is proposed to be withdrawn and was used as the basis of demonstrating that this scope was permitted.
17 Citation is from HQ15311 which, as previously stated, is proposed to be withdrawn.

10.2 Coastwise Approved Alternatives

There are coastwise approved vessels capable of installing the SDH. Also, the SDH could be transported on a coastwise approved vessel and transferred to a non-coastwise vessel in the field.

11 Artificial Lift System (ALS)

At a future date the Case Study project will be provided with a complete artificial lift system, which is expected to boost production by approximately 20%.

The overall dimensions of the ALS manifold are 40 feet by 65 feet by 27 feet, and the structure weighs approximately 400 metric tonnes. The pump station sits on a suction pile with a diameter of 32 feet and length of 50 feet, which alone will weigh approximately 200 metric tonnes.

To provide power and controls to the pump system, a variable frequency drive (VFD) building will be installed on the FPSO. It is built as one unit and will be installed offshore.

11.1 Effect of Proposed Modifications

The ALS subsea pile is to be transported to the field on a coastwise approved vessel and installed with a non-coastwise qualified vessel.

The subsea manifold also will be transported to the field on a coastwise approved vessel and installed with a non-coastwise vessel.

The topside power and control unit will be transported to the field on a coastwise approved vessel and installed with a non-coastwise vessel.

Given the above, and given the assumption detailed earlier in the FPSO section, whether or not the ALS installation would be affected by the proposed modifications is dependent upon the position taken by the CBP on incidental movement. Usually the safe over boarding locations will be the equivalent of a nominal 10% water depth away from subsea structures. If any lateral movement is deemed to be transport of merchandise then this would likely prevent the installation being carried out by non-coastwise qualified vessels.

11.2 Coastwise Approved Alternatives

There are no coastwise approved vessels capable of installing all of the ALS components.

12 Jumper Pipe Connectors

Jumpers are installed to connect the manifolds to the pipelines, flowlines or trees. These jumpers are fabricated at coastal fabrication facilities, loaded onto coastwise approved vessels, transported to the field where they were installed by a foreign flagged construction vessel.

12.1 Effect of Proposed Modifications

None. The assumption made earlier about incidental movement of a vessel during installation operations would continue to make this work permissible to be performed as it was.

12.2 Coastwise Approved Alternatives

There are some coastwise approved vessels capable of installing the jumpers in the same manner.

13 Safety Considerations

In various stages described above, the proposed alternative methods that are suggested involve transporting items on a coastwise vessel to the field and transferring offshore. Vessel to vessel transfers are commonplace in the offshore industry but they are a risk that is preferred to be avoided. Introducing more vessel to vessel lifts than needed inarguably makes the industry less safe.

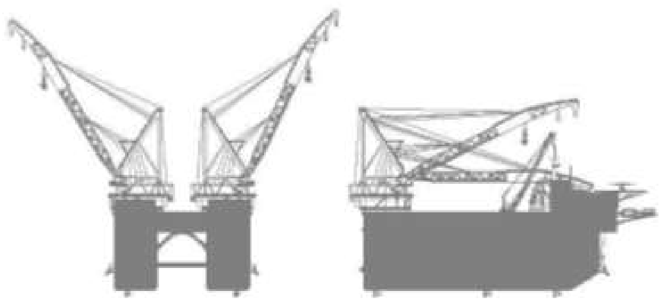
14 Summary

As shown in Table 9, one impact of the proposed modifications for the Case Study project would have been that more vessels would have to be used than needed. However, the particular specialist equipment required for the transportation and installation of the umbilicals had no reasonable alternative and would have meant that the project may not have been able to go ahead.

Phase	Non-coastwise Qualified Vessel(s) Used?	Effect from Proposed Modifications?	Coastwise Alternative?	Impact from Modifications?
Early development	Yes	Possibly	No	Safety, cost
Installation of FPSO buoy and moorings	Yes	Possibly	No	Unclear, subject to clarification on incidental movement
FPSO	Yes	Possibly	No	Safety, cost
Wellheads	Yes	No	No	None
Gas pipeline	Yes	Yes	No	Safety, cost, availability
Flowlines	Yes	Yes	No	Safety, cost, availability
Umbilicals	Yes	Yes	No	Not possible to proceed
SDH	Yes	Yes	Yes	Cost, availability
ALS	Yes	Possibly	No	Not possible to proceed
Jumpers	Yes	Possibly	Yes	None

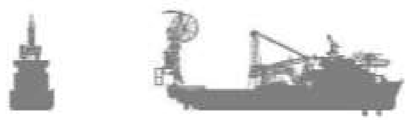
Table 9

Silhouettes of Offshore Vessels

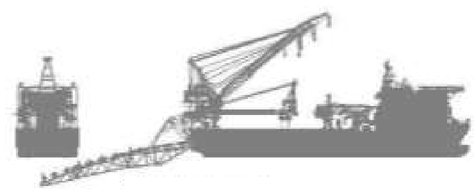


Heavy lift semi-submersible vessel

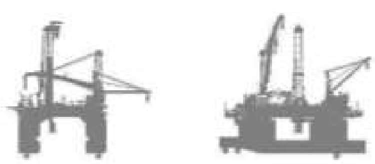
Heavy lift monohull vessel



Pipelay vessel – reeled



Pipelay vessel – rigid



Well intervention semi-submersible vessel

Well intervention monohull vessel

Light construction vessel >350ft

Light construction vessel 300-350ft

Platform supply vessel