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LEGAL RESPONSIBILITIES AND LIABILITIES OF THE OFFSHORE SURVEYOR

by Bruce CALDERBANK [1]

Abstract

The offshore surveyor, either as an employee or on a freelance or consultant basis, performs a number of duties and tasks associated with the particular role undertaken. In the actual execution of these duties and tasks, the offshore surveyor takes on certain legal responsibilities and liabilities, directly and indirectly related to the employer, the client or third parties. This paper discusses the legal responsibilities and liabilities of the offshore surveyor, and how the associated risks can be managed.

1. INTRODUCTION

A surveyor working in the offshore can be involved in a variety of roles where his or her skills are required in the support of the exploration for and exploitation of, the natural resources located on or under the seabed of offshore waters. The changing role of the offshore surveyor has been discussed in a number of publications over the years. [1]

An attempt to categorize all of the tasks in which an offshore surveyor may become involved is provided in Appendix A. For the purposes of this paper an offshore surveyor, as an employee, or on a freelance or consulting basis, will be involved in at least some of these activities during its career.

In the offshore oil and gas industry the rationale for the offshore surveyor is to support engineers, geophysicists, geologists, and maritime personnel. The offshore surveyor will generally obtain data that is complied in such a manner that it will only be used by a limited number of individuals in single organization, for a specific purpose.

[1] Hydrographic Survey Consultants, 74 Granlea Place S.W., Calgary, Alberta T3E 4K2, Canada.

In contrast, the hydrographic surveyor, usually employed or contracted by the State, will work offshore to produce a published chart which will be used by a wide variety of individuals and organizations, over a considerable period of time. A chart is not merely a source of reference, it is also a navigational instrument. [2]

This paper concentrates on the legal responsibilities and liabilities of the offshore surveyor, directly or indirectly related to the employer, the client or third parties. Many of these responsibilities and liabilities will revolve around the issues of liability in negligence and liability arising out of contract. Potential means of reducing these liabilities for the individual offshore surveyor, in order to manage the associated risks, will be discussed.

Some of the third parties affected by the work of the offshore surveyor would include the following: the fishing industry; oil companies leasing adjoining licence blocks; maritime traffic; and the appropriate jurisdictional authority(ies) [country, province or State, municipality or county] with responsibility for the environment, mineral exploration and exploitation.

As a prelude to the main issue addressed in the paper, a brief discussion of the applicable offshore legal regimes is provided. Some points for discussion with respect to the offshore surveyor as a public officer are provided at the end of the paper.

2. OFFSHORE LANDS AND THE APPLICABLE LEGAL REGIMES

A brief description of offshore lands and the applicable legal regimes is given in order to provide a basic framework for the sections following.

The Third United Nations Conference on the Law of the Sea (UNCLOS) describes the various sovereign rights and jurisdictions applicable to the oceans. [3] The Convention was signed on 19 December, 1982. By the closing date for signatures in December 1984, 159 countries had signed the **Convention**. Among the countries that had not signed were the United States, the United Kingdom and West Germany.[4]

As of November 1991, 51 countries had ratified the Convention.[5] Canada ratified the Convention on 6 February, 1970.[6] The Convention will only come into force one year after it has been ratified by 60 of the signatory nations. Most nations are complying with some if not all parts of the **Convention**, despite the fact that it is not yet in force. Many of its provisions may thus be considered customary international law.[7] Also many of the legal rights expressed in the Convention were based on precedents created over the preceding centuries.[8]

The area covered by internal waters comprises all waters on the landward side of the baselines. Within the internal waters regime the coastal State exercises full sovereignty over which the State has complete jurisdiction. Where, however, the drawing of straight baselines has the effect of enclosing as internal waters, areas which had not been previously considered as such, the right of innocent passage

remains in those waters. For example, the archipelagic waters adjoining Indonesia and Malaysia. The North West Passage through the Canadian Arctic Archipelago would be a similar example, although the United States presently disputes Canada's claim.[9]

The area covered by offshore waters comprises all waters on the seaward side of the baselines out into the adjoining bays, oceans and seas, to the edge of the continental or island slope. The offshore can encompass the territorial sea, the contiguous zone and the EEZ (Exclusive Economic Zone). The territorial sea comprises an area extending to a maximum distance of 12 nautical miles measured seaward from the baselines. The contiguous zone extends seawards from the outer limit of the territorial sea up to a maximum limit of 24 nautical miles from the baselines.

The EEZ is comprised of an area beyond and adjacent to the territorial sea and extends out to a maximum of 200 nautical miles measured from the baselines. Beyond that limit a State may claim adjoining areas as part of a continental shelf which are a natural prolongation of the landmass. The waters beyond the EEZ are known as the High Seas (See Fig. 1).

The sovereignty of a coastal State extends beyond its land territory and the limits of the internal waters into the territorial sea. This sovereignty is exercised subject to the right of innocent passage of a foreign vessel. Within the territorial sea the State has complete jurisdiction over the seabed, water column and airspace.

In the contiguous zone the coastal State has jurisdiction to prevent and punish infringements of its customs, fiscal, immigration or sanitary laws committed within its territory or territorial sea.

In the EEZ the coastal State has exclusive rights to exploit and manage the living and non-living resources of the waters superjacent to the seabed, of the seabed and its subsoil. Three out of the six traditional high seas freedoms fall within the sovereign rights and jurisdiction of the coastal State. These freedoms are as follows:

i) the establishment and use of artificial islands, installations and structures;
ii) marine scientific research;
iii) the protection and preservation of the marine environment;

On the high seas all States, whether coastal or landlocked, enjoy the above freedoms and the right to:

iv) navigation;
v) over flight;
vi) the laying of submarine cables and pipelines.

In summary it should be noted that authority of a coastal State always diminishes seawards.[10]

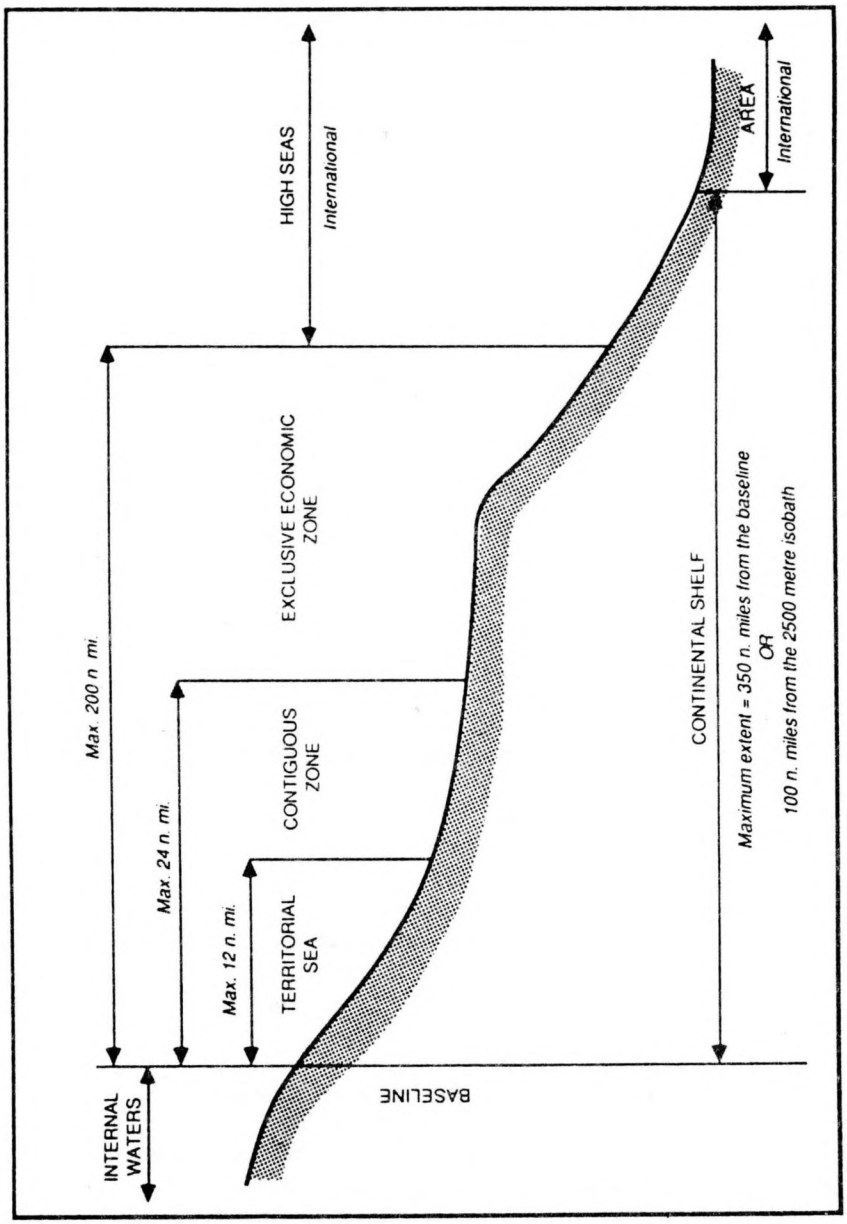

FIG. 1.- The legal regime defined in UNCLOS (From: NICHOLS, S. (1989): Chapter 5, "Water Boundaries - Coastal", in *Survey Law in Canada*, Carswell, Toronto, p. 210.)

Offshore oil and gas related activity takes place for the most part beyond the traditionally accepted limit to coastal State jurisdiction. For most States, including Canada, domestic law is deemed not to apply nor do the courts have any jurisdiction beyond the low water mark or similar boundary, unless the contrary is indicated by statute.[11]

Thus typically, though a coastal State may have certain sovereign rights over an offshore area and the right in international law to administer justice, within certain constraints over that area, the coastal State must enact legislation to extend its laws to apply to the offshore area. For instance, following the loss of the Ocean Ranger on 15 February 1982 in the Newfoundland offshore, many areas of Canadian law were found to be silent on the relevant issues raised by the disaster.[12]

Australia, New Zealand, Norway, United Kingdom and the United States had by 1983, for their own reasons, enacted legislation to apply certain domestic laws to their respective offshore areas.[13] The Canadian Laws Offshore Application Act was given royal assent on 17 December 1990.[14] The purpose of the Act is to bring drilling vessels and other installations on the Canadian continental shelf under the jurisdiction of Canadian laws, particularly, the Coastal Fisheries Protection Act, the Criminal Code, the Canada Labour Code, the Canada Shipping Act and the Immigration Act and the Territorial Sea and Fishing Zones Act. In addition to federal laws, the Canadian Laws Offshore Application Act makes the laws of the nearest province applicable to the offshore, particularly in connection with such matters as the tort of negligence and property rights.

3. OFFSHORE SURVEYOR AS AN EMPLOYEE

The employer is usually liable for the actions of any employee, unless the employee was involved in an illegal activity with or without the knowledge of the employer. An employer is vicariously liable for torts committed by his employees when the employer has authorized or ratified them, or when the tort was committed in the course of the employee's work.[15]

The failure of the offshore surveyor to adequately perform the duties and tasks requested by the employer, may be grounds for a warning or actual dismissal. As internationally accepted quality control standards and the associated procedure manuals are adopted by various employers, the scope for misunderstand the required duties should diminish.

However, the offshore surveyor can still be faced with tasks which may have clear objectives, but the actual execution and the methodology to be used to achieve the desired results, are decided by the offshore surveyor. Although such task can be professionally challenging, the liability of the employer can be increased.

In carrying out these duties the perceived "industry standard" may be cited, in the instructions to the surveyor or in the actual survey contract, as a guide under which the offshore survey will be carried out. Although such circumstances may be rare, several instances where such instructions have been given, are known to the

author. Unfortunately, such "industry standards" can differ based on comparisons between different geographical areas, for example the North Sea versus the Gulf of Mexico, or even based on the practices of a number of different survey service companies working in the same geographical area.

For instance, in Australia, Canada, Denmark, Norway, the United Kingdom, or the United States, when carrying out site specific or hazard surveys for oil and gas offshore drilling, the government departments responsible for offshore exploration in each country have only published general objectives to be meet. These objectives usually address the need to establish the possibility of shallow gas and identify other seabed hazards.

The actual methodology may be specified by the Operator or left to the discretion of the survey service company. The potential for a misunderstanding to occur, and a critical or otherwise hazardous feature to be missed should not be ignored.

To follow the given example further, there has been an occasion known to the author, where a site specific survey was completed just prior to the drilling vessel coming onto the site. Although a detailed analysis of the survey data was not possible before the drilling vessel was on site, the offshore surveyor was forcefully requested to verify the acceptability of the site for drilling operations. The offshore surveyor (who is not the author) did verify that the site was suitable based on extensive survey experience.

Although the suitability of forcing such time critical decisions upon offshore surveyors which may be beyond their technical experience may be questioned, the need for such decisions will most probably occur at some point in the offshore surveyor's career.

Thus, depending on the circumstances, the employee offshore surveyor could be undertaking legal responsibilities beyond those originally foreseen by the employer or the Operator.

In order to limit the individual offshore surveyor's legal liabilities he or she should attempt to execute the work to the best of his or her professional competence at all times. The experience of the survey team should be drawn upon to execute the work and resolve any problems.

The legal responsibility to practice a duty of care to third parties should be a very real concern of the offshore surveyor, particularly with respect to environmental consequences of any work being carried out as the work may have unforeseen long term consequences, not yet fully understood.

The offshore surveyor should attempt to be as current as possible with the developing technical trends through training courses, attending seminars and conferences, and reading technical and professional journals. If the offshore surveyor belongs to any professional or technical organizations, the code of practice or code of ethics, as enacted through the by-laws of those organizations, should be followed.

Except for the initial statement with respect to the liability of an offshore surveyor as an employee, all of the above points would also apply to a freelance or a consultant offshore surveyor.

4. FREELANCE OFFSHORE SURVEYOR

Various companies, including survey service and engineering firms, hire offshore surveyors on a short term basis to supplement their own personnel. Such freelance offshore surveyors working for a Contractor, either directly or through an employment agency, are regard as employees of the Contractor on temporary contract.[16] Hence the Contractor would be liable for the freelance surveyors actions as described in the previous section.

The freelance surveyor would usually be liable for any malicious damage caused by the surveyor to the property of the Operator, the Contractor or third parties. A liability insurance policy may be required to cover such a possibility.

The Contractor may require that the freelance offshore surveyor be covered by workmen's compensation or disability insurance for a minimum amount. In some jurisdictions statutes may be in place which provide that the freelance offshore surveyor has to be covered for this possibility by the Contractor. The offshore surveyor may be required to provide comprehensive general liability or public liability insurance covering liability to the Contractor, the Operator and third parties for a minimum amount.

The value of the workmen's compensation or disability insurance coverage required, besides meeting the required minimum, should also provide sufficient funds to allow the following:

- repatriation from any foreign location,
- all medical and incidental expenses,
- an adequate income while recovering,
- if unable to resume work as an offshore surveyor, an adequate income for life (beyond 65 years of age) indexed to the cost of living or an adequate lump sum payment, and any retaining required.[17]

The value of the comprehensive general liability or public liability insurance coverage required will vary significantly depending on the contract, and the geographical area in which the work will be undertaken or the legal jurisdiction which applies to the contract. The rising amounts awarded for personal injury and pollution liability claims will undoubtedly require higher premiums to be paid in the future for this type of insurance.

Separate policies may be required for different geographical areas due to the jurisdictional limits of the insurance coverage. Separate coverage may be required in some countries to cover third parties who are not nationals of the country where the work is taking place. Minimum amounts sited by the contract or by statute may not reflect the economic necessity for greater coverage. In any case such minimum

amounts are not valid seaward of the country's jurisdictional limit in the offshore.[18]

The employment agency, if used by the freelance offshore surveyor, should clearly set out the legal status of the surveyor so that no misunderstandings occur. The function of the employment agency is to introduce the surveyor to Contractor and to carry out certain administrative tasks. In law the freelance surveyor is not considered to be an employee or partner of the employment agency. It is the responsibility of the Contractor to allocate the appropriate work and supervise the surveyor.

Generally the freelance offshore surveyor will be required to work twelve (12) hours per day, seven (7) days a week through out the contract period at a work location specified by the Contractor. The surveyor would also not usually be entitled to any paid sick leave or vacation time while on contract, although for certain contracts, a work rotation schedule may be specified.

The employment agency should explain the means of claiming expenses for travel, accommodation, meals, laundry, and any extra office supplies if required. The appropriate forms and necessary documentation required by the Contractor should also be reviewed. The employment agency may stipulate that the agency shall not be liable to the Contractor, the client or third parties, in any manner whatsoever for any claim, loss, damage, cost or expense incurred by the Contractor or arising otherwise in connection with any act, omission or neglect on the part of the offshore surveyor. Similarly, the agency may also stipulate that the agency will not be liable to the freelance offshore surveyor in any manner whatsoever for any claim, loss, damage, cost or expense incurred by the offshore surveyor or arising otherwise in connection with any act, omission of neglect on the part of the Contractor. Finally, the freelance offshore surveyor may be required to indemnify the agency against all claims, losses, damages, costs, expenses or liabilities incurred or suffered by the agency arising out of or in connection with the matters mentioned above. Except for the initial statement with respect to the liability of the freelance offshore surveyor, all of the above points would apply to a consultant offshore surveyor.

5. CONSULTANT OFFSHORE SURVEYOR

The consultant offshore surveyor can be involved in the specification and contract award process, as well as working in the offshore as a survey representative for the Operator. While offshore the survey representative will be responsible for providing to the Contractor advice on survey working methods and solutions to problems, as and when they arise.

Depending on the circumstances, the survey representative may be expected to take an active role in the execution of a survey to ensure that the Contractor meets the specifications and that the survey is performed in an efficient and timely manner.

The legal responsibilities and liabilities of the consultant offshore surveyor are not always clearly defined by contract. That the consultant offshore surveyor may be working under the authority of an engineer or a seismic representative, would not remove all legal responsibilities and liabilities from the surveyor. Although the consultant offshore surveyor acts for the Operator in all matters related to survey and navigation, the contract may be silent on the issue of whether the survey representative is an agent of the Operator.

Agency in this context is used to connote the relation which exists where one person has an authority or capacity to create legal relations between a person occupying the position of principal and third parties.[19] Although there may be many situations in which one person represents or acts on behalf of another, it is only when such representation or action on another's behalf affect the latter's legal position, that is to say his rights against, and liabilities towards other people, that the law of agency applies.[20] Whether that relation exists in any situation depends on the true nature of the agreement or the exact circumstances of the relationship between the alleged principal and the agent.[21]

In addition to disability and public liability insurance coverage, the consultant offshore surveyor should also have in place professional liability insurance to cover the professional advice being given. Certain professional groups may require that their members carry a minimum amount of insurance.[22] As for the public liability insurance described in the previous section, the coverage required will vary significantly depending on the contract, and the geographical area in which the work will be undertaken or the legal jurisdiction which applies to the contract. For these reasons coverage may be difficult to obtain or be very expensive, even if obtainable, for the consultant offshore surveyor. To overcome these problems a "hold harmless agreement" could be written into the contract if the Operator was agreeable.[23]

It is important to note that the period of limitations and the methods used by the courts to establish the time of commencement for the liability differ considerably, in the various countries active in offshore exploration and exploitation. For instance in the United Kingdom the ultimate limitation period is 15 years, while in Canada the ultimate limitation period varies from province to province, with British Columbia having an ultimate limitation period of 30 years.[24]

The consultant offshore surveyor can be exposed to increased legal responsibilities and liabilities when time critical decisions are required, or due to the lack of efficient and timely communications. Oral instructions may have to suffice in the time available to allow for the continued efficient operation of a project. During periods when it may be difficult to obtain the requisite authority, such as during the evening, over weekends or on public holidays, the survey representative may have to make the best choice of the options then available.

It is important to remember that the Contractor is responsible for the execution of the survey, or the work on which the survey will be or is based. Even if the Contractor is not adhering to the contract, unless stated otherwise in the contract, the survey representative, if unable to change the Contractor's performance on site, can only report any failings to the Operator so that the Operator can then take the appropriate action. In view of the possible time critical decisions that may

have to be made and to enhance the overall performance of all parties involved in the work, the need for the contract to state, clearly and in detail the standards, accuracies and tolerances required for all survey related matters, can not be under emphasised.

6. OTHER CONSIDERATIONS

Offshore surveyors will be expected to exercise certain levels of professional judgement and ethical practices. How these levels are defined and what is expected, unless expressly stated or referred to by statute, has not been settled in the relatively young offshore industry.

The offshore surveyor should avoid taking on responsibility for areas outside of his or her expertise. The offshore surveyor should also avoid rushing through a survey when providing technical data to other professionals, as the courts may be unlikely to accept a defence for negligence based on the premise that there was insufficient time.

A consultant offshore surveyor should be a disinterested party. Historically, for a variety of reasons a number of consultant offshore surveyors have alternated roles between that of a consultant and a freelance offshore surveyor depending on, for instance, the nature of the project, the location, the Contractor or Operator.

Although this practice may be questioned,[25] the author would be of the opinion that provided the offshore surveyor, whatever the description of the service provided, maintains an "arm's length" relationship with the person paying for that service, and that the confidentiality of all information gathered was maintained, then the offshore surveyor should be able to work for any contractor or client.[26] Clearly the offshore surveyor would have to avoid any possible conflicts of interest by using discretion in his or her choice.

The offshore surveyor should be aware of any possible conflicting rights and the possible uses of the final coordinated data for any man-made feature placed on the seabed, for all projects in which the surveyor becomes involved. By attempting to bring any conflicts or problems to the attention of the Operator, the surveyor would only be fulfilling his or her ethical responsibility to make a faithful report of the evidence and facts, even when they may be contrary to the Operator's interests.

Of course, in such circumstances discretion and diplomacy are advised. However, failure to act on such knowledge may be considered a negligent act on the part of the offshore surveyor, if any legal action was commenced in which the offshore surveyor was involved.

7. OFFSHORE SURVEYOR AS A PUBLIC OFFICER

The concept of the land surveyor as a public officer may be gaining some legal acceptance.[27] In Canada, Quebec passed legislation in 1977 which allows a land surveyor to act as a public officer to authenticate deeds.[28] Some aspects of the surveyor as a public officer may also apply to offshore surveyors.

The essential elements of a public officer are as follows:

1) the position must be created by constitution, legislature, or through authority conferred by legislature;
2) a portion of the sovereign power of the government must be delegated to the position;
3) the duties and powers must be defined, directly or by implication, by legislature or through a legislative authority;
4) the duties must be performed independently without the control of a superior power other than law;
5) the position must have some permanency or continuity.[29]

Offshore surveyors are involved with legal boundaries and man-made features which may define other legal rights. Offshore concession boundaries can not be marked in the usual manner as the sites are located at sea. Coordinates could be used to define the concession boundaries although the methodology used, for example RTDGPS (real time differential GPS), would have to be acceptable to all parties concerned. The positioning of man-made seabed features which could be considered or act as survey monuments, could then become critical to the definition of a legal boundary.

Platforms, subsea wellheads and pipelines are some of the man-made seabed features which could be classified as survey monuments. Even if such man-made features were not associated with the definition of offshore boundaries, they could possibly be used to define other legal rights, such as rights-of-way for pipelines and exclusion zones to prevent fishing, dredging and other marine activities.

Though the services of the offshore surveyor may be of benefit to others beyond those who engaged his or her services, this alone does not qualify the offshore surveyor to be a public officer. Most of the elements which are used to define a "public officer" do not appear, at present, to be in place in most jurisdictions.

The claims made by a State with respect to the natural resources of the continental shelf, beyond the limits of the territorial sea are not territorial, but jurisdictional. A consequence of this is that there is no automatic extension of the domestic laws of a State beyond the outer limit of the territorial sea. Rather, the application of a State's law beyond the territorial limits must be brought about by positive legislative action.[30] Hence any act which may establish the legal responsibilities of land surveyors that have been enacted by the State or other

government body, if such legislation exists, does not extend beyond the territorial limits unless the appropriate legislation has been passed.

For instance, as far as the author has been able to determine, only Canada has enacted legislation under the **Canada Lands Surveys Act** which authorizes only commissioned Canada Lands Surveyors (CLS) to carry out surveys of Canada Lands, which includes all offshore areas.[31] By holding such a commission the offshore surveyor in Canada can be readily accountable to society at large, through the loss of the commission for improper or negligent acts. Hence a CLS may be considered a quasi public officer.

Irrespective of the above discussion, the offshore surveyor may be perceived by society as a quasi public officer, when dealing with the definition of boundaries and associated legal rights. The offshore surveyor may be expected to exercise a duty of care to all parties who could be affected by his or her decisions, not just the party directly benefiting from the services provided.

8. CONCLUSIONS

The legal responsibilities and liabilities of the offshore surveyor, either as an employee or on a freelance or consultant basis, are complex and go beyond the issues of liability in negligence and liability arising out of contract. For instance, the country of operation or the legal jurisdiction designated in the contract, will affect the legal responsibilities and liabilities of the offshore surveyor. However, the best method of ensuring that the legal responsibilities are meet and of guarding against liability actions, is through the best professional conduct appropriate to the work being undertaken.

CAVEAT

If legal advice or other expert assistance is required, the services of a competent professional should be sought. The analysis contained herein represents the opinions of the author and should in no way be construed as being either official or unofficial policy of any government body or company.

APPENDIX A

In general, the offshore surveyor could be involved in the following activities for all of the operations listed below:

- review of existing data;
- survey planning;
- selection positioning systems (satellite, surface, and acoustic)
- shore control;
- installation of the chosen positioning systems on shore as required, and onboard the vessel(s);
- deployment and positioning of the chosen acoustic positioning system, if required;
- calibration of all positioning systems to be used;
- navigation and positioning of the vessel, ROV, and towed sensors;
- collecting geophysical and geological data using side scan sonar, sub-bottom profiling equipment, magnetometer, bottom sampling and coring equipment.
- post processing of navigation and positioning data;
- compilation of data from other professionals, such as geophysicists and geologists;
- quality assurance and quality control (QA/QC) during all stages;
- advising and liaising with the client during all stages.

The following tables list the basic stages of the offshore oil and gas development. Within each stage of development, not all operations will necessarily be carried out in every coastal State involved in offshore exploration and exploitation.

Survey tasks relevant to each operation, in addition to those listed above, are also provided.

Table A1. Seismic Exploration

Type .	Description	Additional Survey Tasks
Regional Reconnaissance	Preliminary examination of subsea strata; single boat, single streamer.	Streamer positioning
2D	Semi-detailed examination of subsea strata; single boat, single streamer.	Streamer positioning, possibly tailbuoy positioning.
3D	General examination of subsea strata; possibly multi-boat, multi-streamer.	Streamer and tailbuoy positioning, positioning of guns and front of each streamer by acoustic or optical methods, binning coverage, Extensive documentation required.
3D (Development)	Detailed examination of subsea strata; possibly multi-boat, multi-streamer.	As above.

Table A1. Seismic Exploration (Continued)

Type	Description	Additional Survey Tasks
Undershooting	Examination of subsea strata under obstructions, such as platforms; multi-boat, one vessel towing streamer and another towing gun array(s).	As for 3D plus, streamer and gun positions displayed on at least on vessel.

Table A2. Exploration Drilling

Stage	Description	Additional Survey Tasks
Site Specific of Hole Hazard Surveys	Map and identify any possible hazards to drilling vessel, both on seabed and within 1000 metres below seabed for shallow gas. Possibly bore holes may be required for a jack-uup rig. Possibly an ROV survey of any suspicious debris or feature.	Bathymetry, mapping of seabed and substrata, streamer positioning, bore positioning, ROV support.
Artificial Islands Positioning	Building a complete island or a berm on seabed to support drilling vessel.	Dredging support including bathymetry, volume calculations, anchor.
Rig Positioning Calculations.	Positioning vessel over chosen coordinates within given tolerances.	Anchor positioning, catenary legal survey or wellhead.

(Vessel in this context could be a dynamically positioned drill ship, a semi-submersible or a drill ship using an achor pattern, or a jack-up drilling rig).

Table A2. Exploration Drilling (Continued)

Stage	Description	Additional Survey Tasks
Site Clearance	Clearance of site of all debris caused by drilling activity.	Onboard analysis of data, ROV and diver support.

Similar steps outline in Table A2 would be carried out to complete an **appraisal drilling** program to define the size of the oil and gas field being developed.

Table A3. Pre-Development Surveys

Type	Description	Additional Survey Tasks
Pipeline Route Surveys	Map chosen corridors identifying any possible hazards to pipeline. Possibly an ROV survey of any suspicious debris or feature.	Bathymetry, mapping seabed and immediate sub-strata, ROV support.
Platform Foundation Surveys	Map chosen site identifying all seabed hazards by ROV, collecting coring samples and sub-strata information.	Detailed bathymetry, mapping seabed and immediate sub-strata, confirming position of wellhead, ROV support.
Tow Out Surveys	Map chosen two out route for possible hazards to chosen type of platform or for pipeline sections which will be towed out to site.	Bathymetry, mapping seabed.

Table A4. Pre-Installation Surveys

Type	Description	Additional Survey Tasks
Pre-Pipelay Surveys	Investigation of chosen pipeline route to identify any features which have changed since initial pipeline route survey was undertaken. Possibly an ROV survey of any suspicious debris or feature. Debris clearance.	Onboard analysis of data, ROV and diver support.
Pre-Pipelay Installations	Preparing intended pipeline route for pipeline, e.g., laying mattresses or bridging over existing pipelines, preparing holding points on platform or setting dead man anchors.	ROV and diver support.
Pre-Platform Installation Surveys	Investigation of chosen site to identify any features which have changed since support. Initial platform foundation survey was undertaken. Investigation by ROV of any suspicious debris or feature. Debris clearance.	Onboard analysis of data, ROV and diver.

Table A5. Platform Construction

Stage	Description	Additional Survey Tasks
Onshore	Building of semi-submersible, tension leg platform (TLP), jacket or gravity based structure.	Dimensional control, as-built surveys.

Table A6. Installation Operations

Type	Description	Additional Survey Tasks
Pipelay	Laying of the pipeline(s) in chosen corridor. Possibly ROV support during portions of lay, such as critical touchdown or near hazardous features.	Anchor positioning, close liaison with engineers and barge personnel to ensure correct placement, ROV and diver support.
As-Laid Pipeline Surveys	Survey of pipeline immediately after lay, to identily possible damage and spans. Both side scan and ROV would be used.	Onboard analysis of data, ROV support. Extensive documentation required.
As-Built Pipeline Surveys	Survey of any intervention work required, such as freespan rectifications, spool piece connections at platforms and structures, repairs and protextive measures to the pipeline. (Note that a resurvey of entire pipeline is not required, only those areas affected by the intervention works).	Onboard analysis of data, ROV and diver support. Extensive documentation required.

Table A6. Installation Operations (Continued)

The categories used above regarding as-laid and as-built surveys have been chosen to agree with the prevailing practice in the North State, and are used to distinguish between the two different tasks.

Type	Description	Additional Survey Tasks
Platform Installation	Tow out or placement over chosen location.	Close liaison with tow captain or barge engineer to ensure correct placement of platform or structure, anchor positioning, ROV and diver support, legal survey.
Subsea Installations	Hook-up of pipeline(s) and control line(s) to subsea wellheads.	ROV and diver support.

Table A7. Post-Installation Inspection Surveys

Type	Description	Additional Survey Tasks
Annual Pipeline Inspection Surveys	Comparison of pipeline with initial as-laid and as-built surveys. Possibly ROV or side scan sonar, alternating every year.	Onboard analysis of data, ROV support.
Platform Surveys (Subsea)	Inspection of submerged portion of platform or structure by ROV and possibly diver.	Onboard analysis of data, ROV and diver support.
Platform Surveys (Superstructure)	As-built of platform superstructure to map ongoing changes.	Land survey and photogrammetry.

Table A8. Installation Removal

Type	Description	Additional Survey Tasks
Platform Removal	Removal of entire platform.	ROV and diver support.
Debris Clearance	Removal of all seabed debris associated with drilling activities	Map all debris over stie, ROV and diver support.

The offshore surveyor can become involved in a large number of associated tasks when working in the offshore. Examples include the following:

- installation of other facilities such as single point mooring buoy (SPMB) or similar, fixed storage tankers, and anchor moorings including subsea maintenance of these facilities;
- general navigation;
- safety zones around platforms and structures;
- search and rescue operations by maintaining an accurate record of the search pattern of the various vessels involved and plotting any contacts or sightings;
- platform and field maintenance;
- salvage operations to confirm the position of the vessel and least depth over the wreck or the possible extent of damage if the vessel is aground or awash;
- manned submersible navigation;
- dry docking support.
- maintain maps, geographical information systems (GIS) and spacial databases related to the production field;
- software and hardware development and advise to support all of the above activities.

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REFERENCES

[1] The following is a selection of articles published on the varied role of the offshore surveyor and how that role has changed since the 1970's. The list is in reverse chronological order.

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[10] MUKHERJEE, *supra*, pp. 7-13; NICHOLS, *supra*, pp. 209-212; and TOWNSEND GAULT, *supra*, p. 7 and pp. 39-40.

[11] TOWNSEND GAULT, *supra*, p. 7 and pp. 39-40.

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