RISK CONTROL - MARINE WARRANTY SURVEY

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Abstract: The Marine Warranty Surveyor's role is to facilitate, by technical examination, the continuation of insurance cover during those periods of a marine related activity when Class is not involved or Class is suspended. This allows for seamless insurance cover throughout the construction phase covering operations which may result in claims that exceed the deductible, either individually or cumulatively.

Keywords: marine warranty, loss prevention, risk management, risk control

1. INTRODUCTION

What is Marine Insurance? According to UK Marine Insurance Act dated 1906 and also R.H. Brown's "Dictionary of Marine Insurance Terms and Clauses" it can be defined as:

"*A marine insurance warranty is a promissory warranty by which the assured undertakes that some particular thing shall or shall not be done, or that some condition shall be fulfilled, or whereby he affirms or negatives the existence of a particular state of facts. The assured must comply literally with the terms of a warranty. Compliance in spirit is not acceptable. If the assured fails to comply with the terms of the warranty, the insurer is discharged from all liability under the policy as from the date of breach of warranty, but without prejudice to insured losses occurring prior to such date. A warranty may be "express" or "implied". An express warranty is set out in the policy conditions. An implied warranty does not appear in the policy, but is implied to be therein by law*." [1-3].

Originally Marine Surveyor groups had the purpose of inspecting ships for classification or approval purposes with flag state or shipping registers rules. Continuous development in offshore industry especially to the exploration and production of hydrocarbons from below ocean floor has created special departments of Classification Societies to embed this domain.

During development of an offshore complex are many situations that involve floating, lifted or submerged structures that need special consideration from risk management point of view. To manage those risks one has to consider the financial aspect of loses which is covered by insurance, but also the technical part provided by specialized inspectors. Soon enough it became obvious the need of an external 3rd party to oversee stages with potential risk which were not part of Class scope of work.

There is no conflict between Class and MWS involvement in a project. The nature of both activities is separate and discrete. The MWS/Class interface usually only requires the transfer of documentation. The MWS is primarily concerned with the conduct of critical marine operations during the construction, installation or other key activity of a project. Class are concerned with the long term quality of construction using established Rules

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to ensure the risk during normal operation is minimal and that these standards are maintained through periodic inspections for the life of the vessel or installation [4].

The relationship between the Insurance Warranty Surveyor, the Underwriter, the Assured and the Broker is often misunderstood. The purpose of this presentation is to discuss this relationship, and to explain some of the activities, duties and responsibilities of the surveyor.

The requirement for a warranty surveyor comes about when:

- an assured has high value equipment which is subject to marine risks;
- he seeks insurance for that equipment, taking into account those risks;
- the underwriter seeks comfort that the equipment and the risks to which it is exposed are in accordance with acceptable standards;
- he writes a warranty into the policy wording, requiring the approval of some or all of the activities by a surveyor.

The Warranty Surveyor is sometimes called a "loss prevention engineer". His role is to reduce the probability of losses to an acceptably low level, by the application of appropriate standards, by checking designs and procedures to ensure that they comply with the standards and by inspecting the readiness of equipment for an operation to begin, and monitoring the suitability of actual and forecast weather conditions.

Loss prevention activities carried out by Marine Warranty Survey service providers include the following:

- approval of ocean towages;
- approval of barge transportations;
- approval of heavy and awkward cargoes carried on ships,
- approval of locations for modu's;
- attendance to witness “in-field” moves of modu's;
- approval of loadout, transportation and installation of offshore platforms and topsides;
- approval of floating construction activities, deck mating, towages and installation of gravity base concrete structures;
- approval of pipelaying procedures and equipment;
- approval of transportation and installation of sub-sea templates and well-heads;
- suitability surveys for barges, tugs, crane vessels, pipelay barges and support vessels;
- dynamic positioning audits;
- annual structural and equipment surveys.

Other related activities, which utilise similar expertise, and provide back-up services to loss-prevention activities include:

- feasibility studies to evaluate approvability of any of the above including preliminary assessments for presentation to underwriters;
- condition and valuation surveys;
- maintenance of databases of tugs, barges, heavy lift transport vessels and crane vessels;
- computation of design wind and seastate for towages, location approvals and offshore operations;
- engineering analyses of motion responses, strength, stability and moorings;
- risk analysis studies;
- maintenance of casualty databases;
- safety case preparation;
- safety audits;
- petroleum engineering - advice on blow-out problems, evaluation of risks and equipment;
- on- and off-hire surveys;
- dynamic positioning audits;
- meteorological and oceanographic studies;
- weather forecasting;
- litigation advice;
- damage surveys.

2. METHODS OF WORKING

2.1. Appointment of surveyors and relationships between the parties

The underwriter will indicate the requirement for a Warranty Surveyor by means of the warranty. He may nominate a particular surveyor, or the assured may be given a choice from a short list of acceptable surveying houses. I will refer below to some of the problems that this can cause.

The assured will appoint the surveyor, who in most cases works for, reports to, and is paid by the assured, rather than by the underwriters (although practice in the United States and France is sometimes different).

Although this is not the forum to complain about the warranty surveyor's lot, I would like to add a note about the effects of giving the assured a choice of surveyors. The first reaction of an oil company purchasing department, on seeing a choice of, say, three suppliers of a service, will be to put the job out to competitive tender. Most organizations are dominated by accountants and unless there is a clear justification otherwise, will select the cheapest.

How does one evaluate the competence and professionalism of a surveyor on the basis of the price and the number of hours proposed for the job?

The more experienced surveyors will see the problems that need investigating, and are almost bound to quote more than a less experienced organization. Even the most competent surveyors must pare their rates and prices to the bone to stay in business. After award of contract, jobs must be run on a minimum cost basis. This is hardly the way to provide the best service to the client, or provide the protection that underwriters seek.

In many cases the oil company will place the onus of hiring the warranty surveyor onto their contractor, who has even less interest in having an effective warranty surveyor.

2.2 Scope of work

An important early task is to define the surveyor's scope of work, so that the assured can comply with the warranty. This is the assured's responsibility, with assistance from the broker, but frequently the surveyor is requested to assist in the interpretation of the warranty. Warranty wordings can sometimes be unhelpful on just what is really required, and fail to reflect the real areas of high or ill-defined risk.

Every operation is susceptible to hazardous situation and their probability of occurrence. Main risks involved in marine operation are referring to loss of property, time delays, human injuries or fatalities, environmental pollution. Accepting the existence of those risks, contingency measure development and definition of allowable risk is the concern of initial risk assessment made through HAZID and HAZOP studies.

To avoid claims of damage to asset environment or human safety endangerment marine insurance has interest to tailor the policy to suit insured operation and maintain level of risk under acceptable limits. Is common practice to use a risk matrix to classify various risks on their impact level as per Table 1.

Table 1. Risk probability matrix (red - intolerable risk, yellow - ALARP, green - tolerable risk) [2].

Occurrence probability	CONSEQUENCES				
	Minor	Severe	Fatal	Catastrophic	Disastrous
Likely	W2	W3			
Reasonably possible	W1	W2	W3		
Unlikely	W0	W1	W2	W3	
Remote occurrence		W0	W1	W2	W3
Extremely remote			W0	W1	W2
Possible theoretical				W0	W1

During initial risk assessment purpose of marine warranty is that no operation is approved as long as they are steps in intolerable risk zone. Target zone for marine operations which are high risk by definition is to lower the risk in ALARP (as low as reasonable practicable) zone marked with yellow in Table 1. To better highlight the

consequence amplitude of an accident HAZOP & HAZID studies use consequence pyramid presented in Figure 1.

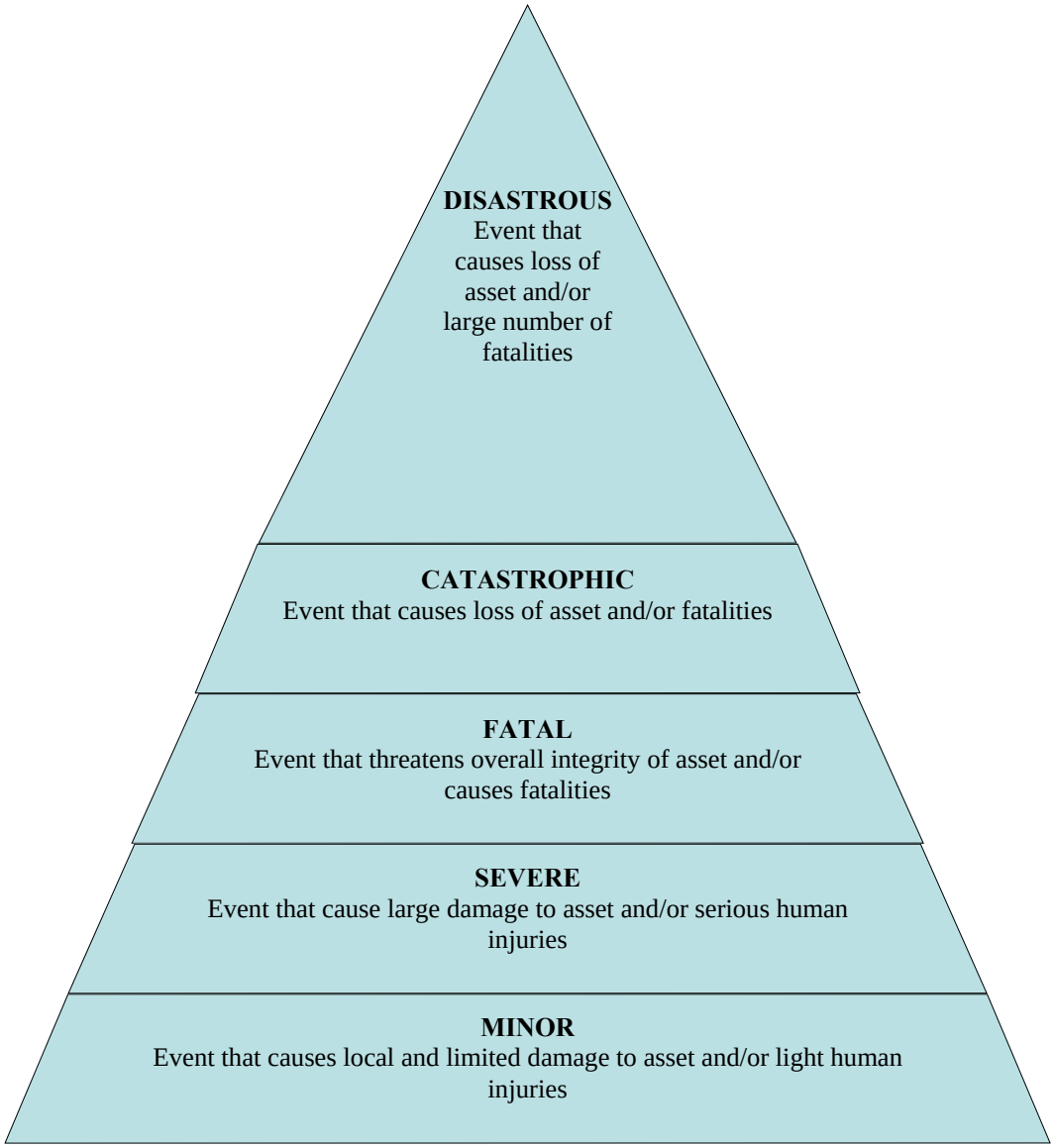

Fig. 1. Consequence pyramid.

When the scope of work is agreed between the surveyor and the assured it may then be passed, via brokers, back to the underwriter for endorsement. In any event, the surveyor can only act on the instructions of his client and this is generally by means of a Contract, to which the Scope of Work will be attached (Table 2).

Table 2. Marine Warranty Survey - Scope of Work.

Project phase	Review & Approve	Attend	Certificate of Approval
General			
Review and approve meteorological criteria for the tow and transportation of all project components including limiting sea-states for all marine operations.	1, 2, 3		
Review and approve weather forecasting procedures	1		
Review and approve tow routes and shelter areas	1, 2		
Review and approve weather criteria for transportation including bollard pull requirements, intact and damaged	1, 2, 3		

stability and ballasting procedures			
Review and approve criteria for installation including limiting sea-states, operational procedures and mooring arrangement.	1, 2, 3		
Vessels			
Piling vessel suitability survey	1	◆	
Towing vessels suitability survey	2	◆	
Barge/module suitability surveys	2	◆	
Modules			
Review and approve:			
Module load-out	1, 2, 3	◆	◆
Modules sea-fastenings	1, 2, 3	◆	
Internal sea-fastening	2	◆	
Module structural strength for transportation	1, 2, 3		
Module stability for transportation phase	1, 2, 3		
Barge/module layout	2	◆	
Mooring and towing equipment	2, 3	◆	
Barge fendering system	2	◆	
Transportation/tow procedures	1, 2, 3		
Barge/module sailaway	1,2	◆	◆
Barge/tow vessel handover		◆	◆
Towage inland waters/canals	1, 2	◆	◆
Marshalling location & mooring procedures	1, 2, 3	◆	◆
Barge/module structural strength for installation	1, 2, 3		
Pilling			
Review and approve:			
Loadout procedures	1, 2, 3	◆	◆
Sea-fastenings layout	1, 2, 3	◆	◆
Transportation procedure	1, 2, 3		
Pile barge sailaway	1	◆	◆
Piling procedures	1, 2, 3		
Installation			
Barge/module positioning, installation aids and securing into piles	1,2,3	◆	
Superstructure protection during lifting procedures	1,2	◆	
Review and approve procedures for barge lifting	1, 2, 3	◆	◆
Review strand jack capacities, dynamic lifting	1, 2, 3		
Review and approve welding and installation procedures	1, 2, 3	◆	
HAZOP		◆	
HAZID		◆	
Pipelines			
Loadout procedures	1, 2,3	◆	◆
Stowage, sea-fastenings and voyage procedures	1, 2, 3	◆	◆
On/off load procedures	1, 2, 3	◆	◆
Pipelay procedures including weather criteria	1, 2, 3		
Vessel suitability survey	2	◆	
Tie-in and critical laying and trenching procedures	1, 2, 3	◆	
Inshore completion			
Lifting procedures	1, 2, 3	◆	◆
Floating/module sailaway	1, 2, 3	◆	◆

2.2 Guidelines and standards [5-7]

A competent surveyor will have access to industry standard guidelines for “normal" type operations. Sometimes these are written by the surveyor. Various warranty survey offices, have produced several guideline documents which are accepted as appropriate standards by the offshore industry.

Not all operations are "normal", and the surveyor, although guided by established guidelines and industry standards, must take a pragmatic view of each operation, particularly when new technology is concerned. Although a surveyor is often seen as a cautious animal, the efforts of designers and offshore contractors to refine their technology and to overcome earlier problems must be recognised.

Evaluation and acceptance of new methods, equipment and technology may sometimes require more flexibility of approach than may be possible in, for instance, a Classification Society or in Government bodies.

It follows that this flexibility can be dangerous without the experience and technical back-up to required to evaluate each proposal critically and professionally.

Acceptance of proposed new technology may require a judgement on whether those responsible are being clever, lazy, devious or are simply seeking the cheapest solution!

Quantitative Risk Analysis (QRA) is increasingly becoming a valuable tool in comparing the risks involved in new methods with accepted criteria [8].

The oil industry is now very concerned with costs, the current catch phrase being CRINE - Cost Reduction Initiative for the New Era. One must respond sympathetically to the Oil Companies' desires to reduce costs. An educated Warranty Surveyor can assist clients in the development of cost effective criteria, where savings can be made without reduction in safety.

A common misconception is that application of Government legislation and Classification Society rules will obviate the need for a Warranty Surveyor. In fact, there is little overlap between the functions of these different bodies.

In particular, it should be noted that Government regulations are generally concerned with personnel safety, and are not directly aimed at the protection of the assured's investment and the underwriters' money [9].

Classification societies apply their Rules to the design and construction of vessels and structures but have little influence on the practical aspects of how they are operated. For instance, a vessel classed and registered as a 'tug' may be of little value as a towing vessel, because of deficiencies in hull design, equipment or manning. Classification Rules for MODU's were, in the past, woefully inadequate to define the operational limitations of these structures.

The Warranty Surveyor's duties can be simplified into the resolution of three questions:

- Is it strong enough?
- Is it stable enough?
- Are the marine procedures adequate?

This is an over-simplification of the surveyor's duties, but nevertheless most of a surveyor's activities are designed to answer these 3 basic questions.

2.3 Specific technical challenges

2.3.1 Steel jackets and topsides [10-17]

A jacket is the structure required to support the topsides - derived from the days when it was simply a protective "jacket" around a wellhead structure. Jackets are nowadays steel platforms, large or small, simple or complex, and ranging in size from a few hundred tons up to about the size of the Eiffel Tower.

There are three main methods of transporting and installing steel jackets;

- Barge transport followed by launch
- Barge transport followed by lift
- Towage to site on the jacket's own buoyancy.

The barge transport/lift option was always the favorite for small jackets, within the capability of available crane vessels. Structure sizes outgrew the cranes, so the launching method was developed. The maximum theoretical jacket launch weight is around 30000 tonnes. In recent years, larger available crane vessels have led to a generation of slimline liftable jackets, up to about 10000 tonnes.

Similarly, topsides module weights have grown to fit the cranes - maximum module weights of over 10000 tonnes can be installed by the latest crane vessels.

A typical warranty surveyor's scope of work for a steel structure would include;

- Load out, transportation and installation of jacket and piles
- Load out, transportation and installation of all topsides modules
- Transport of components by barge or ship to fabrication yards

2.3.2 Concrete gravity structures [11, 13, 15, 17, 18]
Concrete may be preferred to steel as a platform construction material when the sea bed conditions favor a gravity, rather than steel structure; when a large oil storage volume is required; and when there are accessible deep water construction sites available. Concrete has been the favored construction material in Norway, where the majority of the world's largest concrete offshore structures have been built.

Particular considerations for concrete platforms include:

- The platform is afloat during much of the construction period, with daily changes in displacement, draft and ballast condition. The period of exposure to marine risks may be 2 or 3 years for the larger structures.
- Many designs allow for an inshore mating of an integrated deck. This operation exposes the platform to pressures in excess of the operating limits. The full value of both substructure and topsides is at risk at one time, and a total loss could occur from a single structural failure.

2.3.3 Mobile Offshore Drilling Units (MODU's) [11, 13, 15, 19, 20]
These fall largely into 2 types - self elevating platforms (jack-ups) or semi-submersibles. The warranty requirements also fall into 2 parts, to cover both the in-place operating condition, and the movements between locations.

Jack-ups are complex structures, whether operating or afloat. The acceptance criterion for the operating condition was a source of dispute among experts for many years. The methods for computing and combining wind, waves and current loadings were not well understood.

Designers and fabricators sought to offer the cheapest platform possible to meet a given specification. Some oil companies adopted an attitude of extreme conservatism, whilst others had no opinion at all. MWS had operational criteria which fell in the middle ground - we were subject to attacks from both sides, but the fact remained that jack-ups operated in accordance with our criteria did not suffer a single structural failure through overload from wind or wave in a history of many hundreds of rig-years of operation.

Towage of jack-ups presents many problems. Jack-ups are intended to make short field moves, with their operational leg length. The strength, stability and watertightness in this condition do not usually permit longer towages without extensive preparation. Considerable theoretical and practical expertise is required to prepare a jack-up for an ocean towage. Ocean transportations are more often carried out on board semi-submersible heavy-lift vessels, which solve many of the problems, but introduce a range of other ones - chiefly related to motion criteria, structural and seafastening requirements.

Semi-submersible platforms are designed and intended to spend their working life afloat. The critical item for site-specific approval is the mooring system. Again, MWS has developed mooring criteria and reliability assessment techniques which are recognized throughout the industry.

2.3.4 Transport of cargoes by ship [15, 21]
Many items of oilfield plant are transported by ship. These include small modules and structural components for offshore structures, part-assembled units (PAU's) and pressure vessels for onshore plant. A common misconception is that transport by a conventional, classed self-propelled vessel is "safe" when compared with transport on a towed barge. Firstly there are the standards and safety record of the modern shipping industry, which are a cause of world-wide concern.

Practical considerations are:

- cargoes of the sort referred to, although not heavy by offshore module standards, often come in unwieldy packages, which are very difficult to support and seafasten, either in the hold or on deck;
- companies operating specialized heavy lift vessel have a vast experience, and can be relied to perform competently. For smaller packages, general cargo carriers are used, whose owners and masters may have little experience of oil field cargoes;
- the condition of the ships and their equipment frequently leaves much to be desired;
- pre-engineering is difficult, because the ship is often not nominated until very late, and even then may change at the last minute. A suitability survey of the vessel is not usually possible;
- a barge can cheaply be taken on charter days or weeks before the event, so there is ample time for preparation, and construction of grillages. A ship will often arrive only hours before loadout, and will wish to sail as rapidly as possible;
- pre-designed sea fastening materials must often be modified or improvised on site;
- sea fastening materials promised by the ship's owners are frequently not available in the quantities required.

The net result is that much improvisation may be required at the load-out berth, under tight time pressure, involving people who are not experienced in the transport of this type of cargo, and with a less than perfect vessel. The demands on the warranty surveyor become considerable.

2.3.5 Pipelines [22]
An area of current concern is that of pipelines. It is becoming more common to involve a warranty surveyor on pipelaying operations, because of the recent claims record of this type of business, and the moves towards larger pipelines and deeper water.

A warranty surveyor should be able to assess the feasibility of the laying operations, based on the computed tension requirements for the pipe, and to balance these against the mooring capability of the pipelay vessel and its equipment.
The procedures for anchor handling near other pipelines, wellheads and platforms must be reviewed to ensure that they are practical and seamanlike.

Acceptance procedures for the pipe, in terms of the weld specification and the buckle checking arrangements should be reviewed, to minimise claims for rectification after the event.

The towage of pipeline bundles, where pipe strings several kilometers long are fabricated onshore, pulled into shallow water near the shore, then towed to site be either a sub-surface or off-bottom tow, is another area where inexperienced contractors can encounter problems leading to claims, and the services of a warranty surveyor are invaluable.

One problem we meet particularly with pipelines, is the misconception by underwriters that a satisfactory approval can be obtained by a review of the procedures without site attendance. On this basis, we can state that the procedures are acceptable, but this in no way constitutes an approval of the operation. This depends on the fitness for purpose of the equipment, the acceptability of the procedures in practice, and the actual and forecast weather conditions.

3. RESULTS AND DISCUSSIONS

3.1 New technological frontiers [8, 9, 22, 23]
Many of the new oil fields being developed are in very deep water. The deepest field under development, while writing this document, is offshore Brazil, in 1340 m of water. Exploration is only commercially feasible because of new techniques.

These include:

- floating production, storage and offload (FPSO) vessels. Essentially moored, converted tankers. The high wind and wave motions are challenging to designers;
- semi-submersible rigs converted to production. The design challenges include the maintenance of adequate stability and the deep water moorings.(GVA Consultants design series);

- spar type Platforms - these are vertical cylinders, which produce low wave motion and loads, and place the mooring attachments well below the water lines (Perdido 2010);
- new flexible riser systems capable to reach 3000m in operational stage with diameters of 11'' (tested by Technip France in Gulf of Mexico, 2011);
- new transmission facility.

3.1 Breach of warranty (case study) [24]
In "Royal & Sun Alliance Insurance (Singapore) Ltd v Metico Marine Pte Ltd" [2006] SGHC 97 the insurers of a tug and two barges sued the insureds for salvage and towage expenses incurred by the insurers in recovering a barge before the insurers discovered that the insureds were in breach of warranty.

3.1.1 Facts
The related companies Metico Marine and Wecoy Maritime respectively bought a tugboat, Wecoy 7, and two barges, Bintang 9 and Bintang 10, in Shanghai, China. The vessels were intended for the Singapore home trade. Metico and Wecoy insured the vessels with Royal & Sun Alliance under a time hull policy which covered the voyage from Shanghai to Singapore.

The policy contained a warranty which included the term: "warranted towage approval survey by the China Classification Society (CCS) at the insured's expense, with all recommendations, if any, fully complied with prior to sailing".

The CCS carried out a pre-towage survey. The survey certificate contained the following recommendation: *"The towing vessel is to depart from any port in daytime on receipt of a favorable weather forecast for the local area for 48 hours and in winds below Force 6 on the Beaufort scale. If the wind is greater than Force 6, the towing vessel shall seek refuge."*

The owners obtained weather forecasts in the days before departure from Shanghai, but the last forecast was obtained 30 hours before departure, at 8:00 AM on December 16 2003. The vessels departed at 2:00 PM on December 17 2003. No forecast was obtained on the day of the departure. In the early hours of December 21 2006 the tow line parted and the barges were lost.

The owners' broker contacted the insurer, which engaged salvors for a search and recover mission. The salvors recovered one barge on December 24 2006 and the tug itself recovered the other barge two days later.

After the recovery the insurer discovered that:
- the owners had not obtained a forecast on the day of departure, much less a favorable one;
- the vessels had departed in winds of Force 6 and above; and
- the vessels had not sought shelter during the voyage, although they had encountered winds above Force 6 in the days before the tow rope broke.

The insurer claimed for breach of warranty, discharging it from liability under the policy, and recovery of the salvage and towage expenses.

The owners argued that there had been no warranty because it had not been mentioned in the negotiations leading up to the issue of the policy that the pre-towage survey would be a warranty, and that the warranty had been inserted into the policy contrary to the parties' true intentions. Alternatively, the owners argued that, if a warranty had existed, there had been no breach. There were a number of subordinate issues and the defense was amended several times. The owners counterclaimed for an indemnity under the policy for its own expenses.

It was common ground that the tow rope connecting the barges to the tug had parted and the barges had drifted off during the voyage from China to Singapore, and that the voyage was covered by the policy issued by the insurers.

Decision
The judge found in favor of the insurer and dismissed the owners' counterclaim. She held as follows:

a) the policy contained the prima facie terms of the insurance contract. Even in ordinary contracts in which the terms are reduced in writing, evidence of previous drafts and negotiations may not be cited to vary or

add to the terms. This is particularly true of a marine insurance contract, which is inadmissible as evidence unless it is embodied in a marine policy in accordance with Section 22 of the Marine Insurance Act.;

b) the correspondence and the examination of the broker showed that, before the policy was issued, the broker was fully aware that the towage survey requirement was material to minimize the risk covered by the policy, and that it was intended for the purpose of the policy. The broker had inserted the warranty into the signing slip which formed the basis of the policy, making use of samples of standard clauses in her possession from her long experience as a broker. There had been no mistake - much less a common mistake - which would justify a rectification of the policy;

c) the wording of the warranty was to be read strictly and any ambiguity was to be construed against the insurer. Compliance with recommendations 'prior to sailing' meant that the recommendations pertaining to the period after departure, such as seeking shelter in bad weather, were not part of the warranty;

d) nonetheless, the owners had breached the warranty in two ways. One was their failure to depart on receipt of a favorable weather forecast for the local area for 48 hours. The judge reduced this recommendation to four elements, namely the requirements that:

- the departure follow receipt of a forecast;
- the forecast be favorable;
- the forecast cover the local area; and
- the forecast cover 48 hours.

e) given that the survey was specifically required for the safety of the tow on a voyage in the monsoon season, this recommendation meant that the tug should depart within reasonable time of a particular weather forecast. As forecasts were available every morning at 8:00 AM and the vessels were required to depart in daylight, the vessels would have had to have departed by 6:00 PM on the day the forecast was issued and received. This meant departing during daylight hours on the same day, not 30 hours later. No forecast was obtained on the day of departure, but the judge accepted evidence from the insurer's expert that it was unlikely that a favorable forecast had been issued on that day. The third and fourth elements meant that the forecast was required to cover the local area for the 48 hours from departure. The owners' contention that the forecast had to be obtained during the 48 hours before departure did not make sense because that would not have given the master of the tug the benefit of knowing what weather to expect on the voyage;

f) the judge accepted the evidence in the master's report for the day of departure that the wind speed was 25 knots, equivalent to Force 6. This was in breach of the recommendation that the vessel was to depart only in winds below Force 6. “

4. CONCLUSIONS

Most major projects have a high technical standards and high-quality management. Nevertheless, recent trends by oil companies to contract-out services, have led to an increase in the number of management interfaces. In our experience, potential problems because of misunderstandings and unclear demarcations at these interfaces - fabricators not understanding marine matters, marine personnel being unaware of structural limitations, inconsistency of design between cargo and seafastenings, and sub-contractors not being advised early enough of design premises.

The warranty surveyor's task includes taking an overview to ensure that nothing has been forgotten because two parties both thought it was the other's responsibility, and that where a topic falls into two camps there is consistency between them.

In the old days, some clients viewed the warranty as an imposition, and the surveyor as a sort of policeman. More enlightened clients view the surveyor as a welcome addition to their own Quality Assurance process, and a way of assisting their project team to monitor the activities of their various contractors.

Recent trends to remove the practical on-site inspections are to be deplored. An office review of procedures must go hand-in-hand with an on-site assessment of the applicability of the procedures, and the acceptability of the equipment and weather conditions.

It can be seen that the role of the surveyor is one of approval on behalf of various interests, both financial and technical, and it is essential to have a good up-to-date technical knowledge, with experienced marine and engineering support for the surveyors in the field. We tend not to be deeply involved in the design activity as

clearly it would be a conflict of interest to approve our own work. Nevertheless guidance is given to the designers to ensure that what they design comes within the acceptable limits of our criteria.

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