



## CHAPTER TEN REGULATORY REGIME

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Any inquiry into ways and means of enhancing safety in offshore exploratory drilling operations leads of necessity to a thorough reconsideration of the regulatory regime currently in place for ensuring optimal safety and security for the men and machines engaged in these operations. The purpose of this inquiry is not to spell out a detailed prescriptive code of conduct but rather to lay out the multifaceted considerations that must be taken into account in developing a safety regimen adapted to the special conditions affecting exploratory drilling off eastern Canada.

Regulation and control of offshore exploratory operations in the countries under review have in general been designed to ensure the proper exploitation of hydrocarbon resources in a manner consistent with the "national interest" as defined by governments of the respective Coastal States. The safety of operations is only one amongst a number of considerations entering into the definition of the national or public interest. Indeed, the rationale for government involvement, either by way of direct participation or by way of regulation, is found in a broad mix of economic, social and political considerations that lie beyond the purview of this inquiry, considerations such as control of pricing, tax policy, royalty payments, or land use policy by the state acting as landlord. However dominant these considerations are in current discussions over the regulation of offshore hydrocarbon exploration and exploitation, they can be examined here only as they impinge on the issue of safety.

While it is possible, for example, to debate the relative merits of permitting free market forces to determine prices as against government-administered prices, the issue of safety is not open to debate. Indeed, it can be argued that the more the enterprise is left to the free play of competition in any unregulated market, the greater the pressure upon operators to reduce those "unproductive" elements of cost associated with the provision of adequate safety. In short, any sustained move to "deregulate" the industry should not be allowed to compromise the issue of safety, for as is said of war and generals, safety is too important to be left entirely to the industry. This is not, however, to argue that industry, accordingly, should be freed from the burden of ensuring safety of the enterprise. Quite the contrary; industry must be held fully accountable for that assurance, even as its invaluable expertise and knowledge should be regularly canvassed by the governments that carry the ultimate duty of defining and implementing the public interest in this critical area of public policy.

Indeed, it is to encourage amongst all participants in the offshore drilling enterprise a sense of responsibility for safety that governments see fit to impose controls. If this attitude of mindfulness could be generated naturally and be nurtured spontaneously in all participants, there would be no need of regulatory controls to ensure safety. But, whether it is the roustabout on the drilling rig allowing familiarity to breed carelessness; or the toolpusher allowing tight timetables to overcome dis-

cretion; or the operator with an eye to the costs entailed in delays for safety reasons; or the designer torn between what his expertise informs him is needed and what the actual minimum requirements demand: all have their reasons for ceasing to pay attention – for failures in responsibility, and, in some cases, even in accountability.

The issue of accountability is rendered more awkward to deal with because of the number of participants involved in a long chain of decisions that leads from the design of a MODU to its operation and the consequent diffusion and dilution of responsibility. It is for this reason that use of the term “the industry” to embrace all of those who have an active role and therefore share in the accountability for ensuring safety of the offshore operation conveys a misleading sense of a rather monolithic entity that has to be regulated and controlled. Not only does the large number of participants make it more difficult to get the accountability equation right, but also there is no continuum of responsibility extending from the designer of the rig through to the drilling contractor who owns it, to the operator who engages it, and to the auxiliary services, such as support vessels, helicopters, and meteorological forecasting. The relationships at each stage are governed by discrete contracts as between rig designers and drilling contractors, builders and drilling contractors, drilling contractors and operators, and operators and sundry suppliers and support service contractors. The fact that each set of participants bears some responsibility for ensuring safety along the way does not guarantee that, when men and machines are placed together in the operative mode offshore, all will coalesce to ensure safety. The fact also that the entire process of designing, constructing and operating drilling rigs is characterized by separate and disconnected contractual relationships is what makes it so important that the regulatory authority, through approval and safety audit procedures, ensures that the relevant participants have been attentive to safety requirements.

In the final analysis it is contractual relationships – the licence to drill – that provide the means by which government asserts its ultimate regulatory and controlling powers over the operation. It is also the means through which, in varying degrees of prescriptive detail, government seeks to encompass all aspects of the drilling operation. But, even the most intrusive government must realistically lean heavily on the expectation that, at each contractual point, sufficient attention has been paid to safety by the contracting participants themselves, regulated as much by their own professional and ethical prescriptive codes as by rules and standards imposed by government. Government regulators are driven to this posture because of the complexity and the number of stages in the enterprise where much has to be done on the basis of reposing faith in the professional and ethical codes of the various participants. This posture of trust is also attributable to the complexity and rapidity of change in the technology involved, where reliance on those with experience or specialized knowledge is called for and where the need to reproduce that same expertise within the governmental bureaucracy would result in unnecessary additional cost. The importance of the industry to the national economy and the fact that offshore drilling is conducted on an international basis provide government regulators with additional reasons for approaching their task in an accommodating and co-operative way.

This last element – the international dimension – emerges partly because of the multinational nature of the offshore drilling industry and partly because the enterprise is conducted offshore, where questions arise concerning the respective jurisdiction of the Coastal State and the jurisdiction exercised over the rig by the country whose flag it flies. Whereas there is a lengthy tradition of dealing with the issues of extra-territoriality of a nation's laws and jurisdictional writ as applied to vessels – all of which is complex and controversial in its own right – there is as yet not nearly as clear a jurisdictional line established for MODUs. At best, regulators confront two separate realms – the case of the elephant and the whale – the land-based tradition for oil drilling uneasily seeking to adapt to the long-standing marine regulatory tra-



10.1 Offshore exploration extends the technology of land-based drilling into the marine environment. The multinational nature of the offshore drilling industry brings it under the control of varied national regulatory regimes and international conventions.

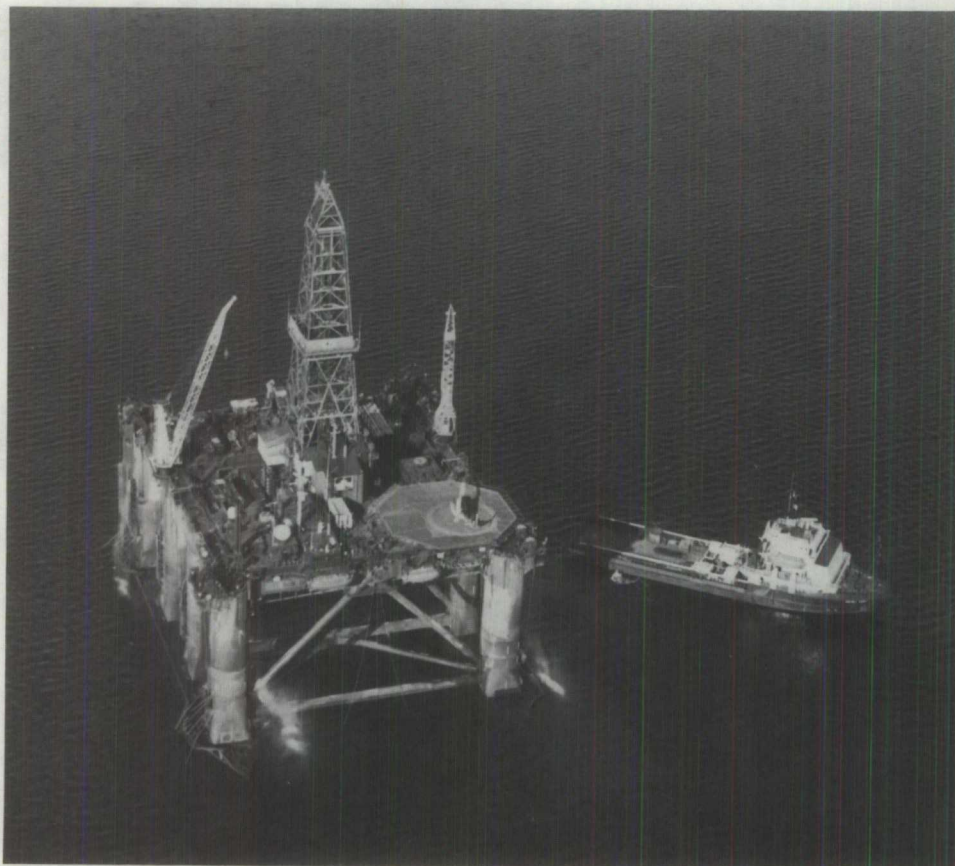


dition. The jurisdictional problem is greater when, as in the case of Canada, one adds the further juridical complication of seeking to regulate offshore operations within the purview of a federally organized state, where powers are constitutionally divided between the two levels of government and where both the national government and the government of the relevant coastal province may have a joint but not necessarily collaborative stake in overseeing the management of the enterprise.

Before the state can exercise control over any activity beyond its territorial boundaries, its claim to do so must be recognized by the comity of nations. The right of a Coastal State to exercise jurisdiction over exploration for and exploitation of oil and gas on its continental shelf is based upon the *Convention on the Continental Shelf, Geneva, 1958*. Article II of that *Convention* provides that the Coastal State exercises sovereign rights over its continental shelf for the purpose of exploring it and of exploiting its natural resources and, as one writer has added, for no other purpose. This means that the Coastal State can apply to these activities the whole body of its domestic law and subject them to all rights, duties and obligations under the law as if they were conducted on land. That *Convention* only enables or confirms the exclusive right of the Coastal State to exercise its jurisdiction over those activities and prohibits other states from doing so without its consent. The law of the Coastal State does not become applicable automatically upon ratification of the *Convention*. In order for its laws to apply to offshore hydrocarbon exploration activities, it is necessary for the Coastal State to enact legislation declaring that its laws are applicable generally or, alternatively, declaring which of its laws are applicable. The right of the Coastal State, however, to extend its laws offshore is not unlimited. The State is sovereign within its territorial boundaries but on its continental shelf it exercises sovereign rights over limited activities – exploration for and exploitation of minerals. There are also certain other limitations but they are not relevant to this analysis.



10.2 Both Canada and Norway have established safety zone regulations which exceed those specified in the *Convention on the Continental Shelf, Geneva, 1958*. Safety zones around fixed and floating drilling rigs are intended to prevent collisions with, or interference from, other vessels transiting the area.



There is, however, one limitation that requires special consideration and that might be exceeded. Article V provides that the Coastal State may establish safety zones to a distance of 500 metres around offshore drilling installations except where interference may be caused in the use of recognized sea lanes essential to international navigation. The 500-metre safety zone, within which the Coastal State may prohibit the entry of ships, has been criticized as being inadequate to allow Coastal States to exercise the necessary degree of jurisdiction and control. It provides, for example, too little room for error because of the size and lack of manoeuvrability of many modern-day vessels. If the safety zone is measured from the installation itself, it will permit entry well within the anchoring pattern of rigs. Canada has incorporated the 500-metre rule in her regulations except for rigs that are moored with anchors. In these cases the safety zone extends 50 metres beyond the anchor pattern. In adopting this 50-metre rule, Canada, like Norway, has exceeded the limit specified in the *1958 Convention*. Neither the 500-metre zone from the installation nor the 50-metre zone from the anchoring pattern provides adequate protection to the installation. Canada should consider establishing the zone at least 500 metres from the perimeter of the anchoring pattern or, preferably, determining what an appropriate zone should be under the environmental conditions on the continental shelf and, like the United Kingdom, declare that zone to be an area of her jurisdiction. The enactment and enforcement of legislation preventing pollution in the waters of the northern archipelago is a precedent for Canada taking unilateral action and receiving international acceptance.

Many Coastal States that have ratified the *1958 Convention* have enacted legislation to extend the application of their laws to the offshore. The United States has enacted the *Outer Continental Shelf Lands Act*, the *Submerged Lands Acts* and other legislation for that purpose. The United Kingdom enacted the *Continental*

*Shelf Act 1964* to provide the legal framework to facilitate offshore development, the *Mineral Workings (Offshore Installations) Act 1971* and other major pieces of legislation to exercise control over various aspects of the operations. Norway has also passed a *Continental Shelf Act 1963*, delegating authority to the King to give approval for exploration, drilling and exploitation of subsea petroleum resources and to establish the rules for the conduct of these activities. In Canada, as in the United States, Supreme Court decisions have confirmed the federal domain over oil and gas activities on the continental shelf. Canada elected to exercise her jurisdiction under the *Canada Oil and Gas Act*, and the *Oil and Gas Production and Conservation Act* and, to some extent, enforces compliance with her laws and her regulations through a permit process. No continental shelf act, however, has yet been enacted nor has legislative action yet been taken to extend the general application of Canadian law to offshore hydrocarbon exploration and exploitation activities.

The reason for Canada's failure to follow other sovereign states and to pass a continental shelf act is a matter for conjecture. What has become evident is the need now for its enactment and the extension of the application of her laws to offshore drilling activities – in short the extension of appropriate federal and, by adoption, provincial law. The extension of Canadian law to the continental shelf will end some of the uncertainties that exist, such as the application of the Criminal Code to an owner of a drilling rig of non-Canadian registry, but it is not a panacea to end them all. What is needed is legislation designed for application to MODUs and to the varied aspects of their offshore operations including the standby role of vessels and the rescue role of helicopters under contract to the industry. This is a matter of enacting comprehensive legislation related to these operations or of amending existing legislation, but not of stretching it to fit a Procrustean bed, by defining, for example, a jack-up as a ship in order to bring it within the *Canada Shipping Act*.

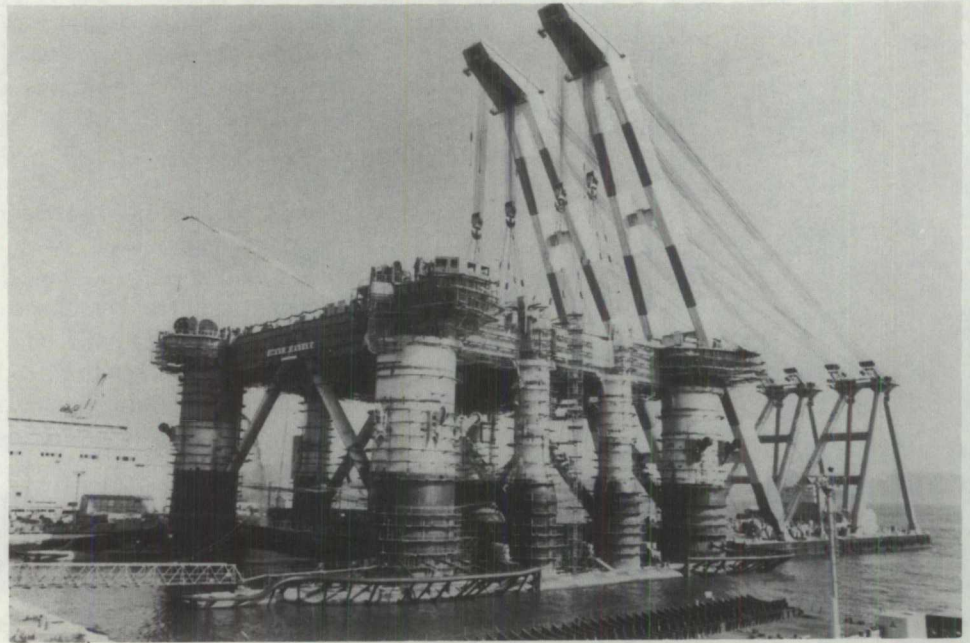
Drilling rigs operate in the international market where the international maritime community, through several agencies, has developed minimum safety requirements for all vessels. The dominant intergovernmental agency is the International Maritime Organization (IMO), formerly the Intergovernmental Maritime Consultative Organization, established in 1958 as a specialized agency of the United Nations with membership drawn from most of the maritime nations of the world. IMO is designed to create order out of the medley of conflicting mandatory requirements of member states and to establish common standards for marine safety, pollution and navigation. The measures that it develops are eventually promulgated as conventions, for example, the *Safety of Life at Sea (SOLAS) Convention* and the *International Convention on Load Lines*. IMO has no legislative or regulatory power; its conventions come into force as and when they are ratified by member states. It also has no means of forcing its members to comply with its rules and conventions. Although during the prolonged discussions and negotiations that precede general agreement upon and adoption of new conventions, efforts are made to raise the level of standards under consideration, the end result is normally the adoption of minimum requirements which are, in fact, the maximum upon which agreement can be reached.

The first *IMO Code* for mobile offshore drilling units was adopted in 1980 and is currently under review. It constitutes a common base for the mandatory controls to be exercised by member states. It is incumbent upon members, including Canada, to support IMO in its efforts to improve the quality and to extend the range of its codes and conventions, though they may, while complying, increase the standards to meet their local needs and perceptions. This latter action Canada should take because of the environmental conditions on her continental shelf.

Active also on the international scene and in establishing international rules are the classification societies. The classification of vessels originated in England over 200 years ago in Lloyd's Coffee House where the most influential members of



10.3 The *Ocean Ranger* was constructed and classed in accordance with the American Bureau of Shipping's 1973 Rules for Building and Classing Mobile Offshore Drilling Units, and retained its classification to the time of its loss.



the shipping trade in London would gather to discuss business. Underwriters called upon to accept maritime risks and shippers of valuable cargo came together to seek some guarantee of fitness of the vessel in prospect. There evolved a rough system of inspecting hulls and equipment and, on the basis of experience, rules were developed, which applied recognized standards. From this voluntary association evolved Lloyd's Register of Shipping, now an international, non-profit body. Similar organizations have developed in other maritime nations. The standards set by the different classification societies are similar and represent the cumulative experience acquired through extensive research and development and through surveys of thousands of ships over many years. In classing a vessel, the societies attest that it meets a standard of construction which assures adequate structural strength under the conditions for which it was designed, that its electrical and mechanical systems comply with acceptable standards and are properly installed, that the vessel is maintained by its owner to the extent that it complies with the rules and does not lose its classification, and finally that all major repairs or structural changes are carried out in accordance with the rules of that society.

*"The American Bureau of Shipping is not responsible for the operation of the unit. It is incumbent upon the owner to provide instructions and to set limits on operations so that the loadings and environmental criteria upon which the classification is based are not exceeded. To this end, an Operating Booklet containing those instructions and limits should be provided aboard the unit. The Operating Booklet is not to be submitted for review."*

*Rules for Building and Classing Mobile Offshore Drilling Units. American Bureau of Shipping. 1980*

Classification societies became involved in the offshore drilling industry in the early years when structures operated close to shore and had many of the features of conventional ships; they applied the rules that had evolved for these ships. But as new designs emerged and rigs operated farther from shore and under increasingly severe environmental conditions, new rules, specific to MODUs, became necessary. The American Bureau of Shipping (ABS) published the first set of MODU rules in 1968 and was followed by the other classification societies. Where MODU rules do not address a particular aspect of a rig, the rules for ships are applied. Where MODU rules exist, they are based on relatively short historical experience. In considering the role of the classification society in the regulatory process, it is tempting for one to lose sight of the original and primary role of classification societies, that is, to satisfy the owner and the insurers that a rig is designed and constructed, outfitted and maintained to a standard which is sufficient for the service and area of operation for which the rig is intended. This standard is considered to be achieved if the rig complies with their rules. Classification does not ensure seaworthiness since the management and operation of the rig, vital aspects of seaworthiness, are not examined by classification societies. As a spokesman for ABS pointed out during the Inquiry into

the loss of the *Ocean Ranger*, if others choose to give a wider meaning to classification than compliance with rules, they do so at their peril.

Many important areas pertaining to the safe operation of a rig, for example, navigation and communication systems, and evacuation systems, that are not covered in the rules of the classification societies, are the concern of the Flag State which has jurisdiction over all aspects of the rig and whose domestic law applies to it. It is for this reason that the owner of a rig ensures, during the design and construction stages, that the rig complies with the rules not only of the classification society but also of the Flag State that has been selected.

The Coastal State, however, can, under international law, set whatever requirements it decides upon for those who seek permission to drill on its continental shelf and can deny that permission and the use of its ports, unless compliance with its laws and regulations is assured by the operator. In areas where the Coastal State has not legislated, the requirements of the Flag State will have to be observed. Where the Coastal State does legislate, there is the possibility of conflict between the requirements of the Flag State and those of the Coastal State, the Flag State asserting its sovereign rights over the rig and the Coastal State maintaining its sovereign rights over the exploration and exploitation of its offshore mineral resources. Under these circumstances the will of the Coastal State must prevail, and, depending upon the nature of the conflict, the owner of the rig may, in the final analysis, have to change the state of registry of the rig or move it to a location in another jurisdiction.

Within the framework of international laws and conventions, every Coastal State in the exercise of its jurisdiction over offshore exploration must wrestle with the same central concern; the suitability of drilling rigs to operate safely under the environmental conditions that prevail on its continental shelf. This central concern will seek expression in each of the several areas that have been analysed in the foregoing chapters. It will entail requirements to ensure the integrity of the rig and its critical systems, its operability, its management, and its manning including the training, health and safety of its crew. There will also be involved measures to protect and safeguard the well and the environment, and means for evacuation and for rescue in the event of an emergency.

In the exercise of its responsibility to protect the national interest, the welfare of its citizens and the environment, each Coastal State will become involved with these substantive areas in varying degrees. The extent of state involvement will be a function of its legal traditions, the social and political philosophy underlying these evolving traditions and the current practices of government. It will depend, as well, upon the nature of the physical environment, the attitudes of its people, and the incidence of accidents or disasters offshore. A generalization based on current practice is that Canadians and Britons accept a greater degree of governmental interference or intervention in their economic affairs than do United States citizens but less than those of Norway. But all general statements, even this one, may be to some extent fallacious. Comparisons between states, because of their inherent differences in traditions and in popular expectations of government, may be misleading though, when exercised with care, they may be enlightening in seeking solution of common problems.

Pre-eminent among the common problems and contributing to them is the fact that the offshore exploratory oil industry is still relatively new and continues to operate at the frontier not only of technology and experience, but also of the law. Developments in technology in this new industry are spurred on by the ever-present search for more efficient modes of operation and by the need, imposed by reason of the marine environment, for greater security and safety. Here the elephant and the whale meet on the frontier where the land-based traditions of the petroleum industry strive with varying degrees of success to adapt to the traditional marine regulatory environment and where, to change the metaphor, the cowboy has to become to some



degree a sailor. Changing technology poses a distinct challenge to the legal system which tends in all countries to move at a slow, reluctant pace. The challenge for the regulatory regime in all states is to find, in the face of a rapidly changing technological environment, a means of ready adaptation in the legal system and an easy mode of change in mandatory requirements, while retaining the necessary degree of certainty. What the regulatory regime of a state should seek to achieve is a balance between controls that are flexible and responsive to the imperative of rapidly changing technology, and controls that possess certainty for the regulated interests. Stability is also required for those regulatory agencies vested with the responsibility for administering, monitoring and otherwise enforcing the rules. The balance between flexibility and certainty for each Coastal State differs, as do the instruments used for achieving that balance.

The instruments used by different countries to exercise control over offshore drilling activities range in authority from legislation to circular notices. They include statutes, regulations, guidance notes, and instructions. Not only do states vary in their use of this selected armoury of regulatory instruments but so also do they vary in the choice of the substantive areas in which they seek to deploy these instruments.

Because of the pressure on a legislature for time and because of the length of time generally required for their enactment, statutes tend to be used sparingly. States normally enact enabling legislation to express governmental objectives, the broad purposes of the legislation, the framework of administrative mechanisms and the authority devolved upon these mechanisms to exercise discretionary decision-making powers. The relative inflexibility of legislation, as a regulatory instrument, induces all governments to rely more on subordinate legislation, for example on orders and regulations, to put flesh on the bare skeleton of the general legislation. Compliance with this subordinate legislation is as mandatory as compliance with the enabling statutes which authorize the promulgation of orders and regulations. The particular governmental structure and practices of each state will determine not only the use of the instruments and the substantive areas of application but also the amount of detail contained in the regulations. Regulations may establish performance standards, accept by reference the standards of established external agencies or specify the equipment to be used or measures to be taken. Penalties in law may follow violation of regulations.

Other instruments used by government to exercise control are of an informal nature and are not mandatory. Such devices as guidance or operation notes are used to elucidate government policies, to interpret the relevant acceptable standards, to provide guidance to the operator, and to clarify what is expected of the operator. Instructions, circular notes and other informal devices are used to explain government policy and delineate anticipated response. While these instruments are non-mandatory, failure to comply may bring loss of the good will of the regulator, may increase the expense entailed in obtaining required permissions through lost time and even, in the last analysis, may lead to the abrogation of permits or refusal of an extension – drastic measures that are rarely, if ever, adopted.

An examination of the regulatory instruments used in the states under comparative review reveals variations in their types and in their application. In the United States, the prime instruments used by agencies and departments are regulations formulated and issued under authority of general legislation and subject to procedural requirements laid down in a general procedures statute, the *Administrative Procedures Act*. A more flexible instrument is the Executive Order which is not required to comply with the *Administrative Procedures Act*, although in recent years revisions to Executive Orders have tended to do so. Stipulations in leases, notices and circulars informing the industry what equipment and procedures will comply with regulations are other devices used. Perhaps the most important practice that has come into common use is that of incorporating in the regulations standards estab-

*"Although the [United States] Coast Guard has not specifically defined the BAST process in regulations, the concept is inherent to our regulatory program. Our system of plan review, our requirements for safety equipment, and our inspections and investigations implement this process. New technologies are accommodated in our regulations by permitting substitutions of materials and procedures if the substitute provides an equivalent or better level of safety."*

Capt. Thomas F. Tutwiler, Chief  
U.S. Coast Guard Merchant Vessel  
Inspection Division  
*Proceedings from the Symposium on  
the Safety of Life Offshore, June, 1983*

lished by external professional associations. This is accomplished through the Best Available and Safest Technology (BAST) requirement, a statutory mechanism that has become generally adopted in recent years. That mechanism is intended to enhance the adequacy of technologies and of regulations dealing with offshore safety. Where the BAST requirement is mandatory, it needs to be supported by a program of investigation that determines what technology is best and safest by a concerted program of research and development to improve existing technology and by a program of monitoring to ensure that the best and safest technology is, in fact, being used. The merit of this technique of control is that it meets the requirement of flexibility by encouraging and accommodating innovations. It meets the need of the operator for a balancing of certainty of application with the need of the regulator for flexibility to adopt emerging technologies and to adapt control to changing conditions. At the same time it vests discretion in the regulatory agencies to determine when an operator complies with the BAST requirement, but without obliging the regulator to establish specific standards.

In the United Kingdom, under the authority of enabling acts related to offshore oil and gas operations, subordinate legislation in the form of Orders in Council are issued on the authority of the Cabinet and departmental regulations on the authority of the Minister. Departmental regulations take less time both in formulation and in promulgation. Guidance Notes, Continental Shelf Operation Notices, Codes of Practice, and Notices to Mariners are devices used to give non-mandatory advice and even instructions to operators on methods of achieving objectives to an acceptable standard of reliability. Control of offshore oil operations in the United Kingdom is based upon the principle of self-regulation by industry and of effective monitoring by or on behalf of the regulatory agency. Regulations, both Orders in Council and departmental, state in general terms the standards to be observed and Guidance Notes are extensively used to provide the details. The need for continual revision of regulations to keep pace with technical changes has thus been reduced. The responsibility is placed fully upon the operator to ensure that acceptable standards and the requirements for safe operations are met.

In Norway, under the provisions of enabling legislation, Royal Decrees are issued, which provide the framework for the promulgation of detailed regulations, on the authority of ministers, to implement the Decrees. Ministers may then delegate the authority to regulate to agencies whose regulations are equally mandatory. As Norway has gained more knowledge of offshore oil operations, and particularly since the loss of the *Alexander L. Kielland*, the range of regulations has become more extensive to the degree that the oil industry is subjected to more regulations there than in any other country reviewed. As in the United Kingdom and in the United States, the Norwegian approach to safety is to make the operator responsible for ensuring that operations are conducted in accordance with safety regulations.

Norway, however, has a much more formalized procedure for ensuring that the operator is, indeed, responsible by requiring each operator to develop an "internal control system" covering his activities and the activities of all who work for him under contract. The operator must include in the contract provisions for ensuring compliance, not only with all mandatory requirements, but also with his own quality control and safety requirements which may well go beyond the minimum acceptable standard set forth in the mandatory requirement. The "internal control system" is designed to reduce risks through a conscious effort to incorporate safety and quality assurance into the planning, design, construction, and operational phases. Government guidelines have been issued, dealing with the arrangements by which an operator establishes an "internal control system". Once that system is submitted and accepted by the regulatory agencies, it is binding on both parties. There are indications that Norway, through this method, is beginning to decrease the range and the specificity of its regulatory control.



10.4 Exploratory drilling operations on Canada's East Coast are carried out under the regulatory control of the Canada Oil and Gas Lands Administration, which maintains regional offices in St. John's, Newfoundland and Halifax, Nova Scotia.



The nature of the Canadian regulatory mode in relation to the offshore is less evident, and apparently less developed, than that of the other jurisdictions under review. Canada has not enacted a continental shelf act and, therefore, her domestic laws lack general application to offshore drilling operations. Regulations, issued as Orders in Council under the authority of the *Oil and Gas Production and Conservation Act* have been rather modest in number and in the extent of their application. Regulations which are issued as Orders in Council are subjected to an unconscionably lengthy process which appears to be as inflexible as the statutes on which they are based.

Section 12.2(1) "The Chief Conservation Officer may in any particular case authorize the use of equipment methods, measures or standards that do not comply with the regulations where he is satisfied that such use provides a level of safety and pollution prevention at least equivalent to that provided by compliance with the regulation."

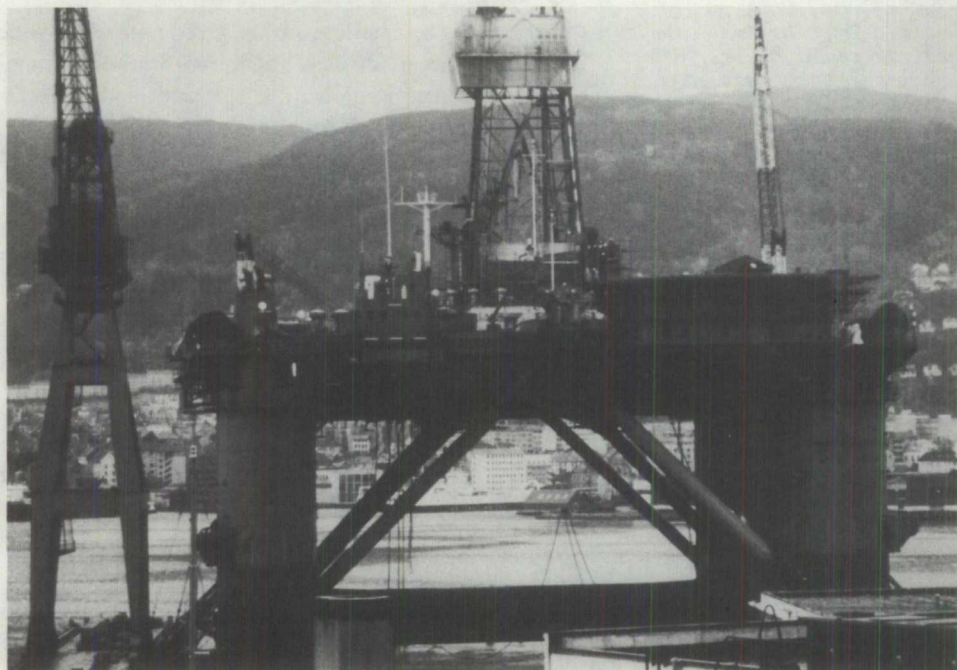
Oil and Gas Production and  
Conservation Act, amended 1981

The legislation gives unusually wide discretionary powers to the Chief Conservation Officer, the head of the primary regulatory agency, even to the extent of authorizing him to suspend or dispense with the application of existing regulations. The prime instrument of control is the application-permit system. Through it the regulatory agency in general, and the Chief Conservation Officer in particular not only implement policies relating to the design, construction and operation of rigs, but also seek to exact compliance with relevant laws. It is under this system that the Chief Conservation Officer exercises wide powers. Compliance with the provision of Canadian laws and regulations is made a condition of obtaining and retaining a drilling permit. In the exercise of these powers, guidelines are issued to interpret regulations, indeed, to stand in the place of regulations, to convey recommended practices and procedures and to explain policies and objectives. Instructions are also issued by word of mouth, telex, letter or other means. For these reasons it is difficult to discover what controls are, in fact, being enforced. Discussions may be held with an operator, and instructions given, which may differ with different operators or with the same operator on different occasions. Such an informal practice not only raises the possibility of differential treatment of various operators but also accentuates the discretionary and possibly, the arbitrary or capricious aspect of the regulatory process. The extent of the application of laws and regulations may be a matter of negotiation and even of trade-offs involving safety. Equivalency standards, for example, may be reduced under pressure for early production. The application of law and regulations becomes a private matter between the regulatory authority and the operator. Nor is there any realistic means of enforcing compliance when it is deemed to be necessary. The owner of a rig of foreign registry is not subject to the laws; thus the penalties relating to a breach of the law applied to the operator cannot, in practice, be applied to the owner of the rig. The regulatory agency has to resort to the withdrawal or threat of withdrawal of permits or to administrative penalties such as costly delays which may prove to be even more effective than threats. The deterrent of public prosecution and of its possible adverse publicity with consequent public criticism is missing. The extension of the full body of Canadian law to offshore drilling operations and the development of a body of regulatory controls in the public domain would remedy these defects.

It is apparent that there are many instruments employed by regulatory agencies in fulfilling their mandate in relation to the offshore. They range from the broad-brush enunciations of general policy or of general objectives to the imposition of detailed design, equipment and procedural requirements. It is difficult to make a valid generalization about any of the states under comparative review because of differences of approach in different subject areas. In the United States, regulations dealing with safety in the workplace range from general provisions requiring that the crew "perform all operations in a workmanlike manner" to very specific requirements as in well control. The United States Coast Guard issues detailed and comprehensive regulations prescribing training and experience for the certification of certain marine personnel, but imposes few regulations regarding manning standards for MODUs or training standards for industrial personnel or ballast control operators. Training is left to individual companies with the result that, as the National Academy of Science reported "regulations have been much more successful in ensuring the use of adequate technologies than in ensuring that workers, particularly entry level workers, are properly trained in safe practices." In other areas such as design of rigs, certification and installation of equipment for fire prevention and well control, the regulations are extremely detailed. Increased demand on United States Coast Guard inspection personnel, increasingly complex technologies and a current desire to minimize government involvement in the private sector appear to have resulted most recently in a greater use of voluntary standards and a greater involvement of classification and professional societies in the regulatory process.



10.5 The method of regulatory control over offshore drilling varies considerably between Coastal States. Canada, the United States, the United Kingdom and Norway have each established regulatory regimes which differ in content and in the manner of enforcement.



The British approach is one generally of stating performance standards in regulations and supplementing them with Guidance Notes and other non-mandatory instruments. With respect to design, construction and survey, all rigs must be certified as fit for the purpose specified. For well control, the operator is responsible for the avoidance of harmful methods of working and he is directed to execute all operations in a proper and workmanlike manner in accordance with methods and practice customarily used in good oilfield practice. More specific regulations pertain to workplace safety and to the training of certain key personnel. It is, however, the responsibility of the operator to ensure that rigs are properly manned with persons competent to perform the task for which they were engaged.

In the combination of broad objectives and specific requirements, the Norwegian approach is essentially the same as the others, though with a much greater emphasis upon specific requirements. The requirements for design and construction are detailed, specific and stringent. For well control they incorporate accepted oilfield practices, place responsibility squarely on the shoulders of the operator and issue specific requirements. There are numerous regulations regarding workplace safety, detailed regulations for training of key personnel and a requirement for basic marine training for all. Though their regulatory system is more extensive than most others, the Norwegians incorporate flexibility in their regulations to ensure that technical changes can be adopted in individual cases.

It is difficult, as stated earlier, to determine the essential nature of the Canadian approach to regulatory control behind the screen of the application-permit system. The Canadian system is the least developed of those that have been examined. Its comparative neglect of regulations, in contrast with stipulation in permit negotiations, however, provides ample opportunity for change and improvement. *Interim Standards* have been established for the design and construction of rigs. For safety in the workplace and for well control, numerous procedures and equipment that must be employed are specified. The only specific regulatory requirement for training is the stipulation that all rig supervisors, drilling foremen and toolpushers successfully complete a course in well control. The operator is, however, responsible to ensure that all employees receive instruction and training with respect to all operational and safety procedures that they might be required to perform. There are requirements

for drills on board but there is no regulation requiring basic marine training for the crew.

In exercising its controls, each jurisdiction examined accepts in principle the desirability of concentrating responsibility for safety on oil rigs in as few regulatory bodies as possible. In the United States, some 18 federal agencies have an active interest in some aspect of offshore operations and 6 agencies have statutory authority to regulate day-to-day activities. There are, however, two prime agencies: the Geological Survey in the Department of Interior with responsibility for regulating all mineral exploration, drilling and production operations on the continental shelf, and the United States Coast Guard in the Department of Transportation with responsibility for all aspects of maritime safety.

In contrast, in the United Kingdom, since the adoption of the Burgoyne Committee report on *Offshore Safety* in 1980, one agency, the Department of Energy, has full responsibility for all offshore safety matters except for ships and seafarers – that responsibility remains with the Board of Trade. The major control body in the Department of Energy has been strengthened through the transfer of inspectors from the Health and Safety Executive of the Health and Safety Commission. In Norway there are nine institutions involved with mobile rigs and five with fixed installations. There are, however, as in the United States, two prime agencies, but with a rather different allocation of responsibilities. The Petroleum Directorate in the Department of Oil and Energy has responsibility for fixed installations, both exploration and production, and for drilling equipment and diving on all offshore installations; the Maritime Directorate in the Department of Trade and Shipping has responsibility for mobile platforms, for rescue equipment and exercises on fixed platforms, and for all maritime matters.

In Canada there exists but one lead agency exercising jurisdiction offshore, COGLA, a unique organization in that its Administrator, the Chief Conservation Officer, is responsible to two ministers, the Minister of Energy, Mines and Resources and the Minister of Indian and Northern Affairs, whose authority over oil exploration and development is divided by the 60th parallel. As in other countries under review, COGLA draws upon the services of several other federal agencies, especially the Canadian Coast Guard, for the performance of its responsibilities. The *Atlantic Accord*, signed in February 1985, between the federal government and the provincial government of Newfoundland, envisages the early establishment of a single administrative agency to exercise jurisdiction over operations on the continental shelf off Newfoundland. The actual institutional arrangements and their impact upon COGLA and the Newfoundland and Labrador Petroleum Directorate at present remain nebulous.

Whatever organizational arrangement may evolve for eastern Canada, it is instructive to observe that in almost all jurisdictions under review – the exception is the United States – the trend has been markedly in favour of a lead agency, if not a “single window” for regulatory purposes. Norway, for example, has initiated the process of moving responsibility for regulating all exploratory activities to the Petroleum Directorate with a view to focusing responsibility for the safety of all aspects of the operations in a single agency. In the United Kingdom the adoption and, indeed, the acceptance within government circles of a single window approach was facilitated by the establishment by the Department of Energy, during the formative years of oil development, of an interdepartmental committee – the Offshore Installations Technical Advisory Committee (OFINTAC) consisting of recognized specialists drawn from government agencies. Its function was to provide the Department of Energy with a wider range of technical knowledge than was available in any one department, in order to develop the regulations for construction and survey and to consolidate the Guidance Notes for the so-called Blue Book. With these purposes achieved, the Committee has been disbanded. This is a device that Canada might well adopt. It is



important, however, to note, as did the Burgoyne Committee report on *Offshore Safety* when it endorsed the single window approach, that combining in one lead agency responsibility for regulating exploration, production and safety carries with it an attendant danger. There is the inherent risk that, in the drive for energy self-sufficiency under conditions of economic stress, the price to be paid may be to compromise safety. If, however, the risk is fully recognized and appropriate precautions taken, as, for example, the establishment of a Safety Branch within the single regulatory agency, the single window approach would appear to be the best institutional arrangement for regulating offshore oil operations. The concept is endorsed strongly by industry because of the reduction in regulatory duplication and conflict and because of the clearer lines of communication between the regulator and the regulated.

A device common to all jurisdictions under review, to ameliorate jurisdictional jealousies and administrative overlaps is the Memorandum of Understanding, negotiated between the lead agency and another department or agency. In the United States, for example, a Memorandum of Understanding has been negotiated between the United States Coast Guard and the Occupational Health and Safety Administration, whereby the United States Coast Guard is given major responsibility for safety in the workplace offshore. In similar fashion and for a similar purpose, the Department of Energy in the United Kingdom took over responsibility for health and safety inspection offshore from the Health and Safety Executive. While it is normal for the Memorandum of Understanding to be used as a device for enabling the lead agency to take on additional responsibilities in the regulation of offshore oil operations, its use in Canada has been somewhat different. The Memorandum of Understanding between COGLA and the Canadian Coast Guard, rather than transferring authority and responsibilities from the Coast Guard to COGLA, in fact empowers the Coast Guard, through delegation from COGLA, to undertake certain functions that would otherwise be outside their jurisdiction. The legal necessity for this transfer of powers to the Coast Guard through a Memorandum of Understanding stems from the fact that, as mentioned above, the *Canada Shipping Act* does not yet apply to rigs of other than Canadian registry that are engaged in drilling operations on the continental shelf. Without application of the *Canada Shipping Act* to rigs of foreign registry, the only way its provisions can be applied by the Coast Guard is by virtue of delegation of powers from COGLA, powers which COGLA obtains from its *Oil and Gas Production and Conservation Act*.

Whatever organizational structure may be adopted, the major roles of the regulatory agency responsible for offshore safety are the formulation of policy and the promulgation and enforcement of regulations designed to give effect to that policy. The complex and highly technical nature of the operations makes it a practical, if not a legal, necessity for industry to participate in that process. For the regulatory agency to be able to act unilaterally in the drafting of regulations and even guidance notes, it would require not only a large infrastructure but also an intimate and extensive knowledge of technical requirements. Industry, for its part, is obliged to keep abreast of advancing technology and, in certain areas such as industrial training, will know best what standard is required for competent performance. Industry's participation, however, in key elements of the regulatory process varies from one country to another and from one area to another area in the same jurisdiction.

It is generally recognized that, because of the complex and changing nature of the technology or because of recognized experience, knowledge and interest of the industry or external professional bodies, certain aspects of the offshore industry should be left to industry to set the standards, subject to the acceptance and monitoring of these standards by the regulatory authority. In the jurisdictions examined, the provision for government to undertake consultation with industry is formally required by law. In the United States, the formal process of consultation is provided

10.6 A careful balance must be sought in the mode of regulation to ensure that human safety is not compromised by national goals for energy self-sufficiency or economic gain.



in the general enactment that applies to all regulatory bodies – the *Administrative Procedures Act*. Under this *Act* all proposed regulations are required to be published in the *Federal Register*, before they are promulgated in the *Code of Federal Regulations*. This provision permits the public and the industry the opportunity to comment before the regulations become final. Executive Orders are not required to follow that process. In addition to the formal requirements, other means are afforded to industry to comment informally on proposed regulations.

In the United Kingdom, there is a statutory requirement that “before making regulations. . .the Secretary of State shall consult with organizations in the United Kingdom appearing to him to be representative of those persons who will be affected by the regulations.” With the emphasis in that country on self-regulation, the consultation between government and industry in drafting both regulations and Guidance Notes assumes increasing importance and has become an integral part of the regulatory process. Consultation is directed towards establishing practical standards for offshore operations and towards giving clarity to governmental objectives. Formal opportunities for input from industry are provided through statutory boards and committees like the Offshore Petroleum Industry Training Board with membership drawn from industry and training institutions and the Oil Industry Advisory Committee with membership from industry and workers to advise the Health and Safety Executive. The main channel of consultation is the United Kingdom Offshore Operators Association (UKOOA) which with its extensive committee system has a significant role through prior consultation in the development of the Guidance Notes issued and amended by the regulatory agency. UKOOA also prepares preliminary drafts of technical regulations for submission to the regulatory agency. In areas where responsibility for standards is left to industry, for example, in training and in health it establishes for its members non-mandatory guidelines which are accepted and monitored by the regulatory agency. In Norway preliminary informal discussions regarding a proposed regulation take place with recognized experts, drilling contractors and others; after approval of the intent of the regulation by government, formal hearings



are held. Before approval is given, the revised proposal in its final form is sent out to interested parties for review.

In Canada, there is no statutory requirement for consultation with industry during the preparation of regulations and guidelines but informal discussions and consultation do take place and efforts are made to obtain the concurrence of industry with new regulations and their advice on standards of performance. Throughout the application-permit process there are opportunities for discussions and even negotiations between the regulator and the operator. In recent years and particularly since the loss of the *Ocean Ranger*, joint committees have been established, with membership drawn from the operators and in some cases from both levels of government. The Joint Government-Industry Offshore Training Committee has been set up to consider training requirements, curricula and standards; a Medical Advisory Group on Offshore Health to advise on matters of occupational health and safety and a Canada Lands Safety Advisory Council, with COGLA and industry providing co-chairmen, to address safety issues and concerns. The effectiveness of this relatively new and cumbersome committee structure as a forum for meaningful consultation and a source of effective action has been questioned. The Eastcoast Petroleum Operators Association (EPOA), now the Offshore Operators Division of the Canadian Petroleum Association, established a task force to study in depth various aspects of safety offshore and to make recommendations for action to its members. More recently it has initiated recommendations for training standards for personnel on MODUs which, if adopted by its members and accepted by the regulatory authority, will have the effect of non-mandatory guidelines.

The offshore oil industry, however, is more than the operating oil companies; it includes also a complex of service companies under contract to operators. These service companies have their own associations and their argument cannot reasonably be denied that, when matters affecting their direct interests are being negotiated between the regulator and the operator, they should participate. No provision exists for discussions between COGLA and the offshore drilling contractors or the owners of the supply vessels, although they have discussions with the Coast Guard on marine safety matters.

It is axiomatic that the compliance of the offshore oil industry with rules and regulations pertaining to safety will be enhanced, the more that it is provided with opportunities to participate in the formulation of regulatory requirements. The mode of ensuring compliance with rules and regulations depends upon the objectives of the regulator, the specific nature of the regulation and the responsibility and accountability of the operator or service contractor. It will depend upon whether the objective is to monitor or to police, to seek assurance of suitability for safety or to assess blame, to ensure strict adherence to the law or to develop sensitive attitudes and shared responsibility for safety. The mode of ensuring compliance also depends upon the subject matter and whether the regulations are specific and detailed, or general and based upon acceptable standards.

Where regulations are detailed and specific, the inspector needs to do little more than complete a check list, a role for which limited special knowledge or experience is required. Where, however, recognized performance standards are called for or particularly where standards are unspecified but, as at present in Canada, must be acceptable to the head of the agency, a much higher level of knowledge, of experience and judgment is required. In a country with a nascent offshore oil industry, there is a distinct shortage of persons who are qualified to exercise these functions and, when they acquire knowledge and experience, they are attracted into the oil industry where remuneration is less restrictive. It is, therefore, not uncommon to engage external agencies, like classification societies, as certifying agents to give assurance that regulatory requirements are being met. This practice has been adopted in the United Kingdom to certify that rigs are structurally suitable for operating

in the North Sea. A similar practice has been suggested for adoption in Canada, a safety audit to be conducted upon all rigs that operate on the continental shelf, to determine their structural and operational suitability. Where matters affecting safety during operations have been left largely to industry, the response has varied from Norway's insistence upon its "internal control system" to the application of BAST in the United States, or to UKOOA-determined guidelines in the United Kingdom. The involvement of the government's regulatory agency is one of monitoring the results, recording significant events and assembling a data base for future action and future controls.

In the final analysis government agencies formally enforce compliance by the use of penalties ranging from cancellation of permits or stoppage of drilling to fines. In countries where the laws of the land have been extended offshore, the full range of legal penalties and the consequent embarrassment of adverse publicity apply. In Canada, where extension of the laws offshore has not yet taken place, when formal enforcement procedures have to be invoked, recourse must be had to the *Oil and Gas Production and Conservation Act*. But in that *Act* offences are few and the most effective penalties are administrative, imposed on the authority of the Chief Conservation Officer. This arrangement, as mentioned earlier, reposes undue discretionary power on one statutory official – not the minister but the Chief Conservation Officer – thereby opening the door to bilateral negotiations between the operator and the regulator. It places reliance on the provisions of the permit to compel compliance and provides no graduated scheme of penalties but only one "sledge hammer" penalty in the event of failure on the part of operators to meet their obligations – namely suspension or a cancellation of the permit. The draconian nature of this inflexible penalty means, in practice, that it will seldom be used, giving rise in turn to the prospect of informal unpublicized arrangements between the regulator and the operator that accentuate, once again, the discretionary powers of the regulator.

Whatever the mode and extent of mandatory controls adopted and whatever the mode of enforcement considered advisable and feasible, the fundamental basis for safety offshore lies in the cultivation, in all those who participate, of a conscious recognition of responsibility and of the promotion throughout the industry of enforceable accountability following the development and adoption of policies and of a regulatory regime appropriate to eastern Canada's offshore. In that development process, Canada should remain alert to the prospect of drawing upon and wisely adapting to its special needs the growing body of knowledge, experience and practice of other nations engaged in offshore oil and gas activities, both in the North Sea and elsewhere.





## CHAPTER ELEVEN CONCLUSIONS AND RECOMMENDATIONS

### INTRODUCTION

Part One of the Terms of Reference of the Royal Commission directed it to inquire into, report upon, and make recommendations with respect to matters directly relating to the *Ocean Ranger* and its loss. The results of that portion of the inquiry and the sixty-six recommendations arising from it are set forth in Report One. They are also included in Appendix B of this report, together with the response of the federal government to them.

Part Two of the Terms of Reference directs the Royal Commission to inquire into, report upon and make recommendations with respect to offshore drilling operations on the continental shelf off eastern Canada.<sup>1</sup> Against the background of the loss of the *Ocean Ranger*, the central concern of the Royal Commission has been to identify practical means of enhancing human safety in exploratory drilling off eastern Canada and that is the subject of this second and final report. Drilling operations there, are, at present, concerned with exploration and with the delineation of geological structures that have promise for hydrocarbon reserves. Development and production of the resources identified will change the nature and scale of those operations and introduce different factors and new risks. Nevertheless, many activities in the exploration and production stages are common, as are the principles governing the safety of operations and the risks to be encountered. The preceding chapters contain the analysis of the main issues affecting offshore safety and the rationale for the conclusions and recommendations that follow.

It is apparent that the hostile nature of the marine environment particularly on the Grand Banks and northward leaves no room for complacency. Fog, frequent storms, ocean currents, severe icing, icebergs, bergy bits, growlers, and pack ice combine to present the offshore drilling industry with what may be the greatest environmental challenge that it has yet faced anywhere in the world. What is needed is reliable information about the physical environment, advance warning of environmental hazards and a co-ordinated system to manage environmental data to meet the needs of both operators and regulators. What is needed even more is a method of assurance that rigs operating offshore are fully capable of meeting these environmental extremes. But the safety of a rig depends not only upon the quality of its structure and of its critical systems but also upon the quality of its management and the training and competence of its crew. It is also apparent that no evacuation system yet devised can, from a rig, cope with the raging seas of the Northwest Atlantic or the North Sea, nor does there yet exist a rescue system that is effective during a combi-

2. "Inquire into, report upon and make recommendations with respect to both the marine and drilling aspects of practices and procedures in respect of offshore drilling operations on the Continental Shelf off Newfoundland and Labrador and . . . to the extent necessary and relevant, such practices and procedures in other eastern Canada offshore drilling operations."

<sup>1</sup>All references in this Chapter to the offshore will indicate the continental shelf off eastern Canada.

nation of emergency situations of which a storm is one. Different means of regulation are adopted by nations reflecting their own constitutional structures and regulatory traditions. The regulatory regimen controlling offshore drilling operations must be firmly based on legislation, on mandatory regulations to the extent deemed necessary, but also on guidance notes to maintain essential flexibility. Its purpose is to provide the criteria against which performance can be measured and to ensure the accountability of those responsible. The issues raised in these chapters are addressed in the recommendations that follow.

The 70 recommendations contained in Report Two are numbered from 67 to 136, thus continuing in sequence from the 66 recommendations presented in Report One. The page reference given after the recommendation refers to the relevant section of Report Two.

### ENVIRONMENTAL FACTORS

Detailed and accurate information about the environmental conditions under which drilling rigs will be expected to operate is essential for those who design and build them and also for those who maintain and operate them. Information on ice, waves and wind in the Northwest Atlantic is required, as also is knowledge of how these complex elements interact and the extremes that they may attain. Industry must know with some degree of precision what environmental conditions are to be anticipated in a particular drilling area, if rigs are to be designed or chartered to meet these conditions. Forecast procedures must also be so developed that accurate warning of approaching environmental hazards, which may require timely precautionary measures, is given to those in charge of operations. Some areas of offshore oil exploration, such as the North Sea, have been subjected to years of sedulous environmental mapping and the data required for analysis and estimation of normal and extreme conditions are relatively well documented and readily available. The region off eastern Canada is more isolated; the data are comparatively sparse and not always reliable, and prediction, particularly of the path of an iceberg, is uncertain. Uncertain, too, are the permutations and combinations of wind, waves, fog, and ice that leave little room for error in the performance of men and equipment. The characterization of environmental conditions is hampered, in some cases, by a technological gap in the capability of detecting, measuring and recording environmental phenomena. There is also no co-ordinated capability of interconnecting and standardizing available archive systems. It is the responsibility of the regulatory authority to know and to make known these conditions and of the drilling contractor who owns the rig and of the operator who seeks the permit to drill to be assured that the rig can cope safely with these conditions. It is therefore recommended:

**67.** That the regulatory authority document and publish a description of normal and extreme environmental conditions for the several offshore regions where drilling is being conducted or proposed. (*p. 32-33*)

**68.** That the collection of wave and climate data by government agencies be expanded in order that more adequate marine and atmospheric climatologies be developed for the offshore. (*p. 28-30*)

**69.** That government agencies in co-operation with industry:

(a) investigate the nature and effects of the interaction of wind, waves and currents at selected offshore sites; (*p. 30*)

(b) extend existing hindcast and the Canadian Forces Meteorological and Oceanographic Centre (METOC) based studies, exploiting fully the available data base to provide better coverage of the wave climate; (*p. 29-30*)

(c) develop wave models capable of dealing with the effects of shallow water and strong currents. (*p. 30*)

70. That government agencies accelerate research and development to improve the capability of equipment used for measurement of the characteristics of the wind and waves in the open sea. (*p. 30*)

71. That a co-ordinated archival and retrieval system of oceanographic and meteorological data be developed by government and industry. (*p. 32-33*)

72. That because of the large area for which environmental information is required and the great potential for contributions from the technology of remote sensing, consideration be given to accelerating the RADAR-SAT program and developing its capabilities to meet the needs of off-shore exploration activities. (*p. 31*)

73. That the accuracy of forecasts of weather and sea states, especially beyond 48 hours and for mesoscale phenomena, be improved through:

- (a) research into the physics of mesoscale phenomena; (*p. 32*)
- (b) an expansion of the program for collecting real-time observation data; (*p. 31*)
- (c) a re-assessment of the data required to be collected by industry and of the locations where the data is collected; (*p. 31*)
- (d) a requirement for private forecasting companies to conduct forecast verification in a manner consistent and comparable with that of the Atmospheric Environment Service (AES). (*p. 32*)

74. That the mode of forecast presentation to those on the rig and the training of operations personnel in the interpretation of the forecasted weather and sea state be improved. (*p. 32*)

A critical feature of "ice management" is the surveillance system to provide early warning. Growlers and bergy bits are difficult to detect under certain weather conditions; their motions during high sea states are unknown as are the forces generated and the potential damage of impact. It is therefore recommended:

75. That industry and government agencies:

- (a) accelerate their efforts to improve the capability of detecting icebergs; (*p. 26*)
- (b) develop more reliable methods of predicting their speed and direction; (*p. 27*)
- (c) increase research into equipment and techniques for changing trajectories of icebergs;
- (d) undertake research into the impact of ice, especially growlers and bergy bits, upon MODUs. (*p. 27, 47*)

Icing can create hazardous working conditions on exposed surfaces and can hamper the operation of support vessels, fast rescue craft and evacuation systems. If severe, it may reduce the stability of the drilling rig. It is therefore recommended:

76. That research be undertaken into the physics and climatology of icing and into the development of methods for forecasting its severity and monitoring its accretion. (*p. 27-28*)

Adequate knowledge of the sea floor and subfloor is essential in order to determine whether "punch-through" or other problems exist at the drill site for jack-up drilling rigs. It has been the practice to take borehole samples before locating a jack-up and that procedure has been included in a "Notice to Operators". To endorse this proposal, it is recommended:

77. That before locating a jack-up drilling rig, the operator be required to make a borehole sampling survey of the proposed site. (*p. 30-31*)



## REGULATORY CONTROL

The *Convention on the Continental Shelf, Geneva, 1958* recognized the jurisdiction of a Coastal State over mineral exploration and exploitation on its continental shelf and, in exercise of that jurisdiction, the United States, the United Kingdom and Norway have each enacted a Continental Shelf Act. They also passed legislation to extend their domestic law to these offshore activities. Canada ratified the *1958 Continental Shelf Convention* in 1974 but has not yet enacted a continental shelf act. To regulate exploration and exploitation of hydrocarbon resources on its continental shelf and to subject these activities to all rights, duties and obligations under the law as if they were conducted on land, a state needs to extend its domestic law to these activities. Canada has an additional juridical complication in that regard in that, under her constitution, both federal and provincial legislatures have specific and exclusive legislative powers. It is recommended:

78. That early action be taken to enact a continental shelf act and/or other necessary legislation to extend the application of appropriate Canadian law, federal and, by adoption, provincial, to offshore oil and gas activities. (p. 131, 136)

Although Canada has ratified the *1958 Continental Shelf Convention*, there is one limitation imposed by it that requires special consideration. Article V provides that the Coastal State may establish safety zones to a distance of 500 metres around offshore drilling installations, except where interference may be caused in essential recognized sea lanes. Canada has incorporated the 500-metre rule in her regulations except for rigs moored by anchors. In these cases the safety zone has been defined to be 50 metres beyond the anchor pattern. In adopting the 50-metre rule, Canada, like Norway, has exceeded the *Convention*. Neither zone is adequate because of the size, speed and lack of manoeuvrability of many modern vessels. Canada should determine what the zone should be under the environmental conditions offshore and, like the United Kingdom, declare that zone to be an area of her jurisdiction. The enactment and enforcement of legislation preventing pollution in the waters of her northern archipelago is a precedent for her taking such an action. It is recommended:

79. That Canada establish the safety zone to be of at least 500 metres outward from the perimeter of the anchoring pattern of moored drilling rigs or, preferably, determine what an appropriate safety zone should be under the environmental and other conditions of the Northwest Atlantic and declare it to be an area of her jurisdiction. (p. 130)

The extension of Canadian law to the continental shelf will end some of the uncertainties that exist, such as the application of the Criminal Code to an owner of a drilling rig of non-Canadian registry, but it is not a panacea to end them all. Where existing laws are deficient for the regulation of offshore drilling activities, extending their application offshore will not improve the legal framework within which the industry operates. The *Canada Shipping Act*, for example, and the regulations made under its authority are designed for conventional ships and not for semi-submersibles and jack-ups. It is not appropriate to stretch the application of existing law to drilling rigs by defining a jack-up rig, for example, to be a ship. What is really needed is the recognition, as classification societies of necessity have done, of semi-submersibles and jack-ups as *sui generis* and the enactment of a comprehensive statute specifically related to them and to the varied aspects of offshore drilling including the standby role of vessels and the rescue role of the helicopters under contract to the industry. It is therefore recommended:

**80.** That there be enacted an omnibus act specific to MODUs, and to the varied aspects of their drilling operations, including the standby role of vessels and the rescue role of the helicopters under contract to the industry. (p. 131)

One of the basic purposes of the regulatory process is to provide a framework within which the offshore industry can function with full and timely knowledge of the rules applicable at any given time. The nature of the Canadian mode of regulating the offshore is less developed than that of other jurisdictions examined. Without the extension of her general body of laws offshore, Canada has relied primarily upon the *Oil and Gas Production and Conservation Act* which is as applicable offshore as on land. Regulations issued under that statute have been rather modest in number and in the extent of their application. The drafting and promulgation of regulations are subjected to an unconscionably lengthy process with a consequent loss of flexibility. The prime instrument of control has been the application-permit process and stipulations in that process are being used instead of regulations and guidance notes. Indeed, instructions are often issued by word of mouth, telex, letter or other means. It is consequently difficult for industry to discover what controls are, in fact, being enforced. The application of law and regulations becomes a private matter between the regulator and the operator. An operator needs to know clearly the requirements which he and the other operators are expected to observe. These requirements, expressed primarily in regulations and explanatory guidance notes, need to be flexible to be responsive to changing technology but also to possess the level of certainty required by those who are regulated. It is therefore recommended:

**81.** That

(a) more extensive regulations and guidance notes be developed.  
(p. 136-137)

(b) insofar as it is practical, regulations be framed in terms of principles, performance standards and criteria, which, supplemented with a comprehensive body of guidance notes, are made available in a consolidated form. (p. 134)

A small committee of approximately twelve members selected by reason of their expert knowledge from other government agencies would provide technical knowledge beyond the capability of any one department to the single regulatory agency recommended in Recommendation 86. It is recommended:

**82.** That an intergovernmental technical advisory committee be established, consisting of recognized specialists from government departments and agencies, to assist in the formulation of the regulations and guidance notes referred to in Recommendation 81. (p. 139)

It is highly desirable that industry participate in the formulation of regulations and guidelines because of the complex, changing and often highly technical nature of the subject matter and because of the recognized experience, knowledge and interest of industry. If the regulatory agency were to be capable of unilaterally drafting regulatory instruments, it would need a large infrastructure with an intimate and extensive knowledge of technical requirements. It is axiomatic that the compliance of industry with rules and regulations will be enhanced through participation in the formulation of regulatory instruments. The offshore industry, however, is more than the operating oil companies; it embraces a complex of service companies under contract to the operators. These service companies have their own associations and their arguments cannot reasonably be denied that, when matters affecting their direct interests are being negotiated between the regulator and the operator, they should participate. Canada, alone of the countries under review, has no statutory requirement for consultation with industry, though in recent years informal discussions have taken place

and efforts have been made to obtain the concurrence of industry with new regulations and their advice on new standards. It is recommended:

**83.** That in the formulation of the regulations and guidance notes mentioned in Recommendation 81, the regulatory agency be required by statute to consult regularly with the associations of those affected by the regulatory requirements. (p. 140-142)

It is generally recognized that there are certain areas such as industrial training where industry will know best what standard is necessary for competent performance or where standards determined by external agencies are the best to be adopted. Where the practice of utilizing external standards is followed, the association of operating companies develops guidelines for its members and the regulatory agency accepts and monitors them. It is therefore recommended:

**84.** That where industry associations have the recognized knowledge, interest and commitment, their guidelines setting forth standards to be observed by their members be reviewed, accepted and monitored by the regulatory agency. (p. 140, 142)

Since MODUs operate in an international market, international rules and conventions have evolved. The International Maritime Organization (IMO) endeavours to create order out of a medley of conflicting requirements of member states and to establish common standards for marine safety, pollution and navigation. Canada should continue vigorously to support IMO. But IMO has no legislative or regulatory power. Its conventions and its codes, which are the product of prolonged negotiations, are the maximum requirement upon which agreement can be reached, though in fact they may be regarded by an individual state as a minimum base for its control system. It is recommended:

**85.** That Canada, in developing its regulatory requirements, endorse and comply with the International Maritime Organization's *Code for the Construction and Equipment of Mobile Offshore Drilling Units* but supplement it with new or revised requirements to meet her needs and draw upon and adapt to her needs the research and experience of other states. (p. 49)

In the formulation of policies for offshore oil operations, in the devising of regulatory instruments and in the enforcement of control, each state under comparative review accepts in principle the desirability of concentrating responsibility for safety in as few regulatory bodies as possible. What organizational structure will evolve for eastern Canada after the signing of the *Atlantic Accord* and after the recommended extension of Canadian domestic law to offshore oil operations is yet unknown. It is instructive to note, however, the general trend towards a lead agency, if not a "single window", for regulatory purposes. The United Kingdom has adopted the single agency approach in allocating full responsibility to the Department of Energy, and Norway has initiated the process of moving full responsibility to the Petroleum Directorate. In this way competing jurisdictions, administrative overlaps and lack of co-ordinated, consistent policy are diminished. In Canada the principle of a single window approach was adopted with the establishment of the Canada Oil and Gas Lands Administration (COGLA). It is recommended:

**86.** That Canada maintain the approach of a single regulatory agency, in concept and in practice, in exercising regulatory control over MODUs and the varied aspects of their drilling operations including the standby role of vessels and the rescue role of helicopters under contract to industry. (p. 131, 139-140)



A device common to all jurisdictions under review to ameliorate jurisdictional jealousies, administrative overlaps and lack of co-ordination is the Memorandum of Understanding negotiated between the lead agency or single window agency and another department or agency. Through this device, authority, responsibility and, in some cases, personnel are transferred to the single regulatory agency as, for example, in the United Kingdom, responsibility for health and safety inspection offshore was transferred to the Department of Energy. In Canada, the Memorandum of Understanding has been used for transferring powers in the reverse direction, as, for example, the empowering of the Canadian Coast Guard, through delegation from COGLA, to undertake certain functions that would otherwise be outside their jurisdiction. It is suggested that this practice be reversed. If the single regulatory agency referred to in Recommendation 86 is to have the authority and capability to exercise fully the responsibilities envisaged for it in Recommendation 80, then powers, and in some cases personnel, will need to be transferred to it. It is recommended:

**87.** That powers and, where necessary, personnel be transferred by Memoranda of Understanding to the single regulatory agency from other line departments and government agencies so that it can exercise fully and effectively its responsibility for safety of MODUs and the varied aspects of their drilling operations including the standby role of vessels and the rescue role of helicopters under contract to industry. (p. 140)

The combination of responsibility in a single agency for regulating both the production of oil and gas and the safety of operations has the inherent risk that, in the drive for energy self-sufficiency, particularly under conditions of economic stress, the price to be paid for accelerated production may be a lowered level of safety. What is required within the single agency to offset this risk is a distinct, co-equal branch under a senior manager, responsible, *inter alia*, for the collection and analysis of safety data, for the formulation of safety standards and for the approving and monitoring of safety standards related to offshore oil operations. It is recommended:

**88.** That a Safety Branch of co-equal status and under a senior manager be established within the single regulatory agency with responsibility, *inter alia*, for the development, application and monitoring of safety standards and for the analysis of safety data. (p. 140)

Accurate and timely data are essential to the formulation and implementation of any sound regulatory policy. Any significant event, including the failure of a safety system from which there is a lesson to be learned, should be accurately and promptly reported, carefully analysed and information about it disseminated throughout the industry.

In Report One it was recommended that information on the occurrences of significant events as defined by the appropriate regulatory authority be collected, systematically analysed and disseminated and that the definition of what constitutes a significant event be more adequately defined by the regulatory authority in consultation with industry.

Current regulations require the immediate reporting of such significant events as loss of life, a missing person, or serious injury to a person, and operators are "urged to advise COGLA of action to be taken to prevent such incidents from recurring." Efforts are being made, in consultation with industry, to define more specifically what constitutes a significant event but the definition remains vague and imprecise. It is recommended:

**89.** That the information regarding significant events and all other information pertaining to human safety be standardized, the information be collected, collated and analysed by the proposed Safety Branch, and the results be disseminated to industry. (p. 66-67)

2.(a) "Inquire into, report upon and make recommendations with respect to the design, construction and stability of offshore drilling units and their suitability to conduct marine and drilling operations."

The fundamental question facing the regulatory authority pertaining to the safety of drilling operations on the continental shelf off eastern Canada is the suitability of the proposed drilling rig to operate under the complex environmental conditions that prevail there. The suitability of a rig for operations off eastern Canada will depend upon many variables. They centre around the physical integrity of the rig, the operability of its critical systems, and the quality of the management and of the crew. All three focal areas need to be investigated but there is also a need for an overall assessment of the rig as an operating entity, the soundness and stability of the structure, and the smooth integration of its systems.

At present all drilling rigs operating offshore are required to comply with the *Interim Standards Respecting Mobile Offshore Drilling Units* and the provisions of the *Canada Oil and Gas Drilling Regulations*. The assessment against the *Interim Standards* is performed by the Canadian Coast Guard who issue a Letter of Compliance, and against the *Drilling Regulations*, by COGLA who issue the Permit to Drill. The emphasis in both cases is upon the physical integrity of the rig. In the United Kingdom the assessment of the rig against the requirements of the Department of Energy has been performed in all instances to date by a classification society which issues a *Certificate of Fitness*. The classification societies are ideally suited for this responsibility by reason of their long experience with floating structures, their storehouse of statistical data and their extensive research facilities. But in the United Kingdom also, the certification process is limited to the physical integrity of the rig.

What is needed for an overall assessment of the suitability of a rig is a formal safety audit or approval process to assess and report on the physical integrity and stability of the rig, the operability of its critical systems, the procedures governing their operations and the rig, and the qualifications and competence of the crew to operate it safely.

Since the owner needs a reasonable assurance that his rig would be permitted to operate on the Canadian Continental Shelf, the major portion of the assessment of the rig should be undertaken before it is committed to a drilling program there. That portion should include an assessment of its physical integrity, performed preferably by a classification society. That assessment, together with supporting documentation, would be made available for examination by a safety audit team of qualified and experienced persons selected by the owner but approved by the regulatory authority. The safety audit team would also review critically, *inter alia*, all operational documents of the rig, the operational and emergency procedures manual, the operational history of inspections and modifications, the preventive maintenance program and maintenance logs, the crew training program, the personnel qualification requirements and administrative procedures. They would also review critical systems individually and as an integrated system. An inspection of the rig, interviews with members of the crew and consultation with the owner would follow. A report would then be made to the owner and to the regulatory authority, identifying any feature which might preclude or unduly inhibit the safe operation of the rig under foreseeable circumstances and recommending any necessary remedial action. The latter portion of the audit would take place after the rig is on the Canadian Continental Shelf to confirm that any deficiencies previously noted had been remedied and to give assurance that approved procedures are being followed by a competent, qualified crew. Upon receipt of a favourable report from the safety audit team, approval would be given by the regulatory authority. It is therefore recommended:

90. That in addition to any specific requirements deemed necessary, the regulatory authority establish performance standards as recommended in Recommendation 81 against which the operational safety of drilling rigs can be assessed. (p. 49-53)

**91. That**

(a) the assessment be carried out by way of a safety audit or approval process consisting of three phases: (1) an assessment of the physical integrity and stability of the rig, (2) an evaluation of the operability of its critical systems and their interrelationships, and (3) an assessment of the qualifications and competence of the crew.

(b) phase one of the safety audit or approval process, namely an assessment of the physical integrity and stability of the rig, be carried out preferably by a classification society.

(c) phases two and three of the safety audit or approval process, namely an evaluation of the operability of the critical systems of the rig and of the competence of its crew, be conducted by experienced, qualified persons appointed by the owner of the rig and approved by the regulatory authority.

(d) the assessment of the physical integrity and stability of the rig and evaluation of the critical systems, their operability and integration take place before the commencement of drilling operations in Canadian waters and an assessment of the competence of the crew within two months after the commencement of operations.

(e) upon the acceptance and approval of the first report of the safety auditors on the operational safety of the rig, the regulatory authority issue an approval subject to the receipt and approval of the safety audit report on the competence and qualifications of the crew and compliance with any conditions that may have been attached to the conditional approval to drill. (p. 49-53)

(f) other audits be conducted, the depth and timing of which would be dictated by the outcome of the initial audit, the occurrence of significant events or the proposed transfer of the unit to a location of greater environmental hazards.

Classification societies and regulatory authorities apply empirical rules to assess the stability of a drilling rig. Mathematical and analytical methods may be used though they are not universally accepted. Research to develop more accurate methods of assessing stability is needed as is also the practical testing of the results of that research to compare the predicted with the actual behaviour of the rig. It is recommended:

**92.** That there be carried out on selected operating drilling rigs full-scale real-time measurements of the environmental conditions and the response of the rigs to those conditions for comparison with predicted behaviour. (p. 42)

Recent surveys by a major oil company disclosed flaws that should have been discovered through rigorous inspections during construction. Questions consequently arise regarding the quantity and quality of inspections carried out during the construction process. It is recommended:

**93.** That a critical assessment be made of the quality control inspections and the testing required during the construction of drilling rigs. (p. 40, 43)

When ice is threatening or when some of the anchor cables part in a storm, a drilling rig may be required to release its moorings at short notice. Drilling rigs in Canadian waters are required to have quick-release mooring systems, but there are no required standards and there is evidence that not all systems are reliable. It is recommended:

**94.** That performance standards for emergency release of moored drilling rigs within a specified time be established and that the reliability of the release system be tested for each drilling location. (p. 26)



The jack-up is the type of drilling rig most susceptible to damage. Jack-ups are particularly vulnerable to damage during transit. While afloat and while being transported on barges, they have suffered structural damage. It is recommended:

**95.** That the regulatory authority undertake a critical review of the structural, stability and inspection requirements for jack-up drilling rigs, particularly during and following transits. (p. 47)

Critical systems, that is those systems deemed to be of crucial importance for the safety of the rig, have not been clearly designated nor do they need to be the same for every drilling rig. It is recommended:

**96.** That the regulatory authority, in consultation with industry, identify for each drilling rig offshore those systems which are critical for its safety and the safety of its crew. (p. 49, 50, Appendix C, Item 3)

While existing Canadian rules provide in general an acceptable level of intact stability, the rules governing damage stability do not adequately provide for damage to floodable compartments below the waterline, for the weatherproofing of downflooding openings and for the protection, from the action of waves, of vents and of other features which may become downflooding openings, if they are damaged. The existing requirement for waterline damage is that the inclination of the rig must not exceed 15 degrees after one compartment is flooded. Other jurisdictions have different requirements, but experience has indicated that the one-compartment test is adequate. Damage resulting in flooding may, however, occur to compartments below the waterline. These compartments should be included in the damage stability calculations and provision made for redundancy of operation of any critical system contained therein. The capsizing of the *Ocean Ranger* is an object lesson in the need for weatherproofing of downflooding openings. It is recommended:

**97.** That to prevent downflooding due to the dynamic effect of waves and the rig's motions, weather-tight closures be required on any downflooding opening within a fixed distance above the waterline after damage. (p. 46-47)

**98.** That where the stability requirements are met by a buoyant deck structure there be appropriate protection for the loss of that buoyancy as a result of wave impact in the damaged condition. (p. 46-47)

**99.** That in calculating damage stability, allowance be made for the flooding of any one compartment adjacent to the sea, provided the compartments which are normally full in a given operating condition need not be considered in the calculation. (p. 46-47)

**100.** That critical systems contained in compartments adjacent to the sea be required to be operable in the damaged condition including the flooding of those compartments, or that provision be made for redundancy. (p. 46-47)

Damage stability requirements reflect the view that damage to a drilling rig by external impact will generally occur at or near the waterline on the outer periphery. These requirements do not address the possibility of damage to the inner periphery of the rig, even below the waterline, by relatively small pieces of ice which, undetected and driven by large waves, may enter this area and cause substantial damage. There is insufficient knowledge of ice and its behaviour in high sea states and research is needed. It is recommended:

**101.** That the adequacy of structural and damage stability requirements for drilling rigs be reviewed upon completion of research into ice impact damage. (p. 27, 47)

**2.(b) "Inquire into, report upon and make recommendations with respect to inspection, inspection procedures, licensing classification and certification pertaining to the conduct of marine drilling operations."**

In Report One, Recommendations 13 to 21 inclusive relate to this Term of Reference. They have either been acted upon or are under active consideration by the appropriate government agency. In this final report recommendations are made for the establishment of principles, performance standards and criteria (Recommendation 81); for a comprehensive safety audit of the rig as an integrated operating unit to be carried out against these principles, performance standards and criteria leading to a certificate of approval (Recommendation 91); for the endorsement and monitoring of industry's guidelines drawn up for the benefit of its members (Recommendation 84); and for the collection and dissemination of information regarding significant events (Recommendation 89).

The mode of ensuring compliance with or of exacting adherence to rules and regulations depends upon the objectives of the regulator, the specific nature of the regulation and the responsibility and the accountability of the operator and service contractor. It will depend on whether the objective is to monitor or to police; to seek assurance of suitability for safety or to assess blame; to develop sensitive attitudes and shared responsibility for safety or to ensure strict adherence to the law. Surely, the objective of the regulator and the regulatory system is to monitor, to assure safety, to develop a shared responsibility for safety and to impose penalties in the event of failure. The mode of ensuring compliance depends upon whether the regulations are specific and detailed or general and based upon standards acceptable to the regulator. Where they are specific and detailed, the role of the inspector, which is virtually completing a check list, requires limited special knowledge or experience. Where recognized performance standards are called for and particularly where they are unspecified but, as at present in Canada, must be acceptable to the Chief Conservation Officer, a much higher level of judgment and of experience is required. It is recommended:

**102.** That within the single regulatory agency there be developed a capable Inspection Service to assure compliance with regulatory requirements of performance and that inspectors, where necessary, be transferred to it from line departments or other government agencies. (*p. 142*)

In a country with a nascent offshore oil industry there is a distinct shortage of persons qualified for the inspectorate envisaged in the previous recommendation. Consequently, it is not uncommon to engage external agencies such as classification societies; to employ, under contract, knowledgeable and experienced persons to certify compliance; or to attempt to recruit suitably qualified persons to ensure compliance with the regulatory requirements. Whatever the mode adopted, it is recommended:

**103.** That where external agencies or contracted experts are engaged to ensure compliance with regulatory requirements, they do so on condition that they assume full responsibility for the accuracy of their reports.

The importance of establishing a very clear understanding of the responsibility and accountability of each of the parties involved in offshore petroleum activity under Canadian jurisdiction cannot be overemphasized. The increasing complexity of the industry has led to an organizational arrangement that fosters a dilution and diffusion of responsibility and accountability. There should be no confusion regarding the responsibility and the accountability of the drilling contractor and of the operator. The drilling contractor should unequivocally be responsible for the integrity of his rig and accountable for its safe operation. The operator should legally be accountable for all aspects of the operations under his permit. It is he who hires the MODU and from that fact he cannot escape responsibility for its quality and its performance. It is recommended:

**104. That**

- (a) every effort be made to enforce the responsibility and accountability of the drilling contractor for the physical integrity of his rig, the operability of its critical systems, the quality of its management and the competence of its crew. (p. 53)
- (b) the operator be held responsible and accountable for the integrity and safety of services provided to him under contract in the execution of his drilling program. (p. 53)

In the final analysis government agencies enforce compliance through penalties ranging from minor fines to cancellation of permits. In Canada where extension of domestic law to the continental shelf has not yet taken place, the *Oil and Gas Production and Conservation Act* specifies few offences, provides a limited range of penalties and gives wide discretionary powers to the Chief Conservation Officer. The penalties range from the discretionary to the draconian and are rarely imposed. It is recommended:

**105.** That a range of penalties be provided for failure to comply with regulatory requirements and the severity of penalties reflect the significance of the non-compliance. (p. 143)

The *Oil and Gas Production and Conservation Act* and the regulations issued under its authority confer unusually wide discretionary powers on the Chief Conservation Officer who is the head of the regulatory agency, both in the application of regulations, and in determining penalties for non-compliance. He has the authority even to suspend or dispense with the application of existing regulations. This situation results from the practice of using stipulations rather than regulations in the permit negotiation as the means of exercising mandatory controls. This system contains two inherent defects: it confers undue discretionary power on one statutory officer who is not even an elected minister and, through reliance on the provisions of the permit, it provides no graduated scheme of penalties. The need for a graduated scheme of penalties is covered in Recommendation 105, but for greater certainty and to avoid any suggestion of discriminatory treatment, it is recommended:

**106. That**

- (a) the powers of the head of the regulatory agency be circumscribed and greater reliance placed upon published regulations and guidance notes as recommended in Recommendation 81. (p. 137, 143)
- (b) provision be made in the legislation for an appeal to the minister by any person affected by a discretionary decision of the head of the regulatory agency.

**EVACUATION SYSTEMS**

**2.(c) "Inquire into, report upon and make recommendations with respect to all aspects of safety of life at sea."**

The lifesaving equipment for evacuating a drilling rig into the sea includes enclosed fibreglass lifeboats, inflatable life rafts and abandonment suits; of these, lifeboats are the primary means. To conclude that they are inadequate as a means of evacuation from a drilling rig in a severe storm is to state the obvious. In Report One it was recommended that utmost priority be given by Canadian authorities to the development of an improved evacuation system which would provide adequate and safe means of escape in foreseeable emergency and storm conditions.

Industry, through the Offshore Operators Division of the Canadian Petroleum Association, has indicated its interest in the development of a safe evacuation system. Government is arranging a survey of existing and newly-conceived evacuation systems and has expressed the intention of encouraging research into new systems and their testing. The Canadian Coast Guard has been appointed to co-ordinate the



research and, eventually, field test the systems. What is required is concerted action and without delay. The solution may not necessarily be a redesigned lifeboat; it may be a radically new concept. Performance standards should be established for evacuation systems and incentives devised for their development and installation. In the meantime, improvements should be made in the existing system. It is recommended:

**107. That**

- (a) government and industry without delay establish performance standards and initiate a joint major engineering development project to produce a safe primary evacuation system for offshore drilling rigs. (p. 104-105)
- (b) during the intervening period, it be a condition of the right to drill that existing primary evacuation systems be improved or replaced so as to improve materially their capability to evacuate the crew. (p. 97-101)

Life rafts, although not a desirable means of evacuation, may, under a given set of circumstances, be the only one available. In Report One it was recommended that life rafts on drilling units be davit launched. There are doubts about their stability and endurance in storm conditions and it is evident that they are not designed to be entered readily from the sea by persons wearing abandonment suits. It is therefore recommended:

- 108. That** the standards for davit-launched life rafts be reviewed in order to determine their adequacy with particular respect to stability, method of construction and joining, and means of entry into them from the sea. (p. 102-103)

A joint government/industry committee has been organized under the direction of the Canadian Standards Association to develop standards for abandonment suits. In support of this worthy initiative, it is recommended:

- 109. That** there be included, *inter alia*, in the standards for all types of abandonment suits, requirements for a greater number of sizes, improved neck seals, the use of radar-reflecting materials, strobe lights and personal locator beacons, the protection of the user's face from breaking waves, grips or other means to facilitate recovery, some form of head protection and the flotation of the wearer in an upright position. (p. 103)

There are no standard procedures or testing methods available to inspectors for ensuring that life jackets or abandonment suits continue to comply with performance standards such as buoyancy or thermal characteristics. It is recommended:

- 110. That** the regulatory authority develop effective inspection and testing procedures for personal safety equipment.

## RESCUE

Canadian regulations require that there be a standby vessel for each drilling rig operating on the continental shelf. Guidelines now state that it should keep station no more than one nautical mile from its drilling unit or at a distance such that the time for return to the drilling unit does not exceed 20 minutes. If helicopters, because of either weather or distance, cannot assist in evacuation, the standby vessel by reason of its proximity is the first source of rescue, but it has not been designed for a rescue role. Canadian regulations require a "suitable" standby vessel but suitability has not been defined. In Report One it was recommended that there be an immediate assessment of the capability and suitability of standby vessels used offshore eastern Canada. By late 1984 all but 7 of the 56 standby vessels were deemed to be suitable and a

Letter of Compliance was issued by the Coast Guard. In April 1985, information was received that COGLA and the Coast Guard, in consultation with industry, are developing criteria of suitability and that the Coast Guard would assess the standby vessels against these criteria. What criteria had been used in late 1984 is not known. While purpose-built rescue vessels may not be justified during the exploration phase, consideration should be given to what the production phase may warrant. It is recommended:

- 111.** That the regulatory authority publish performance standards which determine the characteristics, equipment and supplies required for a vessel to qualify as a suitable standby vessel. (*p. 112-113*)

The Letter of Compliance issued by the Canadian Coast Guard for standby vessels, includes the provision of a "suitable launch/recovery system" for fast rescue craft (FRC) but there are no standards for that equipment. Masters of standby vessels have complained about the dangers of launching and recovering FRCs. If safely launched, they are the best available means for recovering persons from the sea, but their use may be restricted by an inadequate, improperly located launching system, and by "dead time" in the water until the motors are started. It is recommended:

**112.** That

- (a) the regulatory authority develop performance standards which determine the characteristics of a suitable launching/recovery system for fast rescue craft. (*p. 112-113*)
- (b) fast rescue craft be required to have engines which can be started and warmed up out of the water.

Effective rescue operations by standby vessels require a high degree of skill on the part of the entire crew who need to be of sufficient number for the varied duties to be performed. To this end, training in the use of FRC and other rescue equipment is needed for all members of the crew, both through courses and through regular exercises at sea. It is therefore recommended:

**113.** That

- (a) the crew of a standby vessel be thoroughly trained as a rescue team, both through courses and through documented, frequent and regular exercises at sea and that each member of the crew receive, in addition, specialized training for assigned emergency duties.
- (b) the number of crew members be sufficient to perform the varied duties required for rescue and treatment of survivors in the event of a disaster. (*p. 87, 112-113*)

Since 1982 commercial helicopters serving the drilling rigs have been upgraded. They have been equipped for hoists, Billy Pugh baskets and emergency multiple person rescue apparatus (EMPRA) and the crews trained in their use. They can also drop SEA kits. Hoists can be installed within 20 minutes. The rescue baskets are used to recover from the ocean persons who can help themselves. There are, however, no rescue technicians to aid the helpless. In the event of a major disaster these helicopters would be expected to perform a secondary search and rescue (SAR) role to supplement the rescue efforts of the helicopters specified in Recommendation 120. It is therefore recommended:

- 114.** That helicopters under contract to the industry be equipped and available for rescue services in a secondary role; the crews be specially trained for that purpose and hoist operators and rescue technicians be readily available. (*p. 114*)

Industry has exceeded regulatory requirements in the area of emergency response in the creation of a series of multilateral agreements between the operating

oil companies to provide for integration of contingency planning, for common procedures for action, and for the elimination of road blocks to joint action. It is unfortunate that there has not been closer collaboration with government in the development of common policies. Steps have now been taken by industry and government to test the effectiveness of the system and to train, through exercises, key personnel in their essential roles under emergency conditions. It is recommended:

**115. That**

- (a) government work closely with the industry in the development of an effective emergency response. (*p. 114*)
- (b) realistic exercises be regularly held to test the effectiveness of the proposed response system and to train key personnel both at the drilling sites and on shore in the roles that would be thrust upon them in the event of a disaster. (*p. 114*)
- (c) planning by government SAR personnel and the industry for search and rescue requirements for the production phase of oil and gas offshore begin forthwith.

The final responsibility for rescue is that of the state. That responsibility is exercised in Canada by the federal government. To examine critically the effectiveness of the search and rescue program in any part of the country requires an examination of the whole for it is only in the context of the whole, its guiding principles and mode of operations, that the quality and adequacy of the service in the part can be judged. The prime objective of federal SAR is to aid persons involved in air and marine incidents within the area of Canadian responsibility. It was in relation to that objective that facilities and resources have been acquired and deployed. No conscious deliberate attempt was made to extend SAR capability to the offshore where drilling now takes place. Supplementary resources for this purpose will be required. With few exceptions, neither the vessels nor the aircraft designated for primary SAR roles were designed for that specific purpose; rather, they were intended to serve the operational needs of the Department of National Defence and the Canadian Coast Guard. Levels of service have not been established nor criteria determined as a basis for evaluating the quality of service rendered. The result is that what has been delivered has been a set of discrete search and rescue activities provided by two separate departments rather than an integrated program developed to provide an adequate and timely response in the event of an emergency.

Much has been accomplished in the past decade but the stubborn fact remains that there is no single functioning agency with the mandate to knit together the several components into a comprehensive national SAR program. To that end, what is required is a distinct integrated structure under a lead minister who is not otherwise directly involved in providing search and rescue services from his departmental resources, and with managers who have no conflict of interest between departmental obligations and their SAR responsibilities. What is required is a co-ordinated program with a discrete budget that is a distinct element of the appropriate financial envelope. SAR requirements would then be assessed within the context of search and rescue policies; SAR vessels, helicopters, equipment and facilities would be assessed primarily in terms of their suitability for search and rescue functions and not be acquired for other purposes and then adapted to SAR functions. It is therefore recommended:

**116. That**

- (a) a national SAR program be established with a distinct integrated structure: a co-ordinated program with a discrete budget as a distinct element of the appropriate financial envelope, under a lead minister who is not otherwise directly involved in providing search and rescue services and with managers who also have no inherent conflict of interest between their departmental operational obligations and their SAR responsibilities. (*p. 122*)
- (b) search and rescue requirements be assessed within the context of search and rescue policies and SAR vessels and helicopters be assessed primarily in terms of their suitability for SAR functions.
- (c) levels of search and rescue service be established.

It cannot be denied that accurate and continuing analysis of SAR incidents is essential for comprehensive planning, for formulating policy and deploying resources, for properly assessing and determining operational requirements and for guidance. An appropriate weighting system should be devised for the concentration of SAR-related incidents and for the concentration of marine activities and clients in order to assess the hazard to life associated with each incident. Adequate statistical data have not been assembled, correlated and analysed nor have sophisticated resources been made available for that purpose. It is recommended:

**117. That a management information system be developed as a basis for the formulation of SAR policies, the assessment of SAR needs and the rational deployment of SAR resources. (*p. 119-120*)**

The direction and co-ordination of search and rescue operations in the event of a major disaster require first-class facilities and sophisticated equipment as provided at Stavanger, Norway. These functions are performed within each region by the Rescue Co-ordination Centre. It is recommended:

**118. That the Rescue Co-ordination Centre on the East Coast of Canada be fully equipped to the extent that modern technology permits.**

The Canadian Coast Guard's primary SAR vessels have the same drawbacks as the standby vessels under contract to industry but they are not as fully equipped nor do their crews have either Basic Offshore Training (BOT) or Basic Offshore Survival Training (BOST), nor special training in rescue techniques. It is recommended:

**119. That the suitability of the Coast Guard's primary SAR vessels be critically reviewed and also the training of their crews in rescue techniques. (*p. 118*)**

As stated above, serious consideration has not been given to developing a search and rescue capability for the far offshore. Government search and rescue helicopters completed their capability update program (SARCUP) in June of 1984. Proponents say the Labrador/Voyageurs have thereby been made as good as new. They are, however, still 20-year old machines and lack much of the technological development achieved during that period. They have a relatively short endurance and lack auto-hover capability and other equipment needed for marine rescue operations. The auto-hover capacity would allow them to maintain a constant height above a moving surface, a capability which all helicopters involved in sea rescue operations ought to have. The Labrador/Voyageurs are therefore deemed to be unsuited for rescue operations offshore. Other more modern and longer-range helicopters that can be equipped with anti-icing equipment, auto-hover, direction-finding and homing equipment are available as are maintenance services. In the event of a major disaster offshore the helicopters under contract to the industry should be equipped to partici-



pate in rescue operations as stated in Recommendation 114. All helicopters involved in rescue operations should have auto-hover capability.

A federal SAR capability for the far offshore is also needed. For the Grand Banks, at least one long-range helicopter equipped to federal SAR standards should be provided by acquisition or by charter by the government for SAR purposes during the exploration phase; at least one for the Scotian Shelf and a third for the Labrador Sea while drilling is taking place. In the United Kingdom, a commercial helicopter is chartered by government for search and rescue purposes for the Shetland region. It is recommended:

**120. That**

- (a) as a matter of priority all helicopters which may be required to conduct rescue operations offshore be equipped to have auto-hover capability. (*p. 119, 124*)
- (b) for the Scotian Shelf, the government make available by acquisition or by charter at least one long-range helicopter, fully equipped to the extent that technology permits and manned to federal SAR standards to be dedicated full-time to a primary SAR role. (*p. 124*)
- (c) for the Grand Banks, the government make available by acquisition or by charter at least one long-range helicopter, fully equipped to the extent that technology permits and manned to federal SAR standards to be dedicated full-time to a primary SAR role, and another helicopter similarly equipped, manned and dedicated for the Labrador Sea while drilling takes place there. (*p. 124*)

The success or failure of response to an emergency will be primarily a function of the time taken to respond. In the United Kingdom and Norway the standby times are 15 minutes during daylight and 45 to 60 minutes otherwise. Canadian standby is 30 minutes during normal working hours and 2 hours otherwise. It is recommended:

**121. That the standby times of primary SAR helicopters be 15 minutes during daylight hours and 45 minutes at other times. (*p. 124*)**

**2.(d) "Inquire into, report upon and make recommendations with respect to all aspects of occupational health and safety."**

There is a noticeable lack, worldwide, of useful data on which to base any meaningful assessment of offshore health needs and services. It is recommended:

**122. That the regulatory authority take steps to establish a comprehensive data base that will provide timely, accurate and meaningful compilation and analysis of offshore accidents and illnesses. (*p. 83-84*)**

While the operator is responsible for health care of all offshore workers who are part of the drilling program, this responsibility has often been delegated to the service contractors. Different standards of service and methods of health care delivery have been used. In some cases, the screening provided by the pre-employment medical has been inadequate or inappropriate. It is recommended:

**123. That pre-employment medical examinations be required and the regulatory authority, in consultation with industry and its medical representatives, establish minimum standards for the content and scope of such medical examinations. (*p. 84, 85*)**

The operator is responsible for planning and providing all health services for the drilling rig and for the qualifications of the medic who delivers these services. While the rig medic may be an employee of the drilling contractor, his professional activities should be under the direction of the operator's medical director. The rig medic position at present can be filled by an emergency technician, an ex-military paramedic (TQ6B), or a registered nurse.

The qualifications and experience of an emergency technician are considered unsuitable for the rig medic position. While the military medic qualification provides an appropriate background, there is a very limited pool of TQ6Bs available. Registered nurses with experience and appropriate specialist training are generally available and are well qualified to act as rig medics. Further, a well-developed system of professional accreditation for nurses is in place. It is recommended:

**124.** That the minimum qualifications for a rig medic be a registered nurse designation, supplemented by experience in intensive care or emergency nursing. Under certain circumstances, an equivalent combination of training and experience may be accepted. (p. 87)

It has been indicated that the levels of medical and first-aid inventory are under review and that operators should ensure that inventories are maintained to their satisfaction and at levels appropriate for medical and first-aid treatment. Standards are required for medical equipment, supplies and drugs. It is recommended:

**125.** That the regulatory authority, in consultation with industry and its medical representatives, establish standards for the minimum levels and types of drugs, medical supplies and equipment to be available on board each drilling rig and standby vessel. (p. 86, 113)

A diver in trouble during a dive will have immediate assistance available only from another diver. It is important, therefore, that all divers receive considerable training in emergency first aid. A diving contractor employs a number of life-support technicians to maintain above-water equipment and to monitor dives. The rig medic is expected to be familiar with hyperbaric medicine, but, normally, it is the diver medical attendant who enters any pressurized chamber to assist an injured diver. Draft regulations do not provide details on the medical training and qualification requirements of support personnel during diving operations. There is an adequate shore-based hyperbaric medical facility in Nova Scotia but not in Newfoundland. It is recommended:

**126.** That

(a) *The Canada Oil and Gas Diving Regulations* (Draft) be promulgated without delay, and that they include training standards for diving support personnel, including positions providing life-support services to the divers. (p. 88)

(b) an adequate hyperbaric medical facility be established in Newfoundland. (p. 88)

The Canadian regime for the provision of health care services to offshore drilling operations is more complex than that of Norway or the United Kingdom because of the division of powers under the Canadian Constitution and the number of agencies involved. Responsibility for health within provincial boundaries rests constitutionally with the provincial legislature. A mechanism is needed to provide effective co-operation between both levels of government and with industry. It is therefore recommended:

**127.** That a joint federal-provincial committee on health be established consisting of medical representatives from both levels of government and from industry to consider and advise on all aspects of health care in offshore drilling operations. (p. 87)

2.(e) "Inquire into, report upon and make recommendations with respect to the certification, training and safety of the officers and the crew and their respective responsibilities including those of the master and toolpusher."

Crucial to safe operations offshore and to the reliable capacity of a crew to meet the unexpected are the competence of the crew and the confidence that they have in their training, in themselves and in their colleagues. Training standards need to be established and programs developed and approved to provide the required level of competence. A Joint Government-Industry Offshore Training Committee has been established to examine these issues. What is needed is an Offshore Petroleum Training Standards Board, established on a statutory basis with a relatively small membership drawn from persons with a first-hand understanding of offshore operations and from persons with special competence in training. The insight of workers having substantial experience ought also to be represented. The proposed board should be authorized to determine requirements for training offshore, to approve course requirements and training organizations and to determine equivalencies. Underlying all questions of training for safety in the offshore is the issue of reconciling the mixture of marine and industrial characteristics of operations. From this issue stems the questions of certification, of whose responsibility it is to determine standards, and of what positions should be certified.

The Offshore Operators Division of the Canadian Petroleum Association, in collaboration with the Canadian Association of Oilwell Drilling Contractors, has recently recommended minimum qualifications and training standards for all the basic tasks of the rotational crew of the drilling contractor. In early 1985, an inter-departmental working group of representatives from the Canadian Coast Guard, COGLA, and Employment and Immigration Canada issued a draft report proposing, *inter alia*, training requirements for MODU endorsements to marine certificates and also marine training requirements for senior industrial personnel. The proposed Board should co-ordinate these two proposals and be given the responsibility of approving all industrial training endorsements for marine positions on MODUs.

It is important to distinguish between certified positions and positions for which the minimum training requires certification of particular skills. A rig electrician for example, is required to have an *Industrial Electrician's Certificate*. For some positions industry specifies minimum qualifications for which there may not be associated certificates. A toolpusher is required to have training in well control, though there is no certificate for the position of toolpusher, there is an industrial certificate issued for well control training. Certificates give evidence of the possession of minimum requirements. It is the responsibility of the employer to determine whether the holder of the certificate is suited to a particular job. It is recommended:

**128. That**

- (a) an Offshore Petroleum Training Standards Board be established by statute composed of a few members among whom should be persons with first-hand knowledge of offshore operations, with special competence in training, and with the experience and insight of workers.
- (b) the Board be vested with the authority to establish training and qualifications standards, certification and recertification requirements, verification and audit measures, and the requirement for, and approval of, training institutions and facilities.
- (c) the Board establish and maintain a program of certification of training in those skills which are judged to be critical to safety, including the delineation of certificated skills required, if any, for each position, and the scope and the content of certificated specialist training.
- (d) the Board be assigned the responsibility to establish the requirements for and to approve all MODU endorsements of positions which are the subject of marine certification by the Canadian Coast Guard or its foreign equivalent. (p. 75-79)

There is general agreement that basic safety training is necessary for all full-time offshore workers. Industry would prefer this training to follow a period of employment on the rig because of the large turnover of employees and because of the greater benefit to be derived from the course after a period of experience. There is also some debate regarding the components of basic training and the degree to which emergency functions should be left to specialist teams. There is also a question of the basic training to be required for occasional workers. The question of the content of basic safety training is fundamental and should be addressed without delay by the regulatory authority and their decisions subject to subsequent review by the proposed Board. It is recommended:

**129.** That as an interim measure pending formation of the Offshore Petroleum Training Standards Board, the regulatory authority immediately establish uniform standards for basic safety and emergency training for regular and occasional offshore workers.

There are a number of emergency duties that are best carried out by trained specialist teams. These teams should include well control, ballast control, fire control, advanced first aid, lifeboat operations, helicopter landing, and man overboard. Special training should consist of initial training followed by regular and frequent drills by small cohesive groups. Familiarization with the specific drilling rig and its equipment is essential as are incentives to emphasize the importance of the teams and adequate time and resources for training. It is recommended:

**130.** That specialist emergency teams be established on each drilling rig and be highly trained. (*p. 76*)

Training, to be effective, must be realistic, of high quality and delivered by capable instructors with first-class equipment. Workers, as stated earlier, must not only be competent but also be confident in that competence, both their own and that of their fellow workers. It is therefore essential that training facilities of high quality be readily available. It is recommended:

**131.** That

(a) the regulatory authority ensure that programs and facilities of the highest order are available for basic safety training, for specialist training and for designated industrial and marine positions.

(b) the provision of this high quality training recognize the need: (1) for ease of access to basic safety training; (2) for specialist training, where required, to be concentrated in a single centre with research resources available; and (3) to avoid duplication of training resources. (*p. 78*)

The issue of who should be in command of the rig is obscured by the marine and military connotation of the word "command" and the differing practices adopted in other jurisdictions. In an industrial setting, it is normal to ask who is in charge. The person in overall charge of any enterprise normally delegates authority and responsibility for a specific aspect of the operation to the person who has the appropriate qualifications and experience. In like manner, when problems on an offshore drilling rig develop in controlling the well, the operator's senior representative takes charge of remedial action. When it is a marine-related problem, the master acts. When problems develop downhole in the drilling operation or because of malfunction of equipment, the toolpusher has charge of corrective action.

Whether the master or the toolpusher is the person appointed by the drilling contractor to be in overall charge of a semisubmersible varies with the country of registry, the corporate policies of the drilling contractor and the regulatory requirements of the Flag and the Coastal State. On those rigs organized on the Norwegian model, the master is in overall charge at all times; on those on the United States



model, the toolpusher is in charge while the rig is in the drilling mode. In Canada an interdepartmental working group composed of COGLA, Coast Guard, and Employment and Immigration Canada has recommended that there be at all times an offshore installation manager and has laid out career paths for both mariners and drillers to hold that appointment.

Emergencies may occur to a semisubmersible because of collision, loss of stability, storms, or industrial hazards such as loss of well control. What is essential is that, when emergencies occur, all members of the crew should know in advance from whom they are to take direction. When lives are at stake, there should be no question regarding who is in charge. One person should be clearly in charge of the rig at all times. The solution to be desired, and the one to be implemented as soon as it is feasible to do so, is to place in charge of the semisubmersible one who has knowledge and experience in both the drilling and marine aspects of the operation and who has the necessary leadership qualities. In support of the recommendation of the interdepartmental working group, it is therefore recommended:

**132. That**

- (a) the offshore installation manager be the person in charge of the semisubmersible at all times and he be knowledgeable and experienced in both drilling and marine matters. (p. 63)
- (b) within a fixed period of time, the person in command of a semisubmersible be so qualified.
- (c) consideration be given to a lesser requirement for the person in overall charge of a jack-up when it is fixed on location.
- (d) the master of a drill ship have a MODU endorsement of his master's ticket.

**2(l) "Inquire into, report upon and make recommendations with respect to any related matter."**

Offshore workers appear to be reluctant to voice their concerns. To the extent that concerns are related to safety there is need for some means not only of permitting worker participation in safety management but also of encouraging the practice. Provision should be made for the election of a representative by the workers, access by that representative to senior rig personnel and to regulatory inspectors and assurance of protection for his position. It is recommended:

**133. That each operator develop and submit for approval a "safety representative" process which ensures all workers an effective means of expressing safety concerns and of knowing what actions are taken to relieve them and that this process be monitored by the regulatory authority. (p. 67)**

Any investigation of an accident in a regulated industry requires the scrutiny not only of the industrial aspect, but also of those aspects which are the function of the regulator and its inspectors. If an investigation is carried out by the body responsible for establishing and enforcing the regulatory regime, the obvious potential for conflict of interest arises. In a disaster, such as the *Ocean Ranger*, society's need of inquiry is met by the appointment of a Royal Commission. It seems however, that there should exist a competent standing capability to launch immediate investigations into major offshore accidents, such as the Aviation Safety Board does in the event of an air disaster. In Recommendation 83 of the *Study on Marine Casualty Investigations in Canada* (Deschênes Report), it was recommended that the investigating authority be a government agency that is independent of other aspects of the regulatory function. It is therefore recommended:

**134. That an independent agency be established with statutory authority to investigate defined categories of accidents arising during offshore drilling operations, relating to either the marine or the industrial facets of the activity.**

The Conference on Safety Offshore Eastern Canada, organized by the Royal Commission, brought together from the international community knowledgeable persons concerned with offshore drilling operations. Experts from the key disciplines debated the basic issues being addressed by the Royal Commission and illuminated possible new directions and opportunities for improvement. Those who participated agreed that an unusually valuable opportunity had been provided for consultation among a group which was representative of the principal sectors involved. Recognizing the usefulness of informed debate about policy and process on a continuing basis, it is recommended:

**135.** That the Government of Canada encourage and support the convening in Canada of a biennial conference on offshore safety.

The maintenance of a productive ecosystem is essential to sustain all forms of life on this planet. As with most human activities, the exploration for and exploitation of offshore hydrocarbons represents some degree of threat to elements of that ecosystem, and hence in the broadest sense, to human safety. Man now recognizes the need to understand and control the ecological consequences of his activities and, with exploration increasing and exploitation approaching, time and attention must be paid to defining and ameliorating the environmental effects of these activities. It is therefore recommended:

**136.** That government and industry continue to fund and increase their support for studies on the effects of pollutants on the marine environment and for the development of means to reduce the likelihood of and consequences from such pollution. (*p. 176*)