

4

OPERATIONS

CHAPTER FOUR OPERATIONS

This chapter will examine and comment on those aspects of the rig's operations which lie within the mandate of the Royal Commission. A prelude to the loss of the *Ocean Ranger* occurred just eight days earlier, on February 6, 1982, when the rig developed a sudden list because of a ballast control error made by the master. The implications of this event are significant and will receive comment.

The *Ocean Ranger* operated on a 24-hour basis, with two full drilling crews working 12-hour shifts. The drilling operations were supported by ancillary services which also operated on the 12-hour shift system. Generally the entire crew was relieved every 21 days. The shore-based offices of Mobil and ODECO received from their personnel a number of reports including a Morning and an Evening Report which were reviewed in St. John's and then forwarded to their respective head offices in Calgary and New Orleans. These reports were primarily related to drilling performance during the previous 12-hour period. ODECO's reports contained additional information about the rig's stability, the crew and weather conditions. In addition to the Morning and Evening Reports, which were generally sent by telex, the drilling foreman and the toolpusher communicated regularly with their shore bases, via radio or MARISAT, to discuss specific drilling problems with their supervisors.

To co-ordinate communications, ODECO generally employed a licenced radio operator and a second operator with a restricted licence who often doubled as a medic. Most communications occurred during the daytime shift (6:00 a.m. – 6:00 p.m.) while the licenced operator was on duty. The night shift (6 p.m. – 6 a.m.) was covered by the rig's medic. Generally communications on this shift were limited to personal calls by ODECO employees and were routed through the Canadian Coast Guard radio stations in Newfoundland and Nova Scotia where a phone patch was made to the party on shore. Radio operators were instructed by the toolpusher to monitor all calls to ensure that personnel did not relay confidential information.

The drilling operation was supported by air and marine resources provided by Mobil. Universal Helicopters Limited provided a ferry service between the rig and shore using three Sikorsky S-61 helicopters which were available to Mobil every day of the week on a 24-hour basis. Marine support was provided by two supply vessel contractors: Crosbie Offshore Services Limited and Seaforth Maritime Limited. Supply vessels were used extensively to assist the rig during transit, to deploy anchors once on site, to re-supply the rig with consumables and equipment and to transfer personnel when helicopters were not available. Supply vessels were also

Section 18. (1) "A suitable standby craft shall be provided for a drilling operation as a means of evacuating personnel from the drill site"

Section 142. "Every person in charge of a standby craft referred to in section 18 shall . . . (b) maintain the craft within such distance from the drilling unit as is approved by the Chief"

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required to provide a standby service¹ to the rig to render assistance as required. All of these activities were the responsibility of Mobil's drilling foreman on the rig.

COGLA regulations required that a rig have a vessel assigned to it at all times primarily to render assistance as required. The regulations did not define the type of vessel, its standby role or distance from the rig while on standby duty. COGLA chose to let Mobil and the supply vessel owner determine the type of vessel and set an appropriate standby distance. The evidence indicates that on the Hibernia Field Mobil expected vessels to be within 1-2 miles of their assigned rigs during normal conditions and not more than 3-4 miles upwind during heavy weather. The contracts between Mobil and its supply vessel contractors, however, did not set out these requirements. The Petroleum Directorate did not have any regulations governing supply vessels.

Two trained weather observers² were on board at all times to collect environmental data according to standard meteorological procedures. Mobil received this environmental data every six hours and forwarded it to Newfoundland Oceans Research and Development Corporation Limited (NORDCO), their privately-contracted weather forecasting service in St. John's, and to the Atmospheric Environmental Service (AES) centre in Gander. The primary purpose for the data was to assist in the preparation of weather forecasts specific to the site of each drill rig operating on the Grand Banks. The NORDCO forecasts were updated every six hours and transmitted to the rigs via the Mobil shore base.

Confusion existed on the rig and at the shore base over the meaning of certain forecast parameters. Specifically, Mobil and ODECO personnel misinterpreted the definition of maximum wind speed. Michael Hewson of NORDCO testified that the forecast maximum wind speed referred to a sustained wind, not a gusting wind. Mobil and ODECO personnel interpreted it as gusts. This misinterpretation was significant because the operating limitations of the *Ocean Ranger*, as outlined in its *Booklet of Operating Conditions*, prescribed that the rig be deballasted when sustained winds exceeding 70 knots were forecast. If the crew had properly interpreted NORDCO's forecast, and adhered to the procedures outlined in the operating manual, the rig should have been deballasted on the afternoon of February 14, 1982, when sustained winds of 90 knots³ were forecast. Deballasting would have increased the air gap between the upper hull and the seas which were forecast to occur later that day. As a result the portholes in the ballast control room would have been less susceptible to wave damage. NORDCO, Mobil and ODECO ought to have ensured proper interpretation by the crew of the *Ocean Ranger* of the terminology in the forecasts.

A qualified medic who doubled as the night radio operator was on board the *Ocean Ranger* at all times. Canadian regulations required that this person be a qualified physician, trained nurse, or medical attendant with a valid certificate. The evidence of a former medic and ODECO's shore-based physician shows that the rig had a well equipped sick bay and that routine medical treatment was adequately handled on board. Accident statistics reported from the *Ocean Ranger* at least during the

¹Eastern Canadian offshore operators use supply vessels in a dual role – anchor handling/supply and rescue/standby. When a supply vessel has discharged its cargo it is generally assigned to a rescue/standby role.

²Weather observers received training from the Atmospheric Environment Service (AES) on environmental data collection. Their data was collected according to standards set out in the *Manual of Marine Weather Observing* (MANMAR) and *Private Aviation Weather Reporting Services* (PAWRS) manuals, supplied to the weather observers by AES. Appendix E contains information relating to weather forecasting and environmental conditions at the Hibernia site.

³The 90-knot sustained winds were at anemometer height (276 feet) whereas the 70-knot operating limit was for winds at the 10 metre (32.8 foot) level above the mean sea level.

4.1 The *Ocean Ranger* with a Sikorsky S-61 on the helideck. The supply vessel *Ravensturm* is at close standby, as required during all helicopter operations.

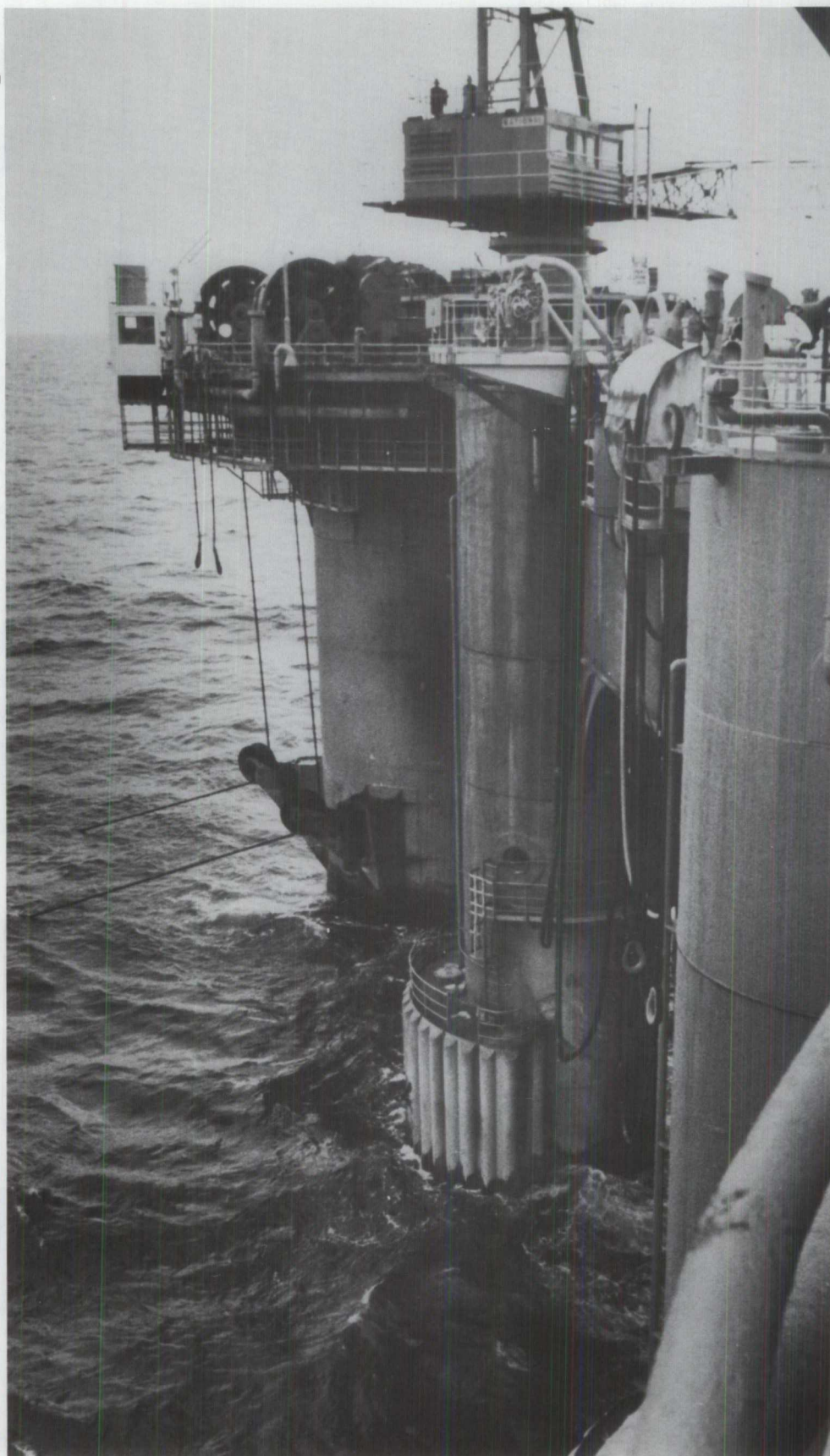


rig's last 12 months of operations do not reveal an abnormally high incidence of injury among the crew.

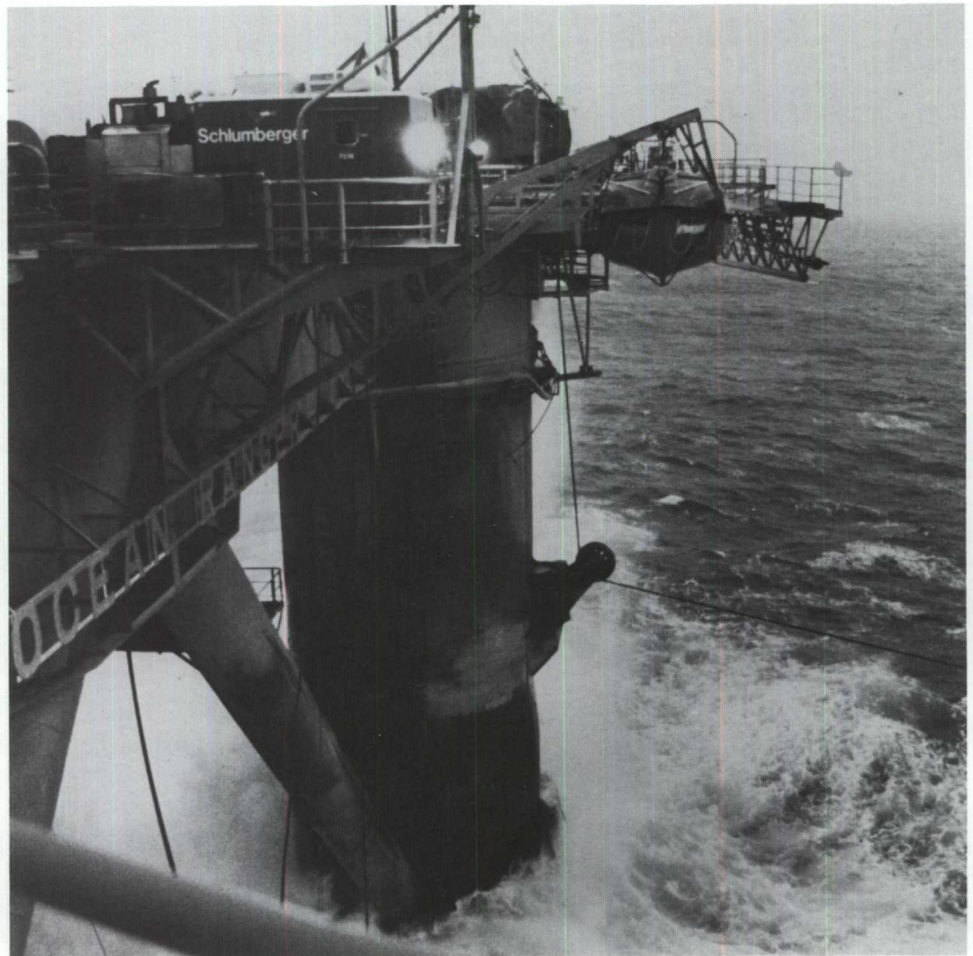
The ballast control operator maintained the rig at the attitude and draft required for the drilling operation. Acting on instructions from the drill floor, the operator added or removed ballast to give the rig a small degree of heel or trim. During the loading of consumables, the ballast configuration was altered to offset the effect of additional cargo. This function was crucial for safe operations; as one observer noted, "the ballast control operator alone of the crew, could sink a rig."

The *Booklet of Operating Conditions* identified specific tasks for the ballast control operators. Section K-2 stated that all valves should be opened daily and that all tanks were to be sounded weekly and the results compared with King gauge readings. Frequent stability calculations were required to determine whether the draft and variable deckload were within specified limits, and the weights of all cargo, equipment and tank contents were to be logged every two hours. According to the testimony of former ballast control operators this two-hour check was not carried out. Their evidence showed that weights recorded in the log were updated every 24 hours. The methods used to determine the weight and location of deck cargo were imprecise. Cargo weights were relayed to the ballast control operator based upon measurements taken by the crane operator, and actual weights were seldom checked against cargo manifests. Thus, the ballast control operator would, on the basis of experience, often estimate the cargo weight and use "inherited" weights for certain items to complete the calculation of the daily stability report (Appendix D, Item 4).

4.2 A view of the starboard side of the *Ocean Ranger*, looking aft from the first starboard column. Porthole #2 in the ballast control room is visible behind the catwalk on the third starboard column. The loading station for bulk liquid and dry cargo transfers can be seen amidships between the second and third columns. A similar loading station was located amidships on the port side.



4.3 The bow lifeboat station adjacent to the well test boom, seen from the first starboard column. The 50-person, Harding lifeboat was more than 70 feet above the sea surface when the rig was at the 80-foot draft. A second bow lifeboat station was to have been installed at the extreme left, and some preparatory work was already under way when this photograph was taken.



The resulting effect of inheriting weight inputs was reflected in the daily stability calculations. In fact, the ballast control operators paid little attention to the mathematical calculation of stability, preferring to use the inclinometers in the ballast control room to check whether or not the rig was level.⁴ The stability report was sent to the master and toolpusher for approval, before being forwarded to shore base in St. John's and then to New Orleans. A review of actual reports and the testimony of former ballast control operators show that errors in calculation were not uncommon and were rarely picked up by supervisors either on board or on shore.

In addition, evidence was given that commencing in January 1982, the anchor tensions listed in reports were fabricated. The ballast control operators were told to record that all anchor tensions were within the 235 – 250 KIPS range. This evidence is supported by the report from Jacobsen on the night of February 14 that all of the anchor tensions were in the 240 KIPS range – an impossibility under the environmental conditions prevailing that night.

EMERGENCY PROCEDURES

COGLA regulations require each operator to develop a contingency plan for any foreseeable emergency that might develop during the drilling program. In August 1980, Mobil submitted for approval its *Contingency Plan and Emergency Procedures Manual for East Coast Operations*. Designed as a guide for company

⁴Ballast control operators were primarily concerned about one variable in the entire stability calculation – the longitudinal metacentric height or GM_L . They were instructed that the calculated GM must be positive and greater than 1.5 feet. Imprecise weight inputs could result in errors in the GM calculation.

Section 79.(1) "Every operator shall ensure that contingency plans have been formulated and that equipment is available to cope with any foreseeable emergency situation during a drilling program"

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employees at all levels to mobilize and co-ordinate personnel, communications and resources in emergencies, the *Plan* specified guidelines and procedures to be followed in the event of an oil spill, icebergs, pack ice, stormy weather, icing of superstructures, blowouts, anchor release, loss of a supply vessel or crash of a helicopter. It did not provide for contingency procedures for evacuation of the rig stating instead:

It is not Mobil's intent to run the operation from a shore location. Wherever possible on-site personnel are expected to keep shore-based staff involved in the decision making process to ensure the best possible decision is made. In emergency situations the drilling foreman, barge captains and rig toolpushers will confer together and formulate the best possible plan to alleviate the situation. They will notify their respective superiors at the first opportunity.

The *Plan* set environmental limits for drilling and specified when hanging-off and disconnecting should be undertaken. It stated as a "generality" that:

on a drilling unit capable of being operated as a vessel, the barge captain has the responsibility at all times for the safety of the vessel under his charge and all the people on it. In situations of imminent threat of severe damage to or loss of the contractor's drilling unit, his authority supercedes that of all other on-site personnel.

There was no copy of the *Plan* on board the *Ocean Ranger* and there was no evidence to indicate that ODECO personnel either on shore or on the rig were familiar with its contents.

ODECO had a manual entitled *Emergency Procedures*. Its objective was to: provide ODECO's toolpusher with guidelines for procedures in case of severe emergency. It is recognized that every situation will require to be dealt with in accord with conditions prevailing at the time and that those persons in command will have to use their initiative on action to be taken.

"The Drilling Foreman is Mobil's on-site representative . . . In emergency situations, the Drilling Foreman, Barge Captain and Rig Toolpushers will confer together and formulate the best possible plan to alleviate the situation"

Contingency Plan and Emergency
Procedures Manual for East Coast
Operations (Mobil)

"Odeco's Toolpusher has overall responsibility for all personnel safety and safety of the drilling unit"

Emergency Procedures: Ocean
Ranger Section 2 (ODECO)

Included were provisions covering safety drills, man overboard and rig evacuation as well as environmental dangers arising from storms, pack ice and icebergs. It also included operational contingencies for fire, blowout, anchor failure, collision and helicopter emergencies. It contained procedures to be followed during severe storms emphasizing the cessation of drilling, hanging-off, disconnecting and evacuation. According to the manual, the toolpusher remained in charge and was responsible for giving the order to abandon the rig. The significance of this *Emergency Procedures* manual is uncertain, since one senior toolpusher, who left the *Ocean Ranger* in January, 1982, testified that he had never seen it. ODECO had no emergency procedures manual for onshore personnel.

A comparison of the Mobil and ODECO contingency plans shows several procedural inconsistencies, differences in criteria for the cessation of drilling, and disagreement over the person in charge. It is evident that there needs to be a co-ordinated contingency plan between the rig owner and the operator as well as between industry and government authorities. The details of these plans must be familiar to those in charge of their implementation.

EMERGENCY TRAINING

Both the U.S. Coast Guard and COGLA had specific regulations for emergency training but the Petroleum Directorate had none. These regulations did not specify the content of the emergency training required but dealt only with the frequency of drills to test the emergency response system. COGLA, for example, required weekly drills for "abandon ship", blowout prevention and fire. COGLA's inspectors, however, appear to have been more concerned whether the existing emergency systems were operable than whether the systems themselves and the training given to the crew were adequate. The U.S. Coast Guard regulations required regular testing of lifesaving and fire fighting systems and the assignment of specific duties to members

On the *Ocean Ranger*, emergency drills were conducted on Sundays between 12:00 noon and 1:00 p.m. These drills were co-ordinated by the toolpusher, the master, and the safety engineer. Each week, at the appointed time, the general alarm was sounded and all off-duty and non-essential crew members were mustered at lifeboat stations. The crew were required to come to lifeboat stations in accordance with assignments given in the muster lists which were posted in all cabins and at other locations throughout the rig. According to the muster list, the master was in charge of Lifeboat #1 and the toolpusher was in charge of Lifeboat #2. Certain members of the crew of the lifeboat were assigned special duties such as starting the motor,

MUSTER LIST

[illegible]

4.4 The muster list on the *Ocean Ranger* had not been altered to assign crew members to the newly-installed stern Lifeboat #4.

checking radio equipment, lowering and releasing the lifeboat, and verifying the passenger lists. Though it was not specified, the person in charge of the lifeboat was presumably responsible for all activities on the lifeboat during drills or emergencies, including manning the helm. It has already been mentioned that the toolpusher was not a certificated lifeboatman and it is difficult to understand how, in the event of evacuation, an untrained person could take command of and operate a lifeboat, particularly in severe sea conditions.

Several former crew members gave evidence on the emergency training received while on board the *Ocean Ranger*. Most were satisfied with the type of training they received. A former master, Captain Karl Nehring, however, testified that he was particularly concerned about the marine safety training and considered the routine evacuation drills to be so inadequate that he gave instruction on lifeboat operating procedures to small groups of crew members during their off hours. He stated that his primary concern was that crew turnover and irregular shift changes often meant that there were not enough crew members on board with marine training and he doubted whether an evacuation could be carried out properly. Other masters were also critical of the marine safety training, stating that lifeboats were rarely lowered to the sea during drills, even though U.S. Coast Guard regulations required that lifeboats be lowered to the water, released, and operated at least once every three months.

The industrial relations representative (safety engineer) reported to the Safety Division of ODECO in New Orleans and to the toolpusher on the rig. His prime responsibilities appear to have been training roustabouts on the job and monitoring industrial safety. He assisted in the conduct of the weekly fire and evacuation drills. His chief concern, however, was fire control; it appears that he had little, if any, responsibility for marine safety which presumably was the responsibility of the master.

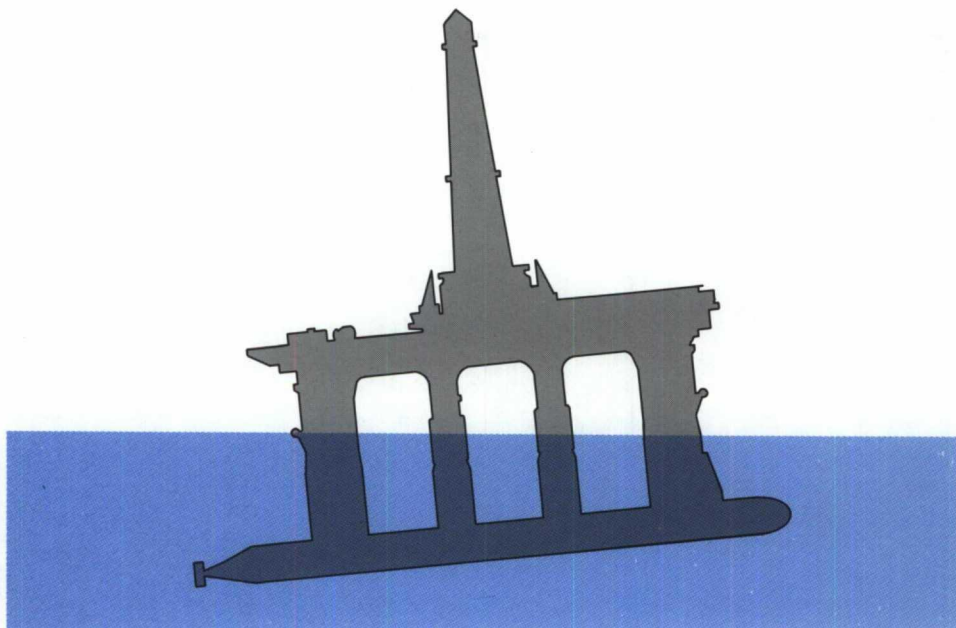
THE FEBRUARY 6, 1982 INCIDENT

On February 6 the *Ocean Ranger* developed a sudden port heel of 6 degrees while taking on liquid cargo from a supply vessel. Bruce Porter, the ballast control operator on duty, testified that he began taking on fuel and drill water at 4:00 a.m. and was relieved by Captain Hauss at 6:00 a.m. so that he could complete a routine inspection tour.

Porter testified that Hauss had asked him to reset the manually controlled fuel tank valves in the pump room because the loading of fuel oil had stopped. Porter was in the process of completing this operation when the rig developed a list which was serious enough to result in the crew preparing to go to lifeboat stations. Senior ballast control operator Rathbun was called from his bunk to correct the list from the ballast control console. Rathbun later explained to Porter that Captain Hauss had been pumping out port tank 14 with the remotely controlled sea chest valve open. Porter could not explain why the sea chest valve was open, because the normal procedure while pumping out was to have it closed. The open sea chest valve caused rapid ingress of sea water ballast which the pumps could not counteract.

After the list had been rectified, Thompson, the toolpusher, in the presence of Jim Counts, ODECO's shore-based drilling superintendent, severely criticized Captain Hauss for causing the list and told him to be sure that it did not happen again. Captain Hauss agreed, according to Porter, not to operate the ballast control console again. Counts testified that both he and Thompson had lost confidence in Captain Hauss, but neither took any action to replace him immediately, a fact which reinforces the impression that the master was only on board in order to comply with U.S. Coast Guard regulations.

4.5 The *Ocean Ranger*, illustrated with a 6 degree stern trim, at the 80-foot draft, giving some indication of the severity of even relatively small trims.



This incident, which was not reported immediately to the Mobil office nor to the regulatory authorities, is worthy of note for several reasons. It illustrates the fact that, although the master was deemed to be responsible for rig safety and for the ballast control operators, he had not been trained in the operation of the ballast control system. It also establishes that on the night of February 14, the master on board the *Ocean Ranger* did not understand the ballast control system and the toolpusher was fully aware of this fact.

EVENTS BEFORE EVACUATION

CHAPTER FIVE EVENTS BEFORE EVACUATION

In February 1982 Mobil was operating, in addition to the *Ocean Ranger*, two other semisubmersible drilling units in its exploratory drilling program on the Grand Banks. They were the *SEDCO 706*, of United States registry and the *Zapata Uglund*, of Norwegian registry. The three semisubmersibles were moored approximately 170 miles¹ east of St. John's. The *Zapata Uglund* was positioned 19 miles north and the *SEDCO 706* was anchored 8 miles northeast of the *Ocean Ranger*.

On Friday, February 12, 1982, a weak disturbance in the Gulf of Mexico was identified by the Atlantic Weather Centre in Bedford, Nova Scotia. The disturbance moved off the coast of Georgia and developed as it progressed northward. By 8:30 p.m. on Saturday, the low had moved to about 210 miles south of Halifax. It intensified rapidly and moved toward the Avalon Peninsula of Newfoundland at a speed of about 35 knots. The low continued to move northeastward with little or no deepening and winds from the storm began to affect the area of the Hibernia Field at about 2:30 a.m. on Sunday. They continued from the southeast at 30 knots, and by 12:30 p.m. Sunday had increased to 50 knots, as the low moved to the northwest of the drill site (Appendix E, Item 4).

SATURDAY, FEBRUARY 13, 1982

On Saturday, February 13, the three rigs were engaged in drilling operations. The *Zapata Uglund* was preparing to pull its drill string to replace a worn drill bit. The *SEDCO 706* was attempting to retrieve a piece of equipment which had been lost in the hole, and the *Ocean Ranger* was drilling at Hibernia J-34.

A series of weather forecasts issued by NORDCO indicated weather conditions at the drill site would deteriorate during the early hours of Sunday, February 14, as a deep low centre approached the area (Appendix E, Item 2).

At 1:30 a.m. on Saturday, NORDCO forecast that wind speeds of 60 knots and maximum sea heights of 24 feet could be expected at the drill site by mid-afternoon on Sunday. At 7:30 p.m. on Saturday that forecast was changed to maximum wind speeds of 70 knots and maximum sea heights of 22 feet. The synopsis stated:

A gale center . . . is forecast to develop into a storm center overnight and pass between St. John's and the drill areas about noon on Sunday . . . Gale force southeast winds expected to spread over the drill area around 14/06Z [2:30 a.m.] or shortly afterward then increase to storm force after dawn . . . A cold front tailing southward from the storm center will sweep across the area in the late afternoon with gale to storm force west to northwest winds, heavy seas, flurries and freezing spray anticipated by Sunday night.

¹In this chapter "miles" refer to nautical miles.

SUNDAY, FEBRUARY 14, 1982

NORDCO revised its weather forecast at 7:30 a.m. on Sunday predicting maximum wind speeds of 90 knots and maximum sea heights of 37 feet at 2:30 p.m. that day and stated in the synopsis:

The forecast trajectory of the low center has been amended to more northerly than the previous forecast but drastic deepening of the pressure center will create higher winds and waves earlier than expected in the previous forecast.

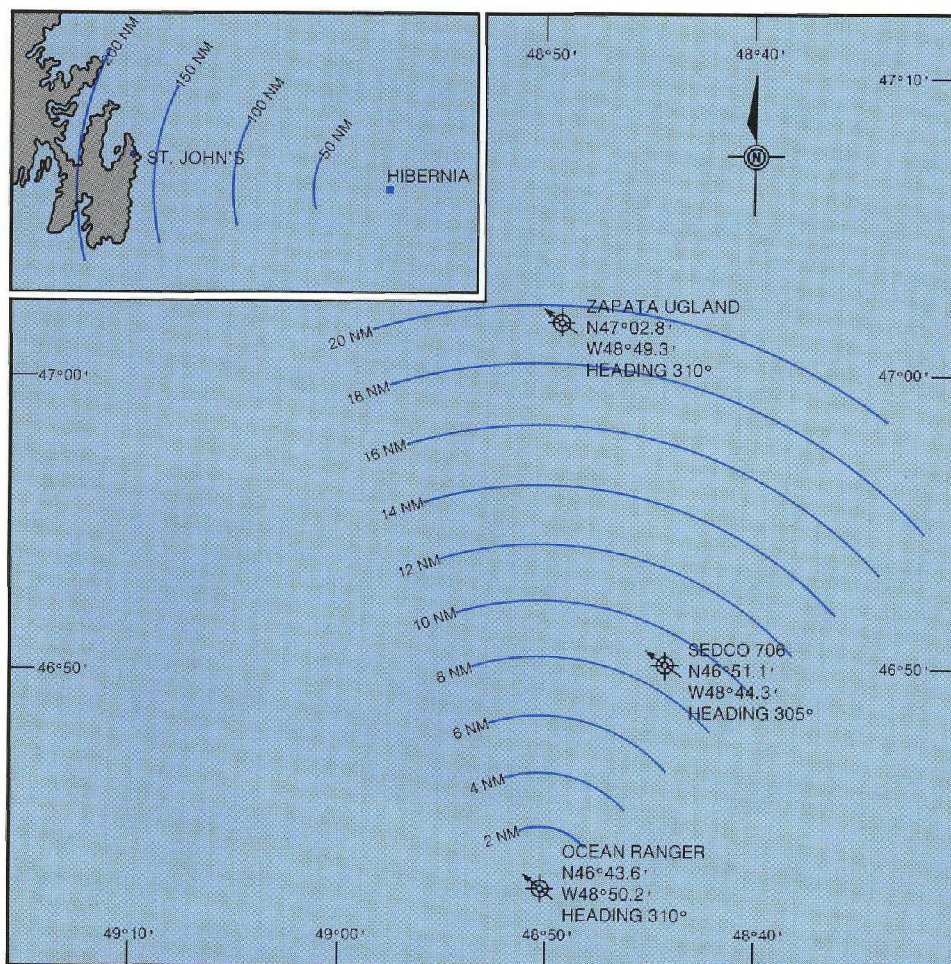
This forecast, as with all other forecasts issued by NORDCO, was forwarded to Mobil's shore base where it was telexed to each rig and to the shore-based office of each drilling contractor. This forecast was received by the *Ocean Ranger* at 8:00 a.m. Sunday.

Mobil's area drilling superintendent in St. John's, Merv Graham, reviewed NORDCO's 7:30 a.m. forecast with Peter Kapral, a shore-based Mobil drilling foreman, at 10:00 a.m. on Sunday morning. Graham and Kapral were aware that a storm of short duration would pass over the rig sites. They wanted to ensure that the rigs would be in a position to cease operations and to implement procedures outlined in their contingency plans to assist them in riding out the storm. It was, according to Graham, Mobil's standard procedure to conduct a review whenever storms were forecast.

Early Sunday morning, ODECO's shore-based drilling superintendent, Jim Counts, went to his St. John's office to check the *Ocean Ranger's* morning report, which had been issued at 6:00 a.m., and to review the operations scheduled for that day with Kent Thompson, the toolpusher.

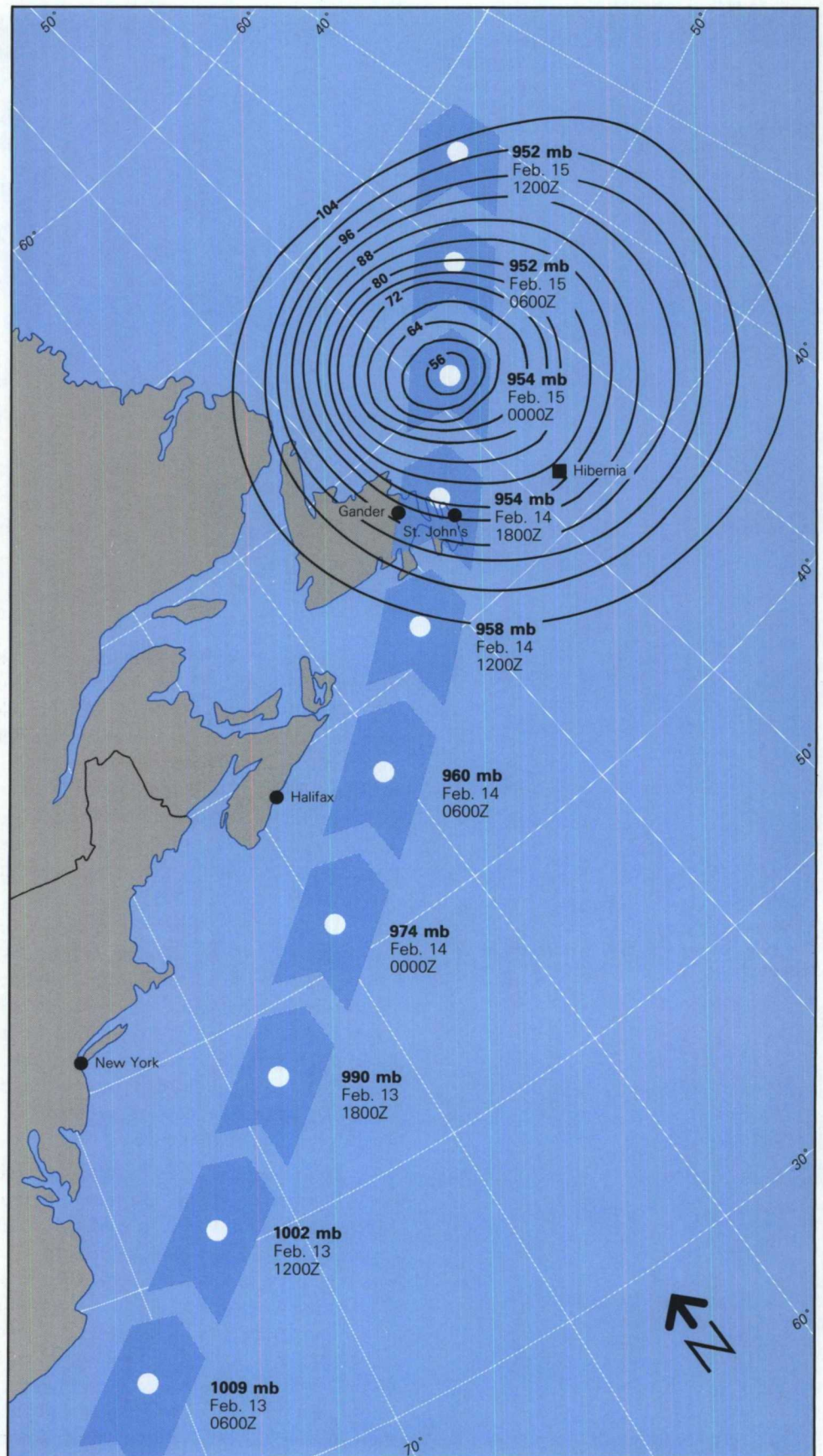
1000 NST (1330Z)

The 0730 NST forecast is reviewed at Mobil office in St. John's.

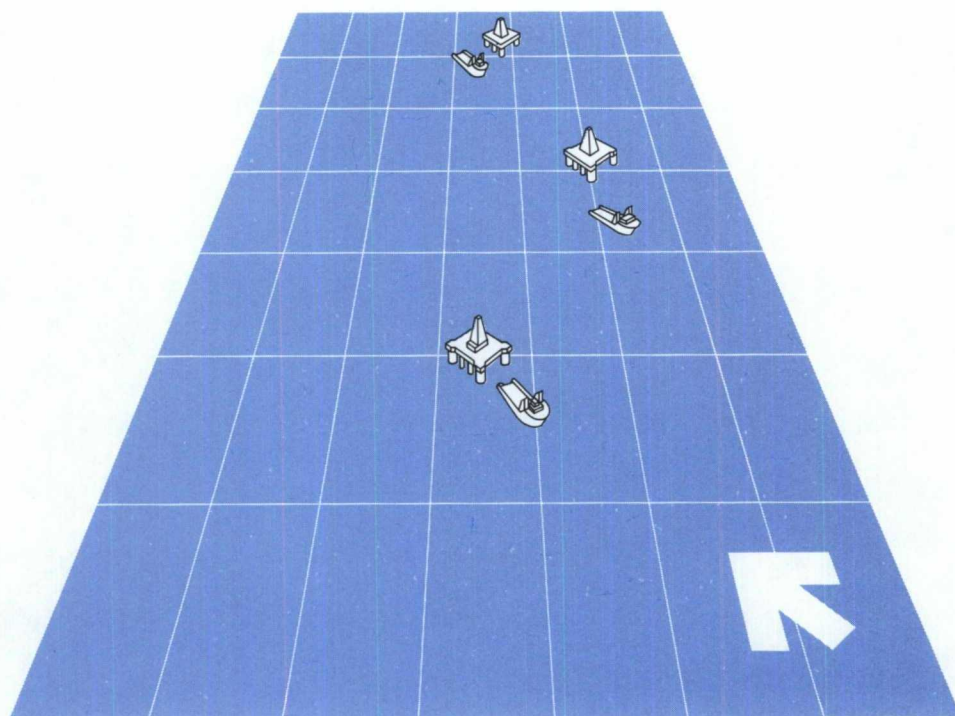


5.1 The location and orientation of the *Ocean Ranger*, the *SEDCO 706* and the *Zapata Uglund* on the Hibernia Field on February 14, 1982. The ranges are shown in nautical miles. A list of the names of the major participants, by their location during the sequence of events, is given at the end of the chapter.

5.2 The path of the severe winter storm that passed over the Hibernia Field on February 14-15, 1982.



5.3 Approximate standby positions of the supply vessels for the three rigs, relative to wind direction at 12:00 noon. The *Nordtor* (top), standing by the *Zapata Uglund*, was maintaining a standby distance of 1-4 miles. The *Boltentor* (centre) was within 3-6 miles of the *SEDCO 706*. The *Ocean Ranger*'s standby vessel, the *Seaforth Highlander*, was within a 1-2 mile range. In order to maintain station in the 50-knot winds and 11-foot seas each vessel was proceeding slowly upwind, executing a 180 degree turn, and returning downwind. This illustration is intended to show relative positions and orientations only, and is not drawn to scale.



Counts spoke with Thompson at 7:00 a.m. and again at 11:00 a.m. During these conversations Thompson advised Counts that drilling operations were proceeding normally. Shortly after 11:00 a.m. Counts left ODECO's offices and returned home because of the deteriorating weather in St. John's. He had advised Thompson that, should any problems arise, he could be contacted at his home on the MARI-SAT system. At 1:30 p.m. NORDCO issued its regular weather forecast update which predicted that maximum wind speeds of 90 knots and maximum sea heights of 35 feet would be observed at the drill sites at 8:30 p.m. that day. The forecast also predicted poor visibility and rough seas through the night with maximum sea heights of 46 feet at 8:30 a.m. Monday.

1400 NST (1730Z)

The *Ocean Ranger* is drilling normally at 18 feet per hour.

At 2:00 p.m. Mobil's Merv Graham, who was at his home at the time, received a call from the *Ocean Ranger*, and at 3:45 p.m. he received a call from the *Zapata Uglund*. The first call was from Jack Jacobsen, Mobil's senior drilling foreman on the *Ocean Ranger*, who informed Graham that the rig was drilling at 18 feet per hour. The second call was from Ken Lovell, Mobil's drilling foreman on the *Zapata Uglund*. He said that attempts to free the drill string were unsuccessful and that they were forced to shear the drill pipe and to disconnect the marine riser. This action was initiated because of drilling problems and not because of the weather conditions which prevailed at that time.

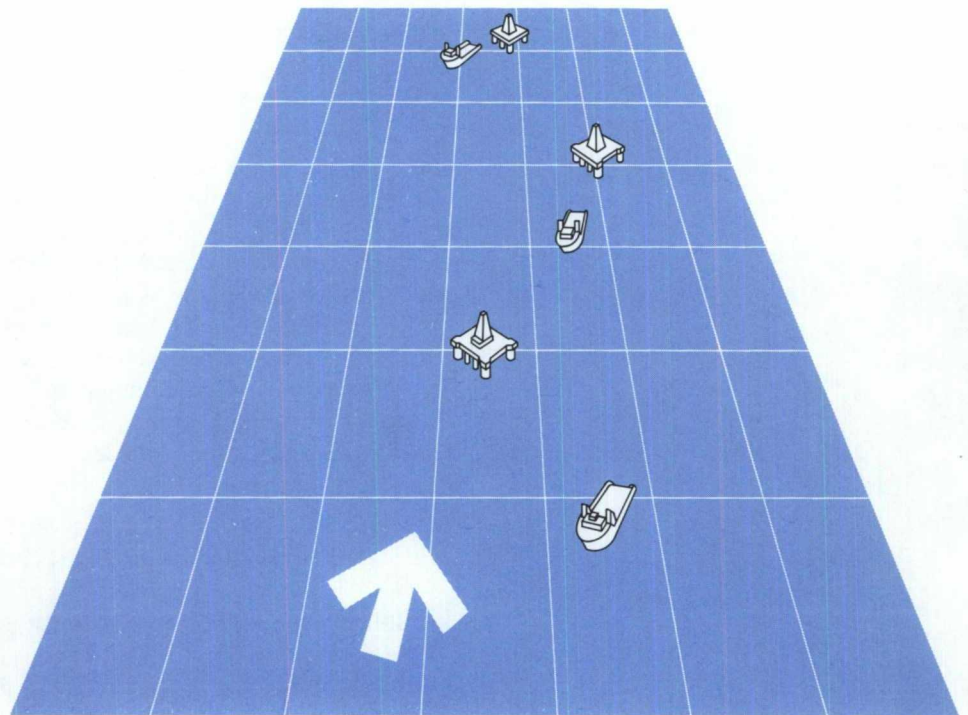
Following this 3:45 p.m. call, there were several important communications involving senior Mobil personnel on the *Ocean Ranger* (Jack Jacobsen and Bob Madden; Madden was also a Mobil drilling foreman on the *Ocean Ranger*) and on shore (Merv Graham and Peter Kapral). Graham testified that at 4:00 p.m., as he was preparing to leave his home for the Mobil office, he received a MARISAT call from either Jacobsen or Madden informing him that the storm had built up very rapidly, forcing the *Ocean Ranger* to discontinue drilling and to hang-off. He further testified that at 4:30 p.m. he arrived at the Mobil office and reviewed status reports on the three rigs. He was advised by Kapral that the three rigs had hung-off successfully and that the *Ocean Ranger* and the *Zapata Uglund* had been forced to shear their drill pipes. On the other hand, Kapral testified that at 4:42 p.m. he spoke with

Bob Madden and they discussed whether they should cease drilling and hang-off because of the deteriorating weather. Kapral further testified that at 5:30 p.m. Madden called to say that drilling had stopped and they were in the process of hanging-off. Madden also reported that high winds were blowing the motion compensator hoses out of the derrick and he was concerned that they might be severed. Under cross-examination, however, Kapral retracted this testimony and reaffirmed the account that he had given before the U.S. Coast Guard Marine Board of Inquiry. Before that Board, he had said that two calls occurred; at 4:30 p.m. he advised Madden to cease drilling; at 4:42 p.m. Madden reported that they had begun the process of hanging-off. Kapral then relayed this information to Graham who was at home, and at approximately 5:00 p.m. Graham arrived at Mobil's office.

Additional evidence regarding the time of hanging-off on the *Ocean Ranger* came from Merv Graham and Keith Senkoe, a Mobil drilling foreman on the *SEDCO 706*. Graham testified that at 6:47 p.m. he received a MARISAT call from Jacobsen advising him that the *Ocean Ranger* had hung-off. Senkoe testified that, shortly after 7:00 p.m., Jacobsen called and said that they were attempting to hang-off and were having difficulty with compensator hoses that had become entangled in the derrick. This conversation was overheard by Mobil drilling foreman, Rod Fraser, who confirmed Senkoe's evidence.

An examination of the records of telephone communications between the Ocean Ranger and Mobil personnel on shore revealed that Graham's testimony on a 4:00 p.m. call from Jacobsen or Madden is in error. There is no record of this call on the MARISAT bills. A call at 4:52 p.m., lasting one minute, was made to Graham's home. Presumably he was not there and was either at Mobil's office or on his way there from his home. After considering all of the evidence, it is concluded that at 4:30 p.m. the Ocean Ranger was still drilling. The process of hanging-off was started shortly thereafter and was completed by 6:47 p.m., when Jacobsen called Graham at his home to advise that they were experiencing heaves of 20 feet and recurring sea spray in the drill floor area.

5.4 At 6:00 p.m. the *Nordertor* and the *Boltentor* (top and centre) were maintaining approximately the same standby distances relative to their assigned rigs. With winds of 78-knots and seas of 29 feet, the *Seaforth Highlander* (bottom) continued to proceed with its bow to the prevailing wind and was almost 6 miles from the *Ocean Ranger*.



At 6:58 p.m. Thompson placed an eight-minute MARISAT phone call to Counts who was at his home, advising him that the *Ocean Ranger* had sheared off and disconnected. Thompson reported winds of 60-65 miles per hour and heaves of 22 feet. After speaking with Jacobsen at 6:47 p.m., Graham telephoned Steve Romansky, Mobil's east coast operations manager, around 7:00 p.m. and updated him on the status of the three rigs.

At approximately 7:00 p.m. the *SEDCO 706* was hit by a large wave, more severe than any other waves that evening. The force of the wave dislodged a small shed welded to the deck in the drill floor area, tore away several pieces of equipment which had been secured before the storm, and caused structural damage to a secondary longitudinal beam underneath the main deck. Given the draft of the *SEDCO 706*, the location of the damage on the main deck, and the fact that "green water" washed over the helideck, several witnesses estimated the height of this wave to be 70-80 feet. When the wave hit the *SEDCO 706*, the barge engineer was in the process of deballasting from an 80-foot draft to a 75-foot draft. This change of draft was completed at 7:25 p.m., and the *SEDCO 706* rode out the storm without incurring additional wave damage. The *Zapata Uglund* was also struck by one or more large waves which washed over the helideck around 7:00 p.m., but although the rig was jarred severely, it did not sustain any serious damage.

INTERNAL COMMUNICATIONS OVERHEARD

1900-2200 NST (2230-0130Z)
Internal VHF radio conversations on the
Ocean Ranger are overheard on the *SEDCO*
706 and the *Boltentor*.

Between 7:00 p.m. and 10:00 p.m., there was surprisingly little communication between the *Ocean Ranger* and the shore, in light of what was happening on the rig. Although Graham was contacted by Jacobsen on several occasions, there is no evidence of any communication between the toolpusher, Thompson and Counts, his superior on shore. Information on what transpired on the rig during these three hours is derived from a series of internal communications between personnel on the *Ocean Ranger*, which were overheard by persons on the *SEDCO 706* and on its standby vessel the *Boltentor*. The communications appear to have been made on hand-held VHF sets. They were overheard in the barge control room of the *SEDCO 706* by John Ursulak, Mobil drilling foreman; Fred Hatcher, watchstander²; and Don King, barge engineer³. On the *Boltentor* some of the conversations were overheard by Captain James Davison. The transmissions were at times poor, and other vessels in the area of the *Ocean Ranger* did not pick them up.

Evidence was received on the substance of these conversations, and in some cases, on the probable identity of the speakers. Ursulak, who had worked on the *Ocean Ranger*, was able to identify the voices of Thompson and Don Rathbun, the senior ballast control operator. Ursulak testified that he overheard Thompson inquire about the condition of the ballast control room and Rathbun respond that: "... the panel was wet, he was working on it and getting shocks off it . . . [and that] . . . he had the cover off. . . ." About five minutes later, Ursulak overheard Thompson request an update and Rathbun replied: "... that everything was fine and that they [were] picking up glass, mopping up water, tidying up." Don King and Fred Hatcher confirmed that reference was made to "cleaning up water and broken glass." Hatcher also stated that a voice he could not identify said that, "... all valves on the port side were opened by themselves."

Don King testified that in several of the conversations he recognized the voice of Domenic Dyke, the junior ballast control operator on the *Ocean Ranger*. King was

²On *SEDCO* rigs the term "watchstander" is used to identify personnel in charge of the rig's ballast system.

³At the time of the *Ocean Ranger* incident, the *SEDCO 706* did not have a qualified master mariner on board. The barge engineer was responsible for all marine operations at that time.

able to identify Dyke because they had worked together on the *SEDCO 706*. He testified that he heard Dyke say that the P.A. system and gas detection system were not working. According to King, Dyke also said that "... they were getting shocks off other equipment ... [and that] ... a valve or valves were opening and closing on their own." King heard a second person (presumably the person to whom Dyke was communicating) state that "an electronics technician was on his way to the ballast control room."

Captain Davison testified that he overheard a reference made to "broken glass and water", to which a person with what Davison identified as a southern United States accent replied: "... 'well get some guys in here and get it cleaned up' ...". Later, reference was made to "... 'high powered cables in here' ..." and "... 'don't get anybody injured or killed or damaged' ...". Davison also recalled that "someone said ... [that] ... there were valves operating, or closing, or opening ... or they were indicating that there were valves doing something, activating themselves one way or another."

The witnesses who overheard these conversations did not agree on the times when they took place. This is not surprising under the circumstances, since the witnesses were preoccupied with the safety of their own vessels and could not, at that time, have realized the significance of what they were overhearing.

Ursulak claimed that the two conversations which he overheard could have occurred as early as 7:30 p.m. or as late as 8:00 p.m. Similarly, Hatcher stated that according to his recollection the time of these conversations was between 7:30 p.m. and 8:00 p.m. King stated that the first conversation occurred after 8:00 p.m. He said that he was present in the barge control room while the *SEDCO 706* was being deballasted. The control room log indicates that the deballasting was completed at 7:25 p.m. King then completed a tour of the main deck to assess the wave damage, and returned from the main deck 20-25 minutes later. He then reported to the tool-pusher and the Mobil drilling foreman on the damage and the steps taken to secure the deck cargo. On the assumption that it would take King five to ten minutes to make his reports and change clothes, the earliest he could have returned to the barge control room would have been 7:55 p.m. – 8:00 p.m. Although King could not be specific as to the time this conversation took place, he said that the period 8:00 p.m. to 9:00 p.m. would be most reasonable.

Captain James Davison of the *Boltentor* testified that during his 8:00 p.m. to midnight watch he overheard VHF traffic emanating from a rig that he could not, at that time, identify. He testified that about midwatch, 10:00 p.m., he overheard several VHF transmissions which were similar in content to those overheard on the *SEDCO 706*. Since the witnesses could not be more specific on the time of these VHF transmissions it is concluded that they started after 8:00 p.m. and continued periodically until 9:30 p.m.

At 8:44 p.m. there was a fourteen-minute MARISAT conversation between Jacobsen and Graham. Jacobsen reported 50-foot seas and winds of 90-100 knots. According to Graham, Jacobson said that a portlight had been broken in the ballast control room but it was not causing any problems and all equipment was functioning normally.

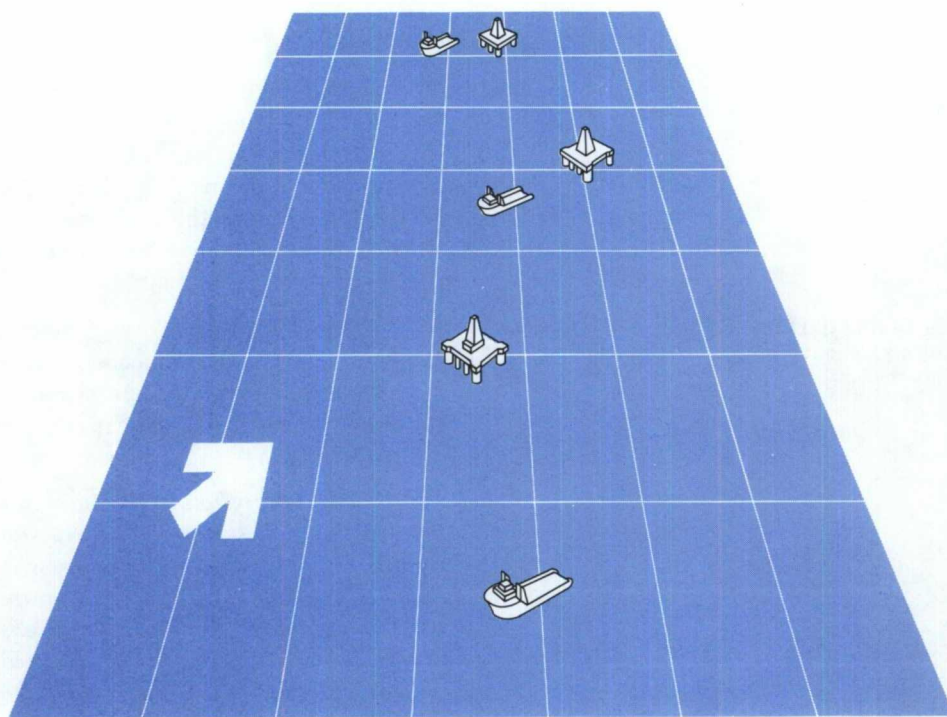
There is conflicting evidence on the time of portlight failure. Merv Graham's handwritten and typewritten notes show that he was informed of the broken portlight in the 8:44 p.m. conversation with Jacobsen. However, he testified that he and Steve Romansky had discussed the portlight shortly after 7:00 p.m. He admitted that his testimony to that fact was based on a reminder from Romansky about the conversation and not on his memory or his notes. Romansky did not give evidence on this point but when interviewed shortly after the loss he was unable to pinpoint

2044 NST (0014Z)
All equipment reported to be functioning normally.

whether the portlight was first discussed with Graham at 7:00 p.m. or at 10:30 p.m. Senkoe and Fraser testified that they recalled a mention of the broken portlight in a radio conversation between Jacobsen, Senkoe and Lovell at 7:00 p.m. However, neither witness was sure of his recollection as to time, and neither the SEDCO 706 radio log nor the Zapata Uglan radio log records any conversation with the Ocean Ranger at that time. Lovell recalled a three-way conversation at 9:06 p.m. in which the broken portlight was discussed. This was his first knowledge of the incident and he also believed that Senkoe had no knowledge of it until that time. On the basis of Graham's notes, the testimony of Lovell, interviews taken shortly after the loss, and the VHF conversations which commenced around 8:00 p.m., it is concluded that the portlight broke sometime around 8:00 p.m., February 14.

At 9:00 p.m. the *Ocean Ranger* called the *Seaforth Highlander*, the supply vessel assigned to stand by the rig, to inquire how the vessel was weathering the storm. Captain Ronald Duncan, master of the *Seaforth Highlander*, replied that his vessel and crew were "not too comfortable" but "doing okay." The *Ocean Ranger* indicated it would check again later. This VHF transmission was overheard by a number of witnesses other than those present on the bridge of the *Seaforth Highlander*. Fred Hatcher of the SEDCO 706 testified that during this transmission the *Ocean Ranger* inquired how far the *Seaforth Highlander* was from the *Ocean Ranger*, and was told that it was seven miles away. There is no evidence of any request, at that time, to have the *Seaforth Highlander* move closer to the *Ocean Ranger*.

At 9:06 p.m. Jacobsen called both Lovell of the *Zapata Uglan* and Senkoe of the SEDCO 706. Jacobsen indicated in this call that he had been asked by Graham to check with the other two rigs to determine how they were weathering the storm. Jacobsen told them that the *Ocean Ranger* had hung-off and disconnected, explaining that because of problems encountered with the motion compensator hoses, they had elected to shear the drill string rather than hang-off in the normal fashion. Jacobsen also told them that a portlight had been broken in the ballast control room, necessitating a clean-up which had been completed, and that there were no further problems arising from the incident.



5.5 At 9:00 p.m. the *Nordertor* and the *Boltentor* (top and centre) continued their dodging patterns. The *Seaforth Highlander* (bottom), proceeding into the 78-knot winds and 29-foot seas, had increased its distance from the *Ocean Ranger* to approximately 7 miles.

2200 NST (0130Z)

Ocean Ranger's ballast control system reported to be functioning normally.

Don King of the *SEDCO 706* testified that sometime between 9:30 p.m. and 10:00 p.m., the final VHF transmission he overheard from the ballast control room of the *Ocean Ranger* indicated that "the electronics technician was there and everything was cleaned up and things were looking okay." In this, as in earlier transmissions he overheard, King recognized Dyke's voice, but not the voice of the other party. This was the last VHF transmission overheard emanating from the *Ocean Ranger's* ballast control room.

At 10:00 p.m. Jacobsen called Graham to report on the status of the three rigs. Graham testified that Jacobsen reported seas of up to 65 feet, that they were having no problems with the ballast control system, and that all equipment was functioning normally. Jacobsen and Graham agreed that the rigs were riding out the storm with no problems and Graham said that he would call each rig in the morning.

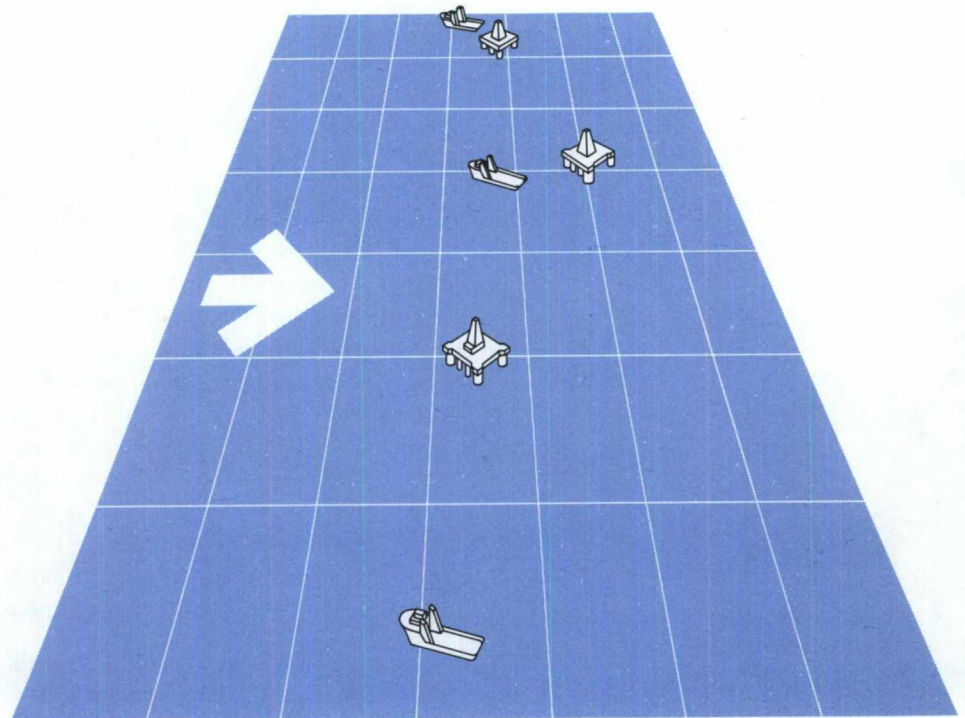
At 10:30 p.m. Graham called Romansky to report on the status of the rigs. He reported that a portlight on the *Ocean Ranger* had broken but that there were no problems and that all its ballast control equipment was functioning normally. At 11:30 p.m. Rick Flynn, Mobil's shore-based radio operator in St. John's, received the weather report from the *Ocean Ranger's* weather observer. The conversation was limited to the transmission of weather observations and there was no indication that the *Ocean Ranger* was experiencing any difficulty.

MONDAY, FEBRUARY 15, 1982

There was no further communication between the *Ocean Ranger* and Mobil personnel on shore after 11:30 p.m. until Graham received a MARISAT telephone call from Jacobsen at 1:00 a.m., Monday, February 15. Jacobsen first attempted to contact Graham at his home by phone patch, but because of atmospheric interference was unable to do so. Flynn radioed the *Ocean Ranger* to inform Jacobsen that the phone patch could not be completed and he was advised that Jacobsen was speaking to Graham on the MARISAT. In this five-minute conversation Jacobsen asked Graham to notify the Coast Guard that the *Ocean Ranger* was "listing to the bow eight

0100 NST (0330Z)

Ocean Ranger reports list to bow and requests assistance.



5.6 At 1:00 a.m. the *Nordertor* and the *Boltentor* (top and centre) continued to maintain their previous dodging patterns. The *Seaforth Highlander* (bottom) had followed a course into the wind to a position approximately 8 miles from the *Ocean Ranger*.

to ten feet." Graham believed that Jacobsen's reference to listing should have been in degrees rather than feet, but he did not pursue that point with him. Jacobsen also told Graham that "they were attempting to isolate the problem." Graham asked Jacobsen how many people were on board the *Ocean Ranger* and Jacobsen replied that there were eighty-four. Graham advised Jacobsen that he would alert the Coast Guard and the helicopters under contract to Mobil, and also arrange to have the standby vessels of the other rigs proceed to render assistance. This, according to the evidence, was the first indication received by Mobil's shore-based personnel of serious problems developing on the *Ocean Ranger*.

The *Ocean Ranger* contacted the *Seaforth Highlander* at 1:05 a.m., and requested that it come to "close standby." A control room operator on the *SEDCO 706* overheard this VHF conversation and testified that the *Seaforth Highlander* asked what the problem was. The *Ocean Ranger's* radio operator, after an interval replied: "I am requested to tell you by the Mobil foreman that we are listing badly. . . ." The captain of the *Seaforth Highlander* testified that the *Ocean Ranger* indicated that "all counter measures [to regain trim] were ineffective." The *Seaforth Highlander* was located approximately eight miles south of the *Ocean Ranger* at this time.

At 1:06 a.m. Graham phoned the Search and Rescue Emergency Center (SAREC) in St. John's and advised them of the situation on the *Ocean Ranger*. At 1:09 a.m., a distress telex from the *Ocean Ranger* was received by a MARISAT operator in Connecticut.⁴ The *Ocean Ranger* was connected with the U.S. Coast Guard Rescue Coordination Center (RCC) in New York and the following message was recorded:

ARE EXPERIENCING A SEVERE LIST UNABLE TO CORRECT PROBLEM. NOTIFYING YOU PF PROBLEM PLEASE QSL. WE ARE THE ODECO OCEAN RANGER KRTB LOC 46.43.33N 48.50.13W AND ARE EXPERIENCING A SEVERE LIST OF ABOUT 10-15 DEGREES AND ARE IN THE MIDDLE OF SEVERE STORM AT THE TIME 12 DEGREES AND PREGRESSING..REQUEST ASST ASAP..WE ARE AN OFFSHORE DRILLING PLATFORM..WE WILL STBY AS LONG AS POSS WINDS AT THIS TIME ARE APPROX FROM THE WEST AT APPROX 75 KNOTS. RIG IS OF SEMI-SU SUBMERSIBLE BUILD AND IS LISTING SEVERELY 12-15 DEGREES TO THE PORT SIDE.. GENL INFO WE CHECK THAT ALL AVAILABLE WORKBOATS IN THE IMMEDIATE AREA ARE COMING TO OUR ASST THERE ARE TWO OTHER SEMI SUBMERSIBLES IN THE AREA AND WILL DO ALL POSSIBLE TO ASSIST

At approximately 1:10 a.m. the night radio operator on the *Ocean Ranger*, Ken Blackmore, contacted Mobil's shore-based radio operator Rick Flynn. He asked Flynn to transmit a Mayday for the *Ocean Ranger*. In the same transmission Jacobsen also spoke to Flynn and made the same request. He told Flynn that the *Ocean Ranger* was listing.

Jerry Higdon, second mate of the *Seaforth Highlander*, testified that at 1:10 a.m. he overheard the *Ocean Ranger's* call to the *SEDCO 706*, which indicated that the rig had a port list that could not be corrected, and that a Mayday relay would be required. The master of the *Seaforth Highlander* testified that the *SEDCO 706* issued a Mayday relay. He immediately increased his vessel's speed and proceeded under full power to the *Ocean Ranger*.

At approximately 1:11 a.m. Jacobsen called Keith Senkoe on the *SEDCO 706*. During the conversation he indicated that the *Ocean Ranger* "was not coming back for us" and that helicopters and supply boats would be required to assist in evacua-

⁴In February 1982, MARISAT communications from the rig were routed through a ground station in Connecticut. The MARISAT operator would direct the MARISAT call to the receiving party using the telephone or telex. The distress telex is reproduced in full in Appendix G, Item 1.

0105 NST (0435Z)
Ocean Ranger is listing badly and calls
Seaforth Highlander to come to close
 standby.

tion. At that time winds were gusting in the 70-80 knots range. This conversation was overheard in Mobil's St. John's office by Flynn, who was in telephone contact with SAREC.

There is a conflict in the evidence regarding the time the Ocean Ranger issued its first Mayday. Baxter King, the SEDCO 706 radio operator recorded in his log that at 12:52 a.m. he picked up a Mayday from the Ocean Ranger. His actions and the evidence of other witnesses cast doubt on the accuracy of this log entry. King testified that he recorded a Mayday message that was sent out from the Ocean Ranger on the 2182 kHz International Distress Frequency at 12:52 a.m. He stated that almost immediately after picking up the Mayday, he received a radio call from Jacobsen on HF Channel 1. Jacobsen told him that the Ocean Ranger had a list which was progressing and asked him to send Mayday relays. He asked to speak with Senkoe. King testified that this call was his last communication from Jack Jacobsen and from the Ocean Ranger. If this is correct, then the evidence of Senkoe, who testified that at approximately 1:15 a.m. he spoke with Jacobsen about an emergency on the Ocean Ranger, must be incorrect. Similarly, the evidence of Don King, the barge engineer on the SEDCO 706, who testified that he overheard Senkoe's radio conversation with Jacobsen, portions of which were recorded by SAREC in St. John's and time logged at 1:14 a.m., must also be incorrect. It is inexplicable that Baxter King would record a Mayday from the Ocean Ranger at 12:52 a.m. and not notify his superiors of this event until 1:15 a.m. or thereabouts. It is concluded that the time in Baxter King's log is in error and that the first Mayday message issued by the Ocean Ranger was at 1:09 a.m., several minutes after Jacobsen advised Graham of the emergency situation on the rig.

At 1:21 a.m. the SEDCO 706 directed its standby vessel, the *Boltentor*, to proceed to the *Ocean Ranger* as a precautionary measure, and at 1:22 a.m. the *Zápata Ugland's* standby vessel, the *Nordertor*, was also directed to proceed to the *Ocean Ranger*. The *Nordertor's* position was given as being 20 miles from the *Ocean Ranger* and the *Boltentor* was 15 miles away.

Ken Blackmore, the medic/radio operator on the *Ocean Ranger*, called Flynn at Mobil's shore base to say that the crew of the *Ocean Ranger* were going to lifeboat stations and requested that another Mayday relay be transmitted. Both the SEDCO 706 and the Mobil shore base acknowledged the message. This was the last communication heard from the *Ocean Ranger*. The time was 1:30 a.m.

At 3:38 a.m. the *Nordertor* reported to the SEDCO 706 that the *Ocean Ranger* had disappeared from radar.

0130 NST (0500Z)

The crew of the *Ocean Ranger* go to the lifeboat stations.

**Personnel Named in Chapter 5
Alphabetical**

NAME	POSITION	COMPANY
BLACKMORE, Ken	Medic / Radio Operator, <i>Ocean Ranger</i>	ODECO
COUNTS, Jim	Drilling Superintendent, St. John's	ODECO
DAVISON, James	Master, <i>Boltentor</i>	Crosbie Offshore
DUNCAN, Ronald	Master, <i>Seaforth Highlander</i>	Seaforth Maritime
DYKE, Domenic (Nick)	Junior Ballast Control Operator, <i>Ocean Ranger</i>	ODECO
FLYNN, Richard	Radio Operator, Mobil Base, St. John's	Harvey Offshore Services
FRASER, Rod	Drilling Foreman, <i>SEDCO 706</i>	Mobil Oil
GRAHAM, Merv	Area Drilling Superintendent, St. John's	Mobil Oil
HATCHER, Fred	Watchstander, <i>SEDCO 706</i>	SEDCO
HIGDON, Jerry	Second Mate, <i>Seaforth Highlander</i>	Seaforth Maritime
JACOBSEN, Jack	Senior Drilling Foreman, <i>Ocean Ranger</i>	Mobil Oil
KAPRAL, Peter	Drilling Foreman, St. John's	Mobil Oil
KING, Baxter	Radio Operator, <i>SEDCO 706</i>	SEDCO
KING, Don	Barge Engineer, <i>SEDCO 706</i>	SEDCO
LOVELL, Ken	Drilling Foreman, <i>Zapata Ugland</i>	Mobil Oil
MADDEN, Bob	Drilling Foreman, <i>Ocean Ranger</i>	Mobil Oil
RATHBUN, Don	Senior Ballast Control Operator, <i>Ocean Ranger</i>	ODECO
ROMANSKY, Steve	East Coast Operations Manager, St. John's	Mobil Oil
SENKOE, Keith	Drilling Foreman, <i>SEDCO 706</i>	Mobil Oil
THOMPSON, Kent	Toolpusher, <i>Ocean Ranger</i>	ODECO
URSULAK, John	Drilling Foreman, <i>SEDCO 706</i>	Mobil Oil

**Personnel Named in Chapter 5
By Location**

ONSHORE	OFFSHORE	
St. John's	Hibernia	
GRAHAM, Merv KAPRAL, Peter COUNTS, Jim ROMANSKY, Steve FLYNN, Richard	<i>Ocean Ranger</i>	<i>Seaforth Highlander</i>
	THOMPSON, Kent	DUNCAN, Ronald
	JACOBSEN, Jack	HIGDON, Jerry
	MADDEN, Bob	
	RATHBUN, Don	
	DYKE, Nick	
	BLACKMORE, Ken	
	<i>SEDCO 706</i>	<i>Boltentor</i>
	SENKOE, Keith	DAVISON, James
	FRASER, Rod	
	URSULAK, John	
	HATCHER, Fred	
	KING, Don	
	KING, Baxter	
	<i>Zapata Ugland</i>	<i>Nordertor</i>
	LOVELL, Ken	<hr/>