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**FINAL REPORT**

**Environmental Management Plan  
Barramundi**

**for  
Globex Far East**

DAMES & MOORE  
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15 September 1999

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Attn : Mr Geoff Rowlands

Dear Sir

**FINAL REPORT  
ENVIRONMENTAL MANAGEMENT PLAN  
EXPLORATORY DRILLING PROGRAM**

Dames & Moore is pleased to present the following Report for an exploration drilling program in Western Bass Strait in the Barramundi lease.

If you have any queries, please do not hesitate to contact Mandy Verdon or myself on 03 9510 5050.

Yours faithfully  
**DAMES & MOORE**

David Gwyther  
*Principal*

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**FINAL REPORT  
ENVIRONMENTAL MANAGEMENT PLAN  
PROPOSED EXPLORATION DRILLING – BARRAMUNDI  
for  
Globex Far East**

**1. DESCRIPTION OF THE DRILLING PROPOSAL**

**1.1 LOCATION AND TIMING**

Globex is preparing for an exploration drilling program in Western Bass Strait in the Barramundi lease and the estimated spud date is between December 1998 and January 1999. It is proposed that a single exploratory well will be drilled in the permit (T/27P) some 120 km north of Wynyard in Northern Tasmania. The well location is known as Barramundi-1. The coordinates are 39.67° South, 145.74° East and the water depth is 70 m. The well will be drilled to a total depth of approximately 3000m. The duration of drilling is estimated at 35 days if production testing is carried out.

**1.2 THE RIG**

The proposed rig is a semi-submersible (Sedco 700) owned by Sedco Forex. Details are given in Appendix A. Eight anchors will be used to anchor the rig to the seabed: two from each corner with an overall radius of approximately 1000m. An exclusion zone of 1.5-km radius from the rig will apply to all non Globex-contracted shipping including fishing vessels.

**1.3 SERVICING OF THE RIG**

The rig will be serviced by two support vessels of approximately 9000hp each, operating out of the supply base at Geelong, Victoria. The support vessel operation will ensure that there is always one vessel in attendance at the rig at all times. The supply program will involve approximately 1 trip per week to the rig during the duration of the drilling program. Both support vessels will be required to tow the rig into position.

Helicopter support will be provided by Lloyd Helicopters using a Sikorsky S76A based at Essendon airport. It is estimated that there will be about 3 to 4 trips per week during the exploratory drilling program.

**1.4 THE PROPOSED DRILLING PROGRAM**

A seabed site survey will be undertaken which will entail echo sounding and side scan sonar in order to determine the state of the seafloor, in particular any drilling debris, prior to drilling the proposed exploration well. Some core sampling will also be undertaken to ascertain the anchoring characteristics of the seabed at the well location. A shallow seismic survey will also be shot over the prospective area in order to detect any shallow gas effects.

The rig will be towed into location on completion of a program of drilling two wells for Shell New Zealand. It is scheduled to arrive on location at Barramundi in December 1998/January 1999, subject to availability. The planned drilling program is shown, as a time, depth and casing schedule, in Figure 1. It is planned to drill a 17 <sup>1/2</sup>" (45 cm) top hole section into which 13 <sup>3/8</sup>" (34 cm) casing will be set at approximately 800 m. From this, a 12 <sup>1/4</sup>" (31 cm) hole will be drilled to the proposed total depth of 3000 m. If the well encounters significant hydrocarbons, a 9 <sup>5/8</sup>" (25 cm) casing string will be set and a production testing program will commence. If the well fails to encounter hydrocarbons, the well will be plugged with a series of cement plugs according to standard oil industry practice. The temporary well head and guide base will be removed and the casing will be cut off below the seafloor, leaving no protruding impediment to fishing activity. If significant reserves are found, the well will be disconnected with suspension cement plugs and a well cap (which will protrude above the seafloor).

Only seawater-based mud will be used for the drilling. Simple additives such as potassium chloride, starch-based polymers and possibly bentonite and barite will be used to make the mud suitable for normal drilling techniques. It is expected that during the drilling process, approximately 1000 m<sup>3</sup> of mud will be discharged into the ocean, whereupon it will be rapidly diluted.

It is not considered likely that tracers will be used although, if it does become necessary to calibrate the rates of rise of material, calcium carbide tracers would be used.

## 1.5 DISPOSAL OF CUTTINGS

Cuttings formed during the drilling of the top hole section will remain on the seafloor. Once the casing is set in place, the cuttings will be raised to the drilling platform, separated from the drilling mud and discharged overboard. The cuttings slide will lead directly over the side of the drilling rig so that the cuttings will settle through the water column. This will avoid or reduce any mounding of the cuttings on the sea floor.

## 1.6 POLLUTION CONTROL

### Domestic waste

The rig will have about 80 people on board. All domestic waste will be collected and placed into containers for return to shore on the supply vessel. From there it will be taken to the nearest municipal refuse dump by a waste disposal contractor. No burning of waste on board the rig will be allowed.

The rig has the capability of producing about 1.5 tonnes of potable water per day by reverse osmosis. However, bulk freshwater will be transported via the supply vessel.

### **Sewage**

The rig will have a self contained sewage treatment system that will process the sewage before disposal of the treated effluent into the ocean. It is expected that 320 m<sup>3</sup> of effluent will be discharged.

### **Solid waste**

All solid waste material arising from drilling operations will be collected by the supply vessels and returned to shore for disposal by a waste disposal contractor. Underwater video of the seafloor will be taken below the rig before and after drilling to determine whether any solid material has been accidentally jettisoned. Any such material will be recovered using the rig's Remotely Operated Vehicle (ROV).

A manifest will be kept to document all material that moves on and off the supply boats and a final inventory of all supplies and materials will be made at the end of the drilling program before the rig is passed on to the next operator for their drilling program. The inventory will include all hazardous material, chemicals and bulk items being transported to the rig and waste materials being returned to shore. This will enable any audit of environmental practice, if necessary, and would enable Globex to account for the volume of materials used.

Material Safety Data Sheets (MSDSs) will be kept for all chemicals used on the rig and will be accessible to all personnel.

### **Liquid waste**

It is expected that trace quantities of drill string lubricant will be washed off the drill platform and discharged into the ocean. Any oily liquid waste will be collected and returned in drums to shore for disposal at a prescribed waste dump by an EPA licenced waste contractor.

Storage of liquid wastes must be banded in order to contain any leaks or spills.

### **Fuel Transfer/storage**

Globex has agreed that its Drilling Contractor's (Sedco Forex) standard procedures for transferring fuel from the supply vessel to the rig's fuel tanks will be followed, involving manual supervision both on the rig and supply vessel at all times. The volume and frequency of transfer of fuel from the supply vessel to the rig will be recorded in the manifest.

### **Transfer of drilling mud**

Drilling mud additives will be transferred to the rig in dry sacks and stored in the dry sack room.

### **Contingencies**

Contingencies for blowout prevention will be covered in the drilling contractor's safety manual. Hydrocarbon or hydrogen sulphide gas will be detected by the mud logging process.

## 2. DEVELOPMENT PLANS IF DRILLING IS SUCCESSFUL

In the event that the exploration drilling is successful, the possible scenarios for the production of gas would depend entirely on the estimated recoverable reserves and initial well daily flow rates. Depending on reserves and the economic comparisons at the time of production, the various scenarios might include:

- A fixed platform; or
- A Floating Offshore Production Facility.

The options for evacuation of gas may include:

- A flow line to a floating storage unit (FSU) with shuttle tankers transporting the gas;
- A direct pipeline to a refinery and distribution link in Victoria; or
- A direct pipeline to a refinery in northern Tasmania.

Depending on the hydrocarbons discovered, the production facilities may comprise oil/gas/water separation, oil dehydration, and power generation/distribution. A decision on the development scheme could not be made until the results of the well are known and the discovery has been properly appraised.

### 3. DESCRIPTION OF THE ENVIRONMENT POTENTIALLY AFFECTED BY DRILLING

An Oil Spill Contingency Plan (OSCP) for Sagasco Resources for the proposed drilling of Yolla fields was prepared jointly by Dames & Moore and Labrador Petro Management Ltd in 1992. This assessment area is near the proposed Barramundi well and therefore relevant to Globex Far East EMP. The environmental assessment related to exploration in the Cormorant, Yolla and Pipipa fields.

#### 3.1 GENERAL ENVIRONMENTAL SETTING

##### North Tasmania

In relation to coastal parks and reserves, and sensitive coastal habitats of North Tasmania, the Tasmanian Department of Primary Industry, Water and Environment is currently in the process of updating the maps and information, with proposed protection zones in environmentally sensitive areas along the coast. While this update is in early stages, the extracts of the Coastal Resources Atlas provided in the 1992 report for the Yolla drilling, remains current. Since any oil potentially spilled in the Barramundi area is not predicted to reach land, the descriptions of sensitive coastal environments and existing maps used in the documentation are provided only for background information.

However, there has been new legislation enacted in Tasmania that is relevant to the coastal zone. The new legislation is the *State Policies and Projects Act 1993* where provision is made for the development of Tasmanian Sustainable Development Policies. These policies address the use, development and protection of natural and physical resources, together with the objectives relating to public involvement and the sharing of responsibility in resource management and planning as well as those relating to economic development.

In accordance with this Act, the *State Coastal Policy 1996* has been developed. This Policy applies to all of Tasmania, including all islands except for Macquarie Island. The Policy emphasises sustainable development and protection of natural and cultural values, as well as shared responsibility for management of the coastal zone and community participation. A State Coastal Advisory Committee will be established under the Policy with representatives from State and local government and the community.

As part of the management arrangements for Tasmania's coastline, a number of coastal precincts have been established. Responsibilities for these areas, within the Department of Environment and Planning is as follows:

**Coast Care North West Region : Anna Winns 03 64372332**

**Coast Care North East Region : Ian Sampson 03 6428 2595**

The Tasmanian Department of Environment and Planning is currently in the process of developing a Strategic Coastal Management Plan which will be implemented through the Coastal marine Program.

The *Living Marine Resources Management Act 1995* is Tasmania's major act relating to the marine environment and is administered by the Tasmanian Department of Primary Industry and Fisheries. The Act has the power to impose penalties for activities causing detrimental effect to the environment. Provisions under the Act include permits, licences, quotas and agreements for commercial and recreational fishing; marine protected areas; habitat protection plans and; various other duties relating to the administration of the act and responsibilities for protection of the marine environment. Of key relevance to mining activities (and other development) is Schedule 1 *Objectives of the Resource Management and Planning System of Tasmania*. This relates to sustainable development of natural and physical resources. This would need to be addressed if development of this field is to follow the proposed exploration.

## Victoria

Victoria has also had changes to its coastal management system with the introduction of new legislation, particularly the *Catchment and Land Protection Act 1994*; the *Fisheries Act 1995*, *Fisheries Further Amendment Act 1997* and *Coastal Management Act 1995*. The Victorian Coastal Council has been set up under the Coastal Management Act as the peak body for the strategic planning and management of the Victorian Coast and to provide advice to the Minister in regards to Coastal issues. Coastal Boards have been set up for regions within Victoria to oversee implementation of the Victoria Coastal Strategy.

In the documents *Marine and Coastal Special Investigation Descriptive Report (June 1993)* and the *Marine and Coastal Special Investigations Draft Final Recommendations (June 1996)*, the former Land Conservation Council (now known as the Environment Conservation Council) has proposed that the existing Wilsons Promontory National Park and Marine Reserve will be extended offshore to the south and west to include areas for a "Sanctuary Zone" and "Marine Park". The Environment Conservation Council has been set up under the *Environment Conservation Council Act 1997*.

A Marine Park is an area of coastal, intertidal, or subtidal land and overlying waters that cover it, or because of its natural environment, is of conservation or scientific significance and contributes to the provision of a system representing the range of marine and coastal habitats of the State.

Sanctuary Zones are given the highest level of protection for conservation of biodiversity by the former Land Conservation Council (LCC). Sanctuary Zones are areas of scientific reference and include examples of a range of marine environments. Sanctuary Zones are proposed to exist within larger Marine Parks, as this will facilitate their management and provide for a buffer against threatening processes.

The current status of the LCC's documents are that they remain drafts and are now the responsibility of the newly established Environment Conservation Council (ECC) administered by the State Department of Natural Resources and Environment. The ECC has published an Interim Report

*Marine, Coastal and Estuarine Investigation (Feb 1998)* which complements the former LCC Reports.

According to the ECC's latest Report, if exploration drilling is proposed in a proposed marine park, the exploration drilling proposal should be subject to Government approval under strict conditions which are to be made available for public comment. The ECC also states that most exploration of oil and gas prospects under marine parks should be possible using non-disturbing techniques or exploratory drilling from adjoining areas (ECC February 98 p.29). However, exploration will not be permitted in sanctuary zones or special nature sites, (ibid p.54).

Wilson's Promontory is represented by rocky (granitic and calcarenite) intertidal and subtidal habitats, seagrass bed habitats, intertidal sandy beaches and subtidal soft substrate habitats. The extensive system of submerged dunes off the western coast of Wilson's Promontory and the granite cliffs create combinations of habitats and biological communities uncommon along the Victorian coast. Wilson's Promontory is a very popular tourist destination with visitor numbers reaching 402,790 in 1993 (LCC).

Bunurong Marine Park is also proposed by the LCC and lies between the Cape Paterson and Inverloch area. This park incorporates the existing Bunurong Park (whose seaward boundary extends 1km offshore), and an additional offshore area extending to 5.5km to the edge of the States territorial sea.

Other proposed Marine Parks and Sanctuary Zones along the Victorian coastline relevant to this study are:

- Bunurong Sanctuary Zone, which extends west from Eagles Nest.
- Cape Liptrap Marine Park has also been proposed between Cape Liptrap and Walkerville.
- Cape Liptrap Sanctuary Zone, east of Cape Liptrap.
- Shallow Inlet Marine Park.
- Shellback Island Sanctuary Zone, extends offshore from Darby Beach and includes Shellback Island.
- Corner Inlet-Nooramunga Marine Park.
- Corner Inlet Sanctuary Zone, extends south from Cape Wellington and includes Waterloo Bay and is on the southern edge of Corner Inlet within the Marine Park.

### 3.2 OIL SPILL TRAJECTORY MODELLING

Dames & Moore's 1992 assessment indicated that none of the spill scenarios modelled for the Yolla, Pipipa and Cormorant sites resulted in oil impacting with either the Victorian or Tasmanian coastline. Oil was predicted to reach the northern Tasmanian coastline from simulated spills from the Pipipa site under 2 percent of wind conditions and was predicted to reach the Victorian coastline from simulated spills from Cormorant under 3 percent of wind conditions. These landfalls were predicted

after 96 hours of winds of continuous direction, an unlikely event and one where considerable weathering of oil would be expected by the time of landfall.

Recent discussions with Mr Peter Greilach of Marine and Freshwater Resources Institute, 03 52580111 (who undertook the original modelling), have confirmed that the tidal and current inputs used at that time were from the current OSSM hydrodynamic model of Bass Strait. Wind conditions used for the modelling would also still be applicable, and on this basis, no additional trajectory modelling has been necessary.

The Iron Baron spill has not altered the validity of the OSSM model for undertaking predictive work. It is still in use federally and remains unchanged since the original report for Sagasco in 1992. Similarly, the current database remains unchanged in the region and as such, the original work would remain unchanged if repeated today. The Iron Baron spill was a significantly more complex modeling exercise than any spill from the Yolla and adjacent Bass Strait fields. The complicating factor in the Iron Baron spill was the interaction between the longshore currents due to Bass Strait and the offshore plumes emanating from the Tamar Estuary. The spill was also very close to shore and landfall was inevitable.

Although trajectories have not been modelled for the Barramundi location, it would be unlikely that a spill would result in any landfall. Winds are predominantly W-SSW and would tend to push spill away from land. The scenarios in Dames & Moore's (1992) report for Sagasco's proposed exploratory drilling required constant NW winds of 9 – 13 knots for 4.5 days to achieve landfall from the Pipipa site. The scenario of ongoing winds in one direction is extremely unlikely. It is more likely that winds will shift around towards the west/south west and back again, increasing the time of the spill on water before landfall. After the period in question, the spill would have undergone significant loss of mass through evaporation and the landfall (if any) is most likely to be scattered tarballs.

Since any oil potentially spilled during exploratory drilling at Barramundi is not predicted to reach land, descriptions of sensitive coastal environments, resources and areas of commercial, recreational and cultural importance and assessments of their vulnerability to oil spills are provided as background information in Dames & Moore (1992). The following section summarises the potential environmental interactions of the exploratory drilling project through the physical presence of the drilling rig, the supporting activities and impacts of spills on the oceanic environment of the permit and adjacent areas. This is described in terms of physical features, areas of specific biological sensitivity and areas of commercial use. This is summarised from Dames & Moore's (1992) environmental assessment of Sagasco's exploratory drilling in Bass Basin, updated as appropriate to reflect existing commercial fishing conditions.

### 3.3 PHYSICAL FEATURES

#### Wind Patterns

Since 1956, three-hourly weather observations have been routinely made at King Island by the Bureau of Meteorology. Wave observations are also made from this station. The patterns indicate that winds from the southwesterly and northeasterly quadrants are typical. Winds from the southeasterly quadrant, whilst infrequent and not "typical" can be produced by strong weather systems that occasionally occur in the Tasman sea. When these easterlies arise, their effect in the Bass Strait basin can be significant. In the event that real-time modelling of this region is required, wind data from King Island can be supplemented with data from Burnie and Cape Otway.

### **Water Circulation**

The strength and direction of the water currents are generally predictable in the study area with tidal currents prevailing most of the time. For short periods (12 - 72 hours), the water currents can be influenced by the major eddies moving into Bass Strait from the Tasman sea, or perhaps by coastal trapped waves. If such currents are present and are of sufficient strength, they may influence the trajectory of the oil however, they are not important under "typical" conditions.

The strength of the tidal currents varies with the spring/neap cycle of the lunar month, which may also slightly modify the expected oil spill trajectory. However the distance of the drilling area from the shore and the consequent time of travel of the oil over several tidal cycles means that the time of tide would not have a critical effect on the timing and location of any beaching.

### **Waves**

The wave climate of western Bass Strait is associated with prevailing westerly winds and results in wave heights in the range 2 - 5 m. Under extreme conditions, associated with intense low-pressure systems further to the south, significant wave heights for design conditions are likely to be in excess of 10m. However, to the east of King Island, there is significant attenuation of wave height due to change of topography and current interaction.

## **3.4 SIGNIFICANT MARINE BIOLOGICAL COMMUNITIES**

### **Benthic communities**

The seabed of Bass Strait is characterised by a wide variety of grain sizes. Sediments in central Bass Strait are predominantly fine sand and mud where tidal currents are slowest. In faster current areas on the eastern and western margins of Bass Strait, the finer material has been generally winnowed out leaving coarser sand and shell material. The benthic communities (fauna living on it in the seabed) are expected to be impacted by the discharge of drill cuttings and drilling fluids that would have a localised smothering effect on the seabed in the immediate area of the rig. Existing benthic studies of Bass Strait and the continental shelf indicate a high diversity and a wide distribution of species present (Poore et al. 1985; Wilson & Poore 1987; Poore et al. 1993).

In most cases, the fauna has been examined with the main purpose of describing the species present. Descriptions of the fauna have been hampered by the poor state of knowledge of the species present

and their characteristics prior to the surveys and need for revision of some invertebrate groups. Consequently, results are more advanced for some groups than others. However, some general conclusions have emerged. A major finding is the high marine species richness (Poore & Wilson 1993).

In general, the results from Museum of Victoria Bass Strait surveys indicate that:

- The fauna are indicative of endemic warm temperate southern Australian faunal element.
- The remarkably high numbers and diversity of a wide range of invertebrate groups has been a recurrent observation of all surveys in Bass Strait. This may be partly attributable to the stable biogenic sediments but even in areas of terrigenous sediments, diversity is high compared with equivalent areas of the northern hemisphere.
- Many species are widely distributed across the Bass Strait, suggesting heterogenous sediments and many microhabitats.
- There is evidence that the deeper central basin of Bass Strait, where finer sediments are found, does not favour some species.
- Some species with warm water affinities are found, their distribution influenced by the East Australia Current which carries their larvae into Bass Strait.
- Some separation of distributions resulting from the original Victoria-Tasmania land bridge are still evident.
- There is a strong influence of sediment types - particularly the dominance of the relatively stable shelly sediments of biogenic origin on the shelf and terrigenous sands confined to marginal environments and embayments.
- A significant component of the fauna is comparable only with fossil record material: some molluscs, bryozoans and brachiopods have been collected alive for the first time in Bass Strait.
- Some invertebrate groups are allied with fauna from Antarctic seas. In winter, the east coast of Tasmania is supplied with water from the sub-Antarctic, the overlap with the East Australia Current contributing to the high diversity.

The existing data have not been collected or analysed in a way to provide any detailed assessment of the fauna of specific areas such as the Barramundi project area. Many of the faunal groups still have not been completely analysed and remain with the Museum of Victoria. However, the main finding of relevance is the wide distribution of the species and heterogeneity of benthic habitats within a

small area. This implies that the Barramundi project area does not contain any unique faunal elements, although this cannot be stated with certainty.

### **Marine birds and mammals**

Many species may occur along the north coast of Tasmania. Those considered at most risk are the rafting and diving birds in the predicted spill path areas and for this reason, wader habitats outside any predicted landfall area have not been re-examined since 1992.

There are no known areas of significant offshore seabird accumulation within the study area although a number of species frequent the area for feeding, including prions, diving petrels, short-tailed shearwaters, cormorants, and little penguins. Fairy terns (which are listed under Victoria's *Flora and Fauna Guarantee Act 1988*) and albatrosses may also occur in the area. Significant areas of offshore aggregation normally occur along the continental shelf margin, particularly in areas of up-welling. While the breeding colonies and accumulations of birds in near shore coastal areas around the colonies are not at risk from spills, feeding concentrations or individual sea-birds in open waters of central Bass Strait may be affected by an oil spill offshore. These birds would be prone to oil contamination because of their diving feeding habit.

Marine mammals (whales, dolphins and seals) could accidentally become contaminated in the event of a spill occurring during their presence in the area. The responses of marine mammals to drilling noise and ship movement is not adequately known although the supply vessel will have no more impact than the frequent shipping which passes through the region.

Leatherback turtles are generally very rare visitors to colder latitudes. In the extremely unlikely event of one being seen in the area of a spill, efforts will be made to cause it to alter course, away from oil or, if oiled, treated in whatever way possible.

Birds of coastal areas could be subjected to localised, short-term disturbances caused by the supply helicopter. The route between Essendon and the rig potentially overflies the coast at Red Cliff Head, Philip Island. However, the actual coastal crossing point of the helicopter flight path will be routed at the cruising altitude of 1000 m, so that any disturbance is not expected.

Bird migratory routes are predominantly in the eastern and western margins of Bass Strait; that is, across Flinders Island to Wilsons Promontory or across King Island to Cape Otway. The Barramundi site is potentially in line with the routes used by migrating land birds and may therefore have some positive impacts, in the provision of resting areas as well as negative impacts of flares (only in the event of production testing) and light induced disorientation.

Inclusion of a First-up Wildlife Response component of the contingency plan is advised in the event of sea birds (or mammals) becoming affected by a spill. Given the location of the project in mid-Bass Strait, wildlife such as rafting seabirds are most likely to be affected at sea. Oiled birds may be in dead or in poor condition by the time of landfall.

### 3.5 OTHER USES

#### Commercial Uses

Commercial activities that may be affected by exploratory drilling at Barramundi include some commercial fisheries and shipping. The data describing commercial fisheries were originally collected as part of the environmental assessment for proposed drilling by Sagasco in 1992. At that time, emphasis was placed on general consultation with community groups. Its purpose was to provide information to address possible misperceptions about exploration drilling (as distinct from production), to discuss potential concerns and in the process, to gain resource information. Although out dated, the data are still generally relevant in broad descriptions of the types of fisheries and coastal resources of the region as a whole.

The only commercial fisheries, which occasionally operate in the central Bass Strait basin, are the Bass Strait Shark Fishery and the Central Zone Scallop fishery. For the South East (trawl) Fishery, the central region of Bass Strait is generally unproductive and not intensively fished. For the purposes of Globex's proposed drilling at Barramundi, updates on these fisheries indicate that as with the South East Fishery, the central part of Bass Strait in which the Barramundi lease area is among the most unproductive parts of the commercial fishing areas. For the shark fishery, most effort is concentrated around the Victorian coast and the edges of Bass Strait, while for scallops, the productive grounds are closer to King Island and the Furneaux group of islands. The shark fishery has been particularly stable over the past few years in terms of catches and distribution of the catches.

#### Communications Cables

Undersea optical fibre cables were installed along the seabed between northern Tasmania and Victoria during mid 1995. The proposed route of the cable passed through the T/RL1 lease, approximately 8 km from Barramundi 2. Agreements have been reached between the parties for the establishment of a Prohibited Anchorage Zone (PAZ) of 1km width either side of the cable route within the lease area. The proposed location and anchoring of the drilling rig Sedco 702 will not violate the PAZ.

## 4. THE POTENTIAL IMPACT OF DRILLING ON THE ENVIRONMENT

### 4.1 DRILLING MUD AND CUTTINGS

It is proposed that tricone bits will be used throughout the drilling. These bits produce cuttings of coarse grained sand size. The lithologies expected to be penetrated include limestone, marl, sandstone, and shale. Drilling is not expected to encounter any naturally radioactive or heavy mineral sands.

Cuttings produced from the initial drilling to 800 m depth will remain on the sea bed, initially forming a mound around the drilling well site. During the remaining drilling, cuttings and some drilling mud will be discharged over board to the surface (in an approximate ratio of 2 : 1 cuttings : mud) as described in Section 1.4, with some surplus mud being discharged at the completion of drilling. The total volume of drilling mud, (which has approximately 20% solids), expected to be released to the marine environment is 1000 m<sup>3</sup>. Thus the total volume of mud plus cuttings will be of the order of 1200 m<sup>3</sup>.

Toxicity of drilling muds and cuttings discharged to the seabed is often questioned in relation to marine offshore drilling and this was also raised in 1992 and 1995. Considerable research effort has focused on this issue worldwide. Although not used in Bass Strait, oil-based muds are known from studies in the North Sea to be associated with adverse impacts to marine benthos extending several kilometers from platforms in some cases (Olsgard & Grey 1995). Conversely, the water-based muds used in Australia are relatively benign environmentally (Swan et al. 1994). Recent studies in Bass Strait (Terrens et al. 1998) have shown that in this high energy environment, detection of muds in sediments (as measured by elevation of barium) and changes to abundances and diversity of some benthic groups is of short duration and mostly limited to within 100m of the platform. Underwater video shows no evidence of mounding of cuttings beneath discharge points.

Thus, given the rapid dispersion and dilution in the open environment of Bass Strait and the short term nature of the discharge, significant adverse impacts to benthic fauna are not expected.

### 4.2 GRADE OF OIL ENCOUNTERED

The properties of any oil that could be found at Barramundi are not presently known. However, it is possible that the properties of any oil may be similar to those, which produced a waxy crude with an API gravity of 25 - 30 ° and a pour point of 33 °C. An initial pour point of nearer 15 °C would increase rapidly as the volatile components evaporate.

### 4.3 INFORMATION ON COMPARATIVE PROPERTIES OF LIKELY OIL

#### Evaporation

Gippsland Mix contains relatively high levels of volatiles, which are expected to evaporate quickly leaving a weathered viscous waxy crude. Approximately 40% of the volume of any oils spilled would evaporate within the first 24 hours.

### **Emulsification**

Gippsland Mix can be expected to form viscous water-in-oil emulsions (mousse) with between 50% and 100% water content. In typical Bass Strait weather conditions, emulsions are likely to form within 6 hours of release of any crude oil.

### **Dispersion**

Dispersion of any spilled oil occurs as a result of wind and wave action working on the oil to produce particles small enough to be come suspended in the water column. Oils that form stable water in oil emulsions tend to disperse very slowly.

Based on the assumed characteristics of the oil, the overall effect is likely to be;

- emulsification within the first few hours;
- loss of the lighter fractions being offset in volume by the emulsification process;
- gradual dispersion depending on wind and wave energy; and
- effectiveness of dispersant application will be highest during the first six hours of a spill.

## **4.4 RISK ASSESSMENT**

The proposed drilling is to a relatively shallow depth and it is not expected that drilling will penetrate any natural, over-pressure lithologies. It is expected that at these shallow depths, the reservoir objective would not have high hydrocarbon pressures and any "kick" would be relatively easy to control.

The risks of a major blowout during exploratory drilling are difficult to estimate accurately. Risks have been estimated as extremely low; less than one spill per 1500 drilling rig years. The Bureau of Transport and Communications Economics (BTCE) estimates the risk of one or more major oil spill from exploratory drilling platforms to be 26 percent in the next five years to 67 percent over a 20 year exposure period. However, BTCE consider these figures to be based on pessimistic assumptions as no major spills have occurred from platforms in Australia and the Australian offshore petroleum industry has spilled less than 400 barrels over 26 years of production (BTCE 1991).

The worldwide rate of spills greater than 1000 barrels from offshore production and exploration is 2.05 spills per billion barrels produced during the period from 1964 - 1980. Equivalent figures are 1.6 and 3.87, from pipelines and shipping respectively. Oil spills from offshore facilities are characterised by small spills and the rare occurrence of large spills. Australian spill statistics DPIE amount to 440 bbl (70 000L) up to 1991 (including spills greater than 320L). From 1965 - 1991, DPIE recorded 51 incidents, of which 29 were of at least 320L. Best estimates of oil spilled from Australian exploration and production are 600 barrels spilled in incidents involving >2 bbl.

However, while the risk of a major blowout is very low, this still remains a hazard if a blowout cannot be contained. In Australia there have been no significant oil spills during drilling for offshore

platforms. There have been a total of six gas blowouts not involving the release of oil, which have been contained. The largest platform-related spill in Australia was in 1981 in Kingfish (in Bass Strait) when 10 000L of diesel (i.e. not production crude oil) spilled.

The Bureau of Transport and Communications Economics (BTCE) has published risk statistics on spill rates, based on comparisons between Australian and a variety of US offshore exploration, production and transport data and for spills in the range 1000 - 10 000 t.

From a spill rate of 0.24 per billion barrels (or 0.001L per gigalitre) from US offshore platforms, BTCE (as at 1991) estimated a probability of one or more major oil spills as much as 26 percent over the next five years and 44 percent over the next ten years. These predictions were considered in the BTCE report to be overly pessimistic on the basis that

- current Australian disciplines and conditions are superior to historical overseas conditions
- wide confidence limits of data
- spill rates from platforms have been declining in recent years.

From the available shipping accident statistics in the entire Sydney - Melbourne shipping routes through Bass St, there have been 4 incidents from 1981 - 1988, giving an accident rate of <0.1 per 1000 passages BTCE 1991). Most spills from vessels come from operational discharges and accidents during fuelling in port; 12.5 percent from tanker accidents (DASETT 1995). Adherence to procedures for notification to mariners and normal warning procedures for shipping should ensure little or no risk of collision.

#### **4.5 NEED FOR ONSHORE/ISLAND FACILITIES AND PIPELINES**

The possible scenarios for the production of oil and its transport onshore have been discussed in Section 2.

## 5. SAFEGUARDS AND STANDARDS FOR THE PROTECTION OF THE ENVIRONMENT

In order to reduce the risk of a spill to the lowest practically achievable level, Globex will follow the Australian Petroleum Exploration Association Limited code of environmental practice for offshore exploration, which will include the following measures. Globex is currently preparing an Australian Safety Case that will be forwarded to the relevant authorities once finalised.

### General

- All procedures will comply with Globex's Health, Safety and Environmental Policy.
- The oil spill contingency plan and backup resources will be ready for action prior to drilling.
- The drilling program and well casing has been designed according to the best available geological information and interpretation.
- Only modern and well-maintained drilling equipment will be used.
- Only experienced contractors with excellent safety records will be used.
- The rig is subject to US coastguard certification and all components and equipment will be subject to a series of inspections prior to the rig being on site. Any materials defects will be itemised in Globex's full audit inspection.
- All personnel will be thoroughly trained in safety procedures and the safe use of equipment.
- All appropriate safety equipment and early warning monitors will be incorporated into the drilling program. Rig safety procedures and operator safety manuals will be made available by the contractor ahead of the scheduled commencement date.

### Specific

- The coordinates of the rig, its schedule and the program of supply vessels will be notified to relevant port authorities and fishing industry representatives at least three weeks in advance in order to allow ships' masters to adjust routes between coastal ports.
- Supply vessel routes between the rig and Geelong do not coincide with intensively fished commercial fishing grounds, or known areas of offshore seabird accumulation.

- Helicopter flight paths are on the direct line between Essendon and the rig. Potential disturbance can be avoided by altitude and by routing the crossing point sufficiently to the east of these colonies.
- An underwater camera will be used both prior to and after the completion of the drilling to examine the well capping and the sea bed for any drilling-related debris accidentally jettisoned.

### **Wildlife**

Inclusion of a First-up Wildlife Response component of the contingency plan is advised in the event of sea birds (or mammals) becoming affected by a spill. Given the location of the project in mid-Bass Strait, wildlife such as rafting seabirds are most likely to be affected at sea. Oiled birds may be in dead or in poor condition by the time of landfall.

## 6. OIL SPILL CONTINGENCY PLAN

The Oil Spill Contingency Plan (OSCP) is currently in preparation and will be submitted to Minerals Resources Tasmania in November 1998. In general terms, the emergency response strategy will include:

- application of dispersants within the expected 6 hour effective period,
- aerial surveillance,
- prediction of movement using the trajectory model of the Victorian Institute of Marine Sciences, using prevailing weather conditions,
- containment and collection, where applicable,
- protection of estuaries, inlets and other sensitive areas using AMSOC equipment.

## 7. CONSULTATION

Sagasco's initial environmental issue analysis (Dames & Moore 1992) identified 29 community groups including State/Local Government departments, conservation groups, primary producers, recreation/tourism interests, commercial interests and local communities who might be affected, either positively or negatively if exploration drilling does lead to full production.

A community consultation program was undertaken in Tasmania from 22-28 January 1992. Meetings were held with local council representatives, State government departments, fishery groups and local conservation groups. These meetings were held in Devonport, Burnie, Smithton, Currie (King Island) and Hobart. A total of 52 people representing the various groups listed below were present at the meetings.

Burnie Chamber of Commerce	Kelp Industries
Burnie Council	King Island Council
Burnie Field Naturalists	King Island Field Naturalists
Burnie Port Authority	King Island Fishermen
Circular Head Council	King Island Marine Board
Circular Head Marine Board	Marine Board of Hobart
Counter Disaster Committee	Port of Devonport Authority
CSIRO	Royal Volunteer Coastal Patrol
Department of Environment and Planning	Save Our Coast
Department of Parks, Wildlife and Heritage	State Emergency Service
Department of Primary Industry	Tasmania Conservation Trust
Devonport Chamber of Commerce	Tourism Tasmania
Devonport Council	Ulverstone Council
Devonport Field Naturalists	Wilderness Society
	Wynyard Council

## 7.1 MAIN ISSUES

The main issues raised in the community meetings (Dames & Moore 1992) are summarised below.

### 7.1.1 General Perceptions and Concerns

- There were many questions regarding the relationship between this proposed exploration program and the recent publicity regarding a pipeline from the Yolla gasfield to the north west coast. Most people believed that it was a pre-election publicity stunt and were aware that the introduction of a gas supply was not certain, despite views expressed in the press.
- There was some confusion about possible relationships between the SAGASCO Bass Strait exploration program and other petroleum industry activity in the area, including BHPP and the issue of impacts on whales.
- The timetable for the exploration program was often asked about.
- The location of on-shore facilities such as a supply base or helicopter base was discussed, with various councils indicating the advantages of using their facilities. Many questions were raised regarding helicopters, the number of flights per day, distances involved, preferred airports, noise impacts, etc.
- Questions were asked regarding the logistics and operation of the drilling rig including issues such as size, location, use and type of drilling muds, volume of cuttings, restrictions to navigation routes, etc. It was considered that the rig, because of its size, position and lighting would present an advantage for navigation, rather than an obstacle. It was noted that the possibility of interference with recreational boats would pose more of a concern.
- A number of people disputed the claim (based on VIMS modelling) that winds do not blow north easterly toward the north west coast of Tasmania.
- It was considered that there would be greater threat to Flinders and Lady Baron Islands and the Kent Group than the coasts of King Island or north west Tasmania.
- 'Save the Coast' have warned that there will be a "wall of protest" if gas/oil discovered in the Bass field is used for production of electricity rather than as a direct energy source.
- A number of people warned that conservation/environment groups would be very concerned and negative toward the exploration. However, representatives from 'Save our Cost', Burnie, Devonport and King Island Field Naturalist Clubs, the Wilderness Society and the Tasmanian Conservation Trust were all present at meetings and not only

determined that there were few environmental issues related to the exploration, but were very positive regarding being given the opportunity to discuss the project.

### 7.1.2 Conservation Issues

- The 'Save our Coast' group was interested in the mechanics and methods of clean-up, including appropriate use of dispersants, access to coastal areas and availability of clean-up equipment and expertise.
- Mention was made of the nomination of the Rocky Cape Marine Park to the Register of the National Estate. It was not confirmed whether this remains a nomination or a listing at present, but it and 'The Nut' were considered vulnerable and contentious sites in relation to possible oil spills.
- There is expected to be little, if any, impact on bird colonies along the north west coast and in Bass Strait. Rafting muttonbirds were identified as potentially susceptible to oil spills or collision from supply vessels.

### 7.1.3 Fisheries Issues

- Fishermen on King Island indicated that the lease areas were not used by local fishermen, but that shark fisheries operated in the area out of San Remo and Apollo Bay in Victoria. These groups should also be consulted. The cray fishing and kelp industries were not likely to be affected by an oil spill, because of their location on the island. Mariculture operations at Circular Head could be affected by an oil spill if it reached the NW coast.

### 7.1.4 Councils and Coastal Agencies

- Many of the people consulted, particularly representatives from marine boards and local councils, with experience in OSCPs requested information on co-ordination and documentation of the OSCP for the Bass Basin exploration program. A number of agencies requested further consultation, when the OSCP was in draft form, so that they could add anything to it and/or ensure that their individual OSCPs included all the relevant information necessary.
- Burnie Mayor, Sandra French, indicated that they were interested in continued consultation so they could include various developments and organisation for production into their current planning program. Other authorities, such as the State Emergency Service and the Marine Board of Hobart, as well as conservation groups, also indicated their interest in the project and their desire for further consultation - particularly if the project reached the production phase.

### 7.1.5 Suggestions and Requests

- 'Save the Coast' are interested in obtaining some of the information to be included in the environmental assessment report, for their own use.
- The 'Save our Coast' group would like SAGASCO to undertake a study to determine what marine life is present in the vicinity of the drill sites and to ensure that no rare or endangered species are located there.
- Sources of information - including studies undertaken by industry, government departments and interest groups, - as well as key contacts to consult with, were provided by many of the people at the meetings.
- Dames & Moore were made aware of the various Oil Spill Contingency Plans which have been completed (or are in the process of review); including the State Plan and various local harbour plans. Dames & Moore has or are receiving copies of these. Other sources of information were also indicated. These included the Counter-Disaster Plan produced by the City of Burnie, the Coastal Resources Atlas for Tasmania, Footprints in the Sand; Tasmania's Coastline - A Discussion Paper by the Department of Environment and Planning and data collected by various local industries on the NW coast, the HEC and CSIRO.
- King Island representatives indicated a desire to be more involved in any exploration or production, especially the supply of materials/equipment etc to boost the suffering economy of the island.

### 7.2 CONSULTATION DURING 1995

- Commercial fishing operators (through Tasmanian Fishing Industry Council TFIC); the Victorian Fishing Industry Federation (VFIF) and AFMA
- Telecom
- Victorian Department of Agriculture, Energy and Minerals
- Tasmanian Department of Development and Resources

### 7.3 CONSULTATION DURING 1998

Ms Carol Bacon – Mineral Resources Tasmania

Mr Peter Greilach – Marine and Freshwater Research Institute

Dr Terry Walker - Marine and Freshwater Research Institute

Mr David Johnstone -Australian Fisheries Management Authority

Dr Gwen Fenton – Department of Primary Industry and Fisheries

Department of Environment and Planning

Victorian Environment Conservation Council (formerly Land Conservation Council)

Victorian Coastal Council

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**FIGURE**

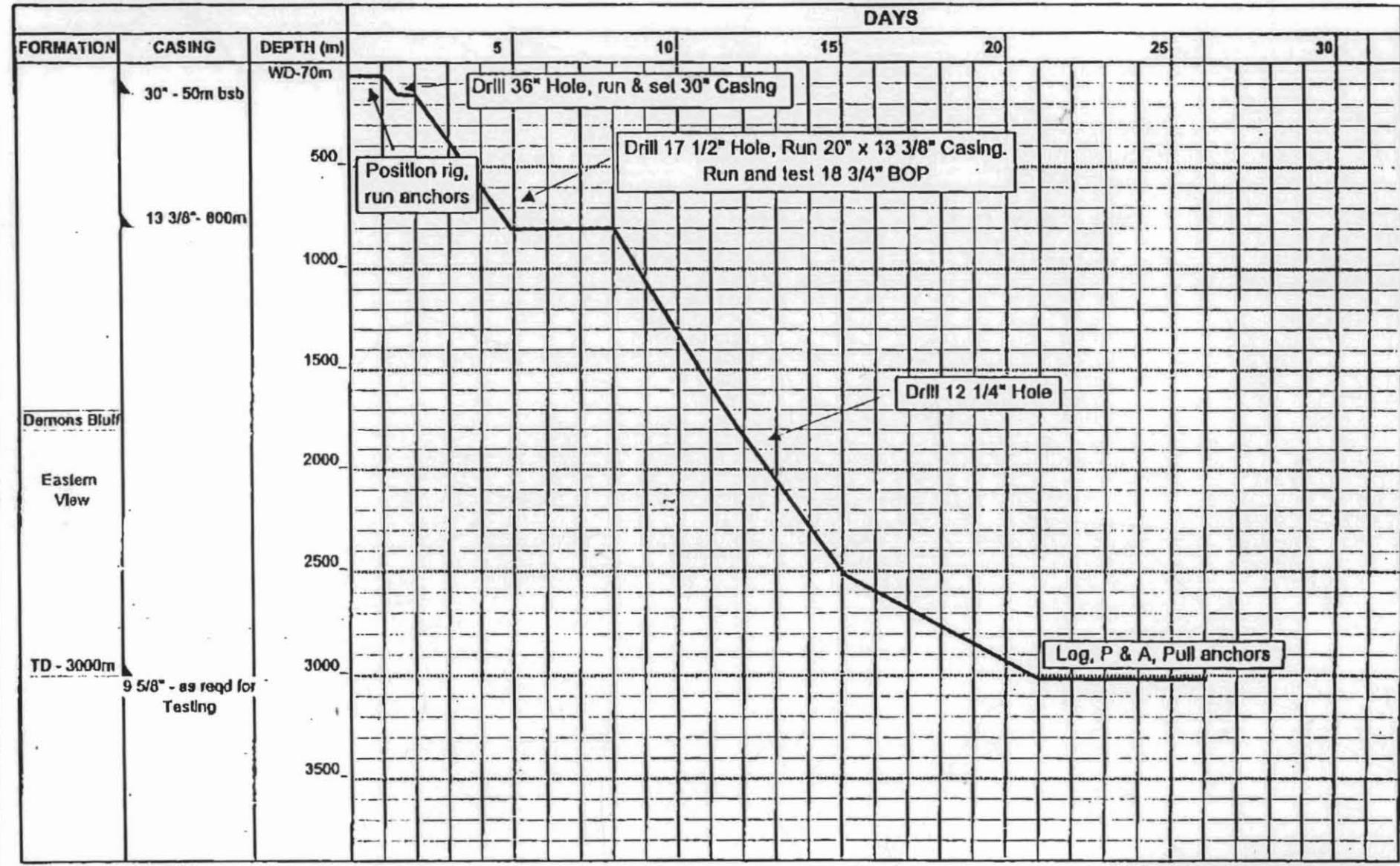
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# LOBEX Far East

## BARRAMUNDI-1 (T-27-P)

### TIME/DEPTH CURVE



Barra-td.xls/gr/28-10-98

Prepared by Kelly Down Consultants PA

FIGURE 1: Drilling Locations

01 NOV 1998 10:00  
 DARRIN & JIM VICE  
 01 NOV 1998 10:00  
 From: 6111

**APPENDIX A**

*Drilling Rig Details*

Schlumberger

Sedco Forax

# SEDCO 702

## Semi-Submersible Drilling Unit

<b>Vessel</b>	<b>Design</b>	MODU (CSDU) Earl & Wright SEDCO 700
<b>Specifications</b>	<b>Service Date</b>	April 1973 - Major enhancement/refit 1992
	<b>Classification</b>	ABS Class - +A1 (E) (M) CSDU +PAS
	<b>Registry/Flag</b>	Liberia
	<b>Length</b>	295 ft
	<b>Width</b>	245 ft
	<b>Main Deck Height</b>	130 ft from keel to top of main deck
	<b>Transit Draft</b>	19 ft
	<b>Operating Draft</b>	85 ft
	<b>Variable Load</b>	
	<b>Transit</b>	1,500 st at 21 ft Draft
	<b>Operating</b>	3,325 st at 80 ft Draft
	<b>Transit Speed</b>	7 knots at transit draft
	<b>Crew Quarters</b>	104 certified berths available along with hospital facilities for 4 persons
	<b>Rated Drilling Depth</b>	25,000 ft
	<b>Operating Water Depth</b>	Currently equipped for 1,500 ft

<b>Mooring System</b>	<b>Anchors</b>	8 - Stevpris, 12 mt Each anchor combined with 4,300 ft of 3 inch chain
	<b>Windlasses</b>	Baylor, 1,000 kips hold, 500 kips stall
	<b>Thrusters</b>	4 - Pleuger/Baylor, each rated 1600 horsepower
	<b>Environmental Capability</b>	Operating : Wind : 70 knots Waves : 70 ft at 11.7 seconds Current : 2.4 knots Survival Wind : 100 knots Waves : 110 ft at 18.8 seconds Current : 2.4 knots

<b>Storage Capacities</b>	<b>Sack Material</b>	3,000 sacks
	<b>Bulk Mud &amp; Cement</b>	15,400 cu.ft
	<b>Liquid Mud</b>	2,185 bbl
	<b>Drill Water</b>	8,700 bbl
	<b>Potable Water</b>	1,325 bbl
	<b>Fuel</b>	3,315 bbl
	<b>Base Oil</b>	3,315 bbl
	<b>Brine</b>	2,900 bbl

# SEDCO 702 Semi-Submersible Drilling Unit

551033

<b>Rig Equipment</b>	<p><b>Drawworks</b> Oilwell E-3000, input horsepower : 2,000</p> <p><b>Derrick/Mast Capacity</b> Lee C Moore 185 ft rated 1000 kips static hook load</p> <p><b>Main Power</b> 3 - EMD 12-645E9; 2,875 hp each</p> <p><b>Emergency Power</b> 1 - Detroit Diesel 16V-71, rated at 350 kW Generator : Delco, 480 V, 60 HZ, 437 kVA, 350 kW</p> <p><b>Power Conversion</b> SCR System ; Baylor Rated at : 2,500 amps and 600 volts</p> <p><b>Mud Pumps</b> 3 - Oilwell A1700-PT, input horsepower : 1,600 each</p> <p><b>High Performance</b> 3 - Thule VSM 100</p> <p><b>Shale Shakers</b> 3 - Brandt scalping shakers</p> <p><b>Topdrive</b> Varco TDS 4S</p> <p><b>Heave Compensator</b> Rucker; 400 kips, 18 ft stroke</p> <p><b>Deck Cranes</b> 2 - National OS-435 Rated : 55 st at 30 ft and 13 st at 120 ft max radius</p> <p><b>Rotary Table</b> Oilwell: 49-1/2 inch with independent drive</p> <p><b>Riser Tensioners</b> 8 - Rucker; Capacity : 80 kips each, 50 ft line travel</p> <p><b>Cementing Unit</b> Dowell Schlumberger; 15,000 psi with recirculating mixer</p> <p><b>Burner Booms</b> None</p> <p><b>Subsea TV System</b> Hydro Products WC-125 for 1,500 ft water depth</p> <p><b>Communications</b> Marisat 'A' 1 - VHF Sailor radios RT2047 Inmarsat terminal 1 - Fax machine, Canon FAX270S 2 - Sailor SSB radios; one 600 watts PCP and one 250 watts PCP</p>
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<b>Blowout Preventer Equipment</b>	<p><b>Diverter</b> Hughes Regan KFDS-3, 47 inch, Pressure rating : 500 psi</p> <p><b>Slip Joint</b> Hughes Regan, size : 26 inch OD by 20 inch ID, Stroke : 55 ft</p> <p><b>Riser</b> Hughes Regan FD-8, integral riser Size : 21 inch, Length : 1,500 ft</p> <p><b>Lower Marine Package</b> Two, NL spherical Size : 18-3/4 inch, Pressure rating : 5,000 psi, H2S Trim LMRP Connector : Cameron Collet</p> <p><b>Blowout Preventers</b> Two, CIW Type U double Size : 18-3/4 inch, Pressure rating : 10,000 psi, H2S Trim Wellhead Connector : Cameron Collet</p> <p><b>Choke Manifold</b> Cameron 3 inch, 10,000 psi, H2S Trim</p> <p><b>BOP Control System</b> Koomey hydraulic Accumulator capacity : 1,500 gal.</p>
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