

Communication

A local command post should be established at the scene of a spill. This could be just the nearest telephone or a portable radio. Ensure that all supervisors have the necessary radio frequencies, telephone and telex numbers. It is a good idea for priority and speed reasons to give a large incident a code name or number.

Documentation

Accurate records should be kept detailing manpower, equipment and materials used at a particular spill. This will assist in formulating a claim for clean up costs and will serve as a useful guide on future incidents. Amounts and type of oil spilt and recovered, times and names of witnesses etc.

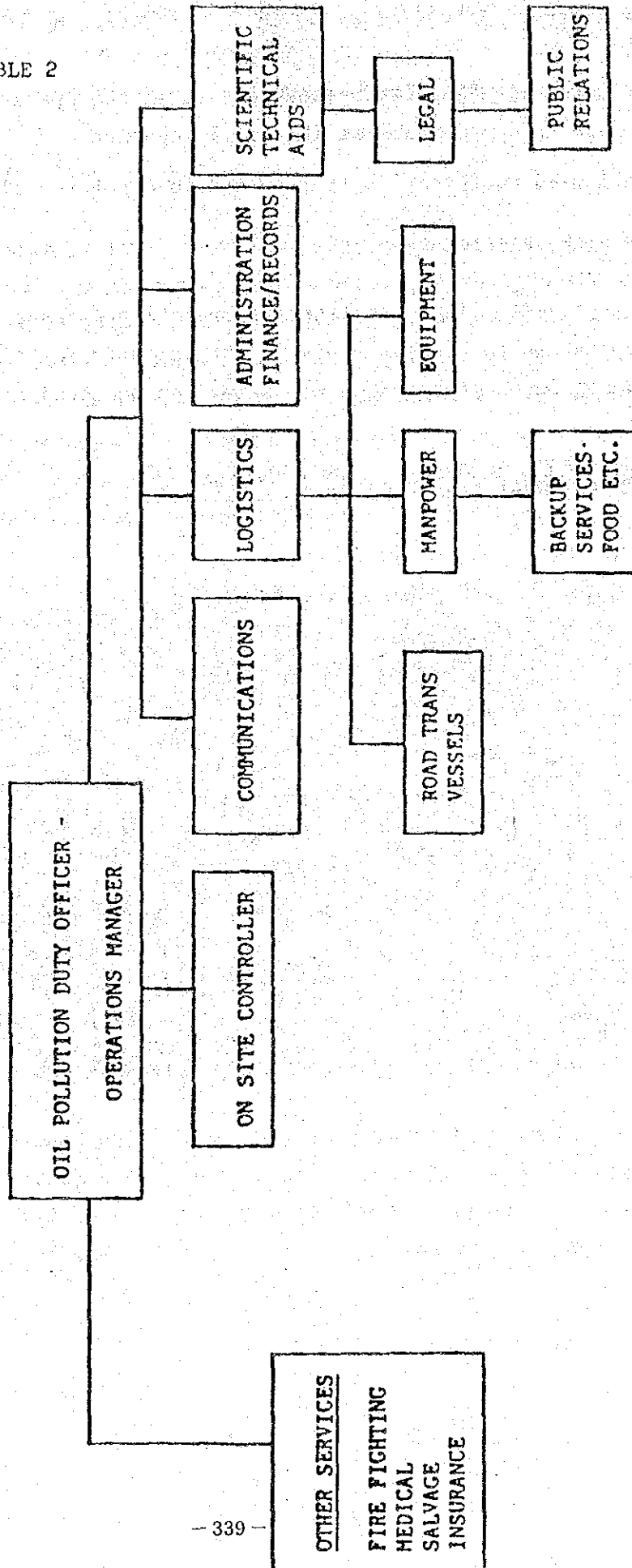
Procedures

Responsibility for procedures and for training and up dating information should be defined. Training programmes must be developed and exercises to test lines of communication and reporting methods are an essential part of the contingency plan.

A post incident meeting should be held immediately following the termination of activities.

An actual oil spill will provide important information enabling improvements and adjustments to be made to the overall plan.

TABLE 2



Termination of Clean Up Operation

Liaison with all interested parties in the operation and level of clean up appropriate at the spill location.

All used equipment to be returned to depot for cleaning and repair.

Replace all consumables.

Prepare detailed report on the operation and assess costs of the operation to present claim on the polluter for clean up costs.

Guidance on preparation of claims can be found at Annex B

Operational Flow Diagram - See Table 2

REPORTS ON VISITS TO SPECIFIC ORGANISATIONS

WITH RECOMMENDATIONS

(reports are in chronological order of visits)

Karachi Fish Harbour

Located in the Karachi Port Trust area this is a very congested harbour with about one thousand, mainly wooden, fishing boats with an average length of fifteen meters. Pollution arises from general garbage and oily wastes being thrown into the water as there does not appear to be any other alternative. The water in the harbour exchanges slowly because the harbour is at the end of a tidal creek and it is almost totally filled with boats. I understand that there are plans to enlarge this fishing harbour.



I strongly recommend that a new bunkering point be situated near to the entrance. At this fuelling point a reception facility should be provided where all waste oils and contaminated materials can be received and collected. A local contractor should be appointed to

clear the reception tank for the correct and safe disposal of the waste. The bunkering point should be maintained to a high standard with hoses submitted for regular inspection and testing and receptacles provided for hose drainage. Garbage skips should be placed at convenient locations and arrangements made for regular collection and disposal.

Pakistan Refinery Ltd., Korangi Creek, Karachi.

This refinery has been operating for approximately twenty-five years. It receives a wide range of crude oils via a twelve inch pipeline from the KPT jetty some eleven kilometres away. Deliveries are also effected by road tanker. The refinery produces heavy fuel oils, diesel and refined products. Cooling water is a closed system using raw water. Process and surface water flows into an open API type separator before being released into the creek.

At the time of my visit this separator was not working correctly and visible oil was being discharged. It was obvious that the final straw basket strainers had not been cleaned for some considerable time and were completely ineffective.

The immediate action is to remove and replenish the straw baskets, overhaul the working parts of the separator and thereafter maintain a higher standard of ongoing maintenance.

I also recommend that a new API separator be constructed with about four times the existing surface area as I consider the present unit to be too small for the current size of operation. Sludge is a problem and I feel that dust and sand blown into the pits contribute to this formation. I suggest the tanks are covered with light sectionalised lids.

Existing and Proposed Fish Harbour In and Around Korangi Creek

There are a number of fishing harbours in this area with large numbers of fishing boats ranging from five to fifteen meters LOA. Very rich fishing and fish breeding areas are associated with Mangroves in the coastal area. There is a Thermal Power Station at Korangi and water is taken for cooling. This intake should be station.

There is a new fish harbour planned at Abro Spur and this should include a reception facility for waste oil and garbage.

Existing fish ports should be provided with facilities to deposit waste oils and garbage for correct and safe disposal. Considerable quantities of waste oil could be seen floating amongst boats in the harbour at Korangi.

Mercantile Marine Department - Karachi Office

A branch of the Ministry of Communications, this Department carries out ships survey and safety checks. I was informed that all ships over five hundred tons flying the Pakistan flag are fitted with oily water separators and monitors to satisfy the MARPOL 73/78 discharge requirements.

Mr Habib A Dar, Engineer and Ship Surveyor handed me a thesis he has compiled for his Master of Science degree, entitled 'Marine Pollution on Pakistan Coast'. This paper is to be commended and I feel that Mr Dar could contribute to any oil pollution training programme set up in Pakistan. This Department could also carry out safety checks and testing of hoses and fittings used during fuel and crude transfer in the port area.

National Refining Limited, Korangi, Karachi

The largest refinery in Pakistan, processing a range of crudes into a wide variety of hydrocarbon products. Receiving crudes from Keamari Tank farm about thirteen kilometres away by pipeline, plus supplies via road tankers. There are about forty large above ground storage tanks at the refinery which has been operating for some twenty three years. The original API type oily water separator has recently been supplemented by a newer and larger separator. Both units appeared to be working well although some problems are experienced with sludge and rubbish blown into the tanks.

A new water treatment plant designed by BP Limited has just been commissioned and in all I was satisfied that good efforts were being taken to keep to a minimum the oil contamination of the effluent.

Karachi Shipyard and Engineering Works Limited - Karachi Port

This is a large shipyard capable of building ships up to twenty-six thousand DWT and with three berths and cranes up to forty tonnes capacity is able to build all types of marine craft, both cargo and passenger. In addition a full range of repair work and conversions are undertaken. Three dry docks, one large enough to take twenty-six thousand DWT ships.

A comprehensive range of fabrication and engineering workshops including a small iron and steel foundry allow this yard to take on almost any type of engineering manufacture from structures to coded pressure vessels. In the oil pollution field they are keen to be involved in the building of oil reception barges, skimmer vessels and storage barges and, to assist in this, was provided a basic design for a floating reception barge also capable of receiving ships garbage.

The shipyard itself has no means of receiving or treating oily water or oil from ships which may be in for repair or service and it is suggested that a floating reception facility as previously mentioned should be built for their own use. The successful use of such a craft would help to convince Karachi Port Trust to purchase a similar barge.

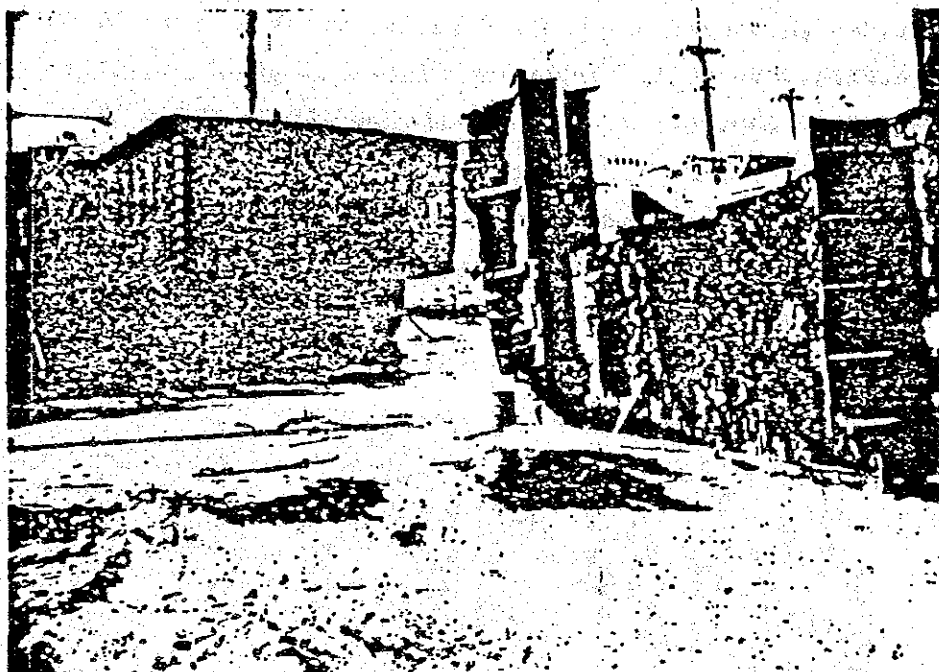
Gadani Ship Breaking Beach (about fifty kilometres West of Karachi)

This ship breaking area consists of an almost straight beach of fine sand stretching in total for twenty kilometres. The foreshore is divided into over one hundred plots operated by individual ship breakers. There is a Pakistan Ship Breakers Association currently with 90 members.

1982 was the peak year for breaking at Gadani and 30,000 workers were employed but the business has fallen off because of economic reasons and only 12,000 men are now working. The largest ship to be beached for scrapping to date was 34,500 DWT.



The ships are driven onto the beach by their own engines or positioned by tugs then winched up. Tankers are checked to be gas free before cutting is commenced. Most ships have fuel oil remaining in their tanks and a large ship can produce 50 tonnes. Tankers can hold up to 300 tonnes of oil and sludge. Most of these oils are quickly removed for resale but a lot of oil and sludge leaks and is washed out when the large section of the ship is cut and dragged up the beach for further cutting. Under these circumstances it is difficult to understand how ships can be gas free if there is still sludge in the tanks.



Whilst there was plenty of evidence of oil in the water and on the beach near to where tankers were being broken, the beach itself did on closer inspection appear to be self cleaning and oil penetration was slight.



number of steps can be taken to reduce oil pollution in this
ea.

- 1) More oil could be removed before cutting starts by the use of more efficient pumps such as double diaphragm, positive displacement or submersible pumps which are all available from the ships themselves.
- 2) Sludge which is removed manually must be transferred to the shore in drums or tipped into a barge alongside instead of being thrown into the sea.
- 3) When breaking tankers a boom could be placed across its stern and the next ship each side so that oil spilt would be trapped between the hulls, then either skimmed with floating equipment or beached for manually lifting into drums. This would not be practicable in the Monsoon Season (or even necessary).

- 4) Sludge and oil should be collected and incinerated when tanker sections are set alight to rid them of residual oils before further cutting.

It is believed that because of the nature of the beach and prevailing weather conditions little of the spilt oil migrates away from the immediate area. It is recommended that the National Institute of Oceanography carry out seasonal surveys to determine the offshore movement of oil from these beaches.

Pakistan State Oil Co. Ltd., Keamari 'A' Terminal, Karachi.

This installation is only one of many in this area operated by different Companies, some handling hydrocarbons, others palm oil and molasses.

P.S.O. receive crude via pipeline from OP4 in the Karachi Port for onward pumping to National Refinery Ltd. They also receive refined products by pipeline and carry out blending and distribution. Some 400 road tankers averaging 2000 gallons are filled daily plus 150 rail tankers. Also one pipeline takes kerosene and diesel up country.

There is no equipment on site to combat an oil spill although it is inevitable that spillages will occur from time to time. Anti-pollution equipment and materials should therefore be kept in a state of readiness to deal with minor spillages.

Water from pipeline flushing is released within the bund walls of the receiving tank and allowed to soak away or evaporate.

The site seemed well managed and improvements are currently being carried out.

It is recommended that all future or replacement pipelines should be constructed to allow line pigging to take place. This would obviate the use of water flushing for separation between differing products, which is the current practice, thus reducing operating costs.

Maritime Security Agency, Karachi Port Area

This Agency, formed approximately one year ago, is at present responsible to the Ministry of Defence.

This appears to be a fast growing organization similar to a Coast Guard drawing its personnel from the Pakistan Navy. There are plans to build an all weather base in the Karachi Port area and expand its fleet of ships and boats plus the possibility of the opening of sub-bases along the coast of Pakistan. There is to be a control room on 24 hour watch with radio, telecommunications and computer links.

The role of MSA is to protect the Pakistan fishing fleet and control fishing zones, smuggling and immigration offences, to see that navigation channels are maintained and to conduct Search and Rescue at sea. A few officers have already attended oil pollution courses run by the British Royal Navy in the UK.

It is recommended that this agency should be made responsible for oil spill control and clean up in the EEZ and all sea areas outside the control of Port Trust and Authorities. They should have their own equipment and trained personnel for these duties and be prepared to give assistance to any other group engaged in a major incident under the direction of the MPCC. Close liaison with MPCC at all times is an intrinsic part of the National Contingency Plan.

National Institute of Oceanography, Seaview Town Ship, Karachi

Inaugurated by the Ministry of Science and Technology in 1981 this Institute carries out oceanographic survey work, pollution studies, fisheries development, biological and ecological projects and marine geology and geophysics plus many related activities.

The laboratories are well equipped, although not always with the latest model and the Institute owns two or three small launches. An 1100 tonnes survey vessel is put at their disposal for about one month each year.

It is recommended that the NIO is used in the overall plan to help protect the coast and fishing grounds of Pakistan from oil pollution by undertaking the following activities:

- 1) Supplementing their equipment with glass sample jars in which oil samples can be collected. Installing gas/liquid chromatograph and a spectrofluorometer, this will enable the positive identification of oils which can lead to the prosecution of a polluter.
- 2) Carrying out studies related to the fact of oils. One such study should be around Gadani beach area to establish what amounts of oil wash along the coast at different times of the year.
- 3) Designating seasonal fish breeding areas and other areas where the use of oil dispersant chemicals would be prohibited.

An organisation doing similar work in the United Kingdom is:

Oil Pollution Research Unit.
Orierton Field Centre
Pembroke, SA71 5EZ
United Kingdom

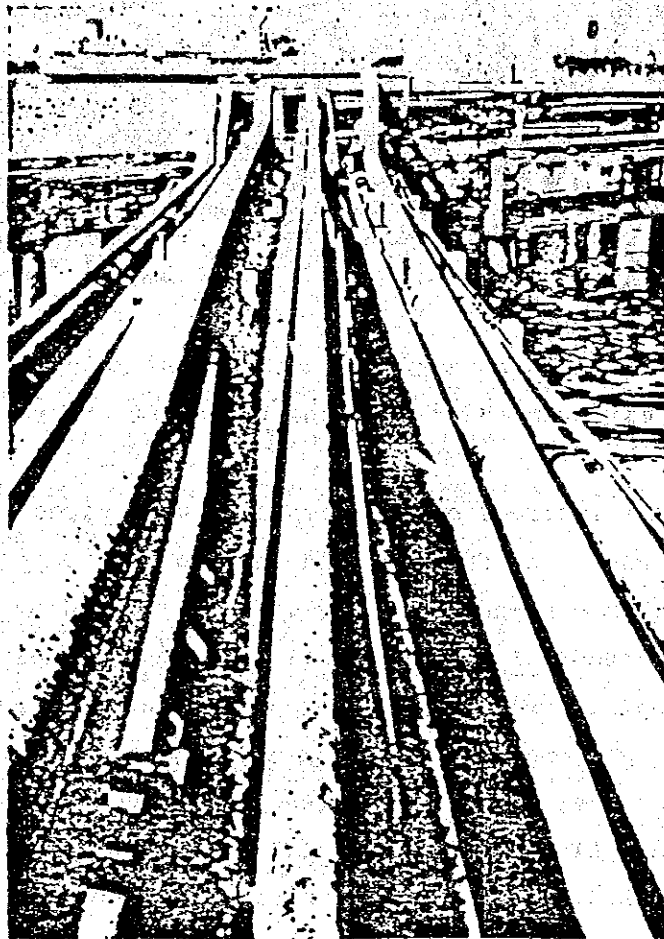
Karachi Port Trust (KPT)

Karachi Port is a large international port dredged to 12.2m and able to provide all usual shipping services. Tankers up to 75,000 tonnes are accepted and the Naval Dockyard is in the Port area. Karachi Fish Harbour comes under K.P.T. The oil jetties and pipelines to the Kearamari Tank Farm Complex are also the responsibility of K.P.T.

The Port Trust offer no reception facilities for visiting ships to discharge oily wastes or water. There are private contractors collecting garbage from ships but this appears to be limited.

The Oil Pier Installations OP1, OP2 and OP3 are in a poor state and OP4 whilst better is not maintained to the usual standards expected for an oil berth handling tankers up to 75,000T.

The pipebridge from OP1 and OP2 is overloaded with pipework and some lines are resting on top of another. A number of flanges are missing, anti-static and earthing strips have been removed and no provision for wear from movement between supports and pipeline has been made.



In many places it would be very difficult to stem a leak developing in a pipe on the inside of the cluster. There is clear evidence of heavy corrosion on many fittings. There did not appear to be any telephone from the berths to shore control. Very few safety notices displayed. Access was not restricted.



All these factors represent a potential major oil spill situation and it is recommended that the following steps should be taken.

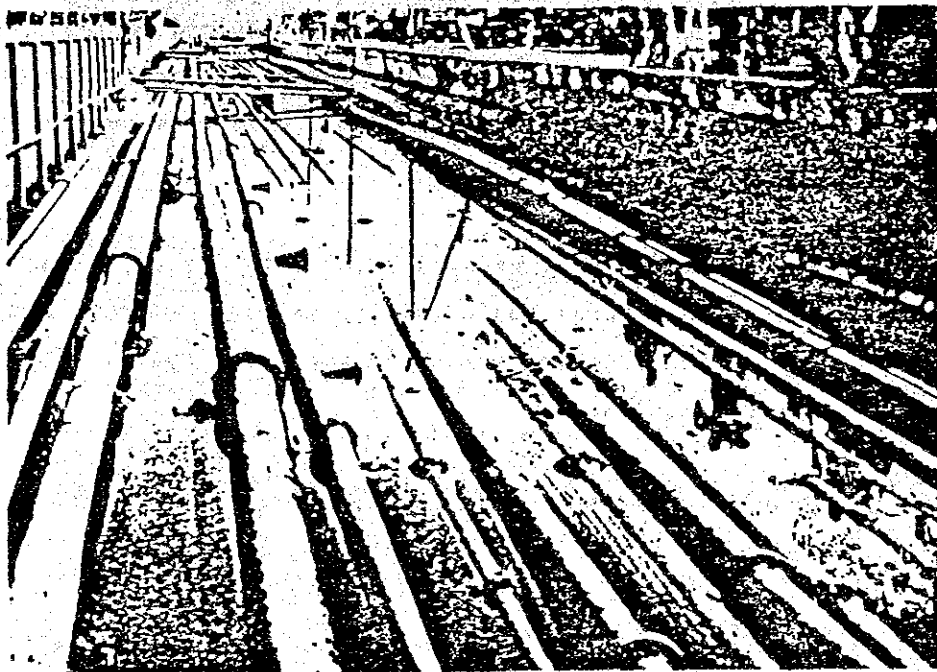
- 1) Issue instructions to companies with pipes which are no longer in use, that these should be removed from jetties and bridges within one month or they will be removed by others and costs charged to the owner. All the remaining pipes to be supported properly, allowing for expansion and contraction, and labelled at each end with owners name, products pumped, maximum working pressure, size and emergency telephone contact. All flange connections must be completely bolted. All anti-static and earthing strips to be connected and checked for continuity.

- 2) All flexible hoses used in loading or discharge should be tested at least annually and a log maintained.
- 3) Look into fitting hoses with safety shut off (breakaway) couplings. These are available but can be expensive, budget £5,500 for a 6" NB fitting.
- 4) When new balanced swing arm assemblies are installed they should be complete with automatic emergency shut off valves. New pipelines should be to piggable standard.
- 5) Fit oil discharge and receiving jetties with floating oil containment boom. Permanent between piers and temporary around each ship during pumping operations. Have on standby floating oil skimmers to retrieve any spilled oil.
- 6) Provide means of communication between oil berths and shore station. This may be already covered by radio during actual operations but a telephone should always be available for any emergency.
- 7) Provide a floating reception facility for use of any visiting ship. This barge could receive garbage and double up as an oil collection skimming vessel in case of a spill. More than one may be required.
- 8) Provide reception facilities in the fish harbour where garbage and waste oils can be deposited by boat crews.
- 9) Provide and maintain drip trays on jetty installations.
- 10) Display hazard warning notices.

11) Increase security on jetties.

12) The use of spade flanges must be banned and properly sealing valves used. Every time a spade flange is inserted there is spillage of product.

Keamari Marketing Companies Trench. This open culvert contains a number of pipelines running from the oil berths to the various marketing and blending companies. Not only pipes containing hydrocarbons but also molasses and palm oil are common to this unprotected trench. Theft, by loosing flange joints is not uncommon. I understand that the Marketing Companies are charged for the use and cleaning of this trench. At the time of my visit the trench bottom was flooded with a fermenting mixture of mineral and vegetable oils. I am told that the trench has only an earth bottom.



This is another potentially dangerous area and I would suggest the following:-

- 1) The trench should be drained by use of suction tankers and the bottom graded into concrete sumps at say every 100m. Any future spillage will drain to sumps for easy removal.
- 2) All outlets from the trench itself should be blocked and all emptying controlled by pumping into tankers.
- 3) A strong fence should be erected along full length of trench, with access points at each sump location.
Owners name and emergency contact painted on each line at sump points.

The roads all around the Keamari Tank Farm area are often heavily congested with hundreds of road tankers either arriving for loading or leaving full plus all those parked awaiting their turn. This would be a serious problem should there be a fire or pollution incident as emergency services would find it almost impossible to penetrate the area. Parked vehicles leave rubbish which adds to the fire risk.

Some method of restricting the number of these tankers in the area at one time must be devised. A parking area is provided but is little used.

Private Sector Visits

Maricon Consultants (PVT) Ltd are marine and industrial consultants, naval architects and surveyors with qualified staff and good offices at Al-Farid Centre, Moulvi Tamizuddin Khan Road, Karachi 4. They are in a position to take on contracts to advise on oil pollution control, specifying equipment, supervising installation and following through with schedules of training and maintenance requirements.

Marine Coordination Centre (PVT) Ltd, 60 Timber Pond, Keamari, Karachi. This company is able to supply a wide range of ships equipment including main engine spares, complete generators, compressors, pumps, chains, winches and light fittings. Modification, repair and maintenance services available.

MAB Group of Companies - Head Office 1st Floor Ebrahim Building, 20 West Wharf Road, Karachi. This Group has a number of activities allied to the manufacture of oil pollution containment equipment. Glassfibre moulding, foam generation, repair of life rafts, fire fighting equipment and plastic cloth fabrication.

Western Marine Engineers (PVT) Ltd, Plot 3, Fish Harbour Road, West Wharf, Karachi. A small general engineering company with facilities to build wooden and steel boats up to about 50m O/A or 500 tonnes.

Precision Rubber Products (PTV) Ltd, 28/48 Korangi Industrial Area, Karachi. This company, as its name suggests, is manufacturing high precision rubber fabrications to very tight limits. They have their own blending mills and laboratory. Ideal set up if mass production of fine limit articles are required.

There followed a visit to Bolton Market Area in Karachi where there are many stores and workshops able to supply a huge variety of engineering, agricultural, automotive and electrical products and spares.

The locations mentioned are those visited and are representative only of what is available in and around Karachi. It is understood there are larger manufacturing units in most city complexes in Pakistan.

Pasni Fisheries Harbour Authority - Karachi Office

Pasni is situated about 250 miles west of Karachi in the State of Baluchistan. A fishing port is currently under construction with planned berthing jetties of 285m. Fuel storage tanks planned to contain approximately 250,000 gallons with a fuelling point near the exit of the harbour. There is at present no reception facility in the design.

It is recommended that reception facilities in the form of a steel tank and compound be provided alongside the fuelling point so that waste oils and garbage can be deposited for controlled collection and disposal. The pipelines from the three storage tanks should be laid in a covered sectional duct which could also carry other services such as water, electrics, telephone and drainage. The tanks to be provided by a fuel marketing company will be individually surrounded by bund walls and with graded floors to sumps for pumping out.

The mouth of the port should be protected by having an oil defence boom ready to place across the entrance from breakwater to breakwater.

Pakistan Naval Dockyard Karachi Port

Large war ships are bunkered by auxiliary tankers with smaller vessels bunkered with diesel from the jetty. Jetty line was not maintained and was dripping diesel into the harbour. Ships have instructions to pump out bilges at sea but it is obvious that some discharges are made in port.

Rubbish is dumped at different points around the Base and periodically taken away for disposal inland. Ships are instructed to place all garbage into plastic sacks for disposal ashore but again these instructions are not strictly adhered to. The dockyard has its own power house taking sea water for cooling purposes. Inlet is well below low water line. Discharge of cooling water was clean during my visit. All surface water drains into gullies then into the harbour. All yard sewage is pumped from receiving tanks untreated into the harbour.

No reception facility exists for waste oils or dirty water.

It is recommended that two oil/reception barges are provided by converting existing dump barges. One of 200T and two ammunition barges of about 250T capacity would be ideal for modification for this purpose. One small and a large unit could service most of the naval ships and the modifications be carried out in the Dockyard from the basic design left with the engineering officer. Once these barges are available more stringent control of harbour discharge can be enforced.

All hoses used to load or discharge hydrocarbon products should be checked regularly and subject to test at least once a year.

It is proposed that the naval dockyard should have its own central sewage treatment plant, there is room for one and certainly this is a requirement if water quality is to be improved.

Gwadar Fish Harbour - cum - Miniport - Karachi Office

Gwadar is situated about 60 miles east of the Iranian border in the State of Baluchistan. The Project appears to be well detailed and

service pipes are shown in concrete lined trenches as suggested for Pasni. Oil storage tanks should be individually surrounded with bund walls and floors graded and supplied with pumps for pumping out.

A reception facility at bunkering points should be provided where waste oils and rubbish can be deposited and cleared regularly for disposal inland. There is a possibility that small tankers will dock at this miniport and if this is the case consideration must be given to surrounding ship with a boom when taking on or discharging hydrocarbons.

The dock layout appears to be open plan and it would not be easy to protect it from an oil spill to seaward.

Pakistan Marine Academy, Mairpur Road, Karachi

A purpose built campus covering 136 acres meets the training requirements of IMO in accordance with the STCW Convention for Merchant Navy Officers. It has extensive premises including workshops and residential accommodation. With just 24 students currently being trained this facility is under utilised.

There are no lectures or tuition on oil pollution prevention or control and it is suggested that this subject be added to the curriculum. The IMO/Videotel video series "Response to Marine Oil Spills" which has been provided by IMO to the Ports and Shipping Wing would be of value in any training programme.

At some time in the future if oil pollution courses are to be run in Pakistan this would be an ideal location as practical work on equipment can be carried out on the tidal creek.

Port Qasim Authority, Bin Qasim, Near Karachi

The sea approach to Port Qasim is by the Ahsan Channel which is some 11 nautical miles south east of Karachi. The Port itself is 16 nautical miles up a winding channel, dredged to 12m, and is surrounded by mangrove and mud flats. In the Port area there is also a large steel mill and an electricity generating station.

Two to three bulk ore carriers are unloaded by grab buckets at the ore jetty which is connected to the steel mill by a 4km long conveyor system. The main port handles Government stores and national exports. Plans are in hand to install a container handling depot which should greatly increase the traffic using Port Qasim.

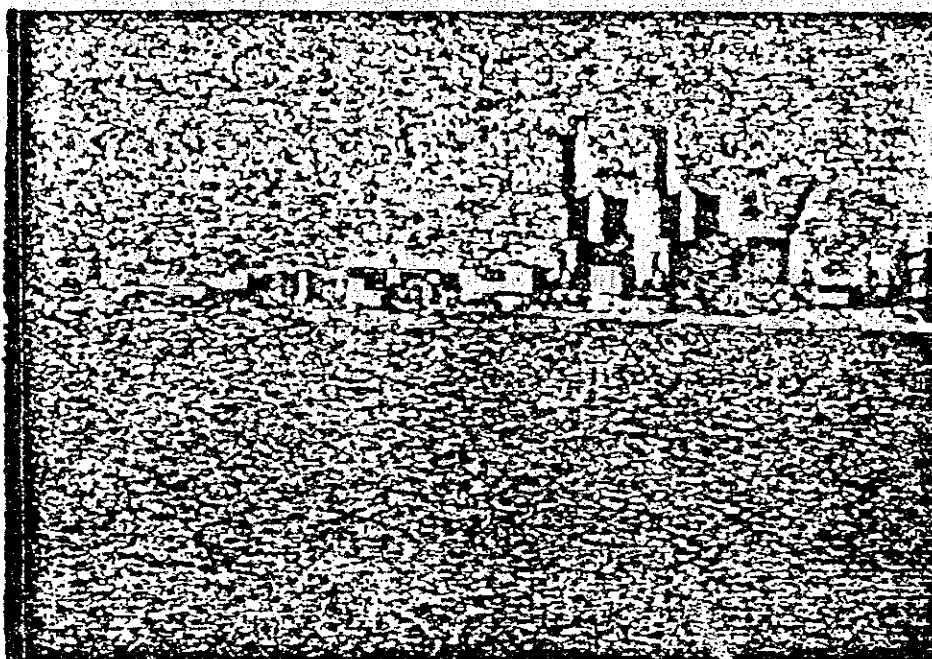
A further planned development is to create an oil terminal at Port Qasim. Initially this will be a single point mooring buoy system with a shore pipeline running along the existing ore conveyor system to serve both steel mill and power station and a distribution depot to fill road tankers.

Currently no tankers visit Port Qasim but occasionally a bunkering barge is called for. The port is served by a small fleet of tug and work boats which have their own jetties. There are no reception facilities for oily water etc.

Maximum tidal range is 3.1m and maximum current at the ore jetty is 3 knots on the ebb at springs.

The Chief Hydrographer and his staff carry out constant survey work to maintain channels and with the aid of an on site laboratory study physical and some environmental aspects of the port and other industrial operations.

The joint cooling water outlet from the steel mill and power station was visually inspected and whilst there was no evidence of any oil being discharged, there were signs of iron ore residuals which coloured the froth and the surrounding mud flats. (It is suggested that an access gate could be built near this outfall). It appears that sewage is being discharged via these cooling waters. Cooling water is taken in by the steel mill and power station further up the creek past the docks. Two separate open channels about 45m wide, of minimum depth 3.2m and approximately 2500m long run up to sluice gates.



Recommendations

A floating or static waste oil and garbage reception facility is provided for use by the small craft in the services float.

The steel mill and power station water intake channels should be permanently protected by placing at least three oil booms across

each channel at about 90m intervals. Simple side piers may have to be built to accommodate the boom ends allowing them to rise and fall with the tide.

When the S.P.M. system is installed sufficient oil containment boom must be on site to surround the oil discharge operation. Boom to be positioned once tanker is anchored and removed to allow departure. It may be possible to arrange for the S.P.M. itself to be more permanently boomed. A floating skimmer and other equipment to be on site in case of spillage.

All onshore oil storage tanks to be properly surrounded with bund walls. Consideration should be given to having all pipeline laid to pigging standards so that products can be batched and freed of water where necessary.

At a later date should it be decided to build a permanent oil terminal an on shore reception facility to receive dirty ballast, tank washings and bilge waters must be included.

The existing service and work boats are quite suitable for deploying oil booms and the two Rotork Seatrucks are ideal platforms from which to operate oil skimmers.

Comment:

The very location of this port means that any oil spill, unless quickly controlled and cleaned up will spread into the mangroves and mud flats, very important ecological areas which are almost impossible to clean of oil. The long term effects of repeated oil contamination would be very serious and dramatically reduce fish and shrimp breeding.

For the above reason the use of oil dispersant chemicals is not recommended unless in extreme cases and only then during the first three hours of an ebb tide on oils which have escaped from the booms. Good agitation of dispersant and oil is essential to create the desired dispersion into the water column.

The on site laboratory is well placed to monitor all sources of pollution and any additional equipment and stores should be provided for this purpose. However the consultant is not qualified to comment on the detailed list compiled, but as far as oil pollution is concerned it should be quite easy with reasonable surveillance to identify the polluter in such a confined operation.

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Aberdeen, AB1 4BG
Scotland

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If external assistance is to be used to its best advantage a line of communication must be established in the early planning stage so that those in authority know how to trigger the level of action required. Some idea of costs involved should be obtained, for it must be realised that sending men and materials by air in an emergency situation is a very expensive exercise. Reciprocal agreements should be investigated.

ANNEX B

PREPARATION OF CLAIMS

5.6 Identification of the polluter

In the case of major oil spills there is usually little difficulty in identifying the source. However, the possibility of legal proceedings being taken under national law against the offending vessel should be borne in mind in all cases of pollution. Samples of spilled oil should be taken immediately, properly labelled and witnessed, and then submitted for analysis, ensuring that a custodial chain can be proved in court. Samples should also be taken (and similarly labelled and witnessed) from oil cargo, bunker tanks and machinery spaces of suspected offenders for comparative analysis with the spilled oil.

5.7 Preparation of claims

5.7.1 When a spill occurs, claims for clean-up costs and damage can be brought against the owner of the ship which caused the oil spill and, if the limit of the owner's liability is exceeded, against the IOPC Fund (if the country where the pollution damage is caused is a member of the IOPC Fund) or CRISTAL (if the cargo owner is a CRISTAL member). Normally an Administration will co-ordinate the submission of the various claims and it is essential that accurate detailed records are kept to support such claims.

5.7.2 Each claim should contain the following particulars:-

- .1 the name and address of the claimant or representative;
- .2 the identity of the ship involved in the incident;
- .3 the date, the place and specific details of the incident, including the type of oil;
- .4 details of the clean-up measures taken, and the kind of pollution damage as well as the places affected;
- .5 the amount of the claim.

5.7.3 Depending on the amount and nature of the claim, it should be broken down into different categories, such as:-

5.7.3.1 *Costs of preventive measures and clean-up operations*

- Summary of events, including a description of the work carried out in different areas and of the working methods chosen in relation to the circumstances prevailing during the incident.
- Delineation of the area affected describing the extent of pollution and identifying those areas most heavily contaminated. This should be presented in the form of a map or chart supported by photographs or video tapes.

- Analytical and/or other evidence linking the oil pollution with the ship involved in the incident (e.g. chemical analysis, wind, tide and current data, observation and plotting of floating oil movement).
- Dates on which work was carried out (weekly or daily costs).
- Labour costs (number and categories of response personnel, regular and overtime rates of pay, days/hours worked).
- Equipment and material costs (types of equipment used, rate of hire, consumable material quantity and cost).
- Transport costs (number and types of vessels, aircraft, vehicles used, number of days/hours operated, rate of hire or operating cost).
- Costs of temporary storage (if applicable) and final disposal of recovered oil and oily material.

5.7.3.1.1 It is essential that comprehensive records are kept detailing all operations and expenditures. Daily work sheets should be compiled by supervisory personnel of the operations in progress, the equipment in use, where and how it is being used, the number of personnel employed, how and where they are deployed and the materials consumed. Recording such information is facilitated by using standard work sheets.

5.7.3.1.2 The foregoing activities usually result in the major expenditures in an oil spill incident which may involve aircraft, vessels, specialized equipment, heavy machinery, trucks and personnel. Some of these resources will be Government owned and others will be the subject of contractual arrangements. To ensure that adequate control of expenditures is kept, it is essential that a financial controller be assigned to the response team.

5.7.3.2 *Replacement and repair costs*

- Extent of pollution damage to property.
- Description of items destroyed, damaged or needing replacement or repairs (e.g. boat, fishing gear, roads and clothing) including its location.
- Cost of repair work or replacement of item.
- Age of item to be replaced.

5.7.3.2.1 With regard to this category, it is likely that numerous claims will be made from the public, and private sector, such as fishermen, pleasure boat owners, marina operators, etc. In this case it may be desirable to arrange through the vessel's insurers to appoint insurance adjusters to whom claimants may be referred. In some incidents a special telephone number and office had been established to process small claims and the public advised through the media that this service is available.

5.7.3.3 *Economic loss*

- Nature of loss, including demonstration that loss resulted directly from the incident;
- Comparative figures for profits earned in previous periods and for the period during which such damage was suffered;
- Comparison with similar areas outside the area affected by the spill;
- Method of assessment of loss.

It should be noted that the IOPC Fund and the voluntary agreements (TOVALOP and CRISTAL) only pay compensation for quantifiable economic loss and do not accept claims for non-economic environmental damage.

5.7.3.3.1 Economic losses can include but are not limited to: restriction of fishing activity, closure of coastal industrial and processing installations, loss of income by resort operators (hotel owners and restaurateurs), etc. In many cases the financial records for previous years may be readily available, although difficulties may arise in distinguishing losses caused by the oil spill from those caused by other unrelated factors such as bad weather or overfishing. When dealing with artisanal fisheries no formal records may be available and some other form of assessment may be required. Also there could be additional indirect expenditures incurred by the local authorities in providing alternate protein sources for the coastal communities affected by the spillage which should be documented.

7.4 The foregoing are the principal categories of claims which are likely to prove acceptable. However, there may be other categories of claims. In all cases the claim should be presented clearly and in sufficient detail so that it is possible to assess the amount of damage suffered on the basis of the facts and the documentation presented. It should be noted that each item of the claim must be supported by an invoice, or other relevant documentation such as daily work sheets and explanatory notes. Reference should be made to the IOPC Fund Claims Manual".

7.5 In cases where the IOPC Fund may become involved, it is very important that the Fund is informed of the incident immediately so that the IOPC Fund will be able to follow closely the clean-up operation and verify damage. This will facilitate the speedy settlement of claims.

3 Oil pollution damage not covered by the intergovernmental compensation regimes

3.1 In respect of oil spills that do not fall under the regime of compensation covered by the Civil Liability Convention and the Fund Convention - i.e. in case

of spills of non-persistent oils, spills from unladen tankers* and spills from ships other than tankers - compensation will have to be sought under applicable national law. States are free to legislate as they consider appropriate as regards such spills. However, a State may be party to the International Convention Relating to the Limitation of the Liability of Owners of Seagoing Ships, Brussels 1957 or the Convention on Limitation of Liability for Maritime Claims, 1976 (LLMC 1976), which contain provisions whereby the shipowners and certain other persons may limit liability. If this is so the State concerned must, of course, in its national law respect the limitations laid down by the applicable convention. It should be noted that the 1976 LLMC CONVENTION does not apply to pollution damage caused by laden tankers within the meaning of the Civil Liability Convention as outlined in paragraph 5.4.

5.8.2 A State may provide in its national law that claims in respect of damage to harbour works, basins and waterways and aids to navigation shall have priority over other claims. Several national Administrations have ruled that oil spills fall under the definition of damage to harbour facilities. However, as regards States Party to the Civil Liability Convention, all claims for pollution damage against the owner of the tanker from which the oil escaped must be given equal priority.

5.9 The role of the P and I Clubs with regard to marine casualties

5.9.1 Protection and Indemnity Associations or P and I Clubs exist to provide shipowners with insurance for liability they may incur to third parties, meaning in this context, anybody other than the insured shipowner. Approximately 85% of all ocean-going ships are entered in Protection and Indemnity Associations. In the case of tankers the figure is closer to 95%.

5.9.2 The risks covered by P and I Clubs are numerous and do include oil pollution liabilities. The intergovernmental regimes and voluntary industry agreements which cover compensation and liability for tankers have been covered under paragraphs 5.4 and 5.5. However, other ships can cause oil pollution from bunker fuel leakage.

5.9.3 In a typical serious casualty, the shipowner is faced with a number of immediate and urgent problems which include the decision as to whether or not to attempt salvage of the ship and cargo or to dispose of either or both as simply as possible, causing the least possible amount of further damage. If oil has been spilled the owner may be required to take immediate action to deal with the ensuing pollution. A P and I Club, through its local correspondent, will provide advice on the shipowner's rights and duties and negotiate on the shipowner's behalf with the appropriate authorities to take fast and effective action to minimize the damage and subsequent liabilities. At a later stage the Club will assist in determining eventual liability for the damage and the extent of the compensation.

* Spills from unladen tankers are covered by TOVALOP.

5.9.4 One important principle is that the shipowner must pay the claim in the first instance and only then claim reimbursement from the P and I Club. As a general rule, the P and I Club will not pay claimants direct. There are exceptions, for example, when the P and I Club has given a letter of undertaking providing a guarantee of payment of the shipowner's liabilities, but in most cases the P and I Club still insists that the principle should be maintained that the shipowner pays first.

ANNEX C

EQUIPMENT PROCUREMENT

Recommended oil pollution control equipment stockpiles at various locations together with current budget prices, excluding delivery costs, in pounds sterling.

Port Qasim

500m Harbour oil containment boom.	35,000
1 x 12 TPH floating mechanical skimmer unit.	14,000
1 x Rope mop type oil skimmer device.	15,000
1 x Harbour dispersant spray system.	4,000
45 x 200ltr drums of dispersant chemical.	<u>9,000</u>
	77,000

Port Qasim Authority

800m Harbour oil containment boom.	56,000
2 x 12 TPH floating mechanical skimmer unit.	28,000
1 x Harbour dispersant spray system.	4,000
45 x 200ltr drums of dispersant chemical.	9,000
1 x 200 tonne dumb barge for collected oil.	
* 300m Water intake defence boom.	<u>21,000</u>
	118,000

* (this item could be purchased by the steel and power plant)

Maritime Security Agency

	<u>£</u>
2 x 400m Offshore oil boom.	65,000
2 x Reel units for above.	20,000
2 x Deep sea oil dispersant spray unit.	12,000
120 x 200ltr drums of dispersant chemical.	24,000
1 x Sea Skimmer 50 unit.	35,000
1 x 12 TPH floating mechanical skimmer.	14,000
2 x 100T Floating oil storage tanks.	<u>75,000</u>
	245,000

Gwadur Fish Harbour

300m Harbour oil containment boom.	21,000
1 x 12 TPH floating harbour skimmer unit.	<u>7,000</u>
	28,000

Pasni Fish Harbour

300m Harbour oil containment boom.	21,000
1 x 12 TPH floating harbour skimmer unit.	<u>7,000</u>
	28,000

Grand Total **£496,000**

Comment:

The purchase of harbour boom represents £154,000 of the total and it is considered that this boom could be manufactured in Pakistan, and suggest contact is made with: Skimmex Oil Pollution Control Ltd, 270 Earls Court Road, London SW5 9AS who are prepared to licence the manufacture of their Sigmoidal Boom. Made out of second hand materials such as conveyor belting, car tyres filled with foam and chain, this boom is ideal for fabrication in Pakistan.

Cost to Pakistan would be £2,000 lump sum plus 7.5% of on site costs as royalty. In addition the cost of sending an expert to teach and supervise the initial manufacture for say 10 days. Estimate £3,000. Following this initial outlay only the 7.5% royalty on costs would represent foreign exchange for any amount of boom.

I also consider that oil dispersant spray systems can be manufactured in Pakistan at certainly half the sterling budgeted price.

Offshore boom, dispersants and skimmers should be purchased from abroad.

Equipment Suppliers

The following companies manufacture oil spill response equipment in the various categories:

Offshore Booms

VIKOMA International Limited
88, Place Road
Cowes
Isle of Wight, PO31 7AE
United Kingdom

Hoyle Marine Limited
Hoyle Buildings
Alfred Road
Merseyside, L44 7HY
United Kingdom

Moldip SPA
Via Milano 8
20038 Seregno (MC)
Italy

Skimmers

VIKOMA International Limited
88, Place Road
Cowes
Isle of Wright, PO31 7AE
United Kingdom

Hoyle Marine Limited
Hoyle Buildings
Alfred Road
Merseyside, L44 7HY
United Kingdom

Alba OPD Limited
Unit 58 Sherwood Road
Aston Fields
Bromsgrove, Worcs
United Kingdom

O.M.I. Limited
Cannon Bridge Works
Cannon Lane
Tonbridge
Kent, TN9 1PP
United Kingdom

Dispersant Chemical- (WSL approved)

Dasic International Limited
Winchester Road
Romsey
Hampshire, SO5 8YD
United Kingdom

Perolin Marine Limited
3 High Street
Rickmansworth
Hertfordshire, WD3 1SW

Youngs International Marketing Limited
Drumshoreland Road
Pampherston
Livingstone
West Lothian, EH53 0LQ
Scotland

Radio telephone equipment must be budgeted for but as this will probably be shared between MPCC and Search and Rescue, The level of commitment is left to the establishing Department.

Established suppliers are already in Pakistan.

In addition to initial equipment purchases approximately 10% should be added for spares. Other items to be budgeted for are training courses, educational books and maintenance programmes. On going costs are the replacement of consumables, practical exercises and general overheads.

ANNEX D

OIL POLLUTION COURSES

List of oil pollution related courses available in U.K., details from the following addresses:-

Warren Spring Laboratory/Institute of Petroleum
Gunnels Wood Road
Stevenage
Hertfordshire, SG1 2BX
United Kingdom

BP International Limited
Oil Spill Response Base
Northam
Southampton, SO1 1QE
United Kingdom

Ministry of Defence
Department of Marine Services (Naval)
Block 'E'
Foxhill
Bath, BA1 5AB
United Kingdom

* ALBA International Limited
Unit 4
Harness Road
Altens
Aberdeen, AB1 4LE
Scotland

* This company can conduct on site training programmes tailored to local requirements.

Vikoma International Limited
88 Place Road
Cowes
Isle of Wight, PO31 7AE
United Kingdom

ANNEX E

BOOKS OF REFERENCE

The following organisations publish a wide variety of books useful to anybody attempting to increase their knowledge and understanding of oil pollution and its control. The list consists of sources which produce unbiased articles at very reasonable cost or sometimes at no charge.

The Oil Companies International Study Group for Conservation of Clean Air and Water - known as "CONCAWE".

c/o Babylon - Kantoren A
30-9 Koningin Julianaplein
2595 AA Den Haag
Netherlands.

(Report 9/80 - "Disposal Techniques for Spilt Oil" will be of particular interest).

International Maritime Organisation
Publication Section
4 Albert Embankment
London SE1 7SR
U.K.

(1987 Catalogue already left with Ports and Shipping Wing and the
Maritime Security Agency)

Her Majesty's Stationery Office
49 High Holborn
London, WC1V 6HB
England

International Tanker Owners Pollution Federation Limited
Staple Hall
Stonehouse Court
87/90 Houndsditch
London, EC3A 7AX
England

* Warren Springs Laboratory
Department of Industry
Gunnels Wood Road
Stevenage
Hertfordshire, SG1 2BX
England

* List of Warren Springs Laboratory oil pollution reports attached.

There are also many commercial publications on oil pollution - far too
many to mention.

WARREN SPRING LABORATORY
Oil Pollution Reports

Feb .

LR SERIES

<u>NO.</u>	<u>TITLE</u>	<u>PRICE</u>
LR 257	Feasibility Study of Aerial Application of Oil Dispersant Concentrates for Oil Spill Clearance 1977.	£10.00
LR 262	Investigation into the Amount of Residue Remaining on Board a Chemical Tanker after Cargo Discharge and Subsequent Tank Washing Procedures 1977	£10.00
LR 272	Investigation of Factors Affecting the Fate of North Sea Oils Discharged at Sea. Part 2: The Ekofisk Blow-out April-May 1977/78.	£10.00
LR 273	Investigation of Factors Affecting the Fate of North Sea Oils Discharged at Sea. Part 1: Ekofisk Crude Oil July 1975-February 1978.	£10.00
LR 292	Report on ORI Oil Recovery Equipment, the Barracuda and Piranna Machines Manufactured by Oil Recovery International, Christchurch, Dorset 1978.	£10.00
LR 294	Clearance of Oil from Water Surfaces: The Oil Mop Recovery Device 1978.	£10.00
R 295	Evaluation Trials on Equipment Manufactured by OMI Ltd., Tonbridge, Kent. The Oil Mop Mark II - 9DP 1978.	£10.00
R 313	Investigation of the Effects of Oil Viscosity and Water-in-Oil Emulsion Formation on Dispersant Efficiency 1979.	£10.00
R 314	Requirements for Remote Sensing of Oil on the Sea.	£10.00
R 315	Evaluation of Infra-Red Line Scan (IRLS) & Slide Looking Airborne Radar (SLAR) Over Controlled Oil Spills in the North Sea.	£10.00
t 318	Criteria for the Selection of Oil Spill Containment and Recovery Equipment for Use at Sea.	£10.00

LR 323	An Interim Report of the Cargo Discharge and Tank Cleaning Experiments Carried out on the Chemical Tanker MV ANCO ENDEAVOUR November-December 1978, 1979.	£10.00
LR 327	Dispersant Gels for Treating Surfaces Contaminated with Residue Oils.	£10.00
LR 328	Oil Mop Device for Recovery of Oil on the Open Sea 1979.	£10.00
LR 340	Komara Mini Skimmer: An Assessment of Performance.	£10.00
LR 346	Residue Assessment Trials on Coastal Chemical Tankers.	£10.00
LR 351	Observations on the Aerial Application of Dispersants Using DC-68 Aircraft, Gulf of Campeche, Mexico.	£10.00
LR 353	A Review of the IMCO Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances from Ships.	£10.00
LR 362	Observations from a Helicopter of Insoluble Substances Discharged into a Ship's Wake.	£10.00
LR 363	Factors Affecting the Efficiency of Dispersants.	£10.00
LR 364	The Droplet Size Distribution of Oils Emulsified in Sea Water by Concentrate Dispersants.	£10.00
LR 365	Investigation of the Demulsification of Water-in-Oil Emulsions formed when Crude Oil or Fuel Oil is Spilt on the Sea.	£10.00
LR 366	An Assessment of the Model 6V Oil Skimmer Supplied by Engineering and General Equipment Ltd.	£10.00
LR 369	Studies on the Use of Helicopters for Oil Spill Clearance.	£10.00
LR 385	Further Aspects of the IMCO Standards for Procedures and Arrangements for the Discharge of Noxious Liquid Substances from Ships.	£10.00

LR 390	The Fate of Controlled Oil Spills at Sea.	£10.00
LR 391	The Use of Laboratory Wave Tank to Assess Oil Spill Dispersants.	£10.00
LR 407	Dispersant Spraying Equipment: The Rotortech TC-3 Underslung Spray Bucket.	£10.00
LR 418	Use of an Infra-red Line Scanner and a Side-Looking Airborne RADAR to Detect Oil Discharges from Ships (ISOWAKE EXPERIMENTS).	£10.00
LR 433	An Assessment of the Shark 5000 Heavy Oil Recovery Unit.	£10.00
	Oil Spill Clean-up of the Coastline Technical Manual.	£ 5.00
LR 443	Assessment of the MacKay Apparatus for Testing Oil Spill Dispersants.	£10.00
LR 448	A Specification for Oil Spill Dispersants.	£10.00
LR 453	The West Netting System for Inshore and Beach Protection Use.	£15.00
LR 455	Aerial Photographs and IRLS Imagery from North Sea Dispersant Trial.	£15.00
LR 463	Evaluation of Oil Spill Dispersant Concentrates for Beach Cleaning.	£10.00
LR 472	An Assessment of the RP300 Beach Cleaner.	£10.00
LR 482	Beach Cleaning Trials: Fendine Sands 1983.	£10.00
LR 490	The Warren Spring Beach Material Washer	£10.00
LR 492	Shipboard Spraying Equipment for Undiluted Dispersant Concentrates.	£12.00
LR 505	Use of Airborne Microwave Radiometry for the Detection and Investigation of Oil Slicks at Sea.	£20.00

LR 507	Evaluation of Oil Spill Dispersant Concentrates for Beach Cleaning Trials.	£10.00
LR 527	Beach Cleaning Trials: Cefn Sidan 1984	£12.00
LR 552	The Use of Flow-Through Techniques to Determine Sub-Surface Concentrations of Oil.	£15.00
LR 554	Trials with Net Booms for Corralling and Recovering Viscous Oils at Sea	£15.00
LR 591	Beach Cleaning Trials: Pendine Sands 1986	£20.00
LR 598	Fate of Crude Oil at Sea and the Natural Dispersion of Crude Oils and Water-in-Oil Emulsions: Results of Experiments using a Laboratory Test Tank and Free-Floating Rings at Sea	£15.00
LR 609	Methods for Predicting the Physical Changes in Oil Spilt at Sea	£15.00
LR 624	Evaluation of Oil Spill Dispersant Concentrates for Beach Cleaning - 1987 Trials	£20.00

ANNEX F

CONCLUSIONS AND RECOMMENDATIONS

All Government and private organizations with responsibilities for, or working within the marine and maritime field, should be directed to report any oil spillage or high risk of spillage, to the MPCC as soon as possible.

All industrial concerns which have sea water intakes should be encouraged to install and maintain oil defence booms to stop the ingress of floating oil into their system which would seriously foul their engineering plant.

A minimum of three booms to each channel will be required so that the necessary periodical maintenance can be carried out on one individual boom at a time. Marine growth must be removed or the booms lose their buoyancy and efficiency. Recommendations on equipment procurement are attached as Annex C.

A "Notification" should be raised to allow the right of inspection of operations likely to pollute the marine environment, to be carried out by MPCC.

The establishment of a Marine Pollution Control Centre in conjunction with Search and Rescue at Sea is a commendable idea.

Legislation is enacted to impose fines on polluters; however, until proper alternatives are available for the correct disposal of oily wastes, prosecutions will not be effective. Maximum fine limits should be increased with provision for charging the offender with the appropriate clean-up costs.

Karachi Port Trust and Port Qasim Authority should conduct random inspections of their Port activities and prosecute all offenders and charge for clean-up if practical.

It is recognised that there is an identified need for training and provision of reference material and information on available courses and reference sources is found at Annex D and E.

It is understood that the International Maritime Organization has offered to conduct in Pakistan a national seminar on Marine Pollution Prevention Control and Response under the IMO/SIDA Programme for the Protection of the Marine Environment, and the authorities should avail themselves of this opportunity. Such a seminar would serve to bring together all concerned agencies and provide a forum for discussion of problem areas. One of the outputs of such a seminar is a series of recommendations to the Government for further activities such as fellowships for training courses.

A number of problems have been identified in the oil terminals and it is recommended that the petroleum industry should follow the guidelines provided in the International Chamber of Shipping/Oil Companies International Marine Forum/International Association of Ports and Harbours publication "International Safety Guide for Oil Tankers and Terminals (2nd edition) 1984 (ISGOTT).

Action be taken on the numerous recommendations contained in this report in respect of specific sites, operations and activities witnessed in the course of the current mission.

Karachi Fish Harbour - A new bunkering point should be situated near to the entrance with a reception facility provided where all waste oils and contaminated materials can be received. A local contractor should be appointed to clear the reception tank for the correct and safe disposal of the waste. The bunkering point must be maintained to a high standard with hoses regularly inspected and tested. Drip trays for the hoses must be provided. Garbage skips should be placed at convenient locations with arrangements made for regular collection and disposal.

Pakistan Refinery Limited - Immediate action is required to remove and replenish the straw baskets and to overhaul the working parts of the API type separator and thereafter maintain a higher standard of ongoing maintenance. A new API separator should be constructed with about four times the existing surface area to be in line with the current requirements for oily water separation. Dust and sand being blown into the open separator pits helps to create sludge and this could be countered by providing light sectionalised lids over the pits.

Existing and Proposed Fish Harbour - Korangi Creek Area - Existing fish ports should be provided with facilities to deposit waste oils and garbage for correct and safe disposal. All new fish harbours must have similar facilities included at the design stage.

Karachi Shipyard and Engineering Works Limited - The shipyard should provide a complete reception facility for waste oils, contaminated water and garbage. This could be a fixed installation and or a converted barge for use by all visiting ships.

1 - Gadani Shipbreaking Beach - The statement that ships are gas free
2 - before cutting is commenced should be investigated more deeply
3 - because the falsification of this state could lead to a very
4 - serious accident. More oil could be removed before cutting starts
5 - by the use of more efficient pumps such as double diaphragm,
positive displacement or submersible pumps which are all available
from the ships themselves. Sludge which is removed manually must
be transferred to the shore in drums or tipped into a barge
alongside instead of being thrown into the sea. When breaking
tankers a boom could be placed across its stern and the next ship
each side so that oil spilt would be trapped between the hulls,
then either skimmed with floating equipment or beached for manually
lifting into drums. This would not be practicable in the Monsoon
Season (or even necessary). Sludge and oil should be collected and
incinerated when tanker sections are set alight to rid them of
residual oils before further cutting.

Pakistan State Oil Co. Ltd. - Keamari - A small store of anti oil
pollution equipment should be held in readiness for minor oil spills
with personnel trained in its efficient use. Future or replacement
pipelines should be laid in a form to allow pigging to obviate the
necessity of water flushing. All areas inside bund walls should be
graded to a sump to facilitate pumping out in the event of a
spillage. These comments should apply to all similar tank farms in
the Keamari area and at other locations.

Karachi Port Trust - The trust should provide reception facilities
to deal with oily wastes, oily water and garbage from all visiting
ships. Issue instructions to companies with pipes which are no
longer in use, that these should be removed from jetties and
bridges within one month or they will be removed by others and
costs charged to the owner. All the remaining pipes to be
supported properly, allowing for expansion and contraction, and
labelled at each end with owners name, products pumped, maximum

working pressure, size and emergency telephone contact. All flange connections must be completely bolted. All anti-static and earthing strips to be connected and checked for continuity. All flexible hoses used in loading or discharge should be tested at least annually and a log maintained. Look into fitting hoses with safety shut off (breakaway) couplings. These are available but can be expensive, budget £5,500 for a 6" NB fitting. When new balanced swing arm assemblies are installed they should be complete with automatic emergency shut off valves. New pipelines should be to piggable standard. Fit oil discharge and receiving jetties with floating oil containment boom. Permanent between piers and temporary around each ship during pumping operations. Have on standby floating oil skimmers to retrieve any spilled oil. Provide means of communication between oil berths and shore station. [This may be already covered by radio during actual operations but a telephone should always be available for the emergency. Provide a floating reception facility for use of any visiting ship.] This barge could receive garbage and double up as an oil collection skimming vessel in case of a spill. More than one may be required. Provide reception facilities in the fish harbour where garbage and waste oils etc. can be deposited by boat crews. Provide and maintain drip trays on jetty installations. Display hazard warning notices. Increase security on jetties. The use of spade flanges must be banned and properly sealing valves used. Every time a spade flange is used there is spillage of product.

The Keamari Marketing Companies Trench is an area which requires immediate attention and the following points must be considered. The trench should be drained by use of suction tankers and the bottom graded into concrete sumps at say every 100m. Any future spillage will drain to sumps for easy removal. All outlets from the trench itself should be blocked and all emptying controlled by pumping into tankers. A strong fence should be erected along full length of trench, with access points at each sump location. Owners name and emergency contact painted on each line at sump points.

Pasni Fisheries Harbour - That reception facilities in the form of a steel tank and compound be provided alongside the fuelling point so that waste oils and garbage can be deposited for controlled collection and disposal. The pipelines from the three storage tanks should be laid in a covered sectional duct which could also carry other services such as water, electrics, telephone and drainage. The tanks to be provided by a fuel marketing company will be individually surrounded by bund walls and with graded floors to sumps for pumping out. The mouth of the port should be protected by having an oil defence boom ready to place across the entrance from breakwater to breakwater.

Pakistan Naval Dockyard - Karachi - That two oil reception barges are provided by converting existing dump barges. Two 200T and two unused ammunition barges of about 250T capacity would be ideal for modification. One small and a large unit could service most of the naval ships and the modifications be carried out in the Dockyard from the basic design left with the engineering officer. Once these barges are available more stringent control of harbour discharge can be enforced. All hoses used to load or discharge petroleum products should be checked regularly and subject to test at least once a year. That the naval dockyard should have its own central sewage treatment plant, there is room for one and certainly this is a requirement if water quality is to be improved.

Gwadur Fish Harbour - A reception facility at bunkering points must be provided where waste oils and garbage should be deposited and cleared regularly for correct disposal inland. When a tanker visits the port to discharge petroleum products, the ship should be surrounded with an oil containment boom during pumping operations.

Pakistan Marine Academy - Lectures on oil pollution prevention and control should be introduced into the curriculum and use be made of the IMO/Videotel video series "Response to Marine Oil Spills".

Port Qasim Authority - A floating or static waste oil and garbage reception facility is provided for use by the small craft in the services fleet. The steel mill and power station water intake channels should be permanently protected by placing at least three oil booms across each channel at about 90m intervals. Simple side piers may have to be built to accommodate the boom ends allowing them to rise and fall with the tide. When the S.P.M. system is installed sufficient oil containment boom must be on site to surround the oil discharge operation. Boom to be positioned once tanker is anchored and removed to allow departure. It may be possible to arrange for the S.P.M. itself to be more permanently boomed. A floating skimmer and other equipment to be on site in case of spillage. All onshore oil storage tanks to be properly surrounded with bund walls. Consideration should be given to having all pipeline laid to pigging standards so that products can be batched and freed of water where necessary. At a later date should it be decided to build a permanent oil terminal an on shore reception facility to receive dirty ballast, tank washings and bilge waters must be included.

There exists a genuine desire to tackle the problems of oil pollution and it is hoped that this mission will stimulate the most important initial steps.